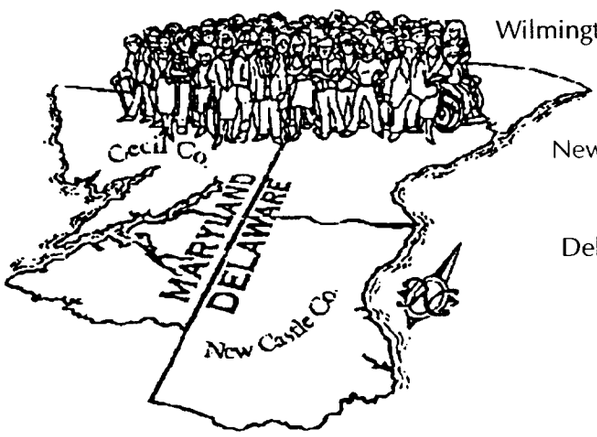
WILMAPCO

MOBILITY FRIENDLY DESIGN STANDARDS

November 6, 1997



Wilmington Area Planning Council

In Partnership with:
Middletown, Delaware
New Castle County, Delaware
Delaware Department of Transportation
Delaware Transit Corporation

Consultants:
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Wilmington Area Planning Council

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RESOLUTION

BY THE WILMINGTON AREA PLANNING COUNCIL (WILMAPCO) TO APPROVE THE *MOBILITY FRIENDLY DESIGN STANDARDS REPORT*

WHEREAS, the Wilmington Area Planning Council (WILMAPCO) has been designated the Metropolitan Planning Organization (MPO) for Cecil County, Maryland, and New Castle County, Delaware, by the Governors of Maryland and Delaware, respectively; and

WHEREAS, the Federal Highway Administration and Federal Transit Administration jointly certified WILMAPCO's transportation planning process on October 1, 1995; and

WHEREAS, the WILMAPCO Council adopted the *2020 Metropolitan Transportation Plan* (MTP) on March 14, 1996; and

WHEREAS, the WILMAPCO Council recognizes that developing and implementing mobility friendly design standards are important parts of achieving the goals of the MTP; and

WHEREAS, the *Mobility Friendly Design Standards Report* was reviewed and commented upon by the Technical Advisory Committee and its recommendations reviewed by the Town of Middletown, the Delaware Department of Transportation and the public; and

WHEREAS, the WILMAPCO Council approves the standards set forth in the *Mobility Friendly Design Standards Report* as consistent with the Goals and Strategies of the MTP.

NOW, THEREFORE, BE IT RESOLVED that the Wilmington Area Planning Council does hereby approve the *Mobility Friendly Design Standards Report* and encourages appropriate member agencies to implement the recommendations of the report.

11·6·97
Date

Ronald L. Gardner, Chairman
Wilmington Area Planning Council

WILMAPCO
Partners with you in transportation planning

1.0 Executive Summary

WILMAPCO, the Wilmington Area Planning Council, in partnership with the Town of Middletown, New Castle County, the Delaware Department of Transportation (DelDOT) and the Delaware Transit Corporation (DTC) contracted with LDR International and their consulting team to assist in developing mobility friendly design standards that will ensure that non-single occupant vehicle modes of travel are considered and implemented in the built environment where appropriate. This project was initiated to support the strategies and recommended actions developed in WILMAPCO's *Metropolitan Transportation Plan*.

This report recommends specific text and design criteria amendments to state and local ordinances and design manuals, to remove existing impediments to mobility friendly design and furthermore, to encourage and promote this type of design as part of new development. The standards presented here are part of a statewide effort to provide mobility options to the residents of Delaware in an effective and efficient manner and in a way that contributes to the quality and character of communities.

These transportation and land use recommendations have been developed in concert to address the overlapping issues, concerns and responsibilities of state, county and local planning agencies and community residents. They seek to provide an objective and quantifiable foundation for both public and private developers as well as reviewing agencies to interpret and implement mobility friendly design systems and features.

This report first describes the recent development trends, patterns and associated consequences that have led to the need for this study. The report then outlines the structure of the multi-jurisdictional project team and the process for developing and implementing the recommendations. Finally, the report outlines recommendations for Middletown's zoning and subdivision regulations and for DelDOT's *Rules and Regulations for Subdivision Streets*. These proposed revisions include recommendations to, among other things, provide a greater mix of uses, bring buildings closer to the street, reduce the impact of parking lots, and modify geometric design criteria for residential streets to calm traffic and create a more pedestrian friendly environment. The specific proposed text amendments are appendices to this report.

Finally, the report recognizes the need for long-term coordinated efforts between state, local and regional entities to ensure effective implementation of mobility friendly design. The report concludes with recommendations on additional supporting documents and policies that are needed in order for a mobility friendly environment to be fully realized.

2.0 Background and Purpose

2.1 Purpose

People—commuters, families with children, students, the elderly—need more transportation choices. They need viable and convenient travel options other than driving alone in their cars. The purpose of the Mobility Friendly Design Standards Project and subsequent recommendations for ordinance revisions is to support Middletown, DelDOT, New Castle County, WILMAPCO and the State of Delaware's long-range transportation goal to increase mobility and accessibility by providing the public with these options and integrating these improvements into the social fabric of communities to help create more livable neighborhoods.

This report recommends amendments and additions to the Town of Middletown's zoning and subdivision regulations and to DelDOT's *Rules and Regulations for Subdivision Streets Manual* to serve as a guide for creating a more mobility-friendly pattern of development.

Mobility-friendly regulations, as created under this project, can be categorized in two ways: the physical network and the associated pedestrian friendly design elements. The recommended changes for the local and state ordinances can be described as follows:

- The physical network—the provision of direct, continuous and convenient routes for alternative modes of transportation (walking, biking and transit use). This includes establishing a built network of streets, sidewalks, pedestrian ways and bikeways through road design criteria, zoning ordinances and subdivision regulations.

- Pedestrian friendly design elements—the creation of a safe and inviting environment by enhancing the physical network in ways that encourage the use of alternative transportation modes. Improvements might include landscaping, site design and building articulation, public open space, street trees and other amenities such as benches and bike racks.

The goal of this project is to develop standards that would help planners —both public and private—design mobility friendly communities. These new standards would be used to prepare land development plans to ensure that alternative modes of travel are considered in the built environment, where appropriate. The recommendations of this report bridge the gap between land use regulation and transportation planning and

engineering as they relate to mobility friendly design. Among the issues addressed as part of this effort are:

- Providing alternative travel modes (walking, biking and transit use) **as part of the development process.**
- Providing network **continuity** for alternate travel modes, meaning that there are no gaps in the network.
- Creating a **pleasant** pedestrian environment that **encourages** walking, biking or transit use.
- Improving **safety** on residential streets through slower vehicle speeds.
- Addressing the issue of **congestion** on major streets due to a lack of alternative connecting routes or alternative modes of transportation.
- Locating origins and destinations within convenient **proximity** to each other to allow walking and biking as viable options.

2.2 Background

The transportation and land use issues facing Delaware are complex and significant. They are at the heart of many of the frustrations that the state's residents are experiencing, which range from traffic congestion to an erosion of the traditional pattern and character of development. Through the development of WILMAPCO's *Metropolitan Transportation Plan* it was established that insufficient road capacity and the resulting congestion cannot be solved by building more roads alone. Efforts to manage growth and minimize congestion by directing growth to designated growth areas based on road capacity and levels of service are often unsuccessful. Often these efforts result in simply pushing growth further out to where adequate road capacity exists to secure approval. Although recognized, this problem will be difficult to solve because land use is a local government responsibility while roads are a state responsibility. The result is what appears to be a game of finger pointing over who is responsible for the problem and who should take the first steps to correct it. DelDOT is blamed for not providing adequate roads to serve the planned land uses while counties and municipalities are blamed for designating land uses without regard to the transportation needs they generate. These issues are exacerbated by the following existing factors:

- More people living and working in the region.
- Origins and destinations separated by single-use zoning.
- Longer commutes from home to work.
- Increased single occupant vehicle use.

Many of these concerns were echoed at the Statewide Land Use Summit, hosted by the Delaware Public Policy Institute in March 1997. Observations voiced at the Summit ranged from a lack of planning and inconsistent or little implementation, to how lifestyle choices are affecting growth. In a 1997 Public Opinion Survey conducted by WILMAPCO, 64% of residents felt that new development should occur in existing and new towns and villages. Of these , 87% supported revising zoning codes to promote land uses and site designs that better support alternate travel modes.

Over the past twenty or more years, residential and non-residential development trends have lacked internal and external connectivity and have yielded a built environment that lacks mobility options and pedestrian friendly design features. Residential subdivisions are characterized by discontinuous street networks that end in cul-de-sacs and provide few alternate routes. While considered safer because of less through-traffic, this development pattern forces all trips onto a limited number of arterial roads. The result is the congestion that plagues most urban and rapidly suburbanizing areas. Long discontinuous streets make trips too long for pedestrians; wide streets and higher auto speeds make trips unsafe for children, walkers and cyclists. These street patterns, which lack alternate connections, make transit difficult to provide because buses must often back track, take indirect routes, or follow routes that are not convenient to residential areas.

In addition, a sprawling disconnected pattern of commercial and industrial development has resulted largely from single use zoning, which tends to create large areas of like uses. These islands and strips of development separate where people live from where they work and shop. The result is again greater dependance on cars for access to the places people want to go.

2.3 The Challenge

Providing for mobility options requires having adequate systems or networks connecting the places that people want to go. These networks must be continuous, meaning that there are no gaps in the network. They must also be direct, safe and convenient if they are to truly offer a viable travel mode option. These pedestrian, bicycle and transit systems must be built as part of the street infrastructure. However, this alone is not

sufficient. Connections must be made that are internal to development parcels as well as between parcels.

In addition, these networks must be attractive and aesthetically pleasing - people have to want to use them. People traveling on foot or by bike are more impacted by attention to detail and scale than are those traveling by car. How buildings are sited and what they look like is of greater importance. Landscaping provides separation from traffic, provides screening and shade, and adds interest to the pedestrian environment.

Finally, origins and destinations must be located near enough to one another for alternate transportation modes to be considered a reasonable option. Walkers and bikers travel much slower than automobiles. This requires that destinations be located in closer proximity to origins than current practices dictate.

A mobility friendly environment can only be created once all of these "pieces" are put in place. Because these pieces are under the jurisdiction of separate state and local agencies, a collaborative effort is required on the part of the transportation and the land use authorities. Here-in lies the challenge. The plans and recommendations for both transportation and land use modifications need to be developed simultaneously. The transportation planners have to be confident that their recommendations are going to be supported by land use policies. Likewise, the local land use agencies have to be confident that their land use decisions can be supported by the appropriate transportation infrastructure.

2.4 The Project Management Team

This project is a joint effort of local, regional and state government and planning agencies. This study is being led by WILMAPCO, the bi-state Metropolitan Planning Organization (MPO) serving Cecil County, Maryland and New Castle County, Delaware. With a regional perspective, WILMAPCO plans and coordinates transportation plans and programs in the two county area. Their partners in the study are the Delaware Department of Transportation (DelDOT), the Delaware Transit Corporation (DTC), the Town of Middletown, and New Castle County.

The goal of increasing access to and providing non-SOV modes of travel is well documented in WILMAPCO's *Metropolitan Transportation Plan*, New Castle County's *Comprehensive Development Plan Update* and DelDOT's *Long Range Transportation Plan*. It is also a stated objective of the Town of Middletown's *Draft Comprehensive Plan*, as recent development in that area has been characterized by a lack of connectivity,

increased congestion on existing roads and development patterns that are not in keeping with the traditional character of the Town.

In the past, the goal of creating a mobility friendly environment has been difficult, if not impossible, for any one agency to accomplish on its own. Elements of the mobility objectives have been successfully achieved. However, coordination of many often disparate land use and transportation initiatives has not been realized. This project brought together representatives of the public, land use and transportation planners, designers, and engineers to develop a comprehensive strategy for enhancing mobility options. By developing the land use and transportation recommendations side-by-side and reviewing the comprehensive package with all of the project team representatives and work groups, each agency was offered a level of confidence and understanding of how the various recommendations would be supportive of one another.

2.5 The Pilot Project

The land use and land development recommendations for this phase of work focuses on Middletown, Delaware. Middletown is located in southern New Castle County. It was selected as a pilot site for this undertaking because of its location, size, historic development pattern, recent growth pressures, and at the request of the Mayor, Kenneth Branner, Jr. Middletown, current population approximately 4,200, has historically served as the business and trade center of an agricultural community. Even today, Middletown's crossroads and the immediately surrounding business and residential areas are characteristic of its pre-1900 origins. However, development patterns of the last ten years have changed Middletown's appearance, as well as traffic patterns and volumes in and around the town.

Pressure has increasingly been put on Middletown to annex adjacent parcels of land, thereby increasing densities from the one unit per acre permitted in New Castle County to the moderately higher densities permitted in Middletown. With growth comes greater demand for services, such as sewer, water, fire and police, schools, parks and libraries. For these reasons, Middletown has wisely embarked on a comprehensive plan update to help the town guide growth in a logical and efficient manner.

For Middletown, the goal of this effort is to adopt zoning code and subdivision ordinance revisions that will guide development character and patterns to be compatible with traditional Middletown, and will be mobility-friendly by facilitating use of and access to a variety of travel modes.

The transportation recommendations for this phase of the project focus on DelDOT's Rules and Regulations for Subdivision Streets Manual. This manual governs the design and construction of streets in residential, commercial and industrial subdivisions. As evidenced by the increasing trend of retrofitting subdivision streets with traffic calming devices, such as speed humps to control speed, a fresh look at how these street networks are designed and built is needed. DelDOT's goal is to provide an excellent transportation system that is integrated into the social fabric of communities and helps to create livable neighborhoods while providing an expanded network of connections within and between communities.

2.6 The Process

The process began with a thorough analysis of WILMAPCO, DelDOT, New Castle County and Middletown's existing rules, regulations, and design criteria for development, as well as their associated policies and long range planning objectives. This information was initially synthesized into two matrices: one compared DelDOT's regulations with other nationally recognized road design standards (see Appendix A), and the other examined land use issues from Middletown's and New Castle County's zoning and subdivision ordinances in the context of mobility friendly design objectives (see Appendix B). These were presented at the outset of the study along with an overview prepared by Reid Ewing, Ph.D. of the fundamental principals of mobility and pedestrian design.

