SOUTH HILLS STUDY

Resolution No. 2295

Adopting the

South Hills Study

RESOLUTION NO. 2295

RECITALS:

On June 26, 1972 the Common Council of the City of Eugene adopted Resolution No. 2070 designating the south hills area of the city as an area of special study.

In July, 1972 the Mayor appointed the Joint Parks Committee to develop the study of the south hills area.

The Joint Parks Committee submitted the preliminary draft of the South Hills Study to the City Council on January 2, 1974, in accordance with the time period specified in Resolution No. 2070.

The Joint Parks Committee conducted two public hearings on the preliminary draft of the South Hills Study during January, 1974, and prepared a final report incorporating modifications to the original recommendations based upon public testimony presented. That report was submitted to the Eugene Planning Commission on March 14, 1974.

The Eugene Planning Commission conducted a public hearing on the preliminary draft of the South Hills Study in February, 1974, and a second public hearing on the final report of the Joint Parks Committee in April, 1974. Following the second public hearing, The Eugene Planning Commission formally recommended adoption of the South Hills Study as modified by the final report of the Joint Parks Committee.

The Common Council of the City of Eugene has conducted a public Hearing on the South Hills Study as recommended for adoption by the Eugene Planning Commission and has considered the recommendation of the Planning Commission and Joint Parks Committee and the testimony presented.

NOW, THEREFORE,

BE IT RESOLVED BY THE COMMON COUNCIL OF THE CITY OF EUGENE, OREGON, as follows:

That the Purpose Statements and Recommendations set forth in Exhibit A are adopted as policy statements and as a refinement of the Eugene-Springfield Metropolitan Area 1990 General Plan for the south hills area and are to be used in making land-use and other decisions in that area.

That the supporting text, maps and diagrams set forth in the preliminary draft of the South Hills Study (attached as Exhibit B) and the Official Report of the Eugene Planning Commission (attached as Exhibit C) are adopted as findings.

That the policies adopted by this Resolution are applicable to that area identified in the study as being south of 18th Avenue, above an elevation of 500 feet.

That the Joint Parks Committee be directed to begin immediately an analysis of the costs involved in acquisition of property in the south hills area and a study of the methods and sources of funding available.

That the staff be directed to develop any ordinances necessary to implement the recommendations of the South Hills Study for further consideration by the Planning Commission and Common Council.

That the provisions of Resolution No. 2070 and Resolution No. 2248 pertaining to density limitations and requirement of planned unit development procedures are superseded by the provisions of this Resolution.

That this Resolution shall become effective immediately. The foregoing Resolution adopted this 10th day of June, 1974.

/s/S.P. Flogstad
City Recorder

Exhibit A

SOUTH HILLS STUDY

Purpose Statements and Recommendations

RIDGELINE PARK

Purpose

The south hills constitute a unique and irreplaceable community asset. The strong dominant landforms and wooded character present there combine to provide distinct areas of contrast in terms of texture and color from the normal pattern of urban development. By virtue of this contrast, the south hills function as a strong visual boundary or edge for the city. The ridgeline of the south hills also marks the most southerly extension of the urban service area. Further, there are areas within the south hills that are especially suitable for park sites for recreational use by present and anticipated population. In view of these factors, any areas recommended for preservation or park usage should serve at least one of the following purposes:

1. To insure preservation of those areas most visibly a part of the entire community;

2. To protect areas of high biological value in order to provide for the continued health of native wildlife and vegetation;

3. To insure provision of recreational areas in close proximity to major concentrations of population;

4. To provide connective trails between major recreational areas;

5. To provide connective passageways for wildlife between important biological preserves;

6. To contribute to Eugene's evergreen forest edge; and

7. To provide an open space area as a buffer between the intensive level of urban development occurring within the urban service area and the rural level of development occurring outside the urban service area.

It is the legislative intent of the City Council that the recommendations of the Ridgeline Park Section of the South Hills Study be achieved through clearly constitutional means.

Specific Recommendations

That all vacant property above an elevation of 901' be preserved from an intensive level of development, subject to the following exceptions:

1. Development of individual residences on existing lots; and

2. Development under planned unit development procedures when it can be demonstrated that a proposed development is consistent with the purposes of this section.

That the area specified for preservation be protected through a variety of techniques including but not limited to acquisition, scenic easements, density transfers, and dedication.

That the Joint Parks Committee be instructed to prepare refined cost estimates and an analysis of funding sources for submission to the City Council.

That the City pursue acquisition of major active-use park facilities to serve existing and potential population in the following areas:

1. Adjacent to the EWEB reservoir off North Shasta Loop;

2. Property south of the present Amazon linkage system, south of Center Way and east of the Fox Hollow elementary school;

3. Property adjacent to the Crest Drive elementary school; and

4. Property adjacent to the EWEB reservoir located south of 25th Avenue and west of Hawkins Heights.

That the city insure the potential for further active-use parks to serve anticipated population in the areas south of Warren Avenue, east of the present Spencer Butte Park and adjacent to Blanton Heights Road.

That all proposed developments in the south hills area be reviewed to determine if connecting linkages are possible between various park sites, particularly north of Skyline Park to Hendricks Park and between Blanton Heights and Hawkins Heights.

That the city should adopt an ordinance concerning the removal of vegetation.

DENSITY

Purpose

The density recommendations contained in the South Hills Study are intended to serve the following purposes:

1. To remain within the broad guidelines of the 1990 General Plan of:

   a. Insuring utilization of vacant property already served with public facilities; and

   b. More precisely defining the broad density range set forth in that Plan.

2. To insure adequate provision for development to accommodate anticipated growth; and

3. To achieve a balance between the level of development and the provision of public services.

Specific Recommendations

That in the area west of Friendly Street the maximum level of new development per gross acre be limited to 8 units per acre (the maximum figure of 8 units per gross acre being subject to positive findings under the planned unit development criteria).

That in the area east of Friendly Street the maximum level of new development per gross acre be limited to 5 units per acre (the maximum figure of 5 dwelling units per gross acre being subject to positive findings under the planned unit development criteria).

That low-moderate income housing developed under the Controlled Income and Rent provisions of the City Code be exempt from the density standards set forth above, but subject to normal specific site analysis standards.

That if a significant volume of low-moderate income housing should develop, the effect on total density should be evaluated and allowable densities of future developments adjusted.

URBAN SERVICE AREA DEFINITION

Purpose

It is the purpose of the recommendations concerning the urban service area to:

1. Provide a more precise definition of the urban service area concept as set forth in the 1990 General Plan for the south hills area of the city;

2. Provide more adequate criteria for the evaluation of annexation requests;

3. Insure that annexation serves a public purpose as well as a private purpose; and

4. Insure preservation of the primary residential character of the south hills.

Specific Recommendations

That the ridgeline identified in the South Hills Study defines the potential extension of the urban service area.

That future annexation requests within the potential urban service area be evaluated upon the following bases:

1. The ability of the community to provide public services for the potential development in an economic and efficient manner (and other factors normally considered in evaluation of annexations); and

2. The previous maintenance of the property as a desirable residential environment (Note: if the city adopts an ordinance governing vegetation removal, the standards set forth in that ordinance could provide the basis for evaluating previous maintenance of the property).

That property which can only be provided sewer service by contouring not be included in the definition of the potential urban service area.

DEVELOPMENT STANDARDS

Purpose

The development standards recommended as part of the South Hills Study are intended to achieve the following purposes:

1. To insure the responsiveness of specific developments to the aggregate of known natural factors;

2. To insure maximum preservation of the natural character of the south hills; and

3. To insure adequate review of the public consequences of development in the south hills.

Specific Recommendations

That all major developments (developments in excess of minor partitions) occurring on property above an elevation of 701' shall be reviewed by the Planning Director to determine if standard subdivision procedures, site review procedures, or planned unit development procedures should be required. In reaching a determination, the Planning Director shall evaluate the following factors: (a) the potential for surface movement; (b) the view potential of the property; (c) the nature of existing vegetation; (d) the nature of surrounding development; and (e) the nature of the development proposal. The decision of the Planning Director shall be appealable to the Planning Commission and thence to the City Council.

That planned unit development procedures be required for development of any parcel over 4 acres in size, characterized by a slope in excess of 20% in the area between 500' and 701' in elevation.

That planned unit development procedures shall be utilized for the following purposes:

1. To encourage clustering of development in areas characterized by:

   a. Shallowest slopes;

   b. Lowest elevations;

   c. Least amount of vegetation;

   d. Least amount of visual impact.

2. To encourage preservation as open space those areas characterized by:

   a. Intermediate and steep slopes;

   b. Higher elevations;

   c. Significant amounts of vegetation;

   d. Significant visual impact.

That adequate review of both on-site and off-site impact of any development by a qualified engineering geologist occur under any of the following conditions:

1. All formations
   Soil depth of 40 inches and above
   Slopes of 30 percent and above

2. Basalt flows
   Soil depth of 40 inches and above
   Slopes of 20 percent to 30 percent

3. Eugene Formation
   Soil depth of 40 inches and above
   Slopes of 20 percent to 30 percent

4. Basalt flows
   Soil depth of 20 to 40 inches
   Slopes of 30 percent and above

5. Eugene Formation
   Soil depth of 20 inches to 40 inches
   Slopes of 30 percent and above

That developments be reviewed to encourage clustering of open space elements of different developments in order to preserve the maximum amount of continuous open space.

That developments be reviewed in terms of scale, bulk and height to insure that development blends with rather than dominates the natural characteristics of the south hills area.

That all proposed road locations be reviewed to insure minimum grade disturbance and minimum cut-and-fill activity, particularly in those areas most visible due to slope, topographic or other conditions.

That planned unit development review shall be based upon a recognition of both public and private interest. In areas of significant conflict (e.g., locating development in a highly visible area as opposed to a less visible area or in an area of significant vegetation as opposed to a relatively open area) which could be resolved through use of an alternative development plan, primacy shall be given to the public interest in any determinations.

That all developments shall be reviewed for potential linkage with or to the ridgeline park system.

That all developments (planned unit developments or subdivisions) be reviewed to insure maximum preservation of existing vegetation.

Joint Parks Committee

Final Report

South Hills Study

March 14, 1974

REPORT

TO: The Eugene Planning Commission

FROM: Joint Parks Committee

SUBJECT: South Hills Study - Final Joint Parks Committee Report

In accordance with the directive set forth in Resolution No. 2070, the Joint Parks Committee submitted the preliminary draft of the South Hills Study to the Eugene City Council on January 2, 1974. Since that time the Joint Parks Committee has conducted two public hearings on the preliminary draft of the study: the first at Spencer Butte Junior High on January 17, 1974, and the second at Crest Elementary School on January 22, 1974. Members of the Joint Parks Committee also attended the first Planning Commission hearing on the South Hills Study conducted on February 12, 1974.

Extensive testimony and written comment was submitted during the three hearings conducted on the South Hills Study. The Joint Parks Committee has reviewed that material and the following report indicates those portions of the preliminary report which should either be clarified, amplified or modified in light of the testimony presented. This report constitutes the final report of the Joint Parks Committee to the Planning Commission concerning the South Hills Study.

General Purposes of the Study

A number of the oral and written comments submitted indicated questions concerning the purpose of the South Hills Study. Specifically, these comments indicated a belief that the study should have produced a definitive "master plan" which delineated exact type and level of usage for specific properties or that the study should have resulted in a definitive major transportation network plan.

In contrast to this conception of the study, the Joint Parks Committee viewed the purposes of the South Hills Study as:

1. To respond to the specific directives of the City Council as set forth in Resolution No. 2070 and the discussion of that resolution when the study was authorized; and

2. To provide data, analytical techniques and recommended policies upon which subsequent decisions could be based that would achieve a balance between the goal of utilizing the hillside areas for development and the goal of preserving the hillside areas in their natural state.

It was recognized from the outset that a definitive master plan approach of the type suggested was impossible due both to the need for additional information in specific circumstances (e.g., specific site analysis) and the relationship between this study and other studies presently in progress (e.g., the E-SATS update). Further, it was the position of the Joint Parks Committee that the study should provide the basis for decisions which could respond to changing conditions or circumstances rather than attempting to make such decisions in advance.

A number of questions have also been raised concerning the relationship between the South Hills Study, the 1990 General Plan and studies for other areas of the city. The South Hills Study is a refinement study of the 1990 General Plan dealing in greater detail and specificity with a portion of the area involved in the General Plan. This process will be followed in other areas of the city and has, in fact, begun already with the Bethel-Danebo study.

Specific Recommendations

The bulk of the public testimony concerning the South Hills Study to date has dealt with the specific recommendations set forth in the preliminary report. Therefore, this report is structured to correspond to those original recommendations and includes both an analysis and modifications recommended in light of the public testimony.

A. Ridgeline Park

The preliminary draft of the study made certain recommendations concerning acquisition of park area and areas to be preserved from an intensive level of development under the concept of a ridgeline park. The Joint Parks Committee would stress the fact that the areas recommended for preservation were intended to serve a variety of purposes, including the following:

1. To preserve areas of high visual significance for the community;

2. To provide active-use recreational areas in close proximity to major concentrations of population;

3. To provide an open space area along the margin of the urban service area as a buffer between the intensive level of urban development and the rural level of development;

4. To provide a connective trail system through the south hills area linking major recreational areas; and

5. To protect areas of high ecological value.

All of the purposes cited above were listed in the preliminary draft of the South Hills Study with the exception of the buffer along the margin of the urban service area. Subsequent review by the Committee has indicated the importance of this purpose and the Committee would recommend that it be included in the purpose section specifically.

There has been considerable testimony presented to the effect that there are areas other than those recommended for preservation which are important from a visual or other standpoint. The Joint Parks Committee acknowledges the legitimacy of this testimony but would note that the recommendations for preservation of certain areas were intended only to identify those areas considered most significant. The purpose of recommending that planned unit development procedures be required through extensive portions of the south hills area was to insure that developments be reviewed to insure preservation of sensitive areas. It was further intended that developments be reviewed to insure continuity between those areas preserved through some form of acquisition and those areas suitable for development.

Under the concept of the ridgeline park, the first recommendations set forth in the preliminary draft of the study was that the area above an elevation of 901 feet be preserved from development. That recommendation was based upon a number of considerations:

1. Through the visual analysis developed in the study, that area was identified as having the most significance for the entire community.

2. Due to the nature of the topography in the south hills area, there was a close correspondence between elevation and the ridgeline which marked the boundary of the urban service area and preservation of the area above 901 feet would provide a buffer averaging several hundred feet along significant portions of the urban service area.

3. There were limited areas above the 901 foot elevation which would be suitable for active-use recreational facilities, particularly in the southwest portion of the city to serve anticipated population. In this respect, it should be noted that the areas above 901 feet suitable for this purpose are somewhat limited. 52% of the area above 901 feet to the ridgeline is characterized by slopes in excess of 20% while only 15% of the same area is characterized by slopes in the range of 1 - 12%.

4. Preservation of the area above 901 feet would provide the basis for a connecting trail system throughout significant portions of the south hills area.

The recommendation concerning preservation of the area above 901 feet has been one of the most extensively debated recommendations of the study to

date. Much of the testimony presented concerning this recommendation has been based only upon the visual significance of the area, whereas all of the purposes previously cited must be utilized in evaluating the recommendation.

The testimony presented to date concerning this recommendation has been to the effect that the recommendation is arbitrary, that it removes too much property from development which will otherwise have to occur on farmland, and that the recommendation should have been based upon slope characteristics (slopes in excess of 30%) rather than topography. It has also been noted that the recommendation is inadequate to insure visual protection since there is property below 901 feet which is equally important visually, that the recommendation will result in a solid line of building immediately below the 901 foot elevation mark, and that there are areas above 901 feet which are developable but still not visually prominent.

With respect to the testimony presented to date concerning this recommendation, the Joint Parks Committee would submit the following evaluation:

1. The recommendation is characterized by a degree of arbitrariness but any precisely defined recommendation could also be considered arbitrary. Whether or not the degree of arbitrariness is acceptable depends upon the reasonableness and the bases for the recommendation.

2. The recommendation does remove some property from potential development, although that impact is mitigated by the provision for density transfer. The impact of the recommendation is further mitigated by the land use inventory which indicates that there is more than adequate area in the south hills to accommodate a significant portion of the anticipated population growth for this area.

3. The argument that the recommendation automatically forces development onto farmlands is fallacious since it assumes that: (a) the south hills represent an inexhaustible reservoir of developable land which would otherwise accommodate future growth; and (b) it assumes that the urban service area concept will be ineffective in insuring preservation of prime agricultural land in other areas. Further, the statement ignores both the information from the land use inventory concerning the amount of developable land in the south hills unaffected by the recommendation and it ignores the provision in the 1990 General Plan for expansion of the present urban service area in the future in response to need.

4. The statement that only steep slopes (normally in excess of 30%) should be preserved does not make adequate provision for the multiple purposes underlying the recommendation nor does it provide the basis for developing a continuous system of open space. However, as noted previously, over 50% of the area is characterized by slopes in excess of 20% and only 15% of the area is characterized by slopes ranging from 1 - 12%.

5. The recommendation concerning preservation of the area over 901 feet does not imply that all other areas in the south hills are insignificant from a visual standpoint. For instance, approximately 21% of the area between the 700 and 900 foot elevations is characterized by slopes in excess of 30% and other areas are characterized by significant stands of vegetation. Part of the reason for recommending that planned unit development procedures be required below 901 feet was to insure preservation of these prominent areas. Those procedures, if adequately utilized, would also insure prevention of a solid line of building or bowl-haircut effect immediately below the 901 foot level cited in the testimony.

6. While there are limited areas above the 901 foot elevation which could be developed with minimal visual impact, those areas represent a minor portion of the total area. Further, those areas are also desirable (because of shallower slopes) to satisfy some of the need for active-use recreational areas. Also, those areas of shallower slope normally occur close to the ridgeline or urban service boundary and intensive development could conflict with that purpose of the recommendation.

While the Joint Parks Committee cannot accept the validity of some of the criticism concerning the recommendation for preservation of areas above 901 feet in elevation, the testimony has indicated legitimate problems with the recommendation as worded in the preliminary draft of the study. The testimony has indicated a need both to define more precisely the term "development" and to provide an exception clause. The term "development" was intended to refer to an intensive level of development such as major subdivision or planned unit development and not to the construction of individual residences on existing lots. The exception clause should make provision for larger developments where the purposes of the basic recommendation may be satisfied more adequately through preservation of areas other than those above 901 feet.

In light of the testimony presented concerning this recommendation, the Joint Parks Committee would recommend that the recommendation as set forth in the preliminary draft of the South Hills Study be modified to read as follows:

That all vacant property above an elevation of 901 feet be preserved from an intensive level of development, subject to the following exceptions:

a. Development of individual residences on existing lots; and

b. Development under planned unit development procedures when it can be demonstrated that more adequate provision for visual

protection, urban service area margin, active-use parks and connecting trails can be made on other portions of the same development.

During the course of the public hearings a number of people have questioned whether the recommendation concerning preservation of certain areas from an intensive level of development constituted a confiscation of private property. It should be noted that the study makes specific provision for compensation through one of the following means: outright acquisition, acquisition of development rights or scenic easements, or density transfers. Preliminary research indicates that the cost of outright acquisition for the program recommended in this study would be within a range of 3 to 3.5 million dollars. A more precise figure would not be possible without specific appraisals of every property involved. It is the position of the Joint Parks Committee that such detailed analysis would be inappropriate without further commitment by the city to such a program. Should the recommendaitons set forth in the South Hills Study be approved, the Committee would recommend that it be assigned the task of deriving a refined cost estimate and providing an analysis of funding sources available.

Based upon the testimony presented concerning the proposed active-use parks, the Joint Parks Committee has reviewed the original recommendations and would submit the following revisions:

1. That an active-use park be acquired surrounding the present EWEB reservoir off North Shasta. This recommendation is based upon the lack of park facilities to serve that particular portion of the city, the availability of vacant property immediately around the reservoir site, and visual preservation since the area is above 900 feet.

2. That an active-use park be acquired south of the present Amazon linkage system, south of Center Way and east of the Fox Hollow elementary school. Again, this recommendation is based upon existing and anticipated population in the area.

3. The preliminary draft of the study recommended acquisition of an active-use park in the Crest Drive area. The Committee would further refine that recommendation to indicate that such a park should be acquired adjacent to the present Crest elementary school.

4. The study originally recommended acquisition of an active-use park in the Hawkins Heights area. The Committee would further refine that recommendation to state that such a park should be located adjacent to the EWEB reservoir located south of 25th Avenue and west of Hawkins Heights Boulevard. This location is necessary to serve existing development in the area.

In addition to the four areas specifically listed above, the Committee is recommending the acquisition of certain areas which are important primarily from a visual and urban service area definition standpoint at the present time, but could be developed with active-use facilities as the need is generated through future development.

Some questions have been raised concerning the need for additional park facilities in southern Eugene. The Joint Parks Committee would note the following considerations relative to the need for additional active-use park facilities:

1. While approximately 67% of the total gross park acreage is located south of 18th Avenue, Laurelwood and Spencer Butte constitute 54% of the park area south of 18th Avenue. Both of these parks are specialized areas. The ecology of Spencer Butte Park is exceptionally fragile due to factors such as slope, soil depth and vegetation. The level of usage of that park has risen to such an intensive level that serious problems are being created and the Parks Department is already having to consider paving the trails on Spencer Butte to prevent further damage. There is definite need to provide relief for this park area.

2. There are areas within the southern portion of the city which are already deficient in terms of park facilities. Three of these areas have been identified as the North Shasta area, the Crest Drive area, and the Hawkins Heights area.

3. Based upon the amount of land available for development in the south hills area and the anticipated level of development, this portion of the city could ultimately accommodate an additional 25,000 to 30,000 people. Using the Parks Department standard of 15 acres per 1,000 people, an additional 375 to 450 acres of active-use park facilities would be required to serve this level of population.

B. Density

The public testimony concerning the recommended density standards has dealt primarily with the exemption provided for controlled income and rent (CIR) housing. That exemption is predicated upon existing, adopted policy of the City. Therefore, the Joint Parks Committee takes the position that the South Hills Study should not preclude the possibility of CIR housing in light of present City policy. However, it should be noted that the recommended exemption deals with the relationship between the level of development and the ability of the city to provide services and is not intended to exempt CIR housing from review on the basis of the aggregate of natural factors affecting any specific site.

While the bulk of the testimony concerning recommended density standards has dealt with the provisions for CIR housing, there has been some testimony concerning the basic densities recommended. That testimony has been of two general types:

1. That density should be flexible and be based upon considerations other than public services; and

2. That density should be based solely upon slope factors (see the written proposal submitted by Mr. Ray Wiley).

After evaluating the testimony submitted, the Joint Parks Committee would recommend that the density standards set forth in the preliminary draft of the South Hills Study be maintained. That recommendation is based upon the following considerations:

1. The recommended densities constitute maximum levels and it is recognized that specific site considerations may necessitate a lower density in certain circumstances.

2. There have been no suggested standards to augment public services as a basis for judgement other than the suggestion that "design quality" of specific projects be used as the basis for determining density. This suggestion is fraught with problems both on the basis of equal treatment and on the basis of what standards should be used for judging design excellence.

3. The suggestion that density be based solely upon slope factors is predicated upon a single factor whereas a variety of natural and design factors should be used and, further, bears no relationship to provision of public services.

For the reasons enumerated above, the Joint Parks Committee does recommend that the density standards as originally set forth be retained.

C. Urban Service Area Definition

Under this section of the South Hills Study, the first recommendation was "That the ridgeline identified in the South Hills Study defines the potential extension of the urban service area." Most of the testimony to date (with the exception of Mr. Cuthbert's critique of the entire urban service area concept) has supported this recommendation. The public hearings have produced no information which would warrant a modification of this recommendation.

There has been extensive public testimony concerning the recommendation that the present city limits be defined as the actual urban service area and that

further expansion of the city only be considered in response to need or in the exception situations provided in the suggested policy statement. The public testimony to date has indicated that if that recommendation were adopted, the only feasible use of property between the present city limits and the ridgeline would be logging and that, in order to preclude such a possibility, the city should annex all property up to the ridgeline immediately.

The recommendation set out in the preliminary draft of the South Hills Study that identified the present city limits as the actual urban service area was premised upon the following factors:

1. The land use inventory which indicated that there was adequate vacant property already within the city limits to accommodate a substantial portion of the metropolitan area's projected growth;

2. The General Plan objective of preventing further scattered development; and

3. The General Plan objective of insuring utilization of vacant property already provided with public facilities.

While the data base and policies underlying the original recommendation were sound, the public testimony presented legitimate problems. In an effort to resolve these problems, the Joint Parks Committee has investigated the possibility of the County exercising some form of control over the area in question and the possibility of annexing all the property to the ridgeline. That investigation indicated that there were a multitude of administrative, political and legal problems associated with seeking assistance from the County to control the removal of vegetation. That investigation also indicated significant problems associated with immediate annexation of all property up to the ridgeline, among which the following should be noted:

1. The statement that all property to the ridgeline should be annexed immediately has been voiced by very few actual owners of property in the affected area. Granted the consequences of annexation, particularly in the form of taxes, the probability of a succesful remonstrance election against such an annexation is high.

2. Under existing legal constraints, there would be no effective way of annexing the property and providing effective deferral of taxes to obviate one of the major objections to annexation.

In view of the problems associated with immediate annexation of the entire

area and the problems associated with the County exercising control over the removal of vegetation, the Joint Parks Committee re-evaluated the premises of the original recommendation. That re-evaluation took into account the following considerations:

1. That a precise definition of the urban service area in the south hills would limit the potential for scattered development;

2. That, based upon the testimony concerning the desirable character of the south hills as a residential environment, the problem of infilling may be temporary and probably would not prove to be a permanent problem; and

3. That with the definition of the urban service area, the primary value of the south hills lies in the potential for residential development and not in tree farming.

In light of these considerations, it is the position of the Joint Parks Committee that the south hills area should be specifically identified as an existing or potential residential area and that every effort should be made to insure preservation of those characteristics that contribute to a desirable residential environment. In this context, the onus should be placed upon the property owners involved to maintain that residential quality and any logging which occurs should be secondary to the potential residential use of the property.

The Joint Parks Committee would recommend that the suggested policy set forth in the preliminary draft of the South Hills Study that identified the present city limits as the actual urban service area be deleted and that the following policy statement be adopted:

That future annexation requests within the potential urban service area be evaluated upon the following bases:

a. The ability of the community to provide public services for the potential development in an economic and efficient manner; and

b. The previous maintenance of the property as a desirable residential environment (Note: if the city adopts an ordinance governing vegetation removal as a result of the present City Council subcommittee research, the standards set forth in that ordinance could provide the basis for evaluating previous maintenance of the property).

The Joint Parks Committee would also recommend that the purpose statement of the Urban Service Area Definition Section be expanded to include the concept of protection of the residential character of the south hills area.

The modification to the annexation policy suggested above would require deletion of recommendations 2, 3 and 5 as set forth in the preliminary draft of the South Hills Study. The Joint Parks Committee would recommend this deletion but would also recommend retention of the fourth recommendation dealing with the question of contouring.

D. Development Standards

During the two public hearings conducted by the Joint Parks Committee and the hearing conducted by the Planning Commission, there have been relatively few comments concerning the recommended development standards. However, several speakers did indicate concern that there may be areas below 700 feet in elevation which should be developed only through planned unit development procedures.

The Joint Parks Committee concurs in the suggestion that there are areas of concern below the 700 foot level which should be treated specially. After reviewing several possible approaches, it is the conclusion of the Committee that slope characteristics would provide the best criterion in this instance. Therefore, the Committee would recommend that the requirement of planned unit development procedures be expanded to include any parcel over 4 acres in size which is characterized by a slope in excess of 20% in the area between 500 and 700 feet in elevation. Approximately 20% of the property in that area is characterized by slopes in excess of 20% (i.e., about 600 acres).

Conclusion

In the above report the Joint Parks Committee has attempted to provide an evaluation and response to the testimony submitted to date concerning the recommendations set forth in the preliminary draft of the South Hills Study. That testimony has indicated a number of areas which should be modified and the Committee has detailed those modifications above. A listing of the original recommendations with the modifications inserted is attached to this report for reference.

Respectfully submitted,

Beth Campbell, Chairperson
Joint Parks Committee

Dave Hoffman
Planning Commission

Neil Murray
City Council

Alan Maxwell
Planning Commission

Synopsis of Recommendations

All of the recommendations set forth in the preliminary draft of the South Hills Study are shown below with the modifications which have been made as a result of the public hearings to date. Deleted portions are shown as stricken (~~deleted~~), while new elements are shown in italics.

A. Ridgeline Park

I. Purpose

The south hills constitute a unique and irreplaceable community asset. The strong dominant landforms and wooded character present there combine to provide distinct areas of contrast in terms of texture and color from the normal pattern of urban development. By virtue of this contrast, the south hills function as a strong visual boundary or edge for the city. *The ridgeline of the south hills also marks the most southerly extension of the urban service area.* Further, there are areas within the south hills that are especially suitable for park sites for recreational use by *present and* anticipated population. In view of these factors, any areas recommended for preservation or park usage should serve at least one of the following purposes:

1. To insure preservation of those areas most visibly a part of the entire community;

2. To protect areas of high biological value in order to provide for the continued health of native wildlife and vegetation;

3. To insure provision of recreational areas in close proximity to major concentrations of population;

4. To provide connective trails between major recreational areas;

5. To provide connective passageways for wildlife between important biological preserves;

6. To contribute to Eugene's evergreen forest edge; and

7. *To provide an open space area as a buffer between the intensive level of urban development occurring within the urban service area and the rural level of development occurring outside the urban service area.*

II. Specific Recommendations

~~1. That all vacant property above an elevation of 901 feet be preserved from development through one of the following means:~~

~~a. Acquisition~~

~~b. Transfer of development rights~~

~~c. Scenic easements~~

~~d. Dedication~~

1. *That all vacant property above an elevation of 901 feet be preserved from an intensive level of development, subject to the following exceptions:*

   a. *Development of individual residences on existing lots; and*

   b. *Development under planned unit development procedures when it can be demonstrated that more adequate provision for visual protection, urban service area margin, active-use parks and connecting trails can be made on other portions of the same development.*

2. *That the area specified for preservation be protected through a variety of techniques including but not limited to acquisition, scenic easements, density transfers, and dedication.*

3. *That the Joint Parks Committee be instructed to prepare refined cost estimates and an analysis of funding sources for submission to the City Council.*

~~2. That the City pursue acquisition of major parks (30+ acres) to serve recreational purposes in the following areas:~~

~~a. In the present Skyline Park area east of Amazon and south of 30th Avenue;~~

~~b. In the area south of Amazon Drives (between the Skyline Park area and the present Spencer Butte Park);~~

~~c. In the area west of Willamette Street and the present 52nd Avenue (the old garbage dump site);~~

~~d. In the area of Crest School; and~~

~~e. In the Hawkins Heights area.~~

4. *That the City pursue acquisition of major active-use park facilities to serve existing and potential population in the following areas:*

   a. *Adjacent to the EWEB reservoir off North Shasta Loop;*

   b. *Property south of the present Amazon linkage system, south of Center Way and east of the Fox Hollow elementary school;*

   c. *Property adjacent to the Crest elementary school; and*

   d. *Property adjacent to the EWEB reservoir located south of 25th Avenue and west of Hawkins Heights.*

5. *That the City insure the potential for further active-use parks to serve anticipated population in the areas south of Warren Avenue, east of the present Spencer Butte Park and adjacent to Blanton Heights Road.*

6. That all proposed developments in the south hills study area be reviewed to determine if connecting linkages are possible between various park sites, particularly north of Skyline Park to Hendricks Park and between Blanton Heights and Hawkins Heights.

7. That the City should adopt an ordinance concerning the removal of vegetation.

B. Density

I. Purpose

The density recommendations contained in the South Hills Study are intended to serve the following purposes:

1. To remain within the broad guidelines of the 1990 General Plan of:

   a. Insuring utilization of vacant property already served with public facilities; and

   b. More precisely defining the broad density range set forth in that plan.

2. To insure adequate provision for development to accommodate anticipated growth; and

3. To achieve a balance between the level of development and the provision of public services.

II. Specific Recommendations

1. That in the area west of Friendly Street the maximum level of new development per gross acre be limited to 8 units per acre (the maximum figure of 8 units per gross acre being subject to positive findings under the planned unit development criteria). ~~and the density point system (if established) of the planned unit development provisions).~~

2. That in the area east of Friendly Street the maximum level of new development per gross acre be limited to 5 dwelling units per acre (the maximum figure of 5 dwelling units per gross acre being subject to positive findings under the planned unit development criteria). ~~and the density point system (if established) of the planned unit development provisions).~~

3. That low-moderate income housing developed under the Controlled Income and Rent provisions of the City Code be exempt from the density standards set forth above, *but subject to normal specific site analysis standards.*

4. If a significant volume of low-moderate income housing should develop, the effect on total density should be evaluated and allowable densities of future developments adjusted.

C. Urban Service Area Definition

I. Purpose

It is the purpose of the recommendations concerning urban service area definition to:

1. Provide a more precise definition of the urban service area concept as set forth in the 1990 General Plan for the south hills area of the City;

2. Provide more adequate criteria for the evaluation of annexation requests; ~~and~~

3. Insure that annexation serves a public purpose as well as a private purpose; *and*

4. *Insure preservation of the primary residential character of the south hills.*

II. Specific Recommendations

1. That the ridgeline identified in the South Hills Study defines the potential extension of the urban service area.

~~2. That the present city limits be identified as the actual urban service area and that further expansion of the city be based upon an analysis of need for additional area to meet anticipated growth and the amount of vacant property remaining within the City to accommodate that growth. (Note: the population projections upon which the analysis of need shall be based shall be the projections accomplished as part of the General Plan updates or the transportation update.)~~

2. *That future annexation requests within the potential urban service area be evaluated upon the following bases:*

   a. *The ability of the community to provide public services for the potential development in an economic and efficient manner; and*

   b. *The previous maintenance of the property as a desirable residential environment (Note: if the City adopts an ordinance governing vegetation removal as a result of the present City Council subcommittee research, the standards set forth in that ordinance could provide the basis for evaluating previous maintenance of the property).*

~~3. That the area between the present city limits and the ridgeline be primarily regarded as an area potentially suitable for annexation if and when the city's projected growth exceeds that presently anticipated.~~

3. That property which can only be provided sewer service by contouring not be included in the definition of the potential urban service area.

~~5. That exceptions to the annexation policy described above be considered only if one of the following circumstances prevails:~~

   ~~a. The present city limits divide an ownership and inclusion of the entire area is essential to allow adequate planning in accord with the objectives of this study; or~~

~~b. Annexation of the property in question would significantly contribute to the achievement of the objectives of this study.~~

D. Development Standards

I. Purpose

The development standards recommended as part of the South Hills Study are intended to achieve the following purposes:

1. To insure the responsiveness of specific developments to the aggregate of known natural factors;

2. To insure maximum preservation of the natural character of the south hills; and

3. To insure adequate review of the public consequences of development in the south hills.

II. Specific Recommendations

1. That planned unit development procedures be required for all major developments (developments in excess of minor ~~subdivisions~~ *partitions*) on property above 701 feet in elevation.

2. *That planned unit development procedures be required for development of any parcel over 4 acres in size, characterized by a slope in excess of 20% in the area between 500 and 701 feet in elevation.*

3. That the planned unit development procedures shall be utilized for the following purposes:

   a. To encourage clustering of development in areas characterized by:

      1. Shallowest slopes;

      2. Lowest elevations;

      3. Least amount of vegetation;

      4. Least amount of visual impact.

   b. To encourage preservation as open space those areas characterized by:

      1. Intermediate and steep slopes;

2. Higher elevations;

3. Significant amounts of vegetation;

4. Significant visual impact.

4. That adequate review of both on-site and off-site impact of any development by a qualified engineering geologist occur under any of the following conditions:

   a. All formations
      Soil depth of 40 inches and above
      Slopes of 30 percent and above

   b. Basalt flows
      Soil depth of 40 inches and above
      Slopes of 20 percent to 30 percent

   c. Eugene Formation
      Soil depth of 40 inches and above
      Slopes of 20 percent to 30 percent

   d. Basalt flows
      Soil depth of 20 to 40 inches
      Slopes of 30 percent and above

   e. Eugene Formation
      Soil depth of 20 inches to 40 inches
      Slopes of 30 percent and above

5. That developments be reviewed to encourage clustering of open space elements of different developments in order to preserve the maximum amount of continuous open space.

6. That developments be reviewed in terms of scale, bulk and height to insure that development blends with rather than dominates the natural characteristics of the south hills area.

7. That all proposed road locations be reviewed to insure minimum grade disturbance and minimum cut-and-fill activity, particularly in those areas most visible due to slope, topographic or other conditions.

8. That planned unit development review shall be based upon a recognition of both public and private interest. In areas of significant conflict (e.g., locating development in a highly visible area as opposed to a less visible area or in an area of significant vegetation as opposed to a relatively open area) which could be resolved through use of an alternative development plan, primacy shall be given to the public interest in an determinations.

9. That all developments shall be reviewed for potential linkage with or to the ridgeline park system.

10. That all developments (planned unit developments or subdivisions) be reviewed to insure maximum preservation of existing vegetation.

SOUTH HILLS STUDY

Preliminary Report

SOUTH HILLS STUDY

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Published December, 1973, by the City of Eugene, 777 Pearl Street, Eugene, Oregon.

SOUTH HILLS STUDY

Summary and Recommendations

SOUTH HILLS STUDY

Summary and Recommendations

Study Background

The south hills area of the city consists of a series of ridgelines and hills which define the eastern and southern perimeters of the city. The ridgelines have an average elevation of 800', significantly higher than the average elevation of the remainder of the city which is approximately 300' to 400'. Within the south hills area, Spencer Butte is 2065' high, the area known as Blanton Heights is approximately 1300' high and Strawberry Hill is over 1200' high.

The south hills area is distinctive not only because of topographic differences, but because much of the area is still undeveloped and characterized by extensive vegetation which provides a contrast in texture to more developed portions of the city. The area is characterized by a wide variety of vegetation associations including meadows, dryland and wetland deciduous trees, and dryland and wetland coniferous trees. The combination of topographic differences and existing vegetation make the south hills a truly distinctive natural feature of the community.

The city has recognized the significance of the south hills. The Community Goals and Policies adopted in 1967 contained the specific assumption that, "The familiar rim of fir trees that fringes the hills around the City will disappear unless action is taken to preserve it." In the Community Goals and Policies the City did adopt the following policy statement:

> The City should create an environment of beauty for its people, not merely by a program of prettification, but by following plans which emphasize our natural resources of beauty and which prevent the destruction of these resources by disorganized development, clutter, sprawl, and other enemies of beauty. We should strive for the beauty that is provided by the harmonious relationship of parts: natural topographic features, parks and parkways, living areas, working areas, arterial street systems, peripheral open spaces.

The Community Goals and Policies also contained the specific recommendations that the City appoint a Scenic Conservation Committee to identify vistas which should be preserved and listed the hill area as an area of concern.

The concern first voiced in the Community Goals and Policies was expressed again in a report prepared in 1969 entitled The Quest for Scenic Quality. That report noted that: "The urban area embraces and is embraced by nature. There is a harmonious visual and physical relationship between nature and the urban environment. That relationship establishes a unique and memorable image of the urban area, gives it personality and makes it a desirable place to live." However, The Quest for Scenic Quality also noted that this situation was changing and pointed out that: "The mantle of vegetation on surrounding hillsides is slowly disappearing as residential developments creep up the slopes and over the ridges. . . If such growth continues, if men continue to work against the form and characteristics of the natural environment, then the metropolitan area will no longer be embraced by nature, but will have marred, overrun and devoured it. The area's present image, personality and desirability as a place to live will be lost."

The concern for preservation of the natural character of the area expressed in these previous reports was continued in the 1990 General Plan. One of the objectives established for the urban service area concept was the "shaping and regulating urban form and growth and preservation of the special character of the area." Under the Environmental Resources section, the General Plan recommends that "development practices that tend to eliminate the tree cover or disturb the natural features of the adjacent hills should be controlled through appropriate codes at the local level." Finally, the Open Space section of the General Plan contains findings that the distinctive hills that ring the metropolitan area add to the quality of the environment and establishes as an objective the development of a distinctive urban pattern through the use of open space.

While the documents just cited expressed concern about the consequences of development on the natural character of the city, there was also concern about the level or intensity of development, particularly in the south hills area. The City Council Minutes of July 12, 1971, record the following discussion which occurred during consideration of an annexation request in the south hills area:

> Councilman Williams voiced some concern regarding a resolution forwarding a request for annexation of 33 acres west of Fox Hollow and south of Donald to the Boundary Commission. He felt that, under present laws, a zoning classification of RA or R-1 which would be placed on the property after annexation would permit 8 units per acre under a PUD. He felt this density excessive, and requested the planning staff prepare amendments to the zoning ordinance that would permit the Council and Planning Commission by contract to require a lower density development in situations where staff, Commission and Council believe it appropriate.
>
> Mr. Teague and Mayor Anderson concurred with this suggestion.

The suggestion discussed above was made as a motion and passed by the City Council unanimously.

This concern about the effects of development on the natural character of the hills and about what level of development the City could reasonably serve reached a culmination in early 1972 during the course of public hearings on several major development proposals in the south hills area. As a result of those hearings the Eugene Planning Commission recommended that a special study of the south hills area be carried out. On June 26, 1972, the Eugene City Council adopted Resolution 2070 which:

1. Designated an area within 2,000 feet of the ridgeline as an area area for special study;

2. Established an 18 month time-frame for the special study;

3. Required development within the special study area to follow planned unit development procedures; and

4. Established a maximum interim density of 6 units per acre for all developments within the special study area during the course of the study.

The minutes of both the Planning Commission and City Council discussion of the proposed study indicate that the study was to have four major objectives:

1. To make recommendations concerning a possible ridgeline park;

2. To make recommendations concerning appropriate density levels in the south hills area;

3. To make recommendations concerning the precise definition of the urban service area in the south hills; and

4. To make recommendations concerning appropiate development standards for the south hills area.

Following the adoption of Resolution 2070, the Joint Parks Committee was reconstituted with two City Council members and two Planning Commission members. This committee was given the responsibility of developing the South Hills Study. A summary of the Joint Parks Committee's study followed by specific recommendations is provided below. (Note: the full text of the South Hills Study consists of the various study elements attached as well as this summary and the specific recommendations.)

Study Summary

A. Land Use Information

The South Hills Study involved approximately 8,880 acres of land situated on both the north and south side of the ridgeline. About 60 percent of this

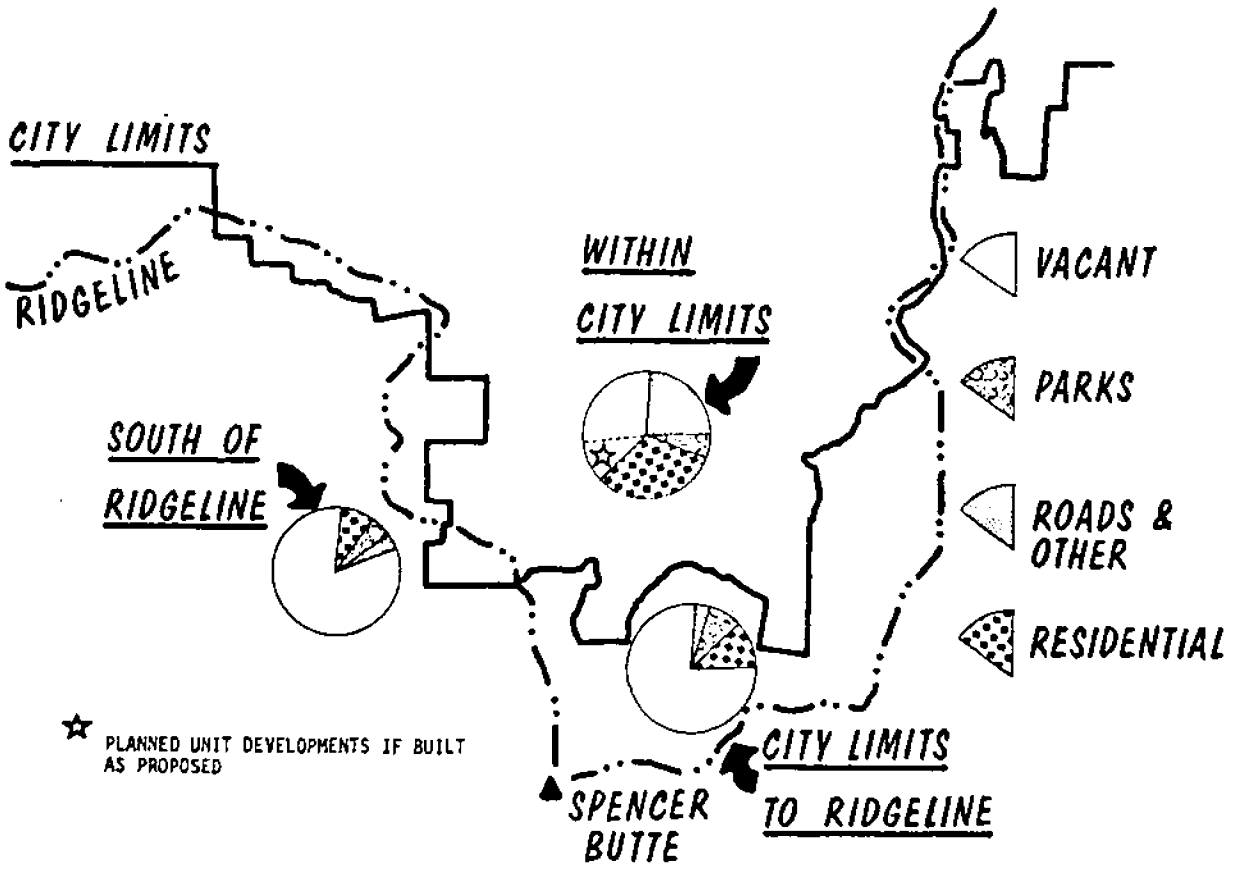
total acreage is presently vacant, about 20 percent is developed with residential uses and the remainder is devoted to roads, parks and other uses.

Approximately 45 percent (4,024 acres) of the total area studied is presently within the city limits. Single family residences account for the bulk of the existing residential development within the South Hill Study area with 5,062 units located within the city limits. Within that same area there are 466 dwelling units in 233 duplex structures and 308 dwelling units in several planned unit developments. Despite the amount of development within the city, vacant property still exceeds all other uses with 37 percent of the total (1,474 acres). At the present time there are 11 planned unit development proposals (in various stages of processing) involving 452 acres of that property presently classified as vacant and representing an addition of about 2,450 dwelling units (if approved as proposed).

There are approximately 1,456 acres of property located bwtween the present city limits and the ridgeline. The bulk of this property is vacant (77 percent) while the remainder is devoted to residential use (11 percent), parks (7 percent), roads (4 percent) or other uses (1 percent).

The amount and percentage of vacant property south of the ridgeline is even greater than in the two previous situations. There approximately 86 percent of the property is vacant (2,938 acres), residential uses account for 7 percent (261 acres) and parks, roads and other uses account for the remaining 7 percent.

The significance of the amount of vacant property remaining within the south hills area becomes more apparent when the amount of development that could be accommodated on this property is considered. If, for instance, 75 percent of the existing lots less than an acre in size were to develop with single family residences and 75 percent of the vacant property in parcels over an acre in size were to develop with planned unit developments at an average density of 5 dwelling units per acre, an additional 5,100 dwelling units could be accommodated (note: all of the property considered in these calculations is presently within the city limits). The present population and dwelling unit projections for the year 1990 indicate an expected increase of between 18,000 and 20,000 dwelling units in Eugene. Therefore, approximately 25 percent to 30 percent of the total expected increase could be accommodated within the south hills area on only 75 percent of the vacant property within the present city limits.



B. Inventory of Natural Factors and Visual Evaluation

As indicated previously, there has been a strong tradition of concern about the significance of the south hills as a unique community asset and a desire to insure that development did not irreversibly alter the character of the hills. In order to develop a more adequate information base and criteria for decision-making, the City contracted with the University of Oregon Landscape Architecture Department. It should be noted at this point that the participation of the University was directed not to making recommendations but to developing information and analytical techniques upon which recommendations could be based.

The results of this portion of the South Hills Study can be summarized under four major categories:

1. Development of an information base.

   Prior to the inception of the South Hills Study, the city had no complete information concerning various natural factors that covered the entire area. As a result of the University participation, information covering the entire study area is now available on the following natural phenomena: (1) base geology; (2) topography; (3) slope; (4) slope orientation; (5) stream order; (6) soil depth; and (7) major vegetation associations.

2. Development of a technique for visual assessment.

   Concern has frequently been expressed about the significance of the south hills as a visual asset for the community. However, there was no method for determining the relative importance of various areas within the south hills from the standpoint of visual significance. The model for evaluation developed in this portion of the study is based upon consideration of three primary factors: (1) elevation; (2) slope; and (3) slope orientation. A comparison of these three factors provides a basis for assessing the visual significance of various areas within the south hills.

3. Assessment for potential surface movement.

   A common concern when evaluating hillside development has been the potential for surface movement (unexpected and undesirable soil movement occurring as a result of development). Through field analysis of existing slumps in the south hills area, a predictive model was developed which indicated the combination of natural factors which have combined to produce the existing slumps. This predictive model does not say that surface movement will actually occur but indicates that the factors which could result in surface movement are present and that special care should be taken in those areas. Those natural factors which appear to be most significant are base geology, soil depth, slope and presence of moisture.

4. Vegetation evaluation.

   As noted previously, there has been consistent concern about the significance of large amounts of undisturbed vegetation in the south hills as a unique community asset. One purpose of this portion of the study was to provide an assessment of the major vegetation associations present in the area and criteria for identifying those areas which are most significant. A technique was developed for identifying those areas characterized by four or more vegetation associations and the presence of a perennial source of water. Both factors are significant both from the standpoint of vegetation and the potential for animal shelter.

A fuller description of both the base information and the analytical techniques described above are set forth in that section of the South Hills Study entitled "An Ecological Description and Visual Evaluation." A final product of this portion of the study which should be noted is the ability to combine all of the major factors and indicate those areas where either visual criteria, surface movement criteria or vegetation criteria apply singlely or in some combination.

C. Public Services

One of the principal concerns which prompted the Planning Commission to recommend and the City Council to order the South Hills Study was the concern over

appropriate density in the south hills area. During the development of the study it was determined that the evaluation of natural characteristics did not provide an adequate base for any density recommendations and that density should be correlated with public services and need. The evaluation of public services was based on three primary services: schools, sewers and traffic.

Evaluation of schools facilities is difficult for a variety of factors, among which the following should be noted: (1) two jurisdictions are involved; (2) adequacy of school facilities may be defined either in terms of particular attendance areas or the entire district; (3) adequacy may be defined in terms of existing facilities or potential expansion of facilities; and (4) the probable number of school age children is dependent upon a variety of factors such as size (defined in terms of number of bedrooms) of anticipated dwelling units, price range and national and local birth rates. Because of these considerations, the school evaluation was limited to an inventory of existing and potential facilities. There are nine elementary schools in the south hills area with a capacity of 2,696 students in the present fixed facilities. Enrollment as of October 28, 1973, was 2,217, down 105 students from the October 31, 1972, enrollment. If the present facilities at these nine sites were expanded to their ultimate potential, approximately 4,340 students could be accommodated. The present policy of School District 4J should also be recognized which provides a number of alternatives short of expansion to accommodate situations of overcrowding (that policy statement is set forth in the School Element of the South Hills Study).

The evaluation of the sewer system was based upon computer simulation tests of the collector and trunk system to accommodate varying levels of population density. The tests were designed to evaluate the capacity of the collector and trunk system and to indicate where increasing density necessitated major capital improvements. Tests were run with four different levels of population: (1) existing dwelling unit and population distribution; (2) projected low level of development (average of 2 dwelling units per acre in low density areas); (3) projected medium level of development (4 dwelling units per acre in low density areas); and (4) projected high level of development (6 units per acre in low density areas). The results of these tests indicated that the collector and trunk systems serving the area west of Friendly Street could accommodate development at an average density of 6 dwelling units per gross acre. However, the tests indicated that development in excess of 4 units per gross acre in the area east of Friendly Street would require a number of extensive modifications of the present collector and trunk system serving that area. The most significant modification to that system involved the additional capacity required to accommodate a higher density in the 66" trunk at Madison Street (7,675' in length) and the 72" interceptor extending to the treatment plant (10,500' in length).

The review of transportation facilities was limited insofar as a major review of transportation planning is presently occurring as part of the E-SATS update process. Since the E-SATS update process will not be completed by the deadline established for the South Hills Study, a more limited review of the traffic

impact of development was carried out in conjunction with the State Highway Department. This review was limited to an analysis of the traffic loading that would occur on major north-south streets as the result of more intensive development occurring in the South Hills area than originally projected in the initial Eugene-Springfield Area Transportation Study. The analysis was limited to the existing street system and did not include any projected routes.

Two alternate loadings were tested: a limited loading reflecting primarily current levels of development and development proposals already submitted, and a "saturation" loading reflecting relatively full development of the south hills area (average density per gross acre of 4.5 dwelling units). The limited loading did not substantially affect the traffic volume originally projected since the aggregate increase in projected dwelling units was minor when compared with that originally projected. However, the saturation loading did indicate a significant increase of traffic volume on the major north-south arterial streets. This increase was particularly significant in the Amazon drainage area (Hilyard, Amazon, and Willamette). The effect of the traffic volume increase is more significant in the Amazon drainage area, in part, because traffic on those streets most traverse extensive areas which are already developed residentially. The impact of the saturation loading was less pronounced on streets such as Chambers or Bailey Hill Road and other north-south streets in the western portion of the city are not as extensively developed with residential uses with direct frontage as streets in the Amazon drainage area.

The results of the limited and saturation loadings are described more fully in the transportation element and supplemental report of the South Hills Study. It should be stressed that the purpose of the transportation analysis conducted in conjunction with the South Hills Study was not to make any definitive determinations concerning street improvement projects but to indicate the type of traffic volumes which could be expected from varying levels of development.

Recommendations

After reviewing all of the material developed as part of the South Hills Study and in response to the direction of the City Council when the study was initiated, the Joint Parks Committee does make the following findings and recommendations.

A. Ridgeline Park

I. Purpose

That the south hills constitute a unique and irreplaceable community asset. The strong dominant landforms and wooded character present there combine to provide distinct areas of contrast in terms of texture and color from the normal pattern of urban development. By virtue of this contrast, the south hills function as a strong visual boundary or edge for the city. Further, there are areas within the south hills that are especially suitable to provide park sites for recreational use by anticipated population. In view of these factors, any areas recommended for park usage should serve at least one of the following purposes:

1. To insure preservation of those areas most visibly a a part of the entire community;

2. To protect areas of high biological value in order to provide for the continued health of native wildlife and vegetation;

3. To insure the provision of recreational areas in close proximity to major concentrations of population;

4. To provide connective trails between major recreational areas;

5. To provide connective passageways for wildlife between important biological preserves; and

6. To contribute to Eugene's evergreen forest edge.

II. Specific Recommendations

1. That all vacant property above an elevation of 901 feet be preserved from development through one of the following means:

    a. Acquisition

    b. Transfer of development rights

    c. Scenic easements

    d. Dedication

All of the property above 901 feet in elevation falls within the area indentified as having high view potential for the entire community. Approximately 880 acres are involved in this area, of which about 136 are presently within the city limits and 744 acres are outside the city limits. A variety of mechanisms are suggested to insure preservation of this property. In some instances, preservation will only be possible through outright acquisition, whereas there are some situations where development can occur with the actual dwelling units being constructed on portions of the project site not included within the high view potential area. In some instances it could be possible to preserve this high view potential area through scenic easements or through dedication. It should be noted that preservation of this area would provide a basis for a linkage system extending both to the east and west of the present Spencer Butte Park.

2. That the City pursue acquisition of major parks (30+ acres) to serve recreational purposes in the following areas:

    a. In the present Skyline Park area east of Amazon and south of 30th Avenue;

    b. In the area south of Amazon Drives (between the Skyline Park area and the present Spencer Butte Park);

    c. In the area west of Willamette Street and the present 52nd Avenue (the old garbage dump site);

    d. In the area of Crest School; and

    e. In the Hawkins Heights area.

    The potential exists to develop a system of nodal parks throughout the ridgeline area to serve the anticipated population in the south hills area of the city. At the present time there is Hendricks Park at the northeast end of the ridgeline and Spencer Butte Park at the extreme southern tip of the ridgeline. The recommendations set forth above would add five additional parks to this system. The potential for such addition exists in the Skyline Park area based upon certain county and water district ownership in that area. The county also owns property in the area west of Willamette Street and 52nd Avenue which could become a park. The areas south of Amazon Drives, near Crest school and in Hawkins Heights would have to be acquired by the city.

3. That all proposed developments in the south hills study area be reviewed to determine if connecting linkages are possible between various park sites, particularly north of Skyline Park to Hendricks Park and between Blanton Heights and Hawkins Heights.

    Preservation of the high view potential area would result in the establishment of a potential linkage system throughout a substantial part of the south hills area. However, the two areas identified above do not fall within the high view potential area and are critical if a linkage system is to be established. The Crest Drive Citizens Association is actively working at establishing a trail system and the City should cooperate in this effort to establish trails in the Crest Drive area between Blanton Heights and Hawkins Heights. The City should also work

with the Oak Hills Homeowners Association for the same purpose in the area north of Skyline Park. There are also instances where the slopes involved in the high view potential area would render a trail system infeasible and in such instances, adjacent developments should be reviewed for the potential of establishing linkages.

4. The City should adopt an ordinance concerning the removal of vegetation.

   The significance of existing vegetation has been noted in the south hills study. Since acquisition of all significant areas of vegetation is not possible, the City should adopt measures to insure adequate review and protection so that vegetation is not indiscriminately removed. The existing vegetation is significant visually, as a wildlife habitat, and for moisture absorption.

B. Density

I. Purpose

The density recommendations contained in the South Hills Study are intended to serve the following purposes:

1. To remain within the broad guidelines of the 1990 General Plan of:

   a. Insuring utilization of vacant property already served with public facilities; and

   b. More precisely defining the broad density range set forth in that plan.

2. To insure adequate provision for development to accommodate anticipated growth; and

3. To achieve a balance between the level of development and the provision of public services.

II. Specific Recommendations

1. That in the area west of Friendly Street the maximum level of new development per gross acre be limited to 8 units per acre (the maximum figure of 8 units per gross acre being subject to positive findings under the planned unit development criteria and the density point system (if established) of the planned unit development provisions).

