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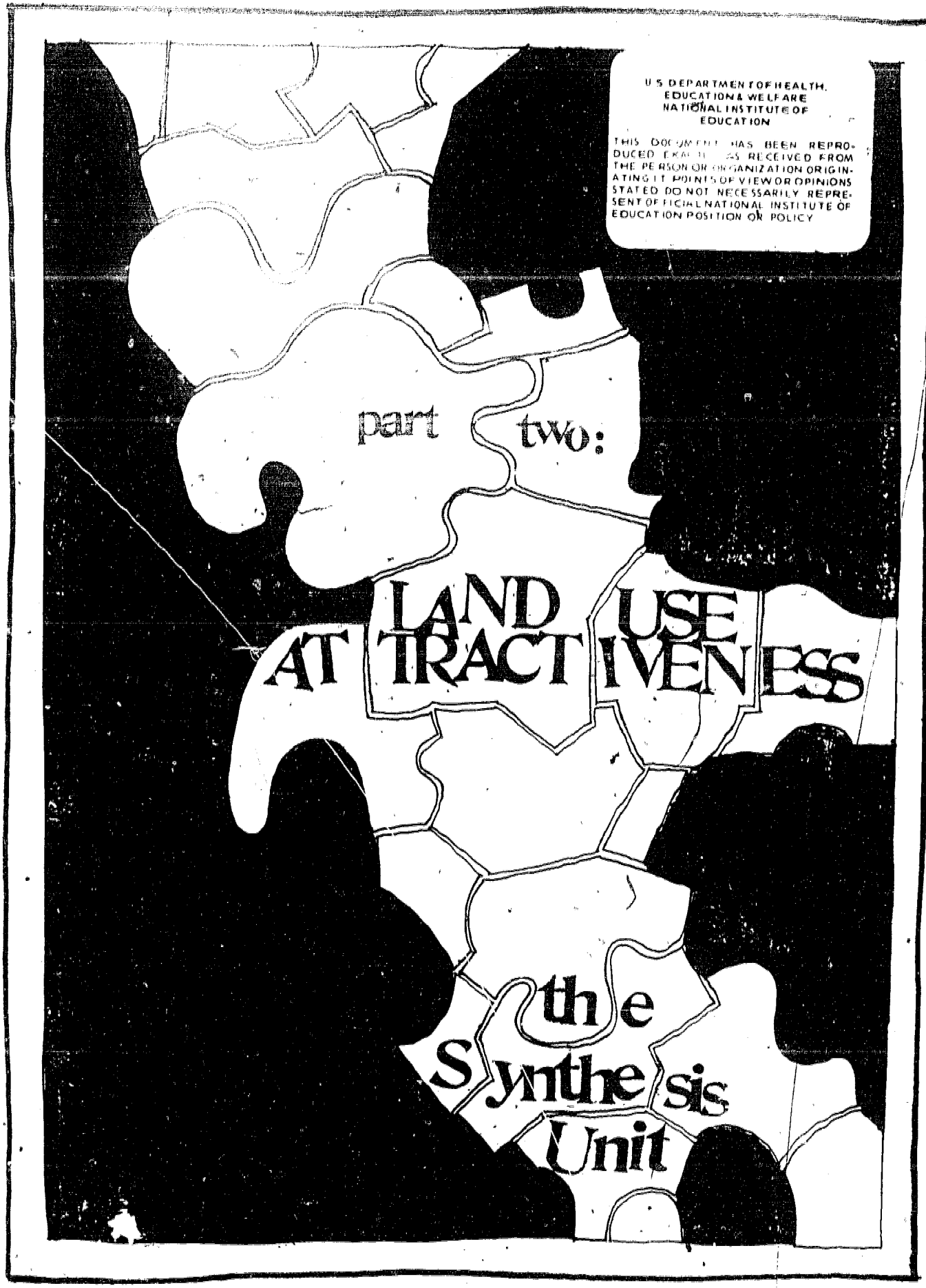
ABSTRACT

This material includes student guide sheets, reference material, and tape script for the audio-tutorial unit on the Synthesis Unit, Land Use Attractiveness. An audiotape is used with the materials. The material is designed for use with Connecticut schools, but can be adapted to other localities; The unit is designed to build on skills and information obtained from previous units. This unit emphasizes the development of a land use allocation map based on information on buildability and land use attractiveness. Buildability emphasizes where development should not be; this unit emphasizes where specific land uses should be. (RH)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part two:
LAND USE ATTRACTIVENESS
the Synthesis Unit

# SYNTHESIS: PART II

# LAND USE

# ATTRACTIVENESS

written
and
illustrated
by

ROB PRESSMAN

GUIDE SHEET # 1

## SYNTHESIS PART II: LAND USE ATTRACTIVENESS

### OBJECTIVES

IN ALL COMMUNITIES, THERE ARE AREAS WHERE BUILDING CAN TAKE PLACE WITH MINIMAL ENVIRONMENTAL IMPACT. BUT IN ADDITION TO THIS INFORMATION ON BUILDABILITY, WE MUST ALSO CONSIDER SUCH FACTORS AS ACCESS TO ROADWAYS, PROXIMITY TO COMPATIBLE AND NON-COMPATIBLE LAND USES AND SPECIAL SITE CHARACTERISTICS. ALL OF THESE FACTORS HAVE A BEARING UPON THE ATTRACTIVENESS OF A PARTICULAR AREA FOR A SPECIFIC LAND USE.

THIS PART OF THE SYNTHESIS UNIT WILL DEAL WITH LAND USE ATTRACTIVENESS. AT THE CONCLUSION OF THE UNIT, INFORMATION ON BUILDABILITY AND LAND USE ATTRACTIVENESS WILL BE INTEGRATED TO PRODUCE A LAND USE ALLOCATION MAP.

AT THE CONCLUSION OF THIS PART OF THE SYNTHESIS UNIT, YOU SHOULD BE ABLE TO:

1. ORGANIZE LAND USE ATTRACTIVENESS INFORMATION ON SINGLE FACTOR OVERLAY MAPS.
2. CONSTRUCT COMPOSITE LAND USE ATTRACTIVENESS MAPS USING THE OVERLAY TECHNIQUE.
3. PROPOSE REASONS FOR BUILDING CLUSTER HOUSING OR A CONVENTIONAL GRIDIRON SUBDIVISION ON A GIVEN SITE AND DEFEND YOUR DECISION.
4. COMPARE AND CONTRAST THE LAND USE ATTRACTIVENESS REQUIREMENTS OF LOCAL AND REGIONAL RECREATIONAL AND OPEN SPACE AREAS.
5. DESCRIBE THE LAND USE ATTRACTIVENESS REQUIREMENTS FOR SINGLE FAMILY AND MULTI-FAMILY HOUSING; COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL USES; CONSERVATION, OPEN SPACE AND RECREATIONAL AREAS; AND SANITARY LANDFILL.
6. CONSTRUCT LAND USE ATTRACTIVENESS MAPS FOR HOUSING - SINGLE AND MULTI-FAMILY; COMMERCIAL AND INDUSTRIAL AND INSTITUTIONAL USES; CONSERVATION, OPEN SPACE, AND RECREATIONAL AREAS; AND SANITARY LANDFILLS.
7. SYNTHESIZE DATA ON BUILDABILITY AND LAND USE ATTRACTIVENESS TO PRODUCE A PLAN FOR USE ALLOCATION.
8. ANALYZE THE COSTS AND BENEFITS TO A NEIGHBORHOOD AND COMMUNITY OF SINGLE FAMILY CONVENTIONAL, SINGLE-FAMILY CLUSTERED, TOWNHOUSE CLUSTERED, WALK UP APARTMENTS, HIGH RISE APARTMENTS AND MIXED HOUSING IN TERMS OF CAPITAL COSTS, OPERATION AND MAINTENANCE COSTS; ENVIRONMENTAL COSTS AND PERSONAL COSTS.
9. ANALYZE THE ECONOMIC COSTS TO A COMMUNITY OF LOW DENSITY SPRAWL, COMBINATION MIXED HOUSING AND HIGH DENSITY PLANNED DEVELOPMENTS IN TERMS OF CAPITAL COSTS, OPERATION AND MAINTENANCE COSTS; AIR AND WATER POLLUTION, ENERGY CONSUMPTION AND WATER CONSUMPTION.
10. SYNTHESIZE BUILDABILITY AND ATTRACTIVENESS DATA FOR SITES IN YOUR COMMUNITY AND DETERMINE HOW LAND USE ALLOCATIONS SHOULD BE MADE BASED UPON THE SYNTHESIS PROCESS.

BE A RECYCLER YOURSELF. WRITE YOUR COMMENTS, NOTES AND ANSWERS ON SCRAP PAPER INSTEAD OF THESE GUIDE SHEETS. IN THIS WAY, THESE GUIDE SHEETS WILL BE AVAILABLE FOR THE NEXT PERSON IN YOUR COMMUNITY WHO WILL BE MAKING USE OF THIS UNIT.

* * * * * * * * * * * * * * * * * * * * * * * * * * * * *

*Written and Illustrated by:* ROB PRESSMAN
*Landscape Architect*

*Edited by:* HARRY HAAKONSEN
LARRY SCHAEFER

*Graphics Consultant:* ANDY MERRIELL

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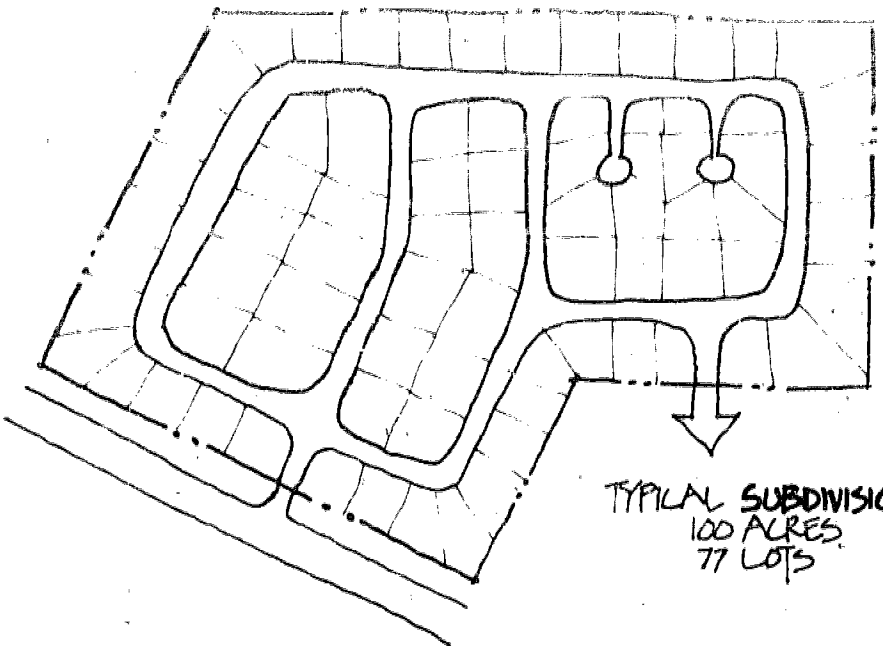
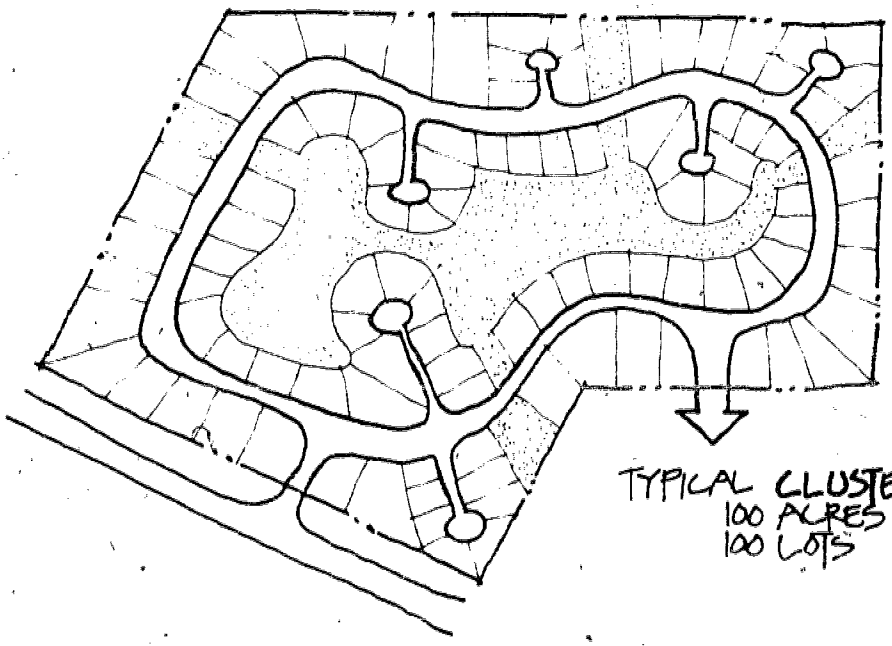
# Cluster vs. Subdivision



TYPICAL **SUBDIVISION** LAYOUT
100 ACRES
77 LOTS



TYPICAL **CLUSTER** LAYOUT
100 ACRES
100 LOTS

2

# GUIDE SHEET #3

CLUSTER: COMMONLY DEFINED AS THE REDUCTION IN SIZE OF THE INDIVIDUAL HOUSE LOTS IN A SUBDIVISION, AND THE COMBINING OF THE CONSERVED LAND INTO SHARED OPEN SPACE FOR AESTHETIC AFFECT, ENVIRONMENTAL PRESERVATION AND RECREATION.

CONVENTIONAL VS. CLUSTER DESIGN*

| CONVENTIONAL | | CLUSTER |
|---|---|---|
| 32 | ACRES IN STREETS | 24 |
| 22,500 | LINEAR FEET OF STREETS | 16,055 |
| 29 | PER CENT OF SITE IN STREETS | 19 |
| 80 | ACRES IN BUILDINGS | 41 |
| 590 | DWELLING UNITS | 604 |
| 0 | ACRES OF USABLE OPEN SPACE | 51 |

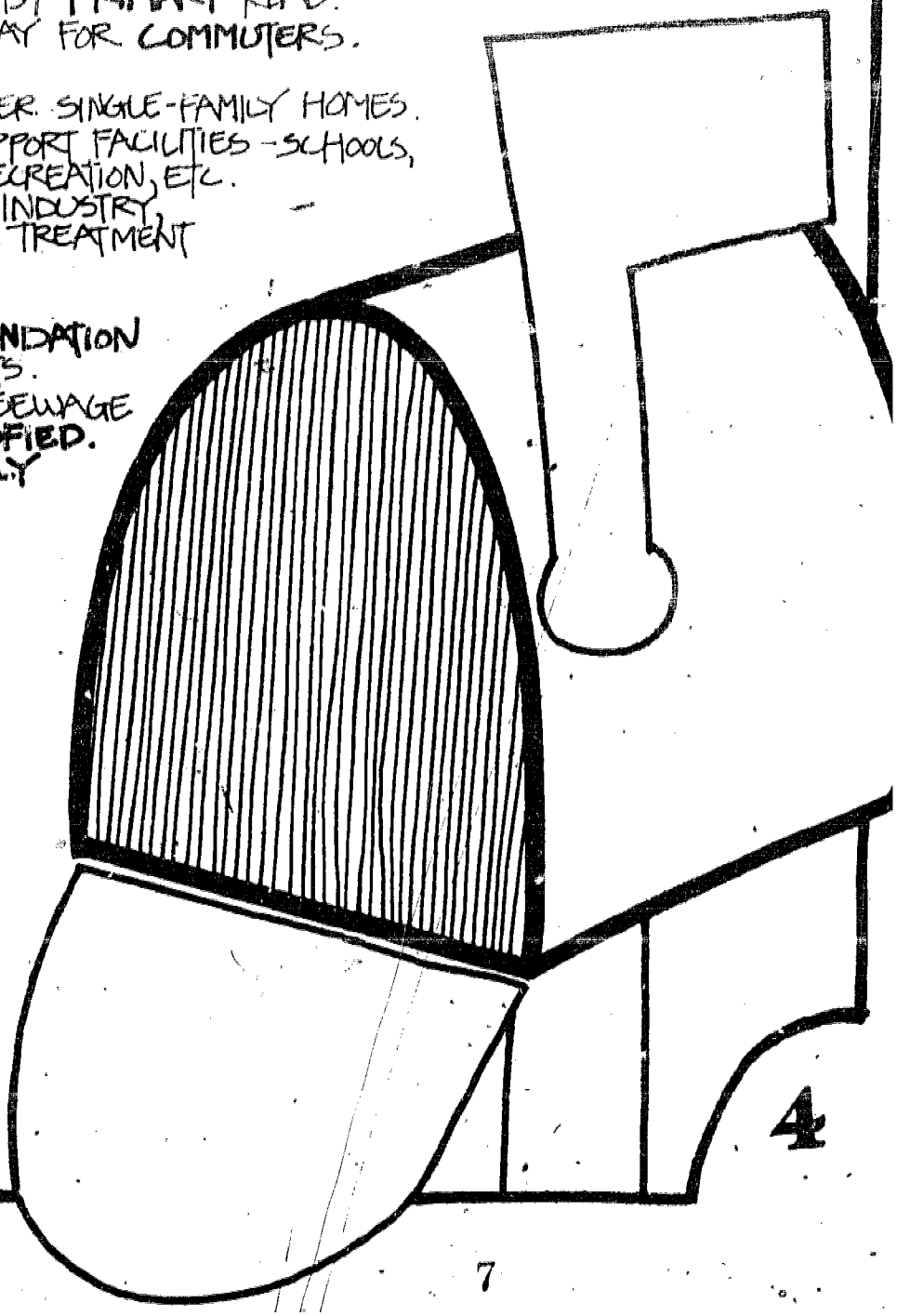
*FROM "THE COMMON GREEN"
BROCHURES BY SANTA CLARA COUNTY PLANNING DEPT.
CALIFORNIA, 1961

review of:

# Single-Family Housing

THE ATTRACTIVENESS CHARACTERISTICS FOR THIS **LAND USE** INCLUDE:

1. ACCESS:
   **YEAR ROUND** BY **PRIMARY** ROAD.
   **MAJOR** HIGHWAY FOR **COMMUTERS**.
2. PROXIMITY:
   **CLOSE** TO OTHER SINGLE-FAMILY HOMES.
   **CLOSE** TO SUPPORT FACILITIES - SCHOOLS, COMMERCE, RECREATION, ETC.
   **AWAY** FROM INDUSTRY, LANDFILL OR TREATMENT PLANTS.
3. SITE:
   ADEQUATE **FOUNDATION** REQUIREMENTS.
   **WATER** AND SEWAGE NEEDS **SATISFIED.**
   **AESTHETICALLY** PLEASING.



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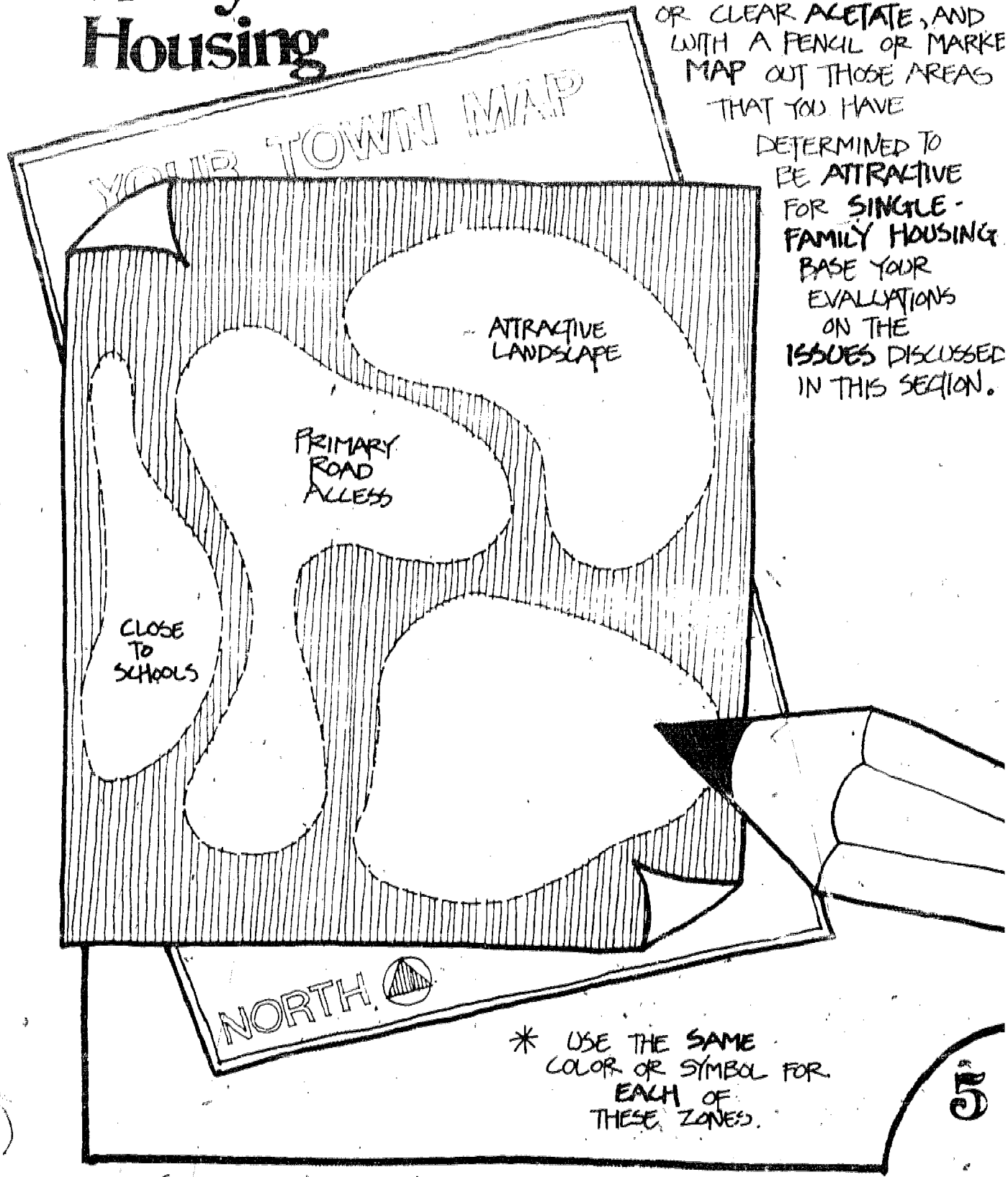
mapping out:

# Single-Family Housing

ON A MAP OF YOUR SITE OR TOWN, OVERLAY A SHEET OF TRACING PAPER OR CLEAR ACETATE, AND WITH A PENCIL OR MARKE MAP OUT THOSE AREAS THAT YOU HAVE DETERMINED TO BE ATTRACTIVE FOR SINGLE-FAMILY HOUSING. BASE YOUR EVALUATIONS ON THE ISSUES DISCUSSED IN THIS SECTION.




* USE THE SAME COLOR OR SYMBOL FOR EACH OF THESE ZONES.

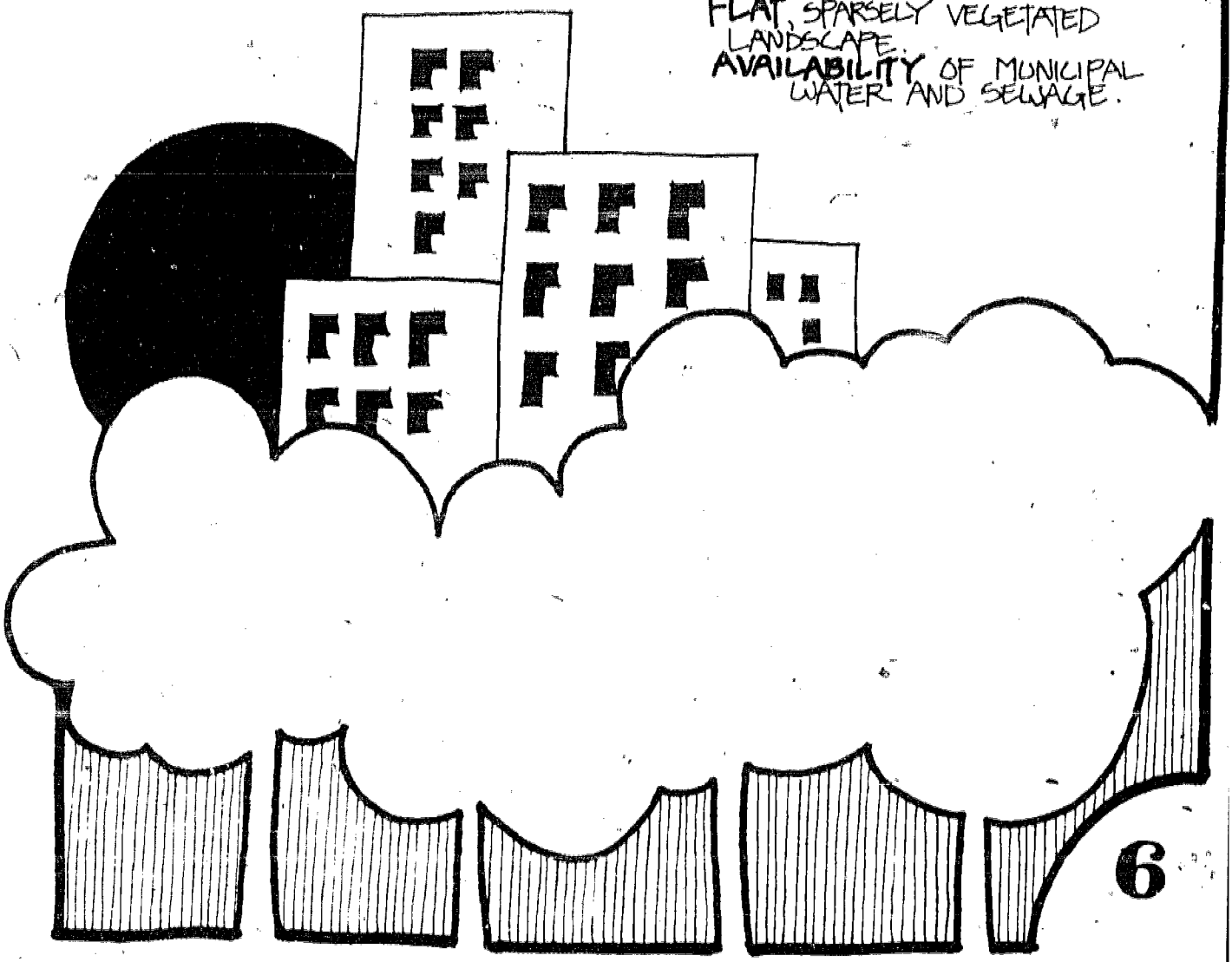
5

review of :

# Multi-Family Housing

THE **ATTRACTIVENESS** CHARACTERISTICS FOR THIS **LAND USE** INCLUDE :

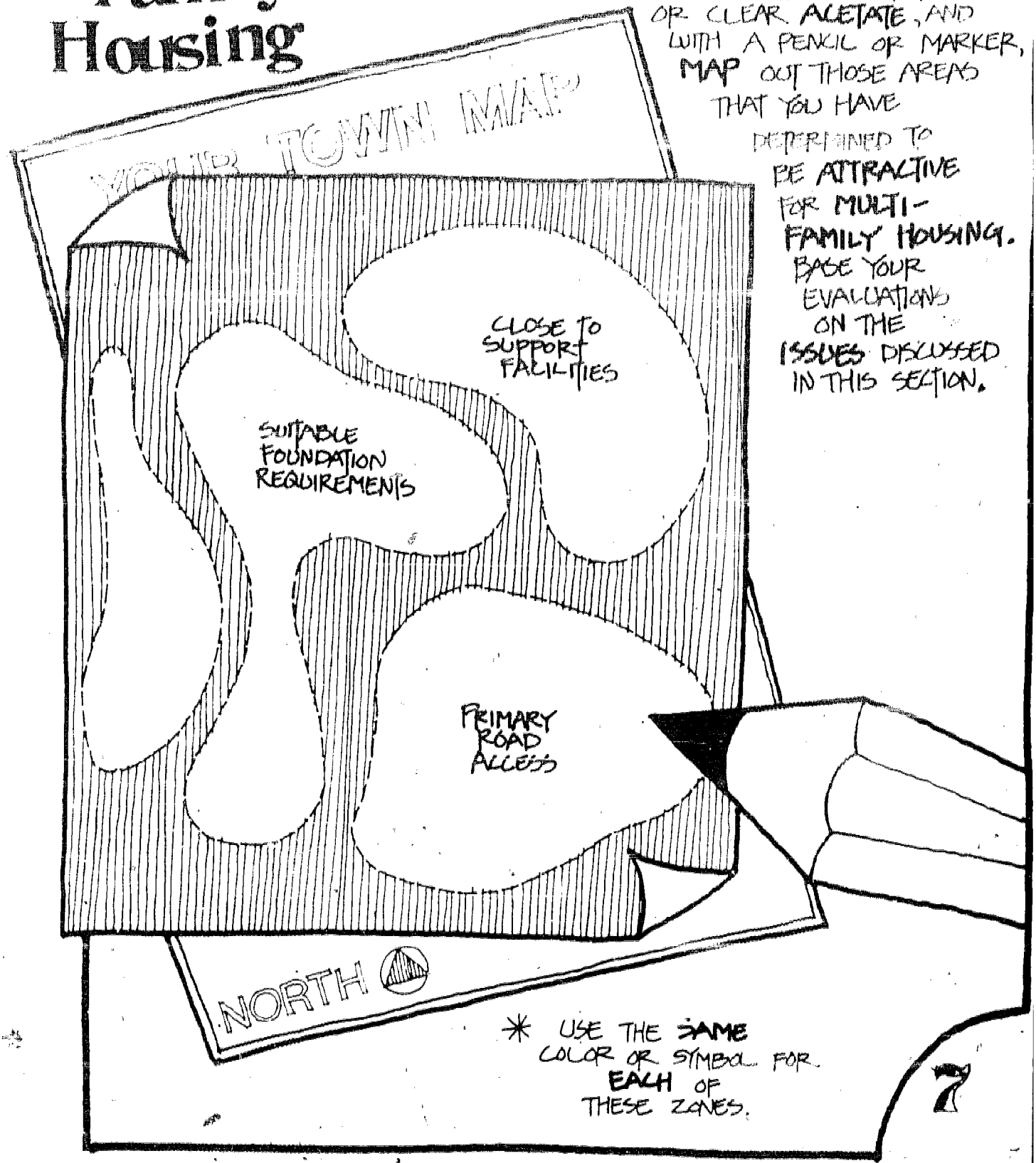
1. ACCESS :
   **YEAR ROUND** ACCESS BY A **PRIMARY** ROAD
2. PROXIMITY :
   **CLOSE** TO RETAIL AREAS, MUNICIPAL FACILITIES AND ACTIVE RECREATION AREAS.
   **AVOID** TRAILER PARKS, INDUSTRY, LANDFILL, ETC.
3. SITE :
   **SUITABLE** FOUNDATION REQUIREMENTS CRITICAL.
   **FLAT**, SPARSELY VEGETATED LANDSCAPE.
   **AVAILABILITY** OF MUNICIPAL WATER AND SEWAGE.