These efforts provided the framework within which to develop an appropriate outline of proposed recommendations. Transportation and land use concept recommendations were developed as an overhead presentation as well as a series of five illustrative boards (see Appendix C). This presentation was made to the project management committee as well as to individual work groups. It was also presented at a public workshop in Middletown and as part of several other outreach efforts conducted by WILMAPCO. The purpose of this effort was to not only seek validation of the analysis and general approach, but also to receive specific feedback to guide the next steps.

With this input, the consulting team prepared specific draft recommendations for DelDOT regulations and Middletown's ordinances. This required working sessions with DelDOT staff to achieve consensus on each specific recommendation to their manual. In addition, presentations were made to the Mayor and Council of Middletown to confirm that the recommendations were appropriate to their town and that any potential conflicts could be identified and minimized. Once these steps had been accomplished, a final draft of the recommendations was developed. Again, these were presented to the project management team and the working groups. A public workshop was held in Middletown and additional input was sought by WILMAPCO as part of their continuing outreach

efforts. The feedback from this process shaped the final recommendations which were forwarded to WILMAPCO in the form of this final report.

WILMAPCO's Council approved this report at their November 6, 1997 meeting and encourages appropriate member agencies to implement the recommendations, listed in section 4.0.

The recommendations developed as part of this report were intended to be agency specific and were developed with the intent that they could be adopted by the individual agencies and easily inserted into their existing documents. It is anticipated that Middletown's Council will adopt these recommendations and institute them in early 1998.

DelDOT is in the process of revising their *Rules and Regulations for Subdivision Streets Manual*. It is anticipated that the recommendations developed as part of this report will be presented to the Secretary of Transportation for approval and will be incorporated as part of the revision to the Manual.

New Castle County has been actively involved with both the transportation and land use recommendations developed as part of this study. The county is in the process of preparing a new Unified Development Code. In addition, they are drafting Transit Oriented Development guidelines. The principles and many of the specific recommendations contained in this report have been, or will be, incorporated into those efforts. As the county continues to develop strategies for "village" type development, the recommendations of this report will be applicable.

For a complete outline of the meetings and presentations that were held, see Appendix D.

3.0 Research

The consulting team was assembled to bring together individuals that offer the foremost experience, knowledge and research in the field of transportation and land use coordination on a national level, as well as professionals with local knowledge of the issues. LDR International, Inc. served as the lead consultant and offered expertise in comprehensive planning, land planning and urban design. For over 25 years LDR has specialized in the design of communities, providing land use planning and site design services as well as planning for street networks and pedestrian and bicycle amenities.

Reid Ewing, Ph.D. served as a consultant to the study and is one of the nation's leading authorities on land use/travel relationships. He is a professor at Florida International University and has authored several books on linking land use and transportation objectives as well as on transit and pedestrian friendly design. His publications include, *Best Development Practices* (Ewing, 1996) and *Pedestrian- and Transit- Friendly Design* (Ewing, 1996). Reid's latest book, *Transportation and Land Use Innovations*, will be published in late 1997, and a book on traffic calming is in the works.

Rummel, Klepper and Kahl (RK&K), a transportation planning and engineering firm, brought to the team a wealth of practical transportation experience in Delaware and DelDOT related work. RK&K has particular experience in the design and implementation of major regional and local transportation projects in Delaware. RK&K recently led the Churchman's Crossing study, which identified many of the same mobility difficulties identified in this study.

SG Associates, under the direction of Frank Spielberg, PE, has for the past twenty years conducted transit and transportation studies and applied research nationwide. Frank had recently chaired the ITE Committee on traditional neighborhood street design; the committee's recommendations were made available during the course of this study.

To create a context within which to evaluate DelDOT's current design criteria (as outlined in their *Rules and Regulations for Subdivision Streets Manual*), Reid Ewing developed a matrix of recognized national and international standards. To this matrix, RK&K added the DelDOT road design information. The matrix looked at specific geometric and other road design criteria comparing DelDOT's standards with the following:

- the American Association of State Highway and Transportation Officials (AASHTO), A Policy on Geometric Design of Highways and Streets

- the Institute of Transportation Engineers (ITE), Guidelines for Streets in Residential Neighborhoods
- the American Society of Civil Engineers (ASCE), Residential Streets, Second Edition
- British Design Guide 32
- Australian Model Code

The ITE committee, chaired by Frank Spielberg, finalized their recommendations and published *Traditional Neighborhood Development Street Design Guidelines* in June, 1997. Frank's review of the DelDOT matrix and the findings of the ITE publication served to validate the preliminary recommendations that were developed.

A series of work sessions were held with Reid Ewing, RK&K, the DelDOT Working Group, LDR and WILMAPCO. This offered an opportunity for Reid to describe what practices were being considered and implemented elsewhere and for the group to discuss the merits and the conflicts of each specific recommendation. Each recommendation that was developed and is included in the matrix (see Appendix A) was agreed to by all parties at the work sessions.

LDR led a similar effort related to the land use issues. A matrix was developed based on an outline of Mobility Friendly Design objectives. This served as a framework for analyzing Middletown and New Castle County's existing zoning and subdivision regulations as they relate to the objectives (see Appendix B). In addition to LDR's strong background in community planning, a number of other resources proved to be instrumental in developing the objectives. These included the American Planning Association's report titled *Creating Transit-Supportive Land-Use Regulations (APA, 1996)* and the state of Washington's *Compendium of Codes, Standards and Guidelines for Creating Transit Supportive Regulations (1995)*. Reid Ewing also assisted in finalizing the matrix, drawing upon his breadth of experience, much of which is highlighted in his books, *Pedestrian- and Transit-Friendly Design* and *Best Development Practices*.

There are many areas around the country struggling with these same issues. The team collected a wealth of information from a number of communities ranging from small traditional villages on the east coast to large cities in the Pacific Northwest. Many of these helped in shaping our final recommendations and can be found in the bibliography outlined below.

Perhaps the most important aspect of the consulting team's research involved listening. We listened to what the Town of Middletown, New Castle County and DelDOT told us

4.0 Land Use and Transportation Recommendations

To achieve the goals and objectives laid out as part of this study, specific text amendments and additions as well as design criteria were developed for DelDOT and Middletown documents. Illustrative graphics were also produced to assist in conveying the intent of the text. The following sections outline these revisions. The existing and proposed text and graphic illustrations are attached as appendices.

4.1 Middletown Zoning Ordinance

The Town of Middletown is fortunate in that it has many of the necessary tools in its zoning and subdivision ordinances to achieve increased mobility. What it needs now is guidance in fine tuning and using these tools effectively. The following paragraphs briefly explain major recommendations for revisions to the zoning and subdivision ordinances, and how these changes relate to a more mobility-friendly environment.

The Town's zoning ordinance contains many of the regulations needed to create mobility friendly development patterns: mixed uses both horizontally and vertically, smaller setbacks, and smaller residential lot sizes. The recommended changes that follow are intended to remove barriers to mobility-friendly design and to create mobility-friendly residential and non-residential environments through land use and site design. Some of the regulations are grounded in infrastructure and site planning and physically improve mobility, whereas others emphasize design and amenities, enhancing the built environment and encouraging the use of the mobility-friendly infrastructure. For the specific existing and proposed text see Appendix E. Supporting graphics can be found in Appendix G.

Statement of Intent. Adding a "Statement of Intent" to the beginning of each zoning district gives Middletown the opportunity to "set the stage" for that district and gives the ordinance user notice of the district's objectives. Statements of Intent have been added to the residential and commercial districts in general and to the C-2 and C-3 zoning districts specifically. A statement about neighborhood centers as a conditional use has been added as well.

Mixed Uses. Mixing of uses is one technique used to create mobility-friendly development patterns. Places where uses are mixed or at least located close together allow people the opportunity to do more than one thing at a time without having to drive

they needed. In addition, the project team held two public workshops and met with local advisory committees, interest groups and elected officials to hear what residents and citizens told us they wanted. As part of reaching out to the local community, Landmark Engineering, a local civil engineering firm, reviewed the recommendations and provided feedback. WILMAPCO was involved in a number of community outreach efforts targeted at soliciting feedback. Our goal has been to blend the most current national experience with the unique characteristics of the local culture to create mobility options appropriate to Delaware.

List of additional reference materials:

Pedestrian Design Guidelines Notebook, Portland Oregon, Office of Transportation Engineering and Development: Pedestrian Program, 1997.

Comprehensive Plan: Transportation Element, Portland Oregon, Office of Transportation, 1996.

Kentlands Information Package, City of Gaithersburg, Maryland - Urban Design Team Planning and Code Administration, 1996.

Managing Maryland's Growth, Modeling Future Development on the Design Characteristics of Maryland's Traditional settlements, Maryland Office of Planning, 1994.

Eugene Oregon Street Plan, Eugene Planning and Development Department, 1996.

Traditional Neighborhood District, Town of Cornelius, North Carolina, Land Development Code, September 1996.

Davidson Land Plan, Town of Davidson, North Carolina, The Regulating Plan and Code. October 1995.

"Made to Measure: How to design a livable street the New England Way," Planning, June 1996.

"Boulder Brings Back the Neighborhood Street," Planning, June 1994.

"Designing for Livable Streets," Camden, Maine.

"Skinny Streets - Better Streets for Livable Communities," Livable Oregon and the Smart Development Project, June 1996.

from place to place. A good example in Middletown is the new high school/library complex which combines two community functions in one and is located near residential areas. Also, Middletown's current C-2 zone allows for a mix of retail, services, residential, and community uses that reflect a traditional downtown character. Additional mixed use opportunities have been incorporated into the Middletown zoning ordinance in the following ways.

- **Conditional Uses.** To create an opportunity for neighborhood-serving commercial/retail in or near residential communities the existing C-1 zoning district has been rewritten so that it is no longer a separate district. Instead, the uses and structure of the old C-1 have been incorporated into the residential districts as a conditional use; some of the uses in the C-1 were shifted to the C-2 or C-3. This will allow for a mix of residential uses and neighborhood serving commercial/retail uses in the neighborhood and within walking and/or biking distance. The conditional use process will allow the Town and the public some discretion in the type, location and appearance of the neighborhood serving commercial uses.

- **Residential Uses Downtown.** The C-2 zoning district has been revised to allow a greater mix of housing types in the downtown. Where previously only apartments in conjunction with non-residential uses were permitted, now single family detached residences, row houses, and the conversion of single family homes to apartments are all permitted. The district has also been fine-tuned to allow the vertical integration of uses with residential apartments allowed above non-residential uses.

- **Regional Retail and Employment.** Rather than recommending a new, distinct employment zone for the Town, the C-3 district language regarding office and employment uses has been strengthened to emphasize that employment and retail can be co-located. Employment and retail uses can be mixed both vertically and horizontally in the C-3 district. Finally, the district itself has been retitled to emphasize the potential for employment as well as shopping centers.

- **Manufacturing/Industrial District.** Providing services in proximity to where people work is another way that the Town can increase mobility options. The MI (manufacturing and industrial) district has been revised to permit incidental service and retail uses that do not exceed ten percent of the total building area.

Setbacks. Setbacks in both residential and non-residential districts can affect the character and scale of the street, and its function as a pedestrian environment. Therefore, setback regulations in the residential and commercial district have been reduced to allow

homes and businesses to be located closer to the street. Some of the specific setback revisions both in the residential and commercial districts are as follows.

- **Residential Parking.** To accommodate on-site parking in the residential districts, garages must be setback at least twenty feet while houses need only be ten. Preferably garages should be setback further back than the house to vary the facade and reduce the impact of garages on the street environment, although this is not required. (See Figure 1)

- **Detached Garages.** Rear yard setbacks for detached garages have been reduced to encourage garages located to the rear of the property and served by alleys. The rear yard setback for a detached garage is five feet compared to twenty-five feet for the house and the side yard setback for detached garages is five feet.

- **Commercial Setbacks.** Front building setbacks in the C-2 district have been reduced from fifteen feet to ten feet to encourage builders/businesses to bring their buildings closer to the street. (See Figure 2)

- **Parking Setbacks.** Parking lots in the C-2, C-3 and for multi-family developments must be setback at least ten feet from property lines and screened. This improves the physical environment for pedestrians as well as the appearance of the street. Previously there was no setback requirement for parking. This provision removes the incentive to place parking in front of the building.

Parking. Parking, and parking lots in particular, have a significant impact on the design and quality of the built environment. Availability of parking can affect transportation mode choice and design of parking lots can enhance transit accessibility, pedestrian circulation and inter-parcel access.

- **Location of Parking Spaces.** To create a more pedestrian-friendly environment, and to reduce the impact of parking lots on the streetscape, all parking spaces for non-residential uses shall be located to the rear and sides of buildings. (See Figure 2)

- **On-site Circulation.** On-site circulation systems should be provided to minimize the conflict between pedestrians and traffic at all points of pedestrian access to on-site parking and building entrances. Pedestrian walkways should also connect building entrances with the road and existing or planned transit stops.