The analysis of public services indicates that both the sewer facilities and the transportation facilities in the western portion of the city are more able to accommodate a higher level of development than in the eastern portion of the city. While 8 units per gross acre is higher than the figures tested in evaluating these facilities, this level of development is only possible under planned unit development procedures and would have to be averaged with existing single family development which is at a considerably lower level. Further, the impact of this higher figure would be mitigated through adoption of a density point system identical or similar to that proposed in the draft of the planned unit development provisions which is based upon anticipated number of people per dwelling unit.

2. That in the area east of Friendly Street the maximum level of new development per gross acre be limited to 5 dwelling units per acre (the maximum figure of 5 dwelling units per gross acre being subject to positive findings under the planned unit development criteria and the density point system (if established) of the planned unit development provisions).

   The analysis of public services in the eastern portion of the city indicated significant capital expenditures for sewers if development exceeded an average of four units per gross acre. Also, the major traffic routes (north-south) in this portion of the city must traverse significant distances of already developed property. Both of these factors point to the need for a lower average density in the eastern portion of the city than in the western portion. The figure of 5 units per gross acre is based on a recognition of the existing level of development in portions of the low density area and the average of that level of development with potential planned unit developments. It should also be noted that 5 units per gross acre also compares favorably with the proposed density of the 11 planned unit developments described in the land use section of the South Hills Study (average density of 5.45 units per acre).

3. That low-moderate income housing developed under the Controlled Income and Rent provisions of the City Code be exempt from the density standards set forth above.

   This recommendation is based upon the recognition that the City has adopted policies concerning the dispersal of low-moderate income housing and specifically recognized the need for increased density in certain situations subject

to the specific criteria set forth in the CIR provisions of the City Code. It is intended that this recommendation obviate the possibility of the density recommendations of this report being used to frustrate the City's housing policies.

4. If a significant volume of low-moderate income housing should develop, the effect on total density should be evaluated and allowable densities of future developments adjusted.

C. Urban Service Area Definition

I. Purpose

It is the purpose of the recommendations concerning the urban service area definition to:

1. Provide a more precise definition of the urban service area concept as set forth in the 1990 General Plan for the south hills area of the city;

2. Provide more adequate criteria for the evaluation of annexation requests; and

3. Insure that annexation serves a public purpose as well as a private purpose.

II. Specific Recommendations

1. That the ridgeline identified in the South Hills Study defines the potential extension of the urban service area.

This recommendation is actually a re-statement of the 1990 General Plan. It is based on the ability to extend services, particularly the existing sewer system. However, further expansion of the urban service area beyond the ridgeline would necessitate a substantial revision to both the sewer and traffic analysis and would substantially affect density recommendations for property north of the ridgeline. One of the purposes of this recommendation is to identify precisely which ridgeline is meant when discussing the question of urban service area definition. This question becomes particularly crucial in the western portion of the city where there are a series of ridgelines.

2. That the present city limits be identified as the actual urban service area and that further expansion of the city be based upon an analysis of need for additional area to meet anticipated growth and the amount of vacant property remaining within the city to accommodate that growth.

(Note: the population projections upon which the analysis of need shall be based shall be the projections accomplished as part of the General Plan updates or the transportation update.)

As indicated under the land use analysis, a substantial amount of the property presently within the city limits in the south hills area remains vacant. If even 75 percent of this property were developed at a relatively modest level, approximately 25 percent to 30 percent of the total anticipated number of new dwelling units to be added to the city's total between now and 1990 could be accommodated within the south hills area. In view of this factor and the 1990 General Plan goal of utilizing vacant property already served with public facilities, the need for annexation of additional property in the south hills is questionable at the present time. Evaluation of annexation requests should include an evaluation of the effect the annexation will have on the goal of utilizing vacant property already served within the city limits. This recommendation would establish official population projections accomplished as part of the general plan update or the transportation update as the basis for evaluation of need for additional area rather than ad hoc estimates of growth.

3. That the area between the present city limits and the ridgeline be primarily regarded as an area potentially suitable for annexation if and when the city's projected growth exceeds that presently anticipated.

   Since there is adequate area already within the city limits to accommodate presently anticipated growth, the property remaining between the city and the ridgeline is particularly valuable as a safeguard in the event actual growth exceeds present expectations. In this sense, that property represents a contingency reservoir which should only be utilized in case of need.

4. That property which can only be provided sewer service by contouring not be included in the definition of the potential urban service area.

   Inclusion of areas which could be served by contouring would require modification of the present evaluation of the capability of service systems and could substantially affect the anticipated level of development. Further, inclusion of areas served by contouring will result in relatively intensive development on the reverse of the ridgeline. This area should only be considered as suitable for urban level of development when major decisions are made as to the need for expansion of the urban service area as provided for in the 1990 General Plan.

5. That exceptions to the annexation policy described above be considered only if one of the following circumstances prevails:

    a. The present city limits divide an ownership and inclusion of the entire area is essential to allow adequate planning in accord with the objectives of this study; or

    b. Annexation of the property in question would significantly contribute to the achievement of the objectives of this study.

The purpose of the above recommendation is to provide necessary flexibility so that the overall recommendations concerning annexation do not have a negative impact on the ultimate realization of the study objectives.

D. Development Standards

I. Purpose

The development standards recommended as part of the South Hills Study are intended to achieve the following purposes:

1. To insure the responsiveness of specific developments to the aggregate of known natural factors;

2. To insure maximum preservation of the natural character of of the south hills; and

3. To insure adequate review of the public consequences of development in the south hills.

II. Specific Recommendations

1. That planned unit development procedures be required for all major developments (developments in excess of minor subdivisions) on property above 701 feet in elevation.

All of the property above 701 feet falls within the intermediate view area and is of significance because of the potential for impact on the visual appearance of the south hills. Further, the bulk of those areas noted for having significant vegetation associations and potential for slippage fall within this area.

2. That the planned unit development procedures shall be utilized for the following purposes:

a. To encourage clustering of development in areas characterized by:

   1. Shallowest slopes;

   2. Lowest elevations;

   3. Least amount of vegetation;

   4. Least amount of visual impact;

b. To encourage preservation as open space of those areas characterized by:

   1. Intermediate and steep slopes;

   2. Higher elevations;

   3. Significant amounts of vegetation;

   4. Significant visual impact.

3. That adequate review of both the on-site and off-site impact of any development by a qualified engineering geologist occur under any of the following conditions:

   a. Basalt flows
      Soil depth of 40 inches and above
      Slopes of 30 percent and above

   b. Eugene formation
      Soil depth to 40 inches
      Slopes of 30 percent and above

   c. Basalt flows
      Soil depth of 40 inches and above
      Slopes of 20 percent to 30 percent

   d. Eugene formation
      Soil depth of 40 inches and above
      Slopes of 20 percent to 30 percent

   e. All formations
      Soil depth of 40 inches and above
      Slopes of 30 percent and above

   f. Basalt flows
      Soil depth of 20 inches to 40 inches
      Slopes of 30 percent and above

   g. Eugene formation
      Soil depth of 20 inches to 40 inches
      Slopes of 30 percent and above

4. That developments be reviewed to encourage clustering of open space elements of different developments in order to preserve the maximum amount of continuous open area.

5. That developments be reviewed in terms of scale, bulk and height to insure that development blends with rather than dominates the natural characteristics of the south hills area.

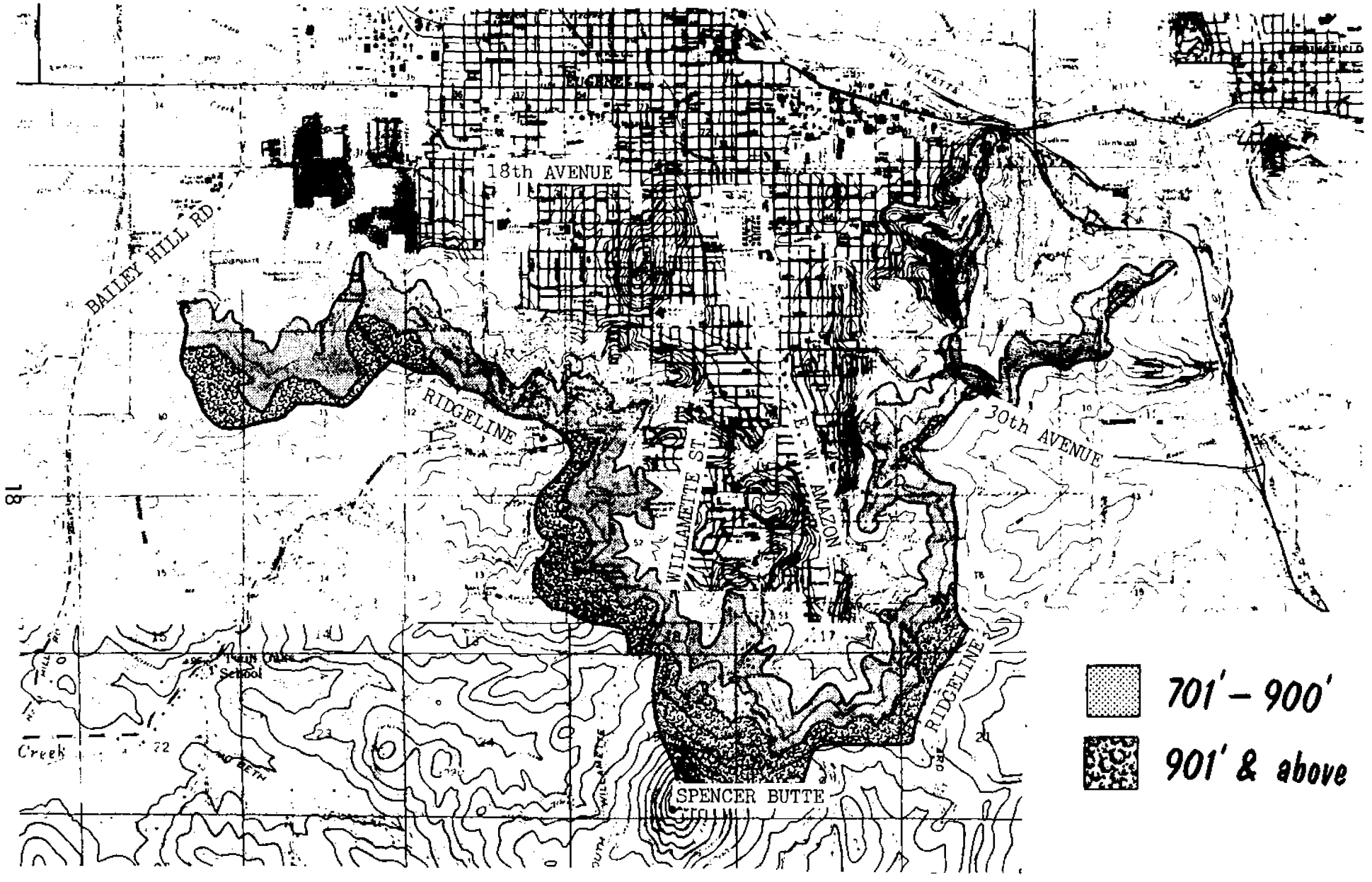
6. That all proposed road locations be reviewed to insure minimum grade disturbance and minimum cut-and-fill activity, particularly in those areas most visible due to slope, topographic or other conditions.

7. That planned unit development review shall be based upon a recognition of both public and private interest. In areas of significant conflict (e.g., locating development in highly visible area as opposed to a less visible area or in an area of significant vegetation as opposed to a relatively open area) which could be resolved through use of an alternative development plan, primacy shall be given to the public interest in any determinations.

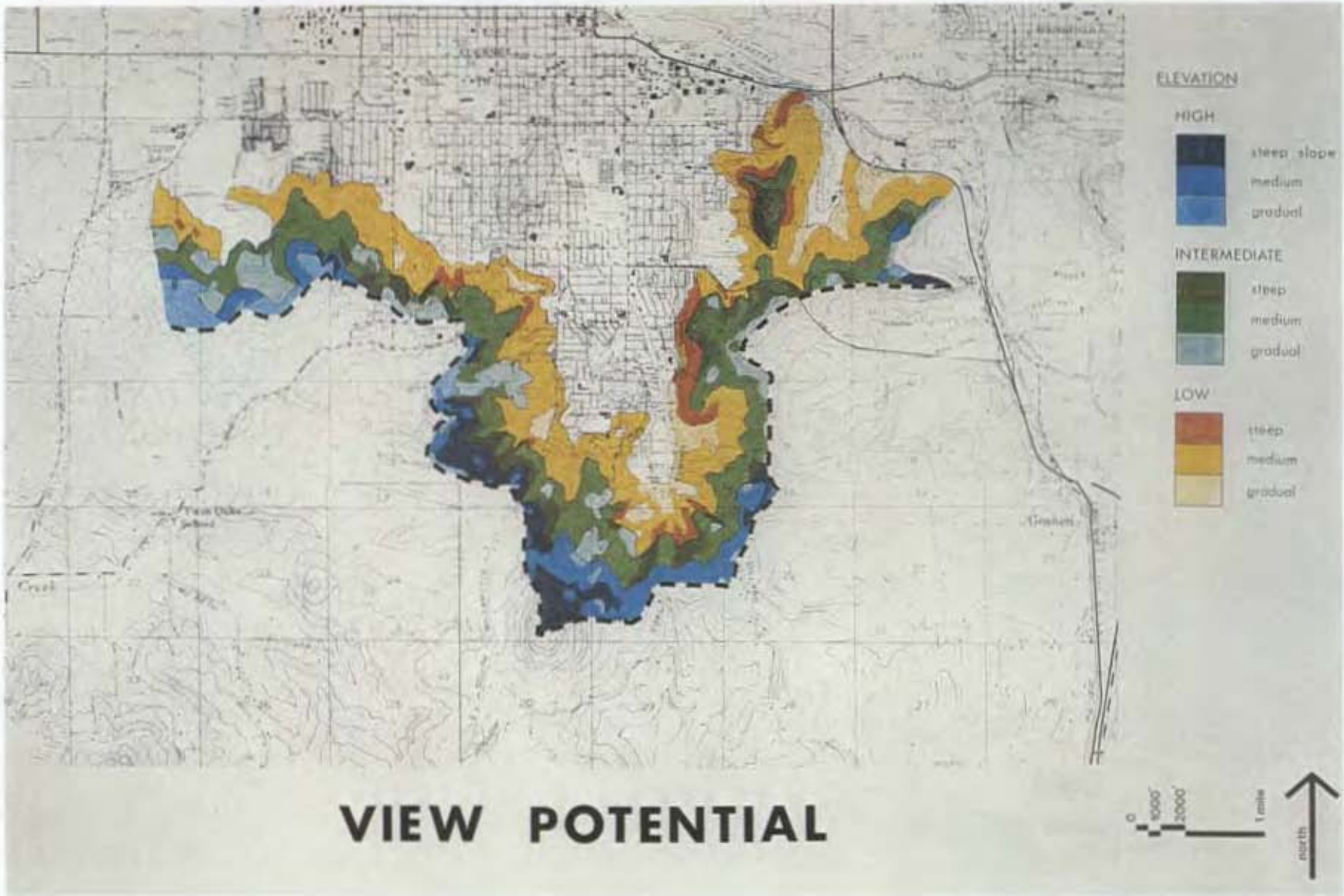
8. That all developments shall be reviewed for potential linkage with or to the ridgeline park system.

9. That all developments (planned unit developments or subdivisions) in the south hills area be reviewed to insure maximum preservation of existing vegetation.

It should be noted that all of the development standards suggested above are based on factors analyzed in the Ecological Description and Visual Assessment element of the South Hills Study. These standards are based on the premise that it is possible to achieve a relatively intensive level of development in the south hills and still preserve the dominant natural character that presently exists if certain safeguards are followed.



AREAS OF SPECIFIC RECOMMENDATIONS



VIEW POTENTIAL

SOUTH HILLS STUDY

Land Use Inventory

SOUTH HILLS STUDY

Land Use Inventory

Introduction

The inventory of existing land use included in the South Hills Study covers approximately 8880 acres of land, the bulk of which is situated south of 29th Avenue. However, on both the western and eastern portions of the study area the land use inventory extends further to the north. On the east the land use inventory extends to Judkins point and includes the Laurel Hill Valley. On the west the inventory extends to 18th Avenue in the Hawkins Heights area. Both of these northerly extensions conform to the configuration of the ridge-line. A map of all of the parcels inventoried is attached.

The basic land use inventory was completed during the summer of 1972 through Lane Council of Governments as part of the preparatory work for the Eugene-Springfield Area Transportation Study update. The city utilized the base data provided by Lane Council of Governments and cooperated in developing the use of the map modeling system as a mechanism for storage and retrieval of the land use data. When utilizing the data, it must be recognized that it reflects the situation existing in 1972. When possible the Staff has attempted to update the data to reflect the current situation (as in the case of planned unit development proposals) but new single family and duplex construction occurring between 1972 and 1973 is not included.

The purpose of providing this land use inventory is twofold:

1. To provide as accurate a catalogue as possible of existing development in the study area; and

2. To provide an indication of what could be anticipated in terms of development based upon available property within the study area.

General Land Use Information

As the following table indicates, the bulk of the property in the South Hills is presently vacant. The term "vacant" includes both land that is not presently being used and land that is being used for agricultural purposes. Agricultural land was included on the premise that agricultural uses would prove temporary if the property already had public services or was to be provided urban services in the future. The term "residential" as used in the table includes single family development, duplex development and multiple family development. The term "other" includes facilities such as Eugene Water

and Electric Board reservoirs, commercial developments such as the Edgewood Shopping Center and cemeteries.

Table 1
General Land Use, South Hills

Category	Acreage	Percent
Residential	1771	20%
Parks	416	5%
Roads	773	9%
Other	382	4%
Vacant	5538	62%
Total	8880	100%

It should be noted that in both the preceding table and following ones, the acreage figures are approximations. Extensive checking to date has indicated an error margin of less than one percent in these figures.

Table 2 provides a breakdown of the property in the study area in relationship to the ridgeline.

Table 2
Land Use North and South of the Ridgeline[a]

Category	Acreage North of Ridgeline	Acreage South of Ridgeline	Total
Residential	1509	261	1770
Parks[b]	356	60	416
Roads	653	120	773
Other	362	20	382
Vacant	2600	2938	5538
Total	5480	3399	8879

[a]As used in this table and elsewhere in the land use inventory the term "north refers to property on the city side of the ridge, while the term "south" refers to property on the county side of the ridge. However, all of the Laurel Hill Valley was included in the city or "north" figures (Section 4, Township 18, Range 3 West).

[b]Spencer Butte marks the most southerly extension of the ridgeline. Although a portion of Spencer Butte Park extends to the north, all of the acreage of that park included in this inventory was treated as south of the ridgeline.

Land Use Within Present City Limits

Residential development is the predominant form of development within the South Hills Study area inside the city. However, as the following table illustrates, the amount of vacant acreage remaining within the city exceeds that presently devoted to residential use.

Table 3
Land Use Within the City

Category	Acreage	Percent
Residential	1344	33%
Parks	260	6%
Roads	594	15%
Other	352	9%
Vacant	1474	37%
Total	4024	100%

Single family residences account for the bulk of the existing residential development within the South Hills Study area with 5062 units located within the city limits. Within that same area there are 466 dwelling units in 233 duplex structures. To date, planned unit development activity has added 308 dwelling units within the area involved in this inventory.

The vacant land remaining within the city is broken up into a number of ownerships with considerable range in parcel sizes. There are a number of parcels available for single family residential development as well as a number of larger parcels.

Table 4
Vacant Property Within the City

Parcel Size	Number of Parcels	Total Acreage	Percent
Less than 1 acre/more than .10 acre	1480	413	28%
Less than 4 acres/more than 1 acre	75	276	19%
More than 4 acres	155	786	53%

A number of planned unit development proposals have been submitted on various sites that are presently classified as vacant. Those proposals are in various stages of processing, some having gone to the Planning Commission for preliminary or final approval, while others are still at a concept stage. A listing of those proposed developments is provided below. This listing is not intended to imply that all of the proposed developments have been approved at the specified density or that all of them will be built but simply provides an inventory of proposals as submitted.

Table 5
Planned Unit Development Proposals

Proposed Development	General Location	Acreage	Number of Units Proposed
Kismet Crest	18-04-02	41.89	165-250
Somerset Hills	18-04-02	117.00	650
Hertelwood	18-04-02	6.69	50
Southridge	18-03-18	107.65	495
Hunnington	18-03-18 & 19	8.44	50
B.A.L.S.M.	18-03-19	32.31	162
Kimmel	18-03-07	7.90	36
Fox Hollow Lodges	18-03-17	6.39	52
Timber Village	18-03-20	36.20	290
Laurelwood Village	18-03-09	21.79	128
Edgewood West III	18-03-18	66.00	300
Total		452.26	2378-2463

Land Use Between City Limits and Ridgeline

Property between the present city limits and the ridgeline is predominantly vacant as the followint table indicates. Residential use (practically entirely of a single family nature) is the next most significant form of use.

Table 6
Land Use Between City and Ridgeline

Category	Acreage	Percent
Residential	165	11%
Parks	95	7%
Roads	59	4%
Other	11	1%
Vacant	1126	77%
Total	1456	100%

The vacant land between the city limits and the ridgeline is primarily found in large parcels as Table 7 indicates.

Table 7
Vacant Property Between City Limits and Ridgeline

Parcel Size	Number of Parcels	Total Acreage	Percent
Less than 1 acre/more than .10 acre	88	41	4%
Less than 4 acres/more than 1 acre	86	179	16%
More than 4 acres	51	907	80%
Total	225	1127	100%

Land Use South of the Ridgeline

The land use inventory included property south of the ridgeline. This property is predominantly vacant with only a limited amount devoted to roads or residential uses.

Table 8
Land Use South of the Ridgeline

Category	Acreage	Percent
Residential	261	7%
Parks[a]	60	2%
Roads	120	4%
Other	20	1%
Vacant	2938	86%
Total	3399	100%

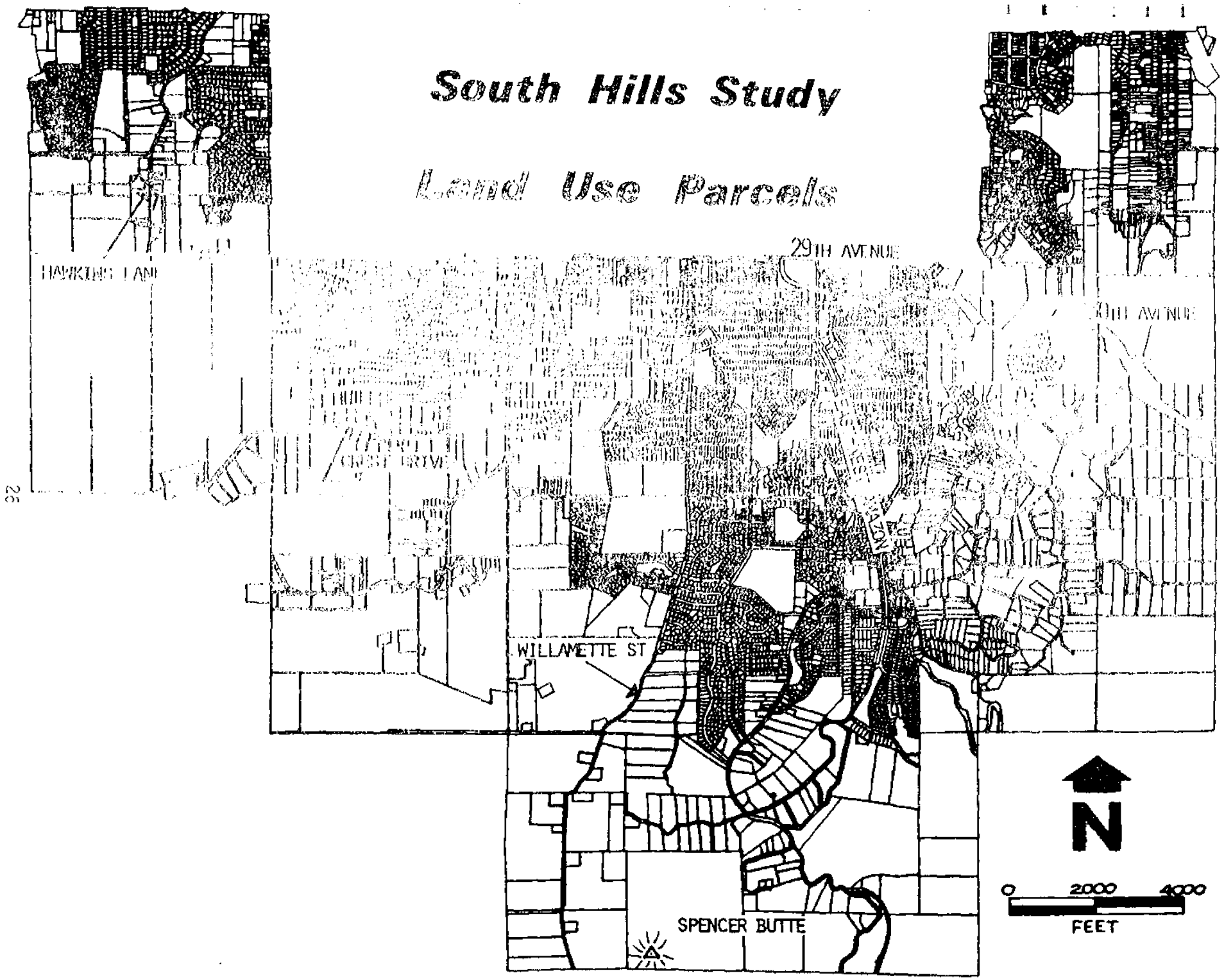
[a]That portion of Spencer Butte Park included within the land use inventory area.

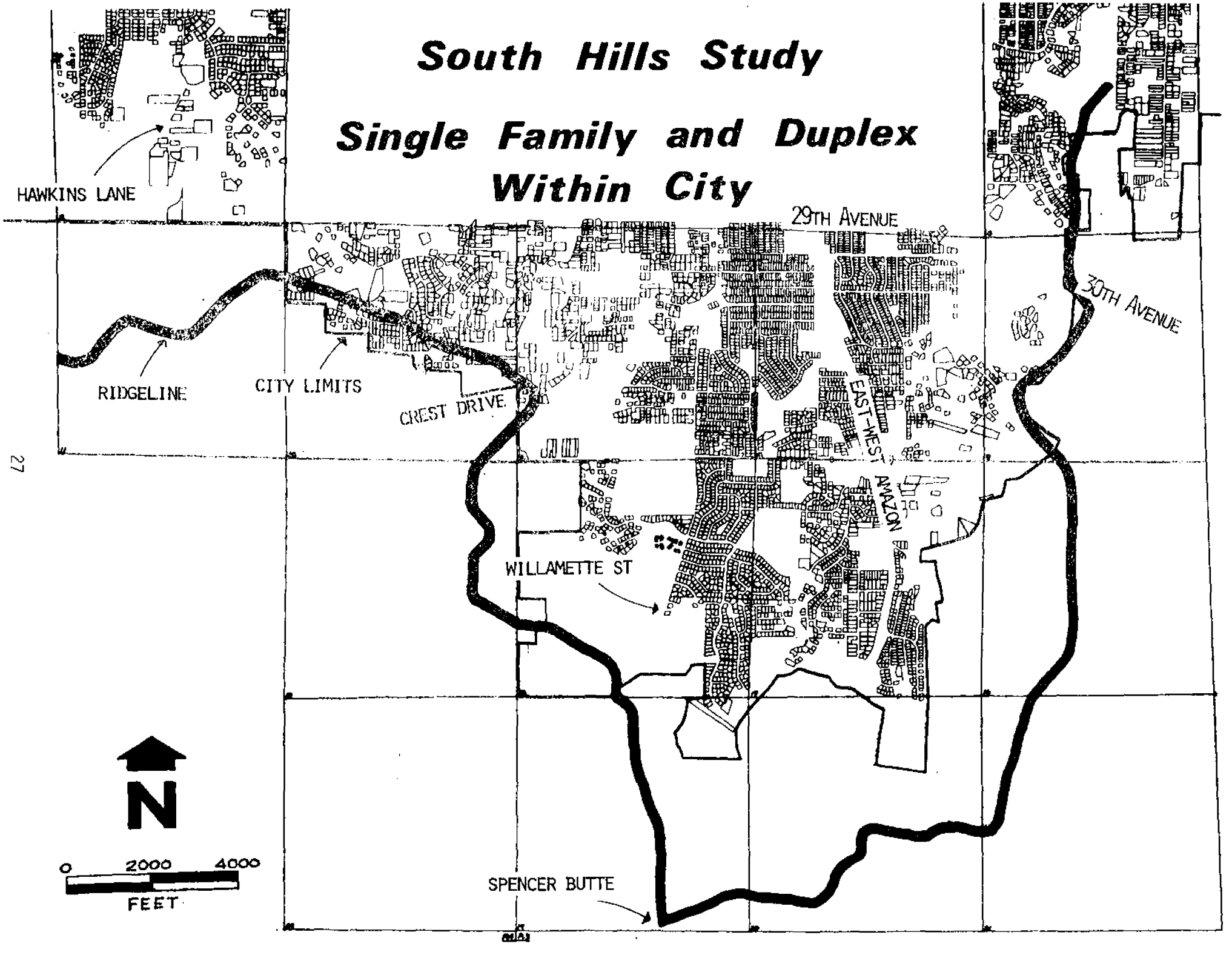
Summary

The information obtained through the land use inventory clearly indicates that the potential for further development still exists in the area included in the South Hills Study. Over 60 percent of the entire area is vacant while approximately 47 percent of the area north of the ridgeline is vacant. Alternatively, existing residential development has utilized only approximately 20 percent of the total area with a total of nearly 6000 dwelling units (within the city).

The significance of the amount of vacant acreage remaining is apparent when considering the potential development of such property. For instance, there are approximately 2148 acres of vacant property north of the ridgeline in parcels over one acre in size. If one assumes that 50 percent of this property is developed with planned unit developments at an average density of 5.45 units per acre (the average density of the 11 development proposals previously listed), an additional 5850 dwelling units could be anticipated.

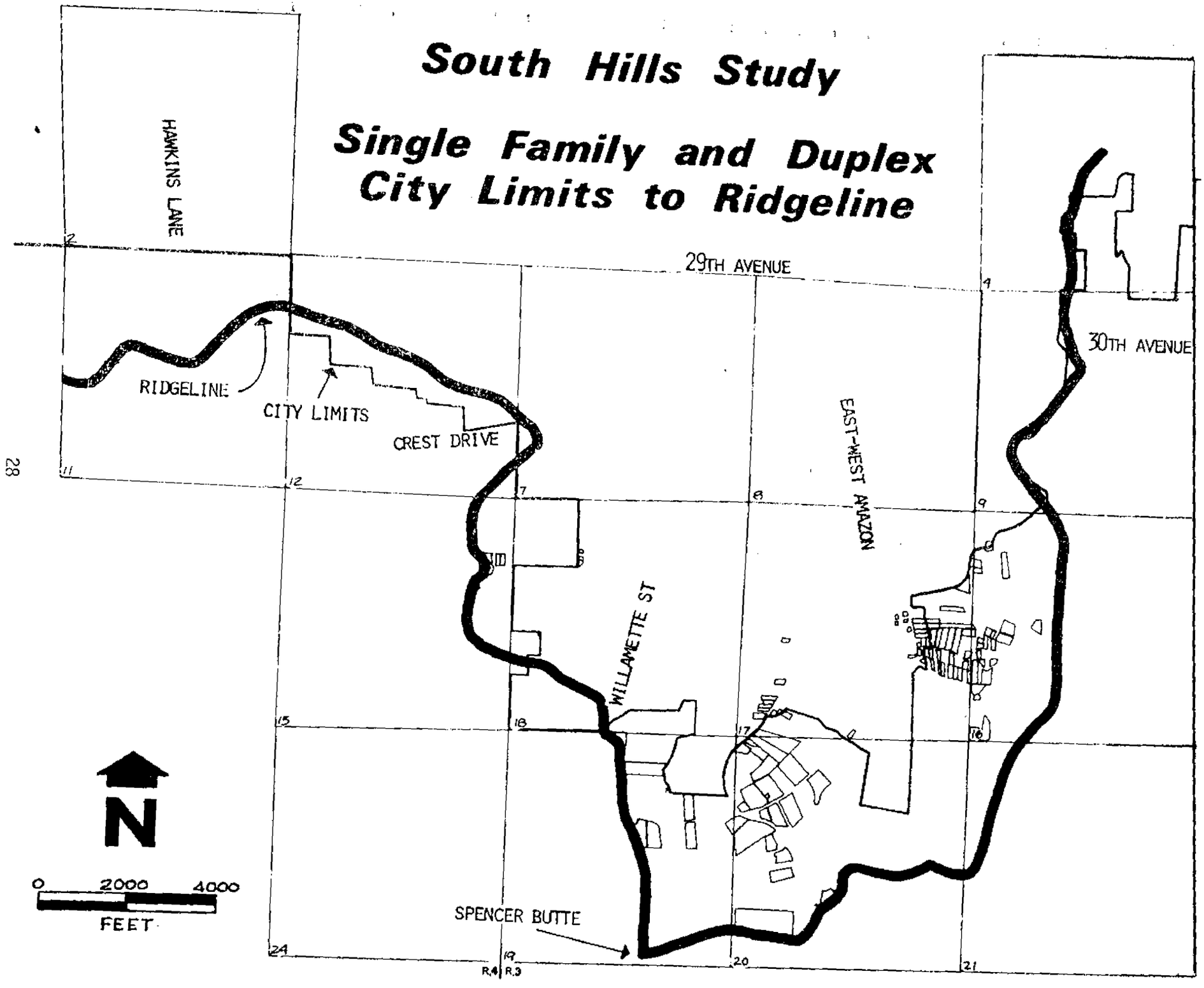
The purpose of this preliminary draft of the land use inventory was to provide data concerning existing development in the study area. No conclusions of recommendations are included at this time since the purpose of this report was simply to provide information that will be used later in formulating recommendations.


South Hills Study
Land Use Parcels
29TH AVENUE
WILLAMETTE ST
SPENCER BUTTE
N
0
2000
4000
FEET


South Hills Study
Single Family and Duplex
Within City
HAWKINS LANE
29TH AVENUE
30TH AVENUE
RIDGELINE
CITY LIMITS
CREST DRIVE
EAST-WEST
AMAZON
WILLAMETTE ST
SPENCER BUTTE
27
N
0
2000
4000
FEET

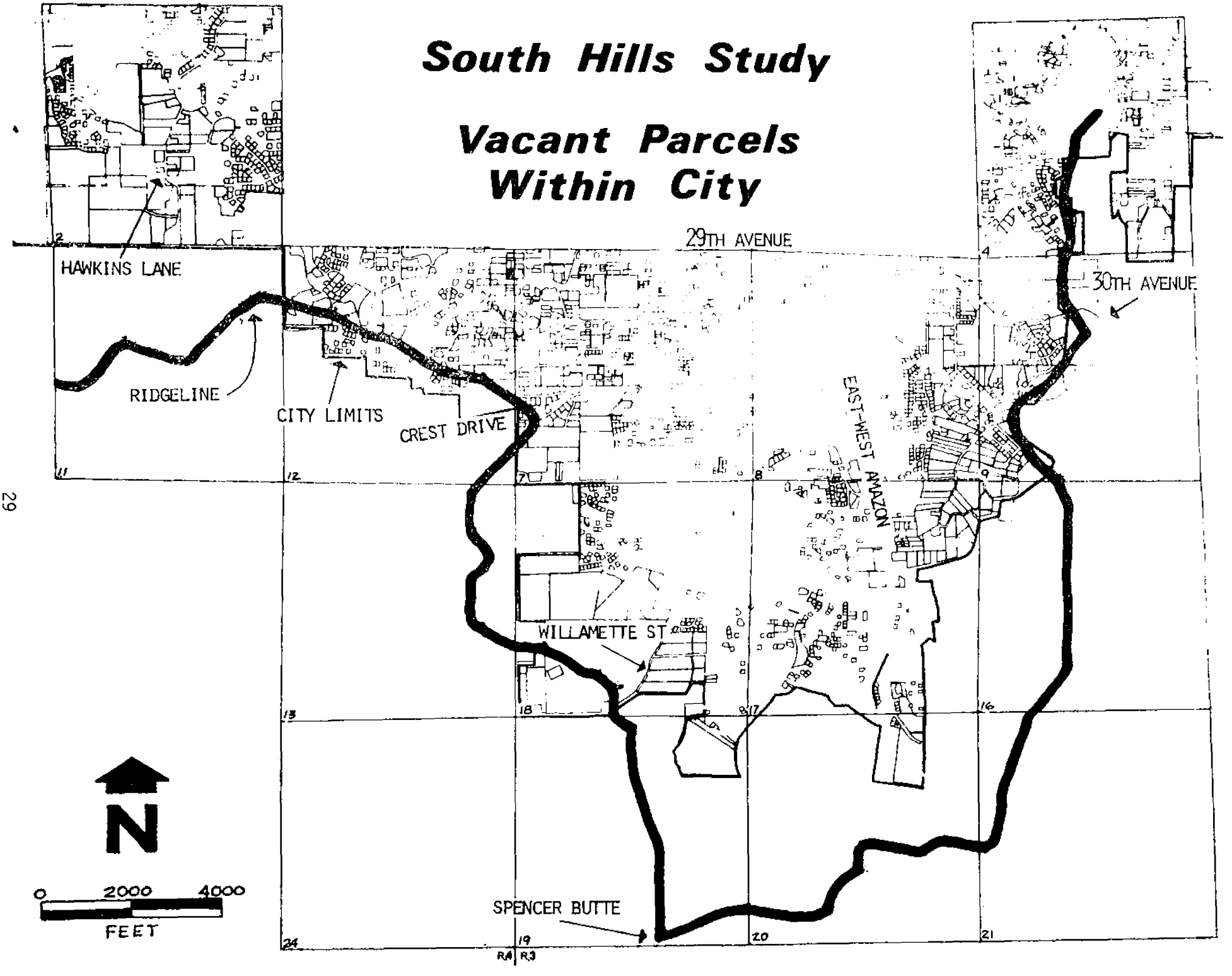
South Hills Study

Single Family and Duplex
City Limits to Ridgeline



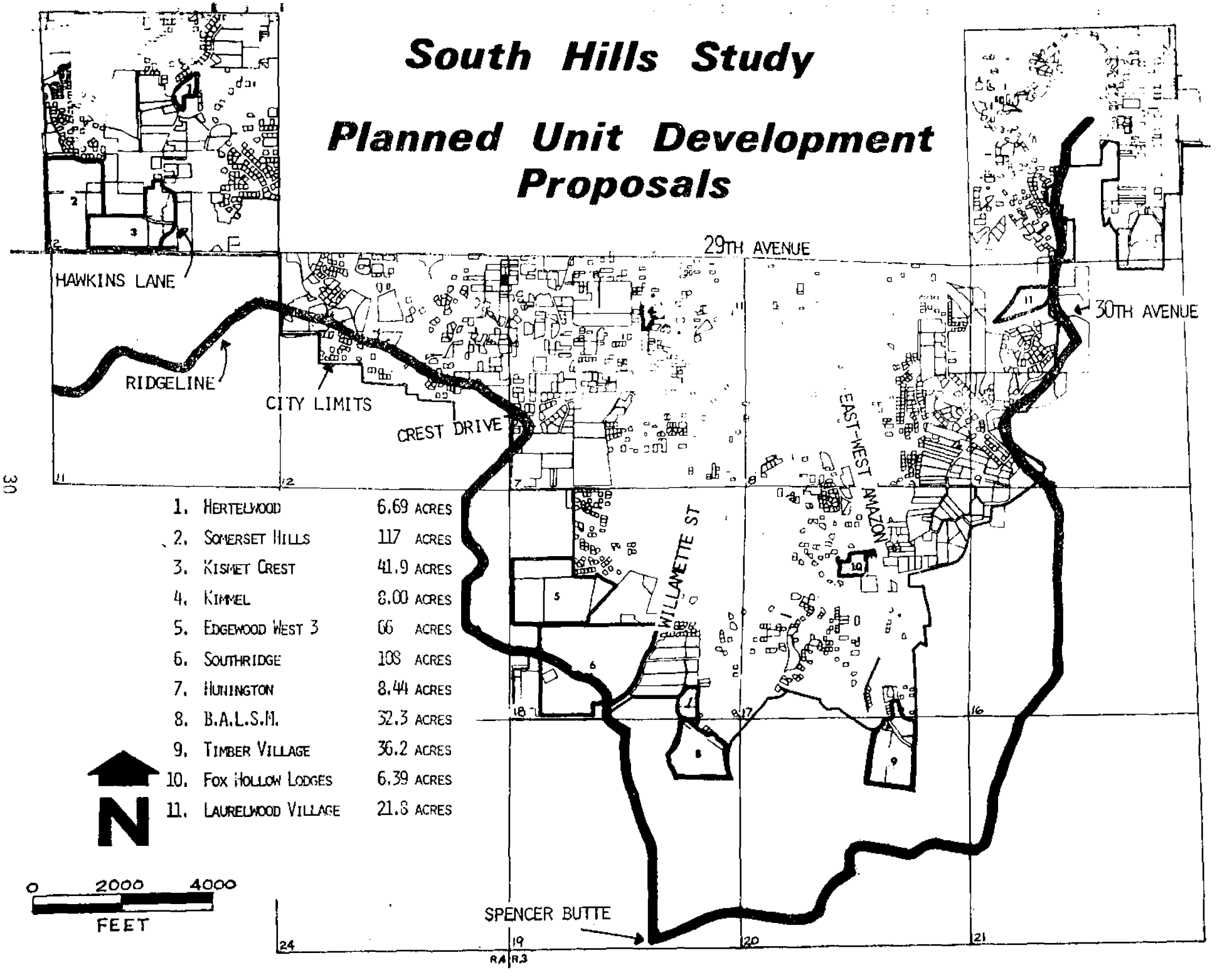
South Hills Study

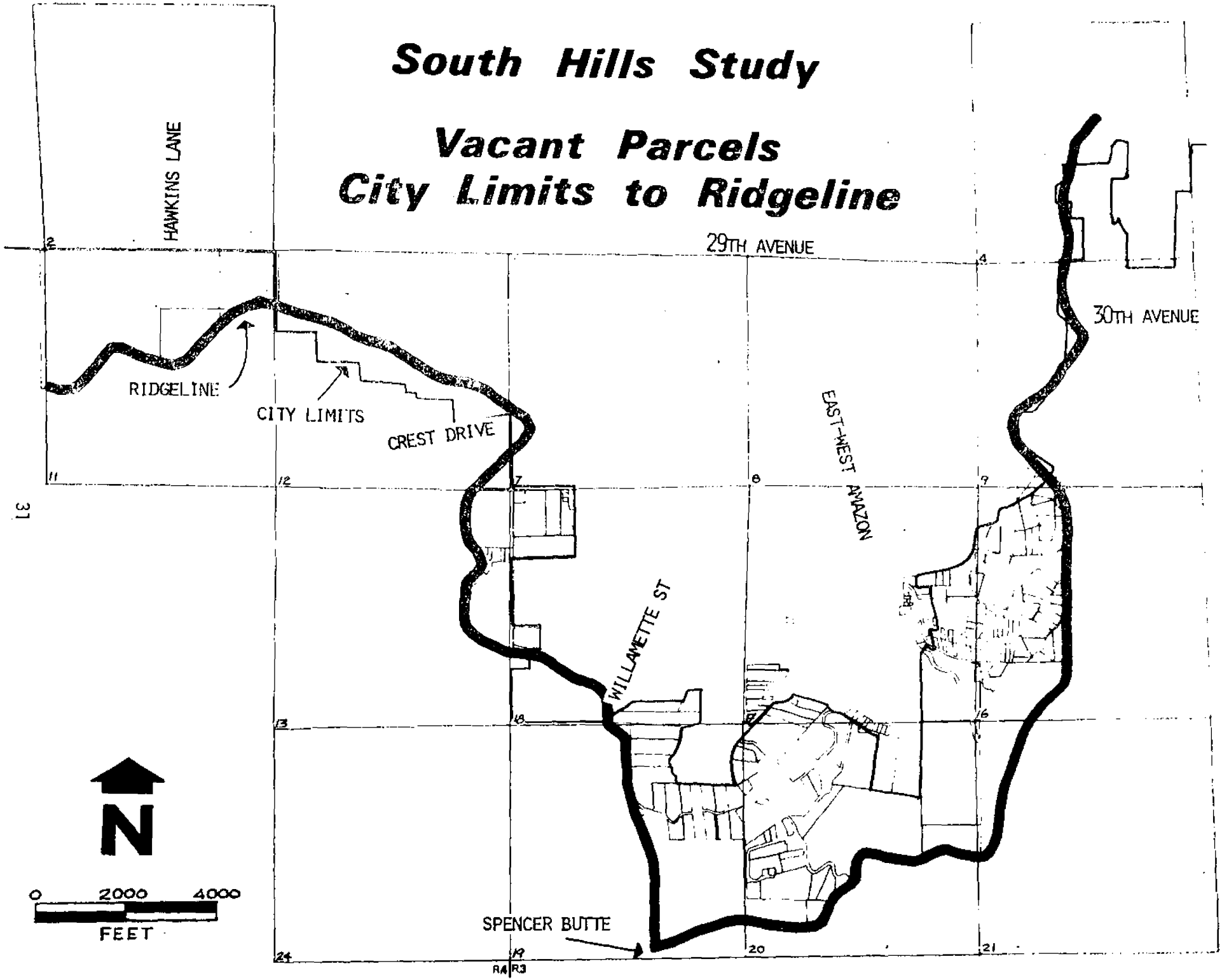
Vacant Parcels Within City



South Hills Study

Planned Unit Development Proposals




South Hills Study
Vacant Parcels
City Limits to Ridgeline
HAWKINS LANE
29TH AVENUE
30TH AVENUE
RIDGELINE
CITY LIMITS
CREST DRIVE
EAST-WEST AMAZON
WILLAMETTE ST
SPENCER BUTTE
31
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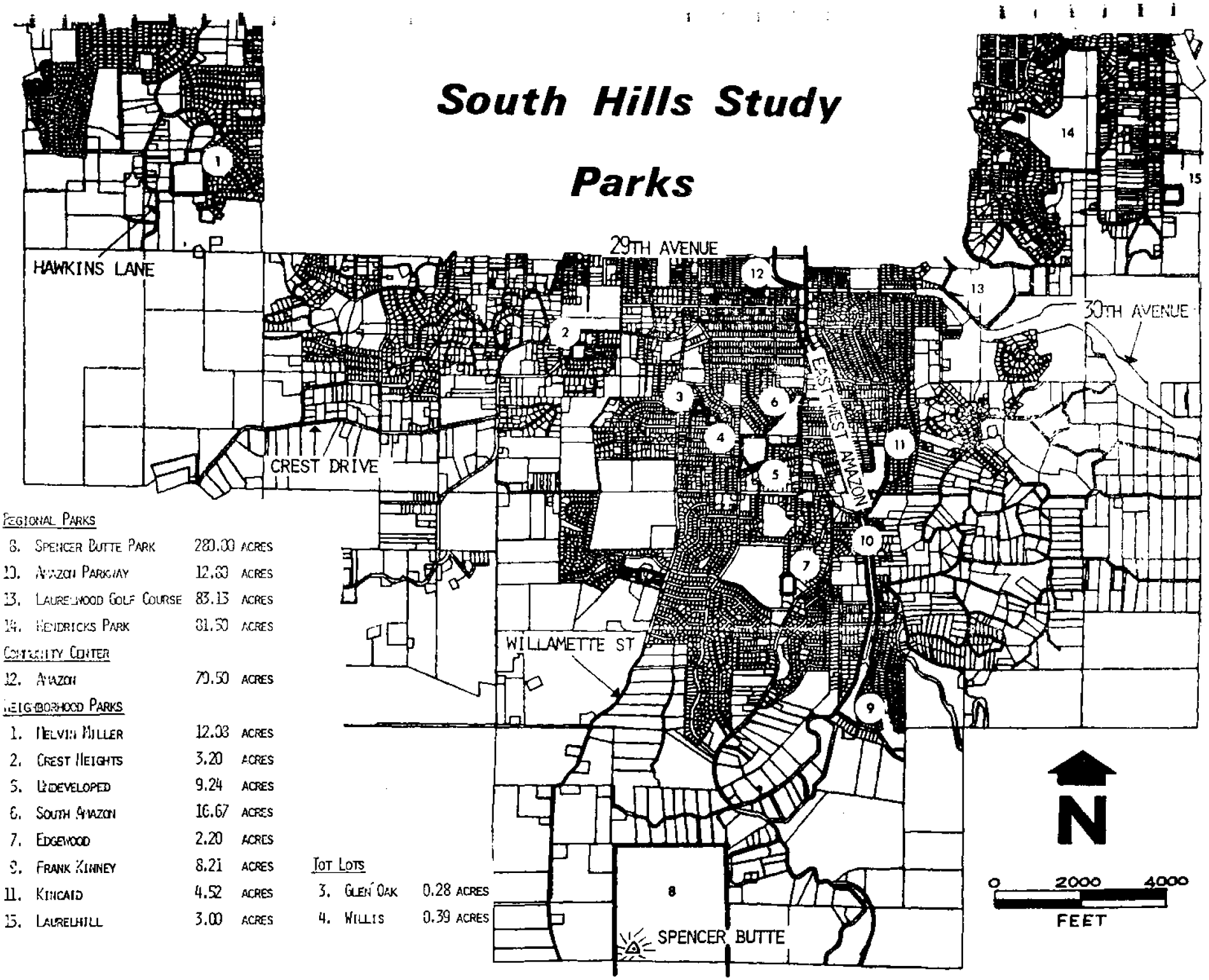
0 2000 4000
FEET
R4 R3

South Hills Study

Parks



Regional Parks

8.	Spencer Butte Park	280.00	acres
10.	Amazon Parkway	12.80	acres
13.	Laurelwood Golf Course	83.13	acres
14.	Hendricks Park	81.50	acres

Community Center

12.	Amazon	70.50	acres

Neighborhood Parks

1.	Melvin Miller	12.03	acres
2.	Crest Heights	3.20	acres
5.	Undeveloped	9.24	acres
6.	South Amazon	16.67	acres
7.	Edgewood	2.20	acres
9.	Frank Kinney	8.21	acres
11.	Kincaid	4.52	acres
15.	Laurelhill	3.00	acres

Tot Lots

3.	Glen Oak	0.28	acres
4.	Willis	0.39	acres

SOUTH HILLS STUDY

An Ecological Description and Visual Evaluation

CHRONOLOGY OF THE STUDY

Extended Study Boundaries

During Winter Term 1972/73, the consultants met with members of the Eugene Planning Department to evaluate the available information with respect to the terms in the agreement. It was noted that the topographic map provided did not include sufficient area to cover the study boundaries; 2,000 feet on either side of the ridgeline and the ridge extension to the west. (This was later resolved by the acquisition of a photo negative of U.S.G.S. maps of the Eugene/Springfield metropolitan area that were spliced togther.) During the review of the terms of the agreement, a more definitive study boundary evolved as well as a clarification of study objectives.

The boundary implied by a limitation of 2,000 feet of either side of the ridgeline was too general for an ecological study and description, due to the varied elevations and finger ridges. It was decided that such a study would require a physiographic definition for boundaries. The most obvious was the pronounced break in landform, or where the south hills meet the valley floor. The 500 foot contour was then established as the boundary of the study.

Physical and Visual Areas of Investigation

The areas of investigation were determined by a thorough examination of the agreement with the City, the interpretation of the intent and application of the study, and an evaluation of the available resources, personnel and time. The agreement covered two basic areas of investigation. The first area being physically oriented would apply to "an ecologic description of the site," "An assessment of unique natural areas that should be preserved...," "a developmental hazard map(s) and an assessment based on soil, water and vegetative interpretations...," and finally, "an assessment with criteria of the site for its road potentials and hazards." The second area being visually oriented would apply to "data supporting the assertion/assumption that the ridgeline has special value for the entire community."

Intent and Application of the Study

The interpretation of the intent and application was made after the representatives from the Planning Department reviewed the events leading up to the study and its potential in the decision making process. The intent was to provide data that was not then available, and through an analysis process, provide the Planning Department, Planning Commission and City Council with information on the physical structure of the South Hills for their recommendations and deliberations in planning for the area. The information was also to be used in discussions with the public on their recommendations or proposals affecting the South Hills. In short, the ecological opportunities and constraints were to become integral to the planning process, once the information was available.

Base Information Needed for Analysis

The evaluation of available resources, personnel and time required an inventory of the material provided by the City and the material deemed necessary for a comprehensive study by the consultants. From a series of discussions, it was determined that the base information should include:

1. Elevation Differences
2. Base Geology
3. Steepness of Slopes
4. Soils
5. Slope Orientation or Aspect
6. Stream Order
7. Vegetation and Animal Populations
8. General Views
9. Climate
10. Population, Zoning and Land Use

Since most of this information was not available, it would have to be collected by aerial photo interpretation, field observation and interpretation of information on the topographic maps. In order to facilitate the collection and processing of information, Special Studies were offered Spring Term, 1973 in each of the departments for student participation and resulted in the involvement of approximately 25 students with the study. Although the time allocated for the results was minimal, it was considered to be sufficient with the addition of personnel for the amount of material to be covered.

Study Objectives

From these preliminary meetings of the consultants with the representatives of the Planning Department, the following study objectives were formulated:

1. As assessment of the land for areas of potential surface movement.
2. An ecological description of the study area.
3. An assessment of the visual importance of the ridgeline.
4. An identification of areas recommended for detailed studies and possible acquisition.

The organization of the study for the realization of these objectives was established in the following sequence:

1. collection and recording of information and data

2. analysis of the information in the context of the stated objectives

3. meetings with interested groups for input into the study and for their information on its progress

4. synthesis by a description of the south hills and assessments related to the stated objectives.

DESCRIPTION OF DATA SHEETS

Due to the size of the study area, two scales and methods were used for its description and evaluation. The first at 1"=1000' allowed the detail of information collected to be recorded graphically, and by the use of overlays, to be analyzed. From the resultant analyses, methodologies were established for the assessments stated in the study objectives. The level of accuracy achieved at this scale makes it possible to identify particular areas and their surroundings and to isolate those requiring further investigation. With the overlay method, care must be excercised in the handling of the original plates. For this reason, and because the process of recording combinations of material is time-consuming, the graphic material was translated into the GRID computer program. (The program was developed by the Department of Landscape Architecture at Harvard University.) This is essentially the division of the study area into five acre grid cells, with each printed symbol representative of these increments. Although the information is then generalized, the program allows for rapid retrieval of the combinations of information on the total study area. The areas keyed by these combinations can then be studied in greater detail on the original base maps. Both of these scales and methods are contextual, in that they allow specific site proposals at a more definitive scale to be reviewed and evaluated in reference to their surroundings.

For the purpose of this report, the computer printouts have been reduced and are being used for illustration with the text. The base maps have been photographed and the slides with the originals have been given to the Planning Department of the City.

PLATE #1

ELEVATIONS

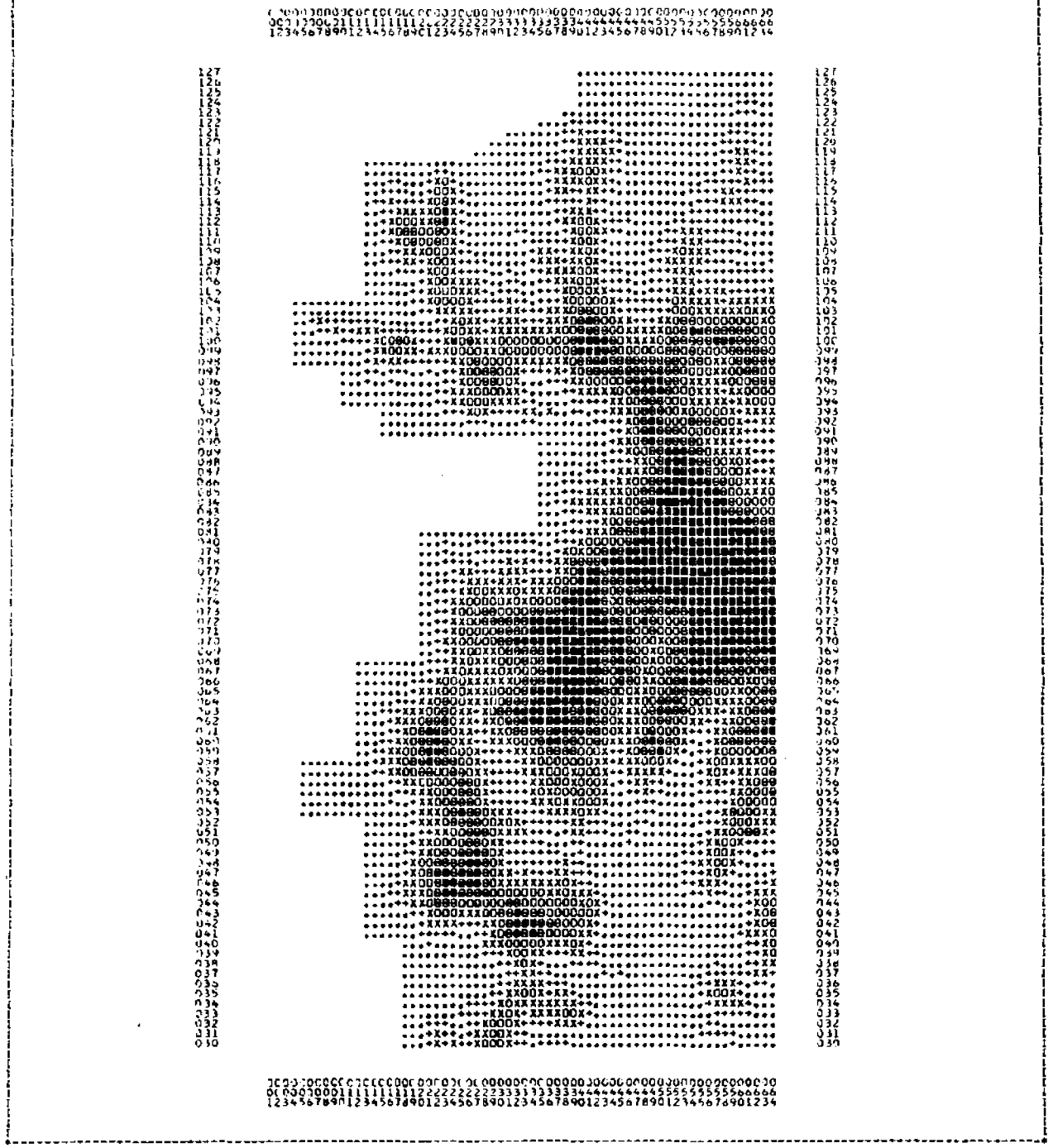
The elevation differences have been recorded in intervals of 100 feet between the elevations of 500'-1200'. Those areas with elevations that exceed 1200' include Spencer Butte at 2065', Blanton Heights at approximately 1300', and Strawberry Hill which exceeds 1200'. The hills form a horseshoe around the southern part of Eugene that varies from one to more than two miles across in an east/west direction and four miles in a north/south direction from the Downtown to Spencer Butte.

