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A STUDY OF THE PLANNED UNIT DEVELOPMENT AND ITS
APPLICATION TO A SITE IN CACHE VALLEY

BY

Margaret Ann Mullins

A thesis submitted in partial fulfillment
of the Requirements for the degree

MASTER OF LANDSCAPE ARCHITECTURE in
Landscape Architecture and Environmental Planning

PLAN B

Approved:

Utah State University

1976



EAST LOGAN BENCH PUD

378.2
M9174
C.2

THESIS STATEMENT

The thesis proposed deals with the design of a Planned Unit Development on a site located in Cache Valley. Included in the study is research of existing PUDs, determining the aspects in which they are successful and those in which they are unsuccessful. Analysis of a site with respect to physical characteristics and aesthetic characteristics will be undertaken with previously compiled data. Thirdly, the given program will be analyzed with respect to the land uses included and their compatibility to the site. The conclusion of the thesis will be the completed master plan, with additional schematic drawings illustrating and analyzing the design.

This type of study has several benefits for the student. Though the student has been exposed to various phases of studio design projects, i.e., data collection, program analysis, and site design, none have gone from site analysis to final design. The thesis proposed provides the student with the opportunity to deal with areas of design which have not already been covered in classwork.

A method and structure for the study must be developed. By including only the necessary information and data, and properly organizing it, the study method will be clear from the initial phases to the completed master plan.

Another major benefit will be the exposure to graphic presentation techniques. The final presentation will have the form of a professional brochure, including graphic illustration and the written text.

The specific objectives of the thesis include both graphic illustration and explanatory text. Data of the site will be presented on a series of data maps with accompanying text. Program analysis will be presented with written text and necessary graphic illustration. In addition to data and program analysis, a site opinion paper will be included. This paper will consist of a visual analysis of the site and sketches of the site.

Research of existing PUDs will be presented as a separate phase, subdivided into problems existing in these developments and the successful aspects of the developments. Graphic illustration and text will be included. The con-

INTRODUCTION

clusion of the research will be the redefinition of the PUD concept.

The conclusion of the thesis will be the finished master plan. This plan will be supplemented by schematic drawings illustrating such aspects as road systems, open space systems, and land use relationships. These schematic drawings will illustrate how the research and analysis done in previous phases relates to the final design of the master plan.

The PUD topic has been covered in previous theses and treated as an abstract concept. Since the PUD has become a more common design approach, its practicality can be judged more accurately by studying existing PUDs. This thesis will attempt to incorporate the realistic results of existing PUDs along with the conceptual definition of a PUD to determine a final design. In the process, a definition of the PUD will be developed which will be exhibited by the final master plan.

Program

Development Program:

A. Housing

1. Single Family Detached:
1300-1600 S.F.
205 Units
2. Single Family Attached:
1300-1600 S.F.
75 units
3. Townhouses:
900-1200 S.F.
100 units
4. Garden Apartments:
800-1000 S.F.
130 units

B. Community Center

1. Four Tennis Courts
2. Swimming Pool
3. Parking -- 30 cars
4. Recreation Building
1200-1500 S.F.

C. Stable

1. Corral
2. Paddocks
3. Barn -- food, storage
24 stalls

D. Circulation

1. Auto
2. Pedestrian
3. Horses
4. Bicycle
5. X-Country Skiing

Site

The site, approximately 150 acres, is located at the base of the Bear River Range, south of Highway 89 on the east edge of Cache Valley. The privately owned land is partially within the Logan City limits, while the remainder is under Cache County jurisdiction. A site inventory has been completed by the first-year graduate class of the Department of Landscape Architecture and Environmental Planning at Utah State University. This data will be used in this thesis.

The purpose of this thesis is to apply the PUD concept to a site in Cache Valley. To achieve a well-developed plan, a definition of a PUD must be derived and the design elements commonly occurring in a PUD must be determined. In addition to developing a general definition of PUD, the problems and successes of existing PUDs must be studied. The successes of other PUDs which are applicable to this site and program will be incorporated in the final design for this study. Similarly, problems of other PUDs which are relevant to this project will be determined and solutions will be attempted in the final design.

PUDs present an alternative to traditional housing developments. Their appearance is different physically because of an abandonment of the traditional grid layout of streets and uniform lot size. A PUD uses a diversity of housing units in a small area, instead of using homes of one size and type throughout a site. More important than the physical differences between PUDs and conventional housing is the conceptual difference. The PUD is attempting to develop "an integrated community instead of the individual lot (which) has become a unit for planning."¹ The

development of a community is aided by a diversification of family types and sizes and the inclusion of various land uses adjacent to the dwelling units. There are several elements incorporated in most PUDs which attempt to achieve this goal.

Most PUDs studied have two to five different land uses. Common to all PUDs are areas reserved for open space, such as green belts. Bahl Patio Homes in Sunnyvale, California, covers a site of 30 acres and reserves 21.3 percent of this land for open space.² Similarly, at Saybrook Mews, Huntington Harbor, California, 21.5 acres of 32 acres is reserved for open space.³

As the project increases in size additional land uses are included. Depending on the size of the site recreational activities such as pools, playgrounds, bicycle trails, tennis courts, pedestrian paths, riding paths and stables, and golf courses⁴ are included.

Commercial land use areas are included in many PUDs. This inclusion is not so dependent on the size of the project as the proximity to other commercial centers. The commercial uses range

from small grocery stores to shopping complexes. On the largest sites, industrial development is included. Nun's Island, Montreal, has developed 220 acres out of 970 acres for industrial and commercial use.⁵ The diversification of land use is developed in five general areas, i.e., residential, open space, recreational, commercial, and industrial.

The second area of diversification is that of housing types. Most projects include housing ranging from single-family detached dwelling units to two- to three-story apartment units. Numerous terms are used to describe the type of housing, e.g., townhouse, patio house, garden apartment, single-family attached, and single-family detached. Each of these units differ from the others in detail of their design, and a different combination of these units is used in each project. Though there are superficial differences in each project, the same objective is sought in each, i.e., to provide housing for a wide range of family types and income levels.

A third design concept that is seen in most PUDs is that of clustered housing. In most areas a certain lot size and density has been established by local zoning

ordinances. Clustered housing maintains the required density but minimizes the lot size. This is done through grouping the housing units around private driveways or cul-de-sacs (Fig. 1) rather than spacing the units at equal distances along a grid pattern street system (Fig. 2).

Flexibility can be seen in the placement of the units on lots within each grouping. The conventional method places the unit in approximately the middle of the lot (Fig. 3). The PUDs studied utilize the zero or double-zero-lot-line concept (Fig. 4 and 5). In both cases the wall which borders the lot line is windowless. Though this can be considered a disadvantage, the drawbacks are compensated for by the increased amount of useable outdoor area (Fig. 6 and 7).

The use of housing clusters relates directly to the retention of open space on the site. The amount of private land around each unit is decreased and large unbroken tracts of land are left for common use. As shown above, in the conventional layout there is a certain amount of land which is unuseable on lots of the conventional form. The open land is