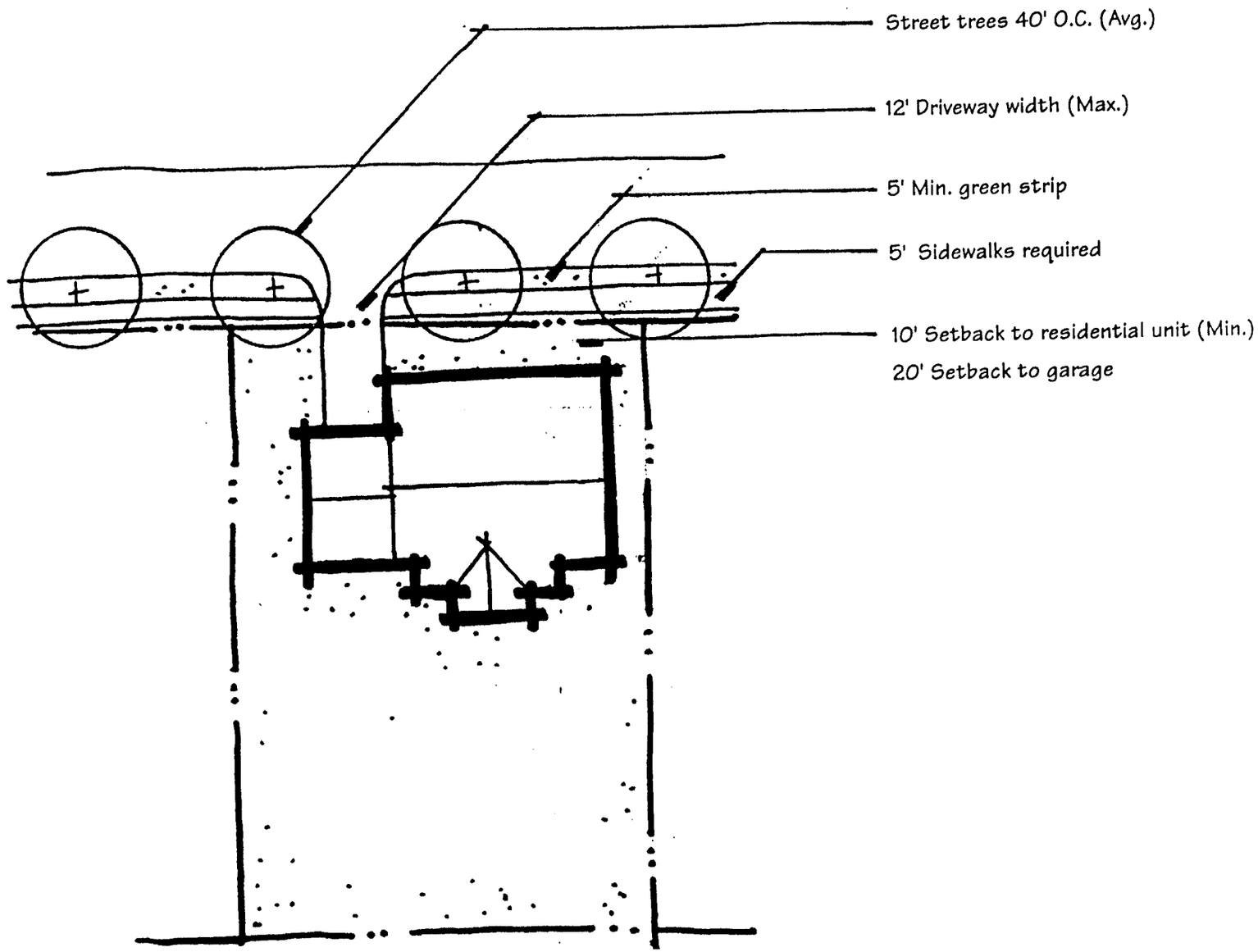


Figure 1: Proposed Residential Setbacks and Streetscape Improvements

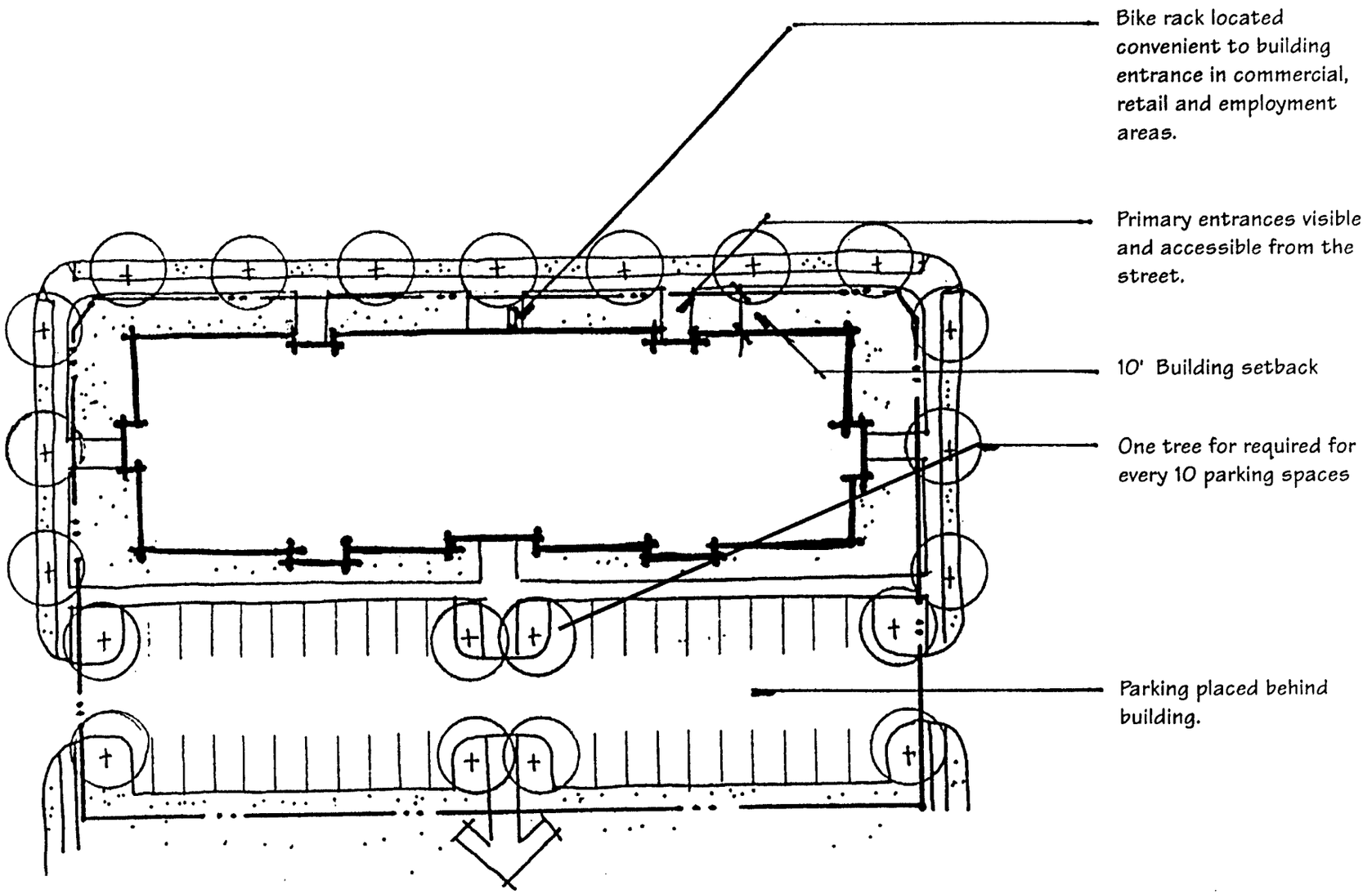


Figure 2: Preferred Building and Parking Layout

- **Inter-parcel Connections**. Inter-parcel connections can improve circulation and reduce the need to enter and exit the highway. Vehicular and pedestrian access points at property edges, and to adjacent lots, shall be coordinated with existing development to provide inter-parcel connections. Buildings, landscaping, fences and other improvements shall be located so that adequate area is reserved for future connections to adjacent properties, not precluding future site-to-site connections. (See Figure 3)

- **Parking Lot Landscaping**. Parking lot landscaping should be provided both around the perimeter of a site and within the site to screen parking from the right-of-way, to minimize the visual impact of large expanses of parking, and to provide a more hospitable environment for pedestrians crossing the lot. (See Figure 4)

- **Size of Spaces.** Smaller parking spaces, but not compact spaces, reduce the amount of pavement required for parking lots. The minimum parking space size shall be reduced from 180 square feet to 162 square feet with a 9 foot minimum width. Overall this can result in less impervious surface, smaller expanses for pedestrians to cross, and additional room for landscaping and other pedestrian amenities.

- **Number of Parking Spaces.** Parking requirements can be reduced and still meet the needs of commercial development. The minimum number of required parking spaces for commercial land uses shall be reduced from 5 spaces per 1,000 square feet of building floor space to 3 spaces per 1,000 square feet plus one parking space for each two employees.

- **Bicycle Parking.** An important component of a bicycle friendly environment is the availability of bicycle parking facilities at destination points. All private parking facilities shall include bicycle parking spaces and the Town shall provide bicycle parking facilities at all public uses such as schools, recreation facilities, and public buildings. One bicycle rack with five spaces shall be provided for the first ten automobile parking spaces with an additional bicycle space to be added for each additional ten auto spaces to a maximum of twenty bicycle spaces.

Transit. Since there are no current plans for providing high-frequency transit/bus service (non-commuter), designing residential subdivisions with densities to support transit is probably not practical at this time. However, designating park and ride lots and providing convenient linkages to those lots would be a reasonable undertaking. Also, requiring

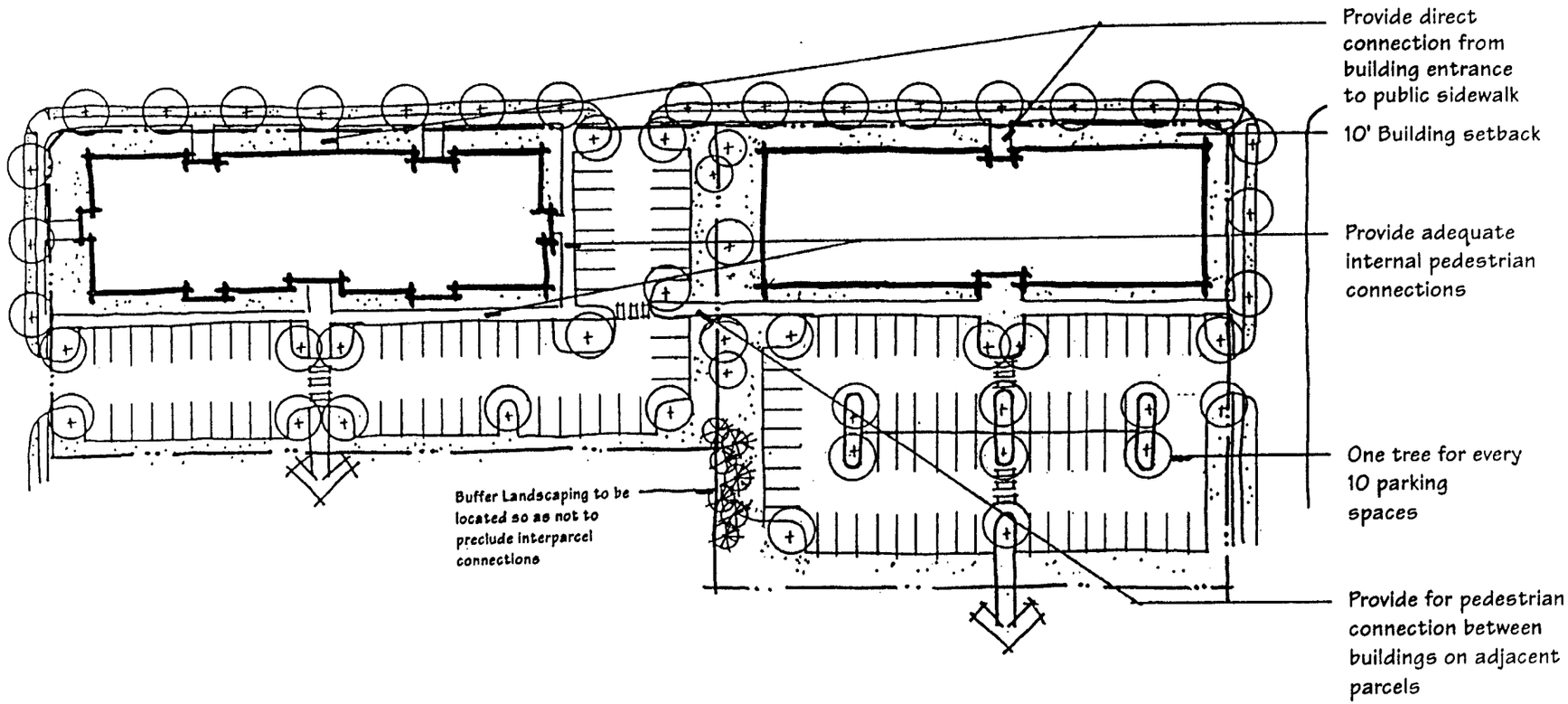
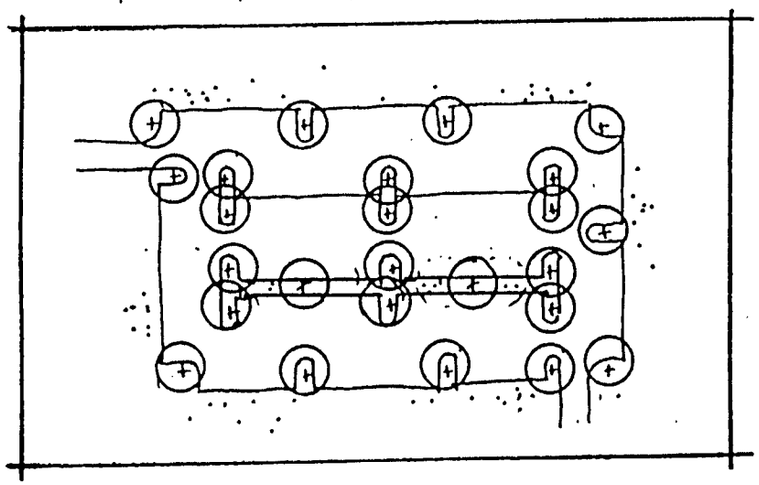
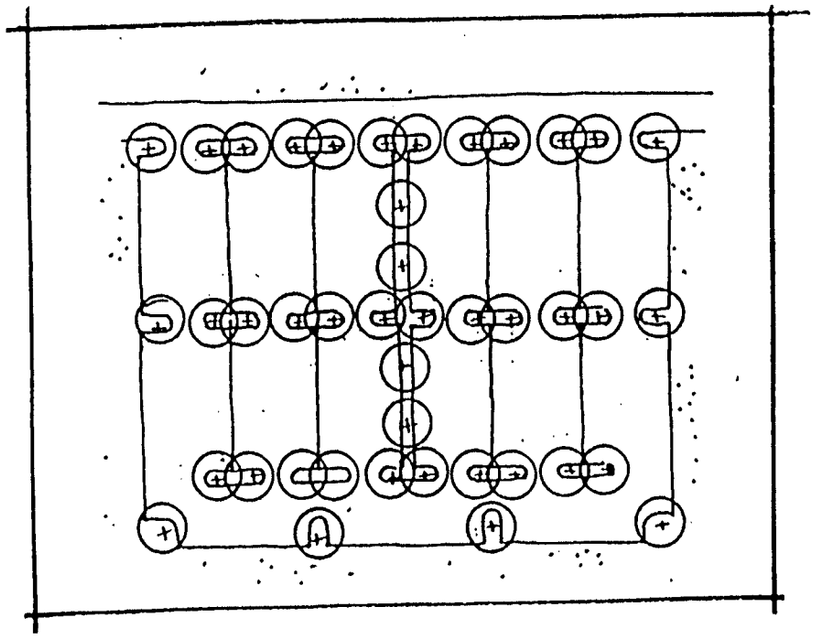


Figure 3: Provide Pedestrian Connections between Parcels

Landscape islands and/or pensinsulas are required to break up rows of parking spaces as follows:)





Example 1

If the total number of parking spaces is less than 100 the minimum requirements is:

- Islands at both ends of each row of parking (9' wide min.).
- One island or peninsula (min. 9'x18') for every 10 contiguous spaces (avg.).
- No more tha 2 contiguous bays (60' width) without a 9' wide island separating the 2 bays from additional parking bays or drive aisles.
- Minimum of 2 ½" caliper shade tree shall be provided per 200 square feet of interior green space.