The hills form this basin north of the ridgeline with termination in the Amazon Drainage. There are a number of basins on the other side of the ridgeline that include the Spencer Creek drainage to the west, Camas Swale to the southeast, Russel Creek to the east and Laurel Hill to the northeast.

The most pronounced elevation points along the ridgeline are Judkins Point, Hendricks Park, South Agate, Strawberry Hill, Spencer Butte, Blanton Heights and Hawkins Heights.

The average elevation for the definition of the rigeline is 800', however, this varies with the more pronounced landforms.

MAP 1,SHEET 1,DATA SET 1



SOUTH HILLS STUDY

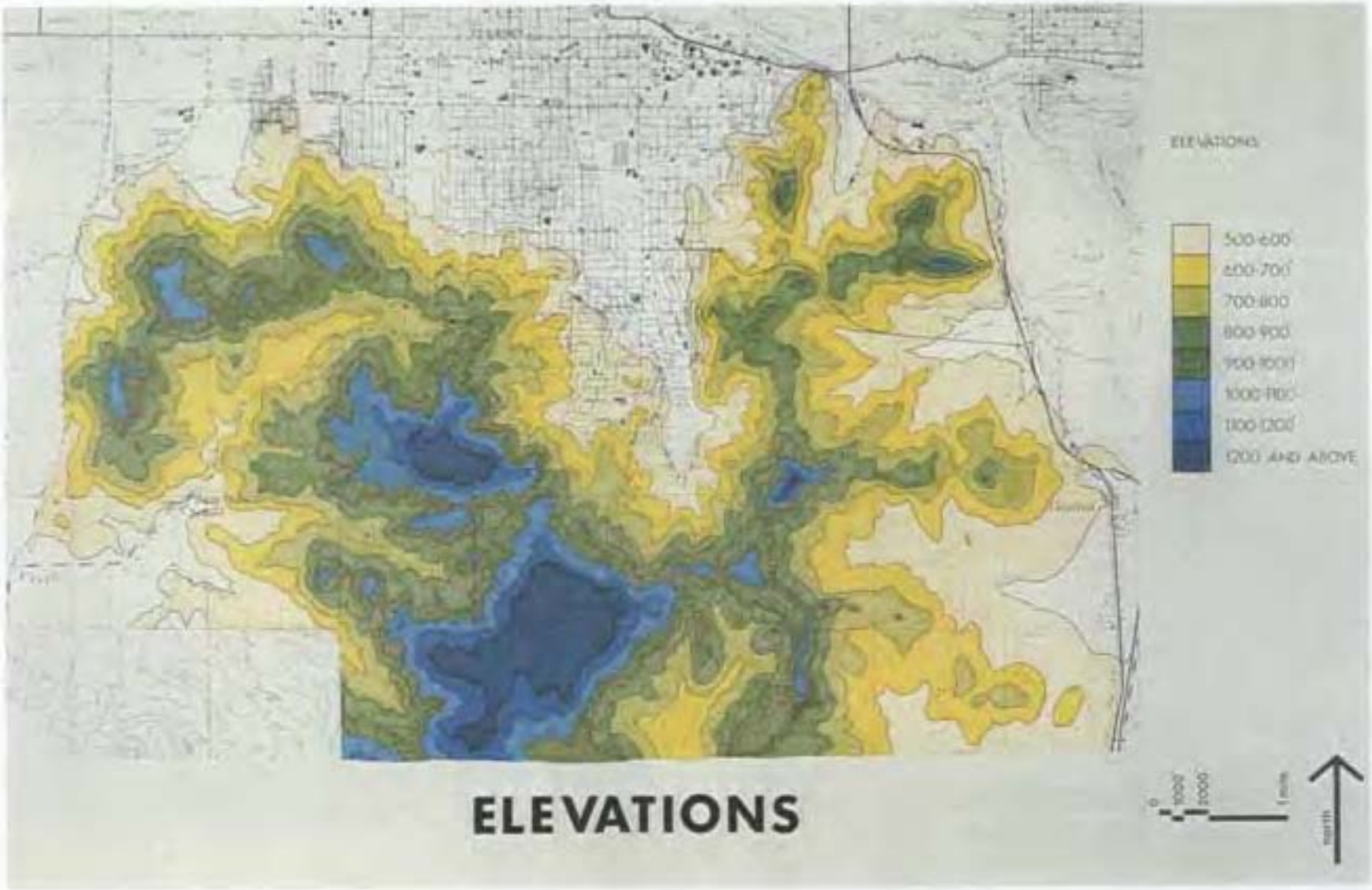
DEPARTMENT OF LANDSCAPE ARCHITECTURE

UNIVERSITY OF OREGON, SUMMER 1973

TOPOGRAPHY

0= C- 500'
1= 501- 600'
2= 601- 700'
3= 701- 800'
4= 801-900'
5= 901-1000'
6= 1001-1100'
7= 1101-1200'
8= 1201+

LEVELS	0	1	2	3	4	5	6	7	8	9
SYMBOLS	0	1	2	3	4	5	6	7	8	9
FREQUENCY	526	997	878	774	634	406	217	105	0	139


ELEVATIONS
500-600
600-700
700-800
800-900
900-1000
1000-1100
1100-1200
1200 AND ABOVE
0
1000'
2000'
1 mile
north

ELEVATIONS

PLATE #2

GEOLOGY

There are five geologic units in the study area of the South Hills that include the Fisher formation (Tf, tertiary fisher), Intrusive rock (Ti, tertiary instrusive), Basalt flows or extrusive rock (Tb, tertiary basalt), Eugene formation (Te, tertiary Eugene), and Alluvial deposits (Qal, quaternary alluvium).

The Fisher formation (Tf) is the oldest of the geologic units (approximately 35 million years) and is found mainly along Bailey Hill Road and Spencer Creek to the west with some outcrops near Russell Creek to the east. This formation is mainly composed of non-marine volcanic sands and has a very peculiar chemical signature; an abundance of minerals or elements like antimony, bizmuth, mercury, iron and arsenic. Water from the Fisher is exceedingly toxic, and because the formation dips gradually (five or ten degrees) toward the east, it underlies much of the South Hills area. The Fisher weathers slowly and breaks down to sand, silt and clay.

The intrusive rock (Ti) is volcanic material that has crystallized or cooled beneath the surface and is only exposed by erosion (Spencer Butte and Judkins Point are examples). This unit is roughly 25 million years old and because of its structure (columnar basalt) weathers very slowly and tends to develop residual hills or ridges.

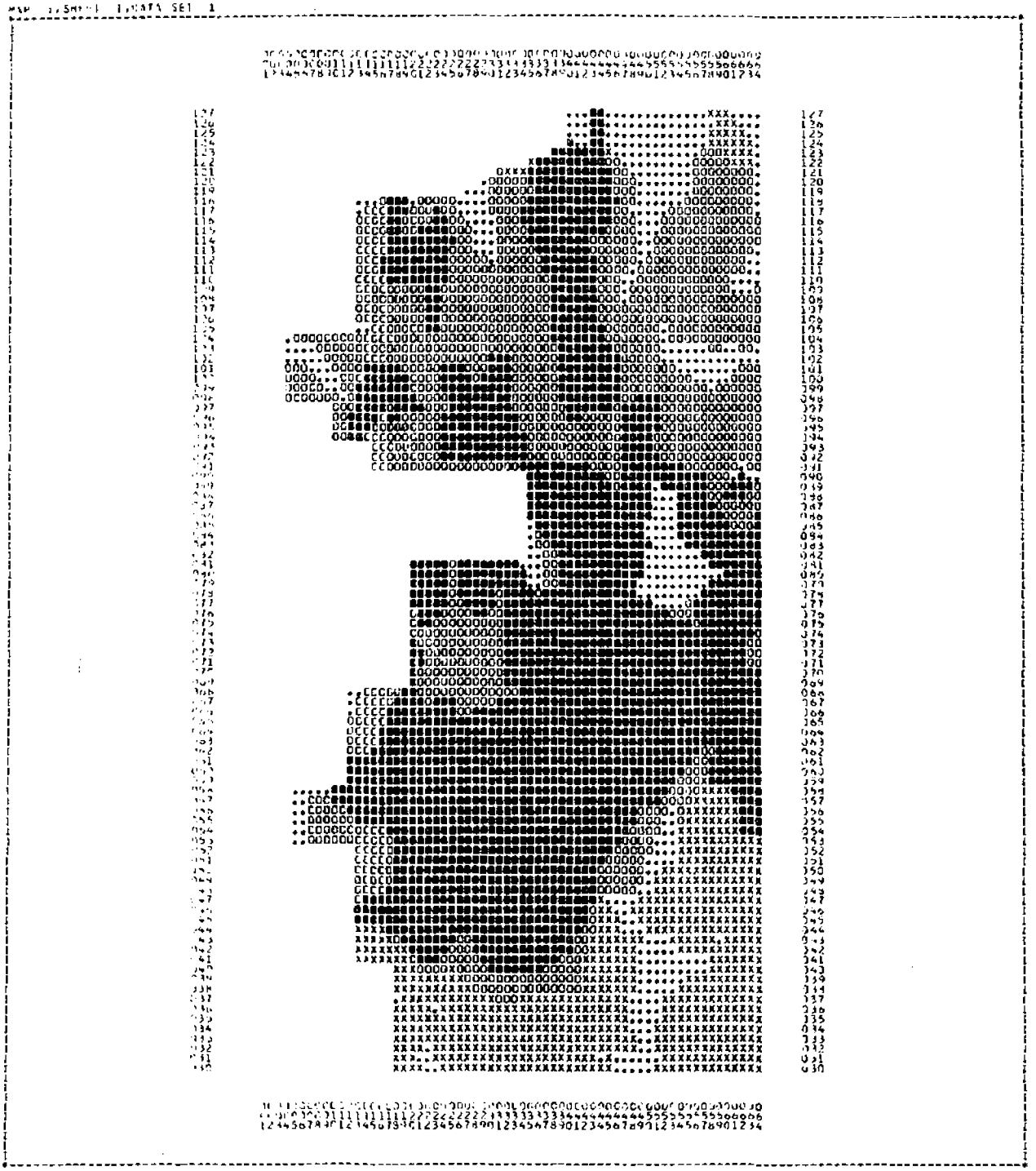
The Basalt flows (Tb) are also volcanic material (approximately 24 million years), but have cooled from the surface and weather to a clay. The general distribution of these flows is in the ridgeline area to the south and southwest and although they tend to hold up ridges, they weather rapidly in the form of rolling hills.

The Eugene formation (Te) is a marine sandstone (approximately 33 million years) and overlays the Fisher. Because of this layering, it tends to develop a dip-slope (gradual slope on the eatern exposure and very pronounced slope to the west) with the most intensive weathering on the east. Drilling into the Eugene formation can cause contact with the Fisher and the aforementioned problems. This unit weathers very slowly, though not as slowly as the Fisher, and breaks down to sand, silt and clay.

The last unit is the Alluvium (Qal) which is found at the lower elevations following the drainages. These deposits have well-developed profiles, containing gravel in the lower parts with a graduation to river loam in the upper parts.

There are two visible faults in the Eugene area. One is to the west of the study area, the other running to the northeast from Spencer Butte, between

the Eugene formation and Basalt flows. There is a sharp ridge there but no evidence of recent activity. This fault is characterized by mineralization along the fault line and erosional differences. Neither of these faults is of appreciable concern as far as movement.



SHORT HILLS STUDY

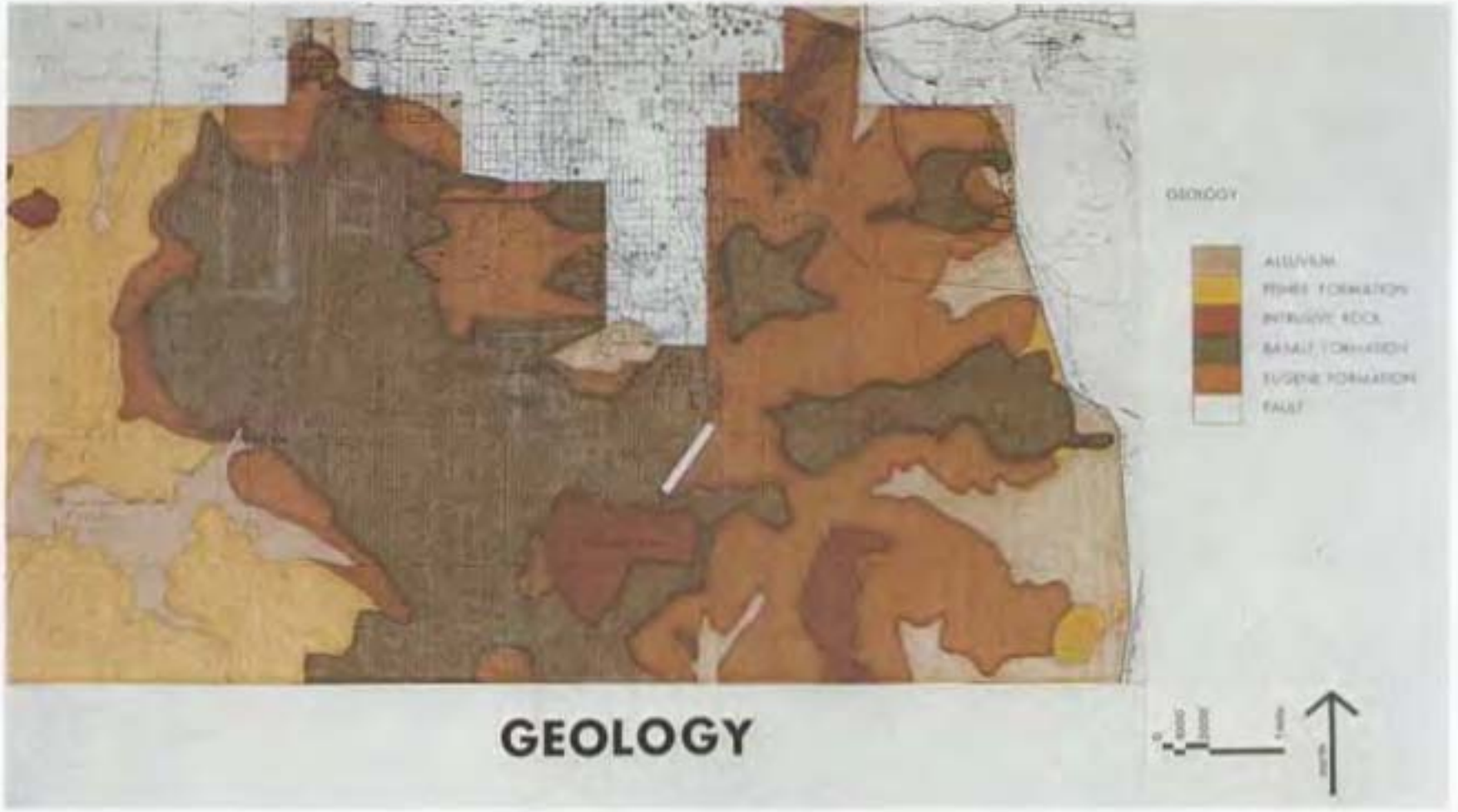
DEPARTMENT OF LANDSCAPE ARCHITECTURE

UNIVERSITY OF OREGON, SUMMER 1973

GEOLOGY

0 - INTRUSIVE BASALT
2 - ALLUVIUM
4 - FISHER FORMATION
5 - EUGENE FORMATION
8 - EXTRUSIVE BASALT
9 - FAULT

LEVEL	0	1	2	3	4	5	6	7	8	9
					XXXXXXXXX	000000000				
					XXXXXXXXX	000000000				
					XXXXXXXXX	000000000				
					XXXXXXXXX	000000000				
					XXXXXXXXX	000000000				
ACRES	129	0	197	0	668	1401	0	0	2112	13


GEOLOGY
ALLUVIUM
FISHES FORMATION
INTRUSIVE ROCK
BASALT FORMATION
TUFFINE FORMATION
FAULT

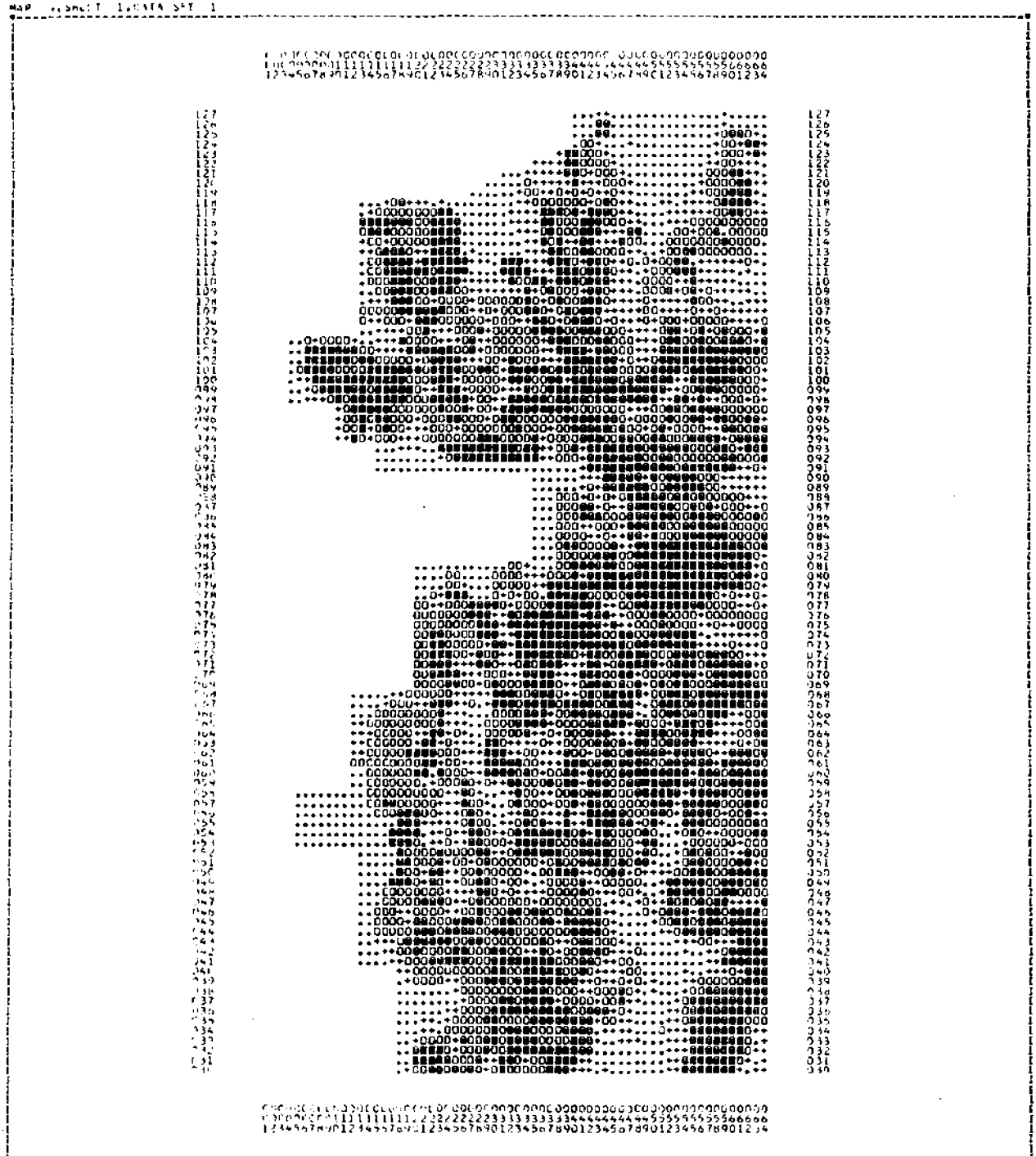
GEOLOGY

PLATE #3

SLOPES

The slopes in the South Hills study area were classified in the following increments: 0%-3%, 3%-12%, 12%-20%, 20%-30% and 30% and above. This series of ordering was selected for two primary reasons. First, it is a common classification utilized by the Soil Conservation Service of the U.S. Department of Agriculture and second, the series corresponds closely to that in frequent use for differing methods of construction.

All of the above slope ranges are found in the South Hills. Slopes from 0%-3% are the least frequent but do occur in small isolated areas as in the Russel Creek drainage near L.C.C.; southwest of Spencer Butte along South Willamette Street; along Crest Drive and the Lorane Highway west of Crest Drive School; and along the bottom lands of Spencer Creek in the area of McBeth Road, Bailey Hill Road and the Lorane Highway. Slopes in the range from 3%-12% occur throughout the area, but are generally confined to the lower hill slopes adjacent to drainage channels and at/or near the ridge crest; i.e. Blanton Heights and South of 30th Avenue. Hillsides throughout the ridge area exhibit steeper slopes, between 12% and 30%, with no one area dominating the overall distribution; although gradients of 20%-30% do appear to be more frequent to the east and west of Spencer Butte in the Amazon Creek Drainage area. The steepest slopes, those greater than 30%, are found throughout the area but are concentrated on Judkins Point; on the Eugene formation along the east side of Amazon drainage between 32nd and 44th Streets; to the northwest of Spencer Butte in the vicinity of Center Way, surrounding and including Spencer Butte, and extending north to Willamette Street; and around Blanton Heights, both northeast of the tower near Sunset Hills Memorial Garden and south of the summit near the powerline right-of-way.



SOUTH HILLS STUDY

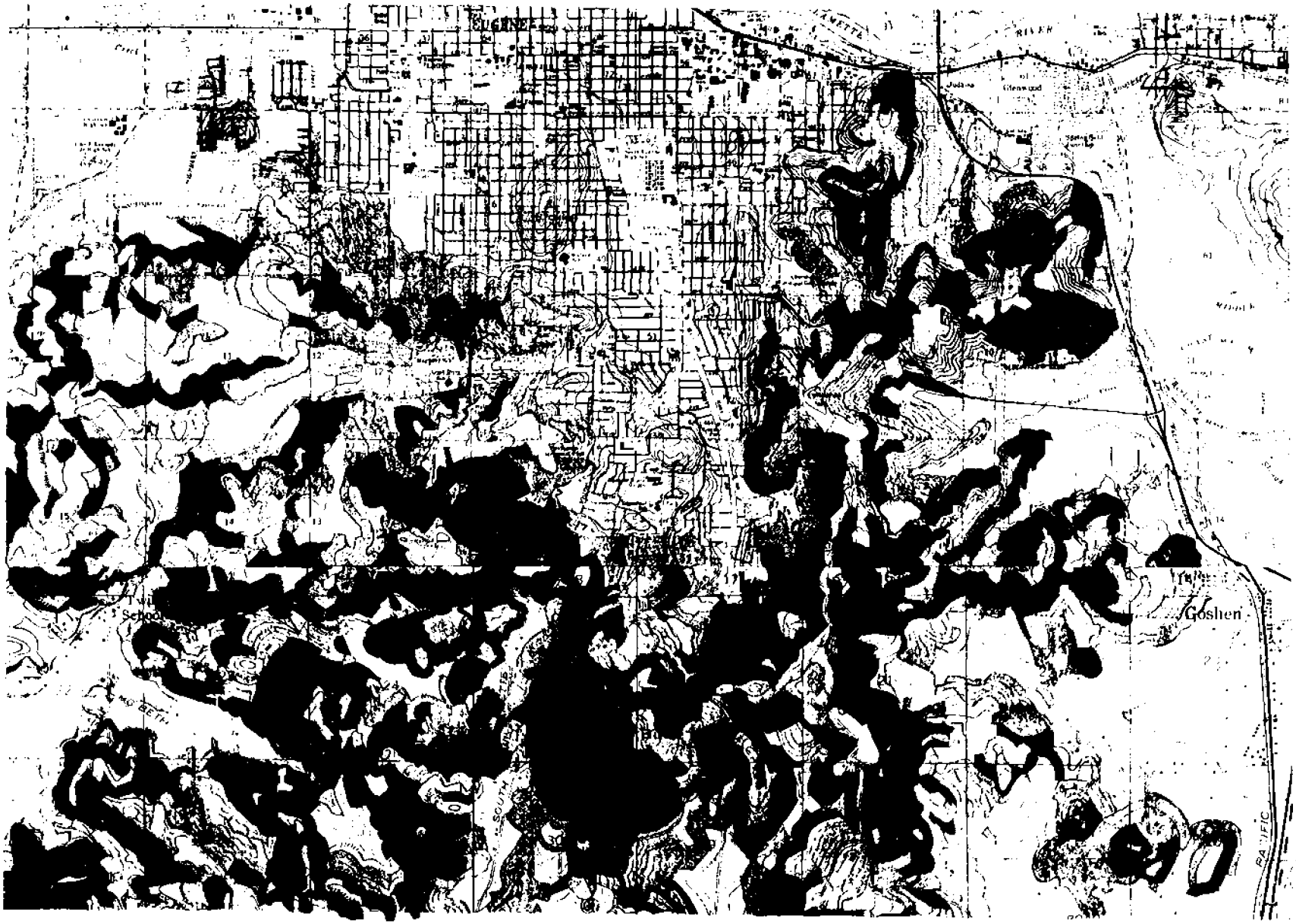
DEPARTMENT OF LANDSCAPE ARCHITECTURE

UNIVERSITY OF OREGON, SUMMER 1975

SLOPE

0 = 1- 3%
3 = 3-12%
5 = 12-20%
7 = 20-30%
9 = 30%+

LEVELS	1	3	5	7	9
	878	1453	1144	537	


EUGENE
Goshen
SLOPE
0-3%
3-12%
12-20%
20-30%
30% & above
0
1/2
1 mile
north

SLOPE

PLATE #4

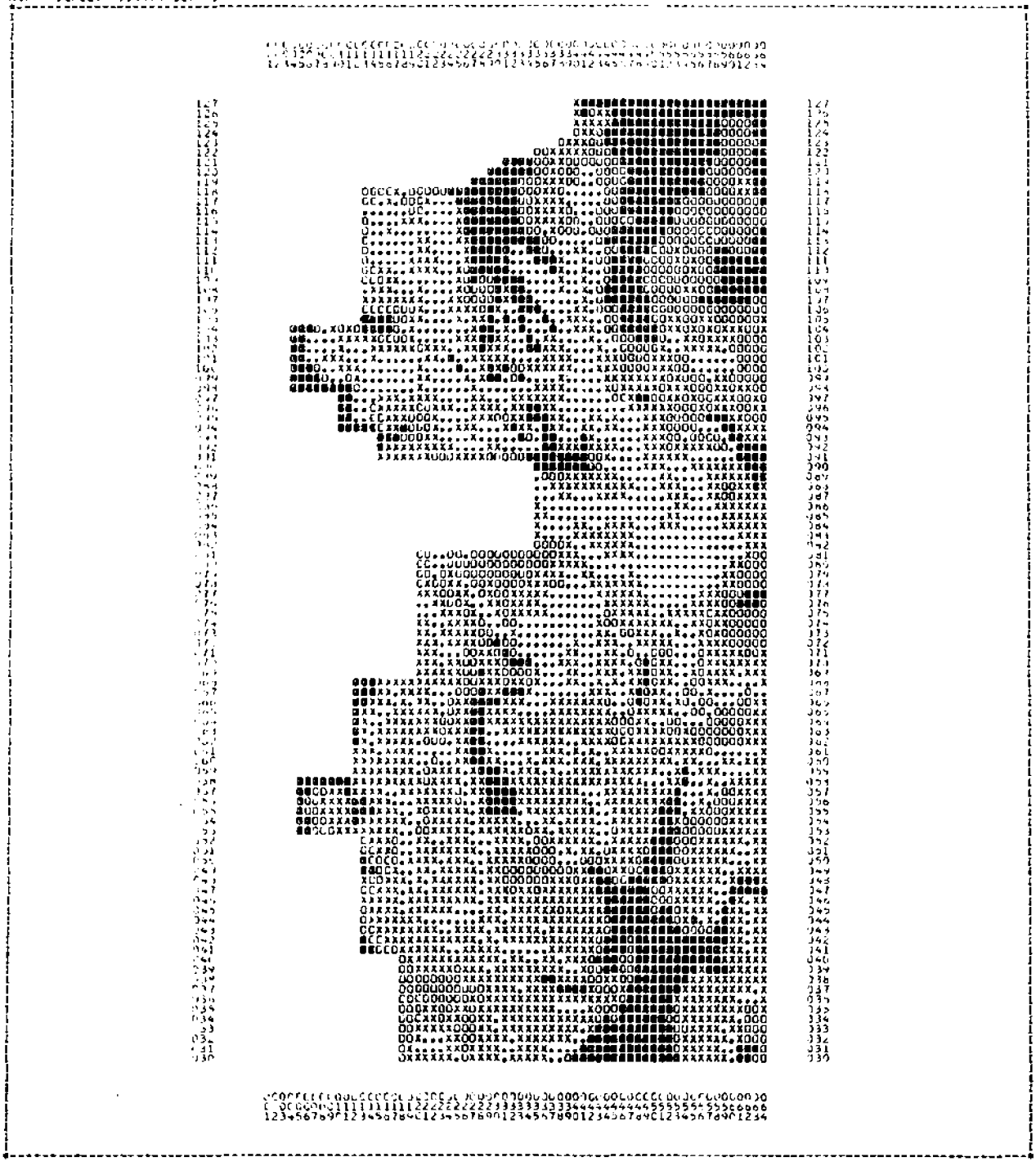
SOILS

Since the soils mapping and interpretation guides furnished by the Lane County Department of Public Works were restricted to the original study area (2,000 feet on either side of the ridgeline), information was not available in that form for the extended boundaries. In addition, reviews of reports by engineering geologists on proposed developments indicated refinements of the information had been found necessary as on-site investigations were conducted. For these reasons, and because soil depth was considered to be of primary significance for slope stability, an independent investigation on depth of soils was undertaken.

The information recorded for depth of soils was determined by slope and erosion analysis from maps and aerial photos, test borings and the test boring results from the study of the Russel Creek basin by Nelson and Worth of CH_2M. The resulting map shows that soils with a depth greater than 80" are largely confined to the alluvial channel deposits of the Spencer, Amazon and Russel Creeks. This depth is also found in the smaller main tributary valleys of these channels and in the colluvial material near the breaks in slopes at the margins of major valley forms.

Soils between 20 and 60 inches in depth occur throughout the study area on the intermediate slopes, the flatter hill tops, the ridges and in minor swales. Shallow soils (less than 20 inches in depth and in some instances where no soil exists) are found on the steepest slopes and correspond to areas of intrusive volcanic material such as Spencer Butte, Judkins Point, and those areas of extrusive material where combinations of slope, vegetation, runoff and lithology have resulted in increased surface erosion and/or mass movement. As the map shows, there is no one area where a particular soil depth exists to the exclusion of others; although the western section does not exhibit the variety of depths found in the more rugged topography of the eastern side where slopes are steeper and the intrusive volcanics are an integral part of the geologic structure.

MAP 1 SHEET 1 DATA SET 1



SOUTH HILLS STUDY

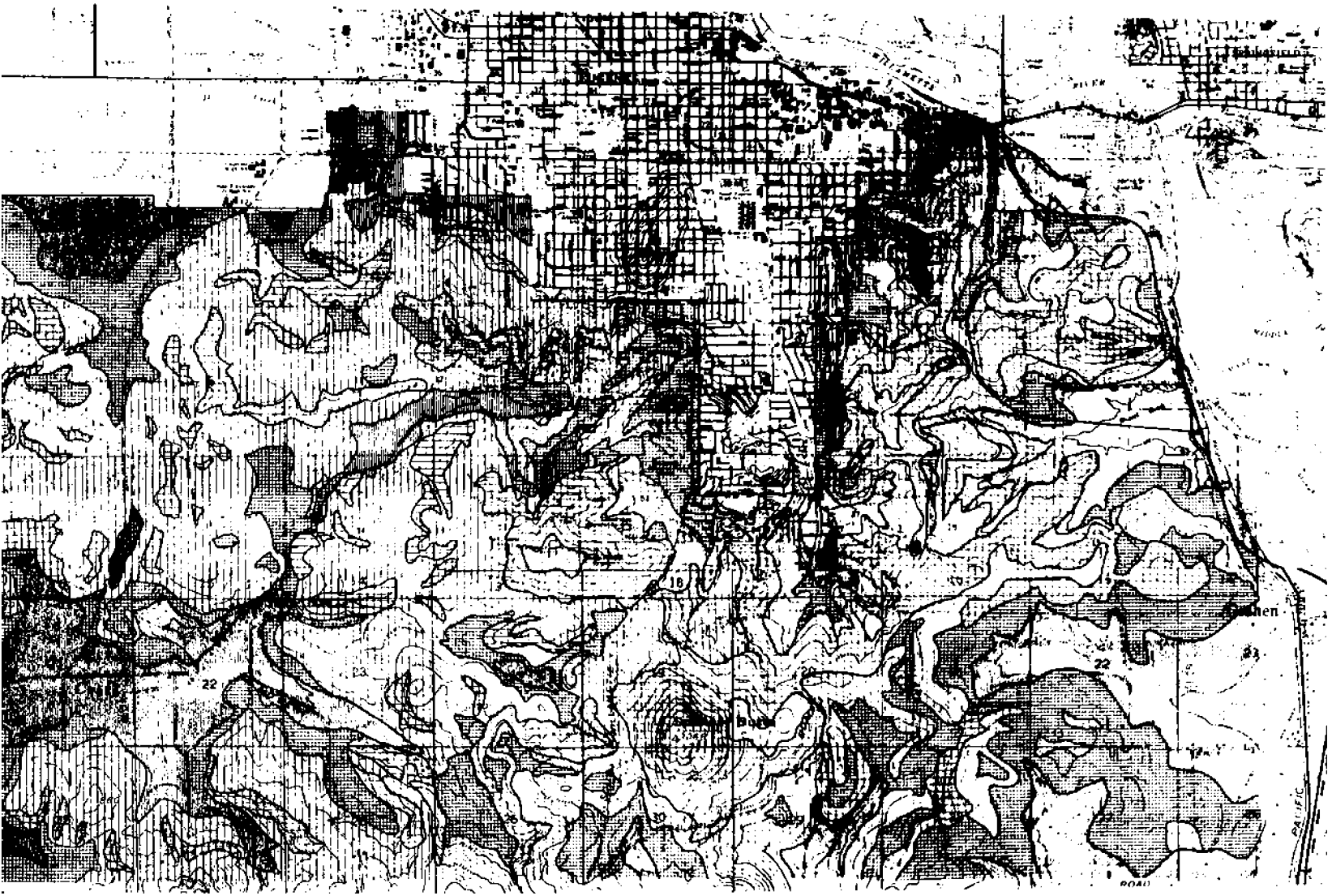
DEPARTMENT OF LANDSCAPE ARCHITECTURE

UNIVERSITY OF OREGON, SUMMER 1973

SOIL DEPTH

1 = 0- 12"
2 = 13- 20"
4 = 21- 40"
5 = 41- 60"
7 = 61-100"
9 = 100"+

LEVELS	0	1	2	3	4	5	6	7	8	9
SYMBOLS	.	1	2		X	0		7		9
FREQUENCY	0	129	549	0	1856	911	0	549	0	293



SOIL DEPTH

- 0-20 inches
- 20-40 inches
- 40-60 inches
- 60 inches & above

SOIL DEPTH

0 1/2 1 mile

north

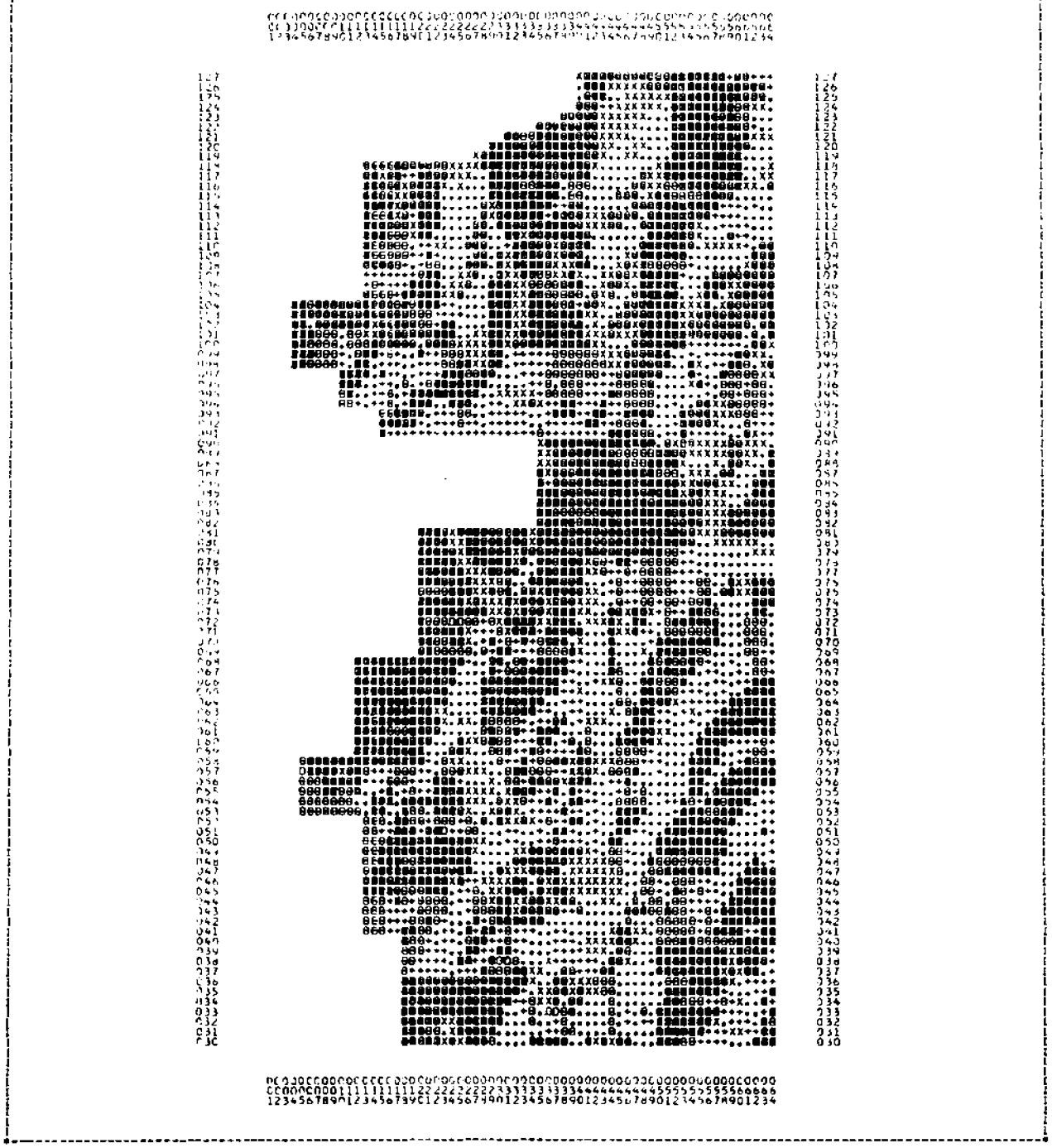
PLATE #5

SLOPE ORIENTATION

The configuration of the ridgelines in the most observable part of the south hills is that of a horseshoe enclosing the southern section of the Eugene metropolitan area. The outline of the main ridge and the changing alignment of its associated finger ridges, or spurs, provides a continually changing orientation of slopes. This map of slope orientation illustrated their aspects in eight compass directions--north, northeast, east, southeast, south, southwest, west and northwest.

Few generalities from this information can be made. However, the northwest, north and northeast facing slopes dominate the section of the hills adjacent to the build-up part of the City. South facing slopes do not become signifcant without crossing the main ridge into the drainages of Spencer, Camas and Russel Creeks, or south of Spencer Butte.

MAP 1, SHEET 1, DATA SET 1



SOUTH HILLS STUDY

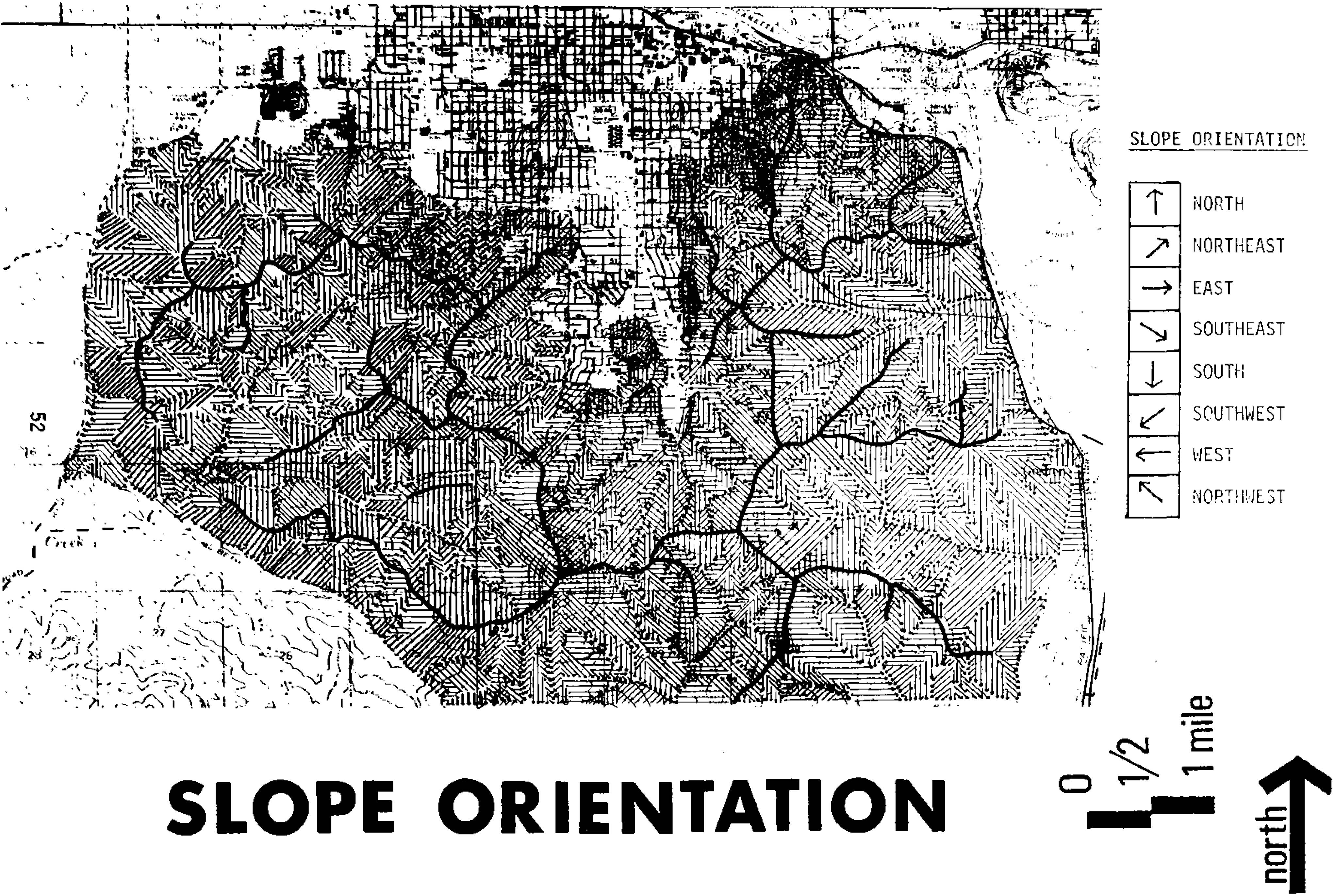
DEPARTMENT OF LANDSCAPE ARCHITECTURE

UNIVERSITY OF OREGON, SUMMER 1973

SLOPE ORIENTATION

0 = SOUTH
2 = SOUTHWEST
3 = WEST
4 = SOUTHEAST
6 = NORTHWEST
7 = EAST
8 = NORTHEAST
9 = NORTH

LEVELS	0	1	2	3	4	5	6	7	8	9
SYMBOLS	0		2	3	4		X	X	X	X
FREQUENCY	475	0	442	567	460	0	566	726	759	681



SLOPE ORIENTATION

PLATE #6

STREAM ORDER

Streams, or surface drainage, have been plotted by stream order, a mechanism which permits the identification of the relative magnitude of water courses. This classification was necessitated by the lack of quantitative information regarding volume of flow or discharge for streams in the study area.

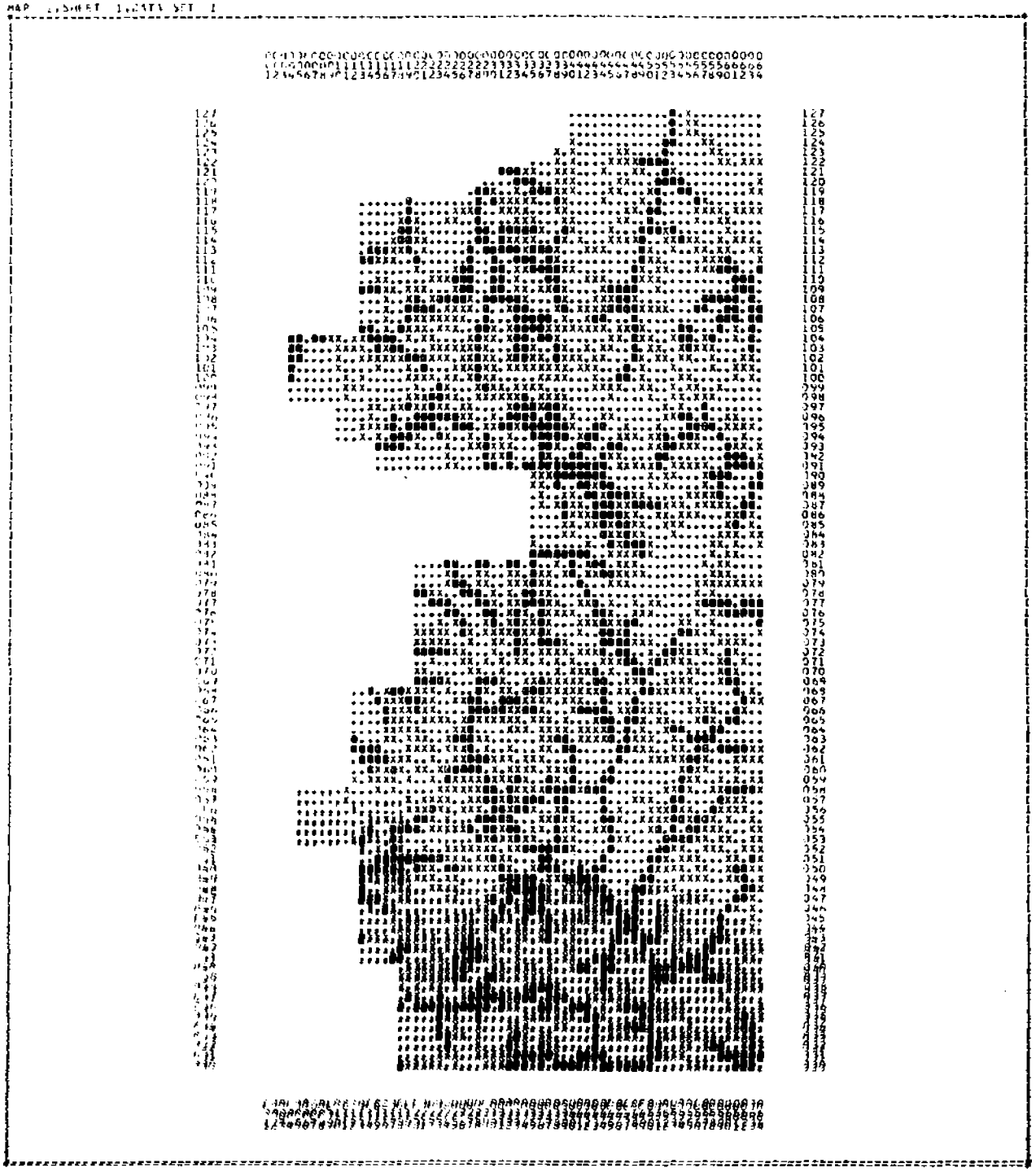
First order streams are the smallest unbranched channels and tributaries which are found most frequently at the higher elevations and slopes in drainage headwaters. Second order channels are those formed as two first order streams join; third order channels result from the confluence of two second order streams and fourth order features result from the joining of two third order channels.

The drainage characteristics of the south hills are generally uniform throughout the area with small intermittent channels on the higher slopes combining to form nearly perennial or perennial channels at the lower elevations. The first and second order streams are dominant and are usually intermittent channels which carry water during the winter season only. Third and fourth order channels in the area are usually perennial; carrying some water year-round.

The relative amounts of water carried; the significance of various streams; and the areas drained by particular stream courses are thus inferred from stream order. The greatest volumes of water carried from the study area accumulate and flow through the Spencer Creek drainage to the west and that branch that parallels the Lorane Highway. Of perhaps greater concern and significance, however, is the runoff into Amazon Creek, the second major fourth order channel in the study. This stream and its first and second order tributaries drains the major northward oriented slopes of the south hills including the north flank of Spencer Butte.

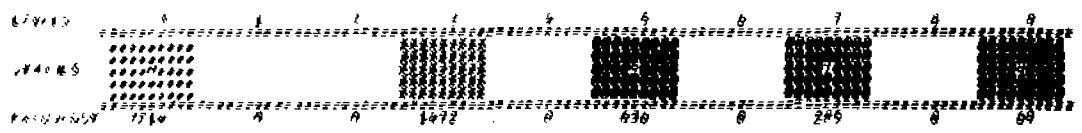
Drainages in the eastern and northeastern portions of the study area are reflected in the water sheds of Russel Creek basin and Laurel Hill valley. Russel Creek is a fourth order channel, but one draining a smaller area and having less discharge than Amazon Creek. The Laurel Hill drainage is a third order channel with considerably less volume than Spencer, Amazon or Russel Creeks.

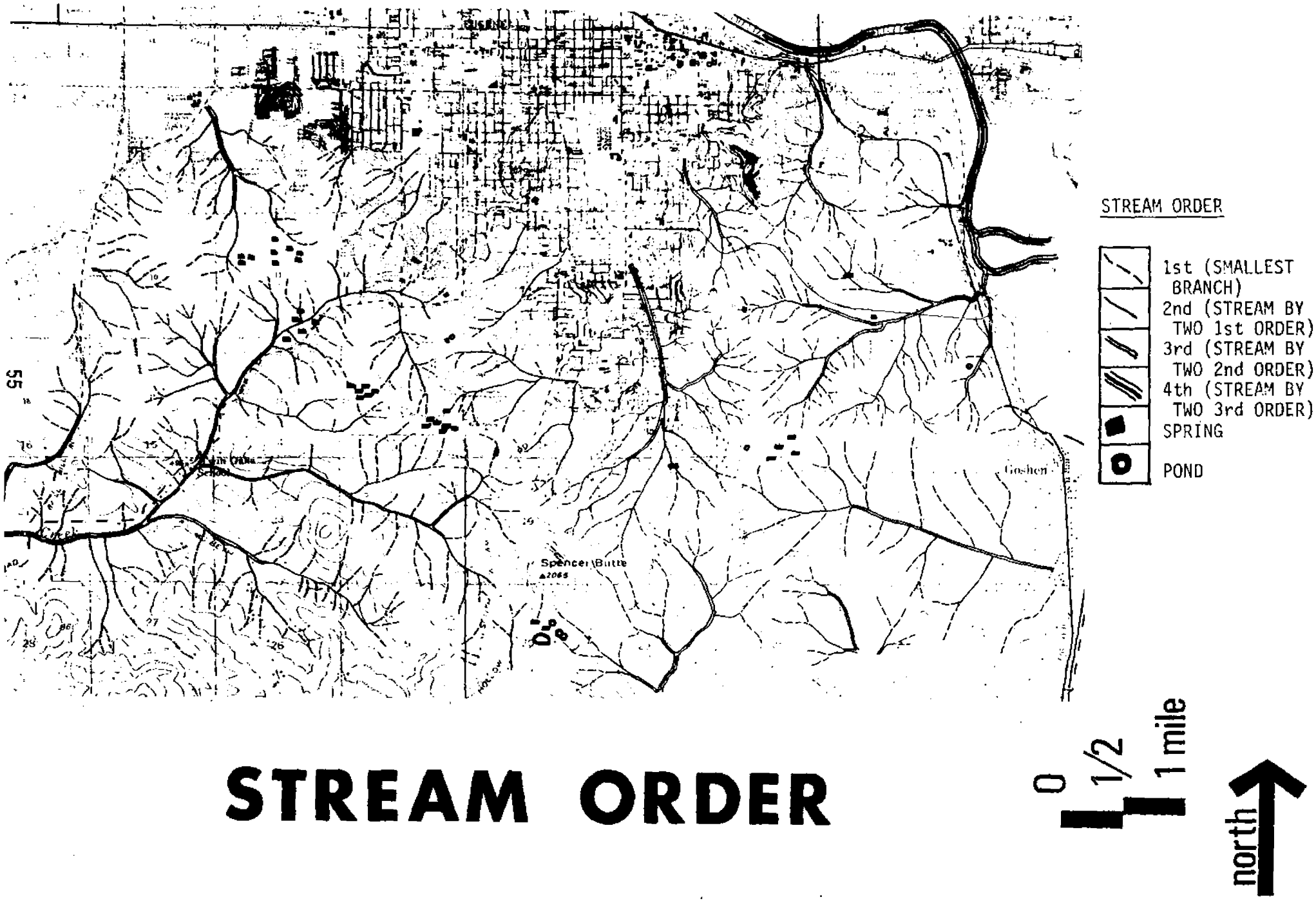
The other hydrologic feature of the study area; springs, seeps and ponds are not too numerous but do contribute to the overall drainage patterns. This is noted particularly on Blanton Heights and to the north in the west hills.



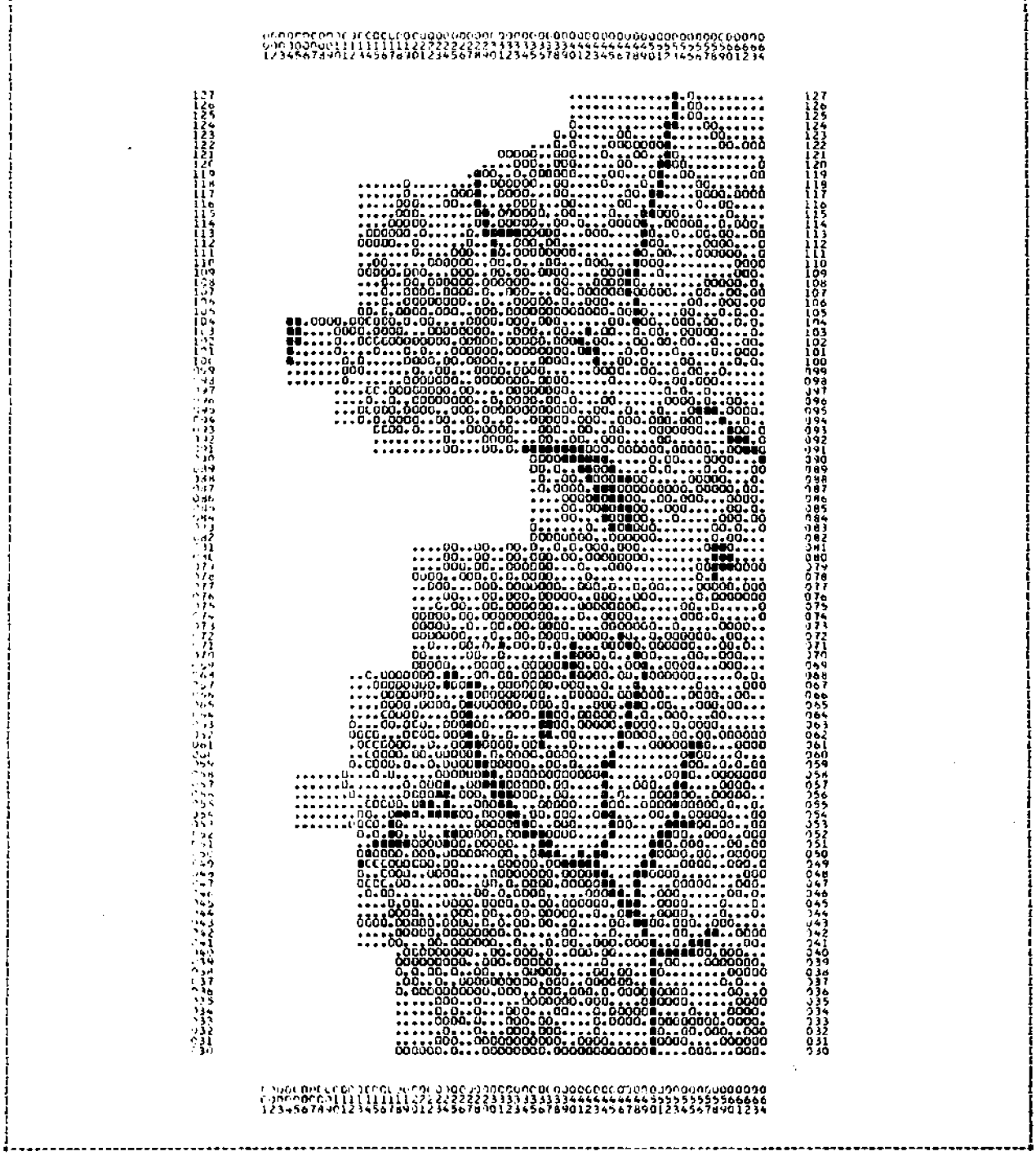
STREAM ORDER

0 = NO DRAINAGE CHANNEL OR TEXTURE
1 = FIRST ORDER (SMALLEST UNBRANCHED TRIBUTARY)
2 = SECOND ORDER (STREAM FORMED BY TWO FIRST ORDER STREAMS)
3 = THIRD ORDER (STREAM FORMED BY TWO SECOND ORDER STREAMS)
4 = FOURTH ORDER (STREAM FORMED BY TWO THIRD ORDER STREAMS)





STREAM ORDER



SOUTH HILLS STUDY

DEPARTMENT OF LANDSCAPE ARCHITECTURE

UNIVERSITY OF OREGON, SUMMER 1973

DRAINAGE

0 = NO DRAINAGE CHANNEL OR FEATURE
3 = INTERMITTENT
5 = PERENNIAL
7 = SPRING OR SEEP
9 = POND OR MARSH

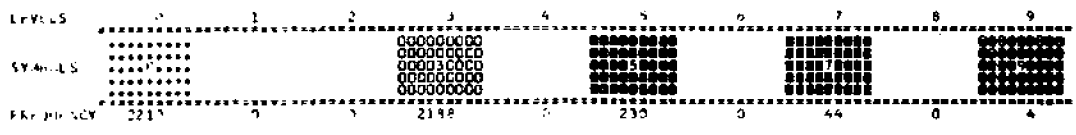


PLATE #7

VEGETATION

A number of alternatives were explored for the classification and presentation of the vegetation information. Due to the size of the study area and available time and resources, the group focused on the identification of dominant indigenous species. This method of identification would give evidence of possible plant associations which would vary with differing conditions of soil, exposure, moisture and stages of succession (process of evolving to a more stable order). Additional site investigations can provide more precise evaluation of each of the variables and their combined effect upon the dominant species present.