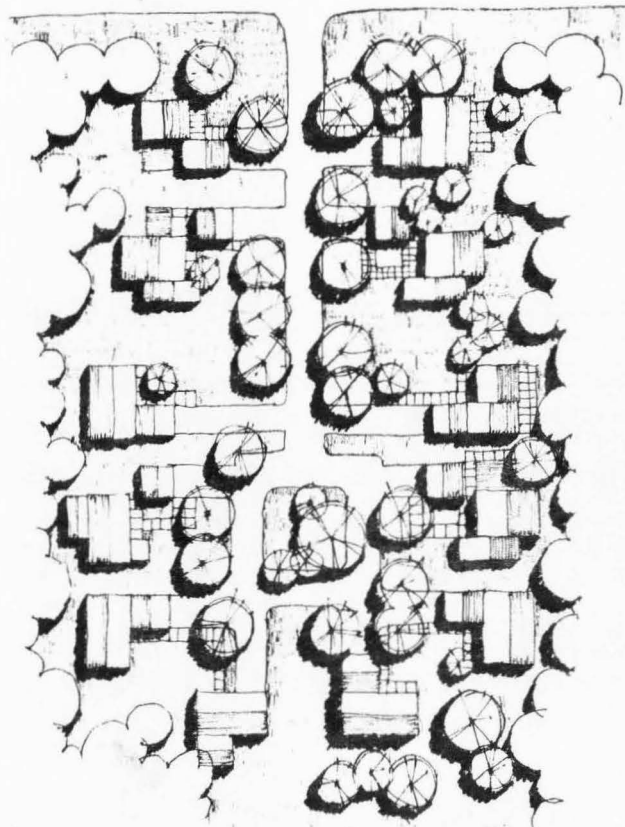


FIG.1 : Clustered Housing

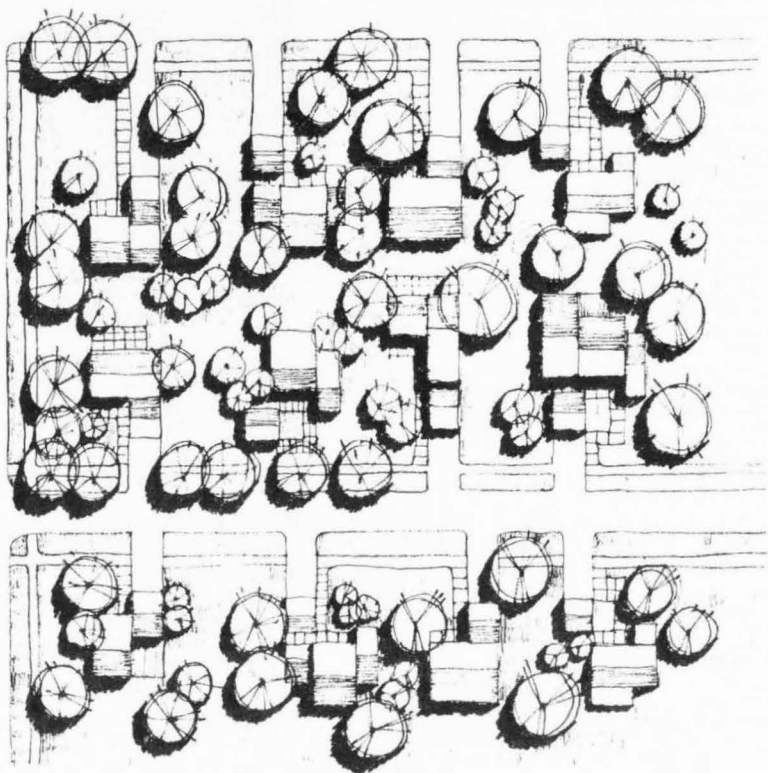


FIG.2 : Grid Pattern

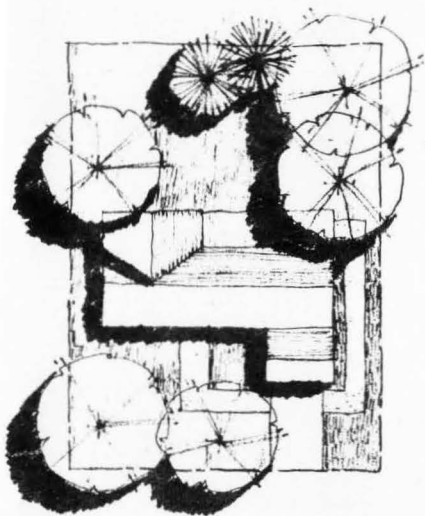


FIG. 3

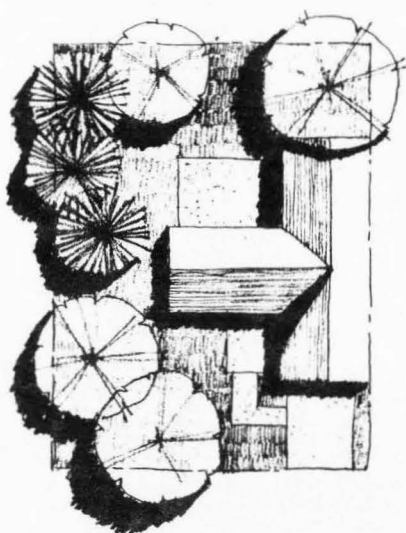


FIG. 4

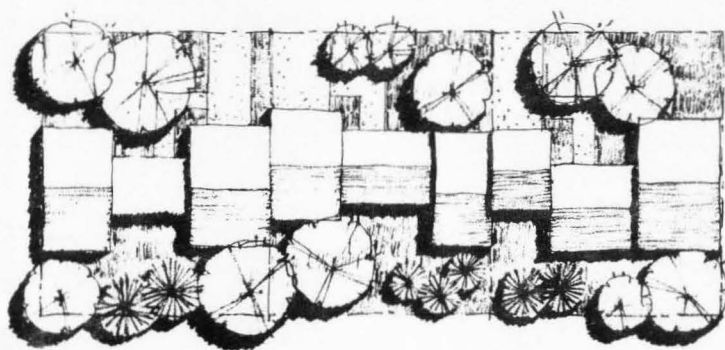


FIG. 5

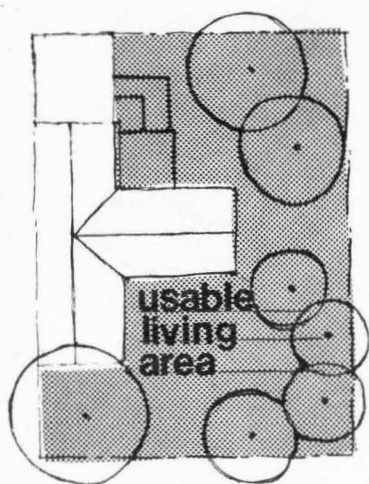


FIG. 6

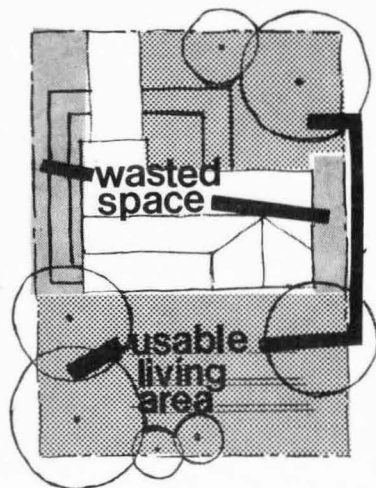


FIG. 7

divided evenly among the units and the result is not unified segments of land but an assortment of left-over spaces. A well-designed cluster of housing gives each unit a small amount of private area all of which can be utilized. The remaining land becomes a large, unified area which can be used for recreational purposes or left in its natural state. The density has remained the same as that of the conventional plan, but each unit has the advantage of well-designed private areas, and park-like common areas.

Another advantage inherent in

the clustering of homes is the greater amount of privacy given to each unit. Through traffic is at a minimum on loop streets and nonexistent on cul-de-sacs. The driveway entrances become private courtyards which can be used as paved play areas for children as well as a buffer zone between the units and the collector street.

The three concepts discussed above, i.e., diversification of land use, diversification of housing types, and clustered housing groups, are seen in almost all PUDs. All three contribute to the development of a community rather than a series of adjacent homes.

There are several economic advantages which can be gained through a PUD design. The principal factor being the shortening of road length. On a site of 24 acres two different schemes are used. The grid pattern (Fig. 8) uses 12,000 feet of road, while the cluster development (Fig. 9) uses 6,000 feet of road.⁶ The cost of road construction is greatly decreased in the PUD design. The road length influences the extent of infrastructure needed in the development, since most utility lines normally parallel the road, their length is

reduced. The original savings are then perpetuated in decreased maintenance costs.

An attempt is made in most designs to construct the road along the natural contours. This increases the quality of the site by minimizing cut and fill, and retaining the existing topography. The topography can create a natural road and trail system. The different vehicular and pedestrian uses, while paralleling each other, are separated by existing vegetation and elevation changes. Through the utilization of natural landforms a unified roadway, walk-



FIG. 8

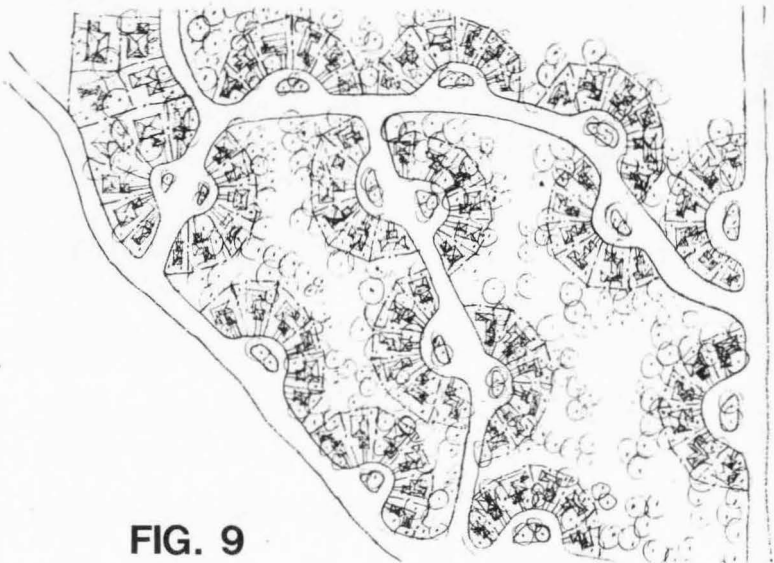


FIG. 9

way, and trail system can be developed while retaining a separation between the different uses.

Construction costs of the individual units are also minimized. By placing the units closer together, the entire site need not be developed. Areas most suitable for construction can be used and those less feasible can be left as open space. Much of the natural topography and ecological system are preserved because of the decreased percentage of development on the site.

Visual amenities are increased in this type of design. The in-

creased amount of open space and retention of natural landscape enhances the visual quality of the site. The monotony of a conventional subdivision can be avoided through a PUD design. Diversity of housing types, variations of setbacks, and placement of the unit on a lot add visual interest to the development.

The problems apparent in the PUDs studied deal with specific aspects of the design and maintenance of the project. A problem occurring in most PUDs is that of maintaining open space. The advantages of having large areas

of unobstructed land are apparent, but the land becomes a detriment to the development if it is not maintained properly and consistently.

The most common solution to the maintenance problem is the organization of a Home Owners Association. A group of residents is elected or chosen to manage the open space. Funding, a fee from the residents, is either mandatory with purchase or rental of a unit or by choice. There are several problems inherent in this type of organization. The persons managing the association most probably have little experience in the type of work and are working on a volunteer basis. For both these reasons the organizations are not being run as effectively as they could be. Problems also arise with funding. Controversy can arise over whether everyone should pay for the facilities or only the users, in the case where a fee is mandatory. In an alternative approach of having homeowners pay the association only for the facilities they use, some residents may feel resentment if others use facilities they have not paid for.⁷ Of the PUDs studied, only a few maintained an effective Home Owners Association over a long period of time.

tion over a long period of time.

Two alternatives to a Home Owners Association have been attempted. The first is managing the common land as a private club. Each resident has the option of joining the club, paying dues, and having use of the facilities. Maintenance is undertaken by a manager hired by members of the club.⁸ This method is effective but has some disadvantages. The club facilities to be managed as a private club must be concentrated in one area, distinct from other areas of the development. This would insure that only members used the facilities. On a large site this would be feasible, but on a smaller site the separation of activities could tend to create a division among the residents.