Example 2

If the total number of parking spaces is 100 or greater the minimum requirement is:

- Islands at both ends of each row of parking (9' wide min.).
- One island or peninsula (min. 9'x18') for every 12 contiguous spaces (avg.).
- No more than 3 contiguous bays (60' width) without a 9' wide island separating the 3 bays from additional parking bays or drive aisles.
- Minimum of 2 ½" caliper shade tree shall be provided per 200 square feet of interior green space.

Figure 4: Internal Parking Lot Landscaping

shopping and employment center site design to be transit-friendly would support future transit service.

- **Internal Circulation.** The site design and internal circulation pattern of shopping and employment centers shall allow for the through movement of transit vehicles and short average walking trips (less than 300') from transit stops to building entrances.

Site Improvement and Design. Not only is it important to provide the infrastructure and land uses that create a mobility-friendly environment, it is also important to make this infrastructure attractive and pleasant so that people will use it. Design elements such as street trees, site landscaping, and other pedestrian amenities will enhance the physical environment making it more attractive to users.

- **Public Space.** For all new shopping and employment center developments public space shall be provided. Public space includes parks and plazas, pedestrian amenities such as seating, lighting, special paving, planting, artwork and special recreational features but excludes pedestrian walkways and required buffer areas.

- **Visual Interest.** An enhanced pedestrian environment can be achieved through building articulation and design. Within shopping and employment centers it is important to design buildings that reinforce the scale of the street and/or pedestrian environment. Blank walls along streets and sidewalks should be avoided; long facades should be divided into shorter segments. Techniques to segment a facade can include varying setbacks of sections, varying architectural elements, using windows, or varying the color of individual segments, using harmonious colors. Within the downtown, smaller lot sizes, narrower lot width, and building proximity to the street will complement the pedestrian scale of the street.

Site Development Plans. Because many of these new regulations remove the barriers to mobility-friendly design, but do not mandate it, a new section requiring submittal of a site development plan as part of the development application has been included as Section 11 (D). The purpose of the site development plan is to show the proposed site design and the recommended design elements and to indicate the location of buildings, structures, paved areas, grading, drainage, on-site utilities, sidewalks, public spaces and trails, within a site proposed for development. This provides the Planning and Zoning Committee, and the Town Council an opportunity to review a proposed development for its mobility-friendly character and suggest improvements prior to approval.

4.2 Middletown Subdivision Regulations

Not unlike the Town's zoning ordinance, the subdivision regulations also contain many of the regulations needed to create mobility friendly development patterns. The changes recommended are intended to remove barriers to mobility-friendly design and to create mobility-friendly residential and non-residential environments through the roadway network and design, site design and landscaping. Some of the regulations are grounded in infrastructure and site planning and physically improve mobility; others emphasize design and amenities, enhancing the built environment and encouraging the use of the mobility-friendly infrastructure. For the specific existing and proposed text, see Appendix F. Supporting graphics can be found in Appendix G.

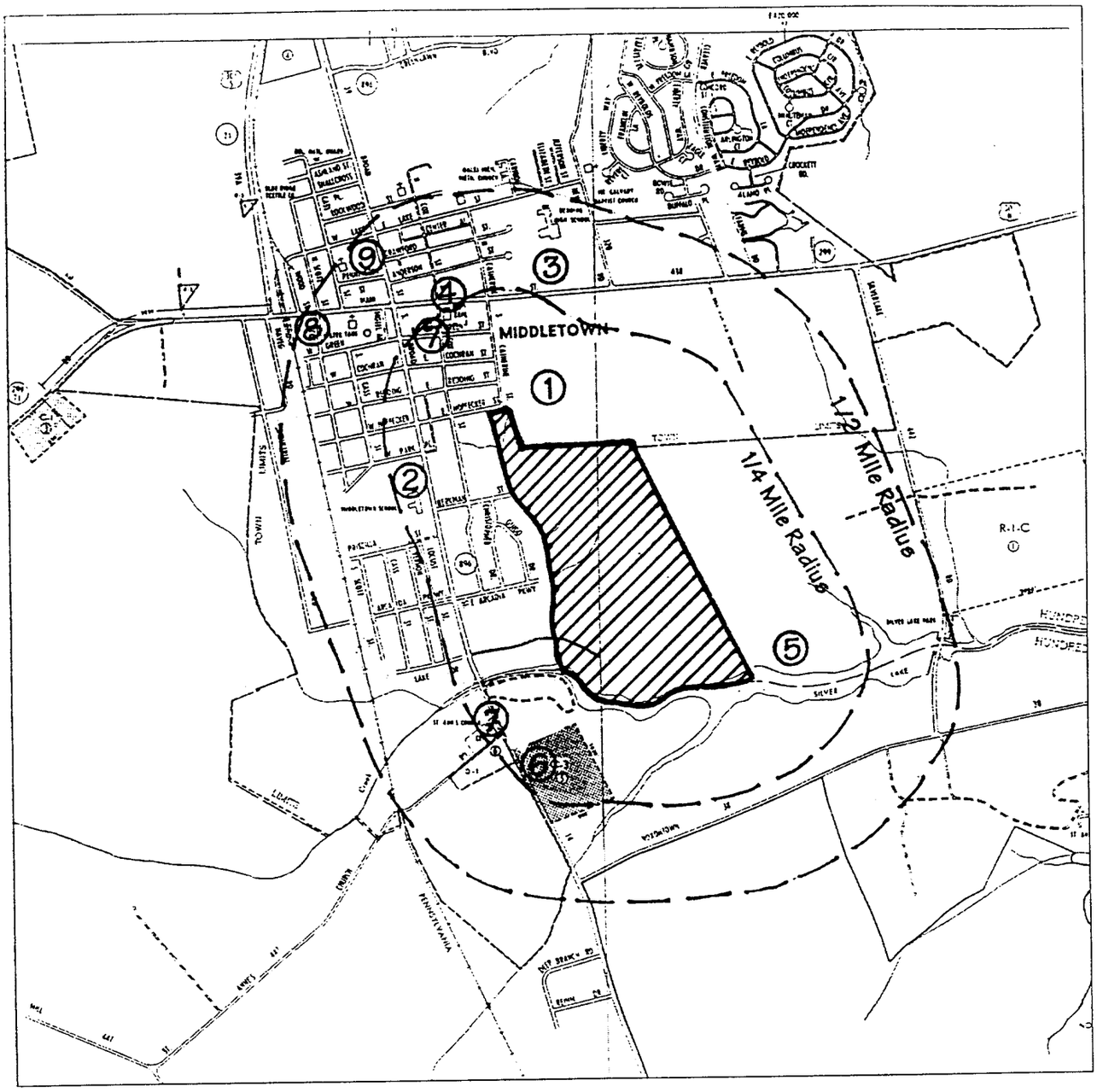
Policy Statement. Similar to the statement of intent in the zoning ordinance, a mobility friendly design policy statement is an opportunity for Middletown to "set the stage" for the pattern and character of development the town is promoting and gives the ordinance user notice of the town's objectives.

Submission Procedures for Preliminary Plan Review. Fundamental to developing a mobility friendly environment is ensuring that origins and destinations are linked by a safe, direct and continuous network that provides a variety of alternate and viable travel options.

- **Trip Generators.** For all new subdivisions the preliminary plan submission must identify all trip generators within a ½ mile radius of the perimeter of the proposed subdivision. In addition, a graphic or written description of the proposed connections between the proposed development and the trip generators shall be required. The submission shall also include the locations of all existing and proposed bike paths/routes within the proposed development and within one mile of the development. (See Figure 5)

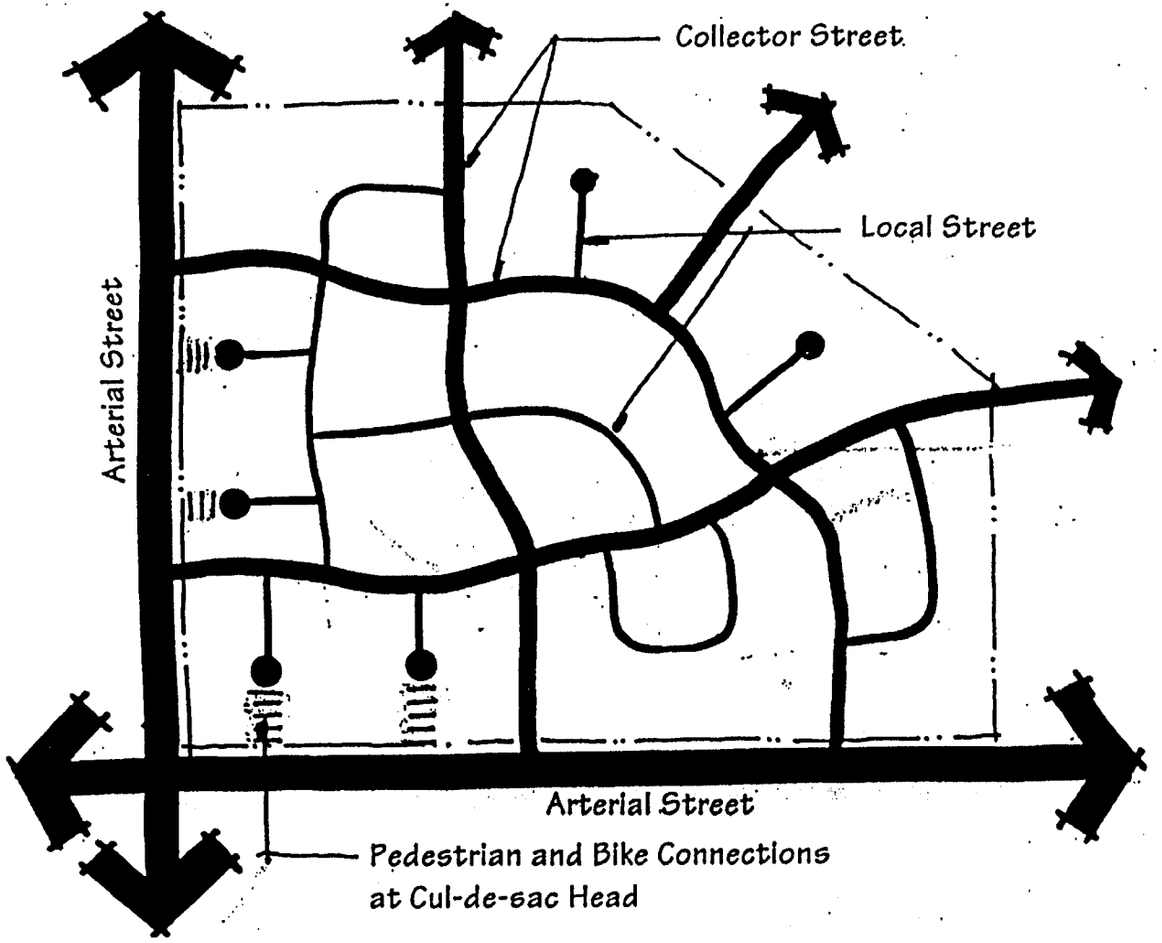
- **Connectivity Index.** A connectivity index is an objective means by which a proposed development can be evaluated relative to meeting the goal of providing sufficient street route and mobility options. The index is a ratio of the number of street links (road sections between intersections and cul-de-sacs) divided by the number of street nodes (intersections and cul-de-sac heads). The more links relative to nodes, the more connectivity. Traditional, gridded, street networks yield an index of approximately 1.7. Contemporary networks yield about 1.2. An index of at least 1.4 is a good target for future planning purposes. (See Figure 6)

Street Network Criteria. Local streets should be designed to discourage through traffic but to encourage linkages between neighborhoods, community facilities and shopping



1. Silver Lake Elementary School and Park
2. Former Middletown High School Site
3. Redding Middle School
4. Main Street Commercial District
5. Proposed Park
6. Future Neighborhood Commercial
7. Churches
8. Post Office
9. Town Hall

Figure 5: Identify Local Trip Generators



Typical "Node": Intersection or Cul-de-sac head

Typical "Link": Road segment Between intersection And Cul-de-sac heads

A simple measure of connectivity is the number of street links divided by the number of nodes(intersections) or link ends (including cul-de-sac heads). The more links relative to nodes, the more connectivity.

$\frac{\text{Links}}{\text{Nodes}} = 1.4 +$ Desired Ratio

$\frac{38}{27} = 1.4\pm$

Note: Only count one half of the nodes that connect to the existing network

Figure 6: Desired Development Pattern/Connectivity Index

areas. A network of arterial and collector streets should be planned for an average ½ mile grid or the equivalent route density. This network of streets provides several community benefits: a denser network of streets can better disperse traffic and provide more viable route options for pedestrians and bikers. Motorists tend to drive at restrained speeds for only a minute or two on local streets before they are tempted to speed. Through streets allow transit vehicles to move through communities without backtracking.

Block Lengths. Block lengths should not exceed 500'. Short block lengths tend to keep automobile speeds down and result in more direct route alternatives for pedestrians and bicyclists.

Alleys. Alleys are to be permitted in residential zones with a right-of-way width of 20 feet and a minimum paved width of 12 feet.