The dominant indigenous species were divided into nine plant associations which include: Meadows, Dryland Shrub, Dryland Deciduous Trees, Mixed Oak and Douglasfir, Dryland Evergreen Trees, Deciduous Wetland Trees, Bigleaf Maple, Moistland Conifer Trees and Moistland Deciduous Shrubs.

Association 1. Meadows: grasses (natural and introduced), rushes and sedges. These can be found in a climax state (a relatively stable community) on the slopes with greater exposure and minimum soil depth. However, most tend to be the result of grazing or agriculture and are in a state of succession specially on the fringe areas. When the activities are terminated these meadow areas provide the open space required for the succession of species such as oaks, Douglasfir, pines and dryland shrub. The shade from the successional trees can provide protection for Snowberry, Poison Oak, Oregongrape and Blackberry.

Association 2. Dryland Shrub: Snowberry, Poison Oak, Oregongrape, Douglas Hawthorn, Indian Plum and Blackberry. These are usually found on the fringe areas between meadows and woods or in old field succession. However, they can stand alone as a unit classification in areas of minimum soil depth with no tree capability. Just as they are found with an overstory, they can tolerate full sun exposure and provide protection for emerging trees. These dryland shrubs are usually present in the first stages of succession from logging or clearing activities.

Association 3. Dryland Deciduous Trees: Oregon White Oak and Calfornia Black Oak. These tend to be located on the drier, well-drained slopes, as found when the slope orientation is to the south. California Black Oak is at its northern limits in this area and can be marginal. These species can be found in combination with meadow, dryland shrub, firs and pines, but will be phased out as the succession of firs and pines provides a canopy over them. The association of these oaks with dryland shrub can provide the necessary habitat for Pacific Dogwood as other species varities increase. Occasionally, Bigleaf Maple and Oregon Ash may also develop, thus providing a more humid and cooler habitat for the other species.

Association 4. Mixed Oak and Douglasfir. The association of these species normally indicates the advances stages of succession to a climax of Douglasfir,

however, the elements of available moisture, soil depth, soil type and slope orientation can make the succession so slow that this group is identifiable for an extended period of time. South and west facing slopes appear to develop slowly into a relatively permanent mix of oak and fir due to exposure and lack of soil moisture. On the moist slopes, the succession to Douglasfir can readily be seen. These successions (the slower and more rapid) can establish the conditions necessary for the development of Zone 8, Moistland Conifer Trees. (This zone is described later, however, it should be noted that the elements of varying soil depth, soil type and available soil moisture caused by the long term establishment of mixed oaks and Douglasfir can provide microclimates for Zone 8 on the dryer slopes as well.) Mixed oak and Douglasfir areas tend to develop a diverse mix of associated species such as the above mentioned Bigleaf Maple, Pacific Dogwood and Oregon Ash as well as the dryland shrubs. Pacific Madrone tolerates this zone, but only as long as light can penetrate. As the concentration and competition from Douglasfir increases, the Pacific Madrone decreases.

Association 5. Dryland Evergreen Trees: Ponderosa Pine, California Incensecedar and Pacific Madrone. Because of their infrequency in the Eugene area, the presence of concentrations of these species in the South Hills have been distinguished as a separate classification. Pacific Madrone occurs infrequently as scattered specimens in Zones 3 and 4 but on occasion develops as the dominant species on south and west facing slopes. The Ponderosa Pine also occurs in Zones 3 and 4 as well as Zone 2, but can develop as the dominant species on north and east facing slopes. The combination of soil type, soil moisture and slope orientation establish a unique situation for these species, which have given indications of sensitivity by disturbance in culturation. Their retention calls for care in order to maintain the balance for survival. Associated species within this zone are not numerous because of the very nature of the Zone 5 species and their selection habitats. These are unrelated to sucessional associations and are dependent upon physiographic conditions. California Incensecedar does not appear as a dominant species, but because of its presence as an anomoly it is included in this classification.

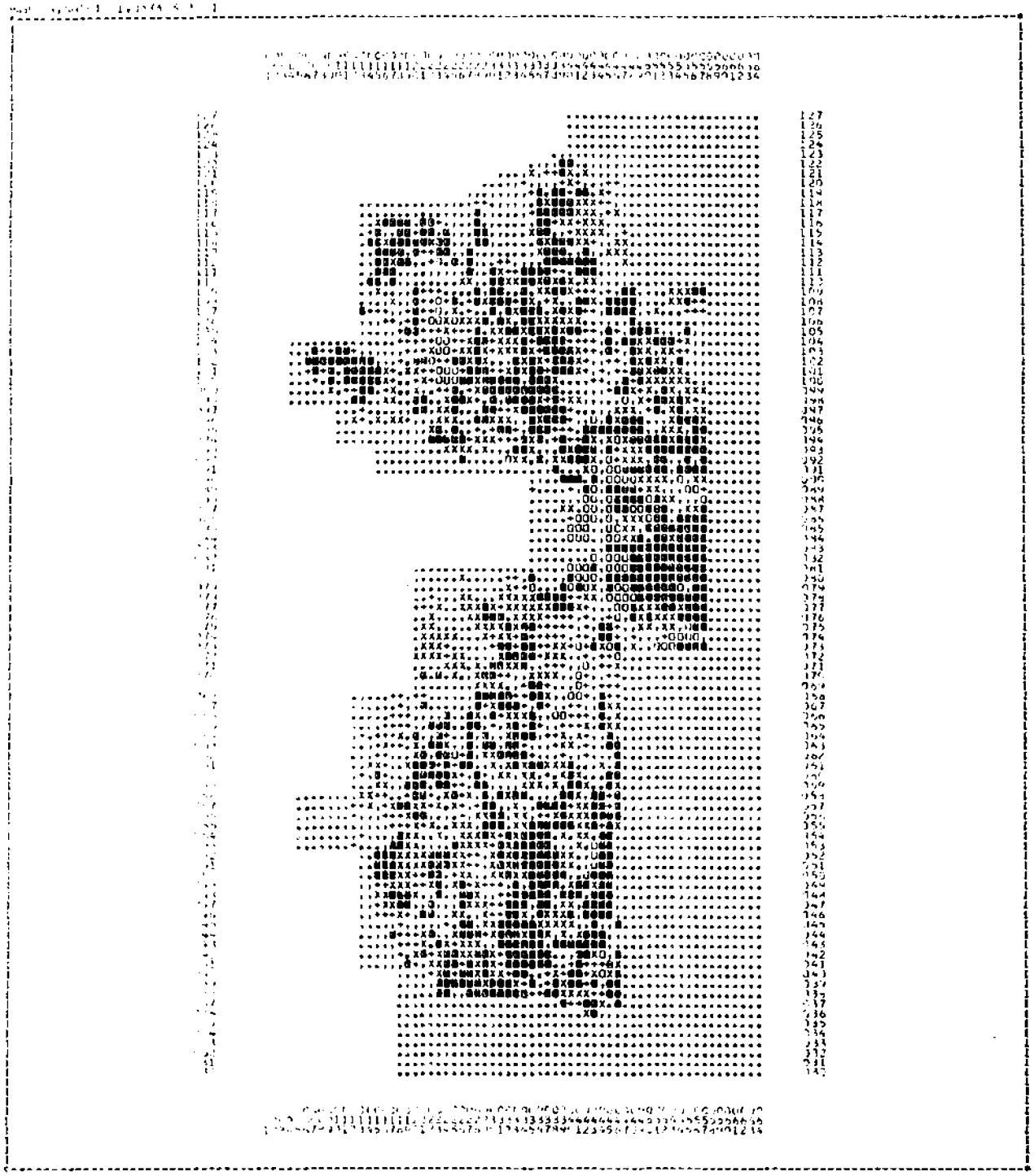
Association 6. Deciduous Wetland Trees: Alder, Willow, Ash and Poplar. The species in this classification are restricted to the drainage ways and the presence of high moisture content and deeper soils. The associated understory consists of Indian Plum, Blackberry, Snowberry and Oregongrape as these are tolerant of wet conditions as well as dry. If the species in this classification are dense enough, Western Swordfern and Maple may associate. Conversely, the association of oaks and Douglasfir may be identified under more open conditions. The open conditions can cause a more rapid succession of the Moistland Deciduous Trees which can result in the dominance of Douglasfir.

Association 7. Bigleaf Maple. The Bigleaf Maple can be found in almost any habitat, but does prefer the presence of soils with medium moisture content. Although it tends to be a plant of association, it can occur in group density large enough to be classified as dominant. Its dependence on light and moisture generally place it in the middle of late stages of succession. By providing ground cooling and soil humus to the forest floor, the maples establish an ideal environment for the Douglasfir; however, they can also germinate and grow well under an existing Douglasfir stand.

Association 8. Moistland Conifer Trees: Douglasfir and Grand Fir. Douglasfir is the most prevalent species in the study area. As a marketable product, the species can be found in all stages of growth; from the juvenile state to maturity. In a natural succession, this progress is slow because of the long term development of soils and overstory protection. In logged-off areas, however, the succession is quite rapid, due to the presence of ideal soils and rapid cover of deciduous shrubs. As the fir growth continues, greater cooling of the forest occurs and associated species are introduced. These species include Pacific Dogwood, Western Swordfern, Vine Maple, Indian Plum and a number of ground covers. Where light permits, Bigleaf Maple and Oregon Ash can also be found. The Grand Fir occur more as anomalies, even though they are shade tolerant.

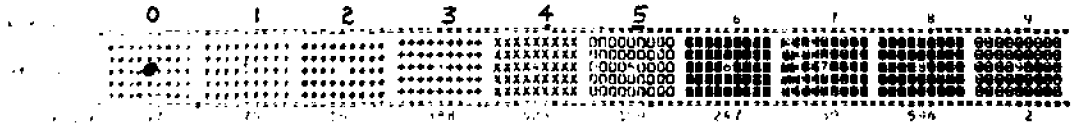
Association 9. Moistland Deciduous Shrub: Indian Plum, Vine Maple and Western Swordfern. As mentioned above, these species are dependent on the presence of moisture, cooling and partial shade. Where they are present in open areas, there is usually evidence of a past history of logging. The succession to Douglasfir takes place mostly on the north and east facing slopes. The south and west facing slopes tend to succeed to oaks, but as noted in Zone 4, this sequence can also result eventually in a Douglasfir dominance.

Note: There is a tenth zone on the vegetation base map which indicates areas of cultural domination i.e., orchards, botanical gardens, reserviors, landfills, etc.



VEGETATION ASSOCIATIONS

0 - UNRANKED OR UNCODED
1 - MEADOW - (GRASSLAND, SEDGES, RUSHES)
2 - DRYLAND SHRUB - (SNOWBERRY, POISON OAK, OREGONGRAPE, BLACKBERRY)
3 - DRYLAND DECIDUOUS TREES - (OREGON WHITE OAK AND CALIFORNIA BLACK OAK)
4 - MIXED OAK AND DOUGLASFIR
5 - DRYLAND EVERGREEN TREES - (PONDEROSA PINE, MADRONE, CALIFORNIA INCENSECEDAR)
6 - WETLAND DECIDUOUS TREES - (ALDER, WILLOW, ASH, POPLAR)
7 - BIGLEAF MAPLE
8 - MOISTLAND CONIFER TREES - (DOUGLASFIR, GRAND FIR)
9 - MOISTLAND DECIDUOUS SHRUBS - (WILD PLUM, VINE MAPLE, DOGWOOD, SWORD FERN)




VEGETATION
MEADOW, GRASSLAND
DRY SHRUB
DRY DECIDUOUS TYPES
MIXED OAK AND PINE
DRY EVERGREEN TYPES
MOIST TIMBER
BROADLEAF MAPLE
MOIST CONIFER
WETLAND DECIDUOUS
CULTURAL ASSOCIATION
NORTH

VEGETATION

PLATE #8

GENERAL VIEWS

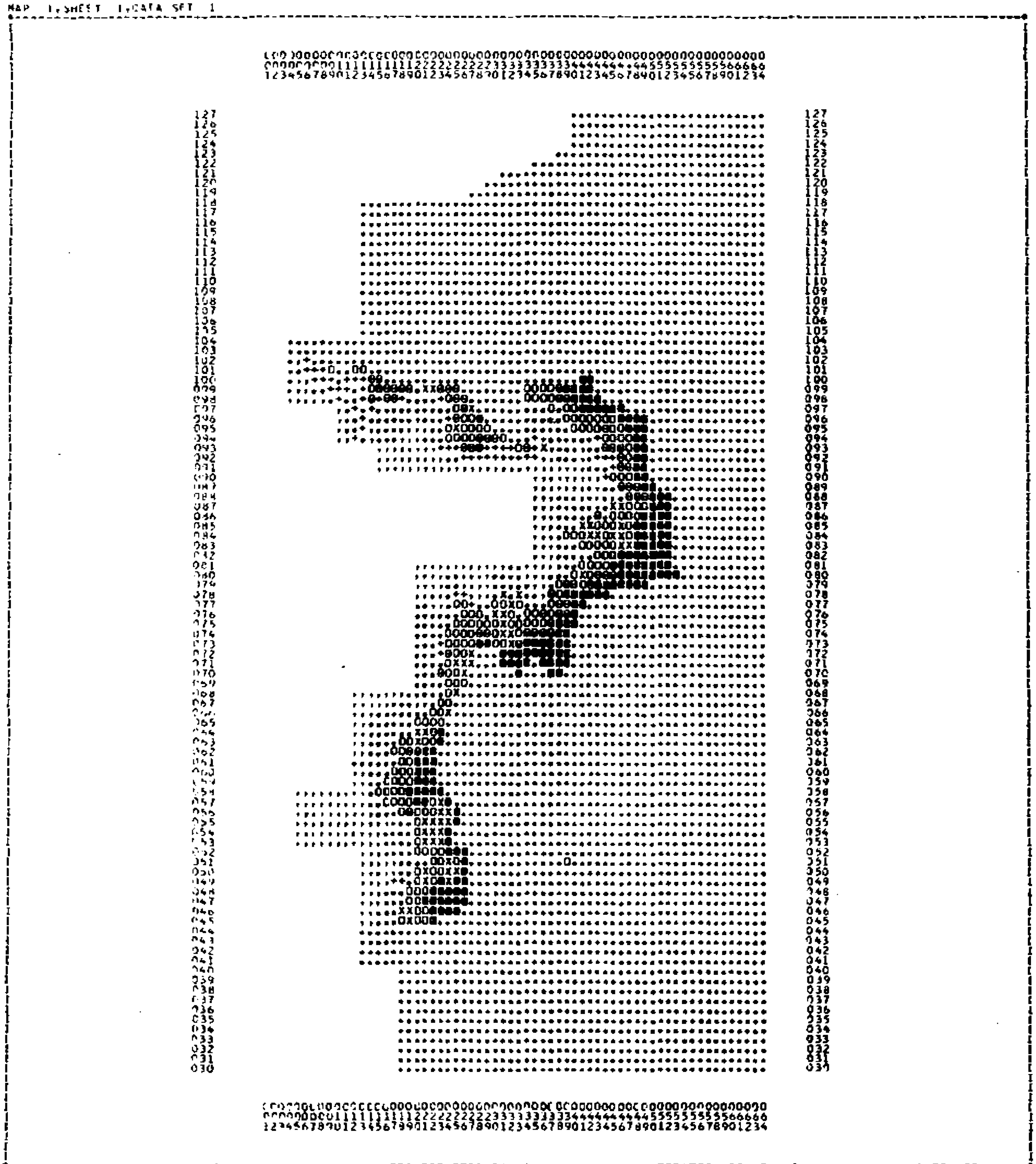
The General Views (those parts that can be seen from the metropolitan area) have been identified according to their topographic positions and steepness of slope. The topographic positions are determined by the high, intermediate and lower elevations in conjunction with slope orientation. It can be seen that the ridgelines at Hawkins Heights and south of 30th Avenue are the two places where the continuity is broken and one series of slopes is either shielded by the other or completely hidden.

For much of the community, a panorama of 180 degrees of selected views is possible, however, as the distance from the ridgeline increases, the sense of enclosure decreases. The higher elveations are the most obvious and can be seem as a landform from most sections of the community as well as from Interstate 5 to the north.

The steepness of slopes have been categorized into steep, intermediate and gradual. The steepest are the most pronounced visually and affect the views of the greater number of people in the community when located on the higher elevations.

From the combination of topographic position and slopes, an ordering of their importance is suggested. This ordering is covered fully in the section of this report on the "Assessment of the Visual Importance of the Ridgeline."

MAP 1, SHEET 1, DATA SET 1



SOUTH HILLS STUDY

DEPARTMENT OF LANDSCAPE ARCHITECTURE

UNIVERSITY OF OREGON, SUMMER 1973

GENERALIZED VIEWS

0= NOT VISIBLE FROM THE EUGENE METROPOLITAN AREA
1= UNDER 700' AND GRADUAL SLOPES
2= UNDER 700' AND INTERMEDIATE SLOPES
3= UNDER 700' AND STEEPER SLOPES
4= 700-900' AND GRADUAL SLOPES
5= 700-900' AND INTERMEDIATE SLOPES
6= 700-900' AND STEEPER SLOPES
7= 900' OR MORE AND GRADUAL SLOPES
8= 900' OR MORE AND INTERMEDIATE SLOPES
9= 900' OR MORE AND STEEPER SLOPES

LEVELS	0	1	2	3	4	5	6	7	8	9
SYMBOLS	....0....	''''1''''	....2....	++++3++++	XXXX4XXXX	0000500000	[illegible]	[illegible]	[illegible]	[illegible]
FREQUENCY	3577	282	261	57	58	191	68	27	97	56

PLATE #9

CLIMATE

The climatic information for the metropolitan area was provided by the U.S. Weather Bureau from their station at Mahlon Sweet Field. Although the seasonal variations (cool wet winters and warm dry summers) are found constant throughout the area, the physiography of the South Hills establishes a number of microclimates in which the daily effects vary significantly. Monitoring stations are necessary for definitive information, however, conclusions can be drawn from the analysis of the data collected.

Differences in elevations, slope orientation, percentage of slope, hydrology, and vegetation, either independently or collectively, affect wind patterns and velocities, relative humidity, ground moisture, temperature and precipitation.

During the winter months, the areas north of Spencer Butte, though protected from the southwest storm winds, can expect to be cooler and retain moisture longer than areas on south facing slopes. The same differences hold true in the summer months when the south facing slopes are much hotter and drier than those to the north. Both of these examples, of course, are now reflected in the vegetation that has established in those types of area. Proposals for development and the connections needed for service should include consideration for lack of light (especially at the base of steep north facing slopes) and the possibility of frozen areas over an extended period of time at the higher elevations. Additional considerations are offered in the sections of this report on surface movement potential and the ecological description.

There are two concerns related to the effects of climate in the metropolitan area that are beyond the realm of this study. One of these is the effect that extensive development could have on the quality of air; especially in this area of frequent inversions and probable downslope air movement in the Amazon Basin. Another is the effect that extensive development could have on the quantity and quality of water in the Amazon Channel; especially if it results in the removal of primary vegetation and/or the addition of impervious surfaces (roads, roofs, etc.) that will significantly increase runoff. Since either or both of these situations could have adverse impact on a significant portion of the population, it is recommended that studies be made as to their effect.

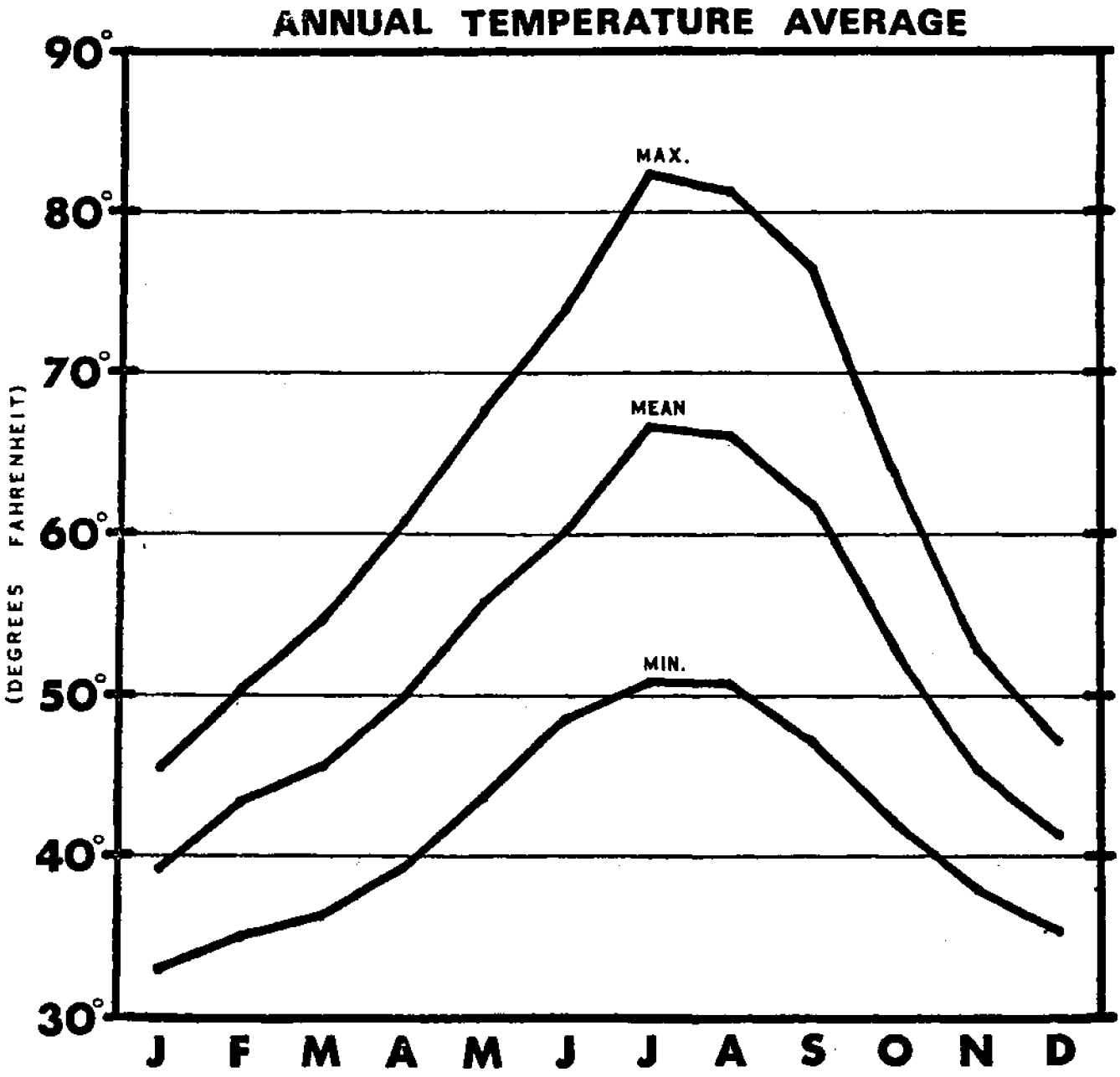

ANNUAL TEMPERATURE AVERAGE
90°
80°
70°
60°
50°
40°
30°
(DEGREES FAHRENHEIT)
MAX.
MEAN
MIN.
J F M A M J J A S O N D

PLATE #9

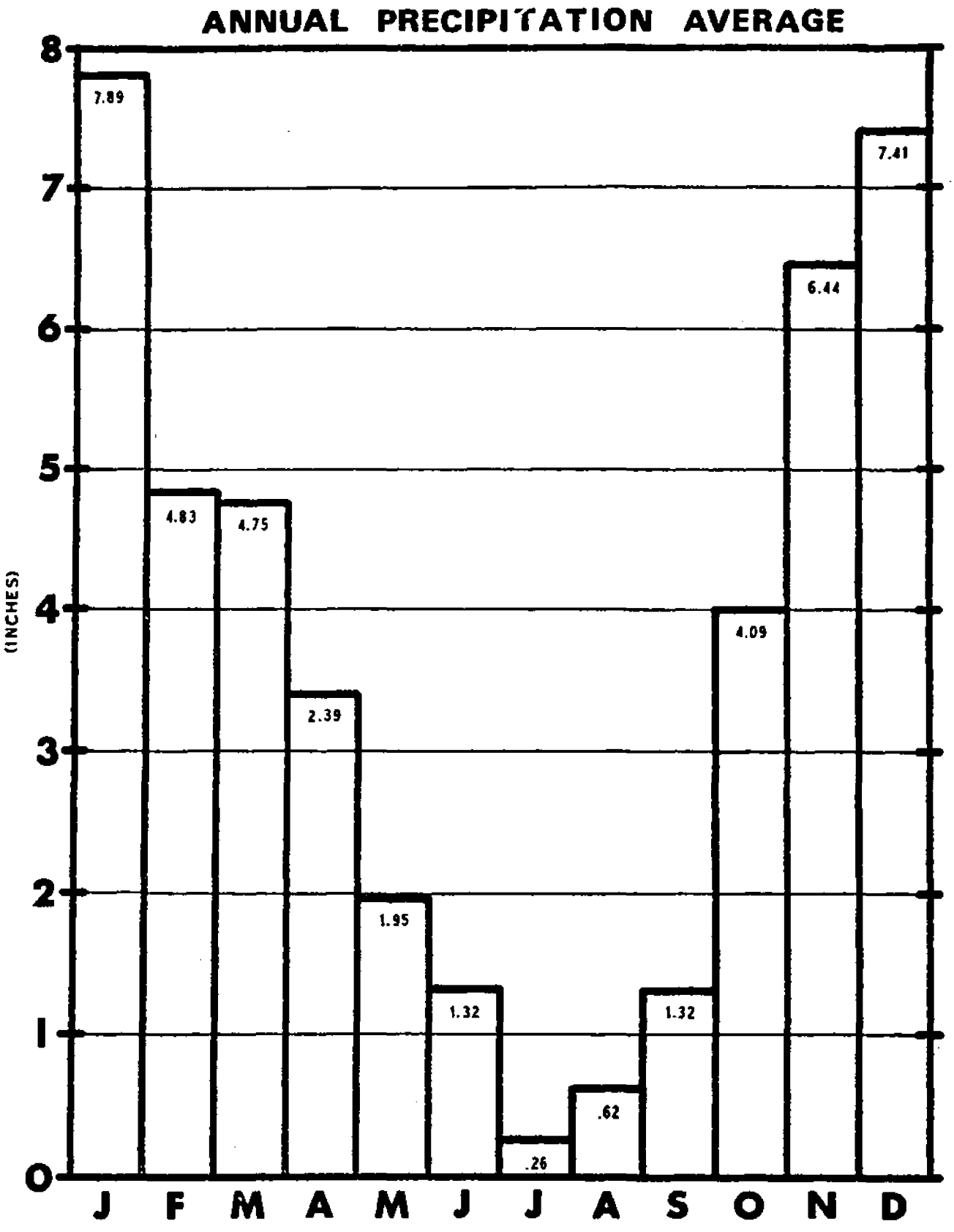
CLIMATE

The climatic information for the metropolitan area was provided by the U.S. Weather Bureau from their station at Mahlon Sweet Field. Although the seasonal variations (cool wet winters and warm dry summers) are found constant throughout the area, the physiography of the South Hills establishes a number of microclimates in which the daily effects vary significantly. Monitoring stations are necessary for definitive information, however, conclusions can be drawn from the analysis of the data collected.

Differences in elevations, slope orientation, percentage of slope, hydrology, and vegetation, either independently or collectively, affect wind patterns and velocities, relative humidity, ground moisture, temperature and precipitation.

During the winter months, the areas north of Spencer Butte, though protected from the southwest storm winds, can expect to be cooler and retain moisture longer than areas on south facing slopes. The same differences hold true in the summer months when the south facing slopes are much hotter and drier than those to the north. Both of these examples, of course, are now reflected in the vegetation that has established in those types of area. Proposals for development and the connections needed for service should include consideration for lack of light (especially at the base of steep north facing slopes) and the possibility of frozen areas over an extended period of time at the higher elevations. Additional considerations are offered in the sections of this report on surface movement potential and the ecological description.

There are two concerns related to the effects of climate in the metropolitan area that are beyond the realm of this study. One of these is the effect that extensive development could have on the quality of air; especially in this area of frequent inversions and probable downslope air movement in the Amazon Basin. Another is the effect that extensive development could have on the quantity and quality of water in the Amazon Channel; especially if it results in the removal of primary vegetation and/or the addition of impervious surfaces (roads, roofs, etc.) that will significantly increase runoff. Since either or both of these situations could have adverse impact on a significant portion of the population, it is recommended that studies be made as to their effect.


ANNUAL PRECIPITATION AVERAGE
(INCHES)
8
7
6
5
4
3
2
1
0
7.89
4.83
4.75
2.39
1.95
1.32
.26
.62
1.32
4.09
6.44
7.41
J
F
M
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KILLING FROST

1911 - 1970

YEAR	LAST AND FIRST DAY OF 32° OR BELOW			FROST-FREE,# of days
1911	April 29	-	October 17	171
1912	April 19	-	October 4	168
1913	May 13	-	November 3	174
1914	February 16	-	November 7	264
1915	May 1	-	October 11	163
1916	June 10	-	October 4	116
1917	April 15	-	October 28	196
1918	May 24	-	November 29	189
1919	April 8	-	November 27	233
1920	May 29	-	October 31	155
1921	April 6	-	September 12	159
1922	March 1	-	November 3	247
1923	March 4	-	December 1	272
1924	April 25	-	October 11	169
1925	March 26	-	November 22	241
1926	March 25	-	September 24	183
1927	April 20	-	December 11	235
1928	April 6	-	December 2	240
1929	April 7	-	October 29	205
1930	March 18	-	November 14	211
1931	March 6	-	November 22	261
1932	March 3	-	December 1	280
1933	March 23	-	November 5	227
1934	February 14	-	December 7	296
1935	March 31	-	October 23	206
1936	April 1	-	October 29	211
1937	April 29	-	December 4	219
1938	April 1	-	November 12	225
1939	March 29	-	December 23	269
1940	March 18	-	November 14	241

Year				
1941	March 14	-	November 20	251
1942	March 24	-	November 11	232
1943	April 26	-	December 6	224
1944	April 25	-	November 16	205
1945	April 15	-	December 13	242
1946	April 30	-	October 16	169
1947	February 27	-	November 22	268
1948	March 10	-	October 27	231
1949	February 13	-	October 19	248
1950	March 12	-	November 13	246
1951	April 22	-	October 31	191
1952	May 5	-	October 16	163
1953	April 8	-	October 23	197
1954	May 1	-	October 1	152
1955	May 31	-	November 11	163
1956	April 6	-	November 18	225
1957	April 7	-	October 21	210
1958	March 16	-	October 21	217
1959	April 15	-	October 30	197
1960	April 23	-	October 10	169
1961	April 23	-	October 8	167
1962	March 28	-	October 17	202
1963	April 20	-	October 19	181
1964	May 3	-	October 26	177
1965	May 6	-	November 28	206
1966	March 22	-	October 14	206
1967	April 28	-	November 21	207
1968	April 18	-	December 16	242
1969	March 25	-	October 12	201
1970	April 17	-	October 7	173
			Average	210

RELATIVE HUMIDITY

Month	4:00 A.M.	10:00 A.M.	4:00 P.M.	10:00 P.M.
January	92	87	81	91
Febuary	93	84	72	90
March	91	77	64	86
April	90	69	56	82
May	91	65	53	81
June	90	61	49	78
July	87	55	37	71
August	88	59	39	73
September	89	63	42	77
October	94	80	65	90
November	94	86	78	92
December	92	88	84	92
Annual	91	73	60	84

The 4:00 A.M. and 10:00 P.M. records are sixteen year averages and 10:00 A.M. and 4:00 P.M. are twenty-seven year averages.

All figures by percent

AN ASSESSMENT OF THE LAND FOR AREAS OF POTENTIAL SURFACE MOVEMENT

The purpose of this section of the report is to outline the conditions for potential movement from an analysis of existing problem areas. Due to the size of the study area (approximately 30 square miles) and the resources available (data and personnel), this assessment differs from an engineering study for a specific project site.

In a study for landslide potential in the Russel Creek Basin by CH_2M, over 100 test pits were excavated with a backhoe and samples were collected for basic soil classification. They also included two previous project studies in the area; preliminary soils mapping and interpretive guides prepared by Lane County Department of Public Works; interpretation of aerial photographs; and field observations which included the character and state of vegetation, tension and/or shrinkage cracks, drainage characteristics and springs, and the nature, consistency and moisture content of the subsurface materials. With this information, they stated that, "significant limitations are inherent to a study of this type, and additional site investigations should be conducted as specific construction plans and designs are developed."

Consequently, the application of this section should be restricted to the making of recommendations for further studies in the areas of proposed developments and the corridors required for their utilities.

The three types of movement to be considered are faults, soil creep and slump. As it was stated in the description of data sheets, the one fault in the study area shows no evidence of recent activity and is not considered to be of appreciable significance as a potential hazard element.

Soil creep is found throughout the study area. It develops in the top level of the soil (6"-12") and is primarily a function of slope. As the soil creeps very slowly, the trees move with their roots being swept backward and upward causing the trunks to be bent into what is called "gunstock growth." Creep can be controlled and should not be considered a major hazard element.

The major problem in soil movement is slump, where a whole block of material breaks loose. Slump in the form of landslide can be of two types; one where a chunk of bedrock breaks away and the other where the soil breaks away. Since the one fault in the study area is considered to be a minor hazard element, the analysis is restricted to soil slumps.

Soil slump is the result of the presence of water in thick well-developed soils on steep slopes and is recognized by tilting trees and pronounced changes in the surface configuration. The thicker soils are present on the geologic units that erode rapidly as in the basalt flows in the Eugene formation, especially on the east facing dip slopes. (Thicker soils are found in the alluvial deposits, but steep slopes are not present.)

Through analysis of existing slumps, an ordering for potential surface movement was made and included the combinations of the base data on geology,

depth of soils and steepness of slopes. The ordering reads as follows with the first being most severe:

1. Basalt flows
   Soil depth of 40" and above
   Slopes of 30% and above

2. Eugene formation
   Soil depth to 40" and above
   Slopes of 30% and above

3. Basalt flows
   Soil depth of 40" and above
   Slopes of 20% to 30%

4. Eugene formation
   Soil depth of 40" and above
   Slopes of 20% to 30%

5. All formations
   Soil depth of 40" and above
   Slopes of 30% and above

6. Basalt flows
   Soil depth of 20" to 40"
   Slopes of 30% and above

7. Eugene formation
   Soil depth of 20" to 40"
   Slopes of 30% and above

8. As soil depth and slope percentage decrease in all formations, so does the potential for soil movement.

Since most of the study area showed no evidence of movement with these conditions present, the recorded slumps were further analyzed with particular attention given to the presence of water. Water not only adds weight to the soil, but also "lubricates" the surface between the soil and substratum. This is especially critical when clay is present as on the basalt flows. It was found on the recorded slumps that recent changes in those areas had affected either the volume of water reaching the area, its retention, or downhill support for the soil. These changes included logging operations, street and sewer installation and road cuts.

It was concluded that a listing of additional conditions should be included to show how the potential for surface movement might be increased or triggered. These conditions are natural as well as those done by man. These additional conditions include the following:

1. If a seep (water coming to the surface) is present on or above the slope, it can either add to the weight of the soil or act as a "lubricant" or both.

2. If a stream is present on the slope or at its base, it can add to the weight, act as a "lubricant," or remove supporting material through erosion.

3. If the slope is near a geologic contact zone (where two of the geologic units come together), especially in the zone between the basalt flows and the Eugene formation. (The basalt flows are more porous in the subsurface allowing water to move along the contact zone to a point where it can surface.) In addition, the basalt flows break down to a clay whereas the Eugene formation breaks down to a fine sand, silt and clay. Even with transportation of much of this material through erosion, the soils on or near these contact zones should have different characteristics which would affect the amount of water in an area.

4. If there is a pasture, meadow or cut-over area on or above the slope, there is less retention of water and thus more water is transported to an area downslope.

5. If there is a flat spot above the slope, it can add to the loading and by the absorption of more water can add to the "lubrication."

6. The steep northeast, north and northwest facing slopes are in shadow for much of the time in winter, when the area receives most of its annual rainfall. It is here that evaporation takes place at a slower rate than on the south facing slopes; consequently, there is more chance of continual saturation.

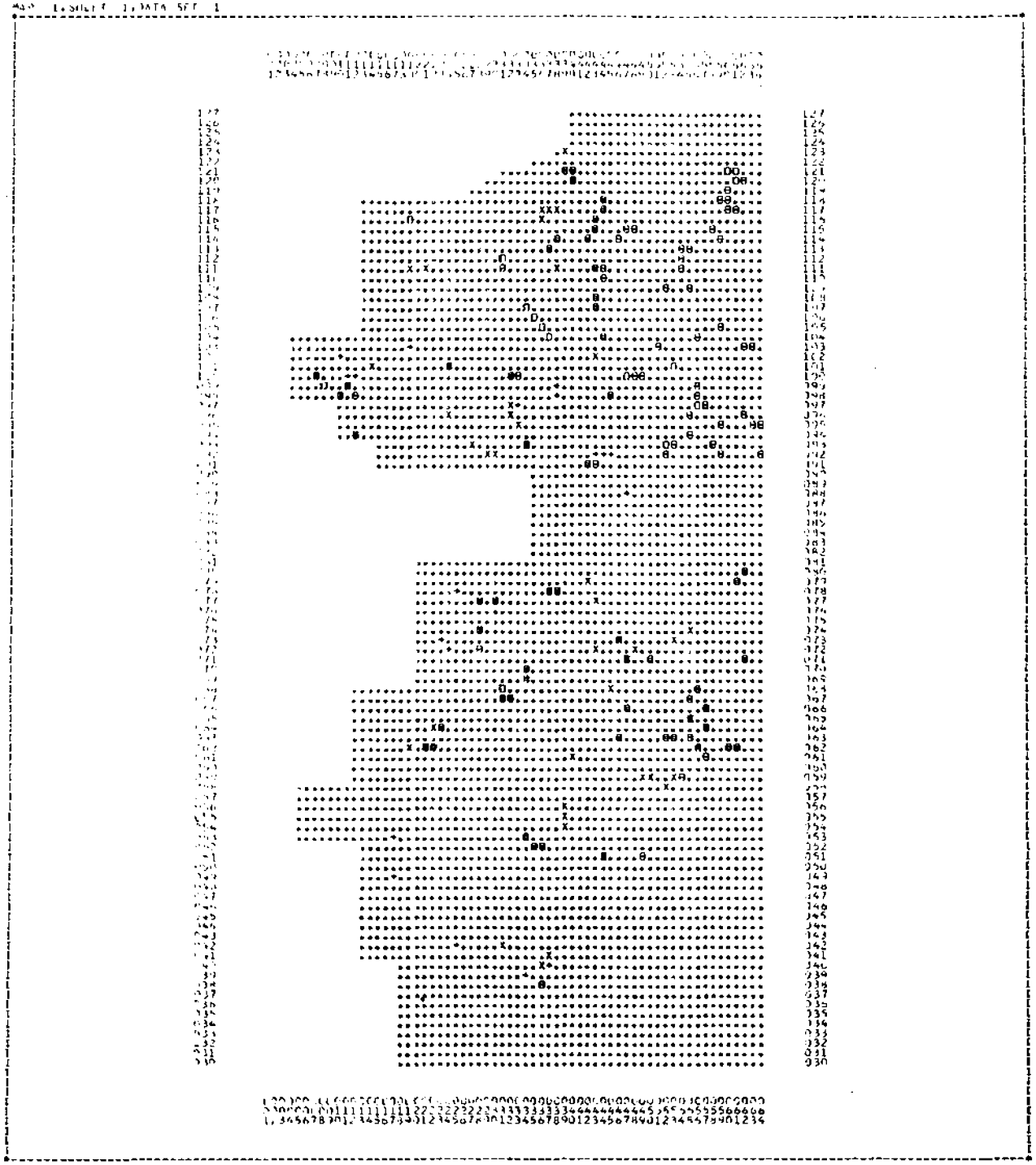
7. If an activity changes the seasonal cycle of precipitation (for example, summer watering), especially if intermittent streams become perennial, the chances are increased for loading, "lubrication," removal of support, or all three.

In summary, if there are any activities or developments proposed which would alter or intensify these additional conditions, either on site or below the site, engineering studies should be made as to their effect.

It should be noted that the assessment of potential surface movement was based on the analysis of information collected for the study and does not include other criteria (such as the engineering properties of soils) that should be considered for proposed developments.

The enclosed computer printout keys the areas with the greatest potential for surface movement according to the ordering of the geologic units, slope and soil depth discussed previously. The additional conditions (water, removal of vegetation, etc.) have not been included, however there is an existing slump that has been identified by field observation south of 30th Avenue which does show as an indication for surface movement on this map. (The slump is in an area where primary vegetation was removed.) Another recorded existing slump (due to removal of vegetation and removal of support) is indicated on this map in the area of McLean Boulevard.

It should be noted that this map is not for definitive use in that the five acre grid cell does not allow the degree of accuracy needed for the location of specific areas. This map does indicate a distribution throughout the South Hills of areas with the potential for surface movement, especially on the intermediate and lower slopes. Additional areas with these conditions can be identified by use of the base sheets and further field observations. Also, specific sites require the aforementioned engineering studies.



SOUTH HILLS STUDY

DEPARTMENT OF LANDSCAPE ARCHITECTURE

UNIVERSITY OF OREGON, SUMMER 1973

POTENTIAL FOR SURFACE MOVEMENT

0= ALL CELLS THAT DO NOT MEET ANY OF THE FOLLOWING CRITERIA
4= EUGENE FORMATION , SOIL DEPTH 20-40", SLOPE OVER 30%
4= EXTRUSIVE BASALT, SOIL DEPTH 20-40", SLOPE OVER 30%
5= ALL GEOLOGIES EXCEPT EXTRUSIVE BASALT AND EUGENE FORMATIONS, SOIL DEPTH OVER 40", SLOPE OVER 30% (NO CELLS OCCOUR THAT MEET THESE CONDITIONS)
6= EUGENE FORMATION, SOIL DEPTH OVER 40", SLOPE 20-30%
7= EXTRUSIVE BASALT, SOIL DEPTH OVER 40", SLOPE 20-30%
8= EUGENE FORMATION, SOIL DEPTH OVER 40", SLOPE OVER 30%
9= EXTRUSIVE BASALT, SOIL DEPTH OVER 40", SLOPE OVER 30%

LEVELS	0	1	2	3	4	5	6	7	8	9
SYMBOLS	.			+	X	0	0	0	0	0
FREQUENCY	4498	0	0	19	37	0	64	44	4	10

AN ECOLOGICAL DESCRIPTION OF THE STUDY AREA

Because of the scale of the study area and the complexity due to culturation, a number of resources were employed for this ecological description. They include a general overview of plant and animal associations, a description of types of areas that can accommodate them, a previous study on the Russel Creek drainage and the identification of areas in the South Hills that illustrate ecological diversity.

General ecological relationships can be drawn which correlate indigenous species of flora and fauna in their environment. In addition to the influences of climate, parent substrata, relief and other organisms; culturation and the presence of man are also instrumental in determining their distribution. There is then more to be considered in the identification of a ecosystem then natural associations. Some plants and animals are adaptable and are able to tolerate human disturbances (some even specialize as "camp followers") while others cannot survive except in undisturbed places. Animal distribution tends to correlate with the types and succession of plants. Some may find nesting or bedding places in one type of vegetation, yet feed in another. Some may occupy only the boundary (ecotone) between two diverse kinds of vegetation. Some live only in climax fir forests while others live in the brush of the first stages of succession. Animal species can also differ with respect to their habitats in a non-successional way; some live in marshes or along streams, but not in well-drained areas, while others live and breed in the water itself.

General associations of plants and animals found in the Eugene area have been analyzed and criteria have been established to describe four types of areas that can sustain diverse species populations and their representative ecosystems. These include natural areas large enough to subsume diverse habitats, corridors between these areas, neighborhood natural areas and hedgerows or strips interspersed in developed areas. These types of areas are briefly described as follows:

1. The large natural areas would be of sufficient size to sustain population of the larger animals such as deer, racoons, hawks and other large birds. These areas would contain a maximum diversity of plant communities (type and succession) and length of border between those communities. These are necessary, both for insulation from human activities and for distribution of plant and animal populations. In addition, these areas would contain perennial drinking water and be of sufficient numbers to minimize the effects of intrusion by man.

2. The corridors connecting these areas would either be of sufficient width to offer visual cover from animals moving through or, because of local conditions, offer protection by density of vegetation or configuration of landforms.

3. The neighborhood natural areas would be of sufficient size to accommodate a few large trees, shrubs and meadow to provide nesting sites for adaptable bird and animal species.

4. The hedgerows would be of sufficient width to provide protection for the movement of adaptable birds and animals and shelter for migratory species.

These criteria, though general, establish the conditions for the plants and animals requiring undisturbed habitats, as well as those that are adaptable. They also describe areas of diversity and connections between the areas for movement. A detailed ecological study of the Russel Creek Drainage by Bill Copeland of the Department of Biology at the University of Oregon contains specific associations that are found in a section of the study area:

"Vegetation.

"The vegetation of the area before man arrived was undoubtedly predominately Douglas Fir forest with the drier areas providing sites for a variety of other tree types such as Grand Fir, Yellow Pine, Incense Cedar, Madrone, Black Cottonwood, and two (2) oak species, and the wettest parts having poplars, willows and ash. Areas kept open first by Indian burning and later by farming and lumbering provided opportunities from some species to become locally abundant. This is particularly true of the White Oak, Quercus garryana, which, in a few places, has formed beautiful oak woods. The second oak, the California Black Oak, Quercus kellogii, reaches the northern limit of its range in the Eugene area. Conditions for it are marginal here, and it is likely to be very sensitive to disruption of its habitat. The Madrone is quite common, particularly in early successional stages on the drier south slopes and ridges. The other three conifers--Yellow Pine, Incense Cedar and Grand Fir--are scattered throughout the basin. Grand Fir is particularly rare; I did not see more than fifty (50) of them in my walks through the basin. The wetter sites provide habitats for at least two (2) poplar species, a number of willow species and Oregon Ash. Ash in particular is found in sites which have soggy ground and standing water at least through part of the year.

"The various logging episodes have left a major part of the undeveloped basin a mosiac of successional Douglas Fir forests. The set of species and their ages, distribution and relative abundances at any one site will depend mainly upon the water supply, soil, slope and type of logging...

"Food and Water Requirements.

"With the exceptions of predators and large mammals, most of the animals generally stay within a small territory and are dependent upon this small area as a very specific habitat for finding food.

"The undergrowth that exists below the trees provides a great variety of food for animals. Many feed directly upon the plants. Deer and rabbits eat the green foliage and young twigs. Fruits and seeds play an important part in the diet of many animals. Chipmunks, squirrels and many birds are dependent

upon the vast quantity of seeds produced each year by the plants forming the underbrush. Raccoons, fox and various birds eat many of the berries and other fruits produced. Some birds even add the berries of poison oak to their diets.

"All parts of the plants provide food for the variety of insects which are very important in the diet of other animals. Mice, moles, bats, skunks, chipmunks, squirrels, and fox all eat insects. Great quantities of insects are consumed by the bird populations. Warblers and flycatchers and exclusively insect eaters. Many birds, like the familiar chickadees and robins, also depend upon insects for a source of food. Dead or decaying trees provide many insects and insure the survival of many species of woodpeckers. A relative of the nearly extinct ivory-billed woodpecker of the South, the pileated woodpecker, is totally dependent upon old Douglas Fir and dead snags. In these dead snags, this bird finds the insects which are its only source of food. The Lewis woodpecker, which is uncommon at best, would also be lost without these dead snags, and many other woodpeckers depend heavily upon them for food. The woodpeckers are important in controlling the abundance of several varieties of insects. In certain areas of the Northwest, when woodpeckers become scarce, insect parasites spread to healthy trees and caused damage. Other factors are also involved, and it is difficult to predict whether such a situation would occur in the study area.

"Water is also important to all animals. Animals are most abundant near the small streams and the three main 'wet areas' of the study area. These 'wet areas' are: 1) the land north of 30th Avenue and west of Route 5 directly across the road from the LCC Campus; 2) the area immediately west of the western-most pond of the LCC lagoon system; and 3) the marshy area behind an old mill pond beyond the southwest corner of the LCC campus.

"Animals come to these areas of moisture concentration for any of several reasons--to drink, to hunt, to nest or to feed upon plants which may be different here than in nearby regions. Amphibians, of course, need this water in order to reproduce. Snakes find this an important area, too. There are more snakes per unit area here than in most other spots I examined in the study. This is most likely because there is more food available to them here. Also, many snakes require water when shedding their skin.

"Of the three 'wet areas' given, the third, at the southwest corner of LCC, is most important. The greatest variety of birds exists here. Information from bird banding done at this location reveals that some winter birds return earlier than had been previously known (fox sparrows and golden-crowned sparrows are two examples). Some of the bird species listed are found here but not elsewhere in the boundaries of the study area. Such birds are the longbilled marsh wren, yellow warbler, and yellowthroat.

"Reproductive Requirements.

"Nearly all of the animals mentioned require some shelter for nesting or den sites. The underbrush provides such shelter. Without this underbrush, many species could not remain in the area. For example, the turkey vulture soars over open areas in search of food but nests on the ground below the dense underbrush. Birds such as towhees, song sparrows, white-crowned sparrows,

bushtits and many others common here will very rarely, if ever, be found nesting anywhere but in the underbrush.

"Fox, skunks, raccoons, or deer may be found most anywhere within the study area. All of them prefer the cover that the underbrush provides to give birth to and raise their young. (Raccoons are often found nesting in the hollow of old trees several feet above the ground and so do not necessarily need the underbrush for nesting.)

"Besides providing food required for many woodpeckers, dead snags are also very important for nesting. All of the woodpeckers depend upon these old trees; only there they can drill nesting holes. If most of the nesting spots of the woodpeckers were to be eliminated, they would decrease or disappear from the area. The pileated and Lewis woodpeckers would be particularly susceptible. In addition, starlings, swallows, swifts and martins all use abandoned woodpecker holes for their nests. Brown creepers nest behind the loosened bark of the dead trees.

"The marshy area beyond the southwest corner of LCC, described earlier, is also important as a nesting site. This area provides the only suitable habitat for nesting of yellow warblers and yellowthroats.

"Wrentits can be found in the underbrush around this marsh to the south and southeast. This population is the only one found near Eugene during the winter months. A few years ago, it was thought that this bird was not to be found at all in the Willamette Valley during the winter. Efforts should be made to maintain the underbrush in this region to insure that this population will not be destroyed."

The study on the Russel Creek basin gives specific information on a section of the total study area. Although the available time and resources did not allow as thorough an investigation for the South Hills, areas of general associations could be identified.

Since little empirical information was available for the study, the identification of ecological habitats was made from field observations, aerial photo interpertation and the recorded data. A number of vegetation and land features were considered important as indications of wildlife diversity and productivity in the South Hills. By the format established of five acre increments for the GRID program, two general classes of habitats were coded. They were areas of diverse habitats and areas of specialized habitats.

Areas of diverse habitats were determined by the cells containing the greatest number of plant associations (from 1 to 6). It has been noted that many animals need a variety of plant types for food, cover and reproduction. The cells containing the greatest number of plant associations also have the greatest number of ecotones which contain not only plants common to both associations but also vegetation unique to the ecotone itself. These are also indicators of stages of succession and provide the greatest number of plant types for animals of limited range. Since most animals require the availability of free standing water, the presence of perennial streams, seeps

and ponds can dramatically increase the carrying capactiy of an area if in sufficient quantity.

Areas of specialized habitats are covered in the categories of riparian vegetation and old growth. Riparian vegetation is found in stream areas and is characterized by deciduous wetland vegetation. The presence of freestanding water plus the great number of plant species makes these areas important to wildlife in two ways. First, they are a distinctive plant community which may add to the diversity of an area by providing a protected environment which many animals need for a part of their life cycle. Second, areas of riparian vegetation provide a specialized environment for a great number of animals which must carry out their entire life cycle within the protected wet area.

The other category of specialized habitats includes old growth Douglasfir and oak. These areas may not have the number of species that diversified areas have, but because of their rarity in the study area, they contain relatively rare species.

The enclosed computer printout keys major areas of diversity and of specialized habitats. These biological zones are identified by those cells containing a dominance of old growth, four or more vegetation associations, water (streams, ponds or seeps), and stream bank (riparian) vegetation.

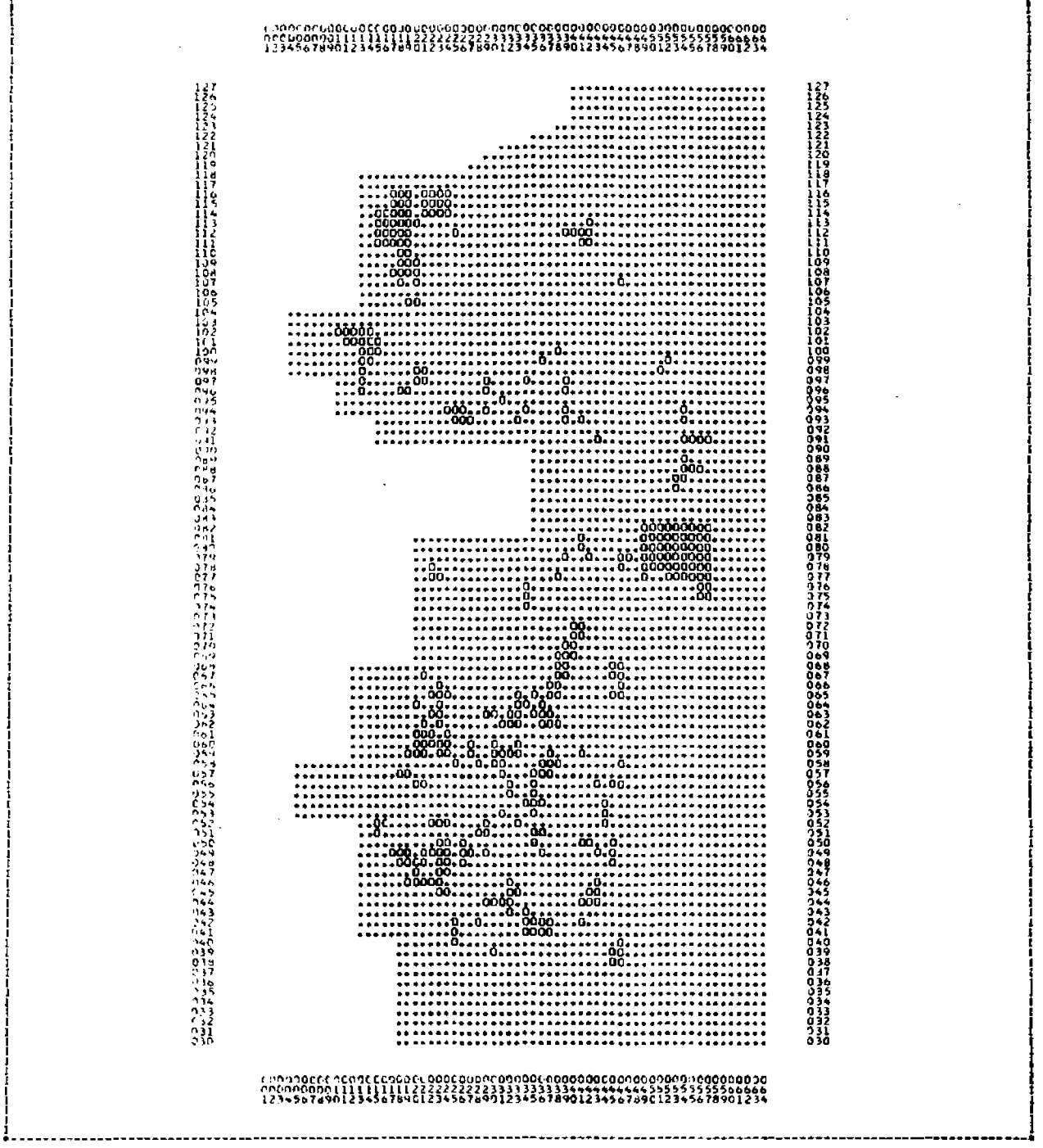
A review of this plate indicates that the largest areas of old growth Douglasfir are located in the vicinity of Hendricks Park and Spencer Butte. Large areas of diverse vegetation (four or more associations) are indicated on the southern part of the Russell Creek basin and on the southeast section of the Amazon basin. Riparian vegetation reflects the presence of perennial streams or other sources of water.

In addition to these individual biological support zones, the area to the northwest of the TV Towers indicates the presence of old growth, diversity, riparian and water, in combination. This composite area of specialized and diverse habitats is of sufficient size and complexity to be significant in itself.

It should be noted that the information recorded on vegetation did not cover all of the southern part of the study area; consequently the presentation of that part is restricted to the presence of water and does not reflect the possible vegetation associations.

From the indications presented, it is evident that there are large natural areas of specialized and diverse habitats with possible connectors in the South Hills. These are particularly pronounced in that area found to be composite. Further definition of these areas can be made by referral to the base sheets and further field observations. By additional investigation, the corridors needed to connect these areas can be defined more accurately.