The second alternative is that of having common areas and facilities funded and maintained by an institution completely divorced from the development. The Twin Rivers Project in New Jersey has attempted this and found it to be successful.⁹ The First National Bank of Middlesex County owns all the land except for private strips around individual units. The developer donates the land and lends or donates the initial funds for its maintenance. Though the bank

owns all the land, each resident has an easement over the common land. The easement necessarily includes restrictions over the use of the lands, covering any possible degradation of the property. The bank as trustee hires a professional manager and disburses the necessary funds to him. The manager is in charge of maintaining the property and gathering "feed-back" from the residents. This system insures effective management of the land by a professional over a long period of time. The trust for Twin Rivers also includes a termination date. After seven years, the trust agreement can be terminated and another method of management tried or the trust agreement can be perpetuated for another seven-year period.¹⁰

In some communities zoning laws have required each developer to donate a percentage of his site for public use. This system has not been highly successful. In many cases the developer will donate the land which is least useful to him and probably least useful to the community. When the land donated can be used as a public park other problems arise. The community may resent maintaining a park which appears to be a private park for the residents of the

development. The residents may feel an equal resentment at being surrounded by a public park.¹¹ In most cases land which was donated by the developer for public use has not been used heavily by residents of the community or the development.¹²

In the actual design of the PUD several devices can be used to ease the maintenance of open space. Each unit has a private strip of land surrounding it. This parcel of land should be made distinct from the common land. Heavy landscaping in comparison to the more naturalistic open space, fencing and plant masses on the perimeter of the land parcel would all serve to differentiate the private from the public land. Included in the common land would be all roadways, walkways, bike, horse and cross-country trails. Another requirement, not necessarily for the maintenance of open space, but necessary for the quality of the development, is the modification of the common land. Some additional planting and design work is needed, preserving the natural character, but avoiding the appearance of leftover land.

Street layout presents a problem in many PUDs. In an attempt to avoid the monotony of a grid

system, the street system may be overdesigned, becoming confusing. A definite hierarchy of roads must be developed, consisting of collector roads, loop roads, and cul-de-sacs. These road categories can be distinguished by road width, off-street parking, access to housing, and types of intersections.

The collector road would exist as a continuous road throughout the site, with a minimal number of direct accesses to living units and no on-street parking. Because of the elimination of parking lanes, this road can be as narrow as 28 feet. Loop roads would provide direct access to living units and cul-de-sacs. The cul-de-sac would provide access to clusters of living units and on-street parking. According to current standards a cul-de-sac is restricted in length to a minimum of 40 feet and a maximum of 500 feet. All roads intersecting the collector roads would utilize a 3-way intersection, these intersections being separated by a minimum of 125 feet. If the above requirements were adhered to, a road system which is easily understood can be developed without reverting to the traditional grid system.

An adequate number of parking

stalls is necessary if the PUD design is to work well. Because of the closeness of the units there is little room for on-street parking. An average of two parking stalls per townhouse or garden apartment should be maintained with an additional visitors' parking stall per unit. Single-family units should average three parking stalls per unit with one additional visitor parking stall. A maximum distance of 150 feet should be maintained from a parking stall to its respective unit.

Utah's climate makes some requirements in both parking and street layout. Where possible single-family units should have attached parking garages, while apartment units have adjacent covered parking.

The most practical street layout to ease snow removal would be a maximum number of loop streets and a minimum number of deadend streets. Where cul-de-sacs are used an area 90 feet in diameter is needed for turning the snow plough. If a design were determined by the above requirements many of the previously stated objectives would not be achieved. A compromise must be made between the ease of snow removal and the benefits of using more cul-

de-sacs and less loop roads. A cul-de-sac can be designed to provide an area where snow is piled off the pavement. This would eliminate the large turn-around for the snow plow. Loop roads when convenient should be used, but not excessively. Though a design using the ideas stated

above would require some private maintenance, it is justified by the benefits gained. The advantages of a lessened amount of pavement and a greater amount of privacy outweigh the disadvantages of partially inefficient snow removal.

The program includes two major land uses, residential and recreational. Residential land uses range from high-density garden apartments to low-density single-family detached housing. In addition to housing, adequate parking is provided for each unit, i.e., 3 parking stalls per single-family detached unit, 2.5 parking stalls per single-family attached unit, 2 parking stalls for each townhouse unit, and 1.5 parking stalls for each garden apartment.

Each single-family detached unit will be sited on a lot of one-fifth to one-quarter acre. Single-family attached units will be located in groupings of five to six units per acre. Both townhouses and garden apartments will be constructed as five to six attached two-story buildings. The townhouse will consist of both stories, while one story will constitute a garden apartment. Densities in these areas will range from eight to twelve units per acre.

The tennis courts, pools, recreation building and parking for the building will be located in a central area, accessible to all units by pedestrian, bike, horse and cross-country ski trails. The stable and corral will be located

on the perimeter of the site, but will be accessible by the trail system. Because of the steep slopes existing on the site, there is much land which necessarily remains open space. Linkages will be developed throughout the site, unifying the open space system.

A. Housing

1. Single Family Detached:
205 units - 1300-1600 S.F.
2. Single Family Attached:
75 units - 1300-1600 S.F.
3. Townhouses: 100 units -
900-1200 S.F.
4. Garden Apartment: 130 units
800-1000 S.F.

Total area of housing:
100 acres

B. Community Center

1. Tennis Courts (4)(60'x120')
Total area 7200 S.F.
2. Swimming Pool
 - a. wading area: 10 S.F. per person; 60'x30' - 1800 S.F.
 - b. swimming area: 24 S.F. per person; serve 1/4 population; 75'x60' - 4500 S.F.
 - c. diving area: 300 S.F. per person; 10' radius around diving board; 30'x15' - 450 S.F.
 - d. deck area: 100% of pool areas - 6750 S.F.

PROGRAM ANALYSIS

- Total area 13500 S.F.
3. Parking (30 stalls):
Total area 6000 S.F.
4. Recreation building:
Total area 1200-1500 S.F.
Total area of Community
Center: approximately
1 acre
- C. Stable and Corral
1. Stalls (24)(12'x10')
 2. Feed Storage (3)(12'x6')
 3. Tackroom (1)(12'x15')
4. Corral and Paddocks: 30'x30'
per horse (24)
Total area of Stable and
Corral: approximately
1/2 acre
- D. Circulation
1. Auto
 2. Pedestrian
 3. Horse
 4. Bike
 5. Cross-Country Ski

SITE INVENTORY/ANALYSIS

SITE ORIENTATION

Location: Bench area at base of
east side of Cache Valley

Size: 150 acres

Ownership: Privately owned

Zoning: R-1

Adjacent Land Use: North: low
density residential, agricul-
tural land; South: open range,
old agricultural fields;
East: Bear River Range, public
recreation, conservation areas;
West: recent SF housing develop-
ment

On Site Land Use: rangeland

Access: North-South: U.S. Highway
91; West: State Highway 89;
East: State Highway 89

Presently, direct access to
site is through River Heights. A
new access route should be dev-
eloped and the existing Dry
Canyon access road expanded to
accommodate increased traffic.

On Site Linkage: several dirt
roads, presently suitable for
four-wheel drive vehicles.

Utilities: There are no existing
utilities on the site which will
accommodate the proposed develop-

ment. Since there are few areas
on the site suitable for septic
tanks, sewer lines from Logan
would need to be extended and
expanded. Water and electric
lines must be provided for the
site, using underground cables.
Community Facilities:

LDS Church	1.11 miles
LDS Temple	1.51 miles
USU	1.60 miles
Fire Department	1.15 miles
Hospital	1.57 miles
Logan CBD	1.63 miles
Police	1.90 miles
HS	1.90 miles
ES	.30 miles
JHS	2.90 miles
Post Office	2.20 miles
Airport	3.50 miles
RR Station	2.80 miles
Public Library	1.51 miles
Bear Lake	1 hour
SLC	2 hours
Ogden	1 hour
Idaho	40 minutes

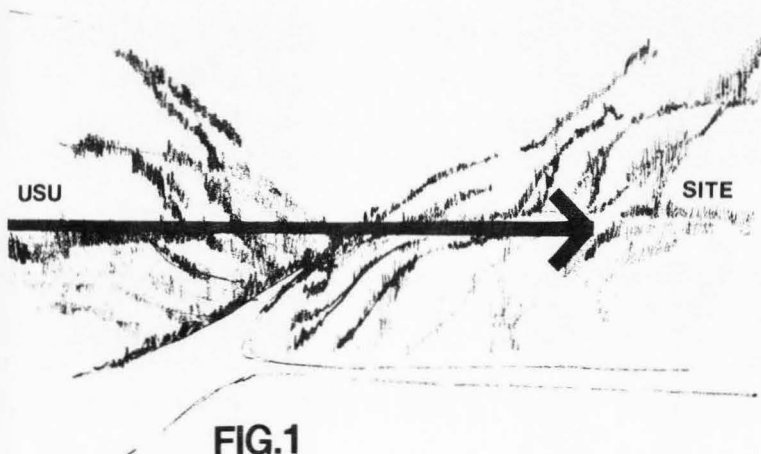
More study is needed to deter-
mine if any expansion is necessary
for facilities such as fire sta-
tions, schools, and the police
force.

SITE OPINION PAPER

The site is located on a bench area on the eastern edge of Cache Valley. The bench area, formed from the deposits of Lakes Provo and Bonneville, and consisting of gravel and clay silt, is one of a series which extend along the eastern length of Cache Valley. These areas present an ideal location for housing because of the suitability for construction and aesthetic value for the dweller. Development can already be seen in some bench

areas of Cache Valley as well as those of Ogden and Salt Lake City. A brief survey of these areas points out the need for well-planned construction due to the high visibility of these benches.

The site can be seen entirely from the Utah State University campus (Fig. 1). From the periphery roads, the site is less visible due to the steep scarps edging it (Fig. 2). As one moves further from the site at the level of the valley floor, more portions of the site are visible, until the entire site can be seen from approximately four miles west of the bench.



The emphasis with respect to visual amenities must be placed on how the development is seen from off the site rather than from within the site. Because of the location of the bench, each unit can be provided with unobstructed views of Cache Valley and the Bear River Mountain Range. One of the principal concerns of a housing design should be to minimize the visual impact of any development on the rest of the valley. Structures should be placed as far back from the edge of the bench as feasible and the architecture of the buildings should mirror the forms of the mountains (Fig. 3).

The site provides varied terrain from flat areas to gently rolling hills. The majority of the area is suitable for non-vehicular travel so a network of bike trails, pedestrian trails, and horse trails would be appropriate. The varied terrain also provides natural boundaries for the varied functions which are included in the program (Fig. 4).