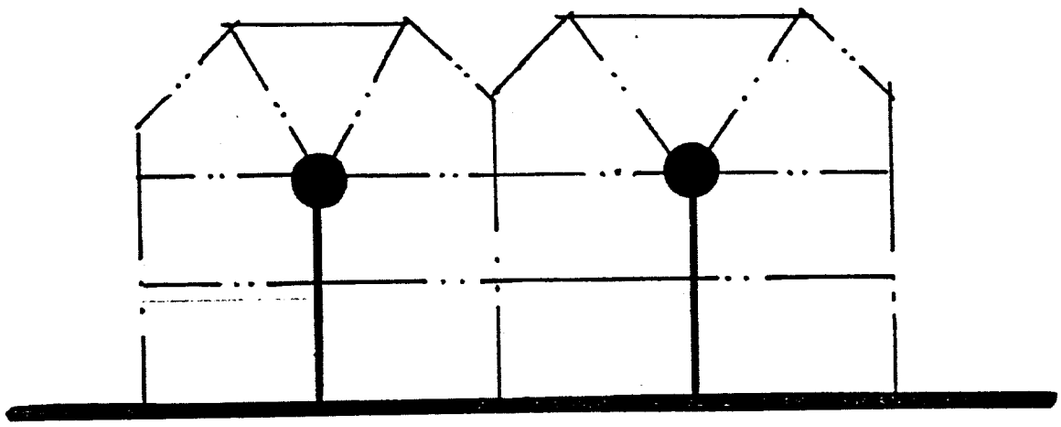
Cul-de-sacs. Cul-de-sacs by definition are at odds with the objectives of mobility friendly design. They provide for only one means of ingress and egress. The preferred local street pattern is characterized by short, interconnected streets with direct routes. Where proposed, cul-de-sacs should not exceed 500' in length with the preferred length being no more than 250'. Pedestrian/bicycle connections should be provided between cul-de-sacs and other cul-de-sacs, collectors, minor arterials and other appropriate community facilities. (See Figure 6) At a minimum, loops are preferred to cul-de-sacs (See Figure 7).

Sidewalks. Sidewalks should be provided as part of all new development and as part of any reconstruction as outlined below:

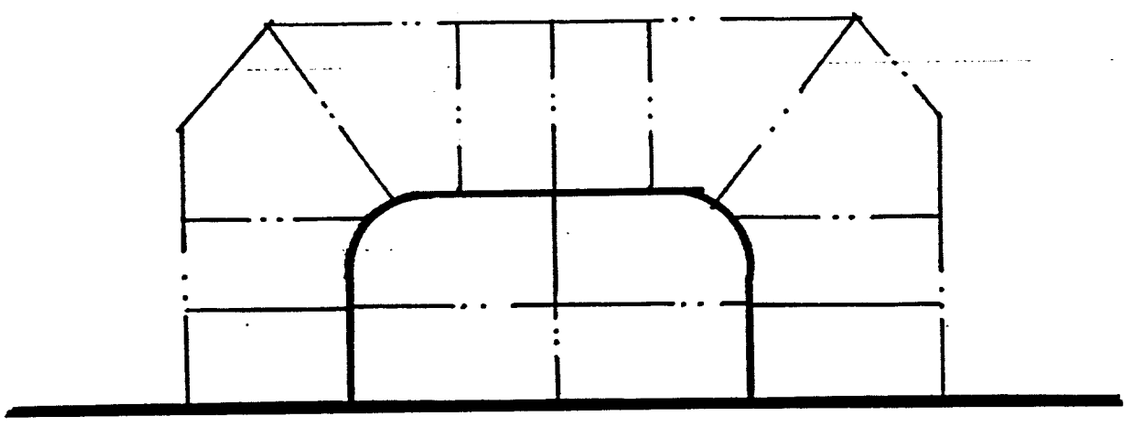
- More than 2 units/acre - sidewalks required on both sides of the street.
- 1 to 2 units/acre - sidewalks required on one side of the street.
- Less than 1 unit/acre - no sidewalks required
- All cul-de-sacs - sidewalks required on both sides of the street.

Sidewalks should be a minimum of 5' wide (6' wide in Middletown) where a green strip is provided between the curb and the sidewalk and a minimum of 8' where the sidewalk is paved from the back of the curb. Where a green strip is provided, it shall be at least 5' wide. Where residential units front onto collector streets the green strip should be a minimum of 10' wide.

Pedestrian Ways. Pedestrian ways internal to a site should be provided to link parking areas to building entrances as well as building entrances to other building entrances both on the same site and on adjacent parcels in the most direct and efficient means practical.



Cul-de-sac



Loop

Figure 7: Loops Preferred to Cul-de-sacs

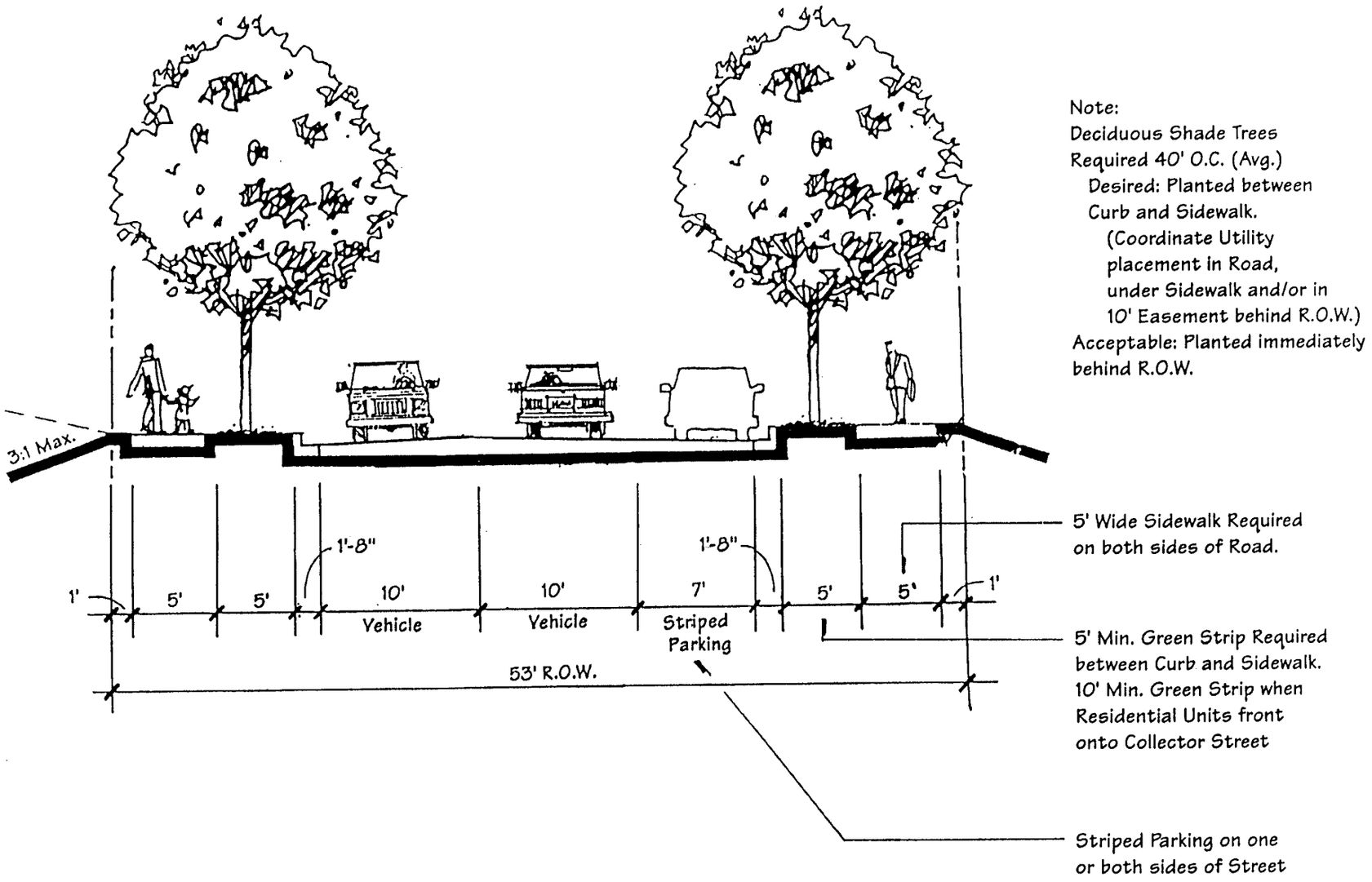


Figure 8: Proposed Collector Street

Bicycle Facilities. Developers should make provisions for bicyclists along collector and arterial streets in accordance with DelDOT standards and any adopted bicycle plans. Developers should also be required to locate existing and proposed bicycle paths/routes that are located within one mile of the proposed development and demonstrate how the development will connect with those paths/routes.

Landscaping. Landscaping should be viewed as part of the fundamental infrastructure of a community. It adds texture, creates scale, compliments architecture, frames views and provides screening.

- **Street Trees.** Street trees should be provided at a rate of 1 tree per 40 linear feet of right-of-way frontage for the site. Proposed trees should be predominantly deciduous shade trees installed at a minimum caliper of 2 ½ inches. The preferred location for street trees is between the back of curb and the sidewalk. If utility or maintenance agreements cannot be coordinated, the alternate location for street trees is behind the right-of-way no closer than three feet to the sidewalk. (See Figure 8)

  Specific street tree recommendations have been made and are included in Appendix F. Every effort has been made to include native species as part of the recommended tree list. Due to the harsh conditions to which street trees are subjected, additional non-native species and horticulturally improved varieties of natives have been included.

- **Screening.** Screening is important to soften or block views of dissimilar uses. In the interest of promoting circulation patterns between adjacent developments, landscaping, walls, and fencing should be located so as not to preclude site-to-site connections.

Open Space. Open space is provide for the overall good of the community. Natural areas support wildlife, improve water quality, serve a recreational function and provide relief from the built environment. Often, open spaces are made up of unusable land characterized by flood plains, wetlands and steep slopes and are located at the backs of lots or in difficult to access areas. At least 50 percent of required open space should be usable, visible and accessible to all residents within the community. These areas should be defined as having less than 10 percent slopes, contain no floodplain or wetlands and be suitable for active recreation. Consideration should be given to incorporating this open space into the community as a focal point such as a public square or neighborhood park. (See Figure 9)

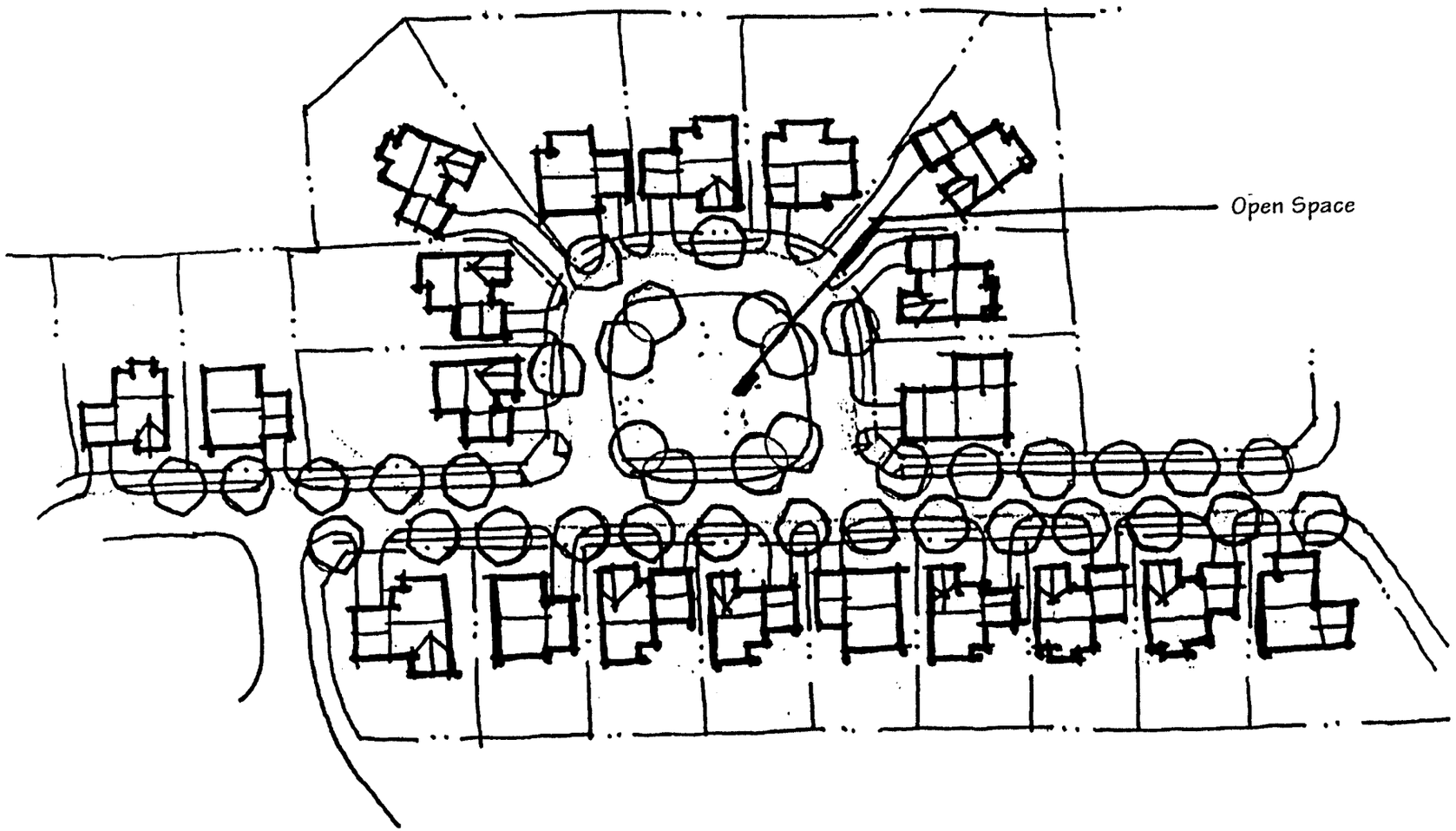


Figure 9: Usable Open Space Serves as Neighborhood Focal Point

4.3 DelDOT Rules and Regulations for Subdivision Streets

DelDOT has established this manual to set forth the criteria for the planning, design and construction of subdivision streets. These are the streets that comprise neighborhood and community road networks and are the focus of this project. The goal is to provide opportunities for flexibility in neighborhood street design through lower design speeds, a finer grained network design and through other geometric design criteria. The result of this efforts is intended to result in:

- A more connected street network which offers multiple, viable route options, dispersing traffic and easing congestion.
- Cars traveling at slower speeds, creating a safer and more pleasant pedestrian and bicycling environment.
- A more direct and continuous network for alternate travel modes.

The scope of this study includes minor streets and minor collector streets as outlined in the Rules and Regulations for Subdivision Streets Manual. Major collector street standards in this manual may be revised in the near future. These recommendations do not pertain to the DelDOT Road Design Manual. For the specific existing and proposed criteria and text, see Appendices A and H. The following is an overview of the proposed modifications.

Network Design. To create greater mobility options a more fine grained network with more through and internal connections is proposed. Short interconnected streets providing direct routing is recommended. Loops are preferred to cul-de-sacs. Block lengths should not exceed 500'. To evaluate the degree to which a network design achieves these objectives a connectivity index is proposed.