MAP 4, SHEET 1, DATA SET 1



SOUTH HILLS STUDY

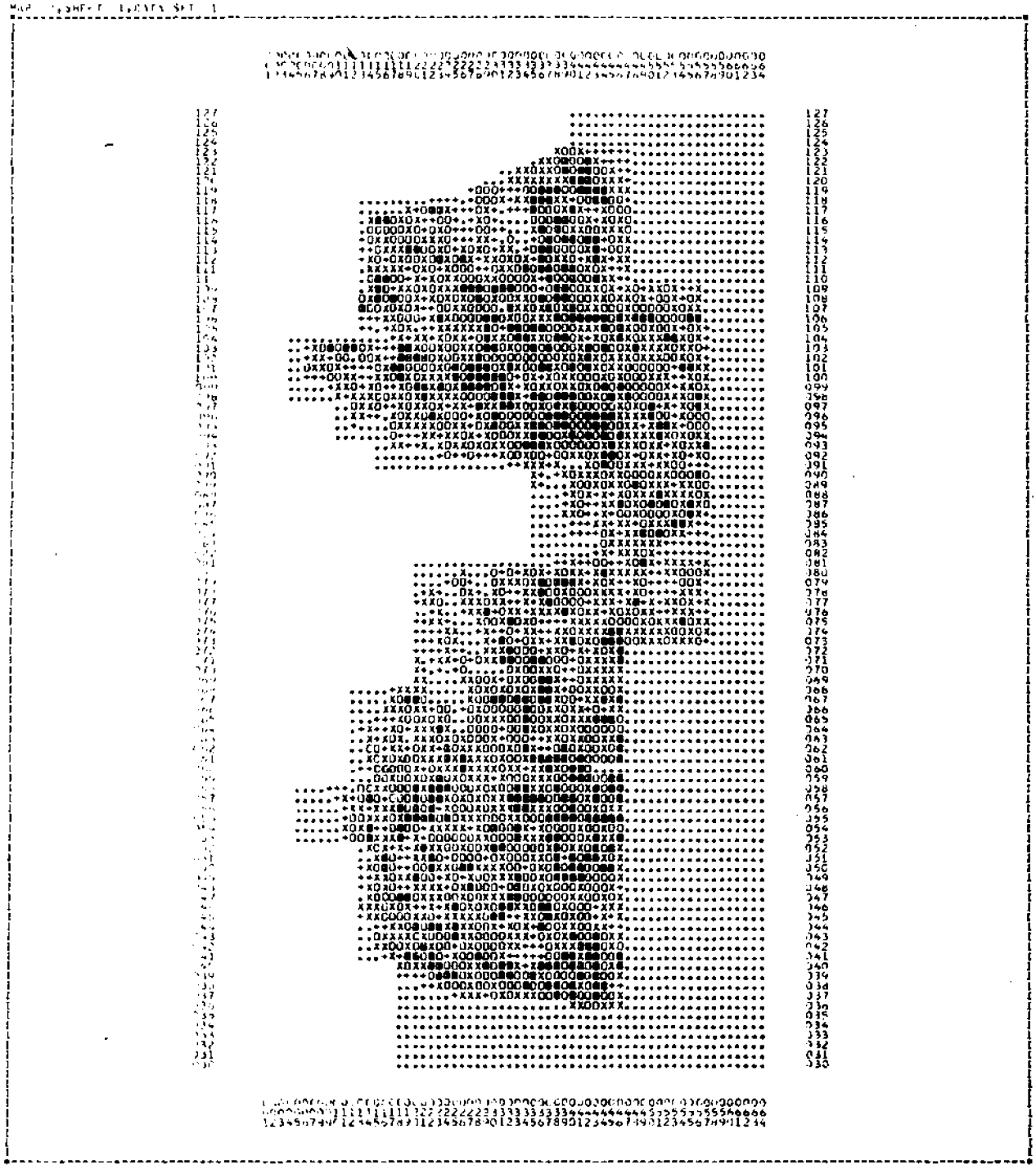
DEPARTMENT OF LANDSCAPE ARCHITECTURE

UNIVERSITY OF OREGON, SUMMER 1973

VEGETATION AGE

0= DISTURBED SINCE 1900
5= UNDISTURBED,OR DISTURBED BEFORE 1900

LEVELS	1	1	2	3	4	5	6	7	8	9
SYMBOLS	.	.	.	.	.	0	.	.	.	.
FREQUENCY	2235	0	0	0	383	0	0	0	0	



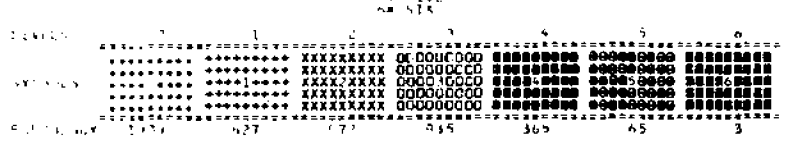
SUSAN FILES STUDY

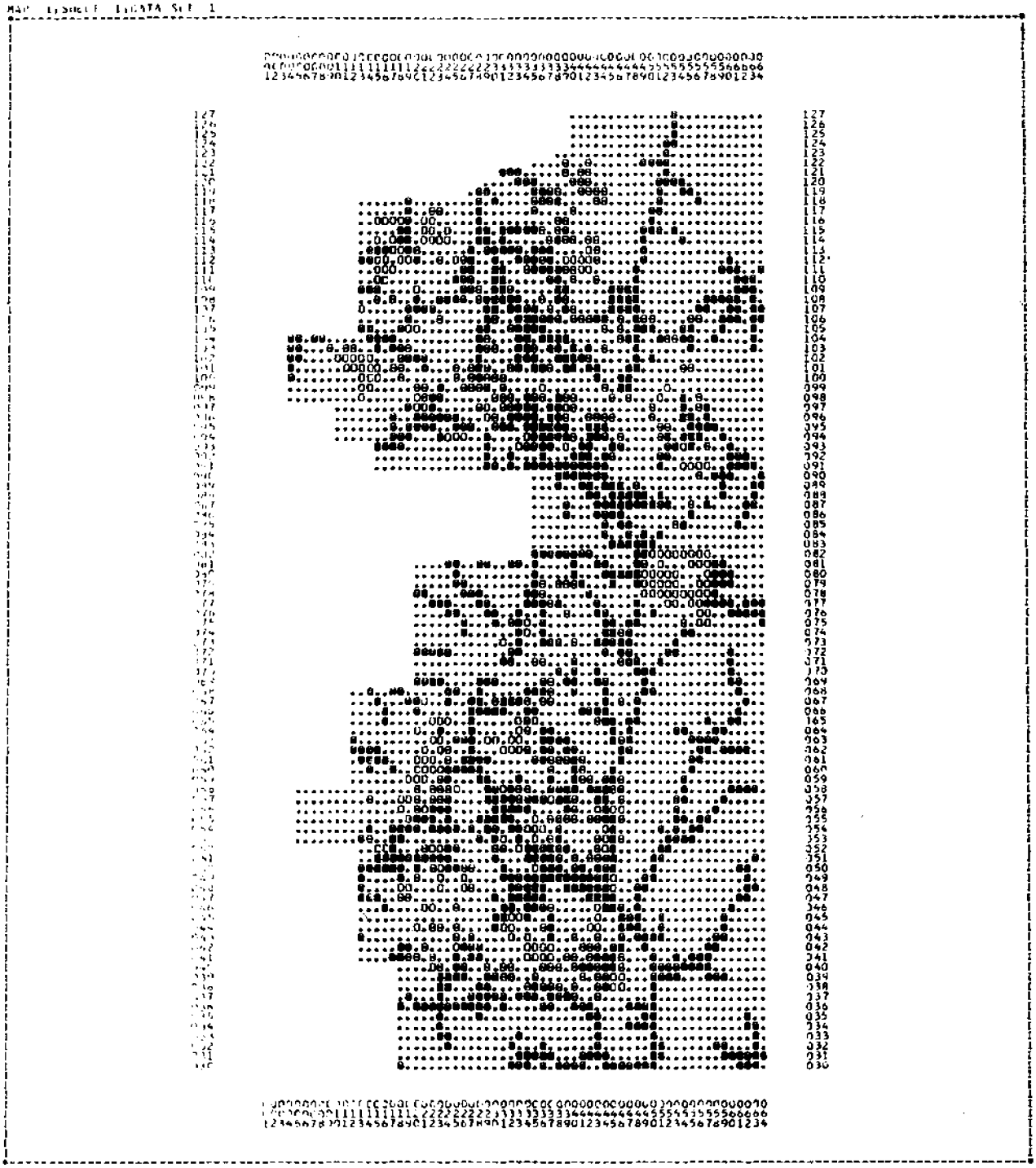
DEPARTMENT OF LANDSCAPE ARCHITECTURE

UNIVERSITY OF [illegible], SUMMER 1975

VEGETATION = NUMBER OF ASSOCIATIONS CONTAINED WITHIN EACH CELL

0= NONE
1= ONE
2= TWO
3= THREE
4= FOUR
5= FIVE
6= SIX





SOUTH HILLS STUDY

DEPARTMENT OF LANDSCAPE ARCHITECTURE

UNIVERSITY OF OREGON SUMMER 1974

BIOLOGICAL SUPPORT ZONES

1= DOES NOT MEET ANY OF THE FOLLOWING CRITERIA
5= OLD GROWTH DOUGLASFIR
6= FOUR OR MORE VEGETATION ASSOCIATIONS
7= STREAMS,PONDS,OR SEEPS
8= STREAM BANK VEGETATION

LEVELS	1	5	6	7	8	9
SYMBOLS	.	0	8	7		9
FREQUENCY	1077	200	277	875	0	247

AN ASSESSMENT OF THE VISUAL IMPORTANCE OF THE RIDGELINE

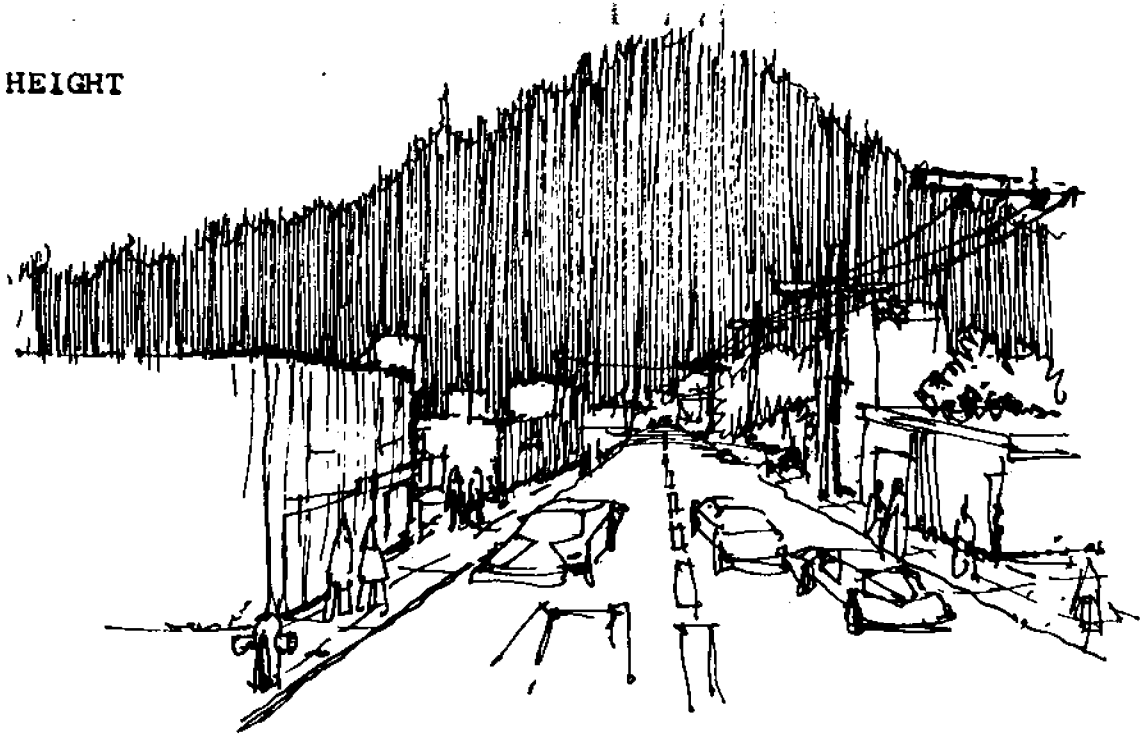
The landforms in and around Eugene were studied and those areas observed to be strong visual boundaries were identified. By analysis of the characteristics which distinguished those areas, an assessment was made of types of changes which would alter (either stengthen or weaken) their impact.

Several topographic features were observed that act as boundaries, or landmarks, for the City. In the north and northeast, the Coburg Hills effect a strong definition of edge or boundary due to their height (above 2200'), length and abrupt break from the valley to the west. To the east and southeast, the knolls of Kelly Butte and Mount Pisgah give definition by contrast of their heights and masses to the surrounding valley floor. Immediately to the east, the ridgeline extending from Judkins Point, south to Spencer Butte and north/northwest to Hawkins Heights defines a very strong boundary. This is not only for the reasons cited for other landforms, but because of the proximity and enclosure of the South hills, the contrasts of color and texture give additional support as a visual boundary. To the northwest, the edge is amorphous in that there are no vertical elements within the immediate area. Within the City, the landforms of Skinner Butte and College Hill are prominent as landmarks, and to a lesser extent edges, but their effects differ. Skinner Butte, with its contrast of vegetation, has much of the character and resultant impact of the South Hills. College Hill, because of development, does not have the contrast and consequently is more a visual extension of urbanization than an edge or landmark.

Through analysis of these areas, a methodolgy evolved for their description and the conditions necessary for ranking their importance. These conditions include the physical structure of the topographic feature, the physical structure of the viewing position and the activities of the viewer which might qualify his/her perception.

1. The physical structure of the topographic features includes the elements of height and width; the degree of slope; the topographic position of slope; and the shade, color and texture patterns on the landform. These elements are graphically presented as follows:

HEIGHT

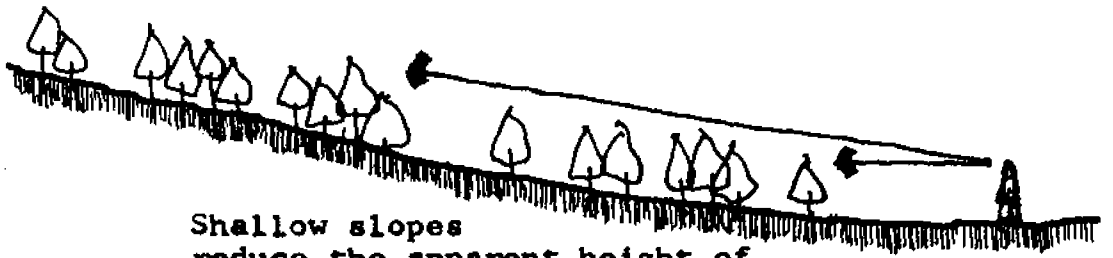


Spencer Butte and
Willamette Street

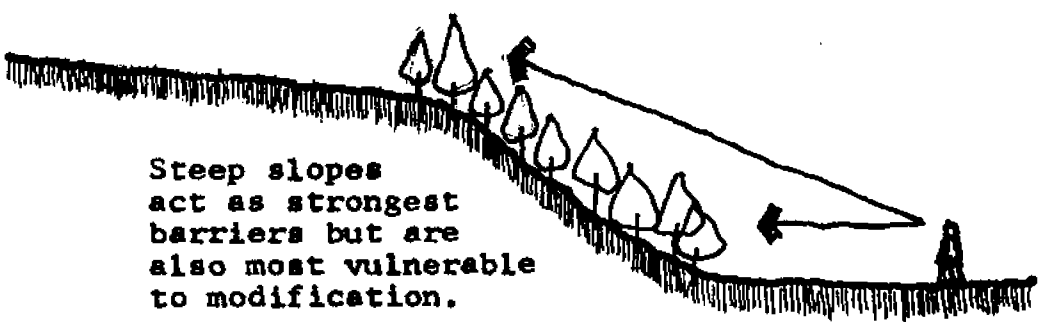
Hilyard Street and
Southern Oaks

k.f.

SLOPE



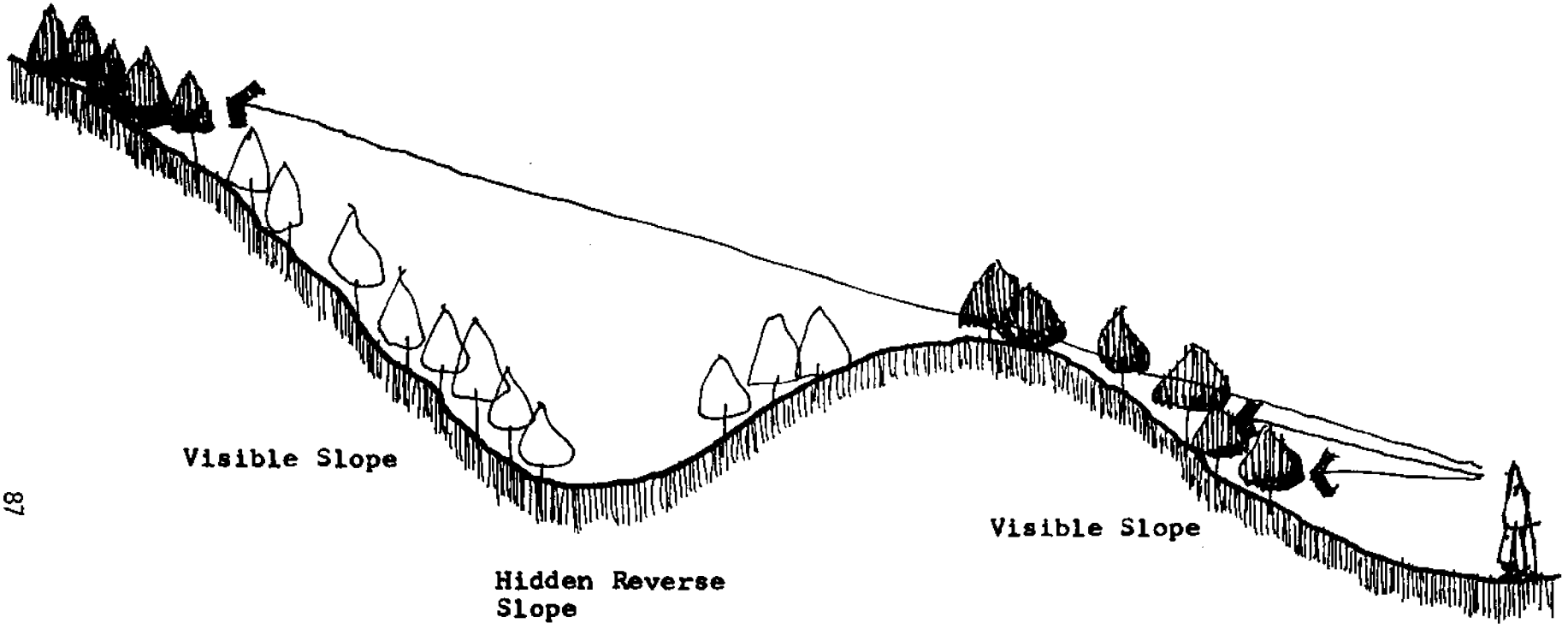
Shallow slopes
reduce the apparent height of
a slope; tree removal and cut and fill
activity will be much less apparent.



Steep slopes
act as strongest
barriers but are
also most vulnerable
to modification.

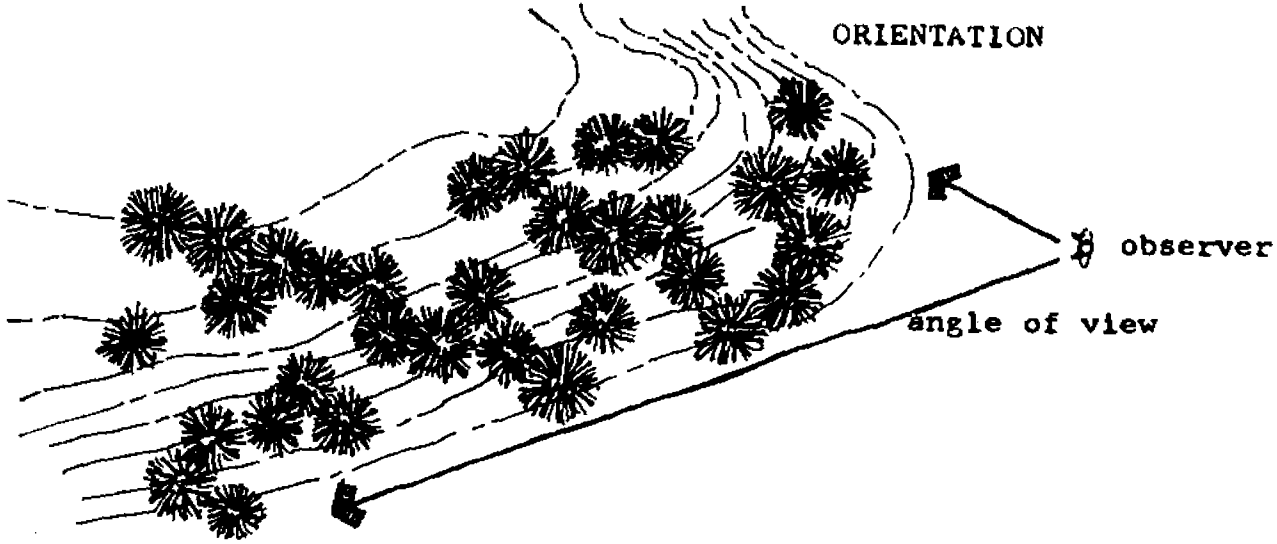
h.f.

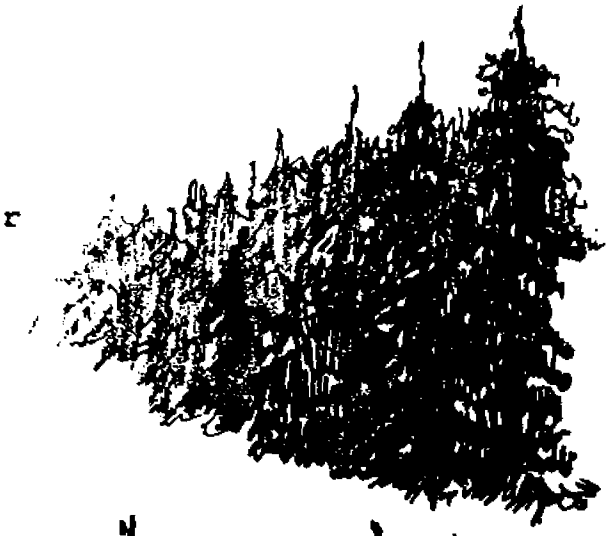
TOPOGRAPHIC POSITION OF SLOPES

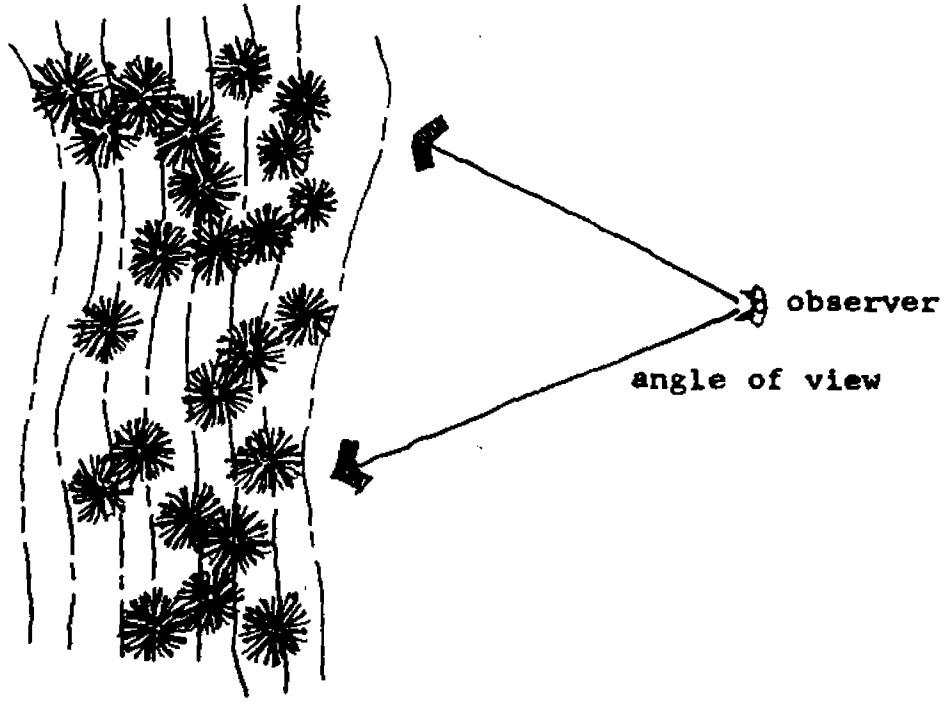


h.f.

ORIENTATION

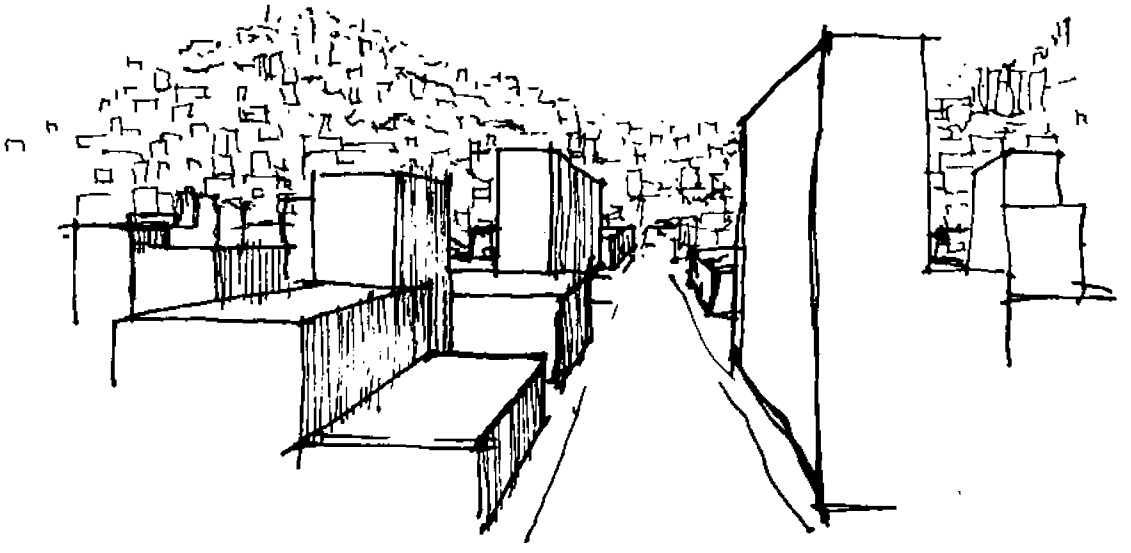




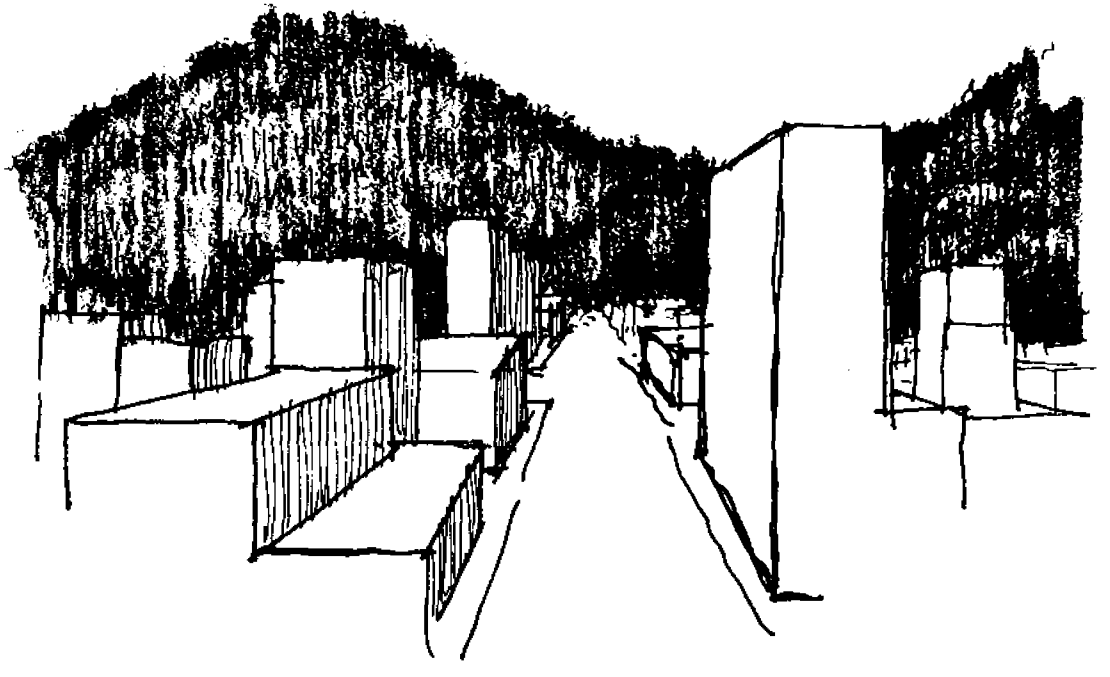


h.f.

CONTRAST IN TONE AND TEXTURE



Lowest when Hills developed with same forms and materials.



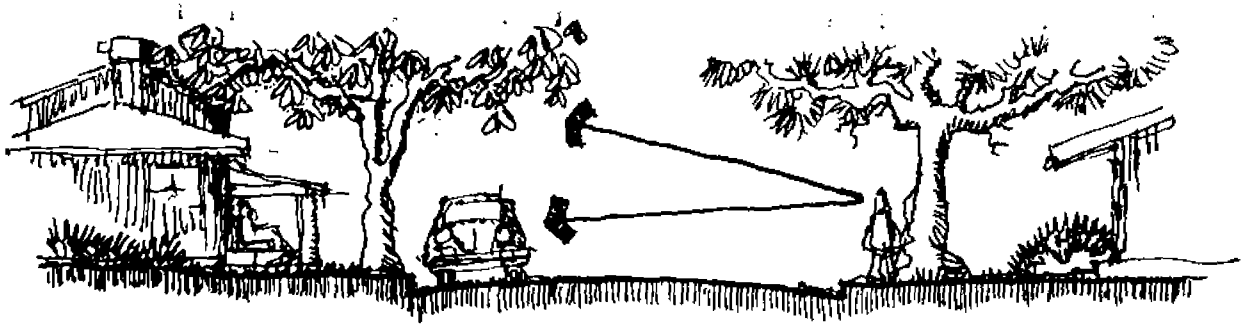
Highest contrast: old growth Douglasfir forest.

From these illustrations, it is apparent that the greater the contrast of any, or all, of these elements to their surroundings, the greater the impact of the topographic feature. The South Hills are in pronounced contrast to the valley floor and its development; consequently they define a very distinctive edge. The length of the ridgeline, the amount of enclosure and consistency of vegetation give them a continuity for a significant portion of the community.

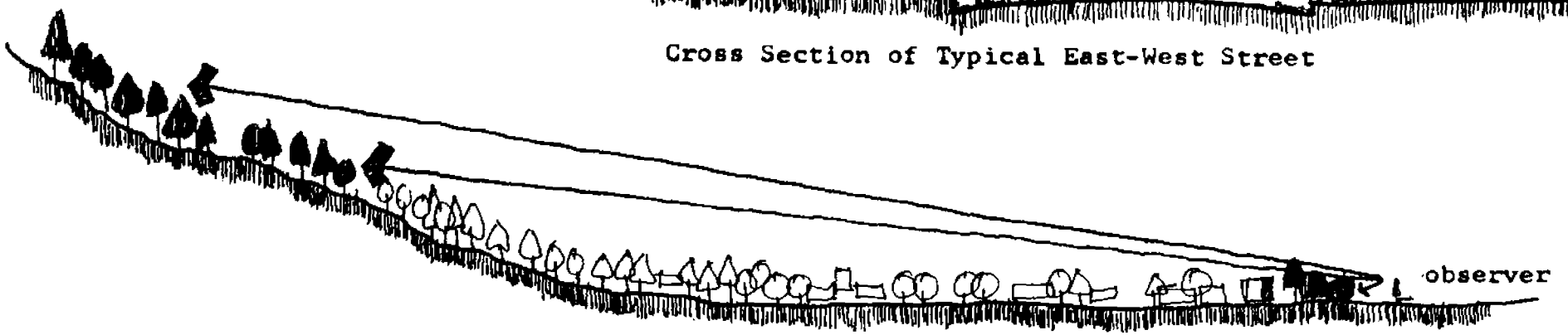
An evaluation of the proposed changes is possible by the effect of those changes on the continuity within the South Hills or the contrasts with their surroundings. If an element, or elements, is changed in character (example: road cuts on steep slopes that remove vegetation and leave a visible scar) the continuity will be disrupted. If an element, or elements is lessened (example: removal of conifers), the effect of boundary or edge will be lessened. The first change would have negative effect on the view, while the second would tend to neutralize the view.

2. The physical structure of the viewing position includes the elements of the orgainization of the city (buildings and their orientation by the pattern of streets); the influence of topography on the observer's position (height and orientation); the influence of open space (parks and open foreground); and the structure of roads and streets (width, direction and velocities). These elements are graphically presented as follows:

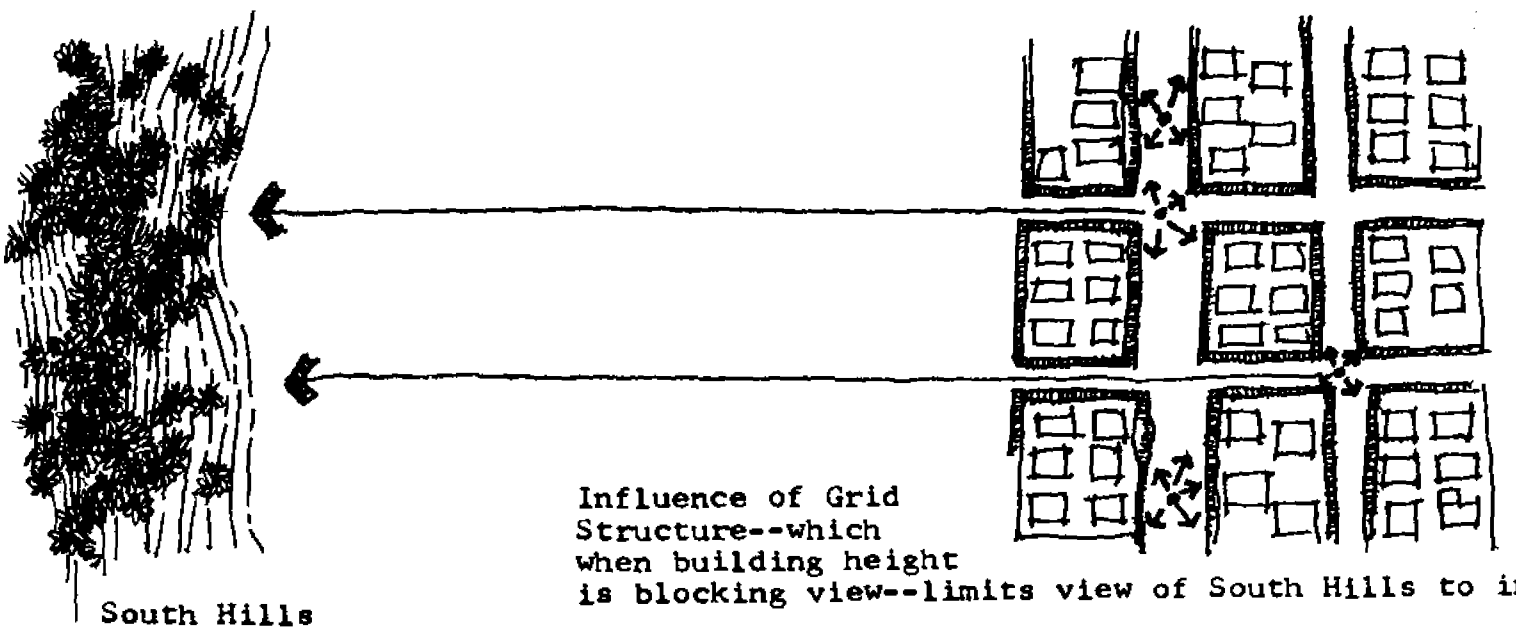
INFLUENCE OF STRUCTURES



Cross Section of Typical East-West Street



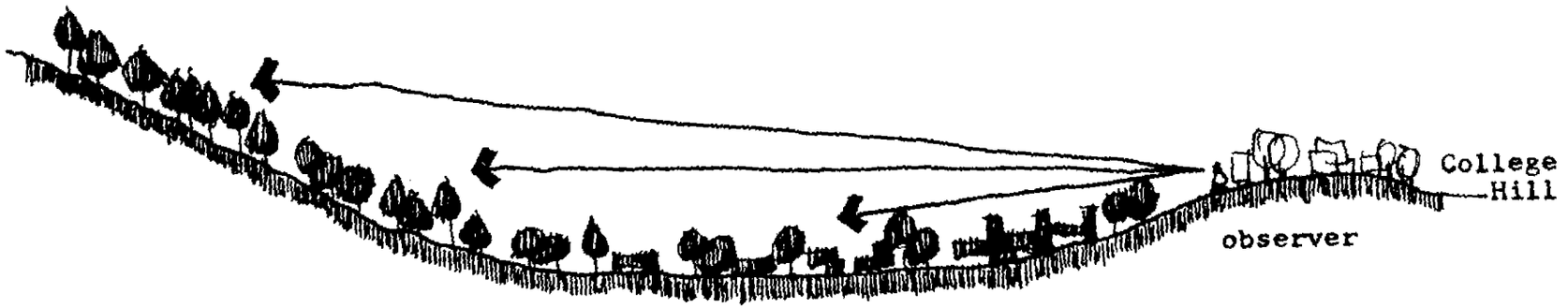
Area whose view is blocked--the built structure of the town limits the view of most residents to the upper slopes.



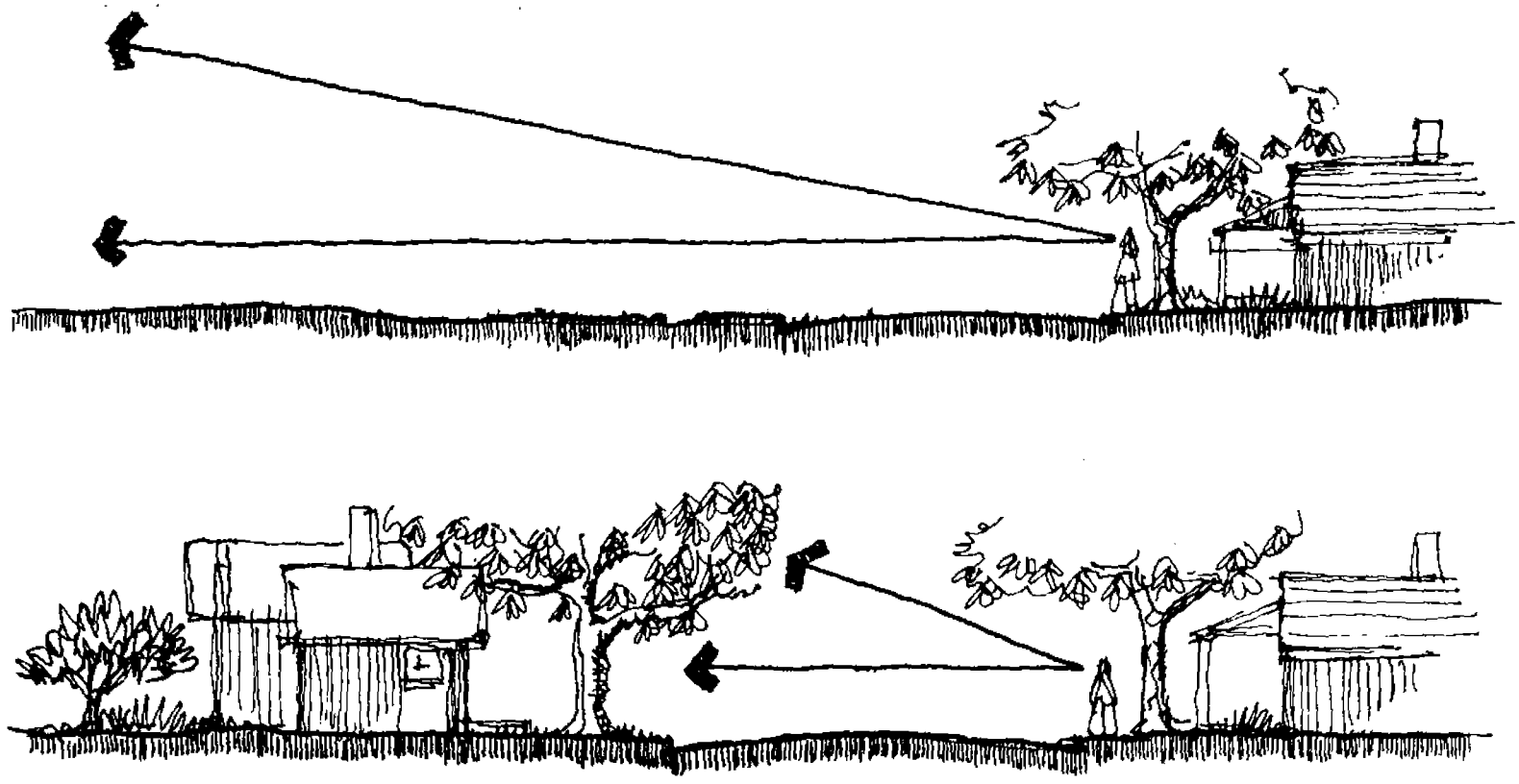
Influence of Grid Structure--which when building height is blocking view--limits view of South Hills to intersections.

w.f.

INFLUENCE OF TOPOGRAPHY



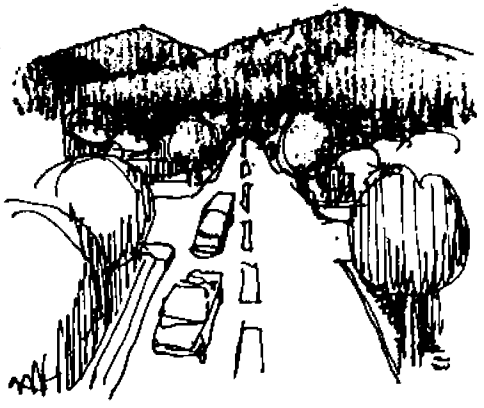
h.f.



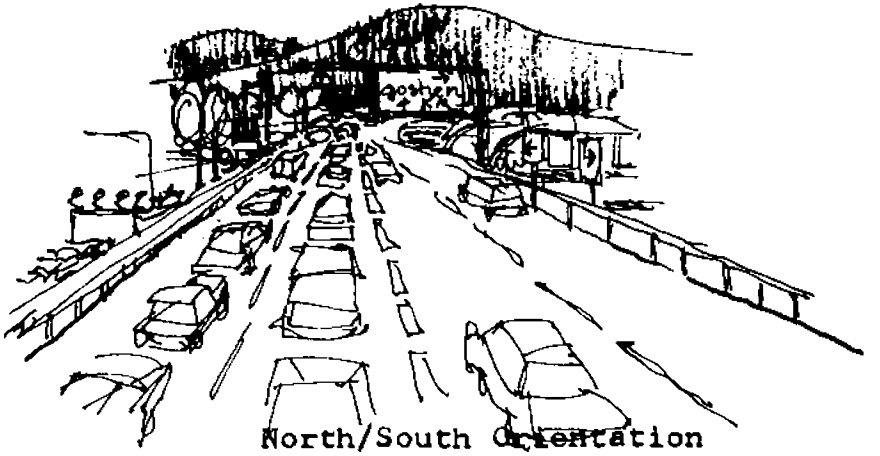
Parks and streets, as open space, allow observer to see larger areas of the South Hills.

hf

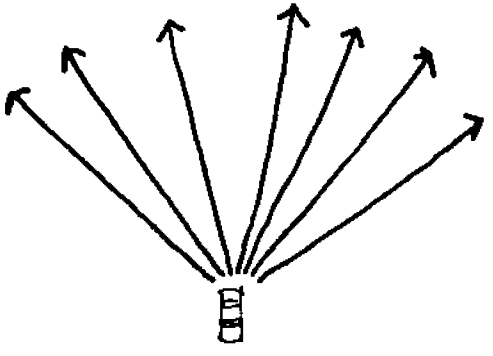
Streets are influenced by orientation, amount of distraction and speed of traffic.



North/South Orientation



North/South Orientation



Angle of view--wider at low speeds

Angle of view--narrow at high speeds

h.f.

Initially, the organization for the city of Eugene followed that of most communities; i.e., the grid pattern. This pattern does not normally emphasize a particular direction for views; however, because of local physiography, Willamette Street was oriented to Spencer and Skinner Buttes. More recent concepts of land subdivision (curvilinear streets) had advantages of relating more strongly to the land and in some cases to the views afforded by changes in the topography. Since most of the city adjacent to the South Hills was developed on the grid system, the illustrations show the significance of this lack of orientation to the potential views. In addition, the observer positions are for the most part restricted to the lower elevations with little opportunity for extended views. Since the foreground in the urbanized area is usually developed, restricted views of the hills are the result. The higher elevations observed afford the greatest expanse; consequently the greatest impact. This is very pronounced with the contrast of the ridgeline and the sky.

It has been stated previously that the grid pattern does not emphasize the view potential of the hills. Streets, however, allow sequential viewing by movement that a stationary viewpoint does not. The changes from corridors (defined by street trees and buildings) to open spaces (large parks and schools) contrasts the limited view to the panorama. This is another aspect of the viewing position that allows for contact with a much greater area of the South Hills.

3. The activities of the viewer which might qualify his/her perception are constantly changing, consequently impressions of the South Hills vary not only with the individual but at different times. In order to assess view potential by activities, a matrix is used to describe some kinds of activities, the type of facility in which they occur, the relative amount of distraction expected and the resultant potential to perceive views.

ACTIVITY	LOCATION	AMOUNT OF DISTRACTION	POTENTIAL TO PERCEIVE VIEW
EATING, CONVERSATION RELAXING, PUTTERING IN HOUSE OR YARD	RESIDENTIAL AREAS	LOW	HIGH
DRIVING TO WORK, SCHOOL, SHOPPING	STREETS	HIGH TO MOD.	LOW TO MOD.
WORK, SCHOOL, SHOPPING	DOWNTOWN, SCHOOLS SHOPPING CENTERS	HIGH TO MOD.	LOW TO MOD.
WALKING OR CYCLING	STREETS AND PARKS	MOD. TO LOW	MOD. TO HIGH

The purpose of the matrix is to identify activities where view is either complementary or integral, especially over an extended period of time. It shows that these view potentials are highest in residential areas and streets and parks. According to the 1970 census information, approximately one-half of the population of Eugene resides in areas of close proximity to the South Hills. Because of this proximity, the elements of shade, color and texture are important to the views of a significant portion of the population.

The ranking of conditions for view potential has been synthesized and presented on one of the base sheets. This illustrates the combination of elevations, slopes and slope orientation for those parts of the South Hills. It also illustrates the land use areas adjacent to the hills. This correlation of activities to land use establishes the viewer position and view potential and the areas of the South Hills found to be most important to the community as views. It is concluded that the criteria established for this methodology can be used in the evaluation of proposals which will cause changes in these areas. It is also assumed that a better understanding of their importance will aid in the making of those proposals.

The enclosed computer printout keys those areas that are most pronounced because of the physical structure of the South Hills. Since the major urbanization has developed to the north of the ridgeline, only the slopes visible from that direction are presented. This urbanization is for the most part residential; consequently, the potential for viewing is quite high. Because of proximity and enclosure, the contrasts and continuity of vegetation in the hills are also pronounced.

Since this presentation is in elevation increments and steepness of slopes, the importance of the contrast between the landform and sky is not evident nor is the continuity of vegetation on the slopes. (These can be seen in a series of slides taken for purposes of the Study which have been submitted to the Planning Department with this report.)

As this map indicates, the most pronounced areas of view for the community form a crescent from Strawberry Hill (the continuity is also broken in this area by a lack of vegetation) to Spencer Butte to the hill with the TV towers. Due to the north/south orientation of major carriers of traffic (Hilyard and Willamette) this crescent is also visible to a great number of residents who do not live in areas with view potential. (Slides for these areas have also been made for this Study and have been enclosed with the others.)

It should be noted that even with the restricted application possible with this form of presentation, the elevations and slopes are in strong contrast to the valley floor and thus affect the view of a majority of the Eugene residents.

AN IDENTIFICATION OF AREAS RECOMMENDED FOR DETAILED STUDIES AND POSSIBLE ACQUISITION:

In this, the final section of the report, the results of three of the study objectives are combined to determine those areas recommended for detailed studies and possible acquisition. They are: 1. an assessment of the land for areas of potential surface movement, 2. an ecological description of the study area, and 3. an assessment of the visual importance of the ridgeline.

In order to facilitate their combination in the computer program, they were entered as follows:

1. Surface movement as one category which included

   a. basalt flows
      soil depth of 40" and above
      slope of 30% and above

   b. Eugene formation
      soil depth of 40" and above
      slope of 30% and above

   c. Basalt flows
      soil depth of 40" and above
      slope of 20% to 30%

   d. Eugene formation
      soil depth 40" and above
      slope 20% to 30%

2. Biological as one category which included

   a. old growth Douglasfir

   b. four or more associations

   c. water

   d. riparian vegetation

3. Generalized Views as one category which included

   a. above 900' contour
      steeper slopes

   b. above 900' contour
      intermediate slopes

c. above 900' contour
gradual slopes

d. 700'-900' contour
steeper slopes

By grouping these most pronounced or diverse elements in each of the categories, a composite map of the study components was possible. (The grouping on only four elements in each of the categories was made to keep the entries simplified in order to see what patterns might develop. The program has the flexibility for the inclusion of one or all elements in each category.)

The enclosed computer printout shows that geographical areas within the South Hills have differing characteristics or emphases. View criteria alone identify areas interspersed along and below the ridgeline. Biological support zones are pronounced in the Laurel Hill area as well as the Russel Creek, Amazon and Spencer Creek drainages. Potential surface movement areas occur at random throughout the study area and show no strong patterns.

The combination of biological and view elements are very pronounced from Hawkins Heights to Spencer Butte as well as in the higher elevations of the Amazon basin. Surface movement potential and view elements combined occur infrequently as was predictable by previous observations. This is also the case of surface movement potential combined with biological criteria and the three categories collectively.

It is also noted that in addition to the areas with characteristics as biological support zones, a network of their connections can be found in the drainages along the slopes. Some of these corridors are indicated crossing the ridgeline.

The following recommendations for detailed studies in particular areas is the result of the analysis and assessment of each of the study objectives.

Recommendation #1

If the conditions are present for potential surface movement and when activities proposed could affect the hydrology, it is recommended that a thorough study be conducted on, or downslope from, the project area. This study should be conducted by qualified persons and include all of the engineering properties of soils, geology and hydrology.

Recommendation #2

If additional discussions verify the potential problems affecting air and water quality or quantity in the Amazon basin (see section on climate), it is recommended that studies be made as to their impact.

Recommendation #3

If areas have been identified as large natural areas of diverse and/or specialized habitats, it is recommended that detailed studies be conducted in those areas and that the studies be extended as more information becomes available. Included with those studies should be the identification and location of possible corridors for migration. If, after detailed investigation, an area is found to be unique in its collection of types, age or succession, its acquisition should be considered.

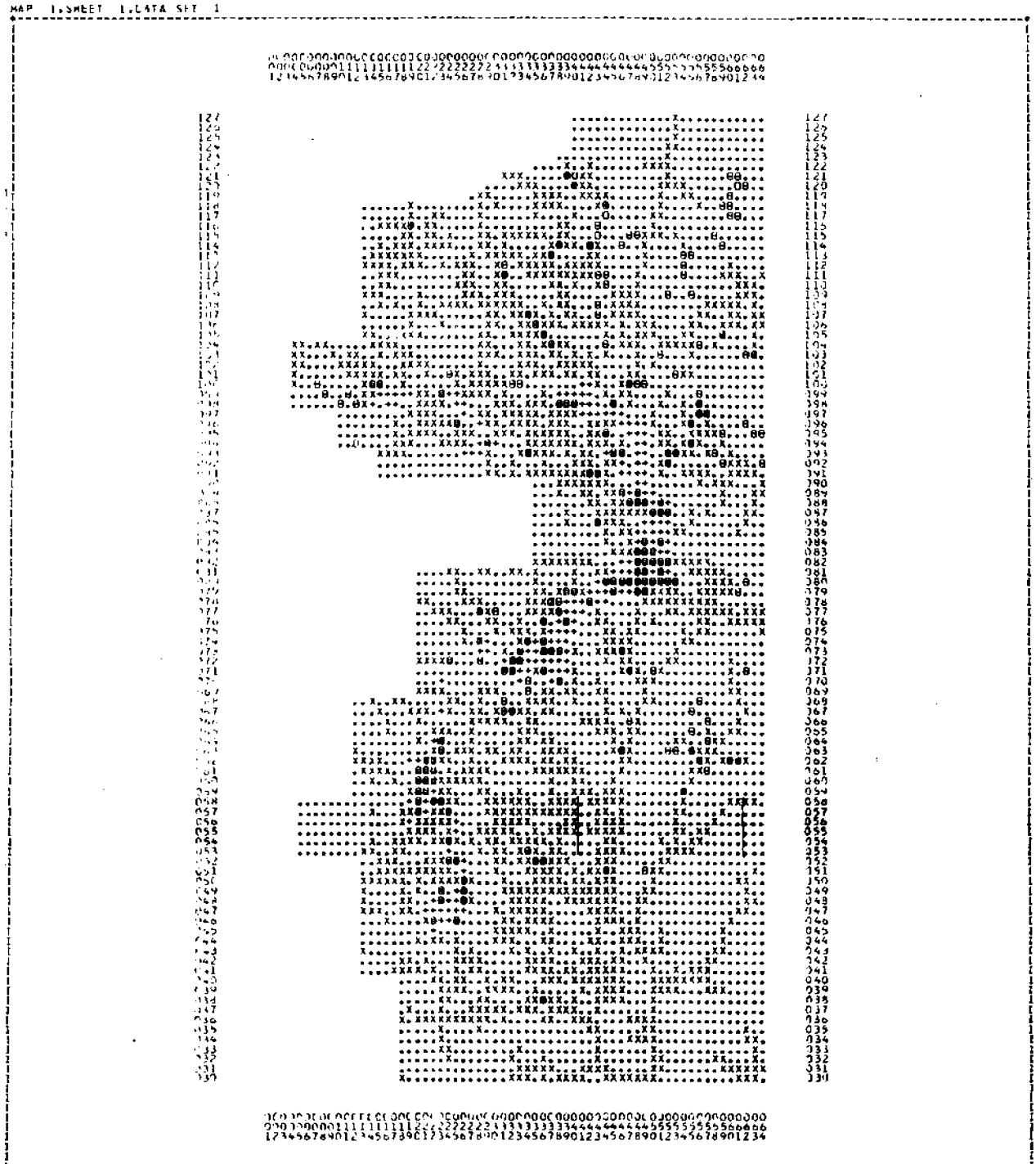
Recommendation #4

If any activities are proposed adjacent to these areas or corridors, it is recommended that studies be made as to their effect on the vegetation and animal populations.

Recommendation #5

If any activities projected will affect the areas of the South Hills that have been identified with high potential for view, it is recommended that the elements of contrast and continuity should be included in the considerations.

MAP 1:SHEET 1:DATA SET 1



SOUTH HILLS STUDY

DEPARTMENT OF LANDSCAPE ARCHITECTURE

UNIVERSITY OF OREGON, SUMMER 1973

COMPOSITE MAP OF STUDY COMPONENTS

0= CELLS WHICH DO NOT MEET THE FOLLOWING INTERPRETATIONS
3= VIEW CRITERIA APPLY
4= BIOLOGICAL CRITERIA APPLY
5= SURFACE MOVEMENT CRITERIA APPLY
6= BIOLOGICAL AND VIEW CRITERIA APPLY
7= SURFACE MOVEMENT AND VIEW CRITERIA APPLY
8= SURFACE MOVEMENT AND BIOLOGICAL CRITERIA APPLY
9= SURFACE MOVEMENT, BIOLOGICAL, AND VIEW CRITERIA APPLY

LEVELS	0	1	2	3	4	5	6	7	8	9
SYMBOLS	0			3	4	5	6	7	8	9
FREQUENCY		0	0	154	1465	75	90	3	41	3

SOUTH HILLS STUDY

Public Services

SCHOOL ELEMENT

Introduction

During the public hearings held on specific development proposals and the general question of the South Hills Study, extensive public concern was expressed concerning the adequacy of schools, particularly elementary schools, to accommodate the anticipated number of children resulting from continued residential development. Questions related to the adequacy of school facilities are particularly difficult to resolve for a number of reasons, among which the following could be noted:

1. School questions involve two jurisdictions, the city of Eugene and School District 4J. The School District Board and ultimately the public have direct control over the provision of facilities while the city has more direct control over the development process which ultimately determines the location of users of the educational facilities.

2. Questions related to the adequacy of existing school facilities are directly related to whether adequacy or inadequacy is defined in terms of a particular school attendance area or the entire district. Resolution of this difference is primarily a policy issue.

3. Questions related to the adequacy of school facilities are also dependent on whether only existing school facilities are considered or whether the ultimate expansion of such facilities is considered. The question of school expansion is direclty determined by the voting public.

4. Projections of probable number of school age children are difficult if not impossible due to the variety of factors which affect the number of children in any particular development and social forces operative within society as a whole. These factors include: (1) size of units: (2) price range of the development; and (3) fluctuations in the birth rate on both the national and local level. The city may have some degree of control over the size of units but only very limited control at best over the price range. The national or local birth rates are totally outside the control of either the city or the School District.

5. The adequacy or inadequacy of the South Hills area schools will be influenced by the ability of the city to maintain the inner city area as a desirable living environment for families with children so that older core schools are utilized rather than having the great majority of families with children locating on the periphery of the city.

It would appear necessary for any assessment of school facilities offered in conjunction with the South Hills Study to take cognizance of the factors and constraints enumerated above.