6

# mapping out : Multi-Family Housing

ON A MAP OF YOUR SITE OR TOWN, OVERLAY A SHEET OF TRACING PAPER OR CLEAR ACETATE, AND WITH A PENCIL OR MARKER, MAP OUT THOSE AREAS THAT YOU HAVE DETERMINED TO BE ATTRACTIVE FOR MULTI-FAMILY HOUSING. BASE YOUR EVALUATIONS ON THE ISSUES DISCUSSED IN THIS SECTION.

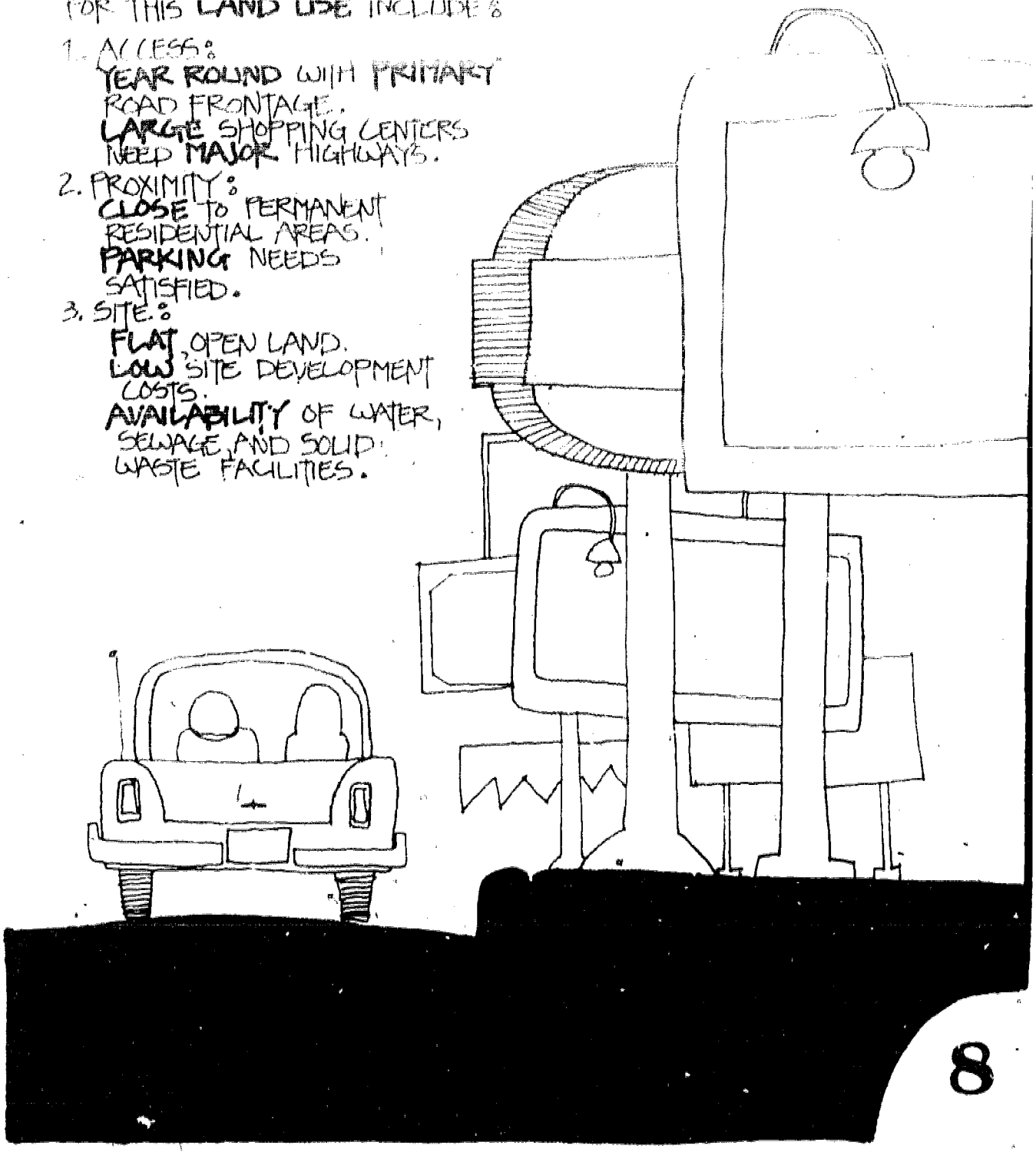



* USE THE SAME COLOR OR SYMBOL FOR EACH OF THESE ZONES.

# review of: Commercial Uses

THE **ATTRACTIVENESS** CHARACTERISTICS FOR THIS **LAND USE** INCLUDE:

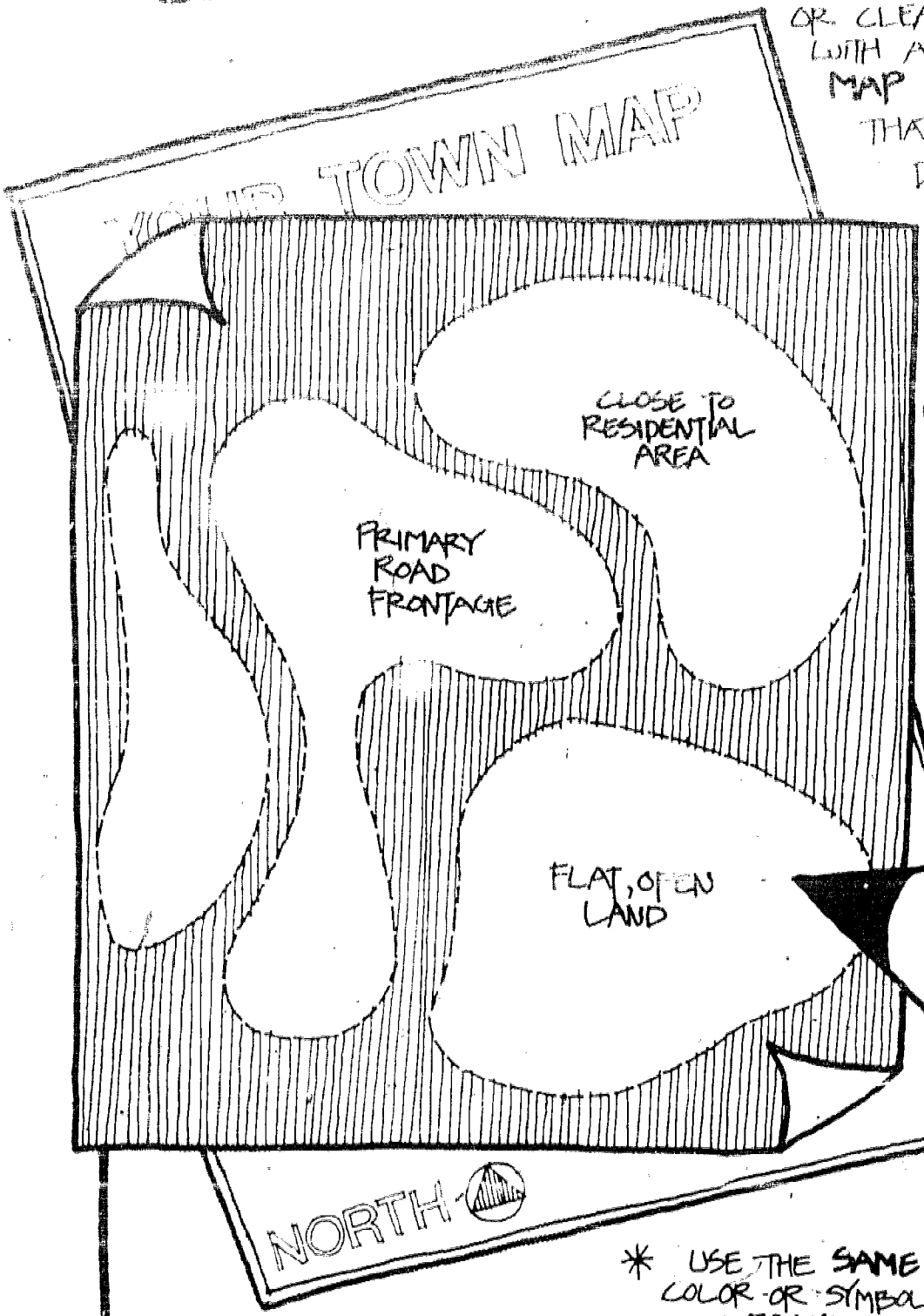
1. ACCESS:
   **YEAR ROUND** WITH **PRIMARY** ROAD FRONTAGE.
   **LARGE** SHOPPING CENTERS NEED **MAJOR** HIGHWAYS.
2. PROXIMITY:
   **CLOSE** TO PERMANENT RESIDENTIAL AREAS.
   **PARKING** NEEDS SATISFIED.
3. SITE:
   **FLAT**, OPEN LAND.
   **LOW** SITE DEVELOPMENT COSTS.
   **AVAILABILITY** OF WATER, SEWAGE, AND SOLID WASTE FACILITIES.



8

# mapping out: Commercial Uses

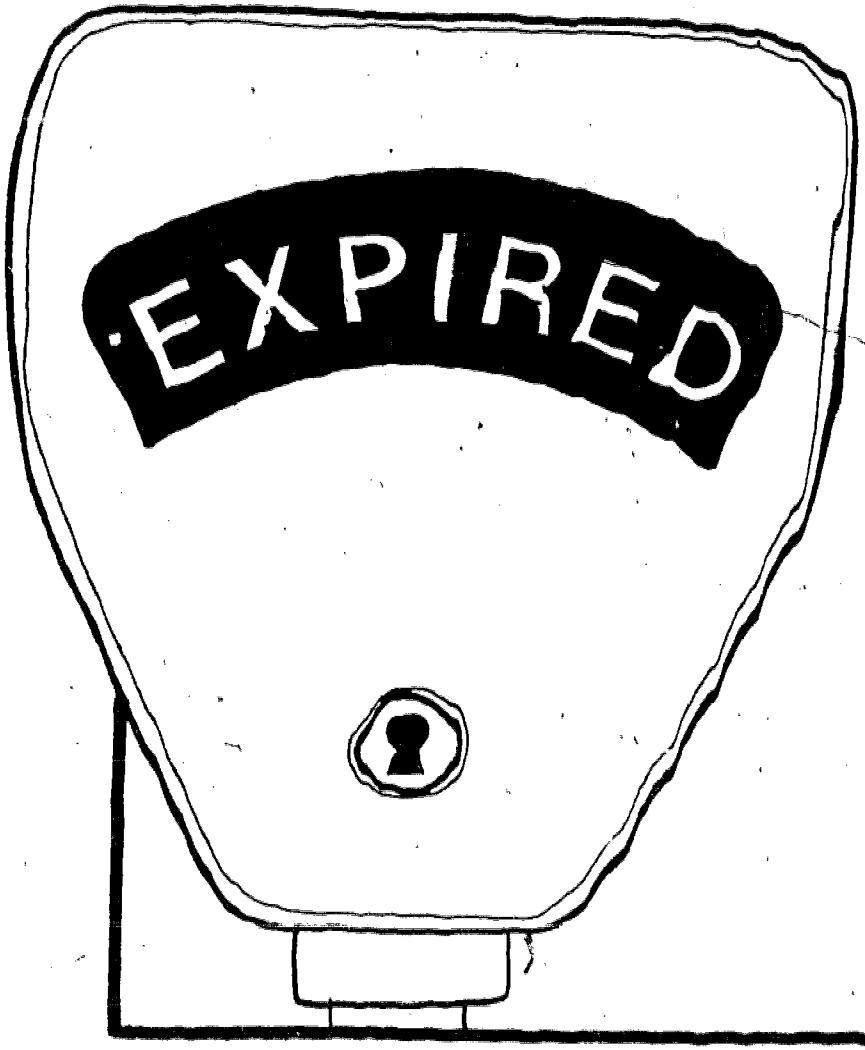
ON A MAP OF YOUR SITE OR TOWN, **OVERLAY** A SHEET OF TRACING PAPER OR CLEAR **ACETATE**, AND WITH A PENCIL OR MARKER, **MAP** OUT THOSE AREAS THAT YOU HAVE DETERMINED TO BE **ATTRACTIVE** FOR **COMMERCIAL LAND USES**. BASE YOUR EVALUATIONS ON THE **ISSUES** DISCUSSED IN THIS SECTION.




* USE THE **SAME** COLOR OR SYMBOL FOR **EACH** OF THESE ZONES.

9

# review of : Institutional Uses



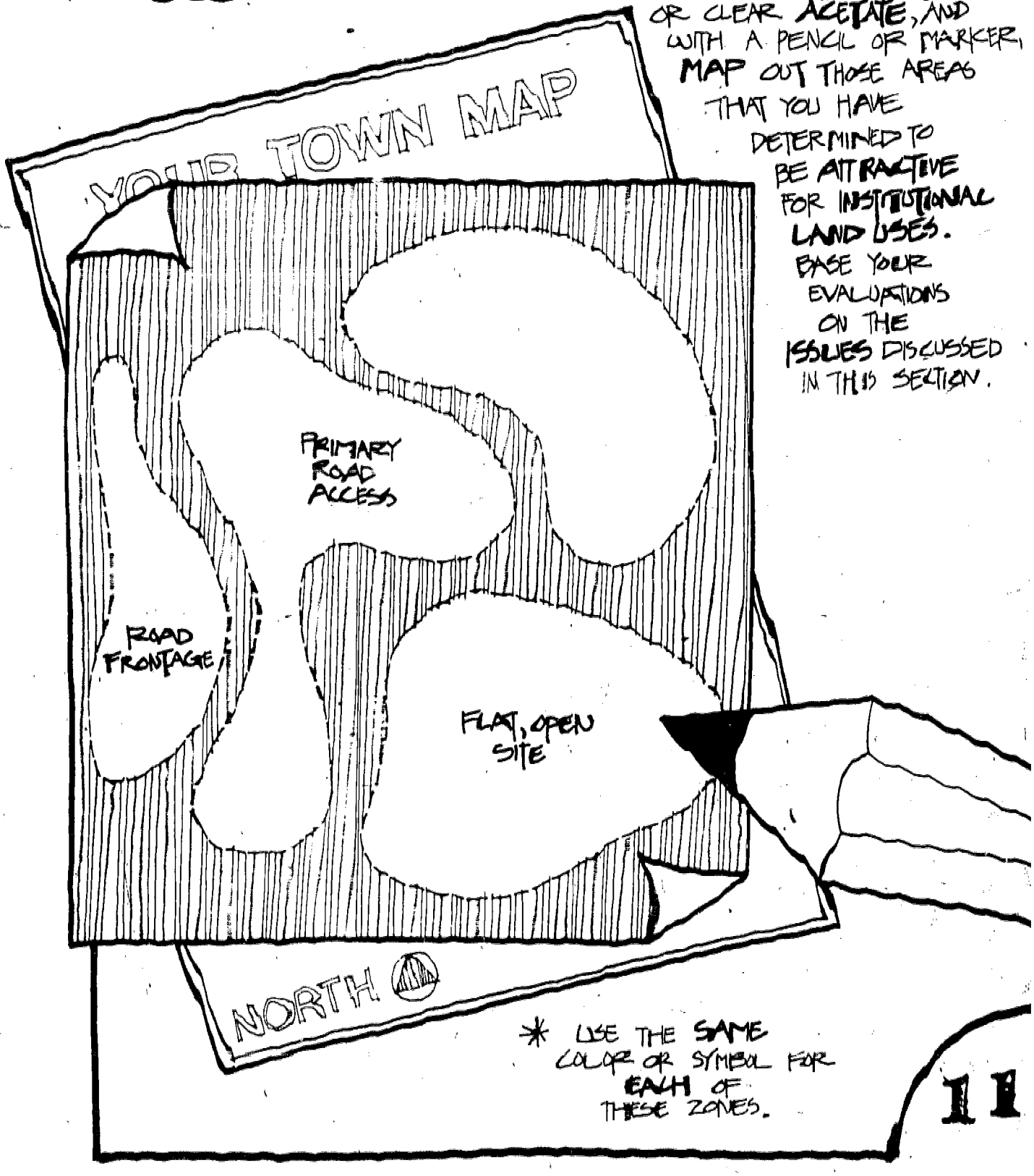

THE ATTRACTIVENESS CHARACTERISTICS FOR THIS LAND USE INCLUDE:

1. ACCESS:
   YEAR-ROUND BY PRIMARY ROAD.
   ROAD FRONTAGE IN MANY CASES.
2. PROXIMITY:
   CENTRALITY TO THE PERMANENT RESIDENTIAL CENTERS.
3. SITE:
   OPEN AND FLAT

10

# mapping out: Institutional Uses

ON A MAP OF YOUR SITE OR TOWN, OVERLAY A SHEET OF TRACING PAPER OR CLEAR ACETATE, AND WITH A PENCIL OR MARKER, MAP OUT THOSE AREAS THAT YOU HAVE DETERMINED TO BE ATTRACTIVE FOR INSTITUTIONAL LAND USES. BASE YOUR EVALUATIONS ON THE ISSUES DISCUSSED IN THIS SECTION.




* USE THE SAME COLOR OR SYMBOL FOR EACH OF THESE ZONES.

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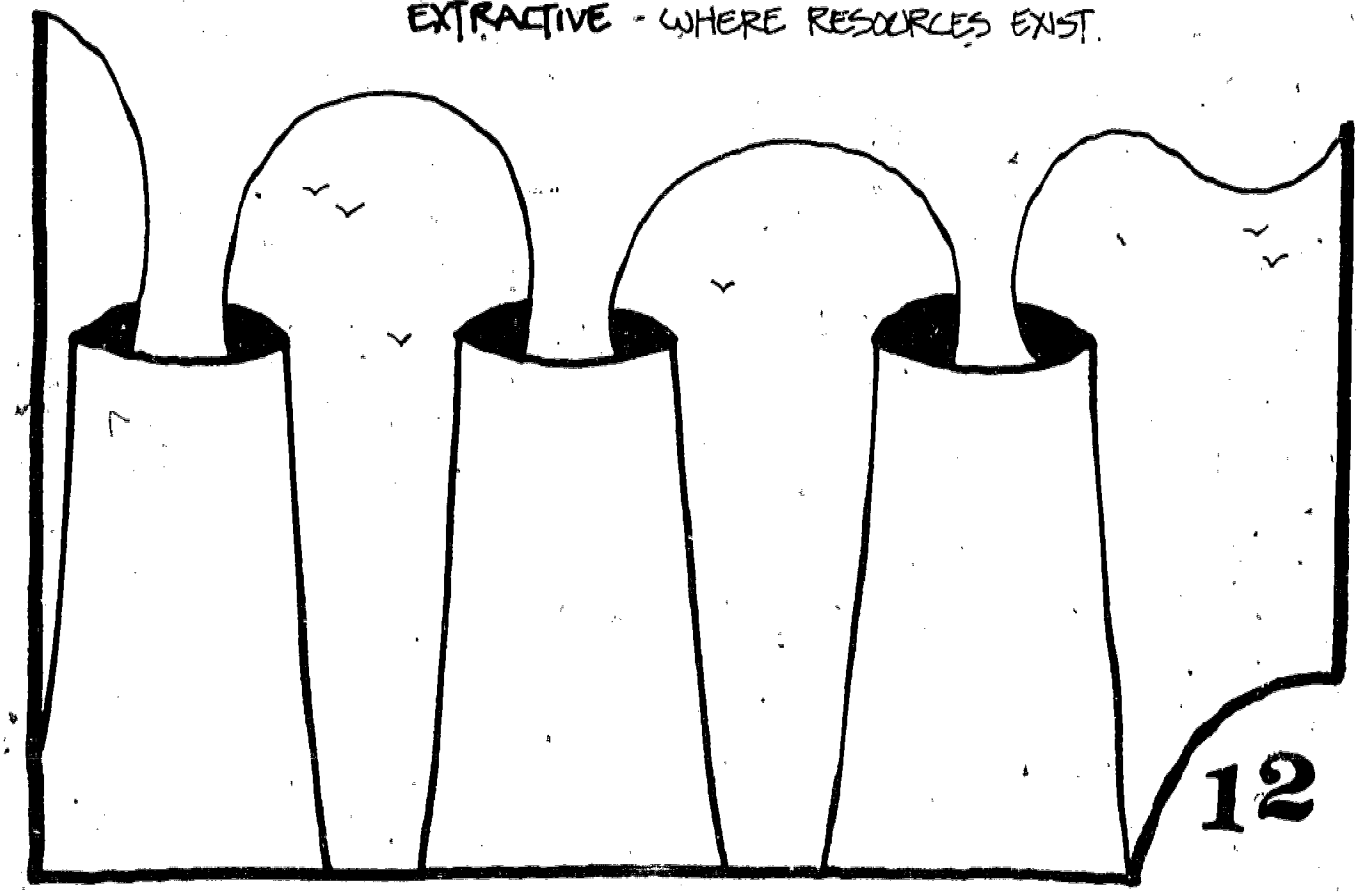
# review of: Industrial Uses

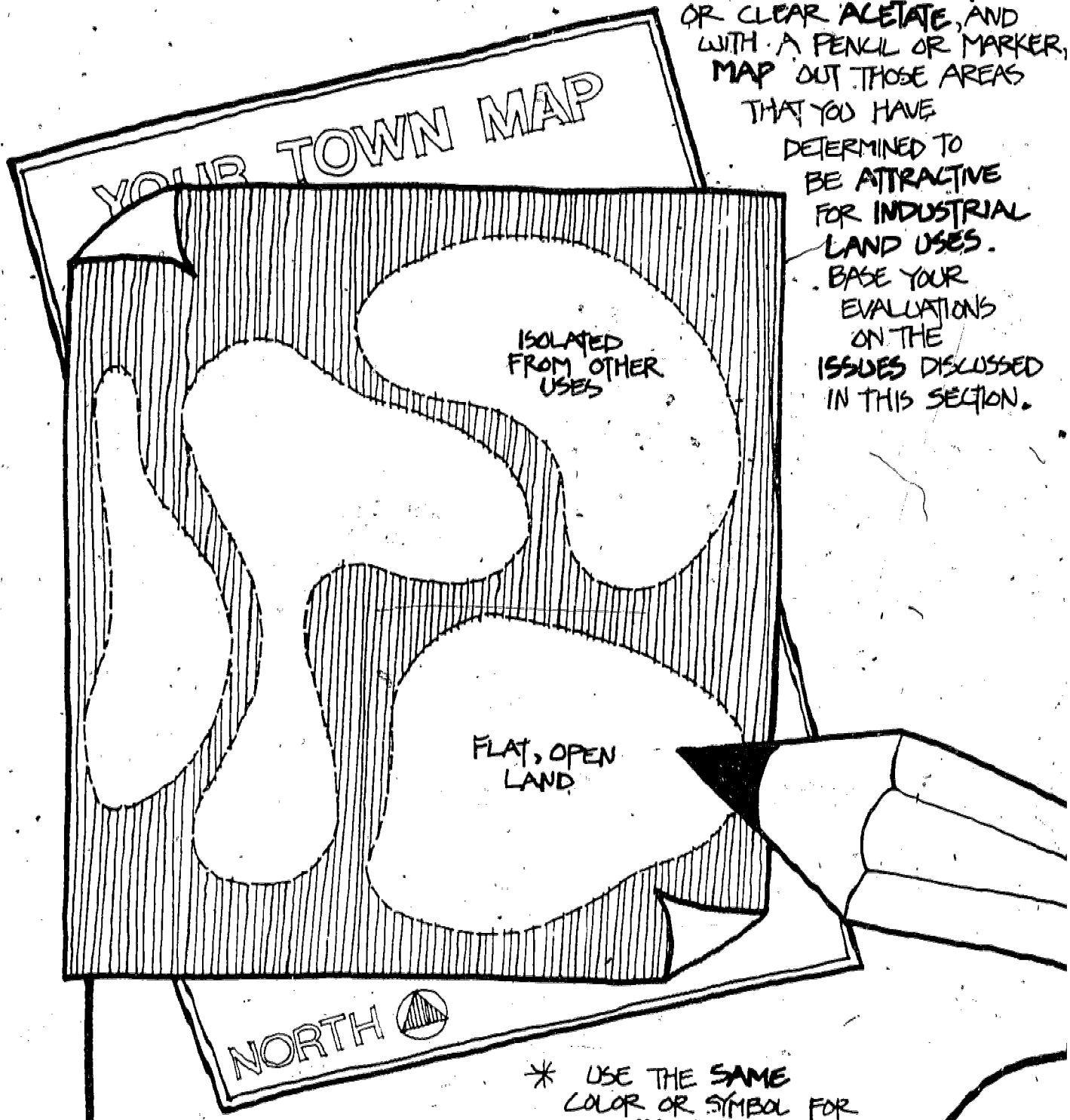
THE **ATTRACTIVENESS** CHARACTERISTICS FOR THIS **LAND USE** INCLUDE:

1. ACCESS:
   **LIGHT** - YEAR ROUND BY **PRIMARY** ROAD, MAJOR HIGHWAY OFTEN NECESSARY.
   **HEAVY** - PRIMARY ROAD **SEPARATED** FROM RESIDENTIAL LOCAL TRAFFIC.
   **EXTRACTIVE** - SAME AS **HEAVY** INDUSTRY.
2. PROXIMITY:
   **ISOLATED**
   **ACCESSIBLE** TO LABOR MARKET.
3. SITE:
   **LIGHT/HEAVY** - FLAT, OPEN, FOUNDATION SUITABILITY REQUIREMENTS.
   **EXTRACTIVE** - WHERE RESOURCES EXIST.



# mapping out: Industrial Uses

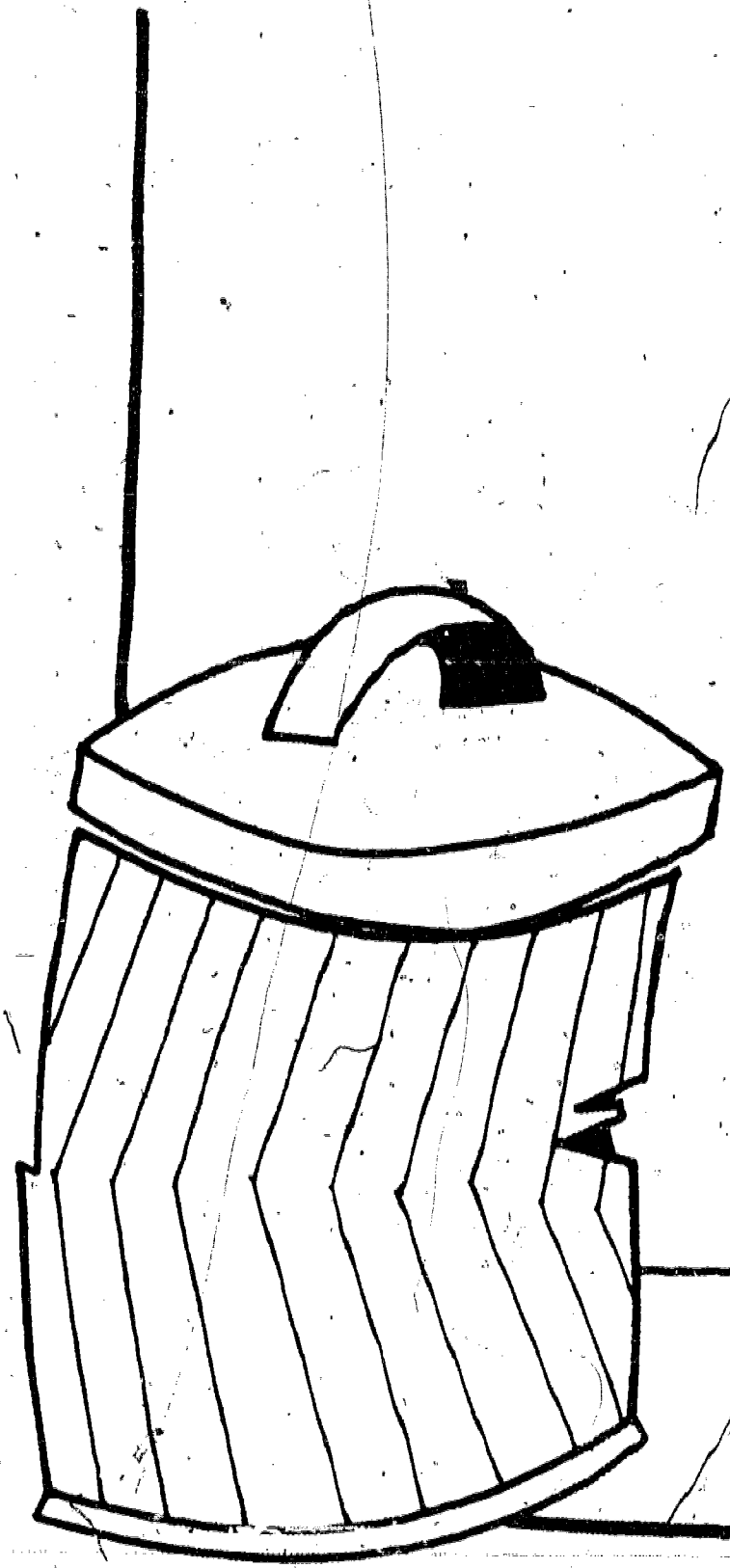
ON A **MAP** OF **YOUR** SITE OR TOWN, **OVERLAY** A SHEET OF TRACING PAPER OR CLEAR **ACETATE**, AND WITH A PENCIL OR MARKER, **MAP** OUT THOSE AREAS THAT YOU HAVE DETERMINED TO BE **ATTRACTIVE** FOR **INDUSTRIAL LAND USES**. BASE YOUR EVALUATIONS ON THE **ISSUES** DISCUSSED IN THIS SECTION.




* USE THE **SAME** COLOR OR SYMBOL FOR **EACH** OF THESE ZONES.