Though problems exist for construction on the site, it remains highly feasible for development. The retention of open space and minimal visual impact should be important considerations in any design.



FIG. 2

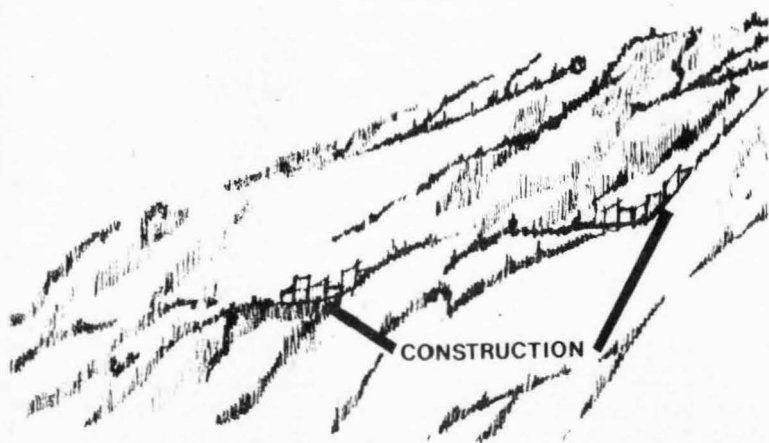


FIG. 3

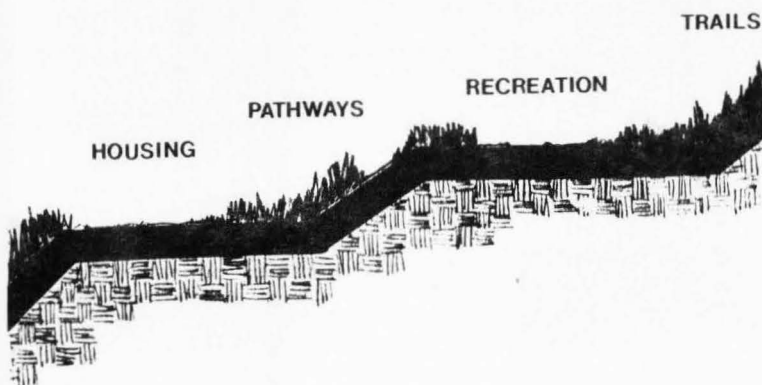


FIG. 4

SOILS

There are eight soil classifications on site, ranging from very rocky soil on 30-60 percent slopes to lacustrine deposits on 0-3 percent slopes. The development potential varies greatly throughout the site, but is generally best on areas where the slope is less than 10 percent.

1. Rt - Rough Broken Land: Soil instability is the most prominent characteristic of these areas. Due to rapid runoff and steep slopes (30-60 percent), these areas are very susceptible to erosion. Slippage is also a common occurrence. The soils are well drained and the surface layers consist of loam or silt loam.
2. SwF₂ - Sterling Gravelly Loam: This soil occurs on slopes of 20-50 percent and is characterized by alluvium and lacustrine deposits. It is excessively well drained and has a very gravelly sandy loam subsoil. Surface layer is from 10" to 15" and mildly alkaline. Subsurface layers are strongly alkaline. There exists a severe erosion hazard due to rapid permeability, steep slope, and rapid runoff. As topsoil and roadfill, this soil is fair to 16" and good below 16".
3. HhE₂ - Hillfield Silt Loam: These areas are composed on lacustrine deposits on 10 to 30 percent slopes. The mildly alkaline surface layer is 8" thick. A lime horizon occurs at 7-12". These soils occur on rolling, short, west-facing slopes. Runoff is fairly rapid, the soil is moderately wooded. HhE₂ can be used effectively as topsoil and roadfill, but provides a poor filter field for septic tanks.
4. Swd - Sterling Gravelly Loam: This soil is very similar to SwF₂, except it occurs on 10 to 20 percent slopes and has a surface layer of 16". The surface layers are mildly alkaline, and the subsurface strongly alkaline. Permeability is rapid, runoff is medium, and a moderate erosion hazard exists.
5. SvC - Steed Gravelly Loam: This soil group is composed of the alluvial fan at the mouth of Dry Canyon. The surface is mildly alkaline gravelly loam and very gravelly sandy loam, 17" thick. The subsurface layer is very gravelly loam about 60" thick. The soil is excessively drained with medium

runoff and a moderate erosion hazard. As topsoil or roadfill this soil is good to 18".

6. TmB - Timpanogos Silt Loam:

These soils occurring on 3 to 6 percent lend themselves best to development. It is a fairly well-drained lacustrine deposit. The surface layer, 7" to 10", is mildly alkaline. Water runoff is slow, permeability is slow, water capacity is moderate, and the erosion hazard is slight. The soil can be used for both topsoil and roadfill.

7. PIB - Parlo Silt Loam: This soil is formed for lacustrine deposits, having a mildly alkaline silt loam, 11" surface. The subsurface varies between a

calcareous, gravelly soil to a loamy sand up to 60" thick. The soil is well-drained, moderately permeable, of a slow runoff, and minimal erosion hazard. It is suitable as topsoil to 30" and good for roadfill below 30".

8. RhA - Rick's Gravelly Loam:

Occurring on 0-3 percent slopes, this soil is well-drained with moderately rapid permeability and slow runoff. The surface soil is 15" to 30" thick, mildly alkaline gravelly soil over a 60" subsurface of very gravelly sand. The soil is composed of alluvium and stream delta sediments. To 18", ThA is suitable for topsoil and below 18" it is suitable for roadfill.

SOIL CAPABILITY

	SLOPE %	EROSION HAZARD	RUN - OFF	SHRINK SWELL	FOUNDATION	SEPTIC TANK
Rt	30 - 60	severe	rapid	—	—	—
SwF₂	20 - 50	sev.	rap.	low	sev.	sev.
HhE₂	10 - 30	moderate	medium	low	mod.	sev.
Swd	10 - 20	mod.	med.	low	sev.	sev.
Svc	6 - 10	mod.	med.	low	mod.	mod.
Tmb	3 - 6	mod.	med.	mod.	mod	mod.



GEOLOGY/ TOPOGRAPHY

The site is located on a bench between the entrances to Logan Canyon and Dry Canyon. The bench was formed by Lake Bonneville deposits.

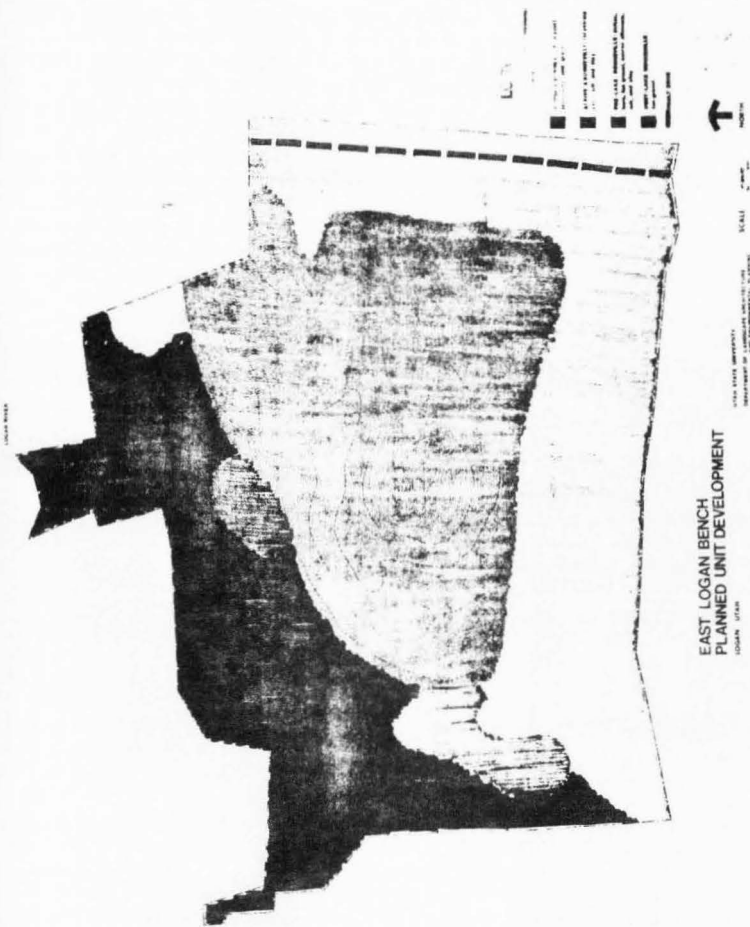
The Alpine and Bonneville deposits are undifferentiated, though the Alpine deposits are the older of the two. Alpine deposits extend to an altitude of about 5100' and the Bonneville to 5135'. Both deposits vary from 50 to 100 feet thick.

The Pre-Lake Bonneville deposits occur in the foothills along the east side of Cache Valley. Post-Lake Bonneville deposits also

consist of fan gravel along the mountain fronts. Paleozoic rocks consist of sandstone, limestone, and dolomite.

Alpine and Bonneville deposits and the Pre-Bonneville deposits have a depth to water table of 100'. Depth to water table in other areas has not been determined.

The most prominent geologic feature on the site is the Wasatch Fault which extends north to south along the western boundary of the site. Structures must be designed to withstand possible tremors and cut and fill should be minimized on the site to avoid any unstable land masses. The other geologic formations on the site do not place any limitations on development.



SLOPE

The percent of slope ranges between 2 percent to 100 percent on the site. Four divisions of percent of slope are used to show the general slope pattern of the site.

1. 2% - 5%: flat, suitable for construction
2. 5% - 10%: easy grade, suitable for construction
3. 10% - 25%: steep, feasible for construction
4. 25%+: very steep, unfeasible for development because of erosion hazard¹³



VEGETATION

The middle plant association occurs along drainage swales, where the soil is drier than along the canals, but can support larger species than the rest of the site.

Middle Association

Juniperus utahensis: Utah Juniper

Acer glabrum: Rocky Mountain Maple

Acer grandidentatum: Bigtooth Maple

Amelanchier alnifolia: Saskatoon Serviceberry

The most prominent vegetation on the site exists along the canal.