- **Connectivity Index.** A connectivity index is an objective means by which a proposed development can be evaluated relative to meeting the goal of providing sufficient route and mobility options. The index is a ratio of the number of street links (road sections between intersections and cul-de-sacs) divided by the number of street nodes (intersections and cul-de-sac- heads). The more links relative to nodes, the more connectivity. Traditional, grid-iron, street networks yield an index of approximately 1.7 while contemporary networks yield about 1.2. An index of 1.4 is a good target for future planning purposes. (See Figure 6)

Design Speed. Fundamental to reducing speeds in neighborhoods is the selected design speed used to define the geometric features of the subject streets. Current

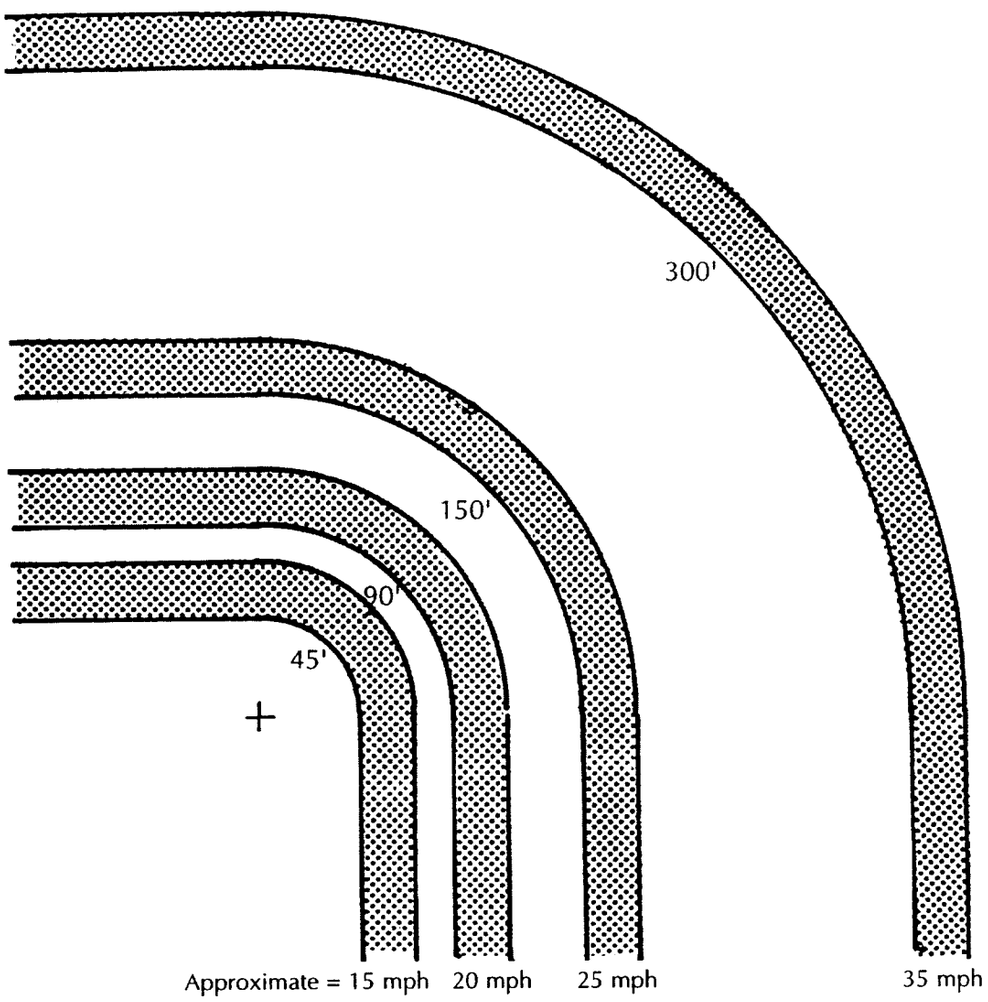
practice is to post speeds at 5-10 mph below the selected design speed. The reality is that people tend to travel at the speed at which they feel comfortable, which is usually the design speed or greater. It is recommended that the design speeds for minor streets be lowered from 25 to 20 mph and the design speeds for minor collectors be lowered from 30 to 25 mph. It is also recommended that these lower design speeds be posted as the operating speed. It is important to note that any changes to the statutory speed limit below 25 mph may require action by the General Assembly. At the time this change is sought it is important to understand that the 20 mph speed limit will only apply to roadways that have been designed with a 20 mph design speed. This means that existing roads designed at higher speeds will not be eligible to be posted at 20 mph.

Geometric Design Criteria. Much of the geometric street design criteria is governed by the design speed. Lower design speeds allow tighter road geometrics which have the effect of slowing traffic. In addition to using the existing criteria for lower design speeds the consulting team, in conjunction with DelDOT, reviewed current national trends in residential street design (e.g. recent ITE report, *Traditional Neighborhood Development, Street Design Guidelines*).

- **Horizontal Curve Radius.** Minimizing long tangent sections and introducing curves is one means of reducing traffic speed. The tighter the radius the more uncomfortable it is for a driver to travel at higher speeds. For minor streets it is proposed that the minimum radius be reduced to 90' (design speed of 20 mph) with the provision that curves could be reduced to a 45' radius (design speed of 15 mph) if signed as a traffic calming measure. For minor collector streets it is proposed that the minimum radius be reduced to 150' (design speed of 25 mph) with the provision that curves could be reduced to a 90' radius (design speed of 20 mph) if signed as a traffic calming measure. (See Figure 10)

- **Intersection Design.** T- and 4-way intersections are preferred. These shall occur at 90 degree angles with a minimum 60 degree angle being permitted on local streets. L-curves or 90 degree turns in loop or U-shape roadways should also be considered. Round-abouts are a preferred intersection treatment to stop signs. However, it is recognized that roundabouts cannot be constructed at every intersection. Sound planning and engineering judgement should be applied in the design of these features.

- **Curb Returns.** Large curb returns, while providing universal access to almost any size vehicle, result in cars rolling through intersections and increase the distance and crossing time for pedestrians at crosswalks (See Figure 11). It is recommended that minimum curb return radii be reduced as follows:



DelDot's current standards for horizontal curve radii are 150' for minor streets and 300' for minor collector streets. Proposed standards are 90' for minor streets when the curve is unsigned, 45' when the curve is signed as a traffic calming measure and 300' for minor collectors when the street is unsigned, 150' when the curve is signed as a traffic calming measure.

Figure 10: Horizontal Curve Radii

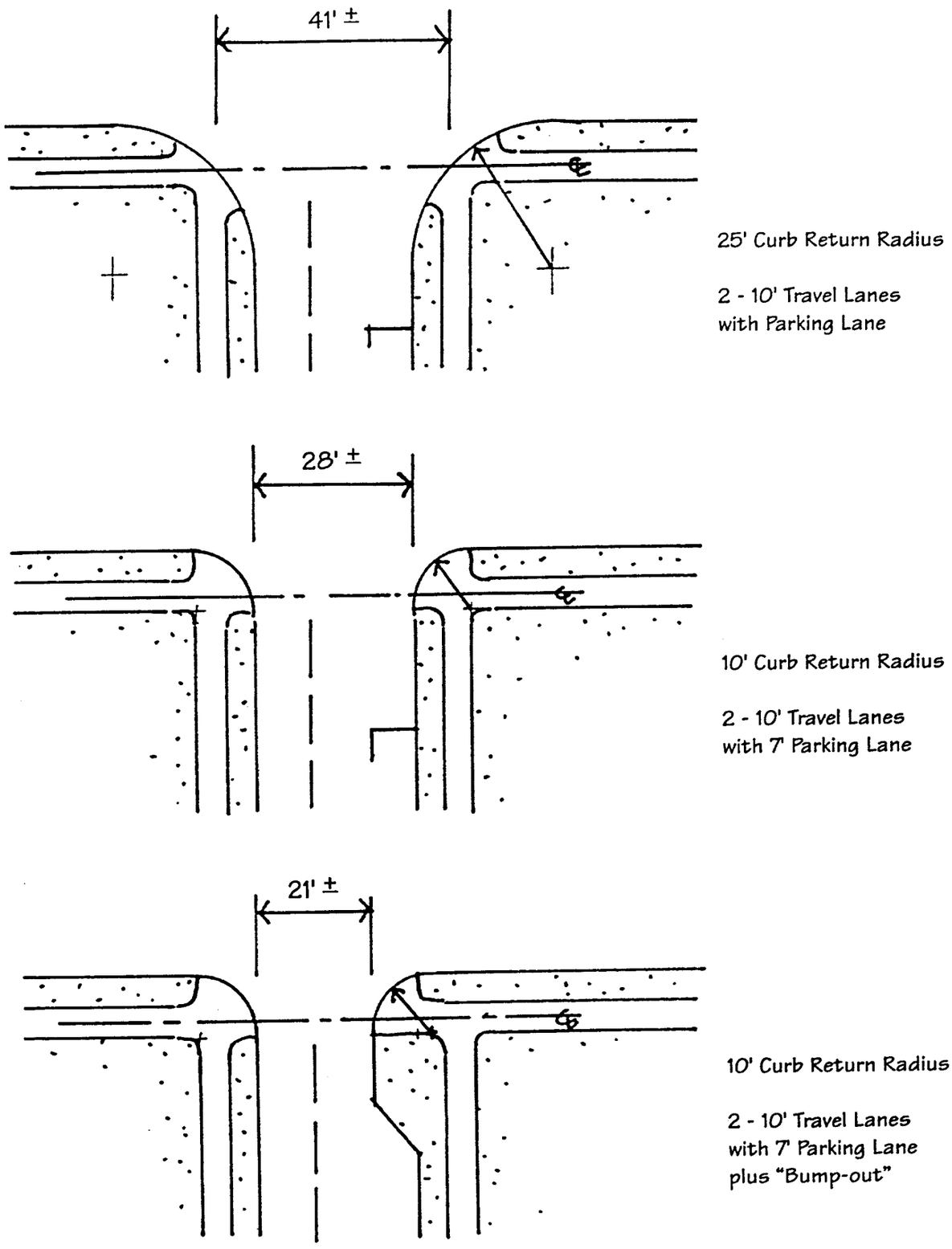


Figure 11: Effects of Curb Return Radii on Pedestrian Crossing Distance

• Minor Street to Minor Street	10' Radius
• Minor Street to Collector w/ Parking Lanes	15' Radius
• Collector Street to Collector w/ Parking Lanes	20' Radius
• Minor Street to Collector w/out Parking Lanes	40' Radius
• Collector Street to Collector w/out Parking Lanes	40' Radius

It is understood that on local streets, reduced curb returns may result in larger vehicles having to wait so that they may encroach on the opposing lane when making turns.

Note: The most common large vehicle using the minor street network is the school bus. The travel path and speed of a school bus making a turn are affected by the intersection curb return radii. An average sized school bus making a right hand turn on minor streets will encroach on the adjacent travel lanes. If the intersection is a minor to minor street connection with curb return radii of 10 feet, a school bus will need the entire paved width of both approaches to make a turn (encroaching 9' into the adjacent travel lanes). If the curb return radii are 15 feet , the school bus will encroach 7 feet into the adjacent travel lanes on both approaches. When minor streets and minor collector streets have parking lanes and curb return radii of 20 feet, the bus will encroach 0 to 5 feet into the adjacent travel lanes. The bus encroachment will be approximately 2 feet at intersections with minor street and minor collector streets that have 40' curb return radii and no parking lanes. School bus routes must be planned and designated as part of street network design if these radii minimums are to be adopted. Discussion with DelDOT regarding these recommendations is on-going at the time of this report.

- **Cul-de-sacs.** Cul-de-sacs by their very nature are at odds with the objectives of mobility friendly design. They provide only one means of ingress and egress. Where provided, cul-de-sacs should not exceed 500' in length with the preferred length being no more than 250'. Pedestrian connections should be provided between cul-de-sac heads and other adjacent streets.

- **Alleys.** Provisions for alleys are recommended in residential zones with a right-of-way width of 20 feet and a minimum paved width of 12 feet.

- **Driveways.** Driveways shall be allowed at a 50' spacing as measured from centerlines. Narrower lots shall require alley access or shared driveways. Driveways shall be staggered so that they do not line up across the street from one another. This will have the net effect of staggering on-street parking therefore minimizing passing conflicts.

- **Lane Width.** Wider streets can have the effect of making drivers feel more comfortable traveling at higher speeds. Increased areas of asphalt and faster moving traffic result in neighborhood streets that are not pedestrian friendly and do not contribute to the scale and the character of the community. Reduced lane widths can minimize some of these impacts while safely carrying the appropriate traffic volumes. Parking can be accommodated as on-street in low volume areas and in parking lanes if necessary. Nine foot travel lanes are proposed for minor streets and 10' lanes for minor collectors. Both types of street can be designed with striped parking lanes which shall be 7' wide. With a 1' off set on each lane, minor roads can have a pavement width of 20-27' depending on whether a parking lane is provided and minor collectors can have a pavement width of 29-36' depending on whether a parking lane is provided on one side or both. (Note: It is anticipated that parking will be required on at least one side of a minor collector.) Right-of-way widths will vary accordingly dependant upon sidewalk warrants and green strip provisions.

- **Sidewalk Warrants.** Sidewalks shall be provided as part of all new development and as part of any reconstruction as outlined below:

  - More than 2 units/acre - sidewalks required on both sides of the street.
  - 1 to 2 units/acre - sidewalks required on one side of the street.
  - Less than 1 unit/acre - no sidewalks required
  - All cul-de-sacs - sidewalks required on both sides of the street.

  Sidewalks shall be a minimum of 5' wide where a green strip is provided between the curb and the sidewalk and a minimum of 8' where the sidewalk is paved from the back of the curb. Where a green strip is provided, it shall be at least 5' wide. Where residential units front onto collector streets the green strip should be a minimum of 10' wide. It is important to note that sidewalks are a community amenity and are not maintained by DelDOT. This is the responsibility of the local jurisdiction, civic association or individual lot owner.