13

# review of: Sanitary Landfill



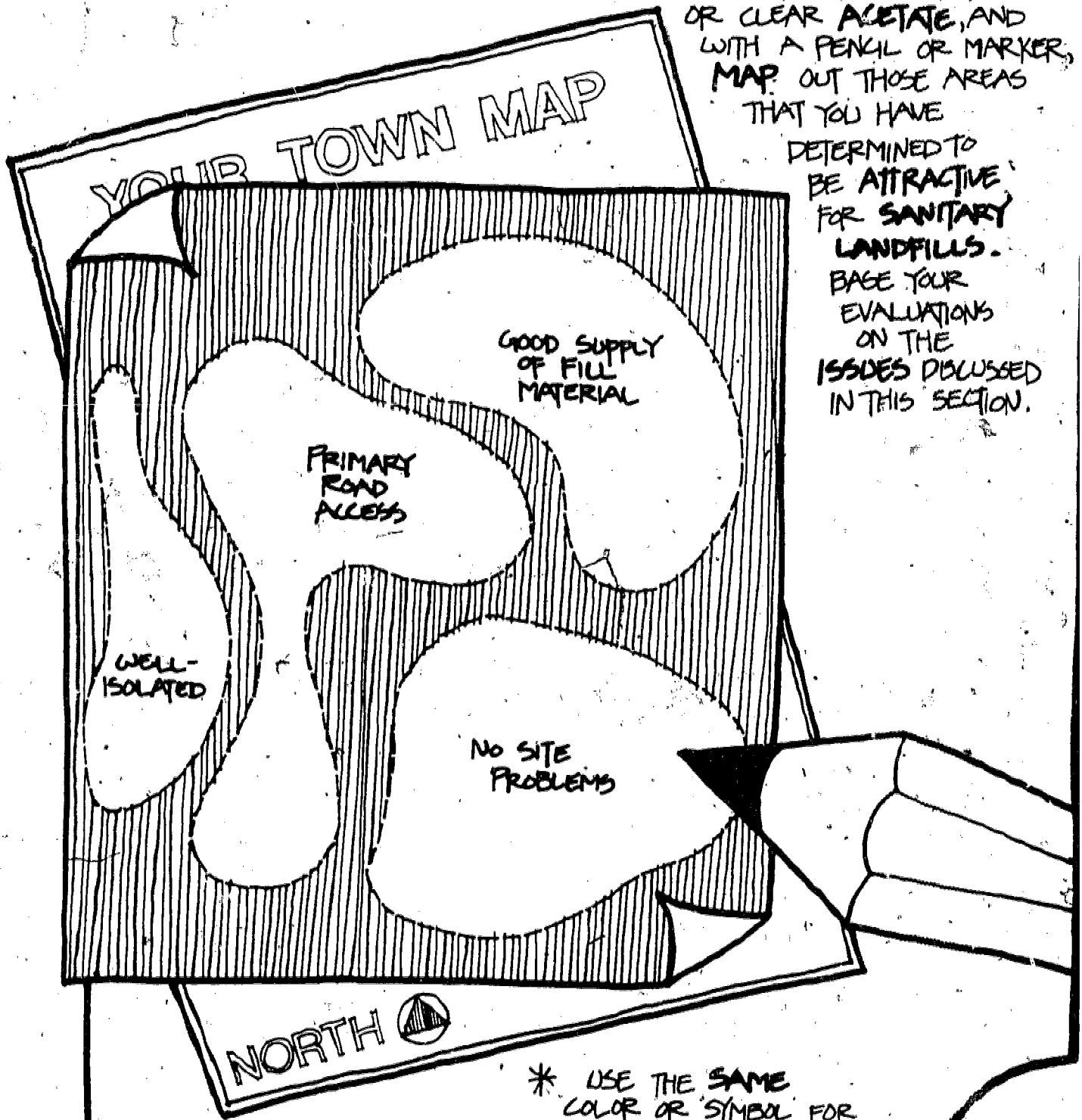
THE **ATTRACTIVENESS** CHARACTERISTICS FOR THIS **LAND USE** INCLUDE:

1. ACCESS:
   **YEAR ROUND** BY PRIMARY ROAD.
2. PROXIMITY:
   **CENTRALITY** TO REFUSE SOURCE.
   **ISOLATION** FROM OTHER USES.
3. SITE:
   **NO** LAKES OR RESERVOIRS WITHIN **ONE** MILE DOWN DRAINAGE.
   **NO** WATER WELLS WITHIN ONE THOUSAND FEET.
   **NO** SPRINGS OR WET AREAS ON SITE.
   **MINIMUM** OF SURFACE DRAINAGE ENTERING SITE.
   **HIGH** WATER TABLE AREAS UNSUITABLE.
   **NOT** BE OVER OR ADJACENT TO AN AQUIFER.
   **AVAILABILITY** OF COVER MATERIAL.

**14**

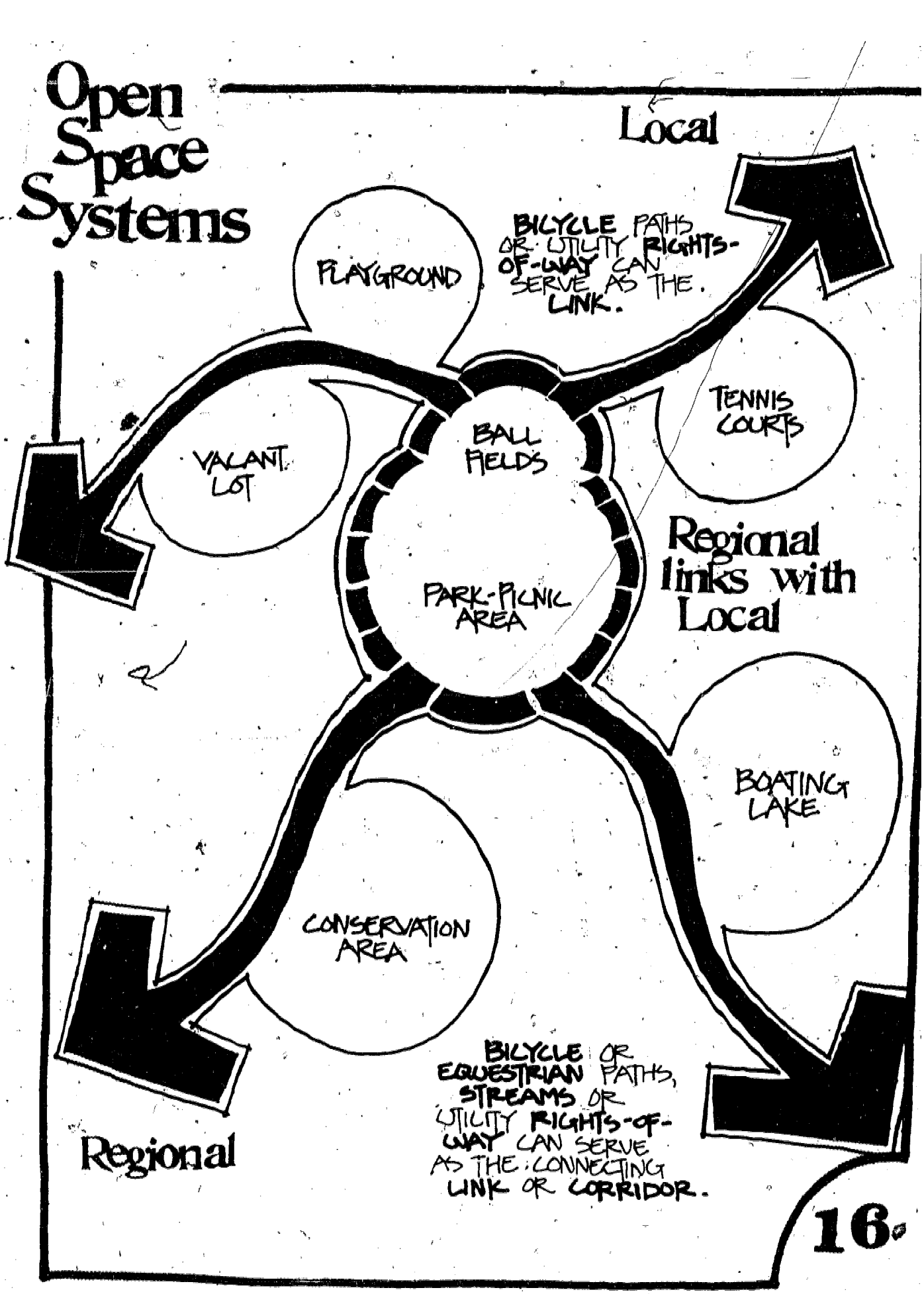
# mapping out: Sanitary Landfills

ON A **MAP** OF **YOUR** SITE OR TOWN, **OVERLAY** A SHEET OF TRACING PAPER OR CLEAR **ACETATE**, AND WITH A PENCIL OR MARKER, **MAP** OUT THOSE AREAS THAT YOU HAVE DETERMINED TO BE **ATTRACTIVE** FOR **SANITARY LANDFILLS**. BASE YOUR EVALUATIONS ON THE **ISSUES** DISCUSSED IN THIS SECTION.

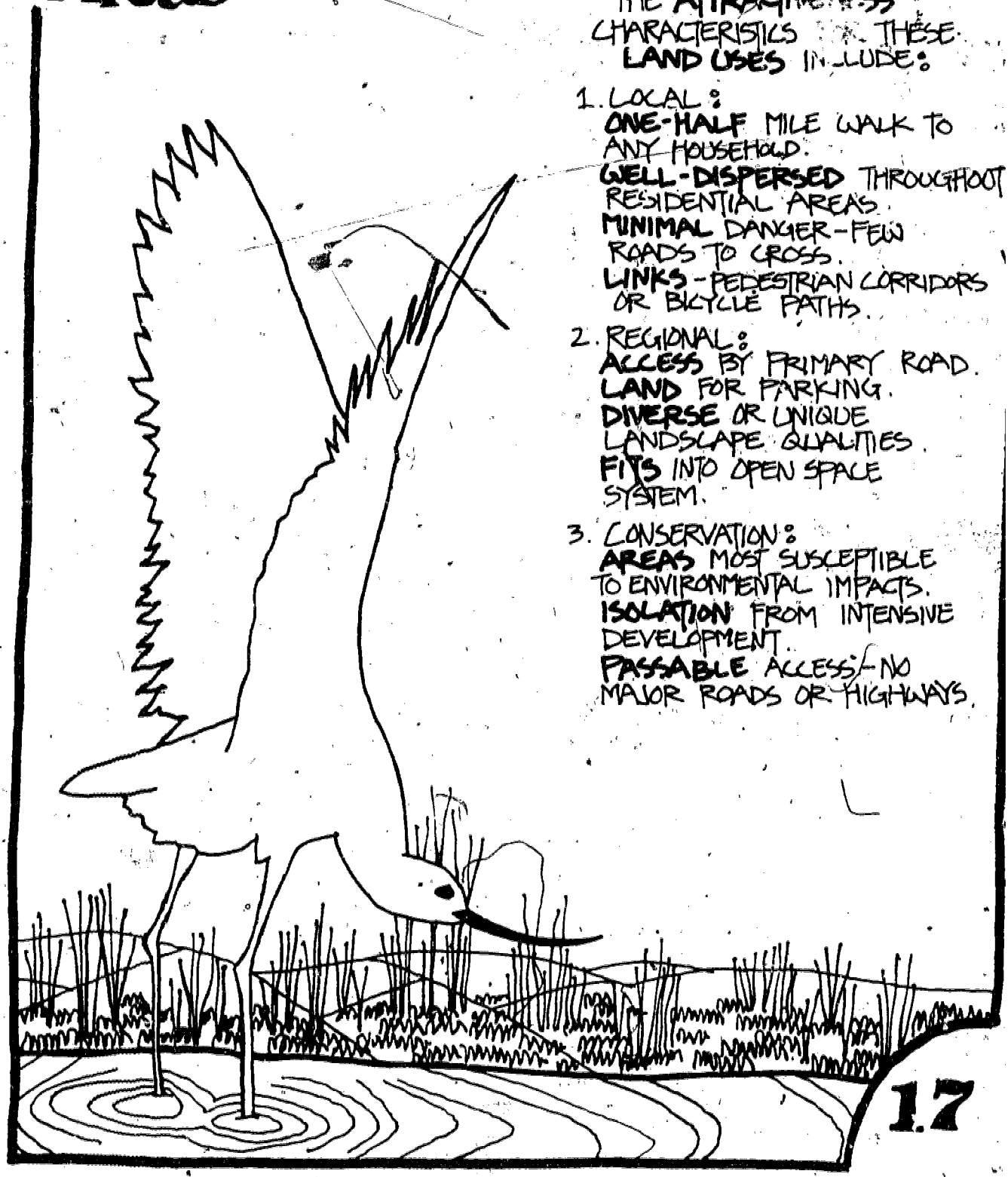



* USE THE **SAME** COLOR OR SYMBOL FOR **EACH** OF THESE ZONES.

**15**


Open Space Systems
Local
PLAYGROUND
BICYCLE PATHS OR UTILITY RIGHTS-OF-WAY CAN SERVE AS THE LINK.
TENNIS COURTS
VACANT LOT
BALL FIELDS
PARK-PICNIC AREA
Regional links with Local
BOATING LAKE
CONSERVATION AREA
BICYCLE OR EQUESTRIAN PATHS, STREAMS OR UTILITY RIGHTS-OF-WAY CAN SERVE AS THE CONNECTING LINK OR CORRIDOR.
Regional
16

# review of: Conservation-Recreation Areas



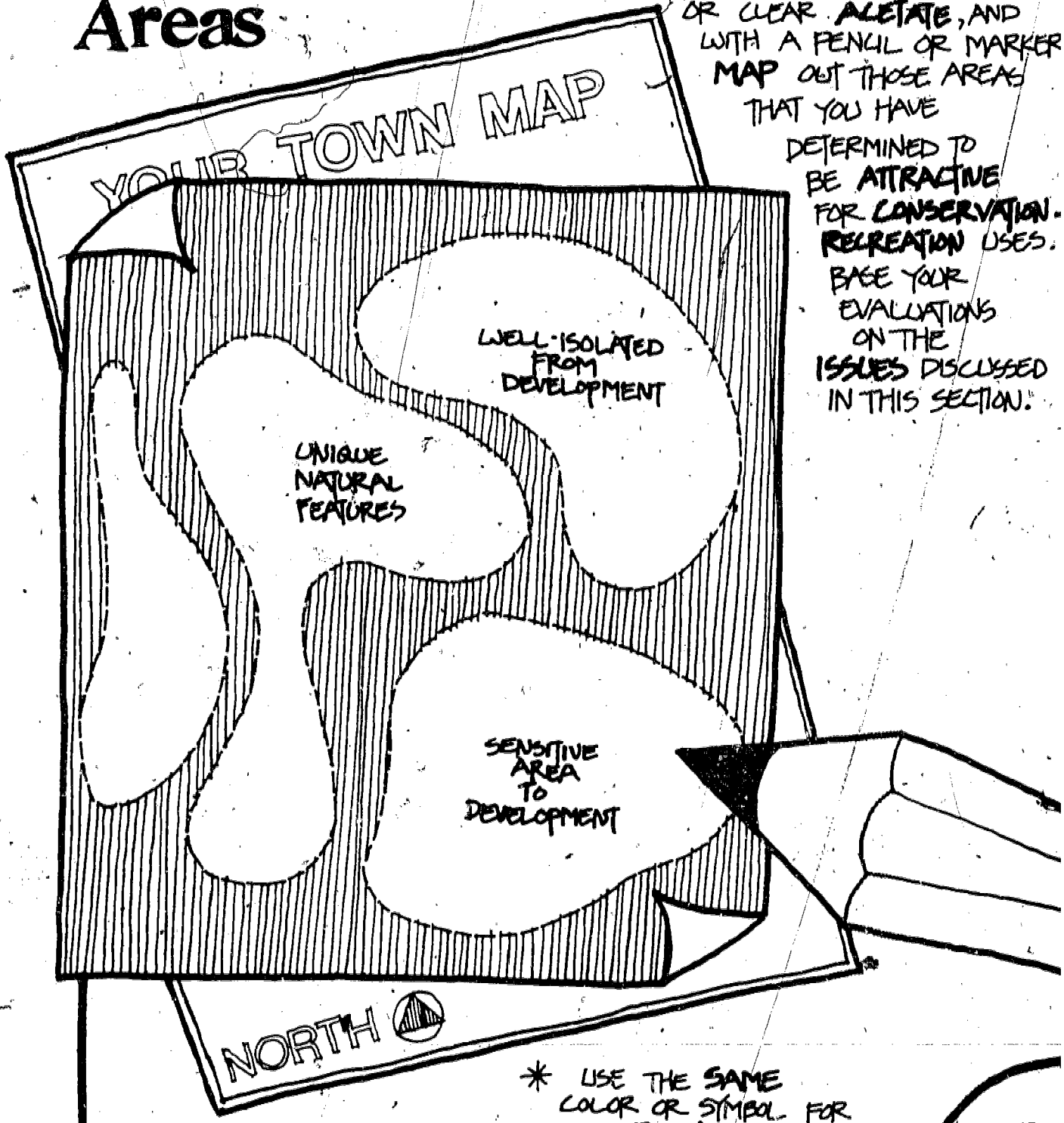
THE **ATTRACTIVENESS** CHARACTERISTICS OF THESE **LAND USES** INCLUDE:

1. LOCAL:
   **ONE-HALF** MILE WALK TO ANY HOUSEHOLD.
   **WELL-DISPERSED** THROUGHOUT RESIDENTIAL AREAS.
   **MINIMAL** DANGER - FEW ROADS TO CROSS.
   **LINKS** - PEDESTRIAN CORRIDORS OR BICYCLE PATHS.
2. REGIONAL:
   **ACCESS** BY PRIMARY ROAD.
   **LAND** FOR PARKING.
   **DIVERSE** OR UNIQUE LANDSCAPE QUALITIES.
   **FITS** INTO OPEN SPACE SYSTEM.
3. CONSERVATION:
   **AREAS** MOST SUSCEPTIBLE TO ENVIRONMENTAL IMPACTS.
   **ISOLATION** FROM INTENSIVE DEVELOPMENT.
   **PASSABLE** ACCESS - NO MAJOR ROADS OR HIGHWAYS.

**1.7**

# mapping out: Conservation-Recreation Areas

ON A MAP OF YOUR SITE OR TOWN, OVERLAY A SHEET OF TRACING PAPER OR CLEAR ACETATE, AND WITH A PENCIL OR MARKER MAP OUT THOSE AREAS THAT YOU HAVE DETERMINED TO BE ATTRACTIVE FOR CONSERVATION-RECREATION USES. BASE YOUR EVALUATIONS ON THE ISSUES DISCUSSED IN THIS SECTION.




* USE THE SAME COLOR OR SYMBOL FOR EACH OF THESE ZONES.

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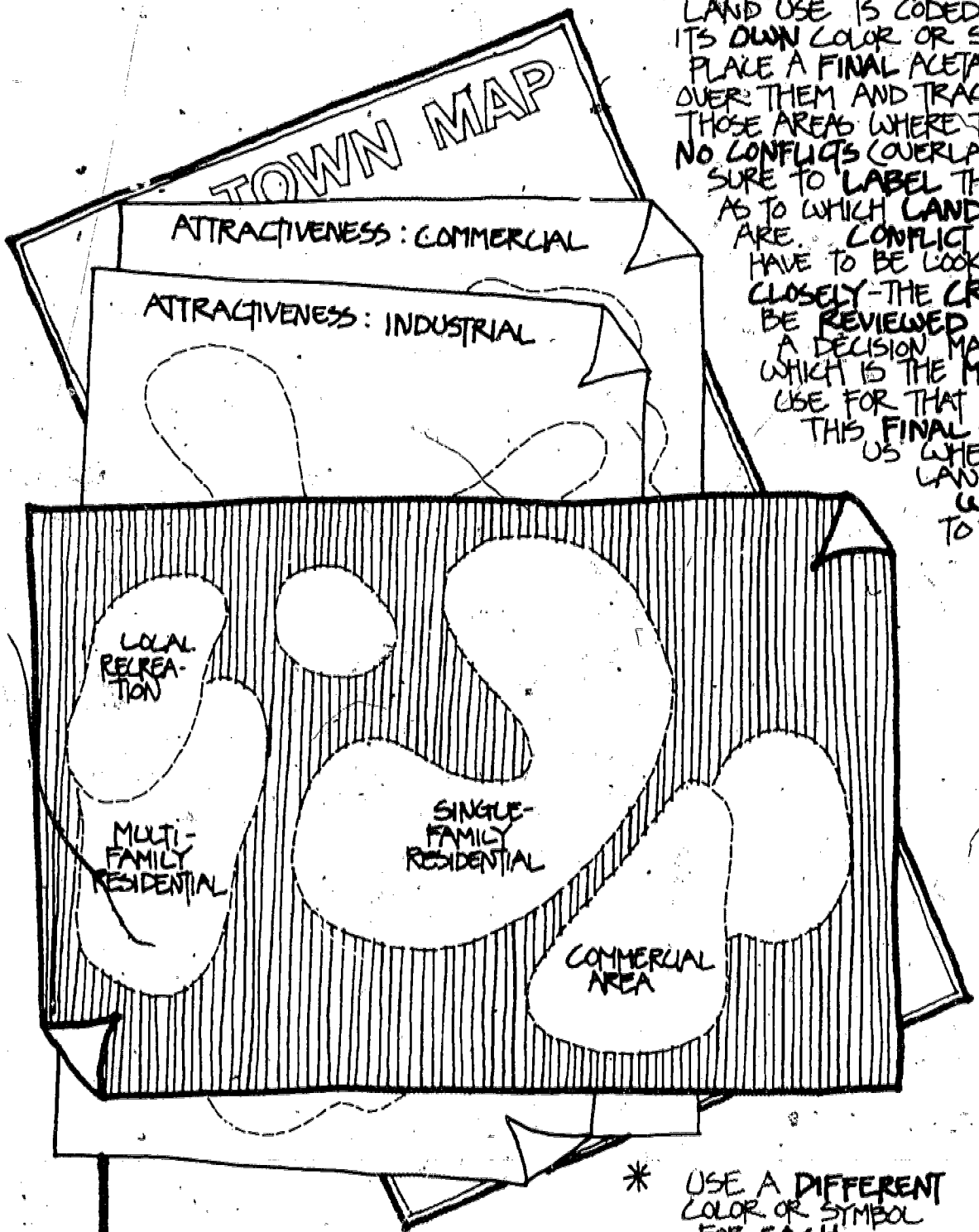
# mapping out: Attractiveness Composite

ON A BASE MAP, OVERLAY **ALL** OR **ANY** COMBINATION OF **SINGLE-FACTOR** ATTRACTIVENESS MAPS THAT YOU HAVE PRODUCED. **EACH** LAND USE IS CODED WITH ITS **OWN** COLOR OR SYMBOL. NOW PLACE A **FINAL** ACETATE SHEET OVER THEM AND TRACE OUT THOSE AREAS WHERE THERE ARE **NO CONFLICTS** (OVERLAPPING). BE SURE TO **LABEL** THESE ZONES AS TO WHICH **LAND USE** THEY ARE. **CONFLICT** AREAS HAVE TO BE LOOKED AT MORE **CLOSELY** - THE **CRITERIA** SHOULD BE **REVIEWED** AGAIN, AND A DECISION MADE AS TO WHICH IS THE **MORE** APPROPRIATE USE FOR THAT PLACE. THIS **FINAL** MAP TELLS US WHERE EACH LAND USE **WANTS** TO BE.

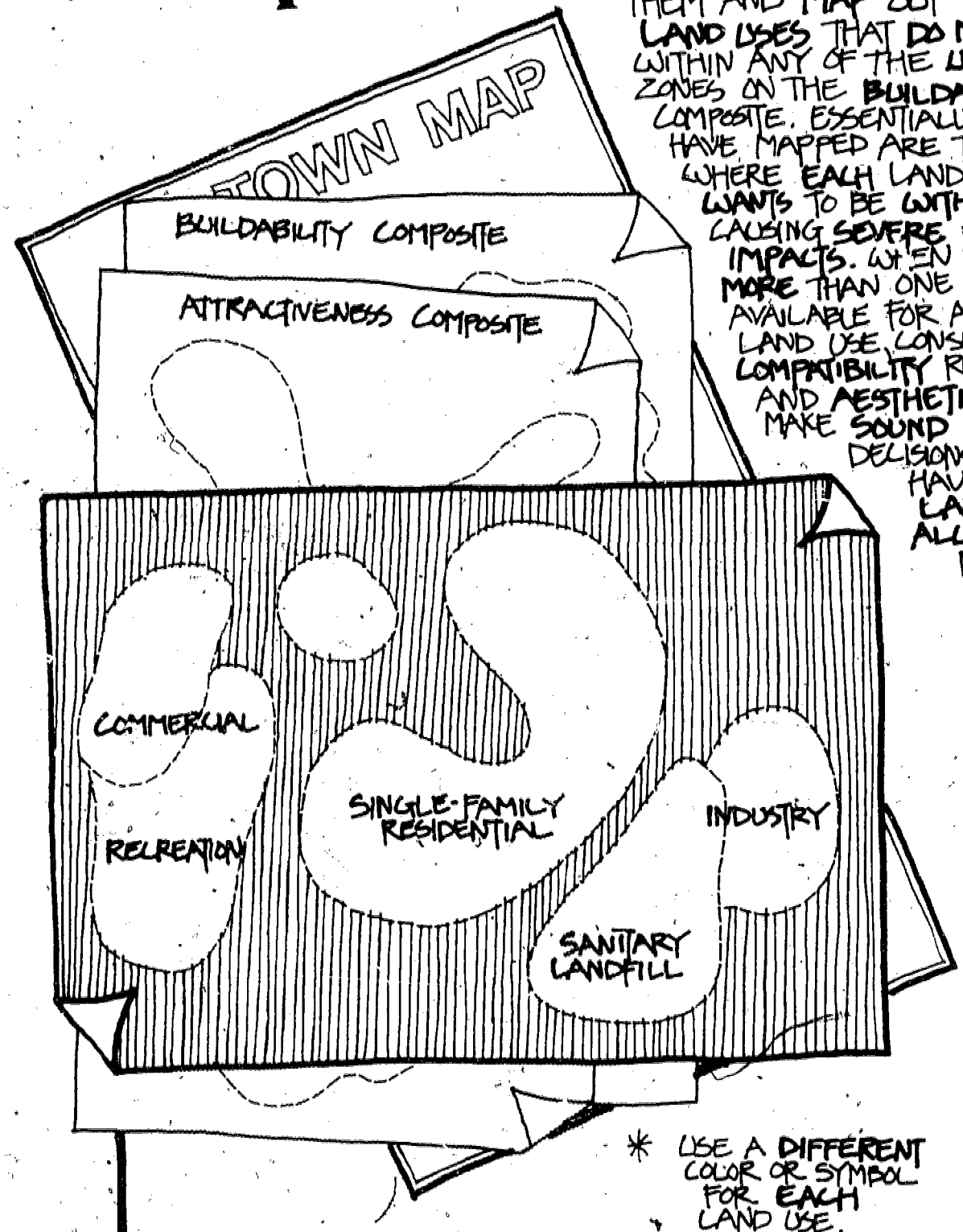



* USE A **DIFFERENT** COLOR OR SYMBOL FOR **EACH** LAND USE.

**19**

# mapping out: Allocation Composite

ON A BASE MAP OVERLAY THE **BUILDABILITY** COMPOSITE WITH THE **ATTRACTIVENESS** COMPOSITE. PLACE A SHEET OF **ACETATE** OVER THEM AND **MAP** OUT THOSE **LAND USES** THAT **DO NOT** FALL WITHIN ANY OF THE **UNSUITABLE** ZONES ON THE **BUILDABILITY** COMPOSITE. ESSENTIALLY WHAT YOU HAVE MAPPED ARE THE AREAS WHERE **EACH** LAND USE MOST **WANTS** TO BE **WITHOUT** CAUSING **SEVERE** ENVIRONMENTAL **IMPACTS**. WHEN THERE ARE **MORE** THAN ONE SITE AVAILABLE FOR ANY **ONE** LAND USE, CONSIDER **COMPATIBILITY** RELATIONSHIPS AND **AESTHETICS** TO HELP MAKE **SOUND** PLANNING DECISIONS. YOU NOW HAVE A **LAND USE ALLOCATION** MAP.




* USE A **DIFFERENT** COLOR OR SYMBOL FOR **EACH** LAND USE.