Existing School Facilities

There are nine elementary schools located within and serving the general area included in the South Hills Study. The attendance figures for these schools for the last two years, the capacity of the fixed facilities and the total capacity with portable units are set forth in the table below.

EXISTING SCHOOL FACILITIES

School	Capacity of Fixed Facilities	Total Capacity with Portables	Enrollment as of 9/28/73	Enrollment as of 9/31/72
Crest Elem.	218	244	250	253
Dunn Elem.	410		246	262
Edgewood Elem.	480		391	416
Fox Hollow Elem.	192		223	196
Harris Elem.	410		244	264
Laurel Hill Elem.	240		157	184
Magladry Elem.	144		130	154
McCornack Elem.	192	288	312	302
(Ellis) Parker Elem.	410		264	291
TOTAL	2696	2818	2217	2322

The table provided above does indicate that the capacity of the fixed facilities does exceed the enrollment at the present time. This statement does not imply that problem areas such as McCornack do not exist but rather addresses only the overall capacity of the facilities. The excess of capacity of over enrollment becomes even more apparent when considering all of the elementary schools within the School District. The figures for the entire district are attached to this report.

Expansion Capability

While recognizing that the ultimate decision as to the expansion of any school rests with the voting public, most of the schools within the South Hills Study area are capable of further expansion. The following table outlines the extent of expansion possible at each school. This potential expansion is primarily governed by the size of each site.

POTENTIAL SCHOOL EXPANSION

School	Present Teaching Stations*	Potential Additional Teaching Stations	Capacity of Present Facilities	Capacity of Potential Facilities**
Crest Elem.	9	15	218	548
Dunn Elem.	17	4	410	498
Edgewood Elem.	20	2	480	524
Fox Hollow Elem.	8	16	192	544
Harris Elem.	17	5	410	520
Laurel Hill Elem.	10	13	240	526
Magladry Elem.	6	0	144	144
McCornack Elem.	8	16	192	544
(Ellis) Parker Elem.	17	4	410	492
TOTAL	112	75	2696	4340

*Teaching Station defined as a classroom.
**Total capacity of existing and potential facilities. This figure is purposely low since an average of 22 students per classroom was used for this calculation.

As the figures cited above indicate, the existing school sites have the potential for expansion to accommodate an enrollment forty percent greater than is possible within the existing facilities. However, construction of these additional facilities would be contingent upon voter approval of funding.

School District Policy

In recognition of the problems posed by fluctuations in enrollment levels and the reluctance of the public to accept additional funding requirements when space is available within the overall district, the School District Board has adopted the following policy for dealing with overcrowded schools.

> The following alternatives will be considered when attempting to provide solutions to problems relating to overcrowded schools. Alternative #1 must be considered first to determine if overcrowding can be alleviated within the school. If a solution cannot be found by the principal and his staff, the Directors of Education and other appropriate district personnel will be involved to explore the other alternatives.
>
> 1. Consider in-building re-organization.
> 2. Provide portable classrooms with an allowance for consideration of existing support facilities, such as cafeteria, gyms, lavatories, offices, library, shops, etc.
> 3. Encourage patrons to voluntarily transfer their students without the provision of district transportation.
> 4. Adjust boundaries between contiguous attendance areas.
> 5. Transport students to available standard classrooms in other schools of the district.
> 6. Double shifting may have precedence over transporting to nonstandard facilities.

Summary

The purpose of this section was to provide background information on the present and potential school facilities within the South Hills Study area and current enrollment statistics. It was also intended to provide a context within which questions related to the adequacy of school facilities could be viewed.

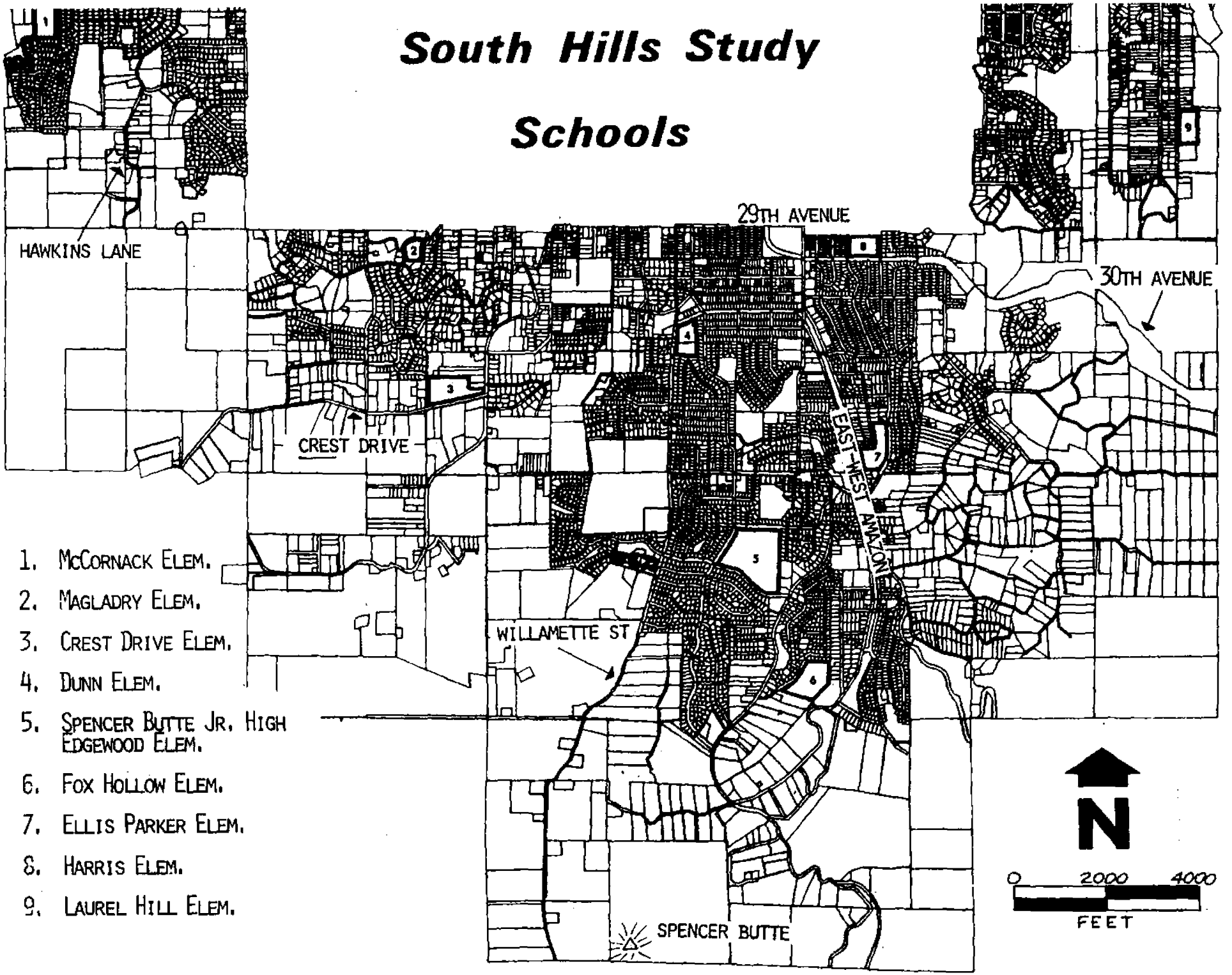
As the figures cited indicate, the existing school sites could be expanded to accommodate twice the present enrollment. The adopted School District policy represents a method of dealing with problems of overcrowding as these occur in various attendance areas until such time as growth within the overall district necessitates actual physical expansion.

SCHOOL DISTRICT 4J
ELEMENTARY SCHOOLS

School	Present Teaching Stations	Capacity of Present Facilities	Enrollment as of 9/28/73	Enrollment as of 9/31/72
Adams	19	458	328	353
Awbrey Park	21	506	584	600
Bailey Hill	16	384	296	275
Coburg	10	240	188	202
Condon	13	314	196	194
Crest Drive	9	218	250	253
Dunn	17	410	246	262
Edgewood	20	480	391	416
Edison	16	384	242	267
Fox Hollow	8	192	223	196
Gilham	12	288	320	298
Harris	17	410	244	264
Howard	22	528	523	553
Laurel Hill	10	240	157	184
Lincoln	14	336	172	199
Magladry	6	144	130	154
McCornack	8	192	312	302
Meadow Lark	21	506	486	493
Parker	17	410	264	291
Ida Patterson	16	384	254	246
River Road	22	528	436	457
Santa Clara	19	458	448	466
Silver Lea	21	506	466	475
Spring Creek	20	480	496	503
Twin Oaks	12	288	261	238
Washington	17	410	412	457
Westmoreland	18	432	361	352
Whiteaker	14	336	183	217
Willagillespie	17	410	318	343
Willakenzie	17	410	312	320
Willard	20	480	361	338
TOTAL	489	11752	9760	10168

South Hills Study

Schools



1. McCornack Elem.
2. Magladry Elem.
3. Crest Drive Elem.
4. Dunn Elem.
5. Spencer Butte Jr. High
   Edgewood Elem.
6. Fox Hollow Elem.
7. Ellis Parker Elem.
8. Harris Elem.
9. Laurel Hill Elem.

SEWER ELEMENT

Introduction

An analysis of the sewer system has been completed as part of the South Hills Study. The primary purposes of this element of the study were:

1. To determine if varying levels of development would have any impact on the sewer system; and

2. To isolate and identify the type and extent of modifications (if any) that would be necessary to accommodate varying density levels.

Within the context of the purposes specified above, it was not intended that this element of the study provide the sole or absolute base for any decisions concerning density, but rather, that any such decisions could be made with more adequate knowledge of the consequences.

The sewer analysis is limited to evaluation of the impact of varying density levels on the sewer lines (collector system). It does not address questions related to the adequacy or capacity of the treatment facility itself.

Methodology

The sewer analysis presented in this report is based upon an analytical model which incorporates certain fixed factors, certain design standards and a variable factor. These elements can be more precisely defined as follows:

1. Fixed Factors

   Those elements classified as fixed factors are the actual physical elements of the collector system as constructed. These include pipe length between manholes, elevation difference between manholes, type and size of pipes.

2. Design Standards

   The term "design standards" identifies certain standard formulae for calculating the flow rate and capacity of varying pipe sizes. It also includes commonly accepted measurements of anticipated discharge. For the purpose of this study, a discharge figure of 350 gallons per day per person (.000592 cfs/person/day) was used for drainage areas of less than 250 acres and a discharge figure of 250 gallons per person per day (.000386 cfs/person/day) was used for drainage areas of more

than 250 acres. The differential in these figures is based upon the fact that the bulk of the discharge from residential sources occurs at two peak periods during the day and the system must be designed to accommodate peak flows. In larger drainage areas more extensive lengths of pipe are involved and, consequently, a greater capacity to accommodate peak flows. Also included in the design standards is an infiltration factor of 3000 gallons per acre per day (.0046 cfs/acre/day).* The measurements used in this study are based on nationally recognized standards (see for instance, Design and Construction of Sanitary and Storm Sewers prepared by a Joint Committee of the Water Pollution Control Federation and the American Society of Civil Engineers) and are the standards normally used by the Eugene Public Works Department for sewer design.

3. Variable Factor

The variable factor within this analytical model is the population assigned to various drainage areas. The program is designed to compute the aggregate amount of discharge generated by different population densities in numerous small drainage areas (a map of these small drainage areas is attached to this report). A more detailed description of the population assignments is provided subsequently in this report.

The analytical model is designed to compute the cumulative discharge generated by varying levels of population through the system for the remote collector lines through the major trunk systems to the treatment facility. Based upon the specific population level being tested, the model indicates what segments of the system (if any) are being overloaded, the percent of volume over capacity, and the size of the pipe required to accommodate the amount of discharge being generated. (An example of the analysis of the Friendly Street system is attached. See Appendix A, Technical Appendices.)

Population Assignment

The assignment of varying levels of population is crucial in this analytical model. Information from the 1970 Census was used to determine the existing population level for each of the 90 drainage subareas being evaluated. The test of existing population distribution was important for two reasons:

1. It provided a comparative base for subsequent population projections for each drainage area; and

2. It allowed for testing of the model with a known situation so that the results of the test run could be evaluated by the Public Works Department to determine if the results of the analytical process corresponded to reality as presently known.

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* The infiltration factor compensates for ground water entering the system through pipe joints, manholes and other sources.

In addition to the test run involving existing population distribution, three other tests were made on the basis of gradually increasing densities. The first projection involved assignment of a relatively low development factor to the various drainage areas. This development factor was based upon the 1990 General Plan recommendations for different areas of the city and provided for development at an average density of two units per acre in low density areas, approximately ten units per acre in medium density areas and twenty units per acre in high density areas. Depending upon the specific drainage area involved, the figure of two units per acre was occasionally modified in those situations where development already exceeded two units per acre. The second projection involved the assignment of a slightly higher development factor of four units per acre in low density areas with a corresponding increase in medium and high density areas. The final projection tested involved assignment of a six unit per acre development factor in low density areas with a similar increase for medium and high density areas. In most instances, the projected population was based upon applying a population per dwelling unit ratio of 2.79 persons per dwelling unit (based upon 1970 Census average for Eugene). In certain medium and high density situations where the existing population per dwelling unit ratio is lower than that average, a reduced figure was used that corresponded to the present ratio. The data sheets with information concerning the present population and the projected population for each of the 90 drainage subareas are attached to this report. (See Appendix B, Technical Appendices.)

Care was taken in developing the population projections to guard against unreasonably high assignments. Each area was reduced in size to account for any commercial or industrial property or other types of uses which would preclude residential development when computing the dwelling unit per acre figure. Also, in many of the low density areas, the existing population per dwelling unit figure is significantly higher than the ratio used in this test. These precautions were considered necessary to provide a more credible base for the overall analysis.

Commercial and Industrial Sources

Discharge from commercial and industrial sources was accounted for either by adding a standard factor covering anticipated discharge per acre or by adding a special factor based upon known discharge from specific sources. For instance, a standard factor of .02 cfs per acre was added to drainage area 72 to account for discharge from the central business district. The special factors added were based upon the measured quantity per specified source reported in the Sewer Study Report prepared by Cornell, Howland, Hayes & Merryfield and were as follows:

1. 7.5 cfs added to drainage area 67 (AGRIPAC)
2. 0.89 cfs added to drainage area 72 (Darigold)
3. 0.51 cfs added to drainage area 72 (Meadowland)
4. 0.24 cfs added to drainage area 67 (Sacred Heart)
5. 0.21 cfs added to drainage area 77 (Eugene Dry Cleaners)
6. 0.17 cfs added to drainage area 10 (U. S. Plywood)
7. 0.16 cfs added to drainage area 65 (South Eugene High)
8. 0.07 cfs added to drainage area 72 (Domestic Laundry)

Sewer System Analysis

As previously indicated, the analytical model used is designed to evaluate the cumulative impact of discharge on the collector and trunk system. For the purposes of the South Hills Study, therefore, only those portions of the system directly affected by development in the South Hills were analyzed. For this reason, no analysis of the sewer system in the Willakenzie area is included since that drainage area is handled by a separate collector system. Included in this study are the three principal systems serving the western and southern portions of the city which are:

1. The Bethel-Danebo system which serves the Bethel-Danebo area proper and that portion of the city south of 18th Avenue and west of Hawkins Heights Boulevard;

2. The Friendly Street trunk system which serves property situated between Hawkins Heights Boulevard on the west and Friendly Street on the east; and

3. The Madison Street trunk system which serves all of that area east of Friendly Street including the Laurel Hill area.

Each of these three systems is an independent system with major trunks or interceptor lines extending to the treatment plant.

Tests of the Bethel-Danebo system indicated relatively few problems at any of the densities evaluated as the following table indicates.

Table 1
Bethel-Danebo System

Test Density*	Existing Pipe Size	Indicated Replacement Size	Length of Pipe Segment	General Location
+4 & +6	10"	12"	403'	Four Oaks Grange
+4 & +6	15"	18"	400'	Bertelsen Road
+6	15"	18"	825'	Bertelsen Road
+6	30"	36"	760'	11th Ave - Wallis

*Test Density indicates the specific density range being tested at the time the problem was first indicated.

The test of the Bethel-Danebo system indicates that of the 2400 feet of pipe that would have to be replaced with larger sizes at any of the densities tested, one-third of that amount would have to be replaced to accommodate even four units per acre. The Public Works Department has indicated that the amount of replacement specified is minor in terms of the overall system and could be expected as part of upgrading of the sewer system in that area.

Tests of the Friendly Street system also indicated relatively few problems of major significance.

Table 2
Friendly Street System

Test Density	Existing Pipe Size	Indicated Replacement Size*	Length of Pipe Segment	General Location
Existing	10"	12"-18"	217'	28th Ave.
+4	10"	12"-18"	299'	28th Ave.
+6	10"	12"-18"	305'	28th Ave.
+6	12"	15"	268'	28th Ave.
+6	15"	18"	493'	Between 26th & 27th
Existing	10"	12"-18"	1412'	17th Ave.
Existing	12"	18"	335'	17th Ave.
+6	10"	12"	352'	17th Ave.

*A double figure in the replacement size column indicates the range of size needed to accommodate varying densities.

While the table above appears to indicate some relatively extensive problems, it is important to note that these problems are located in two principal locations along 28th Avenue and 17th Avenue. In both instances, the test program indicated problems with the existing system which were simply exacerbated as the density increased. The Public Works Department has indicated that the identification of problems with the existing system in these locations is accurate and that necessary upgrading of these two areas would be of such a nature as to accommodate any of the population ranges projected within the test parameters. The problems indicated along the 17th Avenue portion of the system exemplify this problem. Approximately 2100 feet of pipe are indicated as needing replacement; however, about 1800 feet of that length needs to be replaced under existing population totals.

While the tests of the Bethel-Danebo and Friendly Street systems indicated relatively few problems, the test of the Madison Street system serving the area east of Friendly Street did indicate more serious problems. The results of the test runs on the Madison Street system are provided in Table 3, as follows:

Table 2
Madison Street System

Test Density	Existing Pipe Size	Indicated Replacement Size	Length of Pipe Segment	General Location
Existing	12"	15"-18"	618'	W of Center Way
+2	12"	15"-18"	612'	W of Center Way
+4	12"	15"-18"	400'	W of Center Way
+2	24"	30"	2908'	Franklin Boulevard
+4	24"	30"	108'	Franklin Boulevard
+4	12"	15"-18"	421'	17th Avenue
+6	27"	30"-36"	452'	Franklin Boulevard
+4	15"	18"	384'	Agate
+6	15"	21"	1524'	Agate
+4	27"/30"	36"-42"	2315'	Franklin @ 11th
Existing	15"	18"	575'	Jackson-Jefferson @ 24th
+4	10"/12"	15"-18"	3085'	26th to 24th
+6	18"	21"	1157'	Van Buren-Tyler @ 6th
+2	24"	36"	400'	Mill-High @ 11th
+6	66"	84"	7675'	Madison
+6	72"	*	10500'	Interceptor

*Size not precisely determined but in excess of 84".

Review of the indicated replacement sizes and sections by the Public Works Department has pointed out the following considerations to be applied to the data set forth above:

1. Those sections noted for replacement west of Center Way again exemplify a situation where problems exist with the present system and grow progressively worse as the density is increased. In this case the problems would be corrected by anticipated maintenance of the existing system.

2. The existing 24" segments located at Franklin Boulevard which are indicated for replacement serve the Laurel Hill and Glenwood area. Replacement of these sections would probably be necessary under any circumstances.

3. The series of sections indicated for replacement located at 17th Avenue, Franklin Boulevard, and the two Agate Street sections are located in the University of Oregon area and are directly influenced by development both at that facility and the surrounding area.

4. The three segments located at Jackson-Jefferson, 26th to 24th and Van Buren-Tyler involve problems presently recognized and will be alleviated through a proposed bypass system.

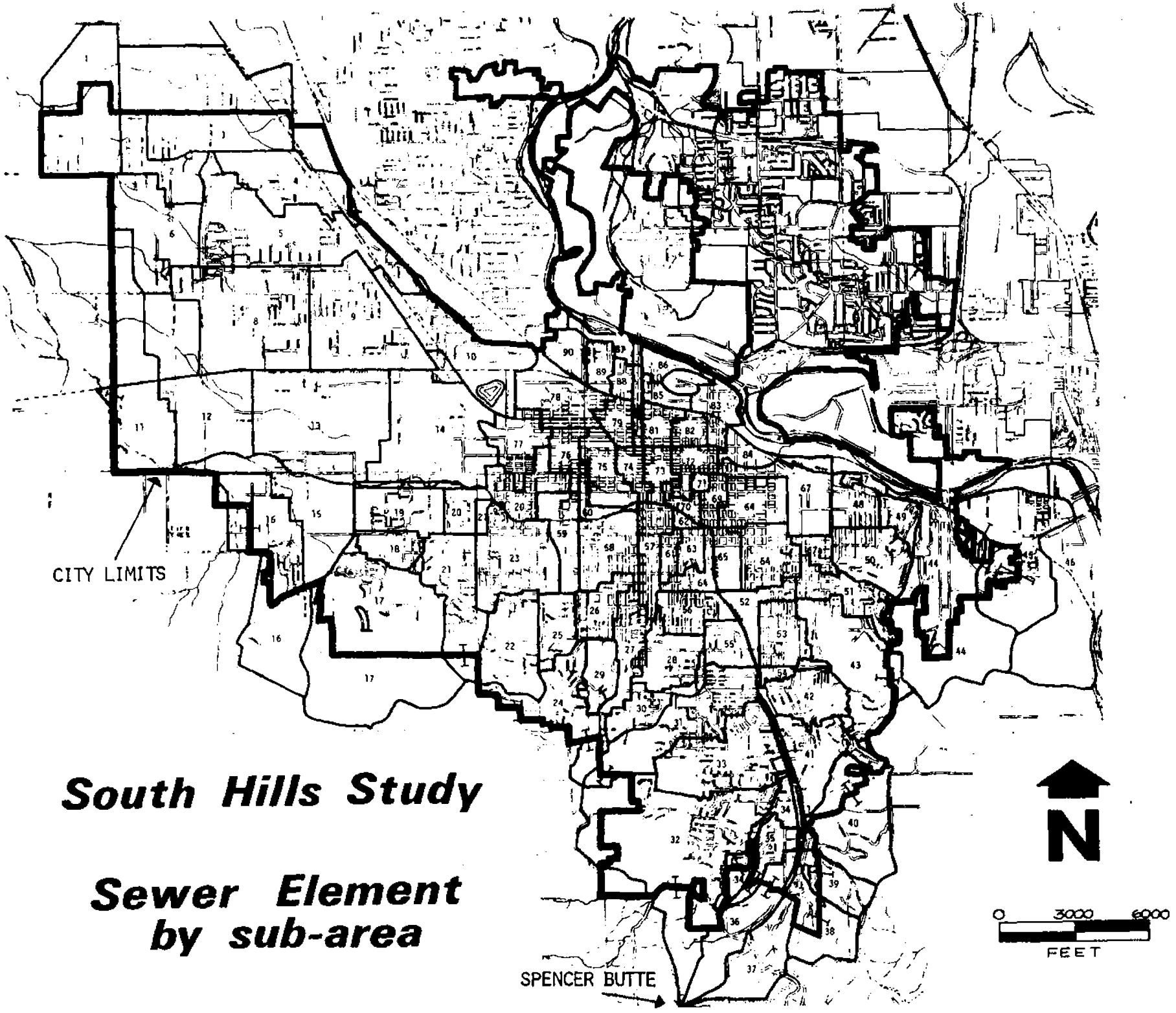
The considerations noted above appear to resolve many of the problems noted in the analysis of the Madison Street system. However, the most serious problem is the impact that development in excess of 4 units per acre will have on the 66" trunk line at Madison Street and the 72" interceptor line extending from Madison Street to the treatment plant. The size of the necessary replacements and length are of particular significance. The cost of replacement of the present 66" line with an 84" line would be in excess of $200 per foot. The cost to replace the existing 72" interceptor line would be even higher per foot.

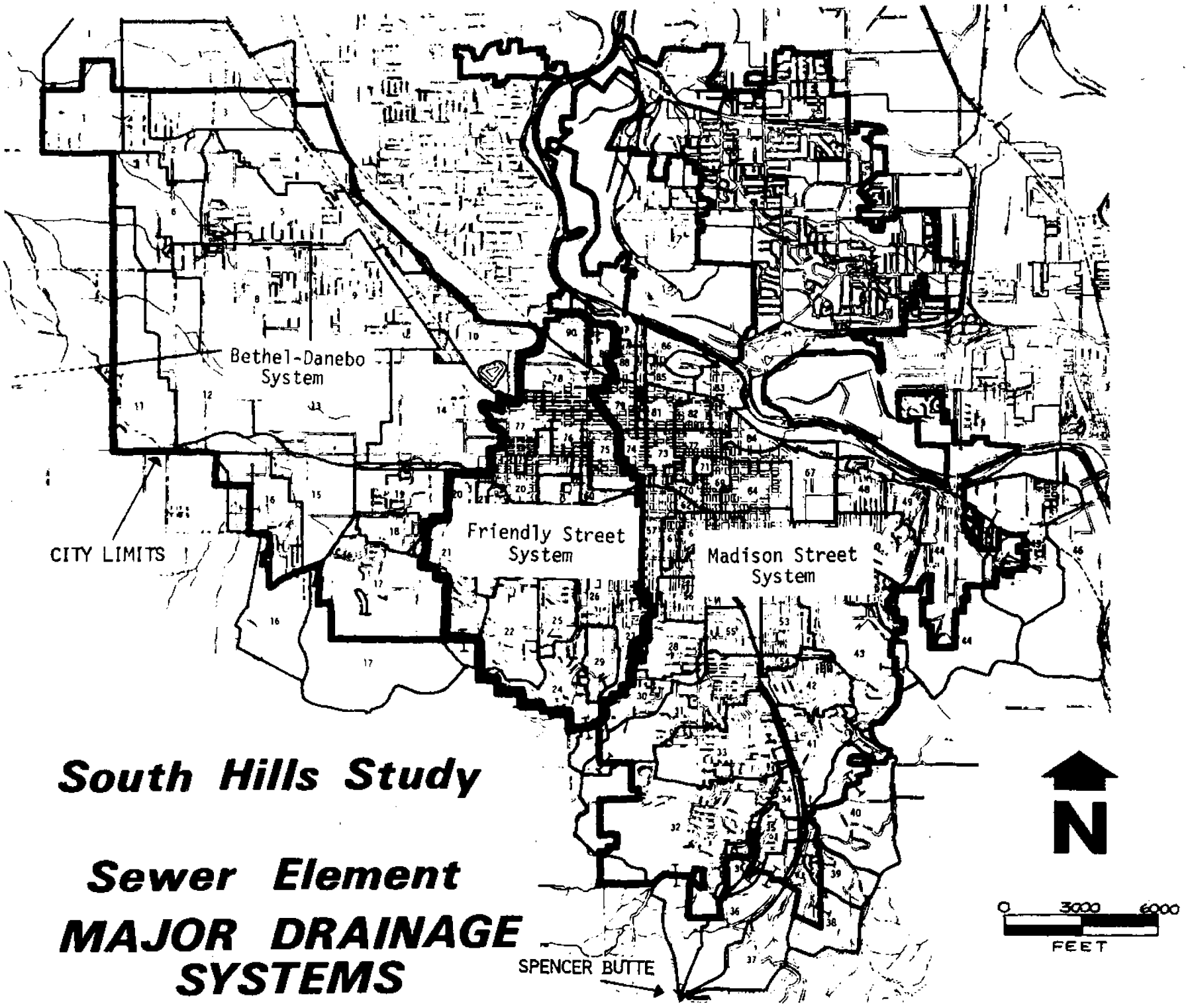
After reviewing the information obtained from the analysis of the Madison Street system, the Public Works Department has indicated that the results are reasonable. The CH2M (Cornell, Howland, Hayes & Merryfield) Sewer Study Report prepared for the city in 1961 established as a design criterion a density standard of six people per acre for the hill areas in the southern portion of the city. Based on this design standard, an overload situation at development in excess of four units per acre could reasonably be anticipated.

Summary

The sewer system analysis indicates that certain modifications will have to be made to all portions of the collector and trunk system to accommodate anticipated densities. However, in the Bethel-Danebo and Friendly Street systems, these modifications are either of a minor nature or necessary under existing population levels.

The most extensive problems were identified in the Madison Street system. Again, many of the problems would be resolved through normal upgrading of the system. The major problem, however, involving the 66" trunk and the 72" interceptor occurring at density levels over 4 units per acre would not be resolved through normal maintenance and upgrading but would require significant capital expenditures.


CITY LIMITS
SPENCER BUTTE
South Hills Study
Sewer Element
by sub-area
N
0
3000
6000
FEET



South Hills Study

Sewer Element

MAJOR DRAINAGE SYSTEMS

TRANSPORTATION ELEMENT

Introduction

Questions related to traffic generation have consistently been recognized as a concern when evaluating potential development in the South Hills area. This concern originates because the major areas yet to be developed are situated at the periphery of the city with the consequent necessity for traffic from these developments to pass by or through existing development along certain major norty-south routes. During numerous public hearings, extensive public concern has been expressed over the amount of traffic anticipated from new development.

While recognizing the significance of this concern over traffic generation and the necessity for considering traffic generation as part of the South Hills Study, it should be noted that the inclusion of a completely new traffic study as part of the South Hills Study was considered extremely difficult if not impossible. This determination was based both upon the cost factor and the time element involved in such a study. A further consideration was the fact that the city, in conjunction with Lane County and Springfield, was undertaking such a study in the E-SATS update process. Unfortunately, the E-SATS update was initiated after the South Hills Study and will not be completed in time to correspond with the deadline established for the South Hills Study.

After reviewing the types of traffic study which would be possible with the City Traffic Engineer, representatives of the State Highway Department and a private consulting firm, it was determined that the most feasible approach would be to submit a modification of the original E-SATS data. In the original E-SATS report, the city was divided into different transportation zones (a map of which is attached to this report) with projections of the anticipated number of dwelling units in each zone. Utilizing this projection of dwelling unit distribution and the location of major industrial and commercial areas, projections were made of the anticipated loading (average traffic volume per day) of the street network as people travelled from home to work or shopping. The State Highway Department indicated that it would be possible to review the original distribution of projected dwelling units in light of development trends which have emerged since 1964 and to redistribute the projected number of dwelling units in light of those trends.

The process of redistributing dwelling units in light of present development trends was subject to several important limitations. In the first place, the total number of dwelling units originally projected for 1985 could not be modified. The original E-SATS study had projected a total of 60,450 dwelling units in the Eugene-Springfield metropolitan area by 1985 (based upon population projections). This figure had to be maintained as a constant since any revision would have involved time and expense that exceeded the constraints of the South Hills Study. A second limitation was that the basic assumptions incorporated into the original E-SATS report such as automobile usage, automobile ownership, mass transit usage and other factors could not be altered.

Again, time and expense factors curtailed modification of these assumptions. It should also be noted that both the population and dwelling unit projections and the assumptions incorporated in the original E-SATS report are being re-evaluated in the E-SATS update process.

The purpose of this limited traffic study was primarily to show the impact that emerging development trends would have on the existing street network. In testing the loading of the street network under the revised dwelling unit distribution, it is possible to indicate the extent to which development trends have modified anticipated street loadings. In order to determine the immediate impact of such trends, the loading was limited to the existing street network and no projected routes were included.

After reviewing the possible loadings which could be made with the State Highway Department, it was determined that two loadings should be made.

1. Limited Loading

   The limited loading is intended to reflect, as acurately as possible, development patterns over the entire city. Under this loading, only about 2000 additional dwelling units were added to the South Hills area beyond that originally projected for 1985. Substantial modifications were also made in the Willakenzie area where extensive planned unit development activity has produced a greater number of units than previously anticipated. This loading is reflective of only existing and proposed development.

2. Saturation Loading

   The saturation loading is intended to simulate full development of the South Hills area. Under this loading, approximately 15,500 additional dwelling units were added to the South Hills area beyond the 8,445 originally projected for 1985.

Limited Loading

When preparing the data for the limited loading test, each transportation zone within the Eugene area was reviewed to determine if dwelling units should be added or subtracted to the originally projected total (projected for 1985). This preliminary analysis included comparison of the actual dwelling unit count as established by the 1964 census conducted by Central Lane Planning Council (L-COG) and by the 1970 census. In addition, these actual counts were compared with known development proposals in each area and with the original projections. The data sheets containing this base information are attached in Appendix C, Technical Appendices of this report. Several examples of how this procedure was applied to specific transportation zones are listed below.

1. Transportation Zone 445

The actual location and dimensions of transportation zone 445 are indicated on the map attached to this report. In general, transportation zone 445 is situated south of 40th between Willamette and Amazon extending south to the city limits. The original E-SATS projections indicated a possible total of 1,300 dwelling units in this zone by 1985. However, approximately 1,100 had already been constructed by 1973. In addition, this zone includes the property being developed as the BALSM project and the Hunington planned unit development. These two developments represent approximately 300 units. Therefore, in view of the existing development, the amount of property available for development and the proposed development, an additional 275 units were added to the original projection of 1,300.

2. Transportation Zone 464

Transportation zone 464 is located south of 18th Avenue, bounded by Hawkins Heights on the east and Bailey Hill Road on the west and contains approximately 470 acres. The original projection for this zone indicated approximately 260 dwelling units by 1985. However, a number of planned unit developments such as Village Oaks and Valley West have been completed after 1970, as well as extensive subdivision development. The 1970 census indicated that 236 dwelling units have already been constructed in this zone. In order to account for this increase and the potential for further development such as the Somerset planned unit development, the dwelling unit projection for this transportation zone was increased by 600 units.

3. Transportation Zone 472

Transportation zone 472 is located south of 18th Avenue (extended) and west of Bailey Hill Road and contains approximately 985 acres. The original E-SATS projection for 1985 indicated the possibility of approximately 260 dwelling units in this zone. However, this transportation zone is not within the city limits and the potential for annexation is remote since sewers cannot be extended to this area at present or in the foreseeable future. In 1970 there were approximately 40 dwelling units in this zone, an insignificant increase over 1964. For these reasons, the projected number of dwelling units in this zone was reduced by 150.

4. Transportation Zone 531

Transportation zone 531 is located north of 11th Avenue and west of Terry Street. Nine hundred eighty dwelling units were originally projected for this zone. However, there were only 167 dwelling units in 1970. Further, much of the area is presently zoned for industrial use and much of the area is outside the Urban Service Area (based upon the potential for sewer extension). Because of the present zoning and the apparently limited potential for development, the total number of projected dwelling units was reduced by 367.

The four examples cited above are indicative of the type of process followed under the limited loading test to redistribute dwelling units. A map indicating which transportation zones were modified and the extent of modification is attached to this report.

The modifications to the dwelling unit distribution were forwarded to the State Highway Department in July of 1973. In October, 1973 the State Highway Department completed its analysis. That analysis indicated that the additional dwelling units added to the South Hills area would result in approximately 5700 additional vehicle trips (home-oriented trips) per day. This figure was arrived at by calculating the additional trips per day on Willamette, Hilyard, Lorane and Chambers at approximately 32nd Avenue. The purpose of this calculation was to show the impact of home-oriented trips in and out of the South Hills area on the major north-south routes. The 5700 trip per day figure cited is in addition to the number previously projected for 1985. A map showing the original loading projections and the new loadings is attached to this report.

While not making a judgment as to the adequacy or inadequacy of the present street network to handle the projected traffic volume, the increase in home-oriented trips under the revised dwelling unit distribution appears relatively modest. One reason for this apparently limited increase is the fact that the total number of dwelling units added did not substantially increase the total number already projected for the area. This factor pointed to the need for a higher overall dwelling unit projection to determine the effects that would result from full development of the South Hills area.

Saturation Loading

After reviewing the results of the limited loading test with the State Highway Department, it was determined that a saturation loading should be run to test the impact that full development of the South Hills area would have on the existing street network. It should be noted from the outset that this saturation loading is not a forecast or statement that development will actually take place in the magnitude projected, but simply an attempt to determine the effects of such development were it to occur.

The dwelling unit projections used in the saturation loading were based on an assumed average density per gross acre for each of the transportation zones involved. Twelve transportation zones situated along the southern periphery of the city were selected for this loading. In certain cases, the gross acreage figure for specific zones was reduced when a portion of the transportation zone was located outside the urban service area.

After reviewing already developed areas within the city, the figure of 4.5 dwelling units per gross acre was selected as the base figure. This figure may be low or high depending upon a number of factors such as type of development and type and extent of regulatory measures. However, the following factors were considered in selecting the 4.5 units per acre figure:

1. The figure is well within the low density range as defined in the 1990 General Plan.

2. Existing development in older portions of the city which are extensively developed approximate this figure without including any planned unit developments. Transportation zone 434, for example, has a density of 4.16 dwelling units per gross acre.

3. While the 4.5 dwelling unit per acre figure is below both the normal density limitation of 8 units per acre common in planned unit developments and the 6 unit per acre figure established in the interim density limitation, it does compensate for land in each transportation zone which is devoted to other uses such as schools, parks and/or cemeteries.

4. The figure of 4.5 dwelling units per acre represents the average density of normal single family development (3.75 dwelling units per acre) and of the eleven planned unit development proposals listed in the land use section of this report (5.45 dwelling units per acre) combined.

The figure of 4.5 dwelling units per gross acre was applied to transportation zones 355, 443, 445, 463, 464 and 474 in their entirety. Transportation zones 341, 342, 439, 473 and 474 were reduced in gross acreage to correspond with the Urban Service Area and then the figure of 4.5 dwelling units per acre was applied. Transportation zone 472 was not changed from the original projection of 256 units on a gross acreage of 985 since all of the zone is outside the Urban Service Area. Transportation zone 444 was not changed from the original projection since that area is substantially developed and the original project appears valid. These twelve transportation zones represent those zones located at the southern periphery of the city.

If a full or saturation level of development were to occur in these zones, a total of approximately 24,000 dwelling units could be anticipated. This is 15,500 dwelling units in excess of the 8,450 originally projected for 1985.

In order to compensate for the additional dwelling units added to the South Hills area and still remain within the total number of dwelling units originally projected for the metropolitan area, it was necessary to substantially eliminate dwelling units from the northern portion of the city. Thus, the dwelling unit count in Santa Clara and River Road and portions of Bethel-Danebo and Willakenzie was eliminated. This elimination is valid as long as the test run is limited to loadings on the north-south streets leading in and out of the South Hills.

Saturation Loading Analysis

The analysis of the saturation loading is subject to the same limitations as the analysis of the limited loading test. The most significant of those limitations are:

1. The analysis is predicated upon the assumptions built into the original E-SATS analytical model such as the level of automobile ownership and usage. In this respect, it should be noted that the original E-SATS data concerning automobile usage (average of 5.3 auto driver trips per dwelling unit per day) appears definitely conservative when compared with present traffic flow volumes and more recent origin-destination studies. Alternatively, the analysis does not reflect the consequences of limited fuel supply nor possible increase in mass transit usage beyond that originally projected.

2. The purpose of this transportation study was not to project specific improvements or routes, but to document the effect that varying levels of development would have on the traffic network. The purpose was to consider development in an aggregate fashion rather than as discrete phenomena. For this reason, it would be inappropriate to use this analysis for specific project evaluations.

While the analysis of a limited amount of development indicated a relatively minor increase in the total number of home-oriented trips on the major north-south arterials (granted the limitations specified above), the analysis of the saturation loading indicated a substantial increase in the number of home-oriented trips on these arterials. Under the limited loading a total of approximately 5,000 more vehicles per day would cross a screenline drawn at about 31st Avenue than originally projected in E-SATS, whereas the saturation loading would result in approximately 27,000 additional trips per day across the same line.

The analysis of the saturation loading has indicated the following factors which should be noted:

1. A full level of development in the South Hills would significantly increase the home-oriented trips on the north-south arterials serving the central portion of the city; particularly Willamette Street, Amazon Drives and Hilyard Street.

2. The increase in home-oriented trips is less severe in the western portion of the city under a full level of development when considered within the context of existing development along those streets and the potential for additional north-south routes. The arterials cited here are Bailey Hill Road and Chambers Street.

3. A full level of development would substantially increase the amount of home-oriented trips on 18th Avenue leading from the western portion of the city to the city center.

4. The State Highway Department report indicates that mass transit may provide some relief but, failing the relief that mass transit may afford, the increase in traffic on the arterials connecting to the city would necessitate substantial improvements.

In addition to the factors noted above, the factor of existing development along arterial streets must be considered in evaluating the impact of varying levels of development. The major arterials south of 30th Avenue serving the central portion of the city (Willamette Street, Hilyard Street and Amazon Drives) are characterized by relatively extensive residential development for distances in excess of two miles in some instances. Many of the residences fronting on these arterials have direct access to the arterial street. In those situations there is greater potential for conflict both from the impact of increasing traffic on the residential development and from the potential hazards of multiple driveways entering the arterial street.

Alternatively, the arterials serving the western portion of the city (particularly Bailey Hill Road and Hawkins Heights Boulevard) are characterized by a relatively limited degree of existing residential development. In that situation, future developments could be designed more readily to accommodate the anticipated volume of traffic on the specific arterial both by limiting the number of direct access points to the arterial and by providing more effective separation between the residential development and the arterial.

As indicated above, the effect of a full level of development in the western portion of the city would be substantial on 18th Avenue. However, in addition to the option of improving that facility, the city still has the option of proceeding with the proposed Amazon Parkway to alleviate conditions in that area.

Evaluation of the Analysis

When evaluating the traffic analysis conducted as part of the South Hills Study, several cautions should be kept in mind:

1. The projected traffic volumes are indicative of what could occur at varying levels of development and are not intended to be precise predictions of exact level of usage for any street. This reflects the basic purpose of this analysis which was to demonstrate the magnitude of changes in total volume that varying levels of development would produce and not to assign specific numbers to any particular route. When the projected volumes are compared with present traffic flow maps, it appears that the projections are actually conservative. Alternatively, the present fuel shortage may induce changes in transportation habits which could result in a lower traffic volume.

2. While mass transit may have an effect upon the total volume of trips per day, it would only have this effect if substantial change were to occur in commuting patterns and if substantial changes were to occur in the present mass transit system. The present bus routes running on Wilamette Street are operating at near capacity during peak periods of the day and are only able to move approximately 200 people per hour. In order to have a noticeable effect on peak period traffic, the level of transit service during peak periods would have to be substantially increased. Further, granted the aggregate volume of trips projected, considerably more than 200 or 400 people per hour would have to use mass transit to affect the total volume substantially. For instance, to reduce peak period traffic flow by 5,000 vehicles would require approximately 85 buses (assuming 50 people per bus) operating during the peak period. At the present time, Lane Mass Transit District operates 34 buses throughout the entire system.

Summary

As indicated in the introduction to the transportation element of the South Hills Study, the purpose of this portion of the study was to indicate the consequences of varying levels of development in the South Hills. As a result of the analysis conducted during this portion of the study, several generalized conclusions are appropriate:

1. That, based on the premises of this transportation analysis, any specific projections of improvements or additional routes should be based upon the E-SATS update rather than this analysis;

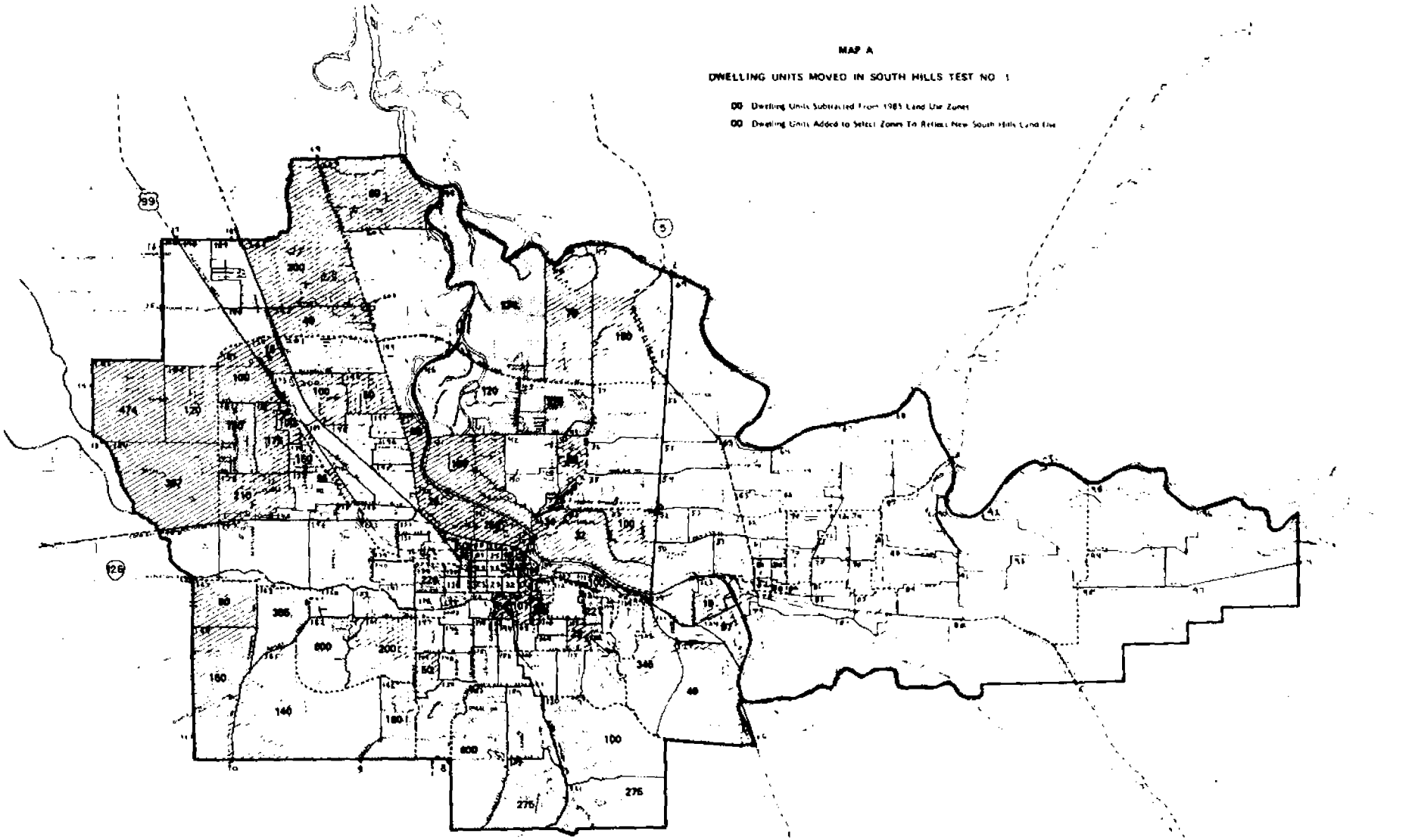
2. That the limited loading test indicated relatively minor increases in the aggregate amount of traffic volume projected for the major north-south routes leading to the South Hills area;

3. That full development of the South Hills area would result in a substantial increase in the number of home-oriented trips on the major north-south arterials beyond that originally projected in E-SATS;

4. That the impact of full development in the South Hills would be more significant in the central portion of the city than in the western portion;

5. That, unless mass transit provides an effective alternative to automobile usage, substantial improvements will be necessary to the existing street network to accommodate the increased traffic generated by a full level of development in the South Hills; and

6. That, while the rest results present a consistent pattern (e.g., the total volume for the 5 major north-south arterials in the central portion of the city came to 58,900 trips per day, 63,700 trips per day and 92,800 trips per day for the three models tested), these figures may be low when compared with the existing (1973) traffic flow figures (50,500 for the same five arterials).

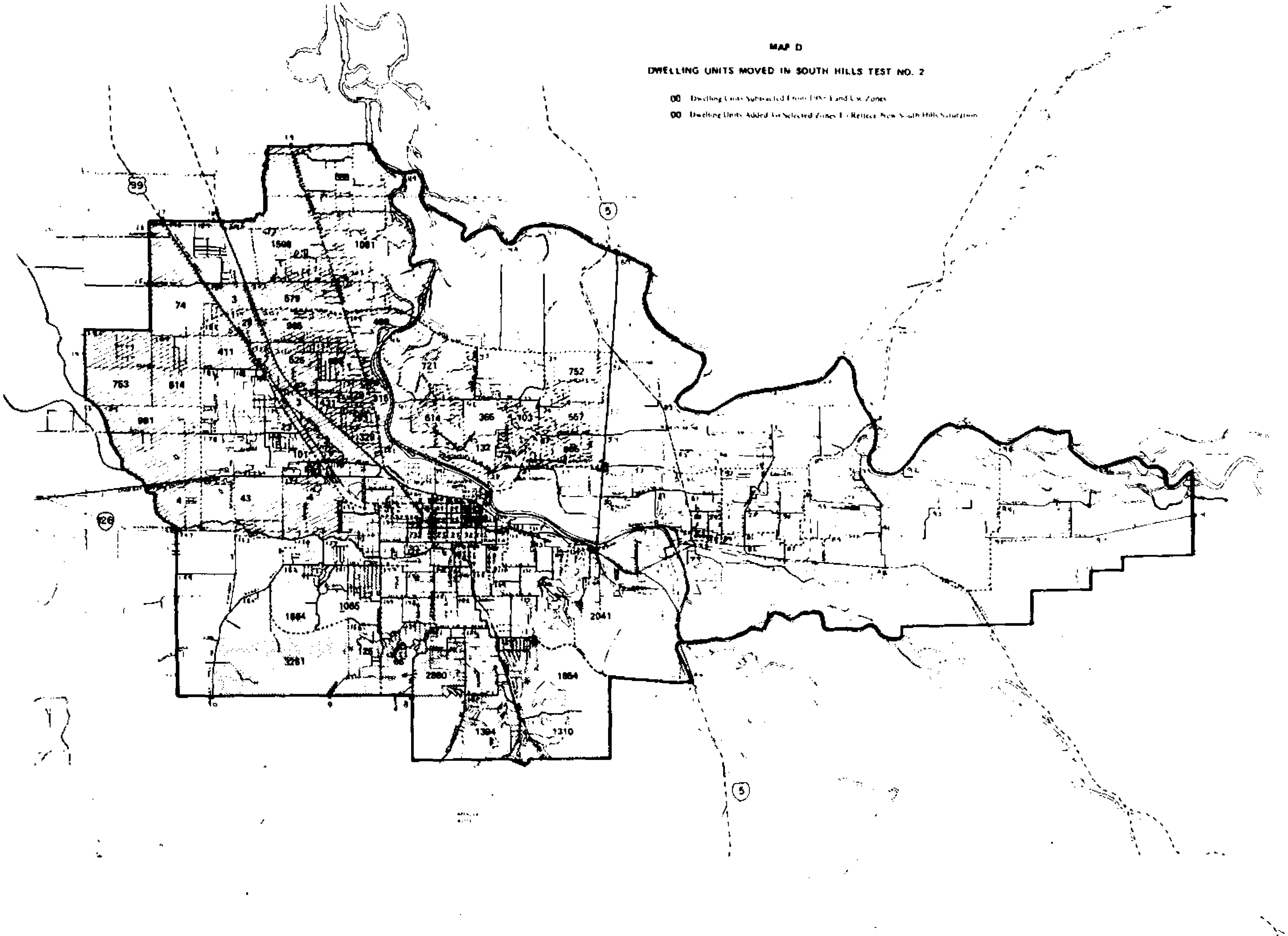

MAP A
DWELLING UNITS MOVED IN SOUTH HILLS TEST NO. 1
00 Dwelling Units Subtracted From 1985 Land Use Zones
00 Dwelling Units Added to Select Zones To Reflect New South Hills Land Use
99
5
26
5

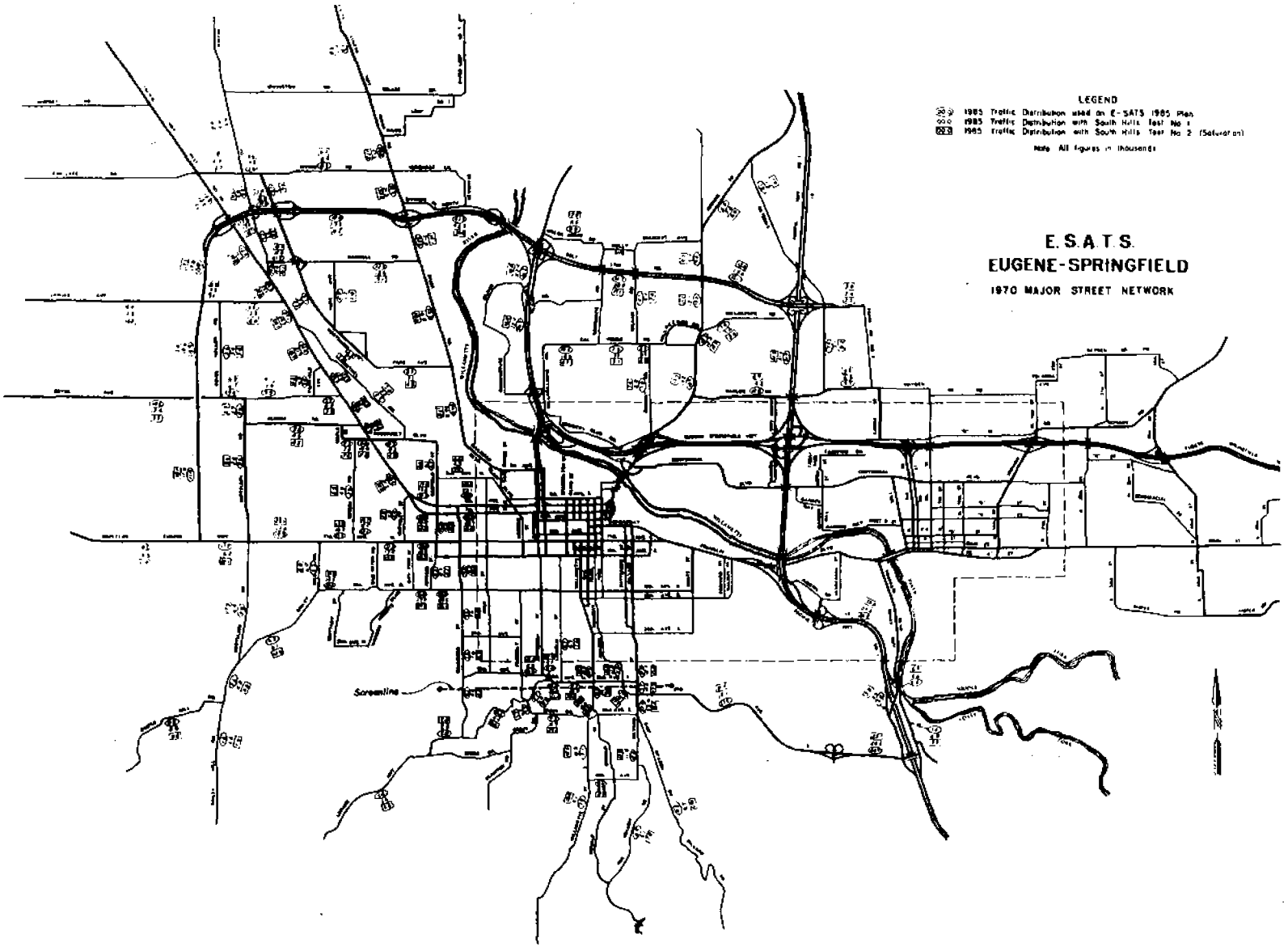
MAP D

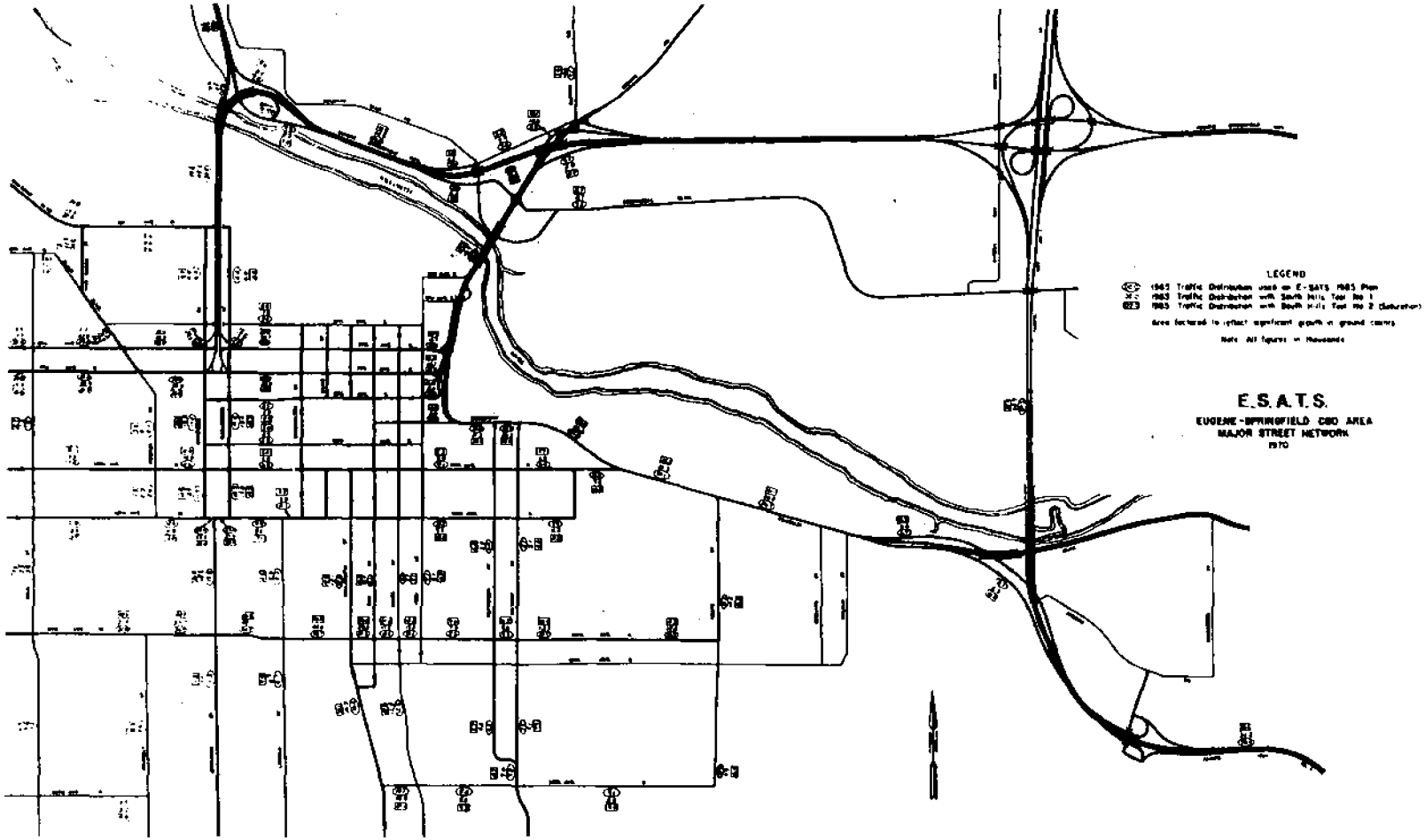
DWELLING UNITS MOVED IN SOUTH HILLS TEST NO. 2

00 Dwelling Units Subtracted From 1995 Land Use Zones

00 Dwelling Units Added to Selected Zones to Reflect New South Hills Saturation




LEGEND
1985 Traffic Distribution used on E-SATS 1985 Plan
1985 Traffic Distribution with South Hills Test No 1
1985 Traffic Distribution with South Hills Test No 2 (Selected)
Note All figures in thousands
E.S.A.T.S.
EUGENE-SPRINGFIELD
1970 MAJOR STREET NETWORK
Screenline