Canal Association

Acer grandidentatum: Bigtooth Maple

Acer glabrum: Rocky Mountain Maple

Acer negundo: Box Elder

Populus alba pyramidalis: Bolleana Poplar

Populus nigra: Lombardy Poplar

Populus angustifolia: Cottonwood

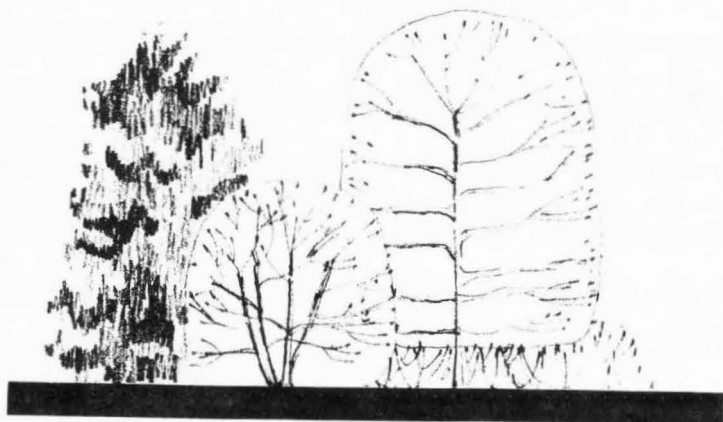
Elaeagnus angustifolia: Russian Olive

Juniperus utahensis: Utah Juniper

Prunus virginiana: Chokecherry

Crataegus pedicellata: Thicket Hawthorne

Sambucus pubens: Red Elderberry

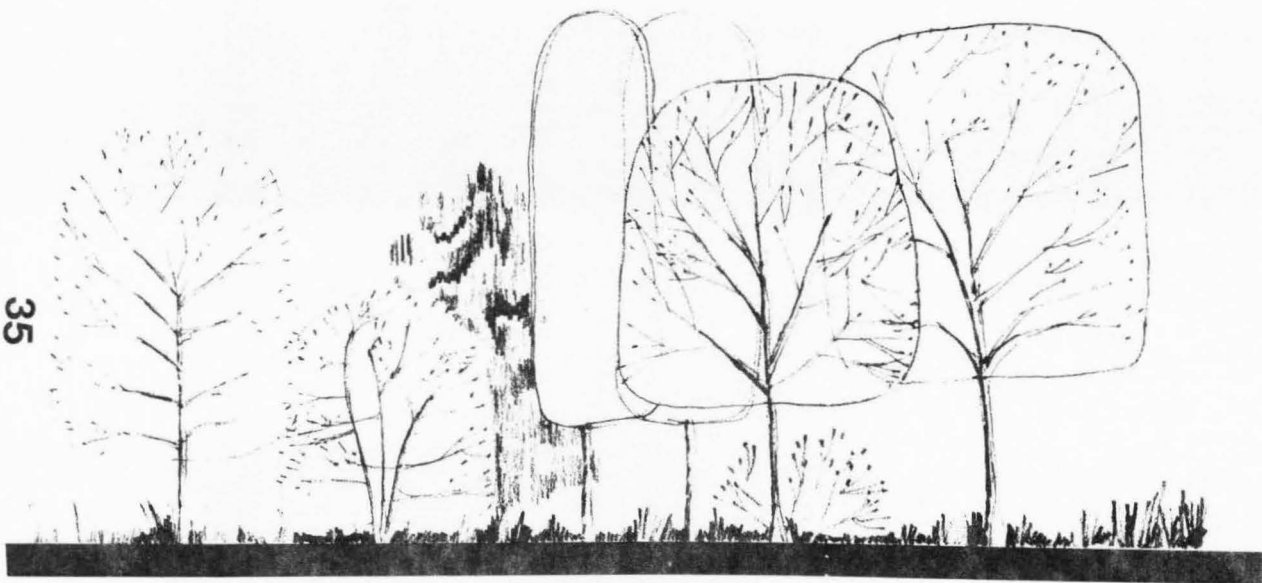


UTAH JUNIPER

MAPLES

SERVICEBERRY

MIDDLE ASSOCIATION



MAPLES

UTAH JUNIPER

POPLARS

BOX ELDER

COTTONWOOD

CANAL ASSOCIATION

North Slope Association -- The north slope association occurs on the steeper north-facing slopes of the site. There are no trees, only low shrubs and grasses.

Mahonia repens: Creeping Mahonia

Rosa woodsii: Wild Rose

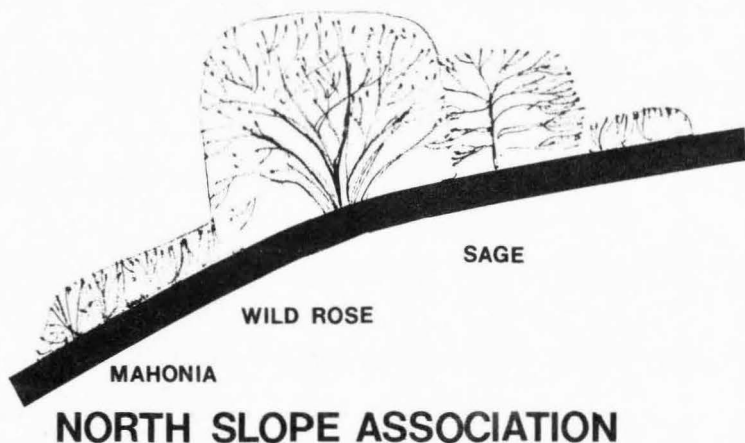
Artemisia tridentata: Sage

Sage Association -- The sage association occurs on most of the site. It provides ground cover consisting of sage and grasses.

Old Agriculture -- The old agricultural areas are similar in

appearance to the areas of the sage association. The two areas differ slightly in vegetation, the agricultural land supporting some previously grown alfalfa and wheat, interspersed with sage and grasses.

Since the amount of existing vegetation on the site is small, as much vegetation as possible should be retained, particularly the dense growth along the canal corridor. In a final master plan, additional planting will be used to enhance existing vegetation.





CLIMATE

Annual Rainfall: 16" - 20"

Annual Snowfall: 60" - 80"

Days with Temperature below 0

degrees: 6 - 12

Days with Temperatures below 32

degrees: 35 - 40

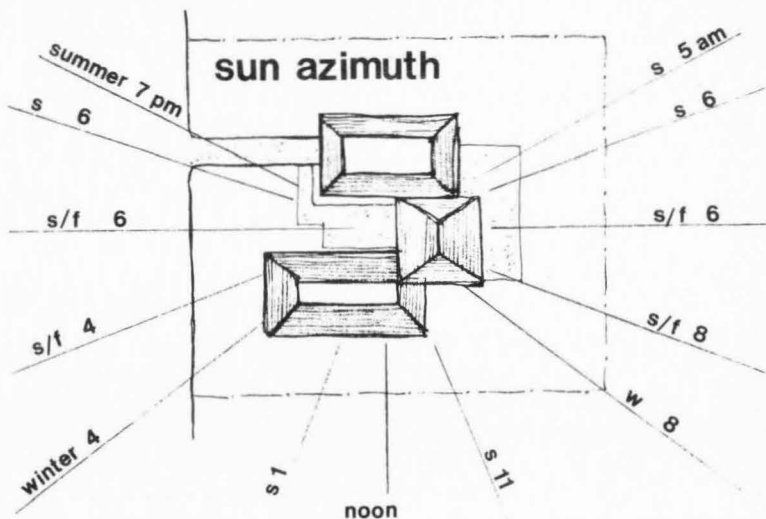
Frost-Free Days: 120 - 160

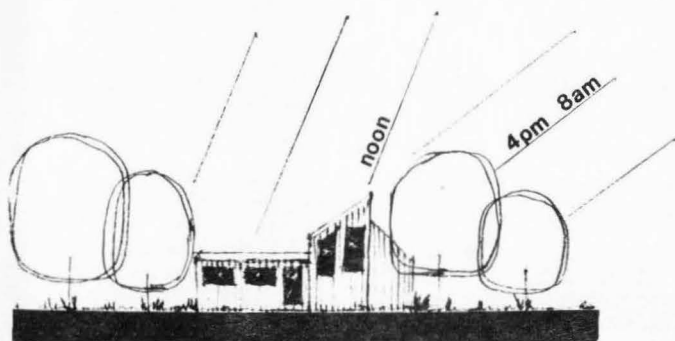
Average Summer Temperature Range:

60 - 70 degrees

Due to low temperatures in the winter, construction of housing and roads should be limited

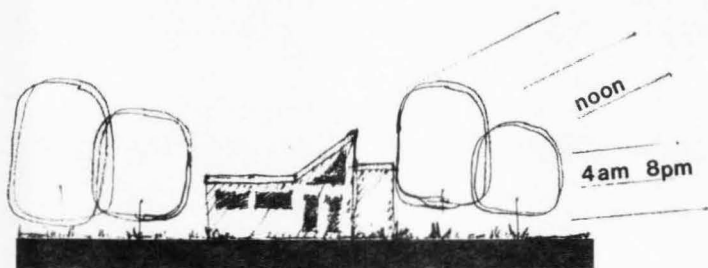
on north-facing slopes. Roads should be constructed along south-facing slopes to ease snow removal. Houses constructed on south, southeast and southwest facing slopes will be able to minimize energy consumption for heating during the winter. For these structures adequate planting must be provided for shade to counteract the heat in these areas during the summer months.