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THE FOLLOWING PAGES ARE EXCERPTS FROM

# THE COST OF SPRAWL

TABLE I

TYPES OF COSTS ANALYZED

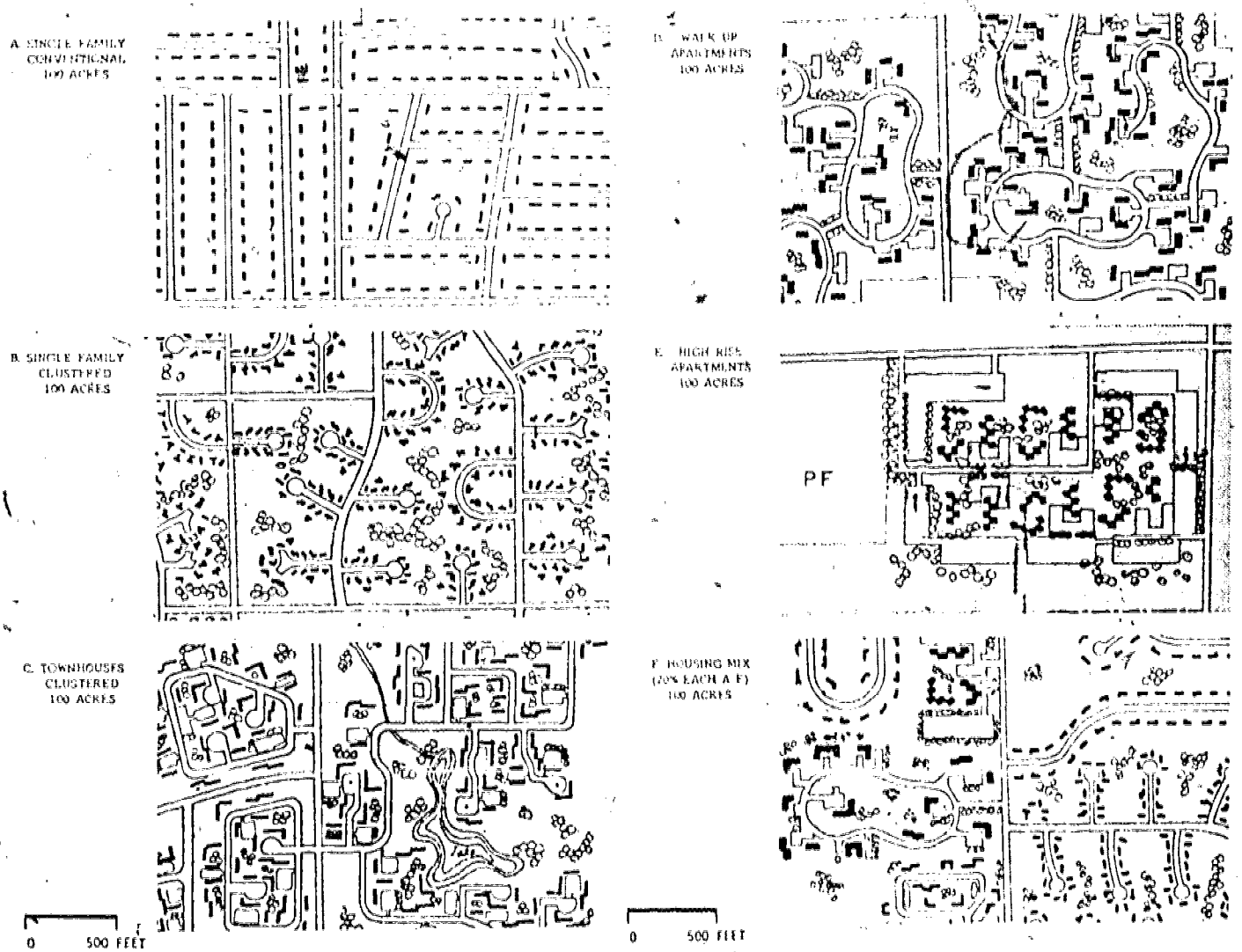
Economic Costs (capital and operating)
- Residential (capital only)
- Open Space/Recreation
- Schools
- Streets and Roads
- Utilities (sewer, water, storm drainage, gas, electric, telephone)
- Public Facilities and Services
  - police, fire, solid waste collection
  - library, health care, churches
  - general government
- Land

Environmental Effects
- Air Pollution
- Water Pollution, Erosion
- Noise
- Vegetation and Wildlife
- Visual Effects
- Water and Energy Consumption

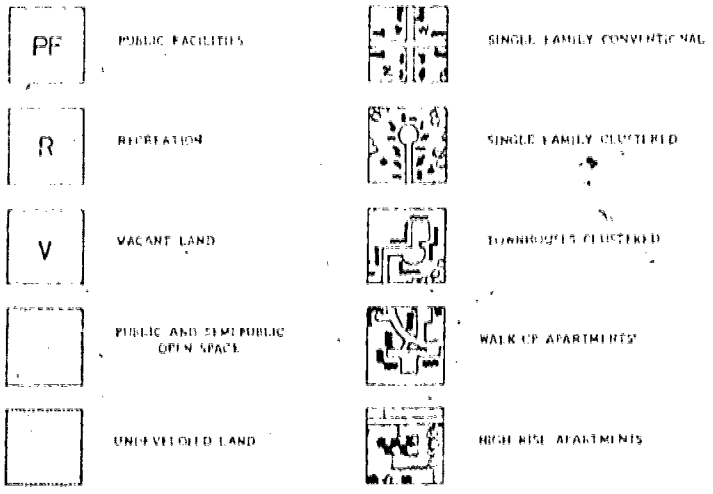
Personal Effects
- Use of Discretionary Time
- Psychic Costs
- Travel Time
- Traffic Accidents
- Crime

# GUIDE SHEET # 21

## REPRESENTATIVE DEVELOPMENT PATTERNS




NEIGHBORHOOD PROTOTYPES LEGEND




*After you are finished studying the patterns, turn the recorder on.*



*ce for guidesheets # 21 - 37:* Cost of Sprawl - Detailed Cost Analysis *see bibliography for reference.*

RESIDENTIAL CONSTRUCTION CHARACTERISTICS
SUMMARY OF ASSUMPTIONS

E SHEET # 22

| | Housing Pattern (1,000 Units) | | | | |
|---|---|---|---|---|---|
| | A<br>Single-Family Conventional | B<br>Single-Family Clustered | C<br>Townhouse Clustered | D<br>Walk-Up Apartment | E<br>High-Rise Apartment |
| ber of Unit | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| ber of units per acre | 3 | 5 | 10 | 15 | 30 |
| [illegible] | [illegible] | [illegible] | 300 | 67 | 17 |
| ber of units per building | 1 | 1 | 5 | 15 | 60 |
| ber of stories | 1.5 | 1.5 | 2 | 3 | 6 |
| of lot per building, square feet | 14,520 | 8,712 | 21,780 | 43,560 | 87,120 |
| of unit, square feet | 1,620 | 1,620 | 1,200 | 1,000 | 900 |
| ture | | | | | |
| Foundation | 35% full, 50% slab, 15% crawl | Same as A. | 50% full, 50% slab | Same as C. | 100% full |
| Exterior walls | 40% brick, 25% wood, 35% other | Same as A. | 100% brick | 100% brick | 100% brick |
| Balconies | None | None | None | None | 50% with balconies, 50% without |
| Elevator | None | None | None | None | 50% 1 elevator, 50% 2 elevators |
| Heating | 33% electric, 67% gas | Same as A. | Same as A. | Same as A. | Same as A. |
| Plumbing | Water heater, disposal, dishwasher | Same as A. | Same as A. | Same as A. | Same as A. |
| Air conditioning | 40% central air conditioning, 60% not | Same as A. | 40% central air conditioning, 60% not | 40% central air conditioning, 60% not | 100% central air conditioning |
| Appliances | Oven, range, built-in cabinets | Same as A. | Same as A. | Same as A. | Same as A. |
| Number of baths | Average 1.8 | Average 1.8 | 1.5 | 1.5 | 1.5 |
| ing | 20% 1 car garage, 50% 2+ car garage, 12% carport, 18% driveway only | Same as A. | 25% 1 car garage, 25% 2 car garage, 50% open parking | 43% carport, 57% open parking | 43% carport, 57% open parking |
| ing | Concrete driveway and sidewalk | Same as A. | Same as A. | Same as A. | Same as A. |
| lity Connectors | | | | | |
| Number of connectors | 1,000 | 1,000 | 100 | 67 | 17 |
| Length - building to street | 65' | 55' | 55' | 60' | 60' |
| Sanitary sewerage | 4" vitrified clay | Same as A. | 6" | 6" | 8" |
| Storm sewerage | 4" vitrified clay channel | Same as A. | Same as A. | Same as A. | Same as A. |
| Water | 1" pipe | Same as A. | 1.5" | 2" | 2" |
| Gas | 2" pipe | Same as A. | Same as A. | Same as A. | Same as A. |
| Electric | Type 3/C 4-0 cable | Same as A. | Same as A. | Same as A. | Same as A. |
| Telephone | Comparable to electric cable | Same as A. | Same as A. | Same as A. | Same as A. |

# GUIDE SHEET # 23

## NEIGHBORHOOD LAND BUDGET

For 1,000 Housing Units

| Residential [a] | Units/Acre | Housing Pattern (Acres) A | B | C | D | E | F [f] |
|---|---|---|---|---|---|---|---|
| A - Single, Conventional | (3.0) | 330 | - | - | - | - | 66 |
| B - Single, Clustered | (5.0) | - | 200 | - | - | - | 40 |
| C - Townhouse, Clustered | (10.0) | - | - | 100 | - | - | 20 |
| D - Walk-Up Apartments | (15.0) | - | - | - | 66 | - | 13 |
| E - High-Rise Apartments | (30.0) | - | - | - | - | 33 | 6 |
| Sub-Total | | 330 | 200 | 100 | 66 | 33 | 145 |
| Open Space/Recreation [b] | | 45 | 90 | 90 | 73 | 32 | 66 |
| Schools [c] | | | | | | | |
| Elementary | | 19 | 19 | 17 | 17 | 12 | 17 |
| Secondary | | 10 | 10 | 9 | 9 | 3 | 9 |
| Sub-Total | | 29 | 29 | 26 | 26 | 15 | 26 |
| Other Public Facilities [a] | | | | | | | |
| Churches | | 5 | 5 | 5 | 5 | 5 | 5 |
| Transportation [d] | | | | | | | |
| Minor, Collector and Arterial Streets | | 75 | 60 | 45 | 30 | 15 | 45 |
| Vacant (Temporary) [e] | | 16 | 16 | 34 | - | - | 13 |
| Total | | 500 | 400 | 300 | 200 | 100 | 300 |

[a] Source: Real Estate Research Corporation.
[b] Derived from ASPO, Standards for Outdoor Recreational Areas (ref. no. 02-001).
[c] Derived from Council of Educational Facility Planners, Guide for Planning Educational Facilities (ref. no. 03-021).
[d] Derived from Urban Land Institute, Innovations Vs. Traditions in Community Development (ref. no. 01-138).
[e] Derived by subtraction from rounded totals. Little significance to these quantities.
[f] 20% each of A-E.

# NEIGHBORHOOD COST ANALYSIS
## RESIDENTIAL

GUIDE SHEET # 24

| | Housing Pattern (1,000 Units) | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | D | E | F |
| | Single-Family Conventional | Single-Family Clustered | Townhouse Clustered | Walk-Up Apartment | High-Rise Apartment | Housing Mix (20 Percent Each A - E) |
| **Capital Costs** | | | | | | |
| Structure 1/ | | | | | | |
| Foundation | $ 2,739,000 | $ 2,739,000 | $ 1,608,000 | $ 1,616,040 | $ 1,844,262 | $ 2,109,260 |
| Shell | 20,373,000 | 20,373,000 | 8,843,200 | 4,789,200 | 6,995,434 | 12,274,767 |
| Plumbing | 3,207,000 | 3,207,000 | 2,440,000 | 2,440,000 | 2,440,000 | 2,746,800 |
| Heating | 1,444,000 | 1,444,000 | 1,044,000 | 1,049,220 | 1,304,478 | 1,257,140 |
| Electric lighting | 1,527,000 | 1,527,000 | 984,000 | 988,920 | 1,229,508 | 1,251,286 |
| Air conditioning | 432,000 | 432,000 | 292,800 | 296,460 | 914,634 | 473,578 |
| Subtotal | $29,722,000 | $29,722,000 | $15,212,000 | $11,179,840 | $14,728,316 | $20,112,831 |
| Paving, parking 1/ | 584,000 | 449,000 | 194,000 | 266,291 | 261,219 | 350,902 |
| Landscaping 2/ | 255,000 | 145,000 | 61,400 | 43,600 | 15,350 | 104,070 |
| Utility connectors 2/ | | | | | | |
| Sanitary sewerage | 332,085 | 280,995 | 158,457 | 24,981 | 8,367 | 160,977 |
| Storm drainage | 273,702 | 262,652 | 60,223 | 32,575 | 9,393 | 127,709 |
| Water supply | 460,850 | 403,000 | 283,868 | 47,922 | 12,159 | 241,561 |
| Gas | 199,895 | 179,862 | 120,770 | 77,734 | 71,724 | 129,997 |
| Electricity 3/ | 197,990 | 179,530 | 125,073 | 85,421 | 79,682 | 133,579 |
| Telephone | 119,990 | 101,530 | 47,073 | 7,420 | 1,882 | 55,579 |
| Subtotal | $ 1,584,512 | $ 1,407,569 | $ 795,464 | $ 276,053 | $ 183,407 | $ 849,402 |
| Total Capital Costs | $32,145,512 | $31,723,569 | $16,262,864 | $11,765,784 | $15,188,292 | $21,417,205 |
| Per Unit Cost | $ 32,146 | $ 31,724 | $ 16,263 | $ 11,766 | $ 15,188 | $ 21,417 |
| **Operating and Maintenance Costs** | | | | | | |
| Per Year | N.E. | N.E. | N.E. | N.E. | N.E. | N.E. |

Notes:

N.E. = Not estimated.

1/ Source: Derived from Boeckh Building Valuation Manual (ref. no. 01-005) and Marshall Valuation Service (ref. no. 01-072).

2/ Source: Means Building Construction Cost Data (ref. no. 09-013). Includes 30% for profit, overhead, and engineering fees for utility connectors.

3/ Assumes cost of electric meter = $60 per unit for all housing types.

GUIDE SHEET # 25

## NEIGHBORHOOD COST ANALYSIS
## OPEN SPACE/RECREATION

| | Housing Pattern (1,000 Units) | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | D | E | F |
| | Single-Family Conventional | Single-Family Clustered | Townhouse Clustered | Walk-Up Apartment | High-Rise Apartment | Housing Mix (20 Percent Each A - E) |
| Capital Costs 1/ | | | | | | |
| Recreation facilities and site development | $190,000 | $190,000 | $190,000 | $190,000 | $190,000 | $190,000 |
| Open space site development | 30,000 | 84,000 | 84,000 | 62,400 | 13,200 | 54,720 |
| Total | $220,000 | $274,000 | $274,000 | $252,400 | $203,200 | $244,720 |
| Operating and Maintenance Costs | | | | | | |
| Total per Year | $ 30,356 | $ 41,172 | $ 41,172 | $ 41,172 | $ 30,356 | $ 36,845 |

Notes:

1/ Source: Derived from community cost analysis, adjusted to Real Estate Research Corporation neighborhood prototype land budget.

Recreation and open space facilities assumed to be as follows:

| | Housing Type | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | D | E | F |
| Open space/recreation (acres) | | | | | | |
| Playground | 10 | 10 | 10 | 10 | 10 | 10 |
| Neighborhood park | 10 | 10 | 10 | 10 | 10 | 10 |
| Open space | 25 | 70 | 70 | 53 | 11 | 46 |
| Subtotal | 45 | 90 | 90 | 73 | 31 | 66 |
| Private recreation ("backyards") | 165 | 98 | 48 | 35 | 13 | 72 |
| Total | 210 | 188 | 138 | 108 | 44 | 138 |

Recreation and open space operation and maintenance assumed to be as follows:

| | Housing Type | | | | | | |
|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | F | |
| Number of employees | | | | | | | |
| Recreation | 2 | 2 | 2 | 2 | 2 | Average costs | |
| Open space | 1 | 2 | 2 | 2 | 1 | of Types A - E. | |

a/ Assumes Type F is average of costs of Types A - E.

b/ Assumes salary is 80% of total expenditure.

GUIDE SHEET # 26

NEIGHBORHOOD COST ANALYSIS
SCHOOLS

| | Housing Pattern (1,000 Units) | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | D | E | F |
| | Single-Family Conventional | Single-Family Clustered | Townhouse Clustered | Walk-Up Apartment | High-Rise Apartment | Housing Mix (20 Percent Each A - E) |
| Capital Costs 1/ | | | | | | |
| Elementary (1 school) | | | | | | |
| Structure | $3,013,650 | $3,013,650 | $2,550,780 | $2,550,780 | $ 695,970 | $2,550,780 |
| Furnishings | 452,048 | 452,048 | 382,617 | 382,617 | 452,048 | 382,617 |
| Parking, paving | 9,731 | 9,731 | 8,251 | 8,251 | 2,368 | 8,251 |
| Landscaping | 3,600 | 3,600 | 3,475 | 3,475 | 2,000 | 3,475 |
| Subtotal | $3,479,029 | $3,479,029 | $2,945,123 | $2,945,123 | $1,152,386 | $2,945,123 |
| Recreation | 121,000 | 121,000 | 110,000 | 110,000 | 88,000 | 110,000 |
| Subtotal | $3,600,029 | $3,600,029 | $3,055,123 | $3,055,123 | $1,240,386 | $3,055,123 |
| Secondary | | | | | | |
| Structure | $1,467,427 | $1,467,427 | $1,241,047 | $1,241,047 | $ 339,570 | $1,241,047 |
| Furnishings | 220,114 | 220,114 | 186,157 | 186,157 | 50,936 | 186,157 |
| Parking, paving | 11,115 | 11,115 | 9,400 | 9,400 | 2,572 | 9,400 |
| Landscaping | 2,871 | 2,871 | 2,428 | 2,428 | 664 | 2,428 |
| Recreation | 52,026 | 52,026 | 44,000 | 44,000 | 12,039 | 44,000 |
| Subtotal | $1,753,553 | $1,753,553 | $1,483,032 | $1,483,032 | $ 405,781 | $1,483,032 |
| Total Capital Costs | $5,353,582 | $5,353,582 | $4,538,155 | $4,538,155 | $1,646,167 | $4,538,155 |
| Operating and Maintenance Costs | | | | | | |
| Total per Year (excluding transportation) 2/ | $1,168,258 | $1,168,258 | $ 988,526 | $ 988,526 | $ 269,598 | $ 988,526 |

Notes:

1/ Source: Derived from community cost analysis; adjusted to various school populations according to housing type. School populations assumed to be as follows:

| | Housing Type | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | D | E | F |
| Elementary | 905 | 905 | 766 | 766 | 209 | 766 |
| Secondary | 363 | 363 | 307 | 307 | 84 | 307 |
| Other | 32 | 32 | 27 | 27 | 7 | 27 |
| Total | 1,300 | 1,300 | 1,100 | 1,100 | 300 | 1,100 |
| Pupils per dwelling unit | 1.3 | 1.3 | 1.1 | 1.1 | 0.3 | 1.1 |

Source: Derived from 1970 U.S. Census Data, General Social and Economic Characteristics, Tables 96, 99. Urban fringe areas. Also ASPO, Pupil Enrollment by Housing Type (ref. no. 03-010), Planned Unit Development (ref. no. 21-019), Barrington, Illinois Cost-Revenue Analysis of Land Use Alternatives (ref. no. 03-001) and Garden Apartment Development: A Municipal Cost-Revenue Analysis (ref. no. 03-016).

2/. Assumes $898.66 per pupil expenditure; consideration of busing transportation given in community cost analysis.
Source: School Management, January 1973 (ref. no. 03-024).

GUIDE SHEET # 27

## NEIGHBORHOOD COST ANALYSIS
## TRANSPORTATION - STREETS AND ROADS

| | Housing Pattern (1,000 Units) | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | D | E | F |
| | Single-Family Conventional | Single-Family Clustered | Townhouse Clustered | Walk-Up Apartment | High-Rise Apartment | Housing Mix (20 Percent Each A - E) |
| Capital Costs 1/2/ | | | | | | |
| Arterial Streets | $ 579,000 | $ 536,750 | $ 482,500 | $ 361,875 | $ 231,600 | $ 443,900 |
| Collector Streets | 337,680 | 832,140 | 651,240 | 542,110 | 300,312 | 612,648 |
| Minor Streets | 1,435,380 | 671,880 | 482,400 | 217,080 | 82,008 | 522,732 |
| Seeding 3/ | 16,832 | 12,306 | 7,479 | 4,871 | 2,617 | 8,085 |
| Subtotal - Capital Costs | $2,368,892 | $2,017,076 | $1,623,619 | $1,125,936 | $ 616,537 | $1,587,365 |
| Profit, Overhead, Engineering | 710,668 | 614,123 | 487,086 | 337,781 | 184,961 | 476,209 |
| Total Capital Costs | $3,079,560 | $2,661,199 | $2,110,705 | $1,463,717 | $ 801,498 | $2,063,574 |
| Operating and Maintenance Costs Per Year 4/ | $ 37,409 | $ 27,901 | $ 17,769 | $ 10,602 | $ 5,580 | $ 18,704 |

Notes:

1/ Road length calculations and standards used are presented below:

| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| Total Road Length | 60,000' | 44,750' | 28,500' | 17,005' | 8,950' | 30,000' |
| Arterial Streets | 6,000' | 5,500' | 5,000' | 3,750' | 2,400 | 4,600' |
| Percent of Total Length | 10% | 12% | 18% | 22% | 27% | 16% |
| R.O.W. Width | 100' | 100' | 100' | 100' | 100' | 100' |
| Collector Street | 7,000' | 17,250' | 13,500' | 8,755 | 4,850' | 12,700' |
| Percent of Total Length | 12% | 39% | 47% | 51% | 54% | 42% |
| R.O.W. Width | 60' | 60' | 60' | 70' | 70' | 60' |
| Minor Street | 47,000' | 22,000' | 10,000' | 4,500' | 1,700' | 12,700' |
| Percent of Total Length | 78% | 49% | 35% | 27% | 19% | 42% |
| R.O.W. Width | 50' | 50' | 60' | 60' | 60' | 40% 50', 60% 60' |

Source: Real Estate Research Corporation. Standards from Community Builder's Handbook (ref. no. 21-088) and Planning Design Criteria (ref. no. 21-034).

2/ Costs per lineal foot include curbs, gutters, sidewalks, lighting, earthwork. Storm sewers are costed separately. Minor roads in neighborhoods A, B and C are surfaced with bituminous materials. All other surfaces are concrete. Pavement widths are for traveled way and parking lanes only.
- Minor street, 50' R.O.W., 20' pavement width, 2 lanes, no parking - $30.54 per linear foot
- Minor or collector street, 60' R.O.W., 32', pavement width, 2 lanes, 1 parking lane - $48.24 per linear foot.
- Collector street, 70' R.O.W., 40' pavement width, 2 lanes, 2 parking lanes - $61.92 per linear foot.
- Major arterial street, 100' R.O.W., 64' pavement width, 4 lanes divided, with 2 parking lanes - $96.50 per linear foot.

Source: Madison-Madison, Adequacy and Cost Analysis of New Community Infrastructure (ref. no. 09-028), and engineering studies for Shenandoah and Nouville new communities (ref. nos. 13-089, 13-090).

3/ Cost of seeding within the right-of-way at $600 per acre:

A - 28 acres
B - 20.51 acres
C - 12.47 acres
D - 8.12 acres
E - 4.36 acres
F - 13.48 acres

Source: Means, Building Construction Cost Data (ref. no. 09-013).

4/ At $3,292 per mile per year. Includes cost of street cleaning.
Sources: Average of estimates found in Howard County: 1985 (ref. no. 21-066), Apartments in St. Louis County (ref. no. 01-105) and Do Single Family Homes Pay Their Way (ref. no. 01-069).

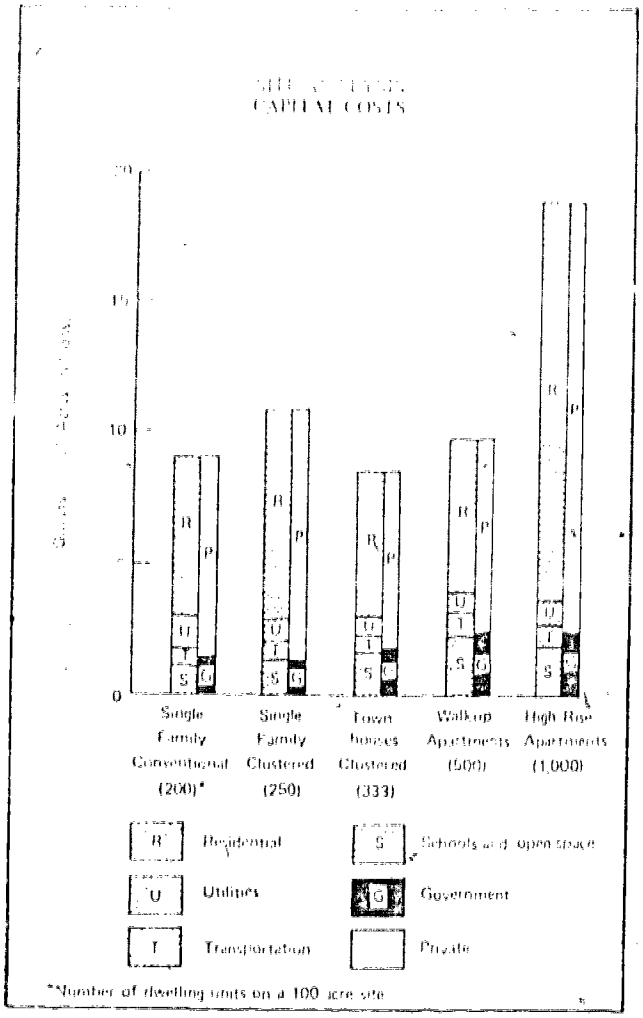
# GUIDE SHEET # 28

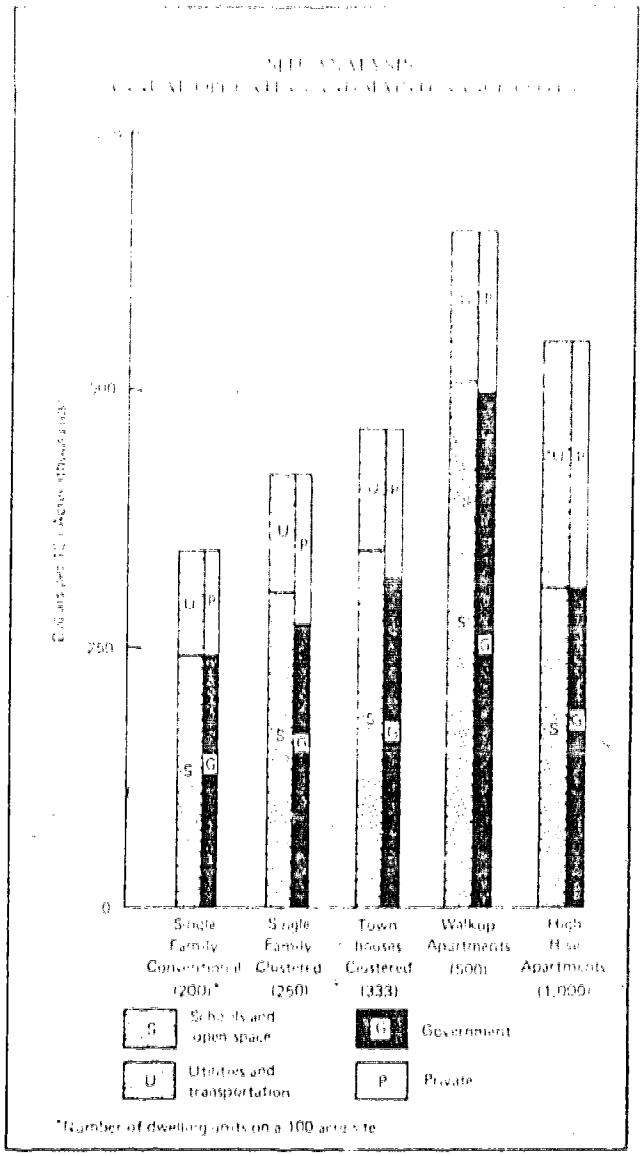
NEIGHBORHOOD COST ANALYSIS
UTILITIES-CAPITAL AND OPERATING COST SUMMARIES

| Cost Category | A: Single-Family Conventional Cost | A: Single-Family Conventional Percent of Total Cost | B: Single-Family Clustered Cost | B: Single-Family Clustered Percent of Total Cost | C: Townhouse Clustered Cost | C: Townhouse Clustered Percent of Total Cost | D: Walk-Up Apartment Cost | D: Walk-Up Apartment Percent of Total Cost | E: High-Rise Apartment Cost | E: High-Rise Apartment Percent of Total Cost | F: Housing Mix (20 Percent Each A - E) Cost | F: Housing Mix (20 Percent Each A - E) Percent of Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | (In thousands) | | | | | | | |
| **CAPITAL COSTS** | | | | | | | | | | | | |
| Water and Sewer | | | | | | | | | | | | |
| Sanitary Sewerage | $ 912 | 17% | $ 605 | 17% | $ 285 | 12% | $ 230 | 15% | $ 136 | 14% | $ 431 | 15% |
| Percent of A | - | | 66% | | 31% | | 25% | | 15% | | 47% | |
| Storm Drainage | $1,596 | 29% | $1,069 | 29% | $ 711 | 30% | $ 462 | 29% | $ 285 | 30% | $ 824 | 30% |
| Percent of A | | | 70% | | 46% | | 29% | | 18% | | 52% | |
| Water Supply | $2,443 | 45% | $1,620 | 44% | $1,043 | 44% | $ 735 | 47% | $ 447 | 47% | $1,262 | 45% |
| Percent of A | - | | 66% | | 43% | | 30% | | 18% | | 52% | |
| Subtotal | $4,951 | 90% | $3,293 | 90% | $2,139 | 90% | $1,428 | 90% | $ 868 | 91% | $2,517 | 90% |
| Percent of A | - | | 67% | | 43% | | 29% | | 18% | | 51% | |
| Energy and Communications | | | | | | | | | | | | |
| Gas | $ 161 | 3% | $ 107 | 3% | $ 68 | 3% | $ 53 | 3% | $ 31 | 3% | $ 84 | 3% |
| Percent of A | - | | 66% | | 42% | | 33% | | 20% | | 52% | |
| Electricity | $ 111 | 2% | $ 74 | 2% | $ 47 | 2% | $ 28 | 2% | $ 17 | 2% | $ 52 | 2% |
| Percent of A | - | | 67% | | 42% | | 25% | | 15% | | 47% | |
| Telephone | $ 259 | 5% | $ 176 | 5% | $ 115 | 5% | $ 70 | 4% | $ 42 | 4% | $ 128 | 5% |
| Percent of A | | | 68% | | 44% | | 27% | | 16% | | 49% | |
| Subtotal | $ 531 | 10% | $ 357 | 10% | $ 230 | 10% | $ 151 | 10% | $ 90 | 9% | $ 264 | 10% |
| Percent of A | - | | 67% | | 43% | | 28% | | 17% | | 50% | |
| Total Networks - Capital (not including plants) | $5,482 | 100% | $3,650 | 100% | $2,369 | 100% | $1,579 | 100% | $ 958 | 100% | $2,781 | 100% |
| Percent of A | - | | 67% | | 43% | | 29% | | 17% | | 51% | |
| **OPERATING AND MAINTENANCE COSTS** | | | | | | | | | | | | |
| Water and Sewer | | | | | | | | | | | | |
| Sanitary Sewerage | $ 32 | 7% | $ 31 | 6% | $ 28 | 8% | $ 27 | 10% | $ 23 | 9% | $ 29 | 8% |
| Percent of A | - | | 97% | | 87% | | 84% | | 72% | | 87% | |
| Water Supply | $ 32 | 7% | $ 32 | 7% | $ 30 | 9% | $ 30 | 11% | $ 26 | 11% | $ 30 | 8% |
| Percent of A | - | | 100% | | 94% | | 94% | | 81% | | 94% | |
| Subtotal | $ 64 | 13% | $ 63 | 13% | $ 58 | 17% | $ 57 | 21% | $ 49 | 20% | $ 58 | 16% |
| Percent of A | - | | 98% | | 91% | | 89% | | 77% | | 91% | |
| Energy and Communications | | | | | | | | | | | | |
| Gas | $ 201 | 42% | $ 201 | 42% | $ 139 | 41% | $ 109 | 39% | $ 93 | 38% | $ 148 | 40% |
| Percent of A | - | | 100% | | 69% | | 54% | | 46% | | 74% | |
| Electricity | $ 219 | 45% | $ 219 | 45% | $ 143 | 42% | $ 112 | 40% | $ 101 | 42% | $ 159 | 44% |
| Percent of A | - | | 100% | | 65% | | 51% | | 46% | | 73% | |
| Subtotal | $ 420 | 87% | $ 420 | 87% | $ 282 | 83% | $ 221 | 79% | $ 194 | 80% | $ 307 | 84% |
| Percent of A | - | | 100% | | 67% | | 53% | | 46% | | 73% | |
| Total Operating and Maintenance | $ 484 | 100% | $ 483 | 100% | $ 340 | 100% | $ 278 | 100% | $ 243 | 100% | $ 365 | 100% |
| Percent of A | - | | 100% | | 70% | | 57% | | 50% | | 75% | |

Note: No operating cost estimates are included for storm drainage and telephone.

Source: Real Estate Research Corporation.




NOTE: It is important to realize that the bar graph comparison is done for the number of dwellings per hundred acre site. To make the comparison better the data should be rationalized to the same number of dwellings for each neighborhood type.