- **Street Trees.** Street trees should be required at the rate of one per 40 linear feet of right-of-way frontage. Street trees should be installed at a minimum caliper of 2 ½-3". Trees shall be planted a minimum of 2 ½' from the back of curb to the centerline of the tree. It is important to note that street trees are a community amenity and are not maintained by DelDOT. This is the responsibility of the local jurisdiction, civic association or individual lot owner. (See Figure 8)

- **Bike Provisions.** DelDOT currently references the Federal Highway Administration's guidelines for bicycle provisions. This is a good resource and should continue to be the reference document. It is anticipated that minor streets will slower vehicle

speeds and that bikers will be comfortable sharing the road with cars. On higher order streets, bikers can be accommodated in one of three ways, as outlined in the FHWA publication. Travel lanes can simply be widened for greater comfort in sharing the road, a striped bike lane can be designated on the street or a separate bikeway can be developed. The FHWA publication includes guidelines for facility selection based on traffic volume, speed and road section. Note: the subdivision regulations developed for Middletown require the developer to identify any existing or proposed bike lanes or routes within a one mile radius of the proposed site and give a graphic or written description of how the new development will provide bike access to those facilities. The ordinance also requires bicycle parking at public, commercial and employment uses.

Emergency Vehicles. It is of critical importance that emergency vehicles be able to access all areas of a proposed development. One of the concepts of this new set of regulations is to have multiple means of access to any point in the community. With loops favored over cul-de-sacs and the allowance of alleys, multiple access routes are provided for. While streets are narrower, efforts have been made to avoid conflicts. Parking lanes are allowed. Driveways should be staggered to avoid cars parking across from one another on the street thereby avoiding conflicts. It should also be assumed that if necessary, emergency vehicles may mount curbs to negotiate conflicts. Designers must be aware of the issues of providing reasonable access for emergency vehicles, while understanding that designing for large and emergency vehicles has impacts on the scale and character of the street and subsequently users of the street live there.

4.4 Transit

Transit is a small component of Middletown's transportation system. A commuter bus provides service several times a day linking Middletown with Wilmington and Dover. The service is focused on the downtown park-and-ride, which is planned to be relocated to the interchange at SR-1 and 299. As part of this study, we developed recommended modifications to Middletown's subdivision regulations to require new development to coordinate with the Delaware Transit Corporation (DTC) to determine existing and proposed bus stop locations and to provide appropriate, direct access to those locations.

During the course of this project, DTC was in the process of developing a new manual outlining bus stop design criteria. This manual, when completed, will govern the design of bus stops for both vehicular and pedestrian purposes. The manual will include both functional and aesthetic considerations related to volume of users and should serve as the reference document.

As part of a concurrent study being conducted by Vanasse Hangen Brustlin, Inc (VHB) for New Castle County, recommended General Standards have been proposed. As "general" guidelines and in the interest of coordinating efforts, those standards are outlined below:

- All bus stops are required to contain a safe place to stand and wait. A five foot sidewalk is required on both sides of the street. Shelters and benches should be encouraged, and where provided, must not reduce the "clear" width of the sidewalk to less than 36 inches (to meet ADA standards).

- Where bus stops are located in areas without sidewalks, prior to the construction of sidewalks, a sidewalk pad is required, with a minimum width of five feet and a minimum length of 12 feet.

- The sidewalk at bus stops should extend to the street curb, rather than contain grassed or landscaped strips between the sidewalk and the curb.

- Bus stops should be located adjacent to signalized intersections, where crosswalks can provide safe pedestrian crossings. Where there are major generating uses located at some distance from a signalized intersection, a safe means of crossing the street must be provided in close proximity to the bus stop.

- All bus stops are required to be lighted, and are required to provide a bus stop marker with bus schedule display.

- All intersections within one quarter-mile of a bus stop are required to have marked crosswalks.

- If sufficient shoulder width does not exist for buses to pull out of the travel lane at bus stops, bus pull-out bays may be used. However, bus pull-out bays should only be used where sufficient right of way exists to construct them, and where warranted by traffic volumes and travel speeds. In most instances, bus pull-out bays are not necessary on Access Level 5 and Access Level 6 streets, given the traffic volumes and travel speeds.

- Park-and-ride lots should be designed with enhanced attention to pedestrian safety and amenities. Park-and-ride lots should contain shelters, benches, bicycle parking and storage facilities, pedestrian-scale lighting, and kiosks.

5.0 Future Steps

Middletown, New Castle County, DelDOT, and WILMAPCO have taken great strides towards their goal of creating pedestrian and mobility friendly environments. The work, however, does not stop here. The amendments proposed in this report represent change to long standing and established standards and procedures at many levels. To implement these changes will require both public and private commitment to a long-term effort. It will also require increased coordination and cooperation between the public and private sectors, as well as between local, state and regional agencies. In addition to the institutional change and commitment, there are a number of policy issues that may need to be incorporated into planning documents. Long-term implementation will require long-term planning.

The recommendations of this study seek to provide mobility options for the residents of Middletown through specific amendments to the Town's zoning and subdivision regulations and to DelDOT's road design criteria. Many of the recommendations are changes to existing regulations however, overall implementation of these recommendations on a regional scale needs to be guided by more broad scale planning efforts. Some of these efforts might include: expanding local and regional roadway plans to guide new development so that there is a clear network of streets with connectivity and opportunities for through movements; adopting local and regional bikeway plans that identify commuter routes as well as recreational opportunities; developing local and regional greenway plans that identify environmental and recreational corridors suitable for hiking and biking systems, again providing for alternate and connecting routes; and identifying the location of local and regional community facilities such as schools, libraries and public uses as major trip generators. Coordination on these regional planning issues needs to occur at the local, county, MPO and state level.

One of the primary goals of this study was to remove existing barriers to mobility friendly design by providing greater flexibility to the current development standards. The proposed recommendations mandate many of the physical network features required to create a mobility friendly environment. Other pedestrian friendly features have been encouraged or the flexibility to include them has been developed. This increased flexibility requires that local planning authorities carefully review plans to understand developer's proposals and also to clearly communicate their objectives so that developers know what is excepted.

Only with a regional planning perspective, the implementation of transportation and land use regulations that complement and support one another, and a strong commitment from the parties involved can a mobility friendly environment be fully realized.

Appendix A: DelDOT Road Standards - Matrix

WILMAPCO - MOBILITY FRIENDLY DESIGN STANDARDS STUDY
DELAWARE DESIGN / POLICY GUIDELINES FOR LOCAL & COLLECTOR STREETS

✦ Purpose of Study:

This study supports the long-range transportation goals of the Delaware Department of Transportation, Town of Middletown, New Castle County and WILMAPCO. These goals include increasing mobility and accessibility by providing people with a range of travel options. Transportation improvements should be integrated into the social fabric of communities to help create livable neighborhoods and provide an expanded network of connections within and between communities. Mobility friendly design standards support travel by pedestrian, bike and transit modes along with reduced vehicle speeds within communities. The goal is to provide an excellent transportation and land use system that is sustainable and provides access and mobility options.

✦ Street Design Criteria:

As part of this study, the consultant team is exploring opportunities to provide flexibility in neighborhood street design through reduced lane widths and other geometric design criteria. The benefits of this approach include:

- Safety: slow speeds and safe connections between travel modes.
- Traffic Calming: narrower streets with tighter curve radii result in cars driving slower.
- Enhanced Pedestrian Environment: less paving and slower moving traffic creates a more pedestrian and bicycle friendly environment, thus allowing short trips by walking or biking instead of by auto.
- Lower construction and maintenance costs.
- Reduced storm water runoff.

✦ Application:

DelDOT Blue Book (Rules and Regulations for Subdivision Streets - 1981)

- minor streets: less than 50 homes (less than 500 trips/day)
- minor collector streets: 50 to 300 homes (500 to 3,000 trips/day)

DELAWARE DEPARTMENT OF TRANSPORTATION

NEW CASTLE COUNTY

WILMAPCO

WILMAPCO - MOBILITY FRIENDLY DESIGN STANDARDS STUDY
DELAWARE DESIGN / POLICY GUIDELINES FOR LOCAL & COLLECTOR STREETS

✦ Approval Process:

- Develop design guideline matrix using several resources including DelDOT (red and blue books), AASHTO, ASCE and ITE, among others.
- Secure input from an individual with national design guideline experience (Reid Ewing), an engineering firm with extensive DelDOT design experience (RK&K), and a firm experienced in traditional neighborhood development (TDN) design (LDR International, Inc.), among others.
- Develop draft design guidelines matrix for "Design Guidelines Task Force", including representatives from DelDOT Planning and Preconstruction offices, Town of Middletown, New Castle County, WILMAPCO and the Study Consultant Team.
- Conduct "Brainstorming Session" with Task Force to review draft design guidelines matrix.
- Develop a draft matrix of recommended design standards.
- Review draft matrix of recommended design standards with DelDOT management.
- ☞ Develop final report of recommendations for submittal to DelDOT, Town of Middletown, New Castle County and WILMAPCO

✦ Follow Up Activities:

DelDot has recommended that consideration be given to expanding the study effort to include major collector streets. The Study Team suggests that this effort also include additional analyses / review of the recommended "Minimum Curb Return" radii noted on page 5 of 10, with respect to the operation of turning school buses at local / local and local / minor collector intersections.

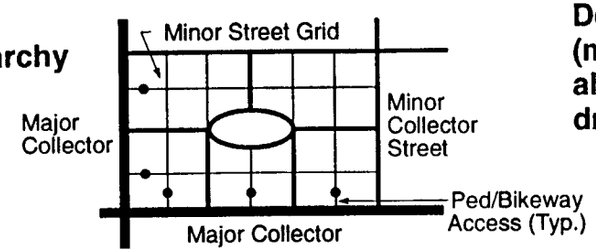
The most common large vehicle using the minor street network is the school bus. The travel path and speed of a school bus making a turn are affected by the intersection curb return radii. An average sized school bus making a right-hand turn on minor streets will encroach on the adjacent travel lanes. If the intersection is a local-local connection with curb return radii of 10 feet, then a school bus will need the entire paved width on both approaches to make the turn (encroach 9 feet into the adjacent travel

lanes). If the curb return radii are 15 feet, then the school bus will encroach 7 feet into the adjacent travel lanes on both approaches. When local and minor collector streets have parking lanes and curb return radii of 20 feet, the bus encroaches 0 to 5 feet into the adjacent travel lanes. The bus encroachment is approximately 2 feet at intersections with local and minor collector streets that have 40-foot curb return radii and no parking lanes.

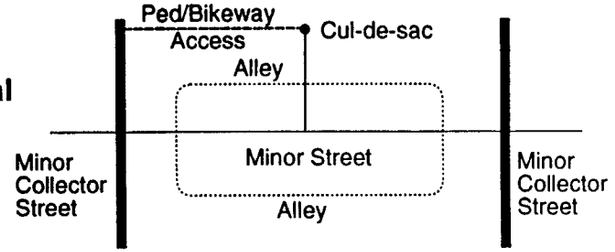
✦ References:

- State of Delaware, Division of Highways
  - Blue Book - Rules and Regulations for Subdivision Streets (1981)
  - Standards and Regulations for Access to State Highways (1983)
  - Red Book - DelDOT Road Design Manual (1992)
  - State Access Management Policy (1996)
- AASHTO: A Policy on Geometric Design of Highways and Streets (1990 and 1994 (Metric))
- ITE: Guidelines for Streets in Residential Neighborhoods
- ASCE: Residential Streets, Second Edition (1990)

Plan Elements: (traditional hierarchy of subdivision street grid)



Detail Layout: (minor street with alleys for individual driveway access)



	DelDOT	AASHTO	ITE	ASCE	RECOMMENDED	COMMENTS
✦ **Network Design** (the conceptual approach to the hierarchy of functional layout of street systems)						
Minor Streets Minor Collector Streets	Not specified	Reference FHWA; "Highway Functional Classification: Concepts, Criteria and Procedures" (1974)	Curvilinear designs with interconnections as direct as possible	Linear or curvilinear design/short distances to collectors	Short interconnected streets/direct routes/loops preferred to cul-de-sacs Consider Network Connectivity Index of 1.4 as desired minimum target	The goal is to provide greater mobility options for pedestrians and bicyclists
✦ **Block Lengths** (distance along centerline of street between centerlines of connector cross streets)						
Minor Streets Minor Collector Streets	Not specified	While not specified, spacing of minor arterial streets may vary from 1/8 to 1/2 mile in CBD and 2 to 3 miles in suburban fringes	Limited number of intersections	Minimum number of intersections	200' to 500' (blocks longer than 500' require midblock crosswalks and pass-throughs based on walkability.)	
✦ **Design Speed**	(selected speed used to define geometric features; posted speed is typically 5 to 10 MPH below Design Speed.) Desirably, this speed reflects adjacent residential and commercial activity)					
Minor Streets	25 mph	20 to 30 mph	20 mph (hilly) 25 mph (rolling) 30 mph (level)	20 mph	20 mph (desired operating speed is 20 mph) Require engineering study to support 20 mph-otherwise need to change statutes.)	Design speed and desired operating speed: 20 mph
Minor Collector Streets	30 mph	30 mph or greater	25 mph (hilly) 30 mph (rolling) 35 mph (level)	25 mph (hilly) 30 mph (rolling) 35 mph (level)	25 mph (desired operating speed is 25 mph)	Design speed and desired operating speed: 25 mph

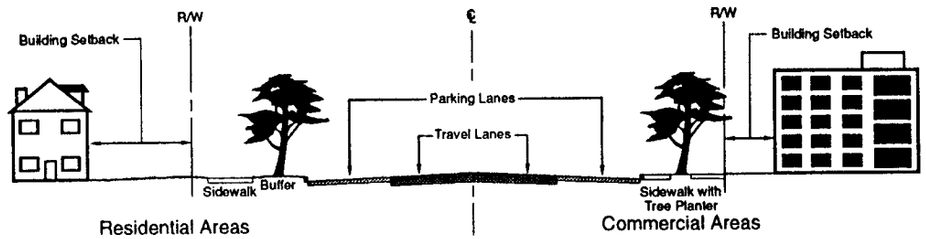
Plan Elements continued

	DelDOT	AASHTO	ITE	ASCE	RECOMMENDED	COMMENTS
✦ Minimum Horizontal Curve Radius (measured at centerline of street)						
Minor Streets	150'	100' min.(desirably as large as possible)	100' (hilly) 180' (rolling) 300' (level)	100' to 150' (access street) 150' to 300' (subcollector)	90' when curve is unsigned 45' when curve is signed as a traffic calming measure.	Additional engineering analysis to be conducted by DelDOT
Minor Collector Streets	300'		180' (hilly) 300' (rolling) 480' (level)	300' to 500'	150' minimum 90' when curve is signed as a traffic calming measure	Vertical curve issues to receive further study by DelDOT
✦ Intersection Design (desirable configuration for intersections with collector / arterial streets)						
Minor Streets	T-Intersection 90°	Type is primarily determined by the number of intersecting legs, the topography, the traffic pattern, and the desired type of operation	T-Intersections (4-way intersections also acceptable)	T-Intersections (4-way intersections and roundabouts are also acceptable)	T-Intersections or 4-way Provide: Intersections with roundabout or other traffic calming measures	Consider permitting "L" curves, i.e. 90° turns for loop or U shaped roadways. Loops preferred to cul-de-sacs. Consider permitting 60° for local streets. Reference recently released ITE manual-Traditional Neighborhood Development - Street Design Guidelines, June 1997.
Minor Collector Streets	T-Intersection 90°				Roundabouts or 2-way stops or 4-way stops	Roundabouts are appropriate for locations with heavy minor street delay, heavy turning traffic, intersections with unusual geometry, where major roads intersect at a "Y" or "T" junction, or where u-turns are necessary. They are inappropriate for locations where a signal interconnect system is necessary, or queuing from adjacent intersections would back up into the roundabout.
✦ Minimum Curb Return (radius of curb at street intersection)						
Minor Streets Minor Collector Streets	25'	15' minimum 25' desirable 30' (collector)	20' (local-local) 25' (local-collector) 30' (collector-collector)	15' to 20' (local-local) 25' to 30' (local-collector)	10' (local-local) 15' (local-collector with parking lanes) 20' (collector-collector with parking lanes) 40' (local-collector without parking lanes) 40' (collector-collector without parking lanes)	40' radius adds 9 seconds to pedestrian crossing (40' radius vs. 20' radius). Further consideration required regarding curb return radii / school buses. See page 2 of 10.