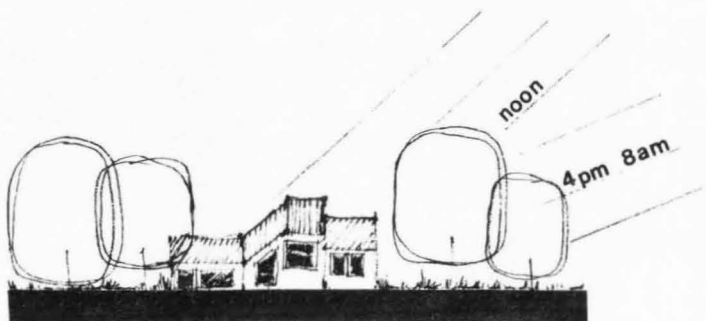
SUMMER SOLSTICE

SUN ALTITUDE



WINTER SOLSTICE

SUN ALTITUDE



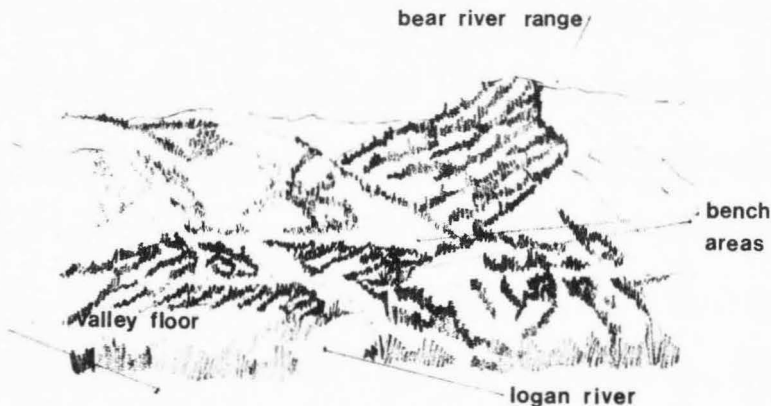
VERNAL & AUTUMAL EQUINOX SUN ALTITUDE

VISUAL

The site varies from being totally visible to only partially visible. When viewed from the USU campus, the entire site can be seen, demanding emphasis on the design of structures and their relationship to each other as well as their placement on the site. As the viewer descends in elevation, less of the site is visible. The edge of the bench can be seen from Route 89, the remainder of the site being screened by the steepness of the scarp bordering it. From Canyon

Road, along Logan River, the entire site is hidden from view.

This fluctuation of visibility occurs within the site as well as off the site. From a point approximately in the center of the site only the outer edges of the bench can be seen to the west and south. The steep slopes to the east are also visible. The north bench area provides a view of the steep slope in the center of the site and the northern half of the bench. The southern bench area provides a similar view, that of the steep slopes and southern bench area.



VIEW EAST TO SITE

bear river range

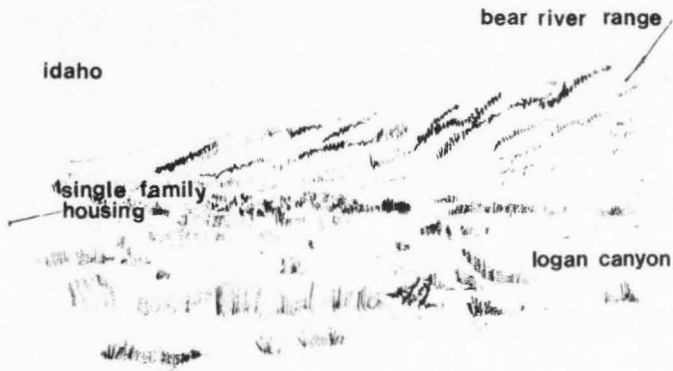
agricultural land

VIEW SOUTH TO SITE

wellsville range

logan
city

VIEW WEST TO SITE



VIEW NORTH TO SITE

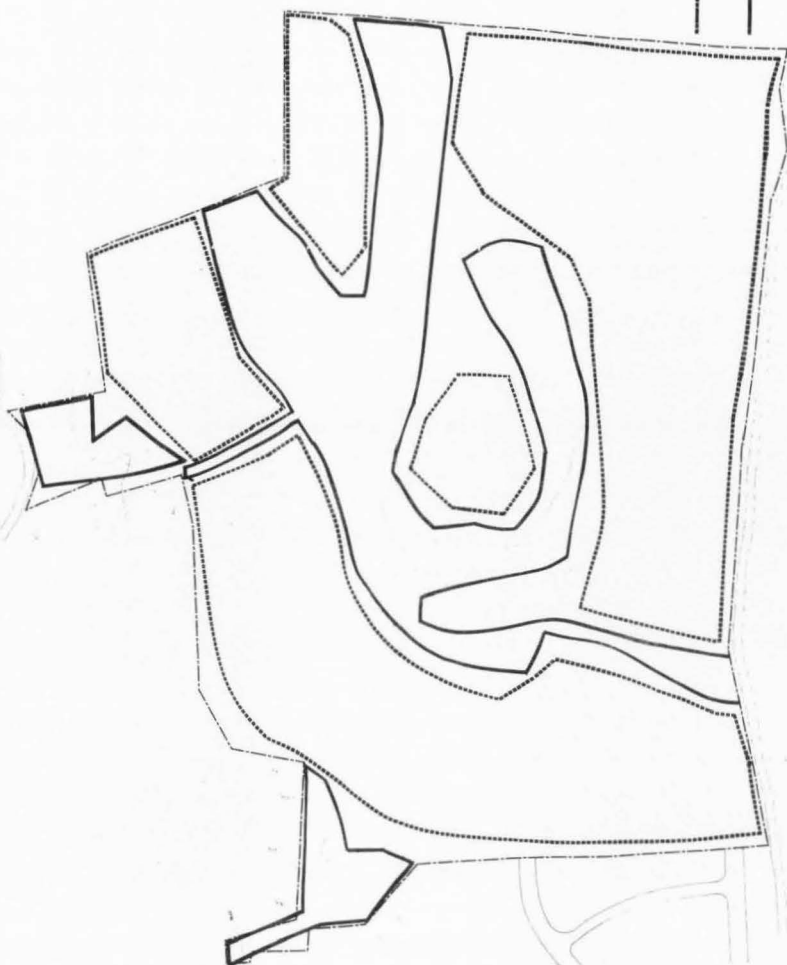
The variety of landforms provide opportunities for screening development and lowering the visual impact of the development from Canyon Road and within the site. Development would be well placed along the inside of the bench and the plateau area in the center of the site, if other conditions are acceptable.



COMPOSITE SITE ANALYSIS

The site has been divided into areas of moderate and severe limitations for development. Most areas suitable for development in respect to physical characteristics are limited by visual impact considerations, explaining why there are no highly suitable areas for construction. The specific limitations of each area are listed on the site inventory map.