# GUIDE SHEET # 30

NEIGHBORHOOD COST ANALYSIS
INCIDENCE OF COST
CAPITAL COSTS
(in thousands)
(For 1,000 Dwelling Units)

| | A Single-Family Conventional | | B Single-Family Clustered | | C Townhouse Clustered | | D Walk-Up Apartment | | E High-Rise Apartments | | F Housing Mix (20 Percent Each A - E) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Government | Private | Government | Private | Government | Private | Government | Private | Government | Private | Government | Private |
| | * | $32,146 | * | $31,724 | * | $16,263 | * | $11,766 | * | $15,185 | * | $21,817 |
| creation | $ 176 | 44 | $ 192 | 82 | $ 164 | 110 | $ 151 | 101 | $ 102 | 101 | $ 147 | 96 |
| | 4,816 | 536 | 4,016 | 536 | 4,084 | 454 | 4,084 | 454 | 1,451 | 165 | 4,084 | 454 |
| ds | 616 | 2,464 | 798 | 1,863 | 633 | 1,478 | 439 | 1,025 | 320 | 481 | 619 | 1,445 |
| | 1,097 | 4,386 | 730 | 2,919 | 474 | 1,895 | 316 | 1,263 | 257 | 671 | 556 | 2,226 |
| | 526 | 2,102 | 260 | 2,336 | 170 | 1,534 | 505 | 1,178 | 570 | 1,330 | 405 | 1,634 |
| | $ 7,233 | $41,678 | $ 6,798 | $39,460 | $ 5,525 | $21,734 | $ 5,495 | $15,767 | $ 2,760 | $17,936 | $ 5,814 | $27,274 |
| | 15% | 85% | 15% | 85% | 20% | 80% | 26% | 74% | 13% | 87% | 18% | 82% |

| | A | | | B | | | C | | | D | | | E | | | F | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ership | Capital Cost | Service Charge | Taxes | Capital Cost | Service Charge | Taxes | Capital Cost | Service Charge | Taxes | Capital Cost | Service Charge | Taxes | Capital Cost | Service Charge | Taxes | Capital Cost | Service Charge | Taxes |
| | $29,722 | $ 0 | $ 0 | $29,722 | $ 0 | $ 0 | $ 7,606 | $ 7,606 | $ 0 | $ 2,236 | $ 8,944 | $ 0 | $ 2,946 | $11,782 | $ 0 | $12,068 | $ 8,045 | $ 0 |
| d Landscaping | 839 | 0 | 0 | 594 | 0 | 0 | 126 | 127 | 0 | 62 | 246 | 0 | 55 | 222 | 0 | 273 | 182 | 0 |
| ation | 951 | 634 | 0 | 845 | 563 | 0 | 239 | 597 | 0 | 26 | 246 | 0 | 16 | 165 | 0 | 255 | 594 | 0 |
| Recreation | 22 | 22 | 176 | 27 | 27 | 192 | 27 | 82 | 165 | 0 | 101 | 151 | 0 | 102 | 101 | 25 | 73 | 147 |
| | 0 | 535 | 4,819 | 0 | 535 | 4,819 | 0 | 454 | 4,084 | 0 | 454 | 4,084 | 0 | 165 | 1,481 | 0 | 454 | 4,084 |
| Bonds | 2,464 | 0 | 616 | 1,863 | 0 | 798 | 633 | 845 | 633 | 147 | 878 | 439 | 80 | 401 | 320 | 413 | 1,032 | 619 |
| | 4,387 | 548 | 548 | 3,919 | 365 | 365 | 948 | 1,185 | 236 | 155 | 1,263 | 156 | 96 | 766 | 96 | 1,113 | 1,391 | 278 |
| | 2,102 | 0 | 526 | 2,336 | 0 | 260 | 652 | 652 | 170 | 105 | 1,010 | 505 | 1,140 | 1,140 | 570 | 1,021 | 613 | 408 |
| | $40,487 | $ 1,739 | $ 6,685 | $38,306 | $ 1,518 | $ 6,434 | $10,263 | $11,706 | $ 5,288 | $ 2,799 | $13,146 | $ 5,337 | $ 3,385 | $14,743 | $ 2,568 | $15,166 | $12,384 | $ 5,536 |
| ent | 81 | 3 | 14 | 83 | 3 | 14 | 36 | 43 | 19 | 13 | 63 | 25 | 16 | 71 | 13 | 46 | 37 | 17 |

Source: Real Estate Research Corporation.

# GUIDE SHEET # 31

NEIGHBORHOOD COST ANALYSIS
INCIDENCE OF COST
OPERATING AND MAINTENANCE COSTS
(In thousands)

(For 1,000 Dwelling Units)

| Initial Cost Incidence | A Single-Family Conventional | | B Single-Family Clustered | | C Townhouse Clustered | | D Walk-Up Apartment | | E High-Rise Apartment | | F Housing Mix (20 Percent Each A - E) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Government | Private | Government | Private | Government | Private | Government | Private | Government | Private | Government | Private |
| Open Space/Recreation | $ 24 | $ 6 | $ 29 | $ 12 | $ 25 | $ 16 | $ 25 | $ 16 | $ 15 | $ 15 | $ 22 | $ 15 |
| Schools | 1,051 | 117 | 1,051 | 117 | 890 | 99 | 890 | 99 | 243 | 27 | 890 | 99 |
| Streets and Roads | 37 | 0 | 28 | 0 | 18 | 0 | 11 | 0 | 6 | 0 | 19 | 0 |
| Utilities | 48 | 436 | 48 | 435 | 68 | 272 | 36 | 222 | 49 | 194 | 73 | 292 |
| Total | $1,160 | $ 559 | $1,156 | $ 564 | $1,001 | $ 387 | $ 962 | $ 339 | $ 313 | $ 236 | $1,004 | $ 406 |
| Percent | 67% | 33% | 67% | 33% | 72% | 28% | 74% | 26% | 57% | 43% | 71% | 29% |

| Cost to the Household | A Service Charge | A Taxes | B Service Charge | B Taxes | C Service Charge | C Taxes | D Service Charge | D Taxes | E Service Charge | E Taxes | F Service Charge | F Taxes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Open Space/Recreation | $ 6 | $ 24 | $ 12 | $ 29 | $ 16 | $ 25 | $ 16 | $ 25 | $ 15 | $ 15 | $ 15 | $ 22 |
| Schools | 117 | 1,051 | 117 | 1,051 | 99 | 890 | 99 | 890 | 27 | 243 | 99 | 890 |
| Streets and Roads | 0 | 37 | 0 | 28 | 0 | 19 | 0 | 11 | 0 | 6 | 0 | 19 |
| Utilities | 484 | 0 | 483 | 0 | 340 | 0 | 279 | 0 | 243 | 0 | 365 | 0 |
| Total | $ 607 | $1,112 | $ 612 | $1,108 | $ 455 | $ 933 | $ 393 | $ 926 | $ 285 | $ 264 | $ 479 | $ 931 |
| Percent | 35% | 65% | 36% | 64% | 33% | 67% | 30% | 70% | 52% | 48% | 34% | 66% |

Source: Real Estate Research Corporation

GUIDE SHEET # 32

# NEIGHBORHOOD COST ANALYSIS
## AIR POLLUTION

| | Housing Pattern (1,000 Units) | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | D | E | F |
| | Single-Family Conventional | Single-Family Clustered | Townhouse Clustered | Walk-Up Apartment | High-Rise Apartment | Housing Mix (20 Percent Each A - E) |
| Pollutants from Residential Natural Gas Consumption (pounds per day) 1/ 2/ 3/ | | | | | | |
| Particulates | 14.27 | 14.27 | 9.56 | 7.42 | 6.48 | 10.40 |
| $SO_x$ | .48 | .48 | .32 | .25 | .22 | .35 |
| CO | .32 | .32 | .21 | .16 | .14 | .23 |
| HC | 31.72 | 31.72 | 21.24 | 16.48 | 14.40 | 23.11 |
| $NO_x$ | 95.16 | 95.16 | 63.72 | 49.44 | 43.20 | 69.34 |

Notes:

1/ Assumes 67% of dwelling units use natural gas for heating, water heating, cooking, and clothes drying. 33% use no natural gas; no pollution effects of electricity use are calculated, as the location of the power plant is assumed to be external to the neighborhood.
Source: U. S. Department of Commerce, C-25 Construction Reports (ref. no. 01-152).

2/ Residential natural gas consumption assumed to be:

| Housing Type | Consumption (Cubic Feet per Day) (rounded to nearest thousand) |
|---|---|
| A | 793,000 |
| B | 793,000 |
| C | 531,000 |
| D | 412,000 |
| E | 360,000 |

Daily Consumption amount is based on average winter month consumption assuming 80% of total annual consumption occurs in five winter months. 1 cubic foot of gas equals 1000 BTUs.
Source: Hittman Associates, Residential Energy Consumption Vols. I and II (ref. nos. 14-008 and 14-009).

3/ Emission quantities from residential natural gas consumption assumed to be:

| Pollutant | Amount (Pounds per $10^6$ Cubic Feet) |
|---|---|
| Particulates | 18.0 |
| $SO_x$ | 0.6 |
| CO | 0.4 |
| HC | 40.0 |
| $NO_x$ | 120.0 |

Source: Kaman Services Corp., Land Use Planning In Pikes Peak Area (ref. no. 17-036).

GUIDE SHEET # 33

# NEIGHBORHOOD COST ANALYSIS
## WATER POLLUTION AND EROSION

| | Housing Pattern (1,000 Units) | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | D | E | F |
| | Single-Family Conventional | Single-Family Clustered | Townhouse Clustered | Walk-Up Apartment | High-Rise Apartment | Housing Mix (20 Percent Each A - E) |
| **Sediment from Erosion** | | | | | | |
| Average Annual Volume during Development Period (Tons per Year) 1/ | 597.32 | 426.73 | 282.09 | 203.76 | 115.81 | 325.34 |
| **Pollutants from Storm Run-Off** | | | | | | |
| Total Volume (Liters per Year) 2/* | 818,986,080 | 606,529,440 | 459,180,480 | 339,245,280 | 171,336,000 | 476,314,080 |
| Pollutants (Kilograms per Year) 3/ | | | | | | |
| BOD | 19,082.4 | 14,132.1 | 10,698.9 | 7,904.4 | 3,992.1 | 11,093.1 |
| COD | 51,596.1 | 38,211.4 | 28,928.4 | 21,372.5 | 10,794.2 | 30,007.8 |
| N | 2,211.3 | 1,637.6 | 1,239.8 | 915.0 | 462.6 | 1,286.1 |
| P | 655.2 | 485.2 | 367.3 | 271.4 | 137.1 | 381.1 |
| S. Solids | 818,986.1 | 606,529.4 | 459,180.5 | 339,245.3 | 171,136.0 | 476,314.1 |
| FCB (Number x $10^{-6}$ per Year) | 995,887.0 | 737,539.0 | 558,363.0 | 412,522.0 | 208,344.0 | 579,197.0 |

Notes:

1/ Volume of sediment calculated as follows:

a. Volumes of sediment (tons per square mile per year) assumed as follows:

| Land Use | Sediment |
|---|---|
| Wooded areas | 100 |
| Agricultural Areas | 300 |
| Vacant Land and Permanent Open Space | 200 |
| Developed, Urbanized Areas | 700 |
| Construction Areas | 2,300 |

Source: Interstate Commission of the Potomac River Basin, Land Run-Off (ref. no. 15-019).

b. Average duration of construction activity assumed to be .5 years.

c. Areas derived from neighborhood prototype land budgets.

d. Average annual volume of sediment during development period calculated according to following:

Vacant or Permanent Open Space Areas (square miles) x 200 tons per square mile per year x 10 years
Developed Areas (square miles) x 700 tons per square mile per year x 10 years
Developed Areas (under construction) (square miles) x 2,300 tons per square mile per year x .5 year
Total Volume of Sediment (in tons) during Development Period, 10 years
Total Volume of Sediment (in tons, 10 years) ÷ 10 = Average Annual Volume of Sediment (in tons)

2/ Volume of storm run-off calculated by use of rational formula as follows:

a. Coefficients of run-off assumed as follows:

| Land Use | Run-Off Coefficient |
|---|---|
| Residential | |
| Housing Types A, B | .40 |
| Housing Type C | .50 |
| Housing Types D, E | .60 |
| Open Space/Recreation | .20 |
| Schools | .25 |
| Other Public Facilities | .60 |
| Transportation | .60 |
| Vacant | .20 |

3/ Pollutant quantities from storm water run-off assumed to be:

| Pollutant | Quantity |
|---|---|
| BOD | .0233 grams per liter |
| COD | .0630 grams per liter |
| N | .0027 grams per liter |
| P | .0008 grams per liter |
| S.S. | 1.0000 grams per liter |
| FCB | 1,216.0 number of bacteria per liter |

GUIDE SHEET # 34

## NEIGHBORHOOD COST ANALYSIS
## NOISE

| Noise Sources | Housing Pattern (1,000 Units) A Single-Family Conventional | B Single-Family Clustered | C Townhouse Clustered | D Walk-Up Apartment | E High-Rise Apartment |
|---|---|---|---|---|---|
| Children | Noise confined to that produced by residents' own children or friends. Small lots less than 1/4 acre may have some noise spillover from neighboring yards. | Shared common open space may lead to concentrations of children in places remote from their own home - i.e., playgrounds, tot lots. May cause some localized nuisance to nearby homes. | Same as B. | Same as B. | Noise from children at ground level offset by increased height. Lower floors may be subject to greater than average nuisance. Concentration of children in common areas will result in localization of noise impacts. |
| Lawn mowers and other outdoor equipment | Need for considerable mowing. Frequency not sufficient to create serious nuisance. | Common green areas likely to be mowed professionally at one time during working hours rather than evenings or weekends. | Same as B. | Same as B. | Same as B for lower floors; decreased impact above third or fourth floor. |
| Air conditioners | Less noise impact from individual window units due to low density. Central air conditioning units vary considerably in noise created. | Closer proximity of dwelling units may cause more nuisance from neighbor's window or central air conditioning units. | Noise could be a considerable nuisance where units are located around small court-yards where reverberation could occur. | Same as C. | Same as C. |
| Garbage collection | Individual pickup per unit causes many stops and repetition of noise created by compaction. Noise offset somewhat by setback distance. | Similar to A. | Noise from pickup will be localized at specific central collection points. | Same as C. | Same as C. Less exposure on upper floors. |
| Adjacent dwellings | No walls or floors shared with other dwelling units; minimal noise from neighboring structures. | Dwelling units closer together resulting in greater noise impact than in A. | Common walls between units; noisier than detached dwellings. Impact will depend on quality of construction. | Common walls; shared ceilings. Noisier than detached dwellings or townhouses. Impact will depend on quality of construction. | Same as D. |

Source: Derived with reference to U. S. Environmental Protection Agency, Community Noise (ref. no. 16-013).

GUIDE SHEET # 35

## NEIGHBORHOOD COST ANALYSIS
## DISCRETIONARY TIME

| | Housing Pattern (1,000 Units) | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | D | E | F |
| | Single-Family Conventional | Single-Family Clustered | Townhouse Clustered | Walk-Up Apartment | High-Rise Apartment | Housing Mix (20 Percent Each A - E) |
| Discretionary Time 1/ (Hours per Person per Week) | | | | | | |
| Head of Household | | | | | | |
| Household maintenance or improvement, housekeeping 2/ | 12 | 10 | 9 | 6 | 6 | Varies by |
| Leisure | 24 | 26 | 27 | 30 | 30 | housing |
| Total | 36 | 36 | 36 | 36 | 36 | type |
| Spouse Not Employed | | | | | | |
| Household maintenance or improvement, housekeeping | 40 | 40 | 32 | 24 | 24 | Varies by |
| Leisure | 34 | 34 | 42 | 50 | 50 | housing |
| Total | 74 | 74 | 74 | 74 | 74 | type |
| Employed Spouse | | | | | | |
| Household maintenance or improvement, housekeeping | 24 | 24 | 20 | 16 | 16 | Varies by |
| Leisure | 12 | 12 | 16 | 20 | 20 | housing |
| Total | 36 | 36 | 36 | 36 | 36 | type |

Notes:

1/ Derived from following budgets of time, illustrative of weekly schedules of head of household and spouse.

| | Head of Household | Spouse Not Employed | Employed Spouse |
|---|---|---|---|
| Total Time per Week (Hours) | 168 | 168 | 168 |
| Sleep | 56 | 56 | 56 |
| Work | 40 | - | 40 |
| Meals | 17 | 17 | 17 |
| Personal | 12 | 12 | 12 |
| Travel | 7 | 9 | 7 |
| Total | 132 | 94 | 132 |
| Net amount allocated between leisure, household maintenance and improvement, and housekeeping | 36 | 74 | 36 |

2/ Assumes that exterior maintenance burden will be less in single-family clustered neighborhoods (where homeowners' associations often provide exterior maintenance) than for conventional single-family homes.

Source: Derived from Walker and Gauger, The Dollar Value of Household Work (ref. no. 19-018).

| | A<br>Single-Family Conventional | B<br>Single-Family Clustered | C<br>Townhouse Clustered | D<br>Walk-Up Apartment | E<br>High-Rise Apartment | F<br>Housing Mix<br>(20 Percent Each A - E) |
|---|---|---|---|---|---|---|
| Privacy | Detached units, private lots with possible use of landscaping to increase privacy. | Detached units, same as A, but somewhat less privacy due to greater density. | Attached or semi-detached units, no hallways or internal common areas; less external privacy. | Attached units, buildings contain hallways, other common areas, shared open space, building lot and parking area | Same as D. | Not applicable |
| Comfort | Depends upon expenditure for housing amenities and facilities | Same as A. | Same as A | Same as A, perhaps less room for living and storage. | Same as D. | |
| Security | Relative isolation; depends on frequency of crime in area. | Same as A. | Same as A | Less isolation; depends on crime rate and security provisions within building. | Same as D. | |
| Status | Depends on perception of socio-economic level of neighborhood: property values, age, school system, etc | Same as A. | Same as A. | Same as A. | Same as A. | |
| Possession | Typically owner-occupied. | Same as A. | Same as A, some rental units | Typically rented; some condominium ownership. | Same as D | |
| Responsibility | Substantial time and effort for both internal and external maintenance and improvement. | Same as A. | Less time and effort for maintenance and improvement | Renter has little or no responsibility for maintenance, condominium owner has responsibility for own unit. | Same as D. | |
| Authority | Homeowner has choice, and greater involvement in decision-making process of neighborhood and community. | Same as A. | Same as A | Some degree of participation, but less than A; usually through neighborhood association, if one exists | Same as D. | |
| Aesthetic | Depends upon builder-developer although good deal of latitude in choice of style, features in new homes. | Same as A; more aesthetic design possible with greater open space. | Same as B. | Renter has little choice in design or style; depends on builder-developers concern for aesthetics | Same as D | |

Source: Real Estate Research Corporation.
Derived with reference to Planned Residential Environments (ref. no. 21-075), Planning and the Purchase Decision (ref. no. 23-019), Perception of the Housing Environment (ref. no. 23-004), and Residential Environmental Preferences and Choice (ref. no. 23-012)

GUIDE SHEET # 37

# MAJOR CONCLUSIONS OF THE COST OF SPRAWL STUDY

Stated in the most general form, the major conclusion of this study is that, for a fixed number of households, "sprawl" is the most expensive form of residential development in terms of economic costs, environmental costs, natural resource consumption, and many types of personal costs. The major economic cost relationships are indicated in Charts 1, 3 and 4. This cost difference is particularly significant for that proportion of total costs which is likely to be borne by local governments. In terms of alternative development patterns for a given site, the study indicates that better planning will reduce all types of costs and their incidence on government but that increasing density will increase some of these costs, though not nearly in proportion to the increased number of households who can live on the site with increased density. These conclusions are explained in somewhat more detail below:

1. Planned development of all densities is less costly to create and operate than sprawl in terms of environmental costs, economic costs, personal costs, and energy consumption. These cost differences are particularly significant in terms of those costs borne by local governments.

a. With regard to total capital costs, planned community development for 10,000 dwelling units saves $15.3 million (four percent) over sprawl development with the same housing mix. Approximately 60 percent of these total costs is consumed by housing, leaving a difference of 8 to 12 percent in non-housing costs. Major cost savings are attributable to the following (see Table 3 and Chart 1):

   - A savings of just under $11 million (approximately 15 percent) in road and utility costs. Cost savings are due to elimination of "leapfrogging" which involves costly road and utility connections between neighborhoods.

   - A savings of over $4 million (or 20 percent) in land costs due to more contiguous, compact development in the planned community.

b. Planned development is likely to decrease the total capital cost burden to local government by as much as one-third because a larger proportion of land and facilities for open space, roads, and utilities is likely to be provided by the developers.

   - Holding density constant, capital costs borne by government are seven to eight percent less in planned communities compared to sprawl. These savings amounted to over $37 million in the medium density communities and $40 million in the low density communities over a ten year development period.

c. The on-going operating and maintenance costs of most public or semi-public services -- education, recreation, sewage treatment, water supply, general government, police and fire protection -- are largely based on population size rather than development pattern or even housing type. For utilities (sewer, water, gas, electricity, telephone) ongoing costs are largely based on consumption of resources and production of wastes; maintenance of pipe and cables is a comparatively small proportion of total cost (see Table 4).

- Savings between planned and sprawl development in operating costs borne by government are five to six percent of total costs, or over $1 million in the tenth year of development.

d. Planned development shows significant environmental advantages over sprawl (Table 5 and Chart 2) through:

- Twenty to thirty percent less air pollution resulting from reduced automobile travel
- Conservation of open space
- Preservation of significant wildlife and vegetation habitats
- Improved site design to minimize noise impacts
- Careful land use design so as to minimize the amount of soil disturbed and paved over (thus lowering slightly the volume of storm water run-off, sedimentation, and water pollution).

e. Contrasting the environmental effects of constructing sprawl communities on a specified site shows that planned development would be superior in a number of ways:

- Fewer miles of road are likely to fall within areas with poor air movement or on poor soils.
- Fewer dwellings will be directly affected by noise and air pollution from expressways and arterial roads.
- Less soil would be eroded as there would be virtually no development on steep slopes or flood plains.
- Less woodland would be cleared, minimizing the adverse effects of development on vegetation and wildlife habitats.

f. Energy consumption, because of reduced automobile travel, will be from 8 to 14 percent less in planned development than in unplanned developments (Table 5 and Chart 2). Water consumption is essentially the same in planned and unplanned developments unless special conservation measures are planned.

g. Various personal costs such as time spent in travel, traffic accidents, and various types of psychic costs are likely to be less in planned development than in sprawl (Table 5). Some particular aspects of this difference are:

- Reduced automobile use and more efficient vehicular circulation in planned developments
- Design of facilities and use of open space to preserve and enhance the visual environment
- Placing facilities in relation to one another in order to increase convenience and to reduce negative impacts as from traffic noise.

2. Economic and environmental costs (as well as resource consumption) are likely to be significantly less at higher densities to house and service a given population (1,000 households). Some personal costs, however, may increase with increasing density.

a. Total per dwelling unit capital costs (including residential, open space/recreation, schools, roads, utilities and land) range from $48,900 for single-family conventional housing at two units per acre to $20,700 for high-rise apartments at 10 units per gross acre (which is equivalent to 30 units per net residential acre). (See Table 6 and Chart 3.)

- The cost of housing is least for walk-up apartments (5 units per gross acre), being only 37 percent of housing costs at a density of 2 units per gross acre. Housing costs at a density of 10 units per gross acre are somewhat higher than for walk-up apartments, but are still only 47 percent of the housing costs at 2 units per gross acre.

- Even when all the different types of dwelling units contain the same inside living area, the cost of walk-up apartments is only 57 percent of the cost of single family houses (see Chapter IV, Sensitivity Analysis).

- The cost of roads and utilities for housing at 10 units per gross acre is $6.7 million less than at two units per gross acre (a savings of almost 80 percent).

- The amount of land required is substantially reduced (even though the cost per gross acre tends to be higher for increased density).

b. Because operating costs for schools, sewage disposal, and water supply are largely based on household population, they are likely to be lower per dwelling unit for denser developments, but this difference disappears when the different densities are adjusted for a constant population. (See Table 7 and Chart 3.)

- However, operating costs per unit for electricity and gas decrease significantly as density increases because less energy is consumed per unit.

c. The total capital costs likely to be borne by local government are reduced as much as 62 percent in denser developments because of the lower costs of roads and public utilities.

- Public operating costs may be reduced by 73 percent.

d. Increased density reduces total environmental costs but increases the concentration of pollution. (Table 8.)

- Air pollution from natural gas used by residences is reduced by more than half at densities of 10 units per gross acre compared to densities of 2 units per acre. However, the amount of air pollution emitted from this source per acre of development will more than double.

- Similarly, sediment during construction and water pollution from storm water runoff may be 80 percent less with the denser developments, but the concentration of the pollution will be somewhat greater.

e. Energy and water consumption may be reduced by approximately 40 percent in high density developments (see Table 5).

- The reduced energy consumption results both from reduced automobile transportation and reduced space heating and cooling requirements.

- The reduced water consumption results primarily from reduced lawn watering.

f. Some personal costs may increase with denser developments (see Table 8):

- At higher densities, noise impacts are likely to be more severe and overall satisfaction with the residential environment tends to decrease.

- On the positive side, higher density living increases leisure time available by reducing household maintenance responsibilities.

- Psychic costs, such as those associated with a loss of privacy, may increase with higher densities. However, good design can mitigate many of these problems.

3. Thus, while planning results in cost savings, density is a much more influential cost determinant. Clearly, the greatest cost advantages occur when higher density planned developments are contrasted with low density sprawl. (See Tables 3 and 4 and Chart 1.)

a. Total capital costs for the high-density planned community are 56 percent of those for the conventional low density sprawl development, resulting in a cost savings of $227.5 million for communities with 10,000 housing units.

b. Savings in land costs amount to 43 percent ($12,725,000), with savings of 40 percent for streets ($15,103,000), and 63 percent for utilities ($39,542,000).

c. Operating and maintenance costs in the high density planned community are estimated to be approximately $2 million (11 percent) less per year than the low density sprawl development after completion of the total development. Savings are largely due to less road and utility pipe lengths and reduced gas and electric consumption in the high density community.

d. Compared to low density sprawl, the amount of total capital costs borne by local government may decrease by almost 50 percent for high density planned communities. Operating and maintenance costs borne by local government may decrease by 13 percent.

e. Total air and water pollution and other forms of environmental degradation are similarly reduced. Air pollutants from automobiles are reduced 50 percent and those from space heating and other natural gas uses are reduced 40 percent. Sediment is reduced 30 percent and total storm water runoff 20 percent.

f. Energy consumption is reduced 44 percent and water consumption 35 percent in high density planned communities as compared to low density sprawl communities.

4. When alternative residential developments are considered for a given site size (e.g., 100 acres), development costs increase with density, but not as rapidly as the increase in the number of dwelling units which can be accommodated. (See Chart 4 and Chapter IV, Section F.)

a. Exclusive of land and residential costs, capital costs range only between $28,000 and $39,000 per acre. Yet within this range, anywhere from two to ten households per gross acre can be built. Considering total capital costs, five times as many high-rise units as single-family homes can be accommodated on a given site at half the per dwelling unit cost.

b. While density increases from two to ten dwelling units per gross acre (3 to 30 dwelling units per net residential acre), capital costs borne by government almost double (to $2.76 million) and operating and maintenance costs increase 35 percent (to $313,000 per year).

c. For a given site size, air pollution is more concentrated as density increases. The amount of air pollutants from an area developed at 10 units per gross acre is more than double that found in a neighborhood of single-family homes built at two units per acre; emissions from a site with 3.3 units per gross acre would be more than 10 percent greater than at two units per acre.

d. Total energy consumption (excluding transportation) increases approximately 120 percent when the density of a given site increases from two to ten dwelling units per gross acre (an increase of 500 percent). Residential water use will also increase, but again not as rapidly as the number of dwelling units.

e. Many personal costs, particularly those associated with privacy and personal ownership, will increase with increasing densities.

5. Variation in certain basic study assumptions leads to the following conclusions:

a. Doubling or tripling the population assumed in the base analysis would allow the community to support additional services--e.g. vocational and other specialized educational services, regional parks, community health clinics, and public transportation. Diseconomies of scale would be experienced with regard to solid waste collection; some operating economies are likely to be realized for schools, police, fire, libraries, government administration. Significant economies (both capital and operating) would be found for solid waste disposal and sewage and water treatment.

b. The effect of extreme site conditions (poor soil, very flat or very steep slopes, absence of ground and surface water sources, high water table, dense or sparse ground cover, extreme climate) will be to either greatly increase development costs or prohibit development altogether. Where planned development minimizes construction in areas poorly suited for development, significant cost savings can occur. In one example (see Chapter V, Section F) of planned and sprawl development on an assumed site, the sprawl community incurred over $2,387,000 in increased costs (beyond those normally incurred under typical site conditions) due to development in areas with fair to poor suitability for construction while the planned community showed much less development in such areas, resulting in only $850,000 in cost increases -- a difference of $1.5 million, or $150 per household.

6. Given a constant amount of floor space (200,000 square feet), shopping center commercial areas will be 20 percent (approximately $1.5 million) less costly to build and service with roads and utilities than a strip commercial area. (See Table 9.) Savings are largely due to lower land prices per acre in shopping centers than are found for commercial strips. Smaller savings are found for off-site utility and road costs. Environmentally, the strip compares poorly with the shopping center because:

a. The strip is less appealing visually.

b. It takes longer to build (due to incremental construction) thus causing greater sedimentation.

c. The strip configuration encourages multiple stops on shopping trips, thus increasing auto emissions.

d. Traffic accidents are more likely to occur in the strip than the center, which generally has better access control.

7. Although this study provides important basic data about the costs of alternative development patterns, there are some important questions which have not been addressed or are not explored in adequate detail. Some of these questions which are expected to be analyzed in future studies in this series are the various effects at the metropolitan level of alternative development patterns, the costs of replacing facilities which become inadequate to service expanding populations, the effect of including financing costs in the economic cost analyses, and more extensive analysis of cost incidence.

## WORDS WORTH KNOWING

ACCESS. Term used to describe an egress or entry requirements.

ATTRACTIVENESS. A term used to describe the supportive characteristics of a land use: the criteria that describe where a land use should be based upon access, proximity requirements and site characteristics.

AQUIFER. Water-bearing stratum of rock, gravel or sand.

AQUIFER RECHARGE AREA. Point of interchange between surface waters and aquifer.

BIKEWAY. Separate bicycle lanes, selected streets or roads; or specially built paths that are marked as areas set aside for bicycle traffic.

BUILDABILITY. The ability to build in a place without causing severe environmental impact.

BUILDABILITY COMPOSITE. A composite of single factor maps which give information on areas where building can take place without causing severe environmental impact.

CLUSTER HOUSING. Lots of reduced dimensions are clustered around open space owned in common.

COMMERCIAL LAND USE. Business involved in the sale or rental of goods, services or commodities, either on rental or wholesale basis; entertainment activities and business or professional offices.

CONSERVATION (LAND). A supervision of rivers and forests, etc.

COST-BENEFIT ANALYSIS. Analysis of the factors contributing to the costs of operating a business and of the costs which will result from alternative procedures, and of their effects on profits.

ERODIBILITY. The ability or potential of a soil to erode when development is introduced on it.

EXTRACTION INDUSTRY. Extraction of materials from the land; sale or use of extracted material is, usually done by persons other than the owner of the land.

FLOOD PLAIN. A plain bordering a river and made of sediment carried by the stream and deposited during floods.

FOUNDATION SUITABILITY. The ability of the land to accept and support a foundation for a building without severe environmental impacts.

GROUND-WATER. Water contained in the zone of saturation in the soil and in aquifers.

HEAVY INDUSTRY. Industry that manufactures products, such as machinery or steel, for use by other industries. Heavy industries usually require large facilities and process large quantities of materials. Pollutants and waste-by products are normally companions of the operation.

INDUSTRIAL LAND USE. The manufacturing, production, assembly or distribution of goods and materials; light and heavy industry.

INSTITUTIONAL LAND USE. Non-commercial activities which serve the public and are owned and operated by public bodies or agencies; also called community facilities.