LEGEND
E.S.A.T.S.
EUGENE-SPRINGFIELD CBD AREA
MAJOR STREET NETWORK
1970

TECHNICAL APPENDICES

Appendix A - Sewer System Analysis: Friendly Street System

Appendix B - Sewer System Analysis: Population Assignment by Drainage Subarea

Appendix C - Transportation Analysis: Population Assignment by Transportation Zone

Appendix D - Transportation Analysis: State Highway Department Report

TECHNICAL APPENDICES

Appendix A - Sewer System Analysis: Friendly Street System

Appendix B - Sewer System Analysis: Population Assignment by Drainage Subarea

Appendix C - Transportation Analysis: Population Assignment by Transportation Zone

Appendix D - Transportation Analysis: State Highway Department Report

Appendix A

Sewer System Analysis:
Friendly Street System

SANITARY SEWER INVESTIGATION

DRAIN. AREA DESIG.	MANHOLE NUMBERS LOWER-UPPER	TYPE OF PIPE	EXIST. SIZE (IN)	PIPE CAP. (CFS)	FLOW (PERCENT) MEAS.-ENTCP.	ACCUM FLOW (CFS)	REQD. SIZE (IN)	PIPE LENGTH (FT)	ELEVATION OUT	ELEVATION IN	SLOPE	MANHOLE OUT	MANHOLE IN
0- 0	440900-440910	C	54	45.001	0- 36	16.482		332.0	387.57	387.77	0.149	789000	789100
0- 0	440910-440920	C	54	48.011	0- 34	16.234		557.5	387.77	388.15	0.148	789100	789200
0- 0	440920-440930	C	54	48.112	0- 33	16.036		254.4	388.15	388.42	0.148	789200	789300
0- 0	440930-440940	C	54	47.925	0- 33	15.938		161.7	388.42	388.53	0.148	219300	219400
0- 0	440940-440950	C	54	48.185	0- 33	15.790		321.7	388.53	388.75	0.148	789400	789500
0- 0	440950-440960	C	54	54.668	0- 29	15.642		193.2	388.75	388.92	0.148	789500	789600
0- 0	440960-440970	C	54	21.593	0- 72	15.494		97.0	388.92	388.93	0.148	789600	789700
0- 0	440970-440980	C	54	53.818	0- 29	15.346		293.0	388.93	389.18	0.148	789700	789800
0- 0	440980-440990	C	54	21.525	0- 71	15.198		68.3	389.18	389.19	0.148	789800	789900
0- 0	440990-480900	C	54	49.835	0- 30	15.050		531.5	389.18	389.57	0.067	779900	779000
0- 0	480900-480910	C	54	48.575	0- 31	14.963		401.4	389.57	389.85	0.067	779000	779100
0- 0	480910-480920	C	54	47.228	0- 31	14.876		409.0	389.85	390.12	0.067	779100	779200
0- 0	480920-480930	C	54	49.517	0- 30	14.789		262.2	390.12	390.31	0.067	779200	779300
0- 0	480930-480940	C	54	65.342	0- 21	13.974		8.0	390.30	390.31	0.087	779300	779400
0- 0	480930-520960	C	18	14.079	0- 5	0.728		526.5	392.50	399.60	0.132	769500	769600
0- 0	480940-480950	C	54	45.657	0- 30	13.967		388.4	390.31	390.55	0.087	779400	779500
0- 0	480950-480960	C	54	44.918	0- 31	13.880		401.0	390.55	390.79	0.087	779500	779600
0- 0	480960-480970	C	54	58.361	0- 23	13.713		10.0	390.78	390.79	0.297	779600	779700
0- 0	480970-480980	C	54	44.021	0- 30	13.416		712.9	390.79	391.20	0.087	779700	779800
0- 0	480980-480990	C	54	45.956	0- 29	13.329		949.0	391.20	391.60	0.087	779800	779900
0- 0	480990-560740	C	54	46.723	0- 28	13.242		619.0	391.60	392.00	0.076	779900	207300
0- 0	520960-520970	C	18	6.808	0- 8	0.546		274.0	399.60	401.00	0.132	769600	769700
0- 0	520970-520980	C	18	6.734	0- 5	0.364		300.0	401.00	402.50	0.182	769700	769800
0- 0	520980-520990	C	18	6.791	0- 3	0.182		295.0	402.50	404.00	0.182	769800	769900
0- 0	560740-560750	C	54	43.621	0- 28	12.102		371.5	392.00	392.21	0.076	207400	207500
0- 0	560740-560860	C	18	2.073	0- 51	1.064		200.0	394.60	394.90	0.076	208500	208600
0- 0	560750-560760	C	42	102.342	0- 9	9.658		42.0	392.21	392.70	0.076	207500	207600
0- 0	560750-560780	C	36	110.174	0- 2	2.368		32.0	392.21	393.20	0.076	207500	207800
0- 0	560760-560770	C	42	29.810	0- 32	9.582		546.7	392.70	393.25	0.076	207600	207700
0- 0	560770-640880	C	36	27.837	0- 34	9.505		300.8	393.50	394.10	0.079	598700	598800
0- 0	560780-560790	C	36	24.509	0- 9	2.292		374.0	393.20	393.78	0.076	207800	207900
0- 0	560790-560800	C	36	21.977	0- 10	2.216		360.0	393.78	394.23	0.076	207900	208000
0- 0	560800-560810	C	36	21.825	0- 10	2.140		381.0	394.23	394.70	0.076	208000	208100
0- 0	560810-560820	C	36	45.768	0- 5	2.064		112.0	394.70	395.30	0.076	208100	208200
0- 0	560820-560830	C	36	21.754	0- 9	1.988		49.0	395.30	395.36	0.076	208200	208300
0- 0	560830-560840	C	36	21.747	0- 9	1.912		294.0	395.36	395.72	0.076	208300	208400
0- 0	560840-560850	C	36	23.031	0- 8	1.836		350.0	395.72	396.20	0.076	208400	208500
0- 0	560860-560870	C	18	2.280	0- 43	0.988		400.0	394.90	395.14	0.076	208600	208700
0- 0	560870-560880	C	18	2.071	0- 44	0.912		400.0	395.14	395.34	0.076	208700	208800
0- 0	560880-560890	C	18	4.912	0- 17	0.836		400.0	395.34	396.41	0.076	208800	208900
0- 0	560890-560900	C	18	2.976	0- 26	0.760		40.0	396.41	396.45	0.076	208900	209000
0- 0	560900-560910	C	18	5.204	0- 13	0.684		50.0	396.45	396.60	0.076	209000	209100
0- 0	560910-560920	C	18	2.638	0- 23	0.608		580.0	396.60	397.06	0.076	209100	209200
0- 0	560920-560930	C	15	1.109	0- 48	0.532		157.0	397.06	397.26	0.076	209200	209300
0- 0	560930-560940	C	15	1.147	0- 40	0.456		162.0	397.26	397.48	0.076	209300	209400
0- 0	560940-560950	C	15	0.901	0- 42	0.380		270.0	397.48	397.71	0.076	209400	209500
0- 0	560950-560960	C	15	0.217	0- 140	0.304	18	290.0	397.71	397.73	0.076	209500	209600
0- 0	560960-560970	C	12	0.952	0- 24	0.228		149.0	397.76	398.23	0.076	209600	209700
0- 0	560970-560980	C	12	0.821	0- 19	0.152		284.0	398.23	398.90	0.076	209700	209800
0- 0	560980-560990	C	10	0.456	0- 17	0.076		300.0	399.10	399.70	0.076	209800	209900
0- 0	560850-600900	C	18	8.301	0- 21	1.760		372.0	397.00	399.82	0.176	218900	219000
0- 0	600900-600910	C	18	8.414	0- 19	1.584		366.0	399.82	402.67	0.176	219000	219100

DRAIN. AREA DESIG.	MANHOLE NUMBERS LOWER-UPPER	TYPE OF PIPE	EXIST. SIZE (IN)	PIPE CAP. (CFS)	FLOW (PERCENT) MEAS.-ANTCP.	ACCUM ANTCP (CFS)	REQD. SIZE (IN)	PIPE LENGTH (FT)	ELEVATION OUT	ELEVATION IN	QUAN	MANHOLE OUT	MANHOLE IN
0- 0	600910-600920	C	18	8.428	0- 17	1.434		366.0	402.67	405.53	0.176	219100	219200
0- 0	600920-600930	C	18	8.535	0- 14	1.232		367.0	405.53	408.43	0.176	219200	219300
0- 0	600930-600940	C	18	8.623	0- 12	1.056		107.6	408.43	409.31	0.176	219300	219400
0- 0	600940-600950	C	10	0.782	0- 45	0.352		360.0	409.31	411.40	0.176	219400	219500
0- 0	600940-600970	C	10	1.430	0- 37	0.528		434.0	409.31	417.70	0.176	219400	219700
0- 0	600950-600960	C	10	0.695	0- 25	0.176		365.0	411.40	413.08	0.176	219500	219600
0- 0	600970-600980	C	10	1.072	0- 33	0.352		441.0	417.70	422.50	0.176	219700	219800
0- 0	600980-600990	C	10	1.510	0- 12	0.176		334.0	422.50	429.70	0.176	219800	219900
0- 0	640880-640890	C	36	28.048	0- 34	9.427		301.4	394.10	394.71	0.079	598800	598900
0- 0	640890-640900	C	36	32.469	0- 29	9.348		317.8	394.71	395.57	0.079	598900	599000
0- 0	640900-640910	C	36	24.087	0- 38	9.269		427.3	395.57	396.21	0.079	599000	599100
0- 0	640910-640920	C	36	27.939	0- 33	9.190		393.3	396.21	397.00	0.079	599100	599200
0- 0	640920-640930	C	30	29.801	0- 31	9.111		410.0	397.20	399.69	0.079	599200	599300
0- 0	640930-640940	C	30	29.790	0- 30	9.032		407.0	399.69	402.16	0.079	599300	599400
0- 0	640940-640950	C	30	29.510	0- 22	6.610		361.0	402.16	404.31	0.079	599400	599500
0- 0	640940-680890	C	16	1.907	0- 123	2.343	18	192.0	397.50	398.00	0.213	238800	238900
0- 0	640950-640960	C	30	28.854	0- 23	6.531		360.0	404.31	406.36	0.079	599500	599600
0- 0	640960-640970	C	30	30.234	0- 21	6.452		360.0	406.36	408.61	0.079	599600	599700
0- 0	640970-640980	C	30	29.551	0- 22	6.373		360.0	408.61	410.76	0.079	599700	599800
0- 0	640980-640990	C	30	29.168	0- 22	6.294		385.0	410.76	413.00	0.079	599800	599900
0- 0	640990-720950	C	21	11.601	0- 54	6.215		47.0	413.60	413.90	0.193	259400	259500
0- 0	680890-680900	C	16	2.006	0- 106	2.130	18	382.0	398.00	399.10	0.213	238900	239000
0- 0	680900-680910	C	12	0.902	0- 213	1.917	18	335.0	399.10	400.05	0.213	239000	239100
0- 0	680910-680920	C	10	0.672	0- 254	1.704	15	330.0	400.05	401.47	0.213	239100	239200
0- 0	680920-680930	C	10	0.700	0- 213	1.491	15	332.0	401.47	403.02	0.213	239200	239300
0- 0	680930-680940	C	10	0.710	0- 180	1.278	15	331.0	403.02	404.61	0.213	239300	239400
0- 0	680940-680950	C	10	0.681	0- 156	1.065	12	328.0	404.61	406.06	0.213	239400	239500
0- 0	680950-680960	C	10	0.678	0- 126	0.852	12	352.0	406.06	407.60	0.213	239500	239600
0- 0	680960-680970	C	10	0.669	0- 95	0.639		445.0	407.60	409.50	0.213	239600	239700
0- 0	680970-680980	C	10	0.692	0- 62	0.426		276.0	409.50	410.76	0.213	239700	239800
0- 0	680980-680990	C	10	0.721	0- 30	0.213		251.0	410.76	412.00	0.213	239800	239900
0- 0	720950-720960	C	21	10.915	0- 55	6.022		512.8	413.90	416.80	0.193	259500	259600
0- 0	720960-720970	C	18	13.615	0- 43	5.829		295.0	416.00	422.00	0.193	259600	259700
0- 0	720970-720980	C	18	12.167	0- 14	1.738		400.0	422.00	428.50	0.193	259700	259800
0- 0	720970-790930	C	21	13.273	0- 29	3.898		563.0	424.60	429.30	0.081	2629200	2629300
0- 0	720980-720990	C	18	12.069	0- 13	1.545		344.0	428.50	434.00	0.193	259800	259900
0- 0	720990-760870	C	15	1.564	0- 86	1.352		90.0	434.00	434.20	0.104	228600	228700
0- 0	760870-760880	C	15	4.542	0- 27	1.248		245.0	434.20	439.30	0.104	228700	228800
0- 0	760880-760890	C	15	3.617	0- 32	1.144		280.0	439.30	443.00	0.104	228800	228900
0- 0	760890-760900	C	10	2.900	0- 36	1.040		340.0	443.00	470.00	0.104	228900	229000
0- 0	760900-760910	C	10	3.672	0- 25	0.936		220.0	470.00	498.00	0.104	229000	229100
0- 0	760910-760920	C	10	2.636	0- 32	0.832		320.0	498.00	519.00	0.104	229100	229200
0- 0	760920-760930	C	10	2.681	0- 27	0.728		280.0	519.00	538.00	0.104	229200	229300
0- 0	760930-760940	C	10	3.639	0- 17	0.624		200.0	538.00	563.00	0.104	229300	229400
0- 0	760940-760950	C	10	4.765	0- 11	0.520		126.0	563.00	590.00	0.104	229400	229500
0- 0	760950-760960	C	10	4.090	0- 10	0.416		95.0	590.00	605.00	0.104	229500	229600
0- 0	760960-760970	C	10	2.499	0- 12	0.312		373.0	605.00	627.00	0.104	229600	229700
0- 0	760970-760980	C	10	2.607	0- 8	0.208		430.0	627.00	654.60	0.104	229700	229800
0- 0	760980-760990	C	10	2.725	0- 4	0.104		348.0	655.60	680.00	0.104	229800	229900
0- 0	790930-790940	C	15	3.669	0- 104	3.817	18	125.0	430.70	432.40	0.081	2629300	2629400
0- 0	790940-790950	C	15	2.258	0- 165	3.736	18	232.0	432.40	433.60	0.081	2629400	2629500
0- 0	790950-790960	C	15	2.128	0- 89	1.934		261.0	433.60	434.80	0.081	2629500	2629600

SANITARY SEWER INVESTIGATION

DRAIN. AREA DESIG.	MANHOLE NUMBERS LOWER-UPPER	TYPE OF PIPE	EXIST. SIZE (IN)	PIPE CAP. (CFS)	FLOW (PERCENT) MEAS.-ANTCP.	ACCUM ANTCP (CFS)	REQD. SIZE (IN)	PIPE LENGTH (FT)	ELEVATION OUT	IN	QUAN	MANHOLE OUT	IN
0- 0	790950-920890	C	14	3.625	0- 49	1.771		330.3	435.30	441.70	0.161	278800	278900
0- 0	790960-790970	C	15	3.909	0- 47	1.803		273.0	436.40	440.40	0.081	2629600	2629700
0- 0	790970-790980	C	15	5.311	0- 32	1.722		349.0	440.40	450.30	0.081	2629700	2629800
0- 0	790980-790990	C	12	2.181	0- 75	1.641		268.0	451.40	455.80	0.081	2629800	2629900
0- 0	790990-800740	C	12	3.193	0- 49	1.560		74.0	455.80	458.40	0.060	2629900	247400
0- 0	800740-800750	C	12	4.087	0- 37	1.500		412.0	459.10	482.80	0.060	247400	247500
0- 0	800750-800760	C	12	4.522	0- 32	1.440		169.0	482.80	494.70	0.060	247500	247600
0- 0	800760-800770	C	12	4.304	0- 32	1.380		174.0	494.70	505.80	0.060	247600	247700
0- 0	800770-800780	C	12	4.601	0- 29	1.320		321.0	505.80	529.20	0.060	247700	247800
0- 0	800780-800790	C	12	5.127	0- 25	1.260		211.0	529.20	548.30	0.060	247800	247900
0- 0	800790-800800	C	12	3.506	0- 34	1.200		111.0	548.30	553.00	0.060	247900	248000
0- 0	800800-800810	C	12	6.145	0- 19	1.140		120.0	553.50	569.10	0.060	248000	248100
0- 0	800810-800820	C	12	2.332	0- 46	1.080		48.0	569.10	570.00	0.060	248100	248200
0- 0	800820-800830	C	12	5.017	0- 20	1.020		150.0	570.00	583.00	0.060	248200	248300
0- 0	800830-800840	C	12	5.660	0- 17	0.960		301.0	584.00	617.20	0.060	248300	248400
0- 0	800840-800850	C	12	4.915	0- 18	0.900		202.0	617.20	634.00	0.060	248400	248500
0- 0	800850-800860	C	12	6.496	0- 13	0.840		223.0	636.20	668.60	0.060	248500	248600
0- 0	800860-800870	C	12	5.791	0- 13	0.780		226.0	668.60	694.69	0.060	248600	248700
0- 0	800870-800880	C	12	6.251	0- 12	0.720		174.0	694.69	718.10	0.060	248700	248800
0- 0	800880-800890	C	12	8.319	0- 8	0.660		102.0	718.10	742.40	0.060	248800	248900
0- 0	800890-800900	C	12	4.006	0- 15	0.600		173.0	742.40	751.96	0.060	248900	249000
0- 0	800900-800910	C	12	3.936	0- 14	0.540		186.3	751.96	761.90	0.060	249000	249100
0- 0	800910-800920	C	12	3.870	0- 12	0.480		237.6	761.90	773.90	0.060	249100	249200
0- 0	800920-800930	C	12	3.490	0- 12	0.420		288.3	773.90	786.00	0.060	249200	249300
0- 0	800930-800940	C	12	4.274	0- 8	0.360		152.6	786.00	795.60	0.060	249300	249400
0- 0	800940-800950	C	12	2.845	0- 11	0.300		362.1	795.60	805.70	0.060	249400	249500
0- 0	800950-800960	C	12	1.725	0- 14	0.240		126.5	805.70	807.00	0.060	249500	249600
0- 0	800960-800970	C	12	1.684	0- 11	0.180		102.0	807.00	808.00	0.060	249600	249700
0- 0	800970-800980	C	10	1.190	0- 10	0.120		261.0	808.20	811.70	0.060	249700	249800
0- 0	800980-800990	C	10	1.845	0- 3	0.060		56.0	811.70	813.50	0.060	249800	249900
0- 0	920890-920900	C	10	1.420	0- 113	1.610	12	299.0	441.90	447.60	0.161	278900	279000
0- 0	920900-920910	C	10	1.777	0- 82	1.449		305.0	447.80	456.90	0.161	279000	279100
0- 0	920910-920920	C	10	0.763	0- 169	1.288	15	217.0	456.90	458.10	0.161	279100	279200
0- 0	920920-920930	C	10	2.000	0- 56	1.127		450.0	458.10	475.10	0.161	279200	279300
0- 0	920930-920940	C	10	3.432	0- 28	0.966		170.0	475.10	494.00	0.161	279300	279400
0- 0	920940-920950	C	10	4.531	0- 18	0.805		160.0	494.00	525.00	0.161	279400	279500
0- 0	920950-920960	C	10	2.728	0- 24	0.644		185.0	525.00	538.00	0.161	279500	279600
0- 0	920960-920970	C	10	1.695	0- 29	0.483		140.0	538.00	541.80	0.161	279600	279700
0- 0	920970-920980	C	10	2.342	0- 14	0.322		251.0	541.80	554.80	0.161	279700	279800
0- 0	920980-920990	C	10	2.352	0- 7	0.161		379.0	554.80	574.60	0.161	279800	279900

TOTAL QUANTITY INPUT IN THIS AREA = 16.382

DRAIN. AREA DESIG.	MANHOLE NUMBERS LOWER-UPPER	TYPE OF PIPE	EXIST. SIZE (IN)	PIPE CAP. (CFS)	FLOW (PERCENT) MEAS.-ANTCP.	ACCUM ANTCP (CFS)	ADDD. SIZE (IN)	PIPE LENGTH (FT)	ELEVATION OUT	ELEVATION IN	QUAN	MANHOLE OUT	MANHOLE IN
0- 0	440900-440910	C	54	45.001	0- 41	18.252		332.9	387.57	387.77	0.153	789000	789100
0- 0	440910-440920	C	54	48.011	0- 38	18.099		557.5	387.77	388.15	0.153	789100	789200
0- 0	440920-440930	C	54	48.112	0- 37	17.946		394.4	388.15	388.42	0.153	789200	789300
0- 0	440930-440940	C	54	47.925	0- 37	17.793		161.7	388.42	388.53	0.153	219300	219400
0- 0	440940-440950	C	54	48.185	0- 37	17.640		320.7	388.53	388.75	0.153	789400	789500
0- 0	440950-440960	C	54	54.668	0- 32	17.487		193.1	388.75	388.92	0.153	789500	789600
0- 0	440960-440970	C	54	21.593	0- 80	17.334		67.9	388.92	388.93	0.153	789600	789700
0- 0	440970-440980	C	54	53.818	0- 32	17.181		293.0	388.93	389.18	0.153	789700	789800
0- 0	440980-440990	C	54	21.525	0- 79	17.028		68.3	389.18	389.19	0.153	789800	789900
0- 0	440990-480900	C	54	49.835	0- 34	16.875		531.5	389.18	389.57	0.140	778900	779000
0- 0	480900-480910	C	54	48.575	0- 34	16.735		401.4	389.57	389.85	0.140	779000	779100
0- 0	480910-480920	C	54	47.228	0- 35	16.595		409.0	389.85	390.12	0.140	779100	779200
0- 0	480920-480930	C	54	49.517	0- 33	16.455		262.2	390.12	390.31	0.140	779200	779300
0- 0	480930-480940	C	54	65.342	0- 24	15.499		8.0	390.30	390.31	0.140	779300	779400
0- 0	480930-520960	C	18	14.079	0- 6	0.816		326.5	392.50	399.60	0.204	769500	769600
0- 0	480940-480950	C	54	45.657	0- 34	15.359		388.4	390.31	390.55	0.140	779400	779500
0- 0	480950-480960	C	54	44.918	0- 34	15.219		401.0	390.55	390.79	0.140	779500	779600
0- 0	480960-480970	C	54	58.361	0- 26	15.079		10.0	390.79	390.79	0.350	779600	779700
0- 0	480970-480980	C	54	44.021	0- 33	14.729		712.0	390.79	391.20	0.140	779700	779800
0- 0	480980-480990	C	54	45.956	0- 32	14.589		639.0	391.20	391.60	0.140	779800	779900
0- 0	480990-560740	C	54	46.723	0- 31	14.449		619.0	391.60	392.00	0.076	779900	207300
0- 0	520960-520970	C	18	6.808	0- 9	0.612		274.0	399.60	401.00	0.204	769600	769700
0- 0	520970-520980	C	18	6.734	0- 6	0.408		300.0	401.00	402.50	0.204	769700	769800
0- 0	520980-520990	C	18	6.791	0- 3	0.204		295.0	402.50	404.00	0.204	769800	769900
0- 0	560740-560750	C	54	43.621	0- 31	13.309		371.5	392.00	392.21	0.076	207400	207500
0- 0	560740-560840	C	18	2.073	0- 51	1.064		200.0	394.80	394.90	0.076	208500	208600
0- 0	560750-560760	C	42	102.342	0- 10	10.505		42.0	392.21	392.70	0.076	207500	207600
0- 0	560750-560780	C	36	110.174	0- 2	2.728		32.0	392.21	393.20	0.076	207500	207800
0- 0	560760-560770	C	42	29.810	0- 35	10.429		546.7	392.70	393.25	0.076	207600	207700
0- 0	560770-640880	C	36	27.837	0- 37	10.353		300.8	393.50	394.10	0.079	598700	598800
0- 0	560780-560790	C	36	24.509	0- 11	2.652		374.0	393.20	393.78	0.076	207600	207900
0- 0	560790-560800	C	36	21.977	0- 12	2.576		360.0	393.78	394.23	0.076	207900	208000
0- 0	560800-560810	C	36	21.825	0- 11	2.500		381.0	394.23	394.70	0.076	208000	208100
0- 0	560810-560820	C	36	45.768	0- 5	2.424		112.0	394.70	395.30	0.076	208100	208200
0- 0	560820-560830	C	36	21.754	0- 11	2.348		49.0	395.30	395.36	0.076	208200	208300
0- 0	560830-560840	C	36	21.747	0- 10	2.272		294.0	395.36	395.72	0.076	208300	208400
0- 0	560840-560850	C	36	23.031	0- 10	2.196		350.0	395.72	396.20	0.076	208400	208500
0- 0	560860-560870	C	18	2.280	0- 43	0.999		400.0	394.90	395.14	0.076	208600	208700
0- 0	560870-560880	C	18	2.071	0- 44	0.912		400.0	395.14	395.34	0.076	208700	208800
0- 0	560880-560890	C	18	4.912	0- 17	0.836		400.0	395.34	396.41	0.076	208800	208900
0- 0	560890-560900	C	18	2.976	0- 26	0.760		40.0	396.41	396.45	0.076	208900	209000
0- 0	560900-560910	C	18	5.204	0- 13	0.684		50.0	396.45	396.60	0.076	209000	209100
0- 0	560910-560920	C	18	2.638	0- 23	0.608		580.0	396.60	397.06	0.076	209100	209200
0- 0	560920-560930	C	15	1.109	0- 48	0.532		157.0	397.06	397.26	0.076	209200	209300
0- 0	560930-560940	C	15	1.147	0- 40	0.456		162.0	397.26	397.48	0.076	209300	209400
0- 0	560940-560950	C	15	0.901	0- 42	0.380		270.0	397.48	397.71	0.076	209400	209500
0- 0	560950-560960	C	15	0.217	0- 140	0.304	18	290.0	397.71	397.73	0.076	209500	209600
0- 0	560960-560970	C	12	0.952	0- 24	0.228		149.0	397.76	398.23	0.076	209600	209700
0- 0	560970-560980	C	12	0.821	0- 19	0.152		284.0	398.23	398.90	0.076	209700	209800
0- 0	560980-560990	C	10	0.456	0- 17	0.076		300.0	399.10	399.70	0.076	209800	209900
0- 0	560850-600900	C	18	8.301	0- 26	2.120		372.0	397.00	399.82	0.212	218900	219000
0- 0	600900-600910	C	18	8.414	0- 23	1.908		366.0	399.82	402.67	0.212	219000	219100

SANITARY SEWER INVESTIGATION

DRAIN. AREA DESIG.	MANHOLE NUMBERS LOWER-UPPER	TYPE OF PIPE	EXIST. PIPE SIZE (IN)	PIPE CAP. (CFS)	FLOW (PERCENT) MEAS.-ANTCP.	ACCUM FLOW (CFS)	PROJ. PIPE SIZE (IN)	PIPE LENGTH (FT)	ELEVATION OUT	ELEVATION IN	QUAN	MANHOLE OUT	MANHOLE IN
0- 0	600910-600920	C	18	8.428	0- 20	1.696		366.0	402.67	405.53	0.212	219100	219200
0- 0	600920-600930	C	18	8.535	0- 17	1.444		362.0	405.53	408.43	0.212	219200	219300
0- 0	600930-600940	C	18	8.623	0- 15	1.277		107.6	408.43	409.31	0.212	219300	219400
0- 0	600940-600950	C	10	0.782	0- 54	0.424		360.0	409.31	411.40	0.212	219400	219500
0- 0	600940-600970	C	10	1.430	0- [illegible]	0.636		434.0	409.31	417.70	0.212	219400	219700
0- 0	600950-600960	C	10	0.695	0- 30	0.212		365.0	411.40	413.08	0.212	219500	219600
0- 0	600970-600980	C	10	1.073	0- 40	0.424		441.0	417.70	422.50	0.212	219700	219800
0- 0	600980-600990	C	10	1.510	0- 14	0.212		334.0	422.50	429.70	0.212	219800	219900
0- 0	640880-640890	C	36	28.048	0- 37	10.274		301.4	394.10	394.71	0.079	598800	598900
0- 0	640890-640900	C	36	32.469	0- 31	10.295		317.8	394.71	395.57	0.079	598900	599000
0- 0	640900-640910	C	36	24.067	0- 42	10.116		427.3	395.57	396.21	0.079	599000	599100
0- 0	640910-640920	C	36	27.939	0- 36	10.037		393.3	396.21	397.00	0.079	599100	599200
0- 0	640920-640930	C	30	29.801	0- 33	9.953		410.0	397.20	399.69	0.079	599200	599300
0- 0	640930-640940	C	30	29.790	0- 33	9.879		407.0	399.69	402.16	0.079	599300	599400
0- 0	640940-640950	C	30	29.519	0- 25	7.457		361.0	402.16	404.31	0.079	599400	599500
0- 0	640940-680890	C	16	1.907	0- 122	2.344	18	192.0	397.50	398.00	0.213	238800	238900
0- 0	640950-640960	C	30	28.854	0- 26	7.378		360.0	404.31	406.36	0.079	599500	599600
0- 0	640960-640970	C	30	30.234	0- 24	7.299		360.0	406.36	408.61	0.079	599600	599700
0- 0	640970-640980	C	30	29.551	0- 24	7.220		360.0	408.61	410.76	0.079	599700	599800
0- 0	640980-640990	C	30	29.168	0- 24	7.141		385.0	410.76	413.00	0.079	599800	599900
0- 0	640990-720950	C	21	11.601	0- 61	7.062		47.0	413.60	413.90	0.194	259400	259500
0- 0	680890-680900	C	16	2.006	0- 106	2.130	18	382.0	398.00	399.10	0.213	238900	239000
0- 0	680900-680910	C	12	0.902	0- 213	1.917	18	335.0	399.10	400.05	0.213	239000	239100
0- 0	680910-680920	C	10	0.672	0- 254	1.704	15	330.0	400.05	401.47	0.213	239100	239200
0- 0	680920-680930	C	10	0.700	0- 213	1.491	15	332.0	401.47	403.02	0.213	239200	239300
0- 0	680930-680940	C	10	0.710	0- 180	1.278	15	331.0	403.02	404.61	0.213	239300	239400
0- 0	680940-680950	C	10	0.681	0- 156	1.065	12	328.0	404.61	406.06	0.213	239400	239500
0- 0	680950-680960	C	10	0.678	0- 126	0.852	12	352.0	406.06	407.60	0.213	239500	239600
0- 0	680960-680970	C	10	0.669	0- 95	0.639		445.0	407.60	409.50	0.213	239600	239700
0- 0	680970-680980	C	10	0.692	0- 62	0.426		276.0	409.50	410.76	0.213	239700	239800
0- 0	680980-680990	C	10	0.721	0- 30	0.213		251.0	410.76	412.00	0.213	239800	239900
0- 0	720950-720960	C	21	10.919	0- 63	6.868		512.8	413.90	416.80	0.194	259500	259600
0- 0	720960-720970	C	18	13.615	0- 49	6.674		295.0	416.00	422.00	0.194	259600	259700
0- 0	720970-720980	C	18	12.167	0- 17	2.091		400.0	422.00	428.50	0.194	259700	259800
0- 0	720970-790930	C	21	13.273	0- 33	4.389		563.0	424.60	429.30	0.081	2629200	2629300
0- 0	720980-720990	C	18	12.069	0- 16	1.897		344.0	428.50	434.00	0.194	259800	259900
0- 0	720990-760870	C	15	1.564	0- 109	1.703	18	80.0	434.00	434.20	0.131	228600	228700
0- 0	760870-760880	C	15	4.542	0- 35	1.572		245.0	434.20	439.30	0.131	228700	228800
0- 0	760880-760890	C	15	3.617	0- 40	1.441		280.0	439.30	443.00	0.131	228800	228900
0- 0	760890-760900	C	10	2.900	0- 45	1.310		340.0	443.00	470.00	0.131	228900	229000
0- 0	760900-760910	C	10	3.672	0- 32	1.179		220.0	470.00	499.00	0.131	229000	229100
0- 0	760910-760920	C	10	2.636	0- 40	1.048		320.0	498.00	519.00	0.131	229100	229200
0- 0	760920-760930	C	10	2.681	0- 34	0.917		260.0	519.00	533.00	0.131	229200	229300
0- 0	760930-760940	C	10	3.639	0- 22	0.786		200.0	538.00	563.00	0.131	229300	229400
0- 0	760940-760950	C	10	4.765	0- 14	0.655		126.0	563.00	590.00	0.131	229400	229500
0- 0	760950-760960	C	10	4.090	0- 13	0.524		95.0	590.00	605.00	0.131	229500	229600
0- 0	760960-760970	C	10	2.499	0- 16	0.393		373.0	605.00	627.00	0.131	229600	229700
0- 0	760970-760980	C	10	2.607	0- 10	0.262		430.0	627.00	654.60	0.131	229700	229800
0- 0	760980-760990	C	10	2.725	0- 5	0.131		348.0	655.60	680.00	0.131	229800	229900
0- 0	790930-790940	C	15	3.669	0- 117	4.308	18	125.0	430.70	432.40	0.081	2629300	2629400
0- 0	790940-790950	C	15	2.258	0- 187	4.227	18	232.0	432.40	433.60	0.081	2629400	2629500
0- 0	790950-790960	C	15	2.128	0- 101	2.144	18	261.0	433.60	434.80	0.081	2629500	2629600

DRAIN. AREA DESIG.	MANHOLE NUMBERS LOWER-UPPER	TYPE OF PIPE	EXIST. SIZE (IN)	PIPE CAP. (CFS)	FLOW (PERCENT) MEAS.-ANTCP.	ACCUM ANTCP (CFS)	REDD. SIZE (IN)	PIPE LENGTH (FT)	ELEVATION OUT	IN	QUAN	MANHOLE OUT	IN
0- 0	790950-920890	C	14	3.625	0- 55	2.002		330.3	435.30	441.70	0.182	278800	278900
0- 0	790960-790970	C	15	3.809	0- 54	2.063		273.0	436.40	440.40	0.081	2629600	2629700
0- 0	790970-790980	C	15	5.311	0- 37	1.982		348.0	440.40	450.30	0.081	2629700	2629800
0- 0	790980-790990	C	12	2.181	0- 87	1.901		268.0	451.40	455.80	0.081	2629800	2629900
0- 0	790990-800740	C	12	3.193	0- 57	1.820		74.0	455.80	458.40	0.070	2629900	247400
0- 0	800740-800750	C	12	4.087	0- 43	1.750		412.0	459.10	482.80	0.070	247400	247500
0- 0	800750-800760	C	12	4.522	0- 37	1.680		169.0	482.80	494.70	0.070	247500	247600
0- 0	800760-800770	C	12	4.304	0- 37	1.610		174.0	494.70	505.80	0.070	247600	247700
0- 0	800770-800780	C	12	4.601	0- 33	1.540		321.0	505.80	529.20	0.070	247700	247800
0- 0	800780-800790	C	12	5.127	0- 29	1.470		211.0	529.20	548.30	0.070	247800	247900
0- 0	800790-800800	C	12	3.506	0- 40	1.400		111.0	548.30	553.00	0.070	247900	248000
0- 0	800800-800810	C	12	6.145	0- 22	1.330		120.0	553.50	569.10	0.070	248000	248100
0- 0	800810-800820	C	12	2.332	0- 54	1.260		48.0	569.10	570.00	0.070	248100	248200
0- 0	800820-800830	C	12	5.017	0- 24	1.190		150.0	570.00	583.00	0.070	248200	248300
0- 0	800830-800840	C	12	5.660	0- 20	1.120		301.0	584.00	617.20	0.070	248300	248400
0- 0	800840-800850	C	12	4.915	0- 21	1.050		202.0	617.20	634.00	0.070	248400	248500
0- 0	800850-800860	C	12	6.495	0- 15	0.980		223.0	636.20	668.60	0.070	248500	248600
0- 0	800860-800870	C	12	5.791	0- 16	0.910		226.0	668.60	694.69	0.070	248600	248700
0- 0	800870-800880	C	12	6.251	0- 13	0.840		174.0	694.69	718.10	0.070	248700	248800
0- 0	800880-800890	C	12	8.319	0- 9	0.770		102.0	718.10	742.40	0.070	248800	248900
0- 0	800890-800900	C	12	4.006	0- 17	0.700		173.0	742.40	751.96	0.070	248900	249000
0- 0	800900-800910	C	12	3.936	0- 16	0.630		186.3	751.96	761.90	0.070	249000	249100
0- 0	800910-800920	C	12	3.870	0- 14	0.560		232.6	761.90	773.90	0.070	249100	249200
0- 0	800920-800930	C	12	3.490	0- 14	0.490		288.3	773.90	786.00	0.070	249200	249300
0- 0	800930-800940	C	12	4.274	0- 10	0.420		152.6	786.00	795.60	0.070	249300	249400
0- 0	800940-800950	C	12	2.845	0- 12	0.350		362.1	795.60	805.70	0.070	249400	249500
0- 0	800950-800960	C	12	1.725	0- 16	0.280		126.5	805.70	807.00	0.070	249500	249600
0- 0	800960-800970	C	12	1.684	0- 12	0.210		102.0	807.00	808.00	0.070	249600	249700
0- 0	800970-800980	C	10	1.190	0- 12	0.140		261.0	808.20	811.70	0.070	249700	249800
0- 0	800980-800990	C	10	1.845	0- 4	0.070		56.0	811.70	813.50	0.070	249800	249900
0- 0	920890-920900	C	10	1.420	0- 128	1.820	12	299.0	441.90	447.60	0.182	278900	279000
0- 0	920900-920910	C	10	1.777	0- 92	1.638		305.0	447.80	456.90	0.182	279000	279100
0- 0	920910-920920	C	10	0.763	0- 191	1.456	15	217.0	456.90	458.10	0.182	279100	279200
0- 0	920920-920930	C	10	2.000	0- 64	1.274		450.0	458.10	475.10	0.182	279200	279300
0- 0	920930-920940	C	10	3.432	0- 32	1.092		170.0	475.10	494.00	0.182	279300	279400
0- 0	920940-920950	C	10	4.531	0- 20	0.910		160.0	494.00	525.00	0.182	279400	279500
0- 0	920950-920960	C	10	2.728	0- 27	0.728		185.0	525.00	538.00	0.182	279500	279600
0- 0	920960-920970	C	10	1.695	0- 32	0.546		140.0	538.00	541.80	0.182	279600	279700
0- 0	920970-920980	C	10	2.342	0- 16	0.364		251.0	541.80	554.80	0.182	279700	279800
0- 0	920980-920990	C	10	2.352	0- 8	0.182		379.0	554.80	574.60	0.182	279800	279900

TOTAL QUANTITY INPUT IN THIS AREA = 18.252

SANITARY SEWER INVESTIGATION

MAIN. AREA SIG.	MANHOLE NUMBERS LOWER-UPPER	TYPE OF PIPE	EXIST. SIZE (IN)	PIPE CAP. (CFS)	FLOW (PERCENT) MEAS.-ANTCP.	ACCUM ANTCP (CFS)	REQU. SIZE (IN)	PIPE LENGTH (FT)	ELEVATION OUT	ELEVATION IN	QUAN	MANHOLE OUT	MANHOLE IN
0- 0	440900-440910	C	54	45.001	0- 48	21.794		332.9	387.57	387.77	0.167	789000	789100
0- 0	440910-440920	C	54	48.011	0- 45	21.627		557.5	387.77	388.15	0.167	789100	789200
0- 0	440920-440930	C	54	48.117	0- 45	21.460		394.4	388.15	388.42	0.167	789200	789300
0- 0	440930-440940	C	54	47.925	0- 44	21.293		161.7	388.42	388.53	0.167	219300	219400
0- 0	440940-440950	C	54	48.185	0- 44	21.126		320.7	388.53	388.75	0.167	789400	789500
0- 0	440950-440960	C	54	54.668	0- 38	20.959		193.1	388.75	388.92	0.167	789500	789600
0- 0	440960-440970	C	54	21.593	0- 96	20.792		67.9	388.92	388.93	0.167	789600	789700
0- 0	440970-440980	C	54	53.818	0- 38	20.625		293.0	388.93	389.18	0.167	789700	789800
0- 0	440980-440990	C	54	21.525	0- 95	20.458		68.3	389.18	389.19	0.167	789800	789900
0- 0	440990-480900	C	54	49.835	0- 41	20.291		531.5	389.18	389.57	0.166	778900	779000
0- 0	480900-480910	C	54	48.575	0- 41	20.125		401.4	389.57	389.85	0.166	779000	779100
0- 0	480910-480920	C	54	47.228	0- 42	19.959		409.0	389.85	390.12	0.166	779100	779200
0- 0	480920-480930	C	54	49.517	0- 40	19.793		262.2	390.12	390.31	0.166	779200	779300
0- 0	480930-480940	C	54	55.342	0- 29	18.639		8.0	390.30	390.31	0.166	779300	779400
0- 0	480930-520960	C	18	14.079	0- 7	0.988		326.5	392.50	399.60	0.247	769500	769600
0- 0	480940-480950	C	54	45.657	0- 40	18.473		388.4	390.31	390.55	0.166	779400	779500
0- 0	480950-480960	C	54	44.918	0- 41	18.307		401.0	390.55	390.79	0.166	779500	779600
0- 0	480960-480970	C	54	58.361	0- 31	18.141		10.0	390.78	390.79	0.3?6	779600	779700
0- 0	480970-480980	C	54	44.021	0- 40	17.765		712.9	390.79	391.20	0.166	779700	779800
0- 0	480980-480990	C	54	45.956	0- 38	17.599		639.0	391.20	391.60	0.166	779800	779900
0- 0	480990-560740	C	54	46.723	0- 37	17.433		619.0	391.60	392.00	0.086	779900	207300
0- 0	520960-520970	C	18	6.808	0- 11	0.741		274.0	399.60	401.00	0.247	769600	769700
0- 0	520970-520980	C	18	6.734	0- 7	0.494		300.0	401.00	402.50	0.247	769700	769800
0- 0	520980-520990	C	18	6.791	0- 4	0.247		295.0	402.50	404.00	0.247	769800	769900
0- 0	560740-560750	C	54	43.621	0- 37	16.143		371.5	392.00	392.21	0.086	207400	207500
0- 0	560740-560360	C	18	2.073	0- 58	1.204		200.0	394.80	394.90	0.086	208500	208600
0- 0	560750-560760	C	42	102.342	0- 13	12.889		42.0	392.21	392.70	0.086	207500	207600
0- 0	560750-560780	C	36	110.174	0- 3	3.168		32.0	392.21	393.20	0.086	207500	207800
0- 0	560760-560770	C	42	29.810	0- 43	12.803		546.7	392.70	393.25	0.086	207600	207700
0- 0	560770-640980	C	36	27.837	0- 46	12.717		300.8	393.50	394.10	0.093	598700	598800
0- 0	560780-560790	C	36	24.509	0- 13	3.082		374.0	393.20	393.78	0.086	207800	207900
0- 0	560790-560800	C	36	21.977	0- 14	2.996		360.0	393.78	394.23	0.086	207900	208000
0- 0	560800-560810	C	36	21.825	0- 13	2.910		381.0	394.23	394.70	0.086	208000	208100
0- 0	560810-560820	C	36	45.768	0- 6	2.824		112.0	394.70	395.30	0.086	208100	208200
0- 0	560820-560830	C	36	21.754	0- 13	2.738		49.0	395.30	395.36	0.086	208200	208300
0- 0	560830-560840	C	36	21.747	0- 12	2.652		294.0	395.36	395.72	0.086	208300	208400
0- 0	560840-560850	C	36	23.031	0- 11	2.566		350.0	395.72	396.20	0.086	208400	208500
0- 0	560860-560870	C	18	2.280	0- 49	1.118		400.0	394.90	395.14	0.086	208600	208700
0- 0	560870-560880	C	18	2.071	0- 50	1.032		400.0	395.14	395.34	0.086	208700	208800
0- 0	560880-560890	C	18	4.912	0- 19	0.946		400.0	395.34	396.41	0.086	208800	208900
0- 0	560890-560900	C	18	2.976	0- 29	0.860		40.0	396.41	396.45	0.086	208900	209000
0- 0	560900-560910	C	18	5.204	0- 15	0.774		50.0	396.45	396.60	0.086	209000	209100
0- 0	560910-560920	C	18	2.638	0- 26	0.688		580.0	396.60	397.06	0.086	209100	209200
0- 0	560920-560930	C	15	1.109	0- 54	0.602		157.0	397.06	397.26	0.086	209200	209300
0- 0	560930-560940	C	15	1.147	0- 45	0.516		162.0	397.26	397.48	0.086	209300	209400
0- 0	560940-560950	C	15	0.901	0- 48	0.430		270.0	397.48	397.71	0.086	209400	209500
0- 0	560950-560960	C	15	0.217	0- 159	0.344	18	290.0	397.71	397.73	0.086	209500	209600
0- 0	560960-560970	C	12	0.952	0- 27	0.258		149.0	397.76	398.23	0.086	209600	209700
0- 0	560970-560980	C	12	0.821	0- 21	0.172		284.0	398.23	398.90	0.086	209700	209800
0- 0	560980-560990	C	10	0.456	0- 19	0.086		300.0	399.10	399.70	0.086	209800	209900
0- 0	560850-600900	C	18	8.301	0- 30	2.480		372.0	397.00	399.82	0.248	218900	219000
0- 0	600900-600910	C	18	8.414	0- 27	2.232		366.0	399.82	402.67	0.248	219000	219100

SANITARY SEWER INVESTIGATION

DRAIN. AREA DESIG.	MANHOLE NUMBERS LOWER-UPPER	TYPE OF PIPE	EXIST. SIZE (IN)	PIPE CAP. (CFS)	FLOW (PERCENT) MEAS.-ANTCP.	ACCUM ANTCP (CFS)	REQD. SIZE (IN)	PIPE LENGTH (FT)	ELEVATION OUT	ELEVATION IN	QUAN	MANHOLE OUT	MANHOLE IN
0- 0	600910-600920	C	18	9.423	0- 24	1.784		366.0	402.67	405.53	0.248	219100	219200
0- 0	600920-600930	C	18	8.535	0- 20	1.736		362.0	405.53	408.43	0.248	219200	219300
0- 0	600930-600940	C	18	8.623	0- 17	1.498		107.5	408.43	409.31	0.248	219300	219400
0- 0	600940-600950	C	10	0.782	0- 63	0.496		360.0	409.31	411.40	0.248	219400	219500
0- 0	600940-600970	C	10	1.430	0- 52	0.744		434.0	409.31	417.70	0.248	219400	219700
0- 0	600950-600960	C	10	0.695	0- 36	0.243		365.0	411.40	413.08	0.248	219500	219600
0- 0	600970-600980	C	10	1.072	0- 46	0.496		441.0	417.70	422.50	0.248	219700	219800
0- 0	600980-600990	C	10	1.510	0- 16	0.243		334.0	422.50	429.70	0.248	219800	219900
0- 0	640880-640890	C	36	28.048	0- 45	12.624		301.4	394.10	394.71	0.093	598800	598900
0- 0	640890-640900	C	36	32.469	0- 39	12.531		317.8	394.71	395.57	0.093	598900	599000
0- 0	640900-640910	C	36	24.087	0- 52	12.436		427.3	395.57	396.21	0.093	599000	599100
0- 0	640910-640920	C	36	27.939	0- 44	12.345		393.3	396.21	397.00	0.093	599100	599200
0- 0	640920-640930	C	30	29.801	0- 41	12.252		410.0	397.20	399.69	0.093	599200	599300
0- 0	640930-640940	C	30	29.790	0- 41	12.159		407.0	399.69	402.16	0.093	599300	599400
0- 0	640940-640950	C	30	29.510	0- 32	9.569		361.0	402.16	404.31	0.093	599400	599500
0- 0	640940-680890	C	16	1.907	0- 131	2.497	18	192.0	397.50	398.00	0.227	238800	238900
0- 0	640950-640960	C	30	28.854	0- 33	9.476		360.0	404.31	406.36	0.093	599500	599600
0- 0	640960-640970	C	30	30.734	0- 31	9.383		360.0	406.36	408.61	0.093	599600	599700
0- 0	640970-640980	C	30	29.551	0- 31	9.290		360.0	408.61	410.76	0.093	599700	599800
0- 0	640980-640990	C	30	29.168	0- 32	9.197		385.0	410.76	413.00	0.093	599800	599900
0- 0	640990-720950	C	21	11.601	0- 78	9.104		47.0	413.60	413.90	0.226	259400	259500
0- 0	680890-680900	C	15	2.006	0- 113	2.270	18	382.0	398.00	399.10	0.227	238900	239000
0- 0	680900-680910	C	12	0.902	0- 227	2.043	18	335.0	399.10	400.05	0.227	239000	239100
0- 0	680910-680920	C	10	0.672	0- 270	1.816	15	330.0	400.05	401.47	0.227	239100	239200
0- 0	680920-680930	C	10	0.700	0- 227	1.589	15	332.0	401.47	403.02	0.227	239200	239300
0- 0	680930-680940	C	10	0.710	0- 192	1.362	15	331.0	403.02	404.61	0.227	239300	239400
0- 0	680940-680950	C	10	0.681	0- 167	1.135	15	328.0	404.61	406.06	0.227	239400	239500
0- 0	680950-680960	C	10	0.678	0- 134	0.908	12	352.0	406.06	407.60	0.227	239500	239600
0- 0	680960-680970	C	10	0.669	0- 102	0.681	12	445.0	407.60	409.50	0.227	239600	239700
0- 0	680970-680980	C	10	0.692	0- 66	0.454		276.0	409.50	410.76	0.227	239700	239800
0- 0	680980-680990	C	10	0.721	0- 32	0.227		251.0	410.76	412.00	0.227	239800	239900
0- 0	720950-720960	C	21	10.915	0- 81	8.878		512.8	413.90	416.80	0.226	259500	259600
0- 0	720960-720970	C	18	13.615	0- 64	8.652		295.0	416.00	422.00	0.226	259600	259700
0- 0	720970-720980	C	18	12.167	0- 23	2.818		400.0	422.00	428.50	0.226	259700	259800
0- 0	720970-790930	C	21	13.273	0- 42	5.608		563.0	424.60	429.30	0.081	2629200	2629300
0- 0	720980-720990	C	18	12.069	0- 21	2.592		344.0	428.50	434.00	0.226	259800	259900
0- 0	720990-760870	C	15	1.564	0- 151	2.366	18	80.0	434.00	434.20	0.182	228600	228700
0- 0	760870-760880	C	15	4.542	0- 48	2.184		245.0	434.20	439.30	0.182	228700	228800
0- 0	760880-760890	C	15	3.617	0- 55	2.002		280.0	439.30	443.00	0.182	228800	228900
0- 0	760890-760900	C	10	2.900	0- 63	1.820		340.0	443.00	470.00	0.182	228900	229000
0- 0	760900-760910	C	10	3.672	0- 45	1.638		220.0	470.00	498.00	0.182	229000	229100
0- 0	760910-760920	C	10	2.636	0- 55	1.456		320.0	498.00	519.00	0.182	229100	229200
0- 0	760920-760930	C	10	2.681	0- 48	1.274		280.0	519.00	538.00	0.182	229200	229300
0- 0	760930-760940	C	10	3.639	0- 30	1.092		200.0	538.00	563.00	0.182	229300	229400
0- 0	760940-760950	C	10	4.765	0- 19	0.910		126.0	563.00	590.00	0.182	229400	229500
0- 0	760950-760960	C	10	4.090	0- 18	0.728		95.0	590.00	605.00	0.182	229500	229600
0- 0	760960-760970	C	10	2.499	0- 22	0.546		373.0	605.00	627.00	0.182	229600	229700
0- 0	760970-760980	C	10	2.607	0- 14	0.364		430.0	627.00	654.60	0.182	229700	229800
0- 0	760980-760990	C	10	2.725	0- 7	0.182		348.0	655.60	680.00	0.182	229800	229900
0- 0	790930-790940	C	15	3.669	0- 141	5.527	18	125.0	430.70	432.40	0.081	2629300	2629400
0- 0	790940-790950	C	15	2.253	0- 241	5.446	18	232.0	432.40	433.60	0.081	2629400	2629500
0- 0	790950-790960	C	15	2.128	0- 134	2.846	18	261.0	433.60	434.80	0.081	2629500	2629600

DRAIN. AREA DESIG.	MANHOLE NUMBERS LOWER-UPPER	TYPE OF PIPE	EXIST. SIZE (IN)	PIPE CAP. (CFS)	FLOW (PERCENT) MEAS.-ANTCP.	ACCUM ANTCP (CFS)	REQD. SIZE (IN)	PIPE LENGTH (FT)	ELEVATION OUT	IN	QUAN	MANHOLE OUT	IN
0- 0	790950-920890	C	14	3.625	0- 69	2.519		330.3	435.30	441.70	0.229	278800	278900
0- 0	790960-790970	C	15	3.809	0- 73	2.765		273.0	436.40	440.40	0.081	2629600	2629700
0- 0	790970-790980	C	15	5.311	0- 51	2.684		348.0	440.40	450.30	0.081	2629700	2629800
0- 0	790980-790990	C	12	2.181	0- 119	2.603	15	268.0	451.40	455.80	0.081	2629800	2629900
0- 0	790990-800740	C	12	3.193	0- 79	2.522		74.0	455.80	458.40	0.097	2629900	247400
0- 0	800740-800750	C	12	4.087	0- 59	2.425		412.0	459.10	482.80	0.097	247400	247500
0- 0	800750-800760	C	12	4.522	0- 51	2.328		169.0	482.80	494.70	0.097	247500	247600
0- 0	800760-800770	C	12	4.304	0- 52	2.231		174.0	494.70	505.80	0.097	247600	247700
0- 0	800770-800780	C	12	4.601	0- 46	2.134		321.0	505.80	529.20	0.097	247700	247800
0- 0	800780-800790	C	12	5.127	0- 40	2.037		211.0	529.20	548.30	0.097	247800	247900
0- 0	800790-800800	C	12	3.506	0- 55	1.940		111.0	548.30	553.00	0.097	247900	248000
0- 0	800800-800810	C	12	6.145	0- 30	1.843		120.0	553.50	569.10	0.097	248000	248100
0- 0	800810-800820	C	12	2.332	0- 75	1.746		48.0	569.10	570.00	0.097	248100	248200
0- 0	800820-800830	C	12	5.017	0- 33	1.649		150.0	570.00	583.00	0.097	248200	248300
0- 0	800830-800840	C	12	5.660	0- 27	1.552		301.0	584.00	617.20	0.097	248300	248400
0- 0	800840-800850	C	12	4.915	0- 30	1.455		202.0	617.20	634.00	0.097	248400	248500
0- 0	800850-800860	C	12	6.496	0- 21	1.358		223.0	636.20	668.60	0.097	248500	248600
0- 0	800860-800870	C	12	5.791	0- 22	1.261		226.0	668.60	694.69	0.097	248600	248700
0- 0	800870-800880	C	12	6.251	0- 19	1.164		174.0	694.69	719.10	0.097	248700	248800
0- 0	800880-800890	C	12	8.319	0- 13	1.067		102.0	718.10	742.40	0.097	248800	248900
0- 0	800890-800900	C	12	4.006	0- 24	0.970		173.0	742.40	751.96	0.097	248900	249000
0- 0	800900-800910	C	12	3.936	0- 22	0.873		186.3	751.96	761.90	0.097	249000	249100
0- 0	800910-800920	C	12	3.870	0- 20	0.776		232.6	761.90	773.90	0.097	249100	249200
0- 0	800920-800930	C	12	3.490	0- 19	0.679		288.3	773.90	786.00	0.097	249200	249300
0- 0	800930-800940	C	12	4.274	0- 14	0.582		152.6	786.00	795.60	0.097	249300	249400
0- 0	800940-800950	C	12	2.845	0- 17	0.485		362.1	795.60	805.70	0.097	249400	249500
0- 0	800950-800960	C	12	1.725	0- 22	0.388		126.5	805.70	807.00	0.097	249500	249600
0- 0	800960-800970	C	12	1.684	0- 17	0.291		102.0	807.00	808.00	0.097	249600	249700
0- 0	800970-800980	C	10	1.190	0- 16	0.194		261.0	808.20	811.70	0.097	249700	249800
0- 0	800980-800990	C	10	1.845	0- 5	0.097		56.0	811.70	813.50	0.097	249800	249900
0- 0	920890-920900	C	10	1.420	0- 161	2.290	12	299.0	441.90	447.60	0.229	278900	279000
0- 0	920900-920910	C	10	1.777	0- 116	2.061	12	305.0	447.80	456.90	0.229	279000	279100
0- 0	920910-920920	C	10	0.763	0- 240	1.832	15	217.0	456.90	458.10	0.229	279100	279200
0- 0	920920-920930	C	10	2.000	0- 80	1.603		450.0	458.10	475.10	0.229	279200	279300
0- 0	920930-920940	C	10	3.432	0- 40	1.374		170.0	475.10	494.00	0.229	279300	279400
0- 0	920940-920950	C	10	4.531	0- 25	1.145		160.0	494.00	525.00	0.229	279400	279500
0- 0	920950-920960	C	10	2.728	0- 34	0.916		185.0	525.00	538.00	0.229	279500	279600
0- 0	920960-920970	C	10	1.695	0- 41	0.687		140.0	538.00	541.80	0.229	279600	279700
0- 0	920970-920980	C	10	2.342	0- 20	0.458		251.0	541.80	554.80	0.229	279700	279800
0- 0	920980-920990	C	10	2.352	0- 10	0.229		379.0	554.80	574.60	0.229	279800	279900