LOGAN RIVER



EAST LOGAN BENCH
PLANNED UNIT DEVELOPMENT

STATE SITE INVENTORY
DEPARTMENT OF LAND, AIR, AND ENVIRONMENTAL PLANNING

UTAH STATE UNIVERSITY
DEPARTMENT OF LAND, AIR, AND ENVIRONMENTAL PLANNING



NORTH

SCALE 0 200

PUD MASTER PLAN

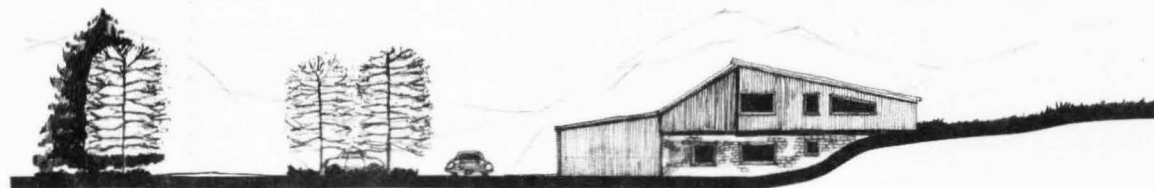
collector
street

visitor
parking

access
road

covered
parking

townhouse
units



garden
apartments

covered
parking

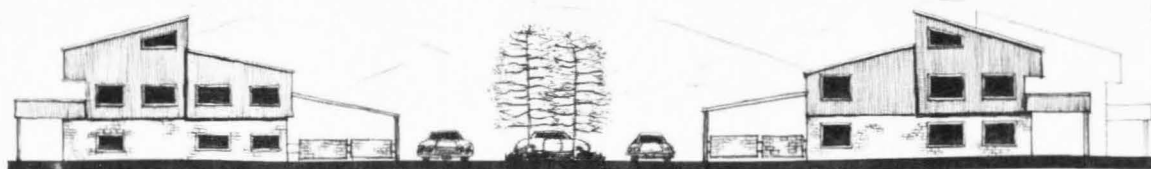
loop
road

visitor
parking

loop
road

covered
parking

garden
apartments



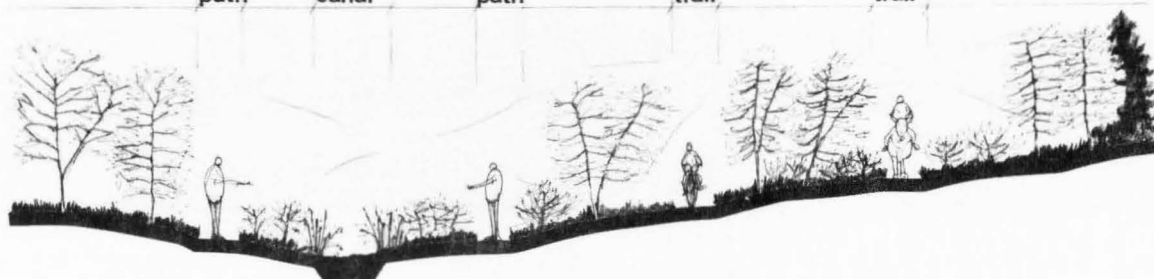
pedestrian
path

canal

pedestrian
path

bike
trail

horse
trail



townhouse

loop
road

20' wide
no parking
either side

collector
street

30' wide
no parking
either side

loop
road

single family
attached

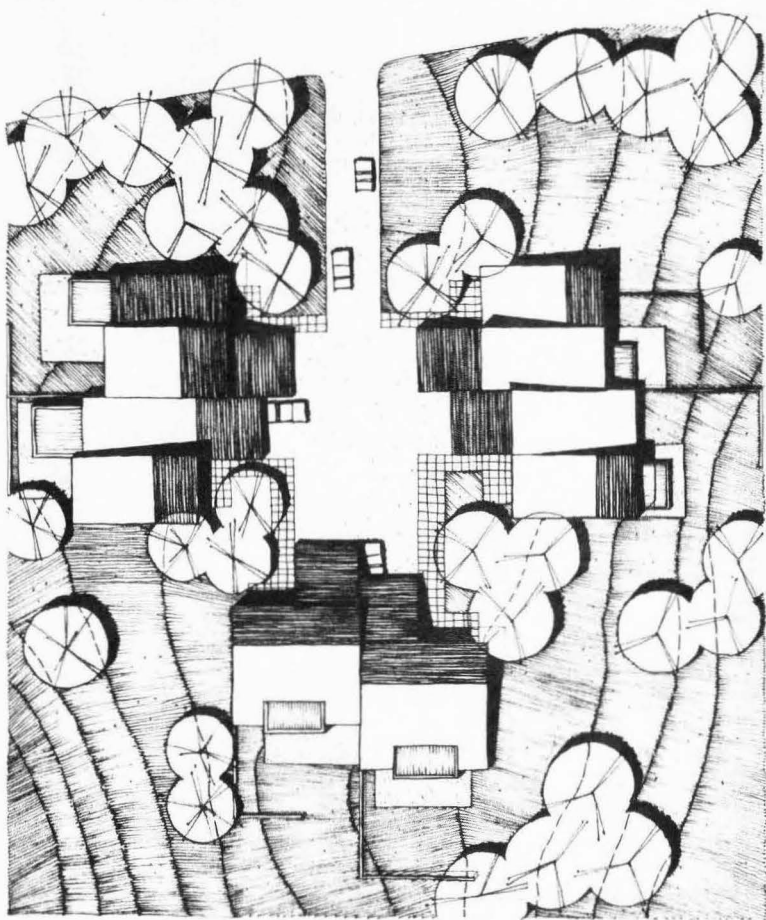
cul-de-
sac

18' wide
parking
one side

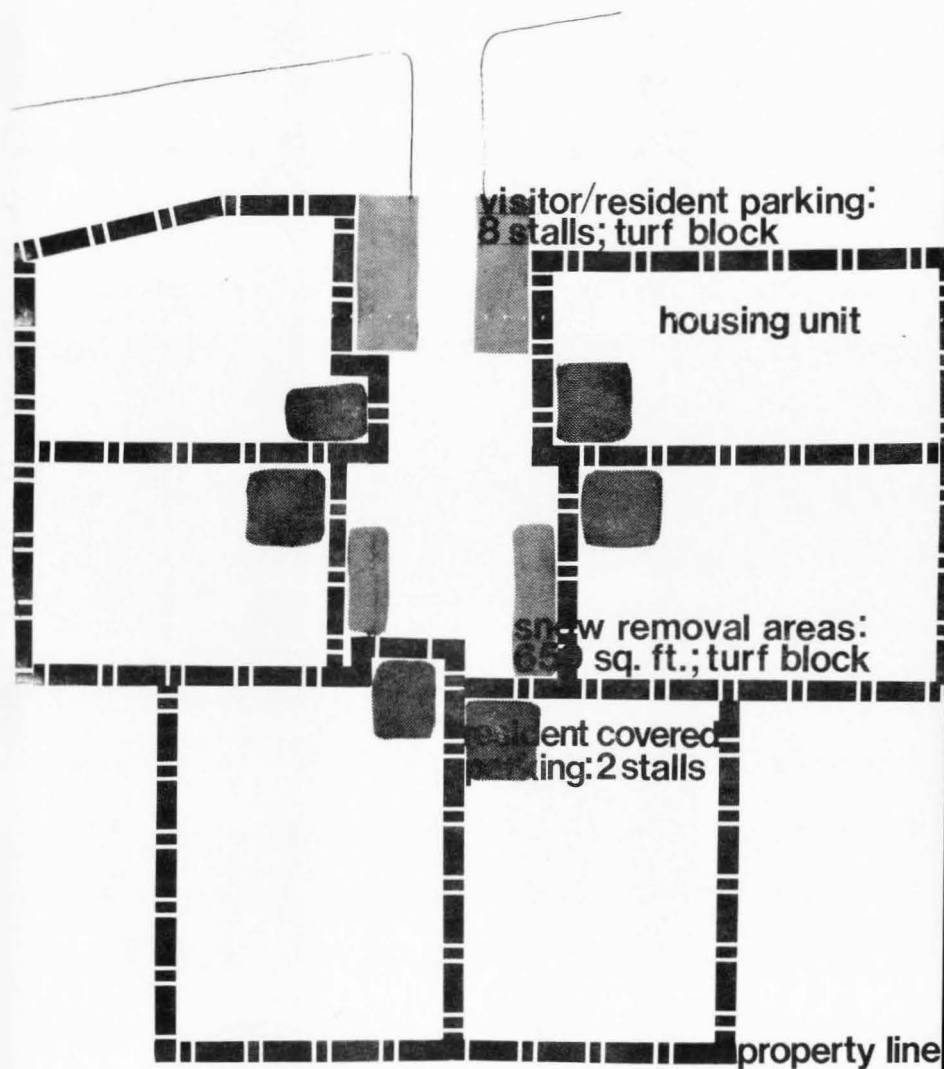
single family
detached



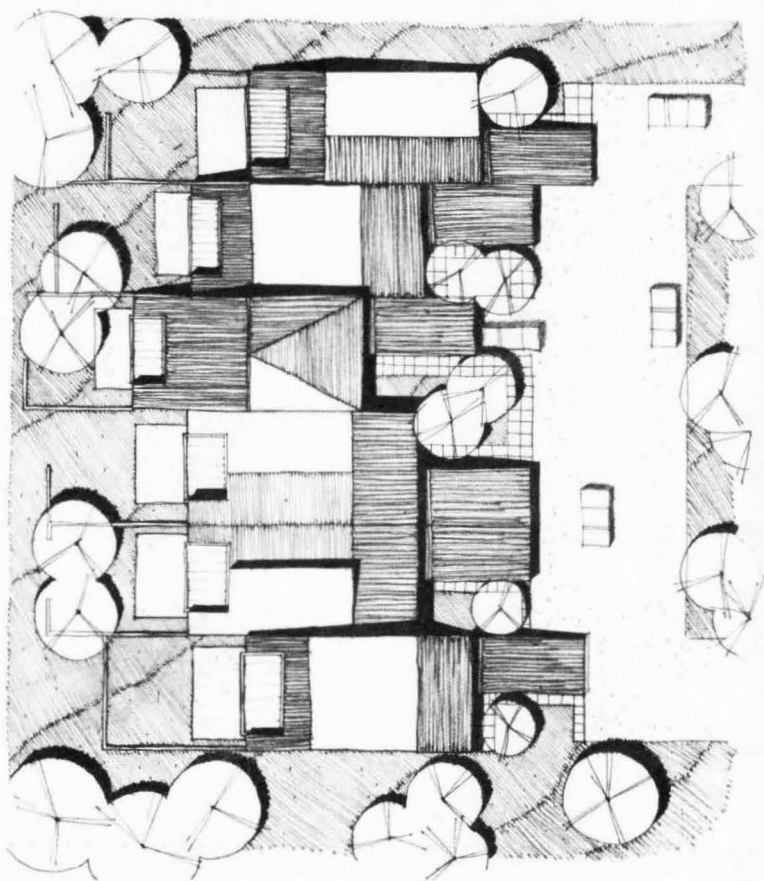
SINGLE FAMILY ATTACHED UNITS



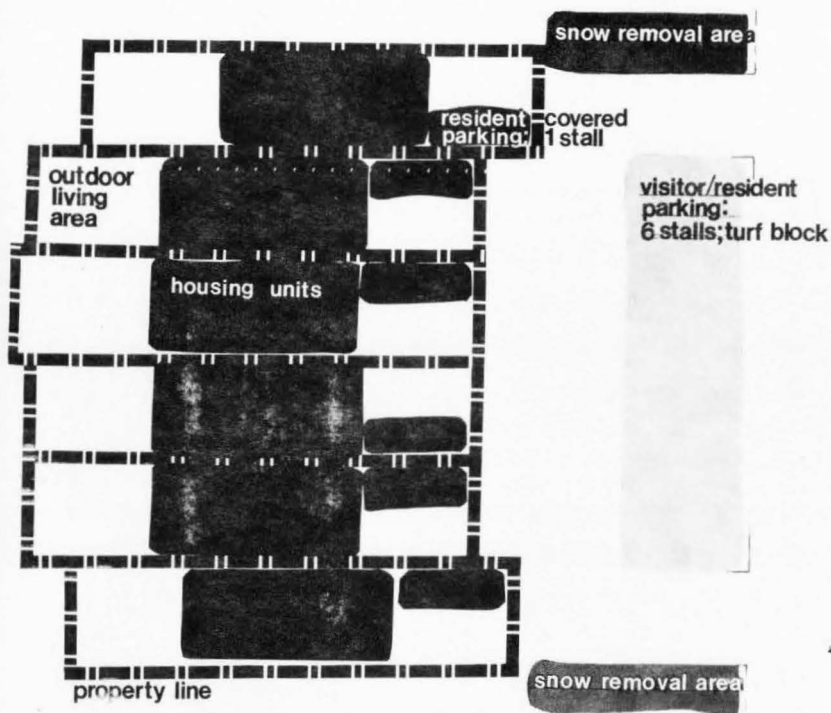
SINGLE FAMILY ATTACHED UNITS (TYPICAL)