LAND USE ALLOCATION PLAN. Plan resulting from synthesizing of environmental impact composite map and land use attractiveness map; plan indicates where future land uses can be located without causing environmental impacts and locational criteria is satisfied.

LIGHT INDUSTRY. Refers to non-polluting, non-waste producing industries. This includes manufacturing, production, assembly and distribution of goods and materials.

LOCATIONAL CRITERIA. The requirements deemed necessary for the locating of a land use in its most attractive place.

MULTI-FAMILY RESIDENCE. A building designed for occupancy, in separate living spaces, by more than one family for permanent year-round residency.

OPEN SPACE. A predominatly vacant land or water area of sufficient size, utility or beauty. It's presence is a public benefit.

OVERLAY. A graphic technique using clear plastic sheets which allow different information categories to be compared at the same time by placing them on top of one another and allowing the viewer to "look through" the information.

PERCOLATION. Movement under hydrostatic pressure of water through spaces of rock or soil

## WORDS WORTH KNOWING (CONTINUED)

PERMEABILITY. The property or capacity of a porous rock sediment or soil to transmit fluid without impairment of the structure of the medium; it is a measure of the relative ease of fluid flow under unequal pressure; a function of the amount of void space and more importantly their interconnection.

PROXIMITY. Term used to describe what supportive services a land use might need and what are compatible adjacent relationships.

REFUSE. Garbage, rubbish and other types of waste.

SANITARY LANDFILL. Method of disposing of solid waste without creating hazards to public health, involves filling a hole in the earth with refuse, compacting it and covering it daily with 6 inches of clean soil.

SHOPPING CENTER. A planned, aggregation of commercial uses.

SEPTIC TANK SYSTEM. An on-site sewage disposal method where municipal collection is not provided; involves dispersing sewage effluent in the soil which sanatizes the effluent as it moves through the soil.

SINGLE-FACTOR MAP. A map containing one type of information or information for one data category.

SINGLE-FAMILY HOME. A house that serves as a dwelling for only one family that is generally inhabited the year around.

SLOPE. The deviation of the earth's surface from the horizontal.

SOIL SURVEY. The systematic examination of soils, their description and classification, mapping of soil types, and the assessment of soil for various agricultural and engineering use.

SUBDIVISION. A tract of land divided into building lots.

SYNTHESIS. A structure or method for integrating discrete parts to produce a final, complete plan or product.

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Represents a summary of environmental planning strategies for Arietta, a rural town located within the boundaries of the Adirondack Park in the State of New York. It recognizes that planning is an iterative, educational process that must continually respond to changing needs through a participatory dialogue among all persons affected by the process.

Cost of Sprawl: Environmental and Economic Cost of Alternative Residential Development Patterns at the Urban Fringe. Prepared for Council on Environmental Quality, Department of Housing and Urban Development, and Environmental Protection Agency by Real Estate Research Corporation.

Vol. I Executive Summary $0.55
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The purpose of The Costs of Sprawl is to help the mayor, city manager, the planning board, and other concerned local officials to assess all the economic costs associated with different types of development. The costs include various economic, environmental, natural resource, and social costs of these developments. Highly Recommended

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The first book for planners to deal with the need for harmonious relationship between man and nature. Outlines regional planning methodology to account for ecological features. A beautiful book - Highly Recommended.

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The map set was prepared as part of the U.S. Geological Survey Connecticut Valley Urban Area Project. Accordingly, each of the maps of the Folio of the Hartford North Quadrangle presents a single characteristic, or a combination of related characteristics of land surface, earth materials, or water resources at a common scale and in a generalized and simplified format. These maps were prepared by interpretation of existing geologic and hydrologic maps and data available from on-going State cooperative Geological Survey programs and from State programs. The maps are intended to be most useful to technical staffs of local or regional planning agencies, town planning agencies, and consultants who prepare land - and water-use plans.

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An excellent semi-technical introduction to the title topic. Includes discussion of the significance of various natural resource factors to land use and a description of the data sources available in Connecticut. A case study demonstrates the planning process involved. This is included in your land use decision making kit through the generosity of the Conn. Agricultural Experiment Station in New Haven, Conn.

VOICE 1: THE ISSUE OF BUILDABILITY, THE ABILITY TO BUILD IN A PLACE WITHOUT CAUSING SEVERE ENVIRONMENTAL IMPACT, HAS BEEN DEALT WITH IS PART ONE OF THIS UNIT. HERE, IN PART TWO, WE WILL TAK A CLOSE LOOK AT LAND USE ATTRACTIVENESS. LAND USE ATTRACTIVENESS DESCRIBES WHERE A LAND USE SHOULD BE, BASED UPON ACCESS, PROXIMITY REQUIREMENTS AND SITE CHARACTERISTICS. AT THE END OF THIS UNIT WE WILL FIND OUT HOW INFORMATION ON BUILDABILITY AND LAND USE ATTRACTIVENESS CAN BE INTEGRATED TO PRODUCE A LAND USE ALLOCATION MAP. ROB PRESSMAN, A PROFESSIONAL LANDSCAPE ARCHITECT, WILL JOIN US AS THE NARRATOR FOR THIS UNIT.

VOICE 2: WE WILL NOW MOVE ON TO THE SECOND IMPORTANT STAGE OF THE SYNTHESIS PROCESS. AS YOU RECALL, THE TERM WE USED TO DESCRIBE THE INTRINSIC REQUIREMENTS OF VARIOUS LAND USES WAS, "LAND USE ATTRACTIVNESS." NOW THAT WE HAVE FOUND, THROUGH THE BUILDABILITY ANALYSIS, WHERE DEVELOPMENT SHOULD NOT BE, WE WILL BEGIN TO DISCOVER WHERE SPECIFIC LAND USES SHOULD BE LOCATED. WE CAN DO THIS BY DISCUSSING THE LAND USES, EXPLORING THEIR CHARACTERISTICS AND NEEDS, AND THEN FINDING ALL OF THE AREAS WITHIN OUR SITE THAT SATISFY THOSE REQUIREMENTS. THE INFORMATION IN THIS SECTION OF THE SYNTHESIS UNIT WILL BE RECORDED JUST AS IT WAS IN THE BUILDABILITY/IMPACT STUDY - DATA FOR EACH CATEGORY WILL BE RECORDED ON A SEPARATE ACETATE OVERLAY SHEET. ULTIMATELY, WE WILL CONSTRUCT A COMPOSITE OVERLAY, AND RESOLVE THE RESULTING CONFLICTS. THAT WILL TAKE US TO THE FINAL SYNTHESIS STEP, WHICH WILL BE TO COMBINE THE BUILDABILITY COMPOSITE WITH THE ATTRACTIVENESS COMPOSITE, YIELDING A FINAL MAP OF LAND USE ALLOCATION. AT THAT POINT, THE ECOLOGICAL PLANNING PROCESS WILL BE COMPLETE.

THE LAND USE CATEGORIES THAT WE WILL CONSIDER ARE: SINGLE AND MULTI-FAMILY HOUSING; COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL DEVELOPMENT: UTILITIES; AND CONSERVATION. ATTRACTIVENESS DATA WILL BE ACCUMULATED FOR EACH OF THESE LAND USE CATEGORIES.

THERE ARE 3 PRIMARY QUESTIONS THAT WE CAN ASK OF EACH LAND USE TO GIVE US INSIGHT INTO ITS LOCATIONAL CRITERIA; THE FIRST QUESTION IS "WHAT ARE THE ACCESS REQUIREMENTS OF THIS LAND USE? WHAT TYPE AND QUALITY OF ROAD ACCESS DOES THE POTENTIAL LAND USE REQUIRE? SECONDLY, WHAT ARE ITS PROXIMITY REQUIREMENTS?

WHAT ARE THE NEEDS OF THE POTENTIAL LAND USE WITH RESPECT TO PROXIMITY TO, OR PROTECTION AND SEPARATION FROM VARIOUS OTHER LAND USES? AND THE THIRD QUESTION IS, WHAT KIND OF SITE CHARACTERISTICS WOULD BE APPROPRIATE FOR THIS LAND USE? WHAT TYPE OF SITE - WATERFRONT OR INLAND, FLAT OR UNDULATING, OPEN OR FORESTED - DOES THE POTENTIAL USE REQUIRE? THERE ARE OTHER QUESTIONS WHICH WILL BE ASKED OF SPECIFIC LAND USES, BUT THESE THREE ARE IMPORTANT QUESTIONS THAT CAN BE ASKED OF ALL OF THE USES BEING CONSIDERED.

WE WILL BEGIN OUR STUDY OF ATTRACTIVENESS WITH SINGLE-FAMILY HOUSING. SINGLE-FAMILY HOUSING IS JUST WHAT IT'S NAME IMPLIES - A HOUSE THAT SERVES AS A DWELLING FOR ONLY ONE FAMILY, AND IS GENERALLY INHABITED THE YEAR AROUND. THERE IS SEASONAL SINGLE-FAMILY HOUSING, CALLED "SECOND HOMES" WHICH HAVE VERY DIFFERENT ATTRACTIVNESS CHARACTERISTICS THAN PERMANENT HOUSING.

SINGLE-FAMILY HOUSING CAN BE CONSTRUCTED AT VARYING DENSITIES AND IN DIFFERENT CONFIGURATIONS. MOST NEW HOUSING DEVELOPMENTS IN SUBURBAN AND RURAL AREAS ARE INTRODUCED IN ONE OF TWO FORMS. FIRST, THERE IS THE CONVENTIONAL SUBDIVISION LAYOUT OFTEN ASSOCIATED WITH URBAN SPRAWL, AND SECONDLY THERE IS THE MORE RECENT ADOPTION OF AN OLD CONCEPT WHICH IS CALLED "CLUSTERING". TURN TO GUIDESHEET # 2 AS WE DISCUSS THEIR DIFFERENCES. (PAUSE) G. S. # 2

THE HOUSES IN EITHER DESIGN PLAN REQUIRE THE SAME BASIC SUPPORTIVE ELEMENTS BUT THEIR NEEDS ARE SATISFIED IN DIFFERENT WAYS. FOR EXAMPLE, THEY BOTH NEED YEAR - ROUND ACCESS BY ROAD; THEY BOTH NEED WATER AND SEWAGE FACILITIES; AND THEY BOTH NEED WELL-DRAINED SOILS FOR FOUNDATIONS. THERE HAS BEEN CONSIDERABLE STUDY AND RESEARCH COMPARING THESE TWO HOUSING OPTIONS AND THEIR FINDINGS FAVOR THE CLUSTER HOUSING CONFIGURATION. THE DATA ON GUIDE SHEET # 3 SUPPORTS THESE FINDINGS. IF YOU NEED MORE TIME TO STUDY GUIDE SHEETS # 2 AND 3, TURN OFF THE RECORDER. G. S. # 3

"CLUSTER" IS COMMONLY DEFINED AS THE REDUCTION IN SIZE OF THE INDIVIDUAL HOUSE LOTS IN A SUBDIVISION, AND THE COMBINING OF THE CONSERVED LAND INTO SHARED OPEN SPACE FOR AESTHETIC AFFECT, ENVIRONMENTAL PRESERVATION, AND RECREATION. G. S. # 3 THE IDEA OF CLUSTERING HOMES TOGETHER AND USING THE SURROUNDING SPACE AS COMMON GREENS AND SQUARES IS CENTURIES OLD: IT IS THE PRINCIPLE OF BOTH THE MEDEVIL VILLAGE AND EARLY NEW ENGLAND TOWNS. HISTORICALLY, AMERICANS LIVED QUITE CLOSE TOGETHER IN TOWNS AND CITIES. THEN, IN THE 1930'S, THE AMERICAN DREAM OF A COUNTRY HOME WAS TRANSLATED INTO THE GROWTH OF SUBURBIA. THERE WERE SEVERAL ATTEMPTS IN THE LATE 20'S AND IN THE 30'S BY PLANNERS TO SHOW THAT GRIDIRON DEVELOPMENT WAS NOT THE SOLE PATTERN FOR DEVELOPMENT. RADBURN, N. J., THE GREENBELT TOWNS OF THE NEW DEAL AND BALDWIN HILLS IN CALIF. WERE ALL QUITE SUCCESSFUL HOUSING DEVELOPMENTS AND ARE THE PREDECESSORS OF PRESENT CLUSTERING ATTEMPTS. UNFORTUNATELY, SUBURBAN SPRAWL HAS CONTINUED AND HAS BECOME THE BLIGHT

THAT WE ALL KNOW WELL.

THE DIFFERENCES BETWEEN CLUSTER AND CONVENTIONAL HOUSING ARE EASY TO ENUMERATE. A DEVELOPER OF A GRIDIRON SUBDIVISION IS ALMOST ALWAYS FORCED TO UTILIZE THE ENTIRETY OF HIS PROPERTY FOR HOUSE LOTS, STREETS AND RIGHTS-OF-WAY.

IN AREAS WHERE LAND IS CHARACTERIZED BY STEEP SLOPES, WETLAND, OR UNIQUE SCENIC OR ENVIRONMENTAL AMENITIES, PREPARING A GRIDIRON SITE PLAN CREATES SOME DIFFICULT PROBLEMS. FREQUENTLY, DEVELOPERS ARE FORCED TO LOCATE SOME LOTS, HOUSES AND STREETS IN LESS-THAN-IDEAL PLACES.

CLUSTER PLANNING ON THE OTHER HAND, OFFERS A REASONABLE, PRACTICAL SOLUTION TO THESE PROBLEMS. CLUSTER DESIGN ENABLES DEVELOPERS TO MAXIMIZE THE DEVELOPMENT OF THE MOST SUITABLE SITES, WHICH INCLUDE THOSE WITH BEST SLOPES, BEST SOIL FOR SEPTIC SYSTEMS, BEST ACCESSABILITY OR BEST VIEWS, WHILE AT THE SAME TIME PRESERVING UNIQUE FEATURES SUCH AS WOODLANDS, WETLANDS OR WILDLIFE HABITAT. DEVELOPERS CAN SET THESE ASIDE AS PERMANENT, COMMON OPEN SPACE.

CLUSTERS OF HOUSES MAY BE GROUPED AROUND CUL-DE-SACS, WHERE THROUGH-STREET TRAFFIC - THE DOMINANT THEME OF THE GRIDIRON SUBDIVISION - IS ELIMINATED. OR THEY MAY BE GROUPED AROUND COMMONLY-OWNED GREEN SPACES WITH PARKING IN THE REAR.

THE BENEFITS OF CLUSTER DESIGNS ARE MOST OBVIOUS WHEN WALKING THROUGH AN EXISTING CLUSTER DEVELOPMENT. IN COMPARISON WITH THE GRID SUBDIVISION, STREETS ARE QUIETER, HAVE LESS TRAFFIC, MORE TREES AND GREENERY, AND CHILDREN HAVE EXTENSIVE OPEN AREAS NEARBY FOR PLAY. RESIDENTS NOT ONLY ENJOY THE DECREASED PERSONAL PROPERTY MAINTENANCE OF THEIR OWN YARD, BUT ALSO BENEFIT FROM THE PRESERVATION OF LARGE ADJACENT GREEN SPACES.

ECONOMICALLY, THE CLUSTER SUBDIVISION HAS PROVEN TO BE MORE PRACTICAL THAN GRIDIRON DEVELOPMENT. MOST OF THE CAPITAL IMPROVEMENTS IN A SUBDIVISION CONSIST OF SUCH COSTLY PROCEDURES SUCH AS BUILDING ROADS, STORM DRAINS, SIDEWALKS, STREET LIGHTING AND LAYING UNDERGROUND UTILITIES. THE EXPENSE OF THESE IS OF COURSE REFLECTED IN THE PRICE POTENTIAL RESIDENTS WILL PAY FOR THEIR LOTS; THE MORE EXPENSIVE THE IMPROVEMENTS, THE MORE THE BUYER WILL PAY. CLUSTER DESIGN CONSIDERABLY REDUCES THE LENGTH OF STREETS AND UTILITY LINES REQUIRED TO SERVICE AN EQUAL NUMBER OF HOUSES IN A GRID SUBDIVISION. LOOK NOW AT GUIDESHEET # 2 *G. S. #* AND COMPARE THE TWO DIFFERENT DESIGNS FOR APPROXIMATELY THE SAME NUMBER OF HOMES ON THE SAME PIECE OF PROPERTY. (PAUSE) THE DESIGNS CLEARLY SHOW THE ECONOMIC AND OPEN SPACE BENEFITS ASSOCIATED WITH CLUSTER DEVELOPMENTS.

ONE LAST POINT ABOUT CLUSTER DEVELOPMENTS CONCERN DENSITY. WHEN THE CLUSTER WAS FIRST BROUGHT TO POPULAR ATTENTION, IT WAS ASSUMED THAT SMALLER LOTS AUTO-

MATICALLY LED TO HIGHER DENSITY. A CLUSTER ZONING ADVOCATE MAY DISPROVE THIS ASSUMPTION BY STATING THAT A DEVELOPER CANNOT BUILD MORE HOMES THAN PROVIDED FOR BY THE EXISTING ZONING EXISTS IN A CERTAIN PART OF TOWN, AND A DEVELOPER COULD BUILD FIFTY HOUSES ON A PIECE OF PROPERTY. WITH CLUSTERING THE DEVELOPER CAN STILL PUT UP ONLY FIFTY HOMES ON THAT PARCEL OF LAND. BUT EACH LOT WILL BE LESS THAN ONE ACRE, IN ORDER TO CONTRIBUTE TO THE SHARED OPEN SPACE. IN THIS WAY DENSITY LEVELS ARE NOT INCREASED, AND RESIDENTIAL SPRAWL IS CONTROLLED. (PAUSE)

NOW THAT WE HAVE A BETTER UNDERSTANDING OF RESIDENTIAL OPTIONS, LET US RETURN TO OUR INITIAL PURSUIT OF THE ATTRACTIVENESS CHARACTERISTICS OF SINGLE-FAMILY HOUSING.

THE FIRST QUESTION TO WHICH WE WISH TO ADDRESS IS: "WHAT ARE THE ACCESS REQUIREMENTS OF THE LAND USE?" A PERMANENT HOME OBVIOUSLY REQUIRES YEAR - AROUND ACCESS BY A PRIMARY ROAD - A PRIMARY ROAD BEING ONE THAT IS WELL-PAVED, MAINTAINED, AND OPEN THE ENTIRE YEAR. FOR DEVELOPMENT THAT IS TO BE FAIRLY REMOTE AND NOT IMMEDIATELY ADJACENT TO TOWN EMPLOYMENT CENTERS, ACCESS TO A MAJOR HIGHWAY IS USUALLY A REQUIREMENT. MARKET STUDIES FOR SUBURBAN HOUSING DEVELOPMENTS HAVE INDICATED THAT PEOPLE WILL COMMUTE UP TO, BUT GENERALLY NO MORE THAN, ONE HOUR'S DRIVING TIME ON LIMITED - ACCESS HIGHWAYS. BEING RELATIVELY CLOSE TO AN ON-RAMP OR INTERCHANGE IS AN IMPORTANT LOCATIONAL CRITERIA.

PROXIMITY REQUIREMENTS CONSTITUTE THE SECOND ISSUE TO BE STUDIED. BEING IN A NEIGHBORHOOD IS HIGH ON THE PRIORITY LISTS OF MOST PEOPLE. THEY LIKE TO FEEL THAT THEY ARE PART OF A COMMUNITY. SO BEING CLOSE TO OTHER HOUSING, ESPECIALLY SINGLE-FAMILY HOUSING IS GENERALLY A REQUIREMENT. THE SUPPORTIVE SERVICES THAT FAMILIES NEED INCLUDE SCHOOLS, MUNICIPAL AND RECREATIONAL FACILITIES, AND TRANSPORTATION AND COMMERCIAL SERVICES. PROXIMITY TO EMPLOYMENT AREAS, IS NOT NECESSARILY IMPERATIVE. PEOPLE ARE WILLING TO TRADE OFF PROXIMITY TO EMPLOYMENT AREAS FOR OTHER AMENITIES. LAND USES THAT ARE GENERALLY NOT COMPATIBLE IN CLOSE PROXIMITY TO SINGLE FAMILY HOUSING ARE INDUSTRY, TRAILER PARKS, COMMERCIAL SITES, TOURIST ACCOMODATIONS, AND PUBLIC UTILITIES SUCH AS SANITARY LANDFILL OR SEWAGE TREATMENT PLANTS.

FINALLY WE LOOK AT THE SITE CHARACTERISTICS THAT SINGLE-FAMILY HOUSING REQUIRES. A HOUSE REQUIRES A FOUNDATION. A FOUNDATION, AS WE DISCUSSED IN THE BUILDABILITY SECTION OF THIS UNIT, REQUIRES ADEQUATE SOIL CHARACTERISTICS TO INSURE STABILITY AND SUPPORT. A WELL-DRAINED SOIL ON FLAT OR GENTLY UNDULATING TOPOGRAPHY IS SUITABLE. PEOPLE WHO LIVE IN THE HOUSE REQUIRE WATER AND SEWAGE

DISPOSAL. THESE NEEDS CAN BE MET IN EITHER OF TWO WAYS; BY THE SITE ITSELF OR BY THE TOWN. IF THE SITE CANNOT MEET THE DEMAND, THEN PROXIMITY TO MUNICIPAL WATER AND SEWAGE SYSTEMS BECOMES A CONSIDERATION.

THE VISUAL QUALITY OF THE LANDSCAPE IS OFTEN DEEMED AN IMPORTANT SITE REQUIREMENT TO ENHANCE THE QUALITY OF LIFE FOR THE INHABITANTS OF A DEVELOPMENT. HILLSIDES WITH LONG VIEWS, LOWLANDS WITH MAGNIFICENT VIEWS OF THE MOUNTAINS, OR THE INTERFACE BETWEEN A MEADOW AND A FOREST ARE SITES THAT MAKE LIVING QUITE SATISFYING AND EXCITING.

AT THIS POINT, YOU HAVE A LIST OF THE LOCATIONAL CRITERIA THAT ARE APPROPRIATE. WE HAVE SUMMARIZED THE LOCATIONAL CRITERIA ON GUIDE SHEET # 4. G. S. #

NOW YOU CAN PROCEED ON YOUR OWN AND EVALUATE VARIOUS PARCELS OF LAND IN YOUR TOWN THAT ARE AVAILABLE FOR DEVELOPMENT IN TERMS OF THEIR ATTRACTIVENESS FOR SINGLE-FAMILY HOUSING. THIS IS A DIFFICULT TASK BUT ONE WHICH MANY TOWNS MUST UNDERTAKE IN ORDER TO PREPARE MASTER PLANS AND ZONING ORDINANCES. AS YOU PROCEED WITH YOUR QUESTIONING AND EVALUATION OF POTENTIAL DEVELOPMENT PARCELS, RECORD YOUR FINDINGS ON ACETATE OVERLAY SHEETS. AS WE PROCEED THROUGH THE UNIT, WE WILL ASSESS THE ATTRACTIVENESS OF SITES FOR OTHER LAND USES. USE SEPARATE SHEETS OF ACETATE TO INDICATE ATTRACTIVE AREAS. YOU SHOULD USE A DIFFERENT COLOR OR SYMBOL FOR EACH DATA CATEGORY OR LAND USE. LOOK AT GUIDE SHEET # 5 G. S. # FOR GUIDANCE. MARK OUT ALL AREAS WHICH APPEAR TO BE ATTRACTIVE SITES FOR SINGLE FAMILY HOUSING.

WE WILL MOVE ON TO DISCUSS MULTI-FAMILY RESIDENTIAL DEVELOPMENTS. WE WILL MOVE MUCH FASTER NOW THAT YOU HAVE AN UNDERSTANDING OF THE APPROACH. TURN TO GUIDE SHEET # 6. G. S. # 6

MULTIPLE FAMILY DWELLINGS INCLUDE APARTMENTS, TOWNHOUSES OR OTHER BUILDINGS DESIGNED FOR OCCUPANCY, IN SEPARATE LIVING SPACES, BY MORE THAN ONE FAMILY FOR PERMANENT YEAR-ROUND RESIDENCY. THIS DOES NOT INCLUDE HOTELS AND MOTELS.

THE LOCATIONAL CRITERIA ARE VERY SIMILIAR TO SINGLE-FAMILY HOUSING, EXCEPT IN HIGH-RISE DEVELOPMENT SITUATIONS. IN TERMS OF ACCESS, MULTI-FAMILY HOUSING REQUIRES YEAR-ROUND ACCESS BY A PRIMARY ROAD. IN SUBURBAN AREAS, ACCESSIBILITY TO A LIMITED-ACCESS HIGHWAY IS ALSO IMPORTANT.

MULTI-FAMILY DWELLINGS OFTEN CATER TO SPECIFIC SEGMENTS OF THE POPULATION, SUCH AS SINGLE PEOPLE, ELDERLY, OR MARRIED COUPLES WITHOUT CHILDREN. IN EACH OF THESE CASES THERE WILL BE PARTICULAR PROXIMITY REQUIREMENTS. FOR EXAMPLE, SINGLE AND ELDERLY PEOPLE MIGHT WANT, TO BE IN VERY CLOSE PROXIMITY TO SUPPORTING SERVICES, WHILE MARRIED COUPLES WITH OR WITHOUT CHILDREN MAY PREFER TO BE IN A MORE REMOTE SETTING WITH EASY ACCESS TO THE SERVICES. REGARDLESS OF THESE

SPECIAL DISTINCTIONS, WE CAN MAKE SOME GENERALIZATIONS ABOUT PROXIMITY NEEDS OF MULTI-FAMILY HOUSING. RESIDENTS OF MULTI-FAMILY HOUSING PREFER TO BE NEAR RETAIL AREAS, MUNICIPAL FACILITIES AND ACTIVE RECREATIONAL SITES. THEY DON'T LIKE TO BE CLOSE TO TRAILER PARKS, INDUSTRIAL USES OR SANITARY LANDFILLS.

SITE REQUIREMENTS FOR MULTI-FAMILY HOUSING ARE SIMILAR TO THOSE OF SINGLE FAMILY HOUSING. HOWEVER FOUNDATION REQUIREMENTS ARE SOMEWHAT MORE CRITICAL SINCE THE BUILDING MASS IS GREATER. SEPTIC TANK SYSTEMS ARE NOT GENERALLY USED FOR MULTI-FAMILY DWELLINGS SO AVAILABILITY OF MUNICIPAL WATER AND SEWAGE COLLECTION IS ESSENTIAL.

REFER TO GUIDE SHEET # 7 AS WE MAP OUT THOSE AREAS, THAT ARE ATTRACTIVE FOR MULTI-FAMILY HOUSING. IF YOU WOULD LIKE TO HAVE MORE TIME TO STUDY GUIDE SHEETS 6 & 7 (PAUSE) TURN OFF THE RECORDER. G.

NOW, LET US CONSIDER COMMERCIAL LAND USES. UNDER THIS CATEGORY WE INCLUDE BUSINESSES THAT ARE INVOLVED IN THE SALE OR RENTAL OF GOODS, SERVICES OR COMMODITIES, EITHER ON A RETAIL OR WHOLESALE BASIS; INDOOR RECREATION AND ENTERTAINMENT ACTIVITIES; AND BUSINESS OR PROFESSIONAL OFFICES. REFER TO GUIDE SHEET # 8. G. S.

COMMERCIAL USES TEND TO BE GROUPED TOGETHER IN VARIOUS PATTERNS. THE CLUSTERING OF INDIVIDUAL STORES IS A FAMILIAR SIGHT ALONG COUNTRY ROADS, WHERE WE FIND THE GAS STATION, DINER, GROCERETTE, AND ANTIQUE SHOP ALL NESTLED TOGETHER IN A CLEARING IN THE WOODS. OR WE MIGHT CONSIDER ANY TOWN CENTER AS A LARGE CLUSTER OF INDIVIDUAL STORES.

ANOTHER FAMILIAR PATTERN TO US IS THE STRIP OR ROADSIDE DEVELOPMENT. THESE ARE THE LONG, SEEMINGLY ENDLESS, STRETCHES OF ROAD LITTERED WITH EVERY IMAGINABLE KIND OF COMMERCIAL SERVICE, EACH ONE ARROGANTLY SHOUTING OUT ITS VIRTUES WITH A FLASHY, GLARING SIGN OR BILLBOARD.

A MORE RECENTLY DEVELOPED PATTERN OF COMMERCIAL USE IS THE SHOPPING CENTER - INDOOR AS WELL AS OUTDOOR. THE SHOPPING CENTER IS A LARGE PLANNED AGGREGATION OF COMMERCIAL USES. USES THAT OFTEN COMPRISE A SHOPPING CENTER ARE DEPARTMENT STORES, RESTAURANTS, SUPERMARKETS, CINEMAS, RECREATION FACILITIES AND EVEN SCHOOLS. SHOPPING CENTERS MAY EXPAND IN KEEPING WITH A DEVELOPMENT PLAN, BUT THEY DO NOT GROW IN A PIECEMEAL FASHION AS STRIP DEVELOPMENT DOES.

THE MOST IMPORTANT LOCATIONAL CRITERIA FOR ANY COMMERCIAL DEVELOPMENT IS ACCESS. IT MUST BE ACCESSIBLE ALL YEAR-ROUND AND HAVE PRIMARY ROAD FRONTAGE. ROAD FRONTAGE IS ESSENTIAL TO MAXIMIZE VISIBILITY FROM THE HIGHWAY OR ROAD. COMMERCIAL USES ARE ONE OF THE FEW LAND USES THAT REQUIRE HIGH VISIBILITY. IT IS CRUCIAL TO COMMERCIAL VIABILITY. ACCESS IS NOT ONLY IMPORTANT FROM THE CUSTOMER VIEWPOINT BUT FOR SERVICE AS WELL. ALL RETAIL STORES NEED TO REPLENISH

THEIR SUPPLY OF GOODS FROM THEIR DISTRIBUTORS. LARGE, REGIONAL SHOPPING CENTERS ARE GENERALLY LOCATED NEAR HIGHWAY INTERCHANGES TO OPTIMIZE THIS ACCESSIBILITY TO CUSTOMERS AND SERVICE VEHICLES.

ANOTHER IMPORTANT PROXIMITY REQUIREMENT IS PARKING. A SHOPPING CENTER HAS PARKING INTEGRATED IN ITS CONCEPT, BUT LOCAL COMMERCE HAS A MORE DIFFICULT TIME WITH FINDING SUFFICIENT PARKING SPACE.

COMPATIBLE LAND USES DIFFER WITH DIFFERENT TYPES OF COMMERCE. COMMUNITY FACILITIES AND SERVICES, TEND TO CLUSTER AROUND MOST COMMERCIAL AREAS AND RELATE AS GOOD NEIGHBORS. INDUSTRIAL PARKS CONSISTING OF "CLEAN", NON-MANUFACTURING INDUSTRIES, ARE ALSO COMPATIBLE NEIGHBORS FOR COMMERCIAL LAND USES.

THE SITE REQUIREMENTS FOR COMMERCIAL DEVELOPMENT ARE STRAIGHT-FORWARD. FLAT, OPEN LAND WITH PLENTY OF ROOM FOR EXPANSION AND LOW SITE DEVELOPMENT COSTS ARE CLEARLY THE MOST ATTRACTIVE LOCATIONS FOR DEVELOPMENT. WATER, SEWAGE, AND SOLID WASTE FACILITIES MUST BE AVAILABLE FROM THE TOWN.