TOTAL QUANTITY INPUT IN THIS AREA = 21.793

SANITARY SEWER INVESTIGATION

DRAIN. AREA DESIG.	MANHOLE NUMBERS LOWER-UPPER	TYPE OF PIPE	EXIST. SIZE (IN)	PIPE CAP. (CFS)	FLOW (PERCENT) MEAS.-ANTCP.	ACCUM ANTCP (CFS)	REQD. SIZE (IN)	PIPE LENGTH (FT)	ELEVATION OUT	IN	SLOPE	MANHOLE OUT	IN
0- 0	440900-440910	C	54	45.001	0- 61	27.527		332.9	387.57	387.77	0.139	739000	739100
0- 0	440910-440920	C	54	48.011	0- 57	27.338		557.5	387.77	388.15	0.139	739100	739200
0- 0	440920-440930	C	54	48.112	0- 56	27.149		394.4	388.15	388.42	0.189	739200	739300
0- 0	440930-440940	C	54	47.925	0- 56	26.960		161.7	388.42	388.53	0.189	219300	219400
0- 0	440940-440950	C	54	48.185	0- 56	26.771		320.7	388.53	388.75	0.189	739400	739500
0- 0	440950-440960	C	54	54.668	0- 49	26.582		193.1	388.75	388.92	0.189	739500	739600
0- 0	440960-440970	C	54	21.593	0- 122	26.393	60	67.9	388.92	388.93	0.189	739600	739700
0- 0	440970-440980	C	54	53.818	0- 49	26.204		293.0	388.93	389.18	0.189	739700	739800
0- 0	440980-440990	C	54	21.525	0- 121	26.015	60	68.3	389.18	389.19	0.189	739800	739900
0- 0	440990-480900	C	54	49.835	0- 52	25.826		531.5	389.18	389.57	0.184	778900	779000
0- 0	480900-480910	C	54	48.575	0- 53	25.642		401.4	389.57	389.85	0.184	779000	779100
0- 0	480910-480920	C	54	47.228	0- 54	25.458		409.0	389.85	390.12	0.184	779100	779200
0- 0	480920-480930	C	54	49.517	0- 51	25.274		262.2	390.12	390.31	0.184	779200	779300
0- 0	480930-480940	C	54	65.342	0- 36	23.758		8.0	390.30	390.31	0.184	779300	779400
0- 0	480930-520960	C	18	14.079	0- 9	1.332		326.5	392.50	399.60	0.333	769500	769600
0- 0	480940-480950	C	54	45.657	0- 52	23.574		388.4	390.31	390.55	0.184	779400	779500
0- 0	480950-480960	C	54	44.918	0- 52	23.390		401.0	390.55	390.79	0.184	779500	779600
0- 0	480960-480970	C	54	58.361	0- 40	23.206		10.0	390.79	390.79	0.394	779600	779700
0- 0	480970-480980	C	54	44.021	0- 52	22.812		712.9	390.79	391.20	0.184	779700	779800
0- 0	480980-480990	C	54	45.956	0- 49	22.628		639.0	391.20	391.60	0.184	779800	779900
0- 0	480990-560740	C	54	46.723	0- 48	22.444		619.0	391.60	392.00	0.119	779900	207300
0- 0	520960-520970	C	18	6.808	0- 15	0.999		274.0	399.60	401.00	0.333	769600	769700
0- 0	520970-520980	C	18	6.734	0- 10	0.666		300.0	401.00	402.50	0.333	769700	769800
0- 0	520980-520990	C	16	6.791	0- 5	0.333		295.0	402.50	404.00	0.333	769800	769900
0- 0	560740-560750	C	54	43.621	0- 47	20.659		371.5	392.00	392.21	0.119	207400	207500
0- 0	560740-560860	C	18	2.073	0- 80	1.666		200.0	394.80	394.90	0.119	208500	208600
0- 0	560750-560760	C	42	102.342	0- 16	16.518		42.0	392.21	392.70	0.119	207500	207600
0- 0	560750-560780	C	36	110.174	0- 4	4.022		32.0	392.21	393.20	0.119	207500	207800
0- 0	560760-560770	C	42	29.810	0- 55	16.399		546.7	392.70	393.25	0.119	207600	207700
0- 0	560770-640880	C	36	27.837	0- 58	16.280		300.8	393.50	394.10	0.108	598700	599800
0- 0	560780-560790	C	36	24.509	0- 16	3.903		374.0	393.20	393.78	0.119	207800	207900
0- 0	560790-560800	C	36	21.977	0- 17	3.784		360.0	393.78	394.23	0.119	207900	208000
0- 0	560800-560810	C	36	21.825	0- 17	3.665		381.0	394.23	394.70	0.119	208000	208100
0- 0	560810-560820	C	36	45.768	0- 8	3.546		112.0	394.70	395.30	0.119	208100	208200
0- 0	560820-560830	C	36	21.754	0- 16	3.427		49.0	395.30	395.36	0.119	208200	208300
0- 0	560830-560840	C	36	21.747	0- 15	3.308		294.0	395.36	395.72	0.119	208300	208400
0- 0	560840-560850	C	36	23.031	0- 14	3.189		350.0	395.72	396.20	0.119	208400	208500
0- 0	560860-560870	C	18	2.280	0- 68	1.547		400.0	394.90	395.14	0.119	208600	208700
0- 0	560870-560880	C	18	2.071	0- 69	1.428		400.0	395.14	395.34	0.119	208700	208800
0- 0	560880-560890	C	18	4.912	0- 27	1.309		400.0	395.34	396.41	0.119	208800	208900
0- 0	560890-560900	C	18	2.976	0- 40	1.190		40.0	396.41	396.45	0.119	208900	209000
0- 0	560900-560910	C	18	5.204	0- 21	1.071		50.0	396.45	396.60	0.119	209000	209100
0- 0	560910-560920	C	18	2.638	0- 36	0.952		580.0	396.60	397.06	0.119	209100	209200
0- 0	560920-560930	C	15	1.109	0- 75	0.833		157.0	397.06	397.26	0.119	209200	209300
0- 0	560930-560940	C	15	1.147	0- 62	0.714		162.0	397.26	397.48	0.119	209300	209400
0- 0	560940-560950	C	15	0.901	0- 66	0.595		270.0	397.48	397.71	0.119	209400	209500
0- 0	560950-560960	C	15	0.217	0- 220	0.476	18	290.0	397.71	397.73	0.119	209500	209600
0- 0	560960-560970	C	12	0.952	0- 38	0.357		149.0	397.76	398.23	0.119	209600	209700
0- 0	560970-560980	C	12	0.821	0- 29	0.238		284.0	398.23	398.90	0.119	209700	209800
0- 0	560980-560990	C	10	0.456	0- 26	0.119		300.0	398.10	399.70	0.119	209800	209900
0- 0	560850-600900	C	18	8.301	0- 37	3.070		372.0	397.00	399.82	0.307	218900	21900
0- 0	600900-600910	C	18	8.414	0- 33	2.763		366.0	399.82	402.67	0.307	219000	21910

SANITARY SEWER INVESTIGATION

DRAIN. AREA DESIG.	MANHOLE NUMBERS LOWER-UPPER	TYPE OF PIPE	EXIST. SIZE (IN)	PIPE CAP. (CFS)	FLOW (PERCENT) MEAS.-ANTCP.	ACCUM ANTCP (CFS)	PROP. SIZE (IN)	PIPE LENGTH (FT)	ELEVATION OUT	ELEVATION IN	CUMM	MANHOLE OUT	MANHOLE
0- 0	790950-920890	C	14	3.625	0- 107	3.877	15	330.3	435.30	441.70	0.452	278800	27990
0- 0	790960-790970	C	15	3.809	0- 92	3.515		273.0	436.40	440.40	0.037	2629700	2629700
0- 0	790970-790980	C	15	5.311	0- 64	3.413		348.0	440.40	450.30	0.097	2629700	2629800
0- 0	790980-790990	C	12	2.181	0- 152	3.321	15	288.0	451.40	455.30	0.387	2629800	2629900
0- 0	790990-800740	C	12	3.193	0- 101	3.224	15	74.0	455.90	456.40	0.124	2629900	24740
0- 0	800740-800750	C	12	4.087	0- 76	3.100		412.1	459.10	482.30	0.124	247400	24750
0- 0	800750-800760	C	12	4.522	0- 66	2.976		169.0	482.30	494.70	0.124	247500	24760
0- 0	800760-800770	C	12	4.304	0- 66	2.852		174.1	494.70	505.80	0.124	247600	24770
0- 0	800770-800780	C	12	4.601	0- 59	2.728		321.0	505.80	529.20	0.124	247700	24780
0- 0	800780-800790	C	12	5.127	0- 51	2.604		211.0	529.20	546.30	0.124	247800	24790
0- 0	800790-800800	C	12	3.506	0- 71	2.480		111.0	548.30	553.00	0.124	247900	24800
0- 0	800800-800810	C	12	6.145	0- 38	2.356		120.0	553.50	569.10	0.124	248000	24810
0- 0	800810-800820	C	12	2.332	0- 96	2.232		48.0	569.10	570.00	0.124	248100	24820
0- 0	800820-800830	C	12	5.017	0- 42	2.108		150.0	570.00	593.00	0.124	248200	24830
0- 0	800830-800840	C	12	5.660	0- 35	1.984		301.0	584.00	617.20	0.124	248300	24840
0- 0	800840-800850	C	12	4.915	0- 38	1.860		202.0	617.20	634.00	0.124	248400	24850
0- 0	800850-800860	C	12	6.496	0- 27	1.736		223.0	636.20	668.60	0.124	248500	24860
0- 0	800860-800870	C	12	5.791	0- 28	1.612		226.0	668.60	694.69	0.124	248600	24870
0- 0	800870-800880	C	12	6.251	0- 24	1.488		174.0	694.69	718.10	0.124	248700	24880
0- 0	800880-800890	C	12	8.319	0- 16	1.364		102.0	718.10	742.40	0.124	248800	24890
0- 0	800890-800900	C	12	4.006	0- 31	1.240		173.0	742.40	751.96	0.124	248900	24900
0- 0	800900-800910	C	12	3.936	0- 29	1.116		186.3	751.96	761.90	0.124	249000	24910
0- 0	800910-800920	C	12	3.870	0- 26	0.992		232.6	761.90	773.90	0.124	249100	24920
0- 0	800920-800930	C	12	3.490	0- 25	0.868		288.3	773.90	786.10	0.124	249200	24930
0- 0	800930-800940	C	12	4.274	0- 17	0.744		152.6	786.00	795.60	0.124	249300	24940
0- 0	800940-800950	C	12	2.845	0- 22	0.620		362.1	795.60	805.70	0.124	249400	24950
0- 0	800950-800960	C	12	1.725	0- 29	0.496		126.5	805.70	807.00	0.124	249500	24960
0- 0	800960-800970	C	12	1.684	0- 22	0.372		102.0	807.00	808.30	0.124	249600	24970
0- 0	800970-800980	C	10	1.190	0- 21	0.249		261.0	809.20	811.70	0.124	249700	24980
0- 0	800980-800990	C	10	1.845	0- 7	0.124		56.0	811.70	813.50	0.124	249800	24990
0- 0	920890-920900	C	10	1.420	0- 248	3.520	15	299.0	441.90	447.60	0.352	278900	27930
0- 0	920900-920910	C	10	1.777	0- 178	3.168	15	305.0	447.80	456.90	0.352	279000	27910
0- 0	920910-920920	C	10	0.763	0- 369	2.816	18	217.0	456.90	458.10	0.352	279100	27920
0- 0	920920-920930	C	10	2.000	0- 123	2.464	12	450.0	458.10	475.10	0.352	279200	27930
0- 0	920930-920940	C	10	3.432	0- 62	2.112		170.0	475.10	484.00	0.352	279300	27940
0- 0	920940-920950	C	10	4.531	0- 39	1.760		160.9	484.00	525.00	0.352	279400	27950
0- 0	920950-920960	C	10	2.728	0- 52	1.408		185.0	525.90	538.00	0.352	279500	27960
0- 0	920960-920970	C	10	1.695	0- 62	1.056		140.0	538.00	541.30	0.352	279600	27970
0- 0	920970-920980	C	10	2.342	0- 30	0.704		251.0	541.80	554.80	0.352	279700	27980
0- 0	920980-920990	C	10	2.352	0- 15	0.352		379.0	554.80	574.60	0.352	279800	27990

TOTAL QUANTITY INPUT IN THIS AREA = 27.526

Appendix B

Sewer System Analysis: Population Assignment by Drainage Subarea

SEWER STUDY - POPULATION ELEMENT

DU / POP

Sub Area	1970 Popul.	1970 DU	Area (Acres)	DU/ Acre	Popul./ DU	General Comments	Units/ Acre	Population	Units/ Acre	Population	Units/ Acre	Population
1	618	183	468.34	0.39	3.37	Low Density	2.00	936 / 2593	4.00	1872 / 5185	6.00	2808 / 7778
2	720	198	169.90	1.16	3.63	Low Density	2.00	340 / 942	4.00	680 / 1884	6.00	1020 / 2826
3	296	89	702.58	0.12	3.32	85% Low Density - 15% Com & Ind	2.00	1194 / 3307	4.00	2388 / 6615	6.00	3582 / 9923
4	341	111	257.15	0.43	3.07	60% Low Density - 40% Com & Ind	2.00	308 / 853	4.00	616 / 1706	6.00	924 / 2559
5	1624	499	495.94	1.00	3.25	65% Low Density - 35% Ind & Public	2.00	644 / 1783	4.00	1288 / 3567	6.00	1932 / 5351
6	427	116	312.26	0.36	3.68	Low Density	2.00	624 / 1728	4.00	1248 / 3457	6.00	1872 / 5185
7	90	17	174.50	0.09	5.29	50% Low Density - 50% Ind	2.00	174 / 482	4.00	348 / 964	6.00	522 / 1446
8	1674	497	523.49	0.95	3.36	66% Low Density - 34% Ind	2.00	680 / 1893	4.00	1360 / 3767	6.00	2140 / 5930
9	2024	674	427.06	1.58	3.00	60% Low Density - 40% Com & Ind	2.00	512 / 1418	4.00	1024 / 2836	6.00	1536 / 4254
10	1050	376	314.55	1.19	2.79	Ind - Possible RG - Assume Constant	----	420 / 1200	----	420 / 1200	----	420 / 1200
11	35	9	234.19	----	----	Industrial	----	--- / ----	----	--- / ----	----	--- / ----
12	32	11	298.48	----	----	Industrial	----	--- / ----	----	--- / ----	----	--- / ----
13	86	31	583.18	----	----	Industrial	----	--- / ----	----	--- / ----	----	--- / ----
14	145	70	477.57	----	----	Industrial	----	--- / ----	----	--- / ----	----	--- / ----
15	162	46	319.14	0.14	3.52	20% Low Density- 80% Ind & Pub	2.00	128 / 356	4.00	256 / 709	6.00	384 / 1064
16	462	128	539.56	0.23	3.60	Low Density	2.00	1080 / 2992	4.00	2160 / 5983	6.00	3240 / 8975
17	323	95	870.18	0.10	3.40	Low Density	2.00	1740 / 4819	4.00	3480 / 9639	6.00	5220 / 14459
18	357	102	84.95	1.20	3.50	Low Density	2.00	170 / 471	4.00	340 / 942	6.00	510 / 1412
19	589	184	169.90	1.08	3.20	50% Low Density - 50% Med Density	4.00	680 / 1883	6.00	1020 / 2825	10.00	1700 / 4709
20	2074	795	187.12	4.24	2.61	75% Low Density - 25% Med Density	4.50	795 / 2074	5.00	935 / 2590	8.00	1496 / 4144
21	1220	400	278.96	1.43	3.05	Low Density	2.00	558 / 1545	4.00	1116 / 3091	6.00	1674 / 4635

SEWER STUDY - POPULATION ELEMENT

DU / POP

Sub Area	1970 Popul.	1970 DU	Area (Acres)	DU/ Acre	Popul./ DU	General Comments	Units/ Acre	Population	Units/ Acre	Population	Units/ Acre	Population
22	591	158	223.86	0.70	3.74	Low Density	2.00	448 / 1241	4.00	896 / 2481	6.00	1344 / 3722
23	2841	998	270.93	3.68	2.84	85% Low Density 5% Med Density - 10% Com & Pub	3.68	998 / 2841	4.00	1084 / 3240	6.00	1380 / 3922
24	807	224	234.19	0.95	3.60	Low Density	2.00	468 / 1296	4.00	936 / 2592	6.00	1404 / 3888
25	874	241	106.76	2.25	3.62	Low Density	3.00	320 / 886	4.00	427 / 1182	6.00	640 / 1772
26	1226	414	102.17	4.05	2.96	Low Density	4.05	414 / 1126	4.05	414 / 1126	6.00	612 / 1662
27	932	330	137.76	2.40	2.82	Low Density	3.00	413 / 1141	4.00	551 / 1526	6.00	826 / 2288
28	877	364	146.94	2.47	2.41	80% Low Density - 10% Med Den - 10% C	3.00	441 / 1221	5.00	735 / 2035	7.00	1029 / 2572
29	317	105	99.88	1.05	3.01	Low Density	2.00	200 / 544	4.00	400 / 1108	6.00	600 / 2880
30	448	137	112.50	1.21	3.27	Low Density	2.00	224 / 620	4.00	448 / 1240	6.00	672 / 1861
31	477	151	312.36	0.48	3.15	Low Density	2.00	624 / 1728	4.00	1248 / 3456	6.00	1872 / 5185
32	2103	573	865.59	0.66	3.67	Low Density	2.00	1730 / 4792	4.00	3460 / 9584	6.00	5190 / 14376
33	2012	585	321.44	1.82	3.43	90% Low Density - 10% Com & Cemetery	2.50	722 / 2000	4.00	1156 / 3202	6.00	1734 / 4803
34	460	131	95.28	1.37	3.51	Low Density	2.00	190 / 526	4.00	380 / 1052	6.00	570 / 1578
35	516	134	81.51	1.64	3.85	Low Density	2.00	162 / 448	4.00	324 / 897	6.00	486 / 1345
36	230	58	204.34	0.28	3.96	Low Density	2.00	408 / 1130	4.00	816 / 2260	6.00	1224 / 3390
37	11	5	196.31	0.02	2.20	Low Density	2.00	392 / 1085	4.00	784 / 2171	6.00	1176 / 3257
38	171	42	185.98	0.22	4.07	Low Density	2.00	372 / 1030	4.00	744 / 2060	6.00	1116 / 3091
39	130	31	120.54	0.25	4.19	Low Density	2.00	240 / 664	4.00	480 / 1329	6.00	720 / 1994
40	417	117	338.66	0.34	3.56	Low Density	2.00	676 / 1872	4.00	1352 / 3745	6.00	2028 / 5617
41	689	217	198.60	1.09	3.17	Low Density	2.00	396 / 1096	4.00	792 / 2194	6.00	1188 / 3290
42	1154	357	148.67	2.40	3.23	Low Density	3.00	444 / 1230	4.00	592 / 1640	6.00	888 / 2459

Sub Area	1970 Popul.	1970 DU	Area (Acres)	DU/ Acre	Popul./ DU	General Comments	Units/ Acre	Population	Units/ Acre	Population	Units/ Acre	Population
43	982	341	351.29	0.97	2.88	Low Density	2.00	702 / 1944	4.00	1404 / 3889	6.00	2106 / 5833
44	769	260	650.92	0.40	2.95	Low Density	2.00	1300 / 3601	4.00	2600 / 7202	6.00	3900 / 10803
45	560	237	445.42	0.53	2.36	Low Density + Com & Ind Not in City - Assume 30% Low Density	2.00	297 / 822	4.00	592 / 1640	6.00	888 / 2460
46	852	372	493.64	0.75	2.29	Low Density (Assume 60% Dev)	2.00	592 / 1639	4.00	1184 / 3279	6.00	1776 / 4919
47	63	28	19.06	1.46	2.25	50% RG - 50% Com	10.00	80 / 200	15.00	120 / 300	20.00	160 / 400
48	1631	187	91.84	-----	----	1160 pop in 4 dorms 75% Low Density	3.00	207 / 1773	4.00	276 / 1964	6.00	414 / 2345
49	260	83	59.70	1.39	3.12	Low Density	2.00	120 / 324	2.00	120 / 324	2.70	160 / 432
50	1155	415	176.79	2.34	2.78	75% Low Density - 25% High Density	4.00	708 / 1911	6.00	1056 / 2745	10.00	1770 / 4425
51	1338	469	151.54	3.09	2.85	Low Density	3.09	469 / 1338	4.00	604 / 1630	6.00	906 / 2445
52	200	111	90.69	1.22	2.71	75% Low Density - 25% Park	2.00	134 / 361	4.00	268 / 723	6.00	402 / 1085
53	1258	402	125.13	3.21	3.10	Low Density	3.21	402 / 1258	4.00	500 / 1385	6.00	750 / 2077
54	207	70	27.55	2.54	2.95	Low Density	3.00	81 / 224	4.00	108 / 299	6.00	162 / 443
55	869	358	105.62	3.38	2.42	60% Low Density - 40% Medium Density	5.00	525 / 1260	8.00	840 / 2016	10.00	1050 / 2520
56	652	276	78.62	3.51	2.36	40% Low Density - 60% Medium Density	6.00	468 / 1123	9.00	702 / 1684	12.00	936 / 2246
57	1153	528	107.91	4.89	2.18	Low Density	4.89	528 / 1153	4.89	528 / 1153	6.00	642 / 1402
59	1549	544	176.79	4.19	2.84	80% Low Density - 20% Medium Density	4.19	544 / 1549	5.00	885 / 2389	7.00	1239 / 3347
58	729	281	121.69	2.30	2.59	45% Public 35% Low Density - 20% Medium Density	2.30	281 / 729	6.00	402 / 1045	8.00	536 / 1393
60	139	58	35.59	1.62	2.39	20% Med Density - 80% Com & Ind	2.00	116 / 278	2.00	116 / 278	4.00	232 / 556
61	443	155	35.59	4.35	2.85	Low Density	4.35	155 / 443	4.35	155 / 443	5.00	180 / 516
62	282	204	14.92	13.67	1.38	Medium - High Density	13.67	204 / 282	15.00	225 / 315	20.00	300 / 420
63	476	198	43.62	4.53	2.40	50% Low Density - 50% Medium Density	6.00	261 / 628	8.00	349 / 837	10.00	436 / 1046

Sub Area	1970 Popul.	1970 DU	Area (Acres)	DU/ Acre	Popul./ DU	General Comments	Units/ Acre	Population	Units/ Acre	Population	Units/ Acre	Population
64	562	226	58.55	3.85	2.48	50% Low Density - 50% Med Density	4.00	232 / 643	7.00	406 / 1124	10.00	580 / 1606
65	985	440	67.73	21.67	2.23	30% High Density - 70% Public	24.00	480 / 1070	30.00	600 / 1338	36.00	720 / 1605
66	2305	1024	53.96	18.97	2.25	50% Low Density - 50% High Density	22.00	1188 / 2673	26.00	1404 / 3159	30.00	1620 / 3645
67	2024	362	183.68	1.97	5.59	Assume Constant 80% University - 20% High Density	-----	360 / 2200	-----	360 / 2200	------	360 / 2200
67a	740	275	41.33	17.90	2.69	50% Low Density - 50% High Density	20.00	380 / 1026	24.00	432 / 1166	28.00	504 / 1360
68	2590	1083	129.72	8.34	2.39	High Density	10.00	1300 / 3120	16.00	2080 / 4992	22.00	2860 / 6864
69	749	436	43.62	9.99	1.71	50% High Density - 50% Com	12.00	240 / 480	16.00	320 / 640	20.00	400 / 800
70	356	211	29.85	7.06	1.68	Commercial - Assume Constant	-----	215 / 400	-----	215 / 400	-----	215 / 400
71	126	69	13.78	5.00	1.82	Commercial - Assume Constant	-----	70 / 125	-----	70 / 125	-----	70 / 125
72	297	148	67.04	2.20	1.33	Commercial - Assume Constant	-----	150 / 200	-----	150 / 200	-----	150 / 200
73	528	306	56.25	5.44	1.72	Medium - High Density	7.00	392 / 784	10.00	560 / 1120	20.00	1120 / 2240
74	923	429	50.51	8.49	2.15	Medium Density	10.00	500 / 1000	12.00	600 / 1200	14.00	700 / 1400
75	1244	611	111.36	5.48	2.03	Medium Density	8.00	888 / 1776	11.00	1221 / 2442	14.00	1554 / 3108
76	781	326	66.58	4.89	2.39	Medium Density	6.00	396 / 950	8.00	528 / 1267	12.00	792 / 1900
77	479	179	132.02	1.35	2.67	50% Med Density - 50% Ind	9.00	585 / 1462	12.00	780 / 1950	14.00	910 / 2275
78	1099	478	181.38	8.85 2.63	2.29	50% Med Density - 50% Ind	10.00	540 / 1188	12.00	648 / 1425	15.00	810 / 1782
79	771	393	59.70	6.58	1.96	60% Med Density - 40% Com & Ind	10.00	600 / 1200	12.00	720 / 1440	15.00	900 / 1800
80	61	42	40.18	1.08	1.45	Highway	-----	---- / ----	-----	---- / ----	-----	---- / ----
81	577	300	56.25	5.33	1.92	Com & Resid Mix - Assume Constant	-----	300 / 600	-----	300 / 600	-----	300 / 600
82	222	133	45.92	2.89	1.66	Com & Resid Mix - Assume Constant	-----	135 / 200	-----	135 / 200	-----	135 / 200

SEWER STUDY - POPULATION ELEMENT

DU / POP

ub Area	1970 Popul.	1970 DU	Area (Acres)	DU/ Acre	Popul./ DU	General Comments	Units/ Acre	Population	Units/ Acre	Population	Units/ Acre	Population
83	517	383	84.95	9.12 4.50	1.34	50% Med Density - 50% Ind	10.00	420 840	12.00	504 1008	16.00	672 1344
84	1005	329	47.53	6.92	3.05	50% High Density - 50% Com	8.00	384 1036	12.00	576 1555	15.00	720 1944
85	222	176	37.88	4.64	1.26	Com & Ind - Assume Constant	-----	175 200	-----	175 200	-----	175 200
26	132	52	37.88	1.37	2.53	33% Med Density - 67% Public	6.00	60 150	10.00	100 250	15.00	150 375
87	50	14	34.44	0.46	3.57	Public	-----	---- ----	-----	---- ----	-----	---- ----
88	366	152	31.00	4.90	2.40	75% Med Density - 25% Com	8.00	184 441	12.00	276 662	14.00	322 772
89	421	137	55.10	2.48	3.07	Medium Density	6.00	330 891	10.00	550 1485	14.00	770 2079
90	552	209	61.99	3.37	2.64	80% Med Density - 20% Ind	6.00	288 720	10.00	480 1200	14.00	672 1680
TOTAL	67,873	21,501						40,231 107,060		65,794 170,377		94,805 253,734

Appendix C

Transportation Analysis: Population Assignment by Transportation Zone

Data Sheets
South Hills Study
Transportation Element - Limited Loading

Study Zone	Area Acres	Actual				Projected				Change		General Description
		1964 Pop	1964 DU	1970 Pop	1970 DU	1970 Pop	1970 DU	1985 Pop	1985 DU	DU Add	DU Sub	
011	18.37	141	66	80	41	59	37	0	0	0	0	Commercial area
012	21.81	297	136	186	94	68	30	0	0	0	0	Commercial area
013	32.14	605	325	586	348	871	347	586	225	0	0	Commercial area with potential for high density
014	32.14	452	209	549	273	442	219	270	135	0	0	Commercial area with potential for high density
015	13.78	200	1	135	6	142	0	202	0	0	0	City-County jail
016	22.96	134	62	90	65	115	52	0	0	0	0	Commercial area
017	32.14	183	57	132	86	183	11	20	0	0	0	Commercial area
021	32.14	222	95	164	110	215	89	210	89	0	0	Commercial area
022	18.37	50	31	63	62	3	3	3	3	0	0	Commercial area & civic center
023	13.78	9	9	7	5	0	0	0	0	0	0	Commercial area & civic center
024	20.66	141	55	82	65	54	36	0	0	0	0	Commercial area & civic center
025	16.07	20	20	45	42	5	4	5	4	0	0	Commercial area

Study Zone	Area Acres	Actual				Projected				Change		General Description
		1964 Pop	1964 DU	1970 Pop	1970 DU	1970 Pop	1970 DU	1985 Pop	1985 DU	DU Add	DU Sub	
026	32.14	327	143	212	109	200	111	167	93	0	0	Commercial area
111	578.59	92	32	61	56	126	32	146	32	0	32	Commercial, lodge & park facilities
112	312.26	113	32	264	31	353	126	633	226	0	100	Sewer service dependent on east bank trunk Low density development (Chevy Chase)
121	355.88	1982	560	2207	633	2736	760	3114	865	0	0	Low density development with some PUD activity and medium density adjacent to Coburg Road
122	322.92	1570	401	1586	446	1734	432	2178	557	0	0	Low density development area
123	539.56	764	222	923	287	843	272	2256	752	0	0	Low density area on eastern portion but with medium density development adjacent to Coburg Road
130	96.43	122	37	30	0	92	34	92	34	0	34	Commercial area - assume replacement of existing mobile home park
131	57.4	4	1	54	0	4	1	4	1	25	0	Bulk of area commercial with some medium density along Coburg Road, east of Frontier Drive
132	190.57	459	129	495	184	452	133	445	139	0	0	Low density area mostly developed - portion of area included in Eugene Country Club
133	700.28	703	174	528	271	586	189	1781	614	0	150	Low density residential development - extensive commercial area
134	238.76	213	55	260	77	193	55	1241	365	0	0	Low density residential area - could have significant increase in development (Oakway Golf Course)
135	220.42	1301	354	1279	404	1328	369	1748	514	0	50	Low density residential area - portion recently rezoned to RP, replacing R-2 zoning

Data Sheets
South Hills Study
Transportation Element - Limited Loading

Study Zone	Area Acres	Actual				Projected				Change		General Description
		1964 Pop	1964 DU	1970 Pop	1970 DU	1970 Pop	1970 DU	1985 Pop	1985 DU	DU Add	DU Sub	
136	39.03	0	0	7	1	0	0	0	0	294	0	Commercial area rezoned to R-2, could ultimately accommodate 484 units
137	438.54	1156	393	2421	700	2360	638	2729	758	320	0	Low density area with some medium density west of Coburg Road - extensive PUD development occurring
138	962.02	893	281	1545	445	1398	341	2740	721	120	0	Low density residential area - PUD development occurring caused increase over original projection
141		642	171	432	151	642	171	1253	346	0	150	Opportunity Area in the 1990 General Plan - will require refinement study prior to extensive devel.
142		571	140	907	307	917	235	2033	535	0	75	Low density residential development with flood plain limitations
143		565	121	1231	325	752	171	1831	426	174	0	Mainly low density development with potential medium density NW of Delta & Beltline
311	33.29	0	0	3	0	0	0	0	0	0	0	EWEB and Agripac area
312	75.77	131	45	115	6	143	45	143	45	0	0	Residential development south of Franklin Commercial and industrial area
313	39.03	139	62	348	211	91	43	39	17	190	0	High density area with some commercial
314	50.51	1479	519	1672	618	1630	603	2807	729	0	61	High density area extensively developed already
315	31.00	871	93	446	132	911	93	1025	107	0	0	High density area
316	67.73	1792	544	1902	764	2332	760	2594	910	0	50	High density area extensively developed already

Study Zone	Area Acres	Actual				Projected				Change		General Description
		1964 Pop	1964 DU	1970 Pop	1970 DU	1970 Pop	1970 DU	1985 Pop	1985 DU	DU Add	DU Sub	
317	71.18	1489	636	1488	839	1878	841	2225	1046	0	107	Medium - High density area - will require extensive redevelopment to attain projected density
318	56.25	621	339	183	279	549	323	464	273	0	50	Primarily commercial area flanking Willamette Street
319	33.29	2	1	0	0	0	0	0	0	0	0	Industrial area - University owned
321	80.36	908	254	843	313	612	278	685	298	0	0	Bulk of area publicly owned - remainder mostly developed already
322	59.70	745	196	636	224	688	196	688	196	0	0	Low - medium density already developed - expected to remain stable
323	58.55	792	358	1033	460	1217	543	1349	608	0	0	High - low density area - limited development expected in high density portion south of 18th
324	99.88	1344	409	1284	527	1510	434	1832	579	0	29	High - Low density area mostly developed already limited development expected adjacent to campus
325	149.24	1125	7	894	4	1125	7	1125	7	0	0	University campus - population in dormitories
326	81.51	2922	221	2077	243	3888	167	4380	0	221	0	Dormitory area east of campus - remainder low density residential area mostly developed
327	53.96	598	237	444	234	664	237	616	237	0	0	Low density residential area already developed
329	144.65	139	47	162	115	114	44	114	44	100	0	Primarily commercial area with extensive RG development occurring north of Garden Avenue
331	18.37	1156	326	890	345	1079	327	981	327	0	0	Amazon Park and low density residential area to the east already developed - expected to be stable

Data Sheets
South Hills Study
Transportation Element - Limited Loading

Study Zone	Area Acres	Actual				Projected				Change		General Description
		1964 Pop	1964 DU	1970 Pop	1970 DU	1970 Pop	1970 DU	1985 Pop	1985 DU	DU Add	DU Sub	
332	156.13	1550	461	1519	501	1547	469	1562	489	0	0	Low density area already developed
333	321.44	1230	303	1222	441	1129	332	1459	442	0	0	Low density residential area & Laurelwood
334	189.42	576	151	724	209	612	180	743	225	0	0	Low density residential area
341	1136.52	1738	498	2265	713	2037	582	3067	902	100	0	Low density residential area south of 30th & east of Hilyard - increase based on PUD activity
342	658.95	731	165	780	201	627	165	1273	335	275	0	Low density residential area - increase based on Timber Village & other PUD development
351	169.90	230	32	67	22	96	32	96	32	0	0	Glenwood area
352	163.02	491	179	449	234	585	225	658	253	0	19	Glenwood area
353	222.71	998	384	380	347	960	384	1066	444	0	97	Glenwood area
354	134.32	63	33	94	40	92	33	92	33	0	0	Glenwood Area
355	596.96	670	210	596	210	726	220	2193	645	0	345	Laurel Hill neighborhood south to 30th - development appears to be occurring less slowly
356	858.70	205	99	166	36	346	99	346	99	0	49	Unincorporated area - potential for annexation and development appears limited at present
411	32.14	289	219	339	162	273	127	223	127	0	0	Medium density & commercial area

Study Zone	Area Acres	Actual				Projected				Change		General Description
		1964 Pop	1964 DU	1970 Pop	1970 DU	1970 Pop	1970 DU	1985 Pop	1985 DU	DU Add	DU Sub	
412	61.99	428	219	692	356	492	219	461	191	50	0	Medium density area - dwelling units added to reflect apartment development which has occurred
413	84.95	1120	325	935	444	975	325	783	290	0	0	Medium density & commercial area
414	95.28	194	97	116	70	308	97	135	54	0	0	Medium density & industrial area
415	89.54	82	53	190	66	149	53	107	41	0	0	Industrial area
416	117.10	0	0	2	2	0	0	0	0	0	0	Industrial area
421	33.29	355	148	412	254	348	148	348	148	0	0	Medium density area
422	52.81	837	266	670	310	804	268	750	268	0	0	Medium density area
423	71.18	2	1	0	1	2	1	2	1	0	0	Fairgrounds
424	117.10	1282	372	1429	372	1064	374	1064	374	228	0	Medium density area
425	92.99	646	238	1042	288	713	264	686	264	0	0	Medium density area
426	32.14	0	0	27	13	0	0	0	0	0	0	Industrial - Commercial area
427	119.39	451	106	308	95	370	102	324	97	0	0	Industrial area with some residential

Study Zone	Area Acres	Actual				Projected				Change		General Description
		1964 Pop	1964 DU	1970 Pop	1970 DU	1970 Pop	1970 DU	1985 Pop	1985 DU	DU Add	DU Sub	
428	80.36	646	167	701	268	319	114	801	308	0	0	Medium Density area
431	84.95	1256	453	1586	595	1504	553	1369	543	0	0	Medium Density area - extensively developed already
432	72.37	657	192	353	192	614	192	582	182	0	0	Medium Density area - already developed
433	66.58	436	218	796	337	610	218	701	293	0	0	Medium density area along Willamette Street
434	91.38	1100	307	1009	347	1092	312	998	312	0	0	Low density area - already developed
435	110.21	795	347	1058	379	942	349	933	359	0	0	Low density area - already developed
436	126.28	619	188	620	189	675	193	686	196	0	0	Low density area - already developed Bulk of area in park
437	121.69	1198	366	1362	460	1155	379	1311	437	0	0	Low density area - mostly developed already
438	126.28	404	89	991	278	577	138	1617	388	0	50	Low density residential area
439	165.31	965	244	1161	356	1205	317	1709	462	0	0	Low density residential area - hillside area
441	120.54	1128	298	1338	358	1120	318	1205	343	0	0	Low density residential area - mostly developed
442	113.65	1198	366	871	422	1171	366	1317	439	0	0	Commercial & Residential mix - mostly developed

Study Zone	Area Acres	Actual				Projected				Change		General Description
		1964 Pop	1964 DU	1970 Pop	1970 DU	1970 Pop	1970 DU	1985 Pop	1985 DU	DU Add	DU Sub	
443	918.40	1647	459	1923	714	2448	720	4003	1251	600	0	Low density area - includes extensive PUD development such as Southridge & Edgewood West III
444	383.43	3766	1110	3825	1255	3973	1188	4133	1238	0	0	Low density area - mostly developed
445	599.26	2503	552	3578	1077	3656	962	4817	1302	275	0	Low density residential area - includes PUD development such as BALSM
451	539.56	36	9	111	54	30	9	14	4	0	0	Industrial area
452	727.83	71	43	125	43	105	43	105	43	0	0	Industrial area - limited residential development along Stewart Road
453	323.74	8	4	23	7	10	4	10	4	0	0	Industrial area
461	176.79	2123	663	2353	914	2403	801	2926	1045	0	0	Medium Density area
462	160.72	893	150	501	159	1076	269	1993	519	0	0	Medium & Low density area
463	521.19	1961	655	2611	742	3079	919	4231	1279	0	200	Low density area - development limited
464	472.98	392	114	688	236	399	114	924	264	600	0	Low density residential area - Includes PUD such as Village Oaks, Somerset & Valley West
471	408.69	150	30	523	111	111	30	683	195	355	0	Low - medium density area - Includes Churchill Village PUD and MHP east of Bertelsen Road
472	984.98	220	33	170	Unav.	201	56	922	256	0	150	Low density area - intensive development dependent upon annexation

Data Sheets
South Hills Study
Transportation Element - Limited Loading

Study Zone	Area Acres	Actual				Projected				Change		General Description
		1964 Pop	1964 DU	1970 Pop	1970 DU	1970 Pop	1970 DU	1985 Pop	1985 DU	DU Add	DU Sub	
473	1575.06	119	33	150	38	144	40	1015	290	0	140	Low density area - approximately 50% of area outside urban service area
474	171.05	256	67	742	214	436	121	796	221	160	0	Low density area - present development approximates projected development - potential for PUD
475	355.88	110	23	73	18	92	23	752	188	0	50	Low - medium density area - recent R-2 zoning west of Bertelsen Road
511	95.28	448	154	348	135	448	154	448	154	0	0	Industrial - medium density area
512	273.22	94	30	117	34	11	3	11	3	0	0	Commercial - industrial area
513	107.91	807	220	662	216	749	204	749	204	0	0	Industrial with limited existing residential
514	34.44	200	104	82	146	232	101	232	101	0	56	Industrial - commercial area
515	44.77	32	23	96	23	30	23	30	23	0	0	Industrial - commercial area
516	136.61	28	14	120	14	14	7	14	7	0	0	Industrial area
517	153.83	55	28	41	28	92	28	92	28	0	15	Industrial area
521	47.07	82	33	69	27	83	33	83	33	0	0	Industrial area
522	106.76	5	2	24	17	5	2	5	2	0	0	Industrial area

Study Zone	Area Acres	Actual				Projected				Change		General Description
		1964 Pop	1964 DU	1970 Pop	1970 DU	1970 Pop	1970 DU	1985 Pop	1985 DU	DU Add	DU Sub	
523	197.46	1460	440	1323	418	1318	412	1366	427	0	0	Low density area - mainly developed
524	393.76	1375	396	1259	395	1810	529	2344	729	0	210	Approximately 50% industrial area - 50% low density residential
525	98.73	309	90	346	118	357	105	646	202	150	0	Medium density area with recent development including Sorgenfri & Tomlinson PUD
526	75.77	102	49	188	49	262	109	473	189	0	100	Low density residential and commercial area - residential portion mainly developed already
527	262.89	1091	328	774	328	1234	363	1965	578	0	175	Low density residential
528	316.85	956	260	1127	376	1037	288	1325	368	150	0	Low density residential - recent PUD activity including Echo Hollow West & Steinmueller
529	298.48	146	31	44	31	105	31	1397	411	0	100	Low density residential area with commercial frontage on 99N
531	1030.90	320	101	436	167	515	156	3237	981	0	367	Low density residential and industrial - much of area outside urban service area
532	518.90	736	214	988	262	924	264	2149	614	0	120	Low density residential - on extreme western margin of city
533	638.29	512	153	593	179	551	153	2711	753	0	474	Low density residential - portion of area outside urban service area
534	557.93	68	24	167	46	96	24	274	74	0	0	Industrial area - airport vicinity
541	142.35	20	3	19	3	10	3	10	3	0	0	Industrial area

Data Sheets
South Hills Study
Transportation Element - Limited Loading

Study Zone	Area Acres	Actual				Projected				Change		General Description
		1964 Pop	1964 DU	1970 Pop	1970 DU	1970 Pop	1970 DU	1985 Pop	1985 DU	DU Add	DU Sub	
611	213.53	525	208	852	600	954	378	1862	931	0	256	Medium density area west of Skinner's Butte
612	270.93	1547	435	1421	522	1024	320	2015	605	0	25	Medium density & existing industrial area
613	168.76	525	160	548	212	528	165	945	315	0	50	Low density residential - no sewers presently
614	373.10	544	195	1459	510	1149	359	1594	498	0	0	Low & medium density residential - River Road area
621	130.18	1006	297	679	332	942	304	1020	329	0	0	Low density - mostly developed - River Road area
622	117.10	920	280	819	284	906	282	938	293	0	0	Low density residential - River Road area
623	102.17	680	192	624	203	657	199	733	229	0	0	Low density residential - River Road area
624	183.22	1156	340	1531	430	1229	351	1508	431	0	0	Low density residential - River Road area
631	245.67	1828	533	2228	614	2041	583	2339	688	0	50	Low density residential - River Road area
632	266.56	1180	317	1405	378	1411	360	2002	525	0	100	Low density residential - River Road area
633	450.48	2650	670	3118	920	2964	760	3667	965	0	0	Low - medium density residential - River Road area
641	1429.95	1810	545	3424	1041	3424	801	3675	1081	0	0	Low density residential - Santa Clara area assume present moratorium on new subdivisions

Data Sheets
South Hills Study
Transportation Element - Limited Loading

Study Zone	Area Acres	Actual				Projected				Change		General Description
		1964 Pop	1964 DU	1970 Pop	1970 DU	1970 Pop	1970 DU	1985 Pop	1985 DU	DU Add	DU Sub	
642	11.48	2	1	0	0	2	1	2	1	0	1	Commercial area - Santa Clara
643	918.40	731	180	1401	480	1401	408	1953	558	0	60	Low density residential - Santa Clara area Assume moratorium on new subdivisions remains
651	361.39	487	128	1804	512	1804	334	2142	579	0	40	Low density residential - Santa Clara area Assume moratorium on new subdivisions remains
652	1000.83	2072	498	4500	1284	4500	998	5913	1598	0	200	Low density residential - Santa Clara area Assume moratorium on new subdivisions remains

Data Sheets
South Hills Study
Transportation Element - Saturation Run

Study Zone	Area Acres	Actual				Projected				Change		General Description
		1964 Pop	1964 DU	1970 Pop	1970 DU	1970 Pop	1970 DU	1985 Pop	1985 DU	DU Add	DU Sub	
341	568								2556	1654		50% of area outside urban service area, acreage reduced, assumed density = 4.5/acre
342	329								1480	1145		50% of area outside urban service area, acreage reduced, assumed density = 4.5/acre
355	597								2686	2041		Assumed density = 4.5/acre
439	132								528	66		20% of area outside urban service area, acreage reduced, assumed density = 4.5/acre
443	918								4131	2880		Assumed density = 4.5/acre
444	383								1238			Area almost completely developed, Assumed constant density
445	599								2696	1394		Relatively extensive development already on a portion of area - Assumed density = 4.5/acre
463	521								2344	1065		Assumed density = 4.5/acre
464	473								2128	1864		Extensive area available for pud development Assumed density = 4.5/acre
472	985								256			Entire zone outside urban service area, Assume only limited development
473	787								3541	3251		50% of area outside urban service area, acreage reduced, assumed density = 4.5/acre
474	85								346	125		50% of area outside urban service area, acreage reduced, assumed density = 4.5/acre

Data Sheets
South Hills Study
Transportation Element - Saturation Run

Study Zone	Area Acres	Actual				Projected				Change		General Description
		1964 Pop	1964 DU	1970 Pop	1970 DU	1970 Pop	1970 DU	1985 Pop	1985 DU	DU Add	DU Sub	
121	356								865		865	Willakenzie Area - north of South Hills Study area - all units deleted
122	323								557		557	Willakenzie Area - north of South Hills Study area - all units deleted
123	540								752		752	Willakenzie Area - north of South Hills Study area - all units deleted
132	191								132		132	Willakenzie Area - north of South Hills Study area - all units deleted
133	700								614		614	Willakenzie Area - north of South Hills Study area - all units deleted
134	239								365		365	Willakenzie Area - north of South Hills Study area - all units deleted
135	200								514		103	Willakenzie Area - north of South Hills Study area - portion of units deleted
138	962								721		721	Willakenzie Area - north of South Hills Study area - all units deleted
451	540								4		4	Bethel-Danebo - industrial area - all units deleted - north of South Hills Study area
452	728								43		43	Bethel-Danebo - industrial area - all units deleted - north of South Hills Study area
453	324								4		4	Bethel-Danebo - industrial area - all units deleted - north of South Hills Study area
512	273								3		3	Bethel-Danebo - industrial area - all units deleted - north of South Hills Study area

Data Sheets
South Hills Study
Transportation Element - Saturation Run

Study Zone	Area Acres	Actual				Projected				Change		General Description
		1964 Pop	1964 DU	1970 Pop	1970 DU	1970 Pop	1970 DU	1985 Pop	1985 DU	DU Add	DU Sub	
513	108								204		204	Bethel-Danebo - All units deleted - north of South Hills Study area
514	34								101		101	Bethel-Danebo - All units deleted - north of South Hills Study area
515	45								23		23	Bethel-Danebo - All units deleted - north of South Hills Study area
516	136								7		7	Bethel-Danebo - All units deleted - north of South Hills Study area
517	154								28		28	Bethel-Danebo - All units deleted - north of South Hills Study area
521	47								33		33	Bethel-Danebo - All units deleted - north of South Hills Study area
529	298								411		411	Bethel-Danebo - All units deleted - north of South Hills Study area
531	1031								981		981	Bethel-Danebo - All units deleted - north of South Hills Study area
532	519								614		614	Bethel-Danebo - All units deleted - north of South Hills Study area
533	638								753		753	Bethel-Danebo - All units deleted - north of South Hills Study area
534	558								74		74	Bethel-Danebo - All units deleted - north of South Hills Study area
541	142								3		3	Bethel-Danebo - All units deleted - north of South Hills Study area

Data Sheets
South Hills Study
Transportation Element - Saturation Run

Study Zone	Area Acres	Actual				Projected				Change		General Description
		1964 Pop	1964 DU	1970 Pop	1970 DU	1970 Pop	1970 DU	1985 Pop	1985 DU	DU Add	DU Sub	
613	169								315		315	River Road area - All units deleted - north of South Hills Study area
614	373								498		498	River Road area - All units deleted - north of South Hills Study area
621	130								329		329	River Road area - All units deleted - north of South Hills Study area
622	117								293		293	River Road area - All units deleted - north of South Hills Study area
623	102								229		229	River Road area - All units deleted - north of South Hills Study area
624	183								431		431	River Road area - All units deleted - north of South Hills Study area
631	246								688		688	River Road area - All units deleted - north of South Hills Study area
632	267								525		525	River Road area - All units deleted - north of South Hills Study area
633	450								965		965	River Road area - All units deleted - north of South Hills Study area
641	1430								1081		1081	Santa Clara area - All units deleted - north of South Hills Study area
642	11								1		1	Santa Clara area - All units deleted - north of South Hills Study area
643	918								558		558	Santa Clara area - All units deleted - north of South Hills Study area

Data Sheets
South Hills Study
Transportation Element - Saturation Run

Study Zone	Area Acres	Actual				Projected				Change		General Description
		1964 Pop	1964 DU	1970 Pop	1970 DU	1970 Pop	1970 DU	1985 Pop	1985 DU	DU Add	DU Sub	
651	361								579		579	Santa Clara area - All units deleted - north of South Hills Study area
652	1001								1598		1598	Santa Clara area - All units deleted - north of South Hills Study area

Appendix D

Transportation Analysis:
State Highway Department Report

OREGON STATE HIGHWAY DIVISION
Planning Section
Transportation Studies Unit

EUGENE SOUTH HILLS ALTERNATE DWELLING UNIT DENSITY STUDY

The objective of this special study was to determine the traffic impact on arterials and collector streets in and leading to the Eugene South Hills area if additional new residential development was substantially increased in density over what had earlier been projected. Because of a deadline for the completion of this work, it was decided to proceed using 1985 data. In this way, the 1985 data would be useful even if the E-SATS Update (now underway) was not sufficiently advanced to allow this test to be made using the year 2000 data.

The technique used in this alternate land use study was to hold the population and the number of dwelling units constant for the study area as a whole, but to redistribute the population and dwelling units according to new hypothetical land use systems. Therefore, to increase the projected number of dwelling units in the South Hills area, it was necessary to reduce the projected number of dwelling units in other areas. This work was done by the City of Eugene Planning Department.

It should be understood that the above technique was necessary to limit the scope of the work to be done and to make it possible to compare the resulting data to previous traffic assignments for 1985. If dwelling units had been added to the South Hills area without compensating deletions of dwelling units in other areas, the net effect would be an increase in the projected population. Not only would this substantially increase the work to be done, but cause more trips to be generated. Thus, comparisons with previous test systems would be like comparing apples to oranges.

Two new different distributions of dwelling units were made and the resulting traffic assignments (loadings) were plotted on a map. This was done so it would be convenient to make traffic comparisons with the original distribution. The original distribution of dwelling units was the same for all the early network tests.

Map A illustrates the changes in dwelling units (from the original distribution) made for the South Hills Test No. 1. Table 1 sums the number of dwelling units added in the South Hills area; it shows that 1,360 additional dwelling units were forecasted in that area for Test No. 1. Most of the increase was placed in the central portion of the South Hills area with some zones, both east and west of the center, having lower dwelling unit forecasts. While the increase in the number of South Hills dwelling units was substantial, the density did not approach saturation in this first test.

The second test (South Hills No. 2) did increase the number of dwelling units to what was considered a saturation level for the South Hills area. Map D and Table 2 shows that a total of 15,650 more dwelling units were forecasted on the south fringe of the city than in the original distribution. Of that total, 7,429 dwelling units were added in the central area as shown by Table 1. It is this central area that will be subjected to screenline analysis later in this report.

Maps B and C show the resulting traffic assignments for the two new tests as well as the traffic resulting from the original dwelling unit distribution. It should be explained that the base maps used for the South Hills Study are the network agreed upon for the initial E-SATS year 2000 traffic forecasts. Some streets are shown that were not on the 1985 test systems. Therefore, these streets that were recently added do not have 1985 traffic assigned to them. Also, it will be noticed that certain major streets show traffic loadings that have been factored up to agree with trends shown by recent ground counts. All streets where such factoring has

occurred are marked by symbol. Other traffic volumes where the streets are not so indicated by symbol are unfactored computer output. It will be seen that none of the streets in the South Hills area, or leading to it, were subject to factoring.

Computer test loadings can frequently be rough tested by using screenlines and making reasonable estimates based on previous Origin-Destination data. Such rough tests were made on the computer loadings and the results seem to indicate that the models were functioning properly. The screenline shown on Map 'B' was used in a analysis concerning the central portion (only) of the South Hills area as follows. 1/ As listed in Table 3, the original dwelling unit distribution had 58.9 thousand trips crossing the screenline. The addition of 1,360 dwelling units to this central area caused an additional 4,800 trips to cross the screenline (Distribution No. 1). For this central section only, the saturation condition added 7,426 dwelling units to the area and resulted in screenline loadings of 92.8 thousand trips (Distribution No. 2). The remaining trips produced by the additional dwelling units were made either: (1) within the South Hills zones, or (2) in attraction areas in the main city.

Some cautions in using this technical data should be observed. First, this mini-study did not include regeneration of trips along with the redistribution of dwelling units. When dwelling units were moved from any area to the South Hills, the travel characteristics of the original area were transferred to the South Hills area. Thus, if the original dwelling unit location area was one of low (or high) trip generation, then this travel characteristic was transferred along with the dwelling unit. This fact could result in some trip generation rates that might be inappropriate for the South Hills area.

1/ A screenline is an imaginary line drawn at a certain location where it is desired to compare traffic crossing the screenline between one alternative and another.

Second, there is evidence that the trip generation rates which were used for the 1985 trip data are low. This is evidenced by screenline counts in certain locations where ground counts have grown faster than was earlier predicted. As a result, certain streets have factored-up volumes (this was mentioned earlier) to account for this unforecasted growth. There are a number of reasons why this may have occurred. Probably one of the foremost is that trip-making (regardless of mode) has been spiraling upward since the Origin-Destination Survey at rates higher than anticipated. Such situations are prime reasons for periodic study updates which should take place about every five years. Whether or not the existing travel trends will continue, level off, or actually go down is a subject for determination by the study update. So far, all travel trends have shown increases.

In view of the above, the traffic loadings for the South Hills Study should be considered conservative in volume. What the study does show that is more significant are the relative changes in traffic between one situation and another. Even these changes may be conservative if the E-SATS Update shows marked increases in trip-making per household.

A final caution is to realize the limitations of this particular study and not base important conclusions on traffic loadings that are remote from the South Hills area. The study was not intended to give indicators other than on the sections of arterials and collectors immediately adjacent to and penetrating the South Hills area. Because it was recognized that some of the traffic assignments in other areas could be misleading, it was first decided not to furnish traffic data, except in the South Hills area. However, after discussions with the city planning staff, it appeared that the study limitations were fully understood and that seeing all of the computer loadings might be of technical interest.

The foregoing comparisons are not meant to be a definitive and complete analysis of trip-making in the South Hills area. However, it does tend to lead to some interesting conclusions.

1. Where large concentrations of dwelling units are kept free of commercial and industrial attractions, non-home connected trips made by the residents are made elsewhere than in their own neighborhood. In this case, many of the residents trips were made elsewhere. This could be used as an argument for or against community shopping centers and areas of employment near home.
2. Once a neighborhood is substantially developed, a change in the density of additional new residential development does not produce substantial traffic changes. A comparison of the traffic from the original distribution to Test No. 1 bears this out. From a traffic standpoint, it is hard to detect a substantial difference resulting from the additional 1,360 dwelling units.
3. The traffic which would result in the South Hills area from a near saturation condition would seriously affect the arterials connecting to the city. As high residential densities promote opportunities for mass transit, it is possible that transit could relieve the conditions to be anticipated on the main arterials. However, without the relief that transit may afford, it appears that the increase in traffic on the arterials connecting to the city would be on the order of six moving lanes of traffic (a very rough estimate). It is possible that some of

the existing arterials could carry more traffic than they do now and thus diminish the number of additional lanes needed. However, topography problems and costs would probably complicate the development of a collector-distributor system to redistribute traffic coming out of the South Hills. An extensive and complete traffic capacity analysis, based on firm city policies for developing such a system, would be necessary before reaching any final conclusions on arterial deficiencies.

4. The traffic forecast data for the immediate South Hills area may not change appreciably if these tests are repeated using E-SATS Update, year 2000, input. This is because saturation is saturation. Even if there are significant changes in other areas, the South Hills are substantially isolated from such effects; the possibility of "through" traffic building up seems minor. Therefore, once the area is fully developed, or nearly so, according to any density plan, the traffic situation should be fairly stable. It would appear that only major changes in trip generation rates, or the inclusion of trip-attracting land uses would upset the stable conditions.

5. From the Highway Division's standpoint, these tests have not been excessively time-consuming or burdensome. It would appear that the cooperative work with the City of Eugene has been successful and useful.

William L. Cranford
Revised December 14, 1973

TABLE 1

CENTRAL SOUTH HILLS AREA

Zone	South Hills Test No. 1		South Hills Test No. 2	
	D.U.'s Added	D.U.'s Deleted	D.U.'s Added	D.U.'s Deleted
120	100	-	1,654	-
121	275	-	1,310	-
149	-	50	-	-
150	-	-	66	-
153	600	-	2,880	-
155	275	-	1,394	-
166	160	-	125	-
	1,410	50	7,429	

1,360 net

TABLE 2

SOUTH FRINGE AREA OF EUGENE
(South Hills Test No. 2)

Zone	D.U.'s Added
120	1,654
121	1,310
126	2,041
150	66
153	2,880
155	1,394
161	1,065
162	1,864
165	3,251
166	125
	15,650

TABLE 3

SCREENLINE NO. 1 VEHICLE VOLUMES
(In Thousands)

	Distribution		
	Original	No. 1	No. 2
Hilyard Street	9.7	10.0	13.3
Amazon Parkway	17.9	18.7	27.9
Willamette Street	21.5	24.4	38.5
Lorane Highway	5.7	6.0	8.3
Chambers Street	4.1	4.6	4.8
	58.9	63.7	92.8