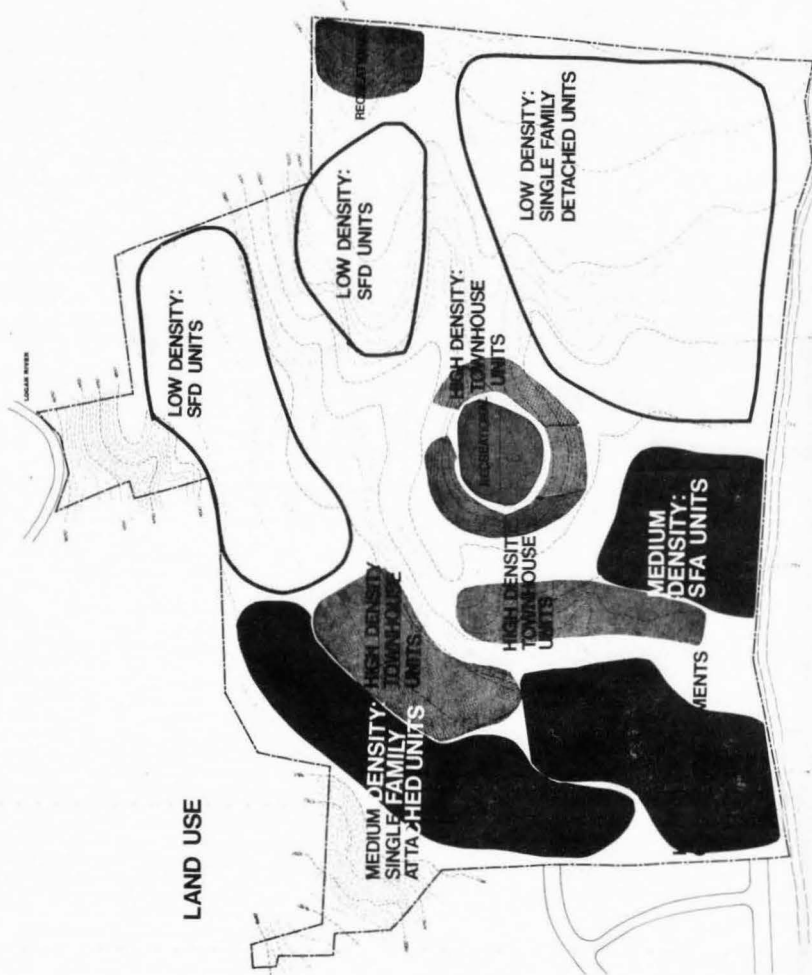


TOWNHOUSE UNITS



TOWNHOUSE UNITS (TYPICAL)



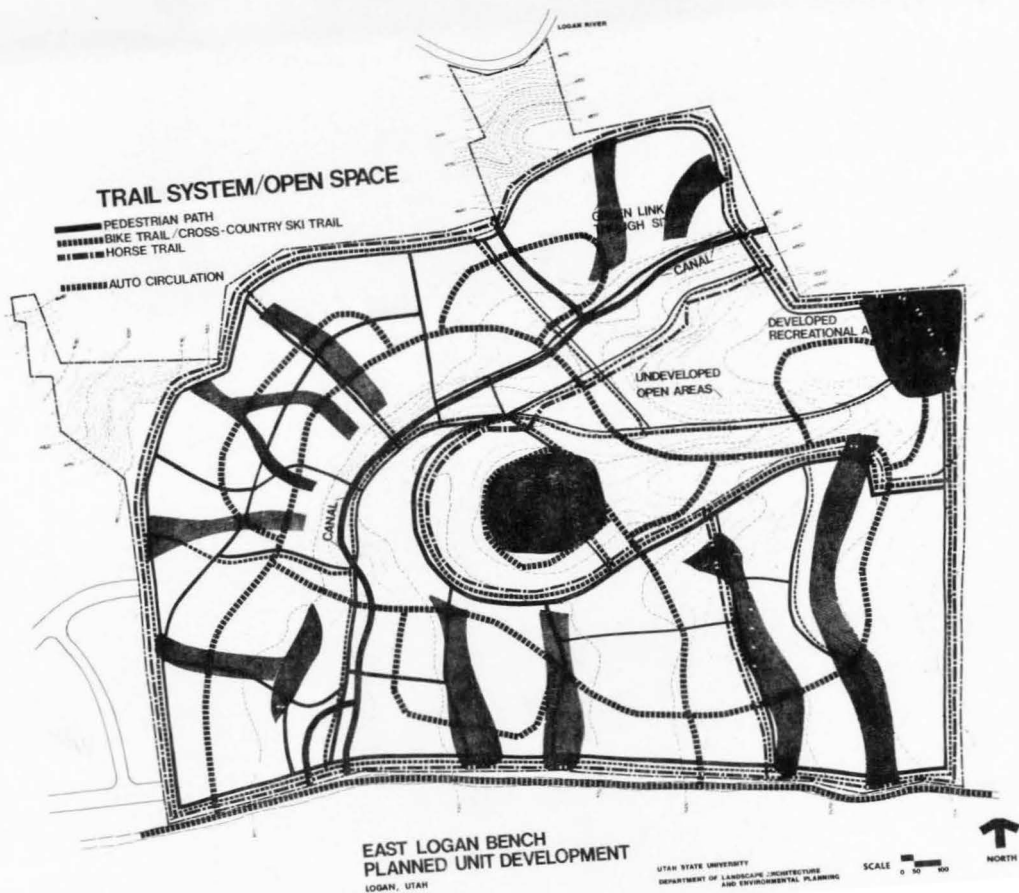


**EAST LOGAN BENCH
PLANNED UNIT DEVELOPMENT**
LOGAN, UTAH

UTAH STATE UNIVERSITY
LANDSCAPE ARCHITECTURE
DEPARTMENT OF LAND ENVIRONMENTAL PLANNING

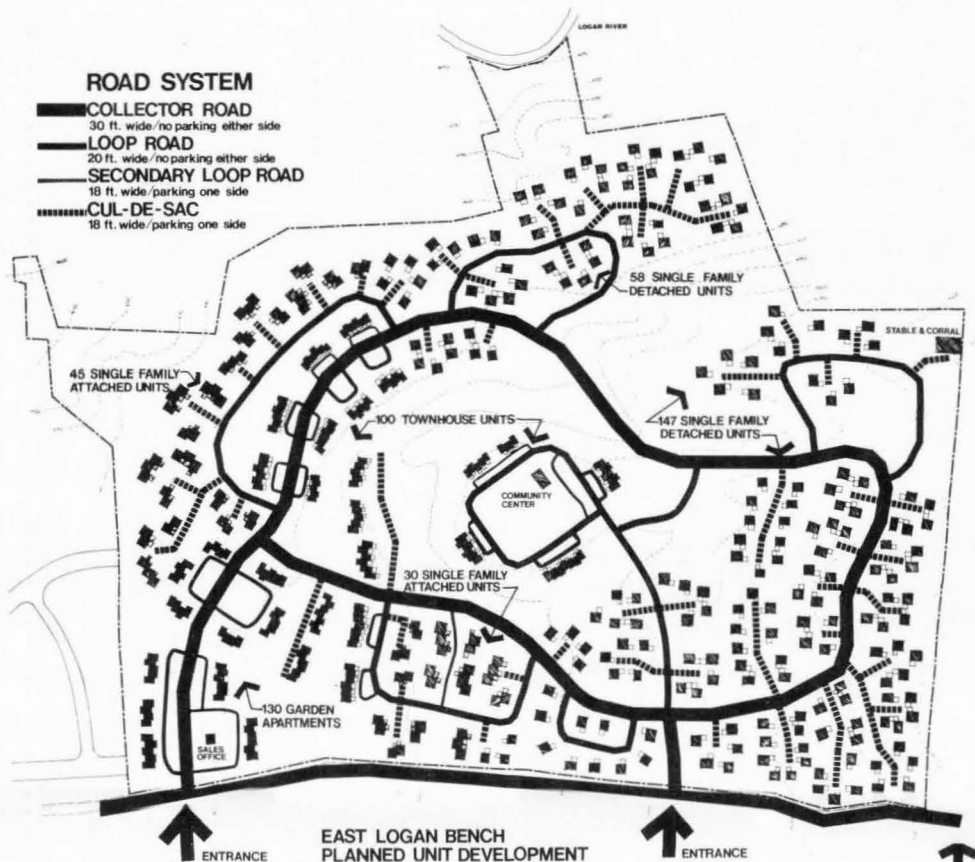
SCALE 1" = 20'

NORTH



ROAD SYSTEM

- COLLECTOR ROAD**
30 ft. wide/no parking either side
- LOOP ROAD**
20 ft. wide/no parking either side
- SECONDARY LOOP ROAD**
18 ft. wide/parking one side
- CUL-DE-SAC**
18 ft. wide/parking one side



**EAST LOGAN BENCH
PLANNED UNIT DEVELOPMENT**
LOGAN, UTAH

UTAH STATE UNIVERSITY
DEPARTMENT OF LANDSCAPE ARCHITECTURE

SCALE 1" = 100'
NORTH



MASTER PLAN

EAST LOGAN BENCH
PLANNED UNIT DEVELOPMENT
LOGAN, UTAH

UTAH STATE UNIVERSITY
DEPARTMENT OF LANDSCAPE ARCHITECTURE
AND ENVIRONMENTAL PLANNING

SCALE 0 100 200
FEET



FOOTNOTES

¹Urban Land Institute, New Approaches to Residential Land Development, TB #40, p. 9.

²Huntoon, A Better Way for the Suburbs, p. 51.

³Huntoon, p. 65.

⁴Norcross, Open Space Communities in the Market Place, p. 6.

⁵Huntoon, p. 69.

⁶Urban Land Institute, TB #40, p. 29.

⁷Huntoon, p. 13.

⁸Urban Land Institute, The Homes Association Handbook, TB #50, p. 71.

⁹Wolffe, New Zoning Landmarks in Planned Unit Development, p. 12.

¹⁰Wolffe, New Zoning Landmarks in Planned Unit Development, pp. 12-14.

¹¹Huntoon, p. 13.

¹²Norcross, p. 70.

¹³Lynch, Kevin, Site Planning, p. 56.

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- Wolffe, Lenard L. New Zoning Landmarks in Planned Unit Development. Technical Bulletin No. 62. Urban Land Institute, Washington, D. C., 1968.

Master's Thesis:

A Study of the Planned Unit Development and Its Application to a Site in
Cache Valley

Department of Landscape Architecture and Environmental Planning
Utah State University
Logan, Utah
October 1976

Committee:

Craig Johnson (Chairman)
Jerry Fuhriman
Vern J. Budge

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Margaret Ann Mullins

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