NOW SURVEY YOUR TOWN FOR POTENTIAL COMMERCIAL DEVELOPMENT SITES. CONSIDER ALL OF THE REQUIREMENTS WE HAVE DISCUSSED. REFER TO GUIDE SHEET # 8 AND REVIEW THESE CRITERIA. THEN, STUDY THE EXAMPLE OF MAPPING ON GUIDE SHEET # 9. G. S # MAP OUT AREAS THAT YOU HAVE DISCOVERED THAT ARE SUITABLE FOR COMMERCIAL DEVELOPMENT. (PAUSE)

COMMUNITY FACILITIES AND SERVICES, AS A LAND USE CATEGORY, INCLUDE A DIVERSE NUMBER OF ACTIVITIES. THIS MAKES DISCUSSING LOCATIONAL CRITERIA DIFFICULT BUT THERE ARE GENERALIZATIONS THAT WE CAN MAKE THAT APPLY TO MOST OF THE ACTIVITIES. WHAT WE MEAN BY "COMMUNITY FACILITIES" ARE THOSE NON-COMMERCIAL ACTIVITIES WHICH SERVE THE PUBLIC, AND ARE OWNED AND OPERATED BY PUBLIC BODIES OR AGENCIES. THIS LAND USE CLASSIFICATION IS ALSO COMMONLY REFERRED TO AS "INSTITUTIONAL". RELIGIOUS OR CHARITABLE ORGANIZATIONS, SCHOOLS, POLICE, FIRE STATIONS, POST OFFICES, AIRPORTS AND CEMETARIES ARE ALL INCLUDED IN THIS CATEGORY.

ACCESS IS THE MOST IMPORTANT LOCATIONAL CRITERIA FOR INSTITUTIONAL LAND USES. YEAR-ROUND ACCESS ON A PRIMARY ROAD IS ESSENTIAL TO ENABLE THE PUBLIC TO REACH THE FACILITY OR, MORE IMPORTANTLY, IN THE CASE OF POLICE, FIRE AND MEDICAL SERVICES, FOR THE FACILITY TO REACH THE PEOPLE. ACTUAL ROAD FRONTAGE IS A REQUIREMENT FOR MANY OF THESE SERVICES.

PROXIMITY TO THE COMMUNITY THAT IT SERVES, IS AN IMPORTANT REQUIREMENT FOR A FACILITY. CHURCHES, SCHOOLS, AND FIRE STATIONS SHOULD BE, AND USUALLY ARE WELL-INTEGRATED INTO PERMANENT RESIDENTIAL AREAS. INSTITUTIONAL USES ARE, THEMSELVES, NOT INCOMPATIBLE WITH MOST OTHER USES, BUT FREQUENTLY THE DESIGN OF THE FACILITIES MIGHT ESTABLISH AN INCOMPATIBLE RELATIONSHIP WITH SURROUNDING USES.

THERE ARE SOME SITUATIONS WHERE AN INCOMPATIBILITY BETWEEN USES MIGHT EXIST. FOR EXAMPLE A COMMUNITY COLLEGE WITH HUNDREDS OF COMMUTING STUDENTS SHOULD NOT BE LOCATED WITHIN A DENSE RESIDENTIAL AREA. TRAFFIC DANGERS FOR SMALL CHILDREN LIVING IN THE AREA WOULD BE SEVERE. CHURCHES ARE NOT GENERALLY CONSIDERED COMPATIBLE WITH COMMERCIAL OR INDUSTRIAL USES, BUT A POST OFFICE OR POLICE STATION, WHICH ARE ALSO INSTITUTIONAL USES, ARE COMPATIBLE IN THOSE ZONES. SO, RECOGNIZING THE DIVERSITY OF ACTIVITIES UNDER THIS LAND USE CATEGORY, WE MUST LOOK AT EACH POTENTIAL RELATIONSHIP INDEPENDENTLY AND EVALUATE IT WITH THE UNDERSTANDING THAT CENTRALITY AND PROXIMITY TO POPULATION CENTERS ARE IMPORTANT UNDERLYING REQUIREMENTS.

CREATING A ZONE OF INSTITUTIONAL USES MIGHT ALLEVIATE A VARIETY OF INCONVENIENCES. FOR INSTANCE, IMAGINE A ZONE THAT INCLUDES THE POLICE AND FIRE STATIONS, A HOSPITAL, POST OFFICE, MOTOR VEHICLES BUREAU, SOCIAL SERVICES OFFICES AND MUNICIPAL FACILITIES OFFICES. COMMUNICATION AMONG THESE SERVICES WILL BE INCREASED AND CITIZENS WILL HAVE AN EASY TIME FINDING A SPECIFIC FACILITY BECAUSE THEY WILL KNOW THAT IT IS WITHIN THE ZONE. SMALL TOWNS OFTEN HAVE AN INSTITUTIONAL ZONE . . . THE TOWN CENTER! HOWEVER, IN GROWING SUBURBAN COMMUNITIES, SERVICES TEND TO BE SCATTERED AND UNRELATED. REFER NOW TO GUIDE SHEET #10 FOR A DIAGRAM ILLUSTRATING HOW THESE ZONES CAN GIVE FORM TO OFTEN FORMLESS COMMUNITIES. G.

SITE REQUIREMENTS FOR INSTITUTIONAL USES GENERALLY CALL FOR SITES THAT ARE OPEN AND FLAT. CEMETARIES, SCHOOLS, COLLEGES AND EVEN CHURCHES ARE EXCEPTIONS WHICH CAN BE DEVELOPED IN AREAS WITH SOME ENVIRONMENTAL DIVERSITY, SUCH AS HILLS AND WOODED AREAS, TO ENHANCE THEIR CHARACTER AND IMAGE.

NOW, LET'S DEFINE THOSE AREAS IN OUR THEORETICAL TOWN THAT ARE ATTRACTIVE FOR INSTITUTIONAL FACILITIES. REFER TO GUIDE SHEET #11 AND MAP OUT THE AREAS THAT ARE ATTRACTIVE FOR INSTITUTIONAL DEVELOPMENT. STOP THE RECORDER WHILE YOU CARRY OUT THIS ACTIVITY. G. S.

LET'S CONSIDER INDUSTRIAL LAND USES NEXT. THERE ARE ESSENTIALLY THREE TYPES OF INDUSTRY - LIGHT INDUSTRY, HEAVY INDUSTRY AND EXTRACTION INDUSTRY.

LIGHT INDUSTRY REFERS TO NON-POLLUTING, NON-WASTE PRODUCING INDUSTRIES. THIS INCLUDES COMPANIES INVOLVED IN THE MANUFACTURING, PRODUCTION, ASSEMBLY, AND DISTRIBUTION OF GOODS AND MATERIALS. THE MANAGING OF THE COMMODITY DOES NOT CREATE LARGE AMOUNTS OF WASTE OR RESIDUAL MATERIAL, SUCH AS SMOKE CONTAINING HIGH CONCENTRATIONS OF AIR POLLUTANTS OR EFFLUENT THAT NEEDS TO BE DISCHARGED INTO A BODY OF WATER. LIGHT INDUSTRY IS CHARACTERIZED BY TRUCKING COMPANIES,

BOTTLING PLANTS, CONTAINER AND PACKAGING OPERATIONS AND THE SO-CALLED "CLEAN INDUSTRY" WHICH ARE INDUSTRIAL PARKS COMPRISED OF INDUSTRY OFFICES AND HEADQUATERS.

HEAVY INDUSTRY IS ALSO INVOLVED IN THE MANUFACTURING, PRODUCTION AND ASSEMBLY OF GOODS AND MATERIALS. BUT, IN CONTRAST TO LIGHT INDUSTRY, THE SCALE OF OPERATION IS QUITE DIFFERENT. HEAVY INDUSTRIES USUALLY REQUIRE LARGE FACILITIES AND PROCESS LARGE QUANTITIES OF MATERIALS. POLLUTANTS AND WASTE-BY PRODUCTS ARE NORMALLY COMPANIONS OF THE OPERATION. STEEL MILLS, LUMBER MILLS, AND CHEMICAL PRODUCERS ARE GENERALLY LISTED AS HEAVY INDUSTRIES. HISTORICALLY, HEAVY INDUSTRY HAS BEEN A MAJOR SOURCE OF AIR AND WATER POLLUTION. MANY OF THESE INDUSTRIES ARE WORKING HARD ON POLLUTION ABATEMENT PROGRAMS.

THE EXTRACTION INDUSTRY INVOLVES THE EXTRACTION OF MATERIALS FROM THE LAND. SAND, GRAVEL, COAL, VARIOUS RICK TYPES AND, MINERALS USED IN THE PRODUCTION OF METALS AND OTHER COMMODITIES ARE COMMONLY EXTRACTED MATERIALS.

MINING AND EXTRACTIVE INDUSTRIES HAVE BECOME THE FOCAL POINT OF MUCH CONTROVERSY. COMPANIES THAT PARTICIPATE IN MINING AND EXTRACTIVE INDUSTRY HAVE HISTORICALLY BEEN VERY INSENSITIVE TO THE LAND. "STRIP-MINING" IS A COMMONPLACE PROCEDURE FOR THESE INDUSTRIES. STRIP-MINING INVOLVES STRIPPING THE LAND OF ALL VEGETATION AND TOPSOIL, EXTRACTING WHATEVER QUANTITIES OF THE DESIRED MATERIAL ARE AVAILABLE, AND LEAVING THE AREA WHEN THE OPERATION IS COMPLETE. THOUSANDS OF ACRES OF LAND ARE TORN UP AND LEFT USELESS IN THE UNITED STATES EACH YEAR BY THESE OPERATIONS. PRESENTLY ATTEMPTS ARE BEING MADE TO RECLAIM SOME OF THESE LANDS AS RECREATION AREAS BY FILLING THEM AND TRYING TO RESTORE VEGETATIVE COVER. FEDERAL LEGISLATION IS BEING DEVELOPED THAT WOULD PROHIBIT A COMPANY FROM PERFORMING ANY EXTRACTION WITHOUT HAVING PLANS FROM THE RECLAMATION OF THE LAND. THIS WOULD PLACE THE FINANCIAL BURDEN OF RECLAMATION ON THE INDUSTRY RATHER THAN ON THE OWNER OF THE LAND.

THESE INDUSTRY TYPES HAVE DIFFERENT LOCATIONAL CRITERIA, SINCE THEY HAVE SUFFICIENTLY DIFFERENT CHARACTERISTICS.

FOR LIGHT INDUSTRY, ACCESS IS A PARTICULARLY IMPORTANT CRITERION. RECEIVING AND DISTRIBUTING GOODS REQUIRES YEAR-ROUND ACCESS BY A PRIMARY ROAD. IN MANY CASES PRIMARY ROADS MUST LEAD DIRECTLY TO A MAJOR HIGHWAY FOR REGIONAL SERVICE. MANY COMPANIES NOT ONLY SERVICE THEIR LOCAL TOWNS, BUT THEY RECEIVE THEIR PARTS FROM DISTANT MANUFACTURES. HEAVY INDUSTRY HAS THE SAME ACCESS REQUIREMENTS AS LIGHT INDUSTRY. IT ALSO NEEDS TO BE EASILY REACHED BY ITS SUPPLIERS AND MUST

BE ABLE TO REACH ITS DISTRIBUTORS. BOTH HEAVY AND EXTRACTIVE INDUSTRIES REQUIRE ACCESS TO PRIMARY ROADS THAT ARE SEPARATED FROM RESIDENTIAL AND LOCAL TRAFFIC TO AVOID INCONVENIENCE AND CONGESTION. FOR THIS REASON, THESE INDUSTRIES TEND TO BE ISOLATED.

ISOLATION IS THE MAJOR PROXIMITY REQUIREMENT FOR MOST TYPES OF INDUSTRY. OTHER LAND USES PREFER NOT TO BE CLOSELY ASSOCIATED WITH INDUSTRY, EVEN LIGHT INDUSTRY. NEW, WELL-LANDSCAPED, CLEAN-INDUSTRY, INDUSTRIAL PARKS; HOWEVER, ARE MORE ACCEPTED AS NEIGHBORS FOR COMMERCIAL OR COMMUNITY FACILITY USES.

ANOTHER IMPORTANT REQUIREMENT FOR ALL INDUSTRIES IS ACCESSIBILITY TO THE LABOR MARKET. THIS DOES NOT NECESSARILY INDICATE A SPATIAL RELATIONSHIP - THE EMPLOYEES DO NOT HAVE TO LIVE NEAR THE FACTORY. THE ACCESS CRITERION OF BEING LOCATED ON OR NEAR A MAJOR HIGHWAY OR ON MASS TRANSPORTATION ROUTES SHOULD SUBSTITUTE ADEQUATELY FOR PHYSICAL PROXIMITY.

MUNICIPAL WATER AND SEWER SERVICE ARE PROXIMITY REQUIREMENTS FOR BOTH LIGHT AND HEAVY INDUSTRY. ON-SITE UTILITIES, IN MANY CASES, CAN'T ACCOMODATE THE DEMAND AND LOAD CREATED BY LARGE COMPANIES. SEWER FACILITIES ARE ESPECIALLY IMPORTANT IN SITUATIONS WHERE CHEMICAL BY-PRODUCTS MUST BE DISPOSED OF. PUMPING UNUSUAL CHEMICALS INTO THE SOIL OR A RIVER CAN HAVE VERY SERIOUS IMPACTS ON THE ECOLOGICAL STATUS OF THE AREA AND SHOULD NOT BE TOLERATED. A SEWAGE SYSTEM WITH ADEQUATE TREATMENT FACILITIES IS A PLANNING NECESSITY.

BOTH LIGHT AND HEAVY INDUSTRY REQUIRE FLAT OPEN SITES. LOW SITE COSTS ARE USUALLY IMPORTANT CONCERNS. A SITE THAT IS FLAT AND WITHOUT ANY LARGE VEGETATION CAN BE BUILT UPON EASILY AND INEXPENSIVELY PROVIDING THAT FOUNDATION CONDITIONS ARE SUITABLE. AREAS WITH SHALLOW BEDROCK OR HIGH WATER TABLE CONDITIONS SHOULD GENERALLY BE AVOIDED.

THE SITE REQUIRED FOR AN EXTRACTIVE INDUSTRY NATURALLY DEPENDS ON THE LOCATION OF THE RESOURCE DESIRED. THIS IS THE MOST IMPORTANT LOCATIONAL CRITERION FOR THAT TYPE OF INDUSTRY.

REFER, NOW TO THE GUIDE SHEET # 12 FOR A REVIEW OF INDUSTRIAL ATTRACTIVENESS CRITERIA. LOCATE AREAS WITHIN YOUR OWN TOWN WHICH WOULD PROVIDE ATTRACTIVE SITES FOR INDUSTRIAL DEVELOPMENTS. LOCATE THEM ON A TOWN MAP. LOOK AT THE SAMPLE ON GUIDE SHEET # 13. G. S. G. S.

WE WILL NOW DISCUSS SOLID WASTE DISPOSAL AS A LAND USE UNDER THE GENERAL CATEGORY OF UTILITIES.

SOLID WASTE IS ANOTHER NAME FOR REFUSE. REFUSE IS ANOTHER NAME FOR THE MORE COMMON TERMS - GARBAGE AND RUBBISH.. YOU MAY NOT KNOW IT, BUT THER IS A DIFFERENCE BETWEEN THE TW

GARBAGE IS WASTE CONSISTING OF ANIMAL AND VEGETABLE SCRAPS, LEFT OVER FROM THE PREPARATION, COOKING AND SERVING OF FOODS.

RUBBISH OR TRASH IS WASTE CONSISTING OF COMBUSTIBLE PAPER PRODUCTS AND WOOD PRODUCTS, AND NON-COMBUSTIBLE METALS, GLASS AND MINERALS.

REFUSE AGAIN, IS GARBAGE, RUBBISH AND ANY OTHER TYPE OF WASTE.

TRY AND IMAGINE HOW MUCH REFUSE YOU PRODUCE EACH DAY. CONSIDER ALL OF THE FOOD YOU LEAVE LEFT OVER ON YOUR PLATE; THE PACKAGES THAT THE FOOD CAME IN; THE EMPTY COKE BOTTLES; THE EVENING NEWSPAPER, THE GIFT WRAPPINGS YOU DON'T WANT TO SAVE. HOW MUCH DO YOU SUPPOSE ALL OF THAT ADDS UP TO? WELL, A NATIONAL SURVEY IN 1968 SHOWED THE AVERAGE AMOUNT OF WASTE WAS OVER 5.5 POUNDS PER PERSON PER DAY. THE FITURE IS MUCH HIGHER TODAY. BUT EVEN THEN, THAT IS 2000 POUNDS OR 1 TON OF REFUSE PER PERSON PER YEAR. MULTIPLY THAT BY 200 MILLION PEOPLE IN THE UNITED STATES AND THAT'S A LOT OF REFUSE. WHAT DO WE DO WITH ALL OF THAT SOLID WASTE?

WELL, THERE ARE SEVERAL WAYS WE CAN DISPOSE OF SOLID WASTE. ONE IS TO BURN IT, BUT THAT PRODUCES A LOT OF AIR POLLUTION AND NOT EVERYTHING BURNS. THE NON-COMBUSTIBLE RESIDUE METHOD, THEN, REQUIRES TWO STEPS - BURNING AND BURYING.

THERE IS COMPOSTING IN THIS PROCESS. PAPER, RAGS, METALS, GLASS AND PLASTICS ARE REMOVED FROM THE SOLID WASTE STREAM, AND THE ORGANIC MATERIAL WHICH IS LEFT IS COMPOSTED AND USED AS FERTILIZER. AS YOU CAN IMAGINE, THIS IS A COSTLY PROCESS AND STILL REQUIRES DOING SOMETHING WITH THE INORGANIC MATERIALS.

LANDFILLING IS THE MOST COMMON AND EFFECTIVE METHOD OF DEALING WITH SOLID WASTE DISPOSAL. A SANITARY LANDFILL IS A METHOD OF DISPOSING OF SOLID WASTES WITHOUT CREATING NUISANCES OR HAZARDS TO PUBLIC HEALTH BY UTILIZING ENGINEERING PRINCIPLES. MIXED REFUSE IS COMPACTED AND COVERED DAILY WITH AT LEAST 6 INCHES OF DIRT WHICH IS COMPACTED TO PRODUCE A TIGHT SEAL. THE SEAL PREVENTS FLIES FROM BREEDING, STOPS RODENTS FROM INVADING THE FILL, SEALS IN ODORS, AND KEEPS LOOSE REFUSE FROM BLOWING ONTO ROADS OR ADJOINING PROPERTY. A PROPERLY DESIGNED AND OPERATED SANITARY LAND FILL PRODUCES NO GROUND OR SURFACE WATER POLLUTION AND THERE IS NO BURNING TO CREATE AIR POLLUTION.

SANITARY LANDFILLS ARE FAR MORE ECONOMICAL THAN OTHER DISPOSAL METHODS. THE INITIAL CAPITAL COSTS INCLUDING COSTS OF SITE ACQUISITION AND PREPARATION ARE ROUGHLY ONE FOURTH TO ONE HALF THE COSTS FOR INCINERATION OR COMPOSITING. OPERATING COSTS FOR LANDFILLS ARE APPROXIMATELY ONE THIRD TO ONE HALF OF THOSE FOR THESE OTHER METHODS. MOREOVER, THE IMPROVEMENT OF PROPERTY IS ONE OF THE

CHIEF ECONOMIC ADVANTAGES OF THE SANITARY LANDFILL METHOD. LAND USES OF COMPLETED LANDFILLS INCLUDE ATHLETIC FIELDS, BOTANICAL GARDENS, GOLF COURSES, PARKING LOTS, PLAYGROUNDS, RUNWAYS AND TRAILER PARKS.

THE MAJOR DRAWBACK TO THE SANITARY LANDFILL METHOD IS THE REQUIREMENT FOR LAND. IN TOWNS WHERE THERE ARE NOT AREAS THAT CAN BE RECLAIMED, SUCH AS OLD QUARRY PITS, NEW LAND HAS TO BE ALLOCATED FOR THIS PURPOSE. DUE TO THE CONSIDERABLE AMOUNT OF WASTE PRODUCED, LARGE PARCELS OF LAND ARE NEEDED TO SATISFY THE DEMAND. AT 5.5 POUNDS/PER PERSON PER DAY, 2 CUBIC YARDS OF COMPACTED FILL SPACE IS NEEDED PER PERSON FOR ONE YEAR. IN LARGE COMMUNITIES THIS CONSUMES QUITE A BIT OF LAND.

IF A LAND FILL IS TO BE USED FOR SOILED WASTE DISPOSAL, WHERE SHOULD IT BE LOCATED? LET'S TURN NOW TO THE ATTRACTIVENESS CRITERIA FOR A SANITARY LANDFILL. THE ATTRACTIVENESS CRITERIA ARE OUTLINED ON GUIDE SHEET # 14. G. S

ACCESS IS AN IMPORTANT CRITERION FOR A LANDFILL. A PRIMARY ROAD THAT IS OPEN YEAR-ROUND IS ESSENTIAL TO FACILITATE ENTRY OF THE TOWNSPEOPLE AND MUNICIPAL TRUCKS TO THE SITE.

IN REGARD TO PROXIMITY REQUIREMENTS, THE LANDFILL SHOULD BE SOMEWHAT CENTRALLY LOCATED TO THE SOURCES OF REFUSE. THE GREATER THE DISTANCE FROM THE SOURCE TO THE SITE, THE MORE THE OPERATING EXPENSES WILL GO UP. ISOLATION IS HOWEVER, USUALLY A LOCATIONAL CRITERION.

MOST LAND USES DO NOT CONSIDER A LANDFILL, REGARDLESS OF HOW SANITARY IT IS, TO BE A COMPATIBLE NEIGHBOR.

THE SITE REQUIREMENTS FOR A LANDFILL ARE VERY STRINGENT, TO AVOID SERIOUS ENVIRONMENTAL IMPACT. AS THE REFUSE OF THE LANDFILL DECOMPOSES, THE DIVERSE CHEMICAL CONTENTS WILL FILTER DOWN THROUGH THE SOIL, JUST AS IN A SEPTIC TANK LEACHING FIELD. IF THE LANDFILL IS IMPROPERLY SITED, GROUND AND NEIGHBORING SURFACE WATER HAVE THE POTENTIAL TO BECOME CONTAMINATED. TO AVOID SUCH IMPACTS, A LANDFILL SHOULD BE LOCATED WITH THESE GUIDELINES IN MIND: 1. NO LAKES OR RESERVOIRS SHOULD BE WITHIN ONE MILE, DOWN DRAINAGE FROM THE SITE; 2. WATER WELLS SHOULD NOT BE WITHIN 1000 FEET OF THE SITE; 3. THERE SHOULD BE A MINIMUM OF SURFACE DRAINAGE ENTERING THE LANDFILL AREA; 4. THERE SHOULD BE NO SPRINGS OR WET AREAS WITHIN THE SITE; 5. THE LANDFILL SHOULD NOT BE OVER OR ADJACENT TO AN AQUIFER. 6. HIGH WATER TABLE AREAS SHOULD BE DEFINED AS UNSUITABLE FOR LANDFILL LOCATIONS.

ANOTHER IMPORTANT SITE AND PROXIMITY REQUIREMENT, IS THE AVAILABILITY OF COVER MATERIAL. SOIL IS NEEDED AT THE END OF EACH DAY TO COVER OVER THE REFUSE. HAVING A PLENTIFUL SOURCE OF MATERIAL ON THE SITE WILL ELIMINATE THE

EXPENSE OF IMPORTING IT FROM AN OFF-SITE SOURCE. THE COVER MATERIAL MUST BE FREE OF SUBSTANCES THAT ATTRACT FLIES AND RODENTS, FREE OF LARGE OBJECTS THAT MIGHT HINDER SPREADING AND COMPACTION, AND SHOULD NOT BE EASILY ERODED BY WATER OR WIND. THE FINAL COVER MATERIAL SHOULD BE ABLE TO SUPPORT VEGETATION, UNLESS THE LANDFILL IS TO BE USED FOR A STRUCTURE OR ROAD. SANDY LOAM IS OFTEN THE MOST RECOMMENDED DAILY COVER MATERIAL.

NOW THAT WE HAVE REVIEWED THE ATTRACTIVENESS CRITERIA FOR A SANITARY LANDFILL, LET'S BEGIN TO LOCATE SOME SUITABLE SITES ON OUR OVERLAYS. LOOK AT GUIDE SHEET # 14 FOR A REVIEW OF LANDFILL SITING CRITERIA AS WELL AS A SAMPLE MAP ON GUIDE SHEET # 15 . TURN OFF THE RECORDER WHILE YOU CARRY OUT THIS ACTIVITY. G. S.

ANOTHER APPROACH TO SOLID WASTE MANAGEMENT IS THE IMPOSITION OF REGULATORY MEASURES AFFECTING THE QUANTITY OF WASTE PRODUCED BY YOU AND ME. LEGISLATION CANNOT RESTRICT PEOPLE FROM BUYING THINGS, BUT IT CAN PROHIBIT THE SALES OF CERTAIN GOODS. IN OREGON, FOR EXAMPLE, IT IS ILLEGAL TO SELL NON-RETURNABLE BOTTLES OR CANS. THIS REGULATION HAS REDUCED LITTER ON THE HIGHWAYS BY OVER 90% AND HAS REMOVED A LARGE VOLUME OF WASTE FROM THE SOLID WASTE STREAM, THUS DECREASING THE DEMAND FOR LANDFILL SITES. THIS TYPE OF LEGISLATION MIGHT PROVE TO BE THE MOST EFFECTIVE WAY TO REDUCE CONSUMPTION OF LAND FOR LANDFILL SITES, AND ENHANCE ENVIRONMENTAL QUALITY.

FINALLY, WE COME TO RECREATION AND CONSERVATION AS LAND USE CATEGORIES. LAND THAT IS INVOLVED IN THESE USES FALL UNDER THE HEADING OF OPEN SPACE, REFER TO THE UNIT ON OPEN SPACE FOR A DISCUSSION OF THE FUNCITONS AND VALUES OF OPEN SPACE. WE CAN TALK ABOUT TWO TYPES OF RECREATIONAL LAND USE - LOCAL AND REGIONAL. CONSERVATION IS NOT GENERALLY SEEN AS A LAND USE IT IS MORE OF A POLICY OF RESOURCE MANAGEMENT.

OPEN SPACE RECREATION CAN BE DEFINED AS ACTIVE RECREATIONAL USE PARTICULARLY ORIENTED TO AND UTILIZING THE OUTDOOR CHARACTER OF AN AREA. THESE AREAS INCLUDE PLAYGROUNDS, PICNIC AREAS, PARKS, PUBLIC BEACHES, MARINAS OR BOAT LAUNCHING SITE, BICYCLE OR HORSE RENTAL FACILITIES AND OTHER SIMILIAR USES AND ACTIVITIES. ALL OF THESE ACTIVITIES CAN BE EITHER LOCALLY OR REGIONALLY ORIENTED.

LOCAL RECREATIONAL LAND USES ARE DESIGNED TO SERVICE AND MEET THE NEEDS OF A TOWN OR LOCAL POPULATION. THE SCALE AND SIZE OF THESE FACILITIES IS DESIGNED TO SATISFY THE NEEDS OF THE IMMEDIATE NEIGHBORHOOD., REGIONAL RECREATIONAL LAND USES CAN INCLUDE THE SAME TYPE OF ACTIVITIES AS LOCAL RECREATIONAL USES, BUT THEY ARE INTENDED TO MEET THE NEEDS OF A GREATER NUMBER OF PEOPLE. A REGIONAL PARK, FOR INSTANCE, IS INTENDED TO SERVE MANY TOWNS RATHER THAN THE RESIDENTS OF A SINGLE TOWN.

LOCATIONAL CRITERIA FOR RECREATIONAL LAND USES VARY DEPENDING ON THE SPECIFIC RECREATION TYPE. HOWEVER, THERE ARE SOME GENERALIZATIONS THAT WE CAN MAKE ABOUT THE TWO CATEGORIES - LOCAL AND REGIONAL RECREATION.

LOCAL RECREATION ACTIVITIES SHOULD BE WELL-DISPERSED THROUGHOUT A TOWN. THE AMOUNT OF OPEN SPACE SHOULD BE DIRECTLY CORRELATED WITH RESIDENTIAL DENSITIES. AREAS WITH HIGHER DENSITIES SHOULD HAVE MORE ACCESSIBLE OPEN SPACE THAN LOW DENSITY AREAS. ACCESS TO THE RECREATION AREA SHOULD NOT BE DANGEROUS. IDEALLY, PEDESTRIAN WALKS OR BIKEWAYS SHOULD LINK THE VARIOUS OPEN SPACE AREAS TOGETHER. THE LINKS OR CORRIDORS SHOULD BE CONTINUOUS, WITH A LIMITED NUMBER OF STREET CROSSINGS.

HISTORICALLY OPEN SPACE HAS BEEN POORLY PLANNED FOR - OPEN SPACE IN MOST COMMUNITIES IS GENERALLY SPACE THAT IS LEFT OVER. PARKS AND PLAYGROUNDS ARE OFTEN BUILT ON LAND LEFT OVER BY MAJOR HIGHWAY DEVELOPMENT. NOT ONLY IS THIS LAND LESS-THAN-IDEAL BECAUSE OF THE NOISE LEVEL FROM PASSING TRAFFIC, BUT THE PASSING TRAFFIC PRESENTS A HAZARD TO CHILDREN AND ADULTS USING THE FACILITY.

RECENTLY, WITH THE GROWING EMPHASIS ON RECREATION AND LEISURE-TIME ACTIVITIES, MORE DESIRABLE LAND IS BEING SOUGHT FOR RECREATIONAL USES. OPEN-SPACE CORRIDORS ARE BEING DEVELOPED TO PROVIDE FOR SAFETY OF MOVEMENT BETWEEN THESE SPACES AS WELL AS TO ENHANCE THE RECREATION EXPERIENCE. REFER TO THE GUIDE SHEET # 16 G. S FOR AN ILLUSTRATION OF AN OPEN SPACE SYSTEM. (PAUSE)

IDEALLY, THERE SHOULD BE SOME SORT OF LOCAL RECREATION ACTIVITY WITHIN A ONE-HALF MILE WALK FROM ANY RESIDENCE. IT IS NOT POSSIBLE TO ESTABLISH GUIDELINES FOR THE TYPES OF ACTIVITIES WHICH SHOULD BE DEVELOPED WITHIN THE 1/2 MILE RADIUS. THAT DEPENDS ON THE POPULATION CHARACTERISTICS. NEIGHBORHOODS WITH LARGE NUMBERS OF CHILDREN SHOULD HAVE MORE PLAYGROUNDS THAN AREAS WITH OLDER PEOPLE WHOSE CHILDREN HAVE GROWN UP. IT IS ALSO DIFFICULT TO CORRELATE A SQUARE FOOTAGE FIGURE WITH OPEN SPACE REQUIREMENTS. THIS IS OFTEN DONE BUT HARDLY SEEMS APPROPRIATE, CONSIDERING THAT PEOPLE HAVE SUCH DIFFERENT NEEDS.

REGIONAL RECREATION, BECAUSE IT IS SERVING A LARGE POPULATION, SHOULD BE ACCESSIBLE BY A PRIMARY ROAD OR HIGHWAY. AVAILABLE LAND FOR PARKING IS A NECESSARY REQUIREMENT FOR A REGIONAL RECREATIONAL FACILITY. THERE SHOULD BE SUFFICIENT PARKING SPACE TO CARRY THE UNUSUALLY BUSY DAYS, SUCH AS HOLIDAYS, WHEN FAMILIES OFTEN FLOCK TO PARKS AND RECREATION AREAS.

REGIONAL PARKS ARE USUALLY SET IN AREAS WITH DIVERSE AND UNIQUE LANDSCAPE QUALITIES. LAKES, STREAMS, MEADOWS, FORESTS, HILLS AND VALLEYS ALL CREATE A RICH VISUAL TEXTURE AND SETTING FOR RECREATIONAL ENJOYMENT.

REGIONAL RECREATION AREAS SHOULD ALSO FIT INTO AN OPEN SPACE SYSTEM. REGIONAL PARKS SHOULD BE LINKED TO EACH OTHER AND LOCAL RECREATION AREAS. LOOK AT THE ILLUSTRATION ON GUIDE SHEET # 17 . ESTABLISHING OPEN SPACE NETWORKS AND INTERLOCKING THE DIFFERENT LEVELS OF RECREATIONAL ACTIVITY ADD TREMENDOUS DIVERSITY AND EXCITEMENT TO THE ENVIRONMENTAL QUALITY OF A TOWN OR REGION. G. S.

CONSERVATION LAND IS USUALLY UNDEVELOPED, FORESTED LAND ACCOMODATING A VARIETY OF PASSIVE USES, ALL OF WHICH ARE COMPATIBLE WITH THE OUTDOOR CHARACTER OF AN AREA. THESE USES INCLUDE HUNTING AND FISHING, GAME PRESERVE, FOREST MANAGEMENT, CROSS-COUNTRY SKIING, BACKPACKING, HORSEBACK RIDING, CAMPING AND OTHER SIMILAR ACTIVITIES. THE AREAS THAT ARE BEST SUITED FOR THESE USES ARE ALSO THOSE AREAS THAT ARE MOST SENSITIVE TO ENVIRONMENTAL IMPACT. THUS, MANAGEMENT AND RESTRICTED USE POLICIES ARE OFTEN ASSOCIATED WITH THESE AREAS.

LAND THAT HAS BEEN LABELED UNSUITABLE FOR DEVELOPMENT, DURING THE MAP BUILDABILITY STUDY, FOR WHATEVER REASON, IS LAND THAT IS BEST SUITED FOR CONSERVATION AND PRESERVATION. IF YOU RECALL, THESE ARE WETLANDS, FLOODPLAINS, STEEP SLOPE AREAS, AQUIFER RECHARGE ZONES, UNUSUAL OR EXCEPTIONAL STANDS OF TREES, AND OTHER AREAS. NON-INTENSIVE RECREATION ACTIVITIES AND CONSERVATION PRACTICES SHOULD BE THE ONLY USES ALLOCATED TO THESE SENSITIVE AREAS.

ISOLATION FROM INTENSIVE DEVELOPMENT AND MAJOR ROADS IS THE PRIMARY PROXIMITY AND ACCESS REQUIREMENTS FOR CONSERVATION LAND. WILDLIFE WILL BE MORE ATTRACTED TO REMOTE NATURAL AREAS THAN LAND ADJACENT TO LAND USES WHERE PEOPLE, DOGS, MACHINERY, AUTOMOBILES OR AIRPLANES ARE PRESENT. ACCESS TO THE LAND SHOULD BE PASSABLE, TO ALLOW PEOPLE TO TAKE ADVANTAGE OF THE AMENITIES IT POSSESSES.

BEGIN NOW TO PICK OUT THOSE AREAS IN YOUR TOWN THAT SHOULD BE PRESERVED AS RECREATIONAL OR CONSERVATION LAND AND MAP THEM ON A NEW ACETATE OVERLAY. REFER TO GUIDE SHEET # 18 FOR AN EXAMPLE OF HOW THE PROCESS MAY BE CARRIED OUT. G. S. STOP THE RECORDER, WHILE YOU CARRY OUT THIS ACTIVITY.

WE HAVE NOW CONCLUDED THE DISCUSSION OF ATTRACTIVENESS CRITERIA FOR EACH LAND USE CATEGORY. WE HAVE GENERATED A SEPARATE MAP OF EACH LAND USE CATEGORY THAT OUTLINES THOSE AREAS WHICH, ACCORDING TO THE CRITERIA DISCUSSED, ARE THE MOST SUITABLE OR "ATTRACTIVE" LOCATIONS FOR EACH RESPECTIVE LAND USE. AS WITH THE BUILDABILITY ISSUES, WE ONLY RECORDED THE EXTREME CONDITIONS. IN THE BUILDABILITY SECTION, WE RECORDED ONLY THOSE AREAS THAT ARE MOST ATTRACTIVE. IN BOTH CASES, THERE ARE NON-EXTREME SITUATIONS. IN OTHER WORDS, THERE EXIST SITES THAT HAVE LOW AND MODERATE BUILDABILITY OR ATTRACTIVENESS. WE HAVE USED THE EXTREME CONDITIONS HERE TO CLEARLY ILLUSTRATE THE PROCESS WITHOUT TOO MUCH COMPLEXITY. WE HOPE THAT THE ILLUSTRATIONS AND THE OVERLAY EXERCISES

HELPED YOU DEVELOP A CLEAR CONCEPTION OF HOW THE SYNTHESIS PROCESS WORKS AND HOW IT CAN BE VALUABLE.

REFER TO GUIDE SHEET # 19 AND LOOK AT THE EXAMPLE AS WE DESCRIBE THIS SECOND SYNTHESIS STEP. (PAUSE).

EACH LAND USE CATEGORY HAS BEEN RECORDED ON A SEPARATE MAP AND EACH IN ITS STANDARD COLOR FOR REPRESENTATION. ON THE BASE MAP OF OUR TOWN, WE CAN OVERLAY ALL OR ANY COMBINATION OF LAND USES ON TOP OF ONE ANOTHER. AS WE "LOOK THROUGH" THE MAPS WE SEE OUTLINED AREAS THAT STAND ISOLATED AND WE SEE OTHERS WHERE THE COLORS OVERLAP. THESE ISOLATED AREAS WHERE NO TWO COLORS OVERLAP TO CREATE A THIRD, INDICATE THOSE AREAS WHERE THERE ARE NO CONFLICTS BETWEEN LAND USES. BY CHECKING THE COLOR CODE SYSTEM WE CAN DETERMINE WHAT LAND USE IS APPROPRIATE FOR EACH AREA OF THE COMMUNITY. IN THE AREAS WHERE THERE ARE MIXED AND OVERLAPPED COLORS, A CONFLICT EXISTS AND MUST BE LOOKED AT MORE CLOSELY FOR RESOLUTION. IF ONE OF THESE USES WITH MULTIPLE OPTIONS IS CONFLICTING IN ONE PLACE WITH ANOTHER USE THAT HAS NO OTHER OPTIONS, THEN THE SOLUTION IS EASY - THE MULTIPLE OPTIONED LAND USE CAN UTILIZE ONE OF THE OTHER SITES THAT IT HAS AVAILABLE. OTHER CONFLICTS MAY NOT BE AS EASY TO RESOLVE. IT MAY REQUIRE RE-EVALUATING THE SITES IN TERMS OF THE CRITERIA AND TAKING A CLOSER LOOK AT THE NEIGHBORING LAND USES OR CHARACTER OF THE AREA. THE FINAL MAP SHOULD BE A COMPOSITE MAP OUTLINING ALL OF THE ATTRACTIVE AREAS FOR EACH LAND USE, WITH AS MANY OF THE CONFLICTS WORKED OUT AS POSSIBLE. IF THERE WERE FOUR SUITABLE ZONES FOR INDUSTRY, THEY SHOULD ALL BE INDICATED. THE SAME IS TRUE FOR ALL OF THE OTHER USES. THE MAP THAT WE HAVE JUST PRODUCED IS A "LAND USE ATTRACTIVENESS MAP."

THE FINAL STEP IN THIS PROCESS INVOLVES OVERLAYING THE BUILDABILITY COMPOSITE THAT WE PRODUCED IN THE FIRST HALF OF THIS UNIT WITH THE ATTRACTIVENESS COMPOSITE THAT WE HAVE JUST COMPLETED. REFER TO GUIDE SHEET # 20 FOR AN ILLUSTRATION OF THIS PROCESS. (PAUSE) LAND USES THAT FALL INTO ZONES UNSUITABLE FOR DEVELOPMENT MUST BE ELIMINATED. ALL OF THE LAND USES THAT ARE NOT LOCATED IN UNBUILDABLE AREAS ARE COMPATIBLE WITH THEIR SITES AND CAN BE CONSIDERED FOR ALLOCATION TO THOSE PLACES. DRAW A FINAL MAP OF THOSE LAND USES WITHOUT ENVIRONMENTAL CONFLICTS - THIS MAP IS CALLED THE LAND USE ALLOCATION MAP OR PLAN. NOW, WE HAVE A MAP THAT TELLS US WHERE WE CAN PUT FUTURE LAND USES THAT WILL NOT HAVE SEVERE ENVIRONMENTAL IMPACTS ON THE LAND. THE LAND USE ALLOCATION MAP GIVES US INFORMATION ON LAND USE REQUIREMENTS, IN TERMS OF ACCESS, PROXIMITY AND SITE CONDITIONS.

IF THERE ARE TOO MANY SITES ALLOCATED FOR A SPECIFIC LAND USE AND ONE OF THEM HAS TO BE SELECTED, THEN LOOK AT ALL OF THE SITES MORE CLOSELY AND RE-

EVALUATE THEM AGAIN IN TERMS OF THE LOCATIONAL CRITERIA. REMEMBER, THAT IT IS UNLIKELY THAT ANY ONE SITE WILL SATISFY COMPLETELY ALL THE CRITERIA. TRADE-OFFS WILL HAVE TO BE MADE BASED UPON A NUMBER OF FACTORS. ONE OF THOSE FACTORS, AND PROBABLY THE MOST IMPORTANT IN MOST COMMUNITIES IS ECONOMICS. REFER TO THE UNIT ON "ECONOMIC TRADE-OFFS" FOR MORE DETAILS ON THIS ISSUE. TO DEMONSTRATE HOW ECONOMICS PLAYS A ROLE IN DECISION MAKING, CONSIDER THIS ILLUSTRATION. SUPPOSE WE HAVE DISCOVERED TWO IDEAL SITES FOR A SANITARY LANDFILL. BOTH ARE ADJACENT TO A PRIMARY ROAD, BOTH ARE WELL ISOLATED, ALL OF THE STRINGENT SITE REQUIREMENTS ARE SATISFIED AND SITE PREPARATION COSTS ARE COMPARABLE. HOWEVER, ONE SITE IS A FEW MILES FURTHER FROM THE POPULATION CENTER THAN THE OTHER. THIS WOULD INCREASE HANDLING COSTS IN TERMS OF GAS, WEAR AND TEAR ON GARBAGE COLLECTION VEHICLES AND TIME TO COVER EXTRA MILES. THE CLOSER SITE, THEN, IS MORE APPROPRIATE.

ANOTHER IMPORTANT FACTOR IN RESOLVING ALLOCATION DECISIONS, IS ZONING. WE MIGHT DISCOVER A NUMBER OF IDEAL SITES FOR LIGHT INDUSTRY BUT DISCOVER THAT MANY OF THEM ARE IN AN AREA ZONED FOR COMMERCIAL USES. THERE ARE SEVERAL THINGS WE CAN DO THEN: EITHER DISREGARD THOSE SITES ALTOGETHER; ASK FOR A ZONING VARIANCE; OR CHANGE THE ZONING PLAN ALTOGETHER. IN MANY CASES, ZONING PLANS ARE BASED ON FAR LESS INFORMATION THAN WE HAVE CONSIDERED HERE. PERHAPS IT IS TIME TO REVISE OLD ZONING PLANS AND MASTER PLANS. THIS SYNTHESIS PROCESS MAY AID YOU IN REVISING ZONING REGULATIONS AND IN THE PREPARATION OF A MASTER PLAN FOR YOUR COMMUNITY.

THIS SOUND, ECOLOGICAL LAND USE PLANNING PROCESS WILL ENABLE TOWNS AND COMMUNITIES TO PREPARE THEMSELVES OR TO BETTER COPE WITH THE GROWING PRESSURES OF DEVELOPMENT AND URBANIZATION.

RECENTLY, THE FEDERAL GOVERNMENT HAS RELEASED A STUDY ENTITLED THE COSTS OF SPRAWL. THE STUDY COMPARES THE COST OF PLANNED DEVELOPMENT WITH THE COST OF SPRAWL. THE PRIMARY INTENT OF THE STUDY WAS TO PROVIDE INFORMATION FOR USE BY LOCAL GOVERNMENT DECISION-MAKERS IN THEIR PLANNING AND DEVELOPMENT DELIBERATIONS. THE FOLLOWING QUOTE DESCRIBES THE PURPOSE OF THE STUDY:

"LOCAL OFFICIALS ARE BEING FACED WITH INCREASINGLY DIFFICULT DECISIONS ABOUT HOW LAND SHOULD BE USED AND HOW MUCH AND WHAT TYPE OF DEVELOPMENT SHOULD BE ALLOWED. THEY ARE BEING PRESENTED PROPOSALS FOR NEW TYPES OF DEVELOPMENT THAT THEY MAY NOT HAVE DEALT WITH BEFORE; CLUSTERED SINGLE FAMILY HOUSING, TOWNHOUSES, WALKUP APARTMENTS, AND HIGH RISE APARTMENTS ARE APPEARING IN COMMUNITIES EVEN OUT TO THE URBAN FRINGE.

AT THE SAME TIME, THERE IS INCREASED CONCERN ABOUT THE IMPACTS OF NEW DEVELOPMENT ON THE COMMUNITY. THIS HAS BEEN LIMITED MOSTLY TO ECONOMIC IMPACTS OF THE DEVELOPMENT - WHETHER THE ADDED TAX BASE WOULD COMPENSATE FOR THE ADDED COSTS THAT THE NEW RESIDENTS IMPOSED ON THE COMMUNITY.

IN RECENT YEARS THESE ECONOMIC CONCERNS HAVE BEEN JOINED BY ENVIRONMENTAL AND OTHER CONCERNS. WHAT WILL THE DEVELOPMENT DO TO AIR POLLUTION, WATER POLLUTION, WILDLIFE, AND OPEN SPACE? WHAT IS THE IMPACT OF DEVELOPMENT UPON ENERGY CONSUMPTION? ON WATER CONSUMPTION? HOW WILL THE DEVELOPMENT AFFECT THE LIVES OF THE PEOPLE WHO LIVE IN IT? OF THOSE WHO LIVE NEAR IT?

THE PURPOSE OF THE COSTS OF SPRAWL IS TO HELP THE MAYOR, THE CITY MANAGER, THE PLANNING BOARD, AND OTHER CONCERNED LOCAL OFFICIALS AND CITIZENS ANSWER SUCH QUESTIONS. THERE HAS BEEN NO RECENT EFFORT TO ASSESS ALL THE ECONOMIC COSTS ASSOCIATED WITH DIFFERENT TYPES OF DEVELOPMENT; NOR UNTIL NOW HAS THERE BEEN A DOCUMENT THAT ATTEMPTED TO INTEGRATE THE VARIOUS ECONOMIC, ENVIRONMENTAL, RESOURCE, AND SOCIAL COSTS OF THESE DEVELOPMENTS."

THE COSTS OF SPRAWL WAS DESIGNED TO HELP FILL THE INFORMATION VOID THAT HAS MADE DECISIONMAKING SO DIFFICULT. THE STUDY ATTEMPTS TO SUMMARIZE WHAT IS KNOWN ABOUT THE DIFFERENT COSTS AS THEY APPLY TO DIFFERENT NEIGHBORHOOD TYPES AND TO DIFFERENT COMMUNITY DEVELOPMENT PATTERNS, AND IT INDICATES WHETHER THE COSTS ARE INCURRED PUBLICLY OR PRIVATELY. TABLE I ON THE COVERSHEET FOR THIS SECTIONS LISTS THE TYPES OF COSTS THAT HAVE BEEN INCLUDED IN THIS STUDY. THESE ARE NOT ALL THE COSTS ASSOCIATED WITH RESIDENTIAL DEVELOPMENT, BUT THEY ARE AMONG THE MOST IMPORTANT ONES. THE COSTS OF SPRAWL SHOULD GIVE THE LOCAL DECISIONMAKER A STRONG START IN DEALING WITH MANY OF THE VERY DIFFICULT DECISIONS THAT HE HAS TO FACE.

THE COSTS OF SPRAWL STUDY PROVIDES US WITH AN ANALYSIS OF PROTOTYPE DEVELOPMENT PATTERNS, NOT OF ACTUAL DEVELOPMENTS, ALTHOUGH MANY OF THE DATA WERE OBTAINED FROM EMPIRICAL STUDIES UNDERTAKEN BY OTHERS. HERE THE APPROACH WAS TO ASSUME TYPICAL SITE CONDITIONS AND AN ABSENCE OF ANY EXISTING INFRASTRUCTURE (ROADS, SEWERS, ETC.) AT THE SITE AND THEN, USING STANDARD UNIT COST FIGURES, TO ESTIMATE THE COSTS OF BUILDING ALTERNATIVE TYPES OF DEVELOPMENT. TURN TO GUIDE SHEET # 21. (PAUSE 3 SECONDS)

THE VARIOUS COSTS WERE FIRST ESTIMATED FOR DIFFERENT NEIGHBORHOOD TYPES, EACH NEIGHBORHOOD BEING COMPOSED OF 1,000 DWELLING UNITS OF ONE OF THE FOLLOWING HOUSING

TYPES: AS WE LIST THE NIGHBORHOOD TYPES, LOCATE THEM ON GUIDE SHEET # 21.

- SINGLE FAMILY HOMES, CONVENTIONALLY LOCATED (PAUSE)
- SINGLE FAMILY HOMES, CLUSTERED (PAUSE)
- TOWNHOUSES (PAUSE)
- WALKUP APARTMENTS (TWO STORIES) (PAUSE)
- HIGH RISE APARTMENTS (SIX STORIES) (PAUSE)

IT IS IMPORTANT TO FAMILIARIZE YOURSELF WITH THE DEVELOPMENT TYPES IN THE STUDY. TURN THE TAPE RECORDER OFF WHILE YOU STUDY GUIDE SHEET # 21. (PAUSE 3 SECONDS)

SINCE THE STUDY COMPARES THE COST AND COMMUNITY IMPACT OF PROTOTYPE DEVELOPMENT IT IS NECESSARY TO CONSIDER THE BASIC CONSTRUCTION ASSUMPTIONS FOR EACH HOUSING PATTERN. A SUMMARY OF ASSUMPTIONS IS REPRODUCED ON GUIDE SHEET # 22.

BECAUSE THE GUIDESHEETS CAN BE COMPLEX IN THIS STUDY, WE SUGGEST YOU STOP THE RECORDER WHENEVER YOU NEED MORE TIME TO STUDY A GUIDE SHEET. FROM HERE ON IN, THE DECISION TO STOP THE RECORDER FOR GUIDE SHEET ANALYSIS WILL BE ENTIRELY UP TO YOU.

GUIDE SHEET # 23 COMPARES THE LAND BUDGET FOR THE CONSTRUCTION OF 1000 LIVING UNITS OF EACH HOUSING TYPE. NOTE THAT EACH HOUSING PATTERN HAS LAND ALLOTTED TO OPEN SPACE, SCHOOLS, PUBLIC FACILITIES, AND TRANSPORTATION IN ADDITION TO THE RESIDENTIAL LAND AREA. THE COSTS OF ALTERNATIVE NEIGHBORHOOD PROTOTYPES ARE ANALYZED IN GUIDE SHEETS 24 - 28. COST COMPARISONS HAVE BEEN COMPLETED FOR THE CAPITAL AND OPERATING COSTS FOR RESIDENTIAL DWELLING UNITS, OPEN SPACE AND RECREATION, SCHOOLS, TRANSPORTATION, STREETS AND ROADS, AND UTILITIES. THE ITEMS MENTIONED HERE ARE THOSE MOST LIKELY TO BE DIRECTLY OR INDIRECTLY AFFECTED BY THE CONSTRUCTION OF NEW HOUSING UNITS. TAKE THE TIME TO COMPARE CAPITAL AND OPERATING COSTS FOR EACH OF THE ALTERNATIVE DEVELOPMENT TYPES. (PAUSE)

THE PRIMARY VALUE OF THE STUDY DOES NOT LIE IN THE ABSOLUTE COST AND EFFECT ESTIMATES. THE GENERAL APPROACH AND SPECIFIC METHODOLOGIES ARE IMPORTANT. ALSO, THE APPROXIMATE MAGNITUDES AND RELATIVE COMPARISONS OF BOTH COSTS AND ADVERSE EFFECTS ARE MAJOR CONTRIBUTIONS OF THIS STUDY. OVERALL, COST ESTIMATES ARE BELIEVED TO BE ACCURATE WITHIN 10 PERCENT OF EITHER SIDE OF THE NUMBERS SHOWN FOR DIRECT COSTS. WHERE SUFFICIENTLY RELIABLE UNIT COST ESTIMATES WERE WIDELY AVAILABLE (AS FOR SCHOOLS, WATER, SEWERAGE, STORM DRAINAGE AND MOST PUBLIC FACILITIES AND SERVICES), THE ONLY INTERPOLATION NECESSARY WAS TO SHOW COST DIFFERENCES AMONG HOUSING TYPES AND DEVELOPMENT PATTERNS. THESE DIFFERENCES OFTEN ARE NOT DOCUMENTED IN THE LITERATURE; THUS, VARIATION IN COST ESTIMATES AMONG THE PROTOTYPES ARE BASED ON THE REASONABLE JUDGMENTS MADE BY THE RESEARCH STAFF, BASED ON THEIR EXPERIENCE AND KNOWLEDGE OF DEVELOPMENT COSTS. FOR OTHER COST CATEGORIES (ESPECIALLY RESIDENTIAL AND OPEN SPACE/RECREATION), COST DIFFERENCES AMONG ALTERNATIVE DEVELOPMENT PATTERNS ARE WELL DOCUMENTED, BUT NEEDED ADJUSTMENT TO MEET THE SPECIFIC CHARACTERISTICS OF THE PROTOTYPE NEIGHBORHOODS AND COMMUNITIES USED IN THIS STUDY.

[illegible] BEYOND THE TOTAL COST OF [illegible] CAPITAL OR OPERATING COST BE [illegible] GUIDE SHEET [illegible] THE TWO CHARTS ON GUIDE SHEET [illegible] THE BAR ON THE LEFT SIDE [illegible] WILL BE SPENT I.E., FOR RESIDENT [illegible] AND OPEN SPACE. THE RIGHT HAND BAR FOR EACH [illegible] PAY THAT COST GOVERNMENT OR PRIVATE HOMEOWNER.

[illegible] GUIDE SHEET # 29 IS LOCATED ON GUIDESHEETS # 30 AND 31. REVIEW AND COMPARE THE PERSONAL COSTS ASSOCIATED WITH THE SIX NEIGHBORHOOD TYPES. (PAUSE)

IN ADDITION TO ECONOMIC COSTS, ENVIRONMENTAL AND PERSONAL COSTS WERE ALSO EVALUATED IN THE COMMUNITY SCENARIO STUDY. ON GUIDE SHEETS # 32 - # 34, AIR POLLUTION, WATER POLLUTION, EROSION, AND NOISE POLLUTION COSTS ARE EVALUATED FOR EACH OF THE NEIGHBORHOOD TYPES. THE COMPARISON OF AIR POLLUTION PRODUCED BY THE SIX PROTOTYPE NEIGHBORHOODS IS PRESENTED ON GUIDE SHEET # 32. AIR POLLUTION HAS TWO MAJOR SOURCES: AUTOMOBILES AND RESIDENTIAL HEATING. FOR THE PURPOSES OF THE STUDY IT WAS ASSUMED THAT AUTOMOTIVE AIR POLLUTION WOULD BE THE SAME FOR ALL NEIGHBORHOOD TYPES. THE DIFFERENCES IN AIR POLLUTION SHOWN ON THE GUIDESHEET REFLECT DIFFERENCES THAT RELATE TO THE HOUSING TYPE. (PAUSE)

EROSION AND SEDIMENTATION ARE INTERRELATED PROBLEMS, PARTICULARLY AS PART OF THE [illegible] IN THE NEIGHBORHOOD AREA. A MEASURE OF EROSION IS SEDIMENTATION [illegible] AND LAKES.

ON GUIDE SHEET # 33, WATER POLLUTION IS MEASURED FOR THE PROTOTYPES IN TERMS OF SEDIMENT PRODUCTION AND POLLUTANTS FROM FARM WATER RUN-OFF. POLLUTION FROM OFF SITE SOURCES ARE NOT CONSIDERED. THE DIFFERENCES IN SEDIMENT VOLUME REFLECT THE VARIATION IN THE AMOUNT OF LAND DISTURBED. THE SAME IS TRUE FOR OTHER WATER POLLUTANTS.

FINALLY, NOISE AS A CRITICAL FACTOR IN EVALUATING ENVIRONMENTAL EFFECTS OF ALTERNATIVE DEVELOPMENT PLANS IS PRESENTED ON GUIDE SHEET # 34. THE LIKELIHOOD OF NOISE [illegible] WITHIN A RESIDENTIAL ENVIRONMENT FROM OUTDOOR ACTIVITY AND FROM ATTACHED DWELLING UNITS IS CONSIDERED AT THE NEIGHBORHOOD LEVEL BECAUSE IT IS PRIMARILY A FUNCTION OF DENSITY AND HOUSING TYPE. REVIEW THE COMPARISON ON GUIDE SHEET # 34. (PAUSE)

THE NEIGHBORHOOD ANALYSIS CONSIDERS TWO TYPES OF INDIRECT PERSONAL EFFECTS OF DEVELOPMENT: (1) DISCRETIONARY TIME - TIME ALLOCATED TO HOUSEHOLD CHORES AND LEISURE AND (2) PSYCHIC COSTS - EFFECTS OF HOUSING TYPE ON PERSONAL PERCEPTIONS OF SECURITY, STATUS, PRIVACY, COMFORT, ETC. THESE PERSONAL EFFECTS ARE MOST LIKELY TO BE ASSOCIATED WITH NEIGHBORHOOD AND DWELLING UNIT CHARACTERISTICS.

ON GUIDE SHEET # 35, THE AMOUNT OF TIME SPENT ON LEISURE OR HOUSEHOLD CHORES WAS

CALCULATED BY SUBTRACTING FROM THE TOTAL TIME PER WEEK THOSE USES OF TIME WHICH WERE ASSUMED NOT TO VARY AMONG HOUSING TYPES (USUALLY SLEEP, MEALS, PERSONAL USE, TRAVEL AND, IN THE CASE OF THE HEAD OF THE HOUSEHOLD OR FOR EMPLOYED SPOUSES, WORK) AND THEN ALLOCATING THE BALANCE BETWEEN LEISURE AND HOUSEHOLD USES ACCORDING TO HOUSING TYPE AND POSITION IN THE FAMILY.

ANOTHER INDIRECT COST OF DEVELOPMENT THAT HAS BEEN GIVEN LITTLE ATTENTION IS THE PSYCHIC COST, OR THE PERSONAL AND EMOTIONAL ATTITUDES OF INDIVIDUALS THAT ARE BOTH AFFECTED BY AND AFFECT DEVELOPMENT. ATTITUDES AFFECT DEVELOPMENT THROUGH AN EXPRESSION OF CONSUMER PREFERENCES -- SO THAT HOUSING OR COMMUNITY CHOICES THAT ARE AVAILABLE TO INDIVIDUALS WILL BE [illegible] IN THE MARKETPLACE BY PURCHASE OR NON PURCHASE DECISIONS. ATTITUDES ARE AFFECTED [illegible] IN THAT INDIVIDUALS RESPOND IN DIFFERENT WAYS TO STRUCTURAL OR SITE FEATURES. PSYCHIC COSTS ARE SUMMARIZED ON GUIDE SHEET # 36.

IN THE ACCOMPANYING PAMPHLET, THE COSTS OF SPRAWL - AN EXECUTIVE SUMMARY, A SIMILAR ANALYSIS HAS BEEN COMPLETED FOR VARIOUS DENSITY DEVELOPMENT PATTERNS. THE SUMMARY DISCUSSES THE ANALYSIS FOR DIFFERING DENSITY DEVELOPMENTS - LOW DENSITY SPRAWL, COMBINATION MIX AND HIGH DENSITY PLANNED IN A PARALLEL MANNER TO THE NEIGHBORHOOD ANALYSIS WE JUST DISCUSSED. IF YOU ARE INTERESTED, READ THE COSTS OF SPRAWL PAMPHLET. (PAUSE)

ALSO OF INTEREST TO YOU MAY BE A SIMILAR COMPARISON OF ECONOMIC, ENVIRONMENT, AND PERSONAL COSTS OF VARIOUS COMMERCIAL DEVELOPMENT. THIS CAN BE FOUND IN THE ECONOMICS OF LAND USE ACTIVITY UNIT.

WHAT CONCLUSIONS CAN BE DRAWN FROM THE COSTS OF SPRAWL STUDIES? GUIDE SHEET # 37 REPRODUCES THE MAJOR CONCLUSIONS OF THE STUDY. IN SUMMARY, THE MAJOR CONCLUSION IS THAT, "FOR A FIXED NUMBER OF HOUSEHOLDS, "SPRAWL" IS THE MOST EXPENSIVE FORM OF RESIDENTIAL DEVELOPMENT IN TERMS OF ECONOMIC COSTS, ENVIRONMENTAL COSTS, NATURAL RESOURCE CONSUMPTION AND MANY TYPES OF PERSONAL COSTS."

THE COSTS OF SPRAWL IS NOT A FINAL DEFINITIVE STUDY. THERE ARE TOO MANY COSTS AND BENEFITS WHICH HAVE NOT BEEN INCLUDED, PARTICULARLY THOSE ASSOCIATED WITH QUESTIONS OF PERSONAL PREFERENCES AND THE REVENUES GENERATED BY DIFFERENT DEVELOPMENT TYPES. BUT THE ANALYSIS DOES PROVIDE ANOTHER BUILDING BLOCK IN THE SYNTHESIS PROCESS. THE COST OF SPRAWL STUDY PROVIDES LOCAL OFFICIALS WITH A BETTER INFORMATION BASE ABOUT THE IMPACTS OF DIFFERENT DEVELOPMENT PATTERNS, ALLOWING THEM TO MAKE BETTER INFORMED DECISIONS ABOUT THE FUTURE FORM OF THEIR COMMUNITIES.

THANK YOU FOR JOINING US FOR THE SYNTHESIS UNITS. IT HAS BEEN A PLEASURE TO HAVE YOU WITH US. STOP THE RECORDER AND READ GUIDE SHEET # 37.