Plan Elements continued

	DelDOT	AASHTO	ITE	ASCE	RECOMMENDED	COMMENTS
✦ **Maximum Cul-de-Sac Length** (measured along centerline of cul-de-sac from centerline of intersecting street)						
Minor Streets Minor Collector Sts.	500' to 1,000' (depending on density)	Not specified	700' to 1,500' (depending on density)	500' to 1,000'	250' preferred to 500' maximum serving no more than 30 units with cut throughs provided at cul-de-sac heads for peds / bikes	
✦ **Minimum Driveway Spacing** (measured along centerline of street between centerlines of connecting driveways)						
Minor Streets	200' (narrower lots call for shared driveways)	Not specified, although desirably as far removed from intersections as practicable		50' (narrower lots call for rear access via alleys)	50' (narrower lots call for alley access or shared driveways)	
Minor Collector Streets	250'					
✦ **Minimum Driveway Width** (out to out dimension of paved surface)						
Minor Streets MinorCollector Sts.	12' standard (not minimum)	Not specified (but returns should not be less than 3' radius)	10' minimum 18' (for 2-car garage on street)		8' to 16' (single-family) 18' (multi-family	

Typical Section Elements



	DelDOT	AASHTO	ITE	ASCE	RECOMMENDED	COMMENTS
✦ **ROW Width** (total width of publicly owned land available for transportation, drainage, landscaping, and utility accommodation uses)						
Minor Streets	50' (minor streets) 26' under special circumstances	50' (with 26' roadway section) 66' (commercial areas with on-street parking)	50' (low density) 60' (medium and high densities)	24' (access street) 42' to 46' (subcollectors)	42' or 49' = 20' or 27' roadway (no parking or one side) + 5' planting strip + 5' sidewalk + 8" top of curb Traffic calmed environment - bicycles accommodated on shared facility.	44' or 51' total ROW including 1' offset from back of sidewalk
Minor Collector Streets	60' (minor collectors)	40' to 60'	70' (low & medium densitlies) 80' (high density)	52' to 56'	51' or 58' = 29' or 36' roadway (parking one side or both sides) + 5' planting strip, 5' sidewalk, 8" top of curb. If frontage on local collector 10' planting strip required each side, increasing R.O.W. by 10'. Larger R.O.W. allowed if a boulevard type median is provided. Designated bicycle accommodations provided based on traffic volume, speed and road section - see FHWA publication used by DelDOT. A local and/or regional analysis should be prepared to identify the destinations that bicycle users may seek.	53' or 60' total ROW including 1' offset from back of sidewalk
✦ **Pavement Width** (width of paved surface; curb face to curb face if curbs provided)						
Minor Streets	22' (minor streets)	26' (OK for less when ROW is severely limited)	20' to 28' (low density) 28' to 34' (medium density) 36' (high density)	22' to 24' (local access street) 26' (subcollectors)	18' roadways (2@9') 2' offsets to curb face (2@1') 20' total --- 18' roadways (2@9') 7' parking lanes 2' offsets to curb face (2@1') 27' total	
Minor Collector Streets	32' (minor collectors)		24' to 36' (low and medium densities) 40' (high densities)	36'	20' roadways (2@10') 7' parking lane 2' offsets to curb face (2@1') 29' total --- 20' roadways (2@10') 14' parking lanes 2' offsets to curb face(2@1') 36' total	

Typical Section Elements continued

	DelDOT	AASHTO	ITE	ASCE	RECOMMENDED	COMMENTS
✦ **Lane Width** (width of travel and parking lanes; centerline and edge lines typically not painted)						
Minor Streets	11' (minor streets)	10' (travel lanes - use 11' where feasible; minimum in residential areas 9') 7' (parking lanes - use 9' in commercial areas)		10' (travel lanes- without parking on both sides) 12' (travel lanes- with parking on both sides) 8' (parking lanes)	9' travel lanes (min) 7' parking lanes	"Bulb-outs" at intersections encouraged DelDOT to establish parking setback from intersections
Minor Collector Streets	11'-4" with curb (minor collectors)	10' (travel lanes) 7' (parking lanes - residential) 8' (parking lanes - commercial)			10' travel lanes (min) 7' parking lane (striped)	"Bulb-outs" at intersections encouraged DelDOT to establish parking setback from intersections
✦ **Pavement Edge Treatment** (choices include barrier (i.e. vertical face) or mountable curbs, and no curbs)						
Minor Streets	Mountable or barrier curbs (none at low densities i.e. 1/2 acre lot size & >100' frontage & >60' building setback)	Urban areas - curbs used extensively Rural areas - exercise caution in use of curbs Normally vertical curbs	None or roll-type curbs (low density) Vertical curb (medium and high densities)	Vertical or roll-type curbs at higher densities	8" vertical curbs (whenever sidewalk provided). Vertical curbs stop vehicles from parking on landscaped buffer strip	
Minor Collector Streets					8" vertical curbs (plus ADA entrance)	

Typical Section Elements continued

	DelDOT	AASHTO	ITE	ASCE	RECOMMENDED	COMMENTS
✦ Sidewalk Warrants (i.e. when and where to provide paved surface for pedestrian conveyance)						
Minor Streets	Not required by DelDOT-New Castle County requires on at least one side of all local streets with 10+ dwellings and densities of > 1 unit/acre and on both sides of minor collectors	Both sides in commercial areas, at least one side in residential areas.	Only at medium and high densities	Not required on access streets. One side of subcollectors.	2 units or more / acre sidewalks both sides; less than 2 units/acre to 1 unit/acre sidewalks one side; greater than 1 acre lots - no side walks All cul de sacs - sidewalks both sides	
Minor Collector Streets	Not required by DelDOT-New Castle County requires on at least one side of all local streets with 10+ dwellings and densities of > 1 unit/acre and on both sides of minor collectors	Both sides in commercial areas, at least one side in residential areas.	Both sides	Both sides	Both sides	
✦ Sidewalk Widths (width of paved surface)						
Minor Streets Minor Collector Sts.	Not specified by DelDOT (New Castle County requires 5')	4' (8' or more may be needed in commercial areas)	4' to 6'	4' minimum with planting strip 6' without planting strip	5' (with buffer strip) 8' (without buffer strip) (at least 40 sq. ft. per person at peak times)	
✦ Planting Buffer / Utility Strip (area between edge of pavement / curb and sidewalk or right of way line)						
Minor Streets	Not specified	12' (desirable)	5' to 6'	3' to 5' desirable	5' minimum Zero permitted for commercial uses with minimum 8' sidewalk	
Minor Collector Sts.			10'	3' to 5' desirable	10' minimum, if lots front on residential collector streets	

Typical Section Elements continued

	DelDOT	AASHTO	ITE	ASCE	RECOMMENDED	COMMENTS
✦ **Alley Width** (width of paved surface)						
Minor Streets	Not specified	16' to 20' in residential areas	20' (alleys allowed but discouraged)	12' (pavement) 16' (right-of-way) (recommended when lot widths are less than 50' wide)	12' (alleys or shared driveways are recommended when lot widths are less than 50') 12' paved width acceptable provided 20' open R.O.W. available Encourage utility placement along alleys.	
✦ **Tree / Obstacle Clearance** (distance from back of curb)						
Minor Streets	Clear zone - 2' in urban areas with barrier curb	1.5'		3'	2.5' from back of curb to centerline of tree One tree per 40 linear feet of right-of-way frontage, 2½" - 3" caliper and DelDOT clear zone requirements. Mature height restrictions to be established based on species to avoid conflicts with overhead utilities.	
Minor Collector Streets	Clear zone - 2' in urban areas with barrier curb	1.5' with vertial curbs (where no curbside parking) 2' with vertical curbs (where curbside parking)		3'	2.5' from back of curb to centerline of tree 5.0' if access fronts on the collector street	

Appendix B: Mobility-Friendly Objectives Matrix

MOBILITY-FRIENDLY OBJECTIVES AND EXISTING TOWN AND COUNTY REGULATIONS: A COMPARISON

Objectives	Middletown Zoning	Middletown Subdivision	New Castle Zoning	New Castle Subdivision
TRANSIT- AND PEDESTRIAN-FRIENDLY SITE DESIGN OBJECTIVES				
1. CONTINUOUS, DIRECT, CONVENIENT LINKAGES				32-41(6) street and circulation patterns will provide for safe, efficient, convenient movement...should promote and encourage the increased use of ped. and bikes
a. Short-to-medium length blocks		7B(5)(f) Requires crosswalks on too long blocks, part. to access schools and shopping. 7B(5)(a) does not require sidewalks, just suggests them.		
b. Providing convenient paths and connections				32-367(b) 1-10 sidewalk standards
c. Accommodating pedestrians and bicyclists in street rights-of-way				
d. Ensuring a continuous network of streets and pathways		7B(1)(b) states that local street design should discourage through traffic.		32-367(1)(a) discourages thru traffic on local streets
e. Overcoming barriers to direct, continuous connections		Landscape regs require perimeter plantings don't emphasize inter-parcel access.		
f. Allowances for future street extensions		7B(1)(b) does not require this except for arterials.		32-41(7) locate stub streets to permit future development of interior parcels
2. IMPROVING THE PEDESTRIAN ENVIRONMENT				
a. Security, Lighting and Heightened Visibility				32.378 streetlights encouraged in residential areas, required in non-res. for driveways, parking lots, walkways, public and semi-public areas

MOBILITY-FRIENDLY OBJECTIVES AND EXISTING TOWN AND COUNTY REGULATIONS: A COMPARISON

Objectives	Middletown Zoning	Middletown Subdivision	New Castle Zoning	New Castle Subdivision
b. Safe crossings (closely-spaced crosswalks and small corner radii)				
c. Sidewalks wide enough for couples				32-367(b)(3) strips between sidewalks and back of curbs shall be 3', when provided
d. Protecting the pedestrian/cyclist from traffic--appropriate buffering from traffic (this is more than street trees)				
e. Providing adequate space for pedestrians and bicycles		7B(1)(d) says setbacks and curbcuts should be designed with future r-o-w in mind.		
f. Limitations on curb cuts	Min. setback in C-1, C-2 and C-3 is 15'; there is no maximum		40 feet in O-1, O-2, C-1, C-2, C-3 and M-1	
g. Building orientation and setback			40.101 supporting services permitted in the O-1 but limited. 40.102 as well.	
h. Providing convenience goods and services in business, office, and industrial parks.				
i. Coherent, small-scale signage				
g. Providing transit shelters, waiting areas and seating.				
3. MEASURES TO ADD INTEREST AND ATTRACTIVENESS				
a. Avoiding blank facades				
b. Coherent, small-scale buildings (or articulated larger ones)				
c. Functional street furniture				
d. Avoiding blank facades				
e. Providing street trees, landscaping, and open space.	Shopping centers in C-3 have a 10' perimeter buffer requirement ; 10% of entire site must be landscaped. In M-1 10% of parking lots must be landscaped. 4I(3)(i)			

MOBILITY-FRIENDLY OBJECTIVES AND EXISTING TOWN AND COUNTY REGULATIONS: A COMPARISON

Objectives	Middletown Zoning	Middletown Subdivision	New Castle Zoning	New Castle Subdivision
4. PROVIDING PUBLIC OPEN SPACES		7C(2) allows the town to require dedication of open space for public purposes		32.376(a) requires open space or equivalent contribution in residential development
PARKING OBJECTIVES				
1. PARKING LOCATION				
a. Restrictions on parking between buildings and the street	No restrictions. Minimum setback in C-1, C-2 and C-3 is 15' and parking is allowed in the rear year setback as well.			
b. Preferential rideshare parking			40.633 5% of required parking in lots w/200+ spaces may be set aside as a Park & Ride lot in conjunction with establishing a public transit stop	
2. REDUCTION OF PARKING SUPPLY/DEMAND	Commercial parking reqs are excessive			
a. Revising existing parking requirements to better match demand				
b. Transportation Demand Management and parking reduction				
c. Reducing parking area by allocating compact spaces	5B(2)(b) permits compact spaces under certain conditions.			
d. Reductions permitted for mixed-use development				
e. Shared and combined parking arrangements	5A(4) Spaces for different uses can be combined in one lot but no overall reduction in spaces required is achieved			32.369(12) allow combined but not shared parking
f. On-street Parking			40.635(d) allows on-street parking but spaces don't count towards requirements	

MOBILITY-FRIENDLY OBJECTIVES AND EXISTING TOWN AND COUNTY REGULATIONS: A COMPARISON

Objectives	Middletown Zoning	Middletown Subdivision	New Castle Zoning	New Castle Subdivision
g. Adding parking maximums to parking requirements				
h. Eliminating minimum parking requirements	In some cases Middletown's reqs are excessive. Parking reqs in C-2 can be waived if parking plan is submitted (allows some shared parking) some spaces must be provided.		40.635(e) permits reduction of required spaces upon completion of a parking demand needs analysis	
i. Restricting stand-alone parking facilities				
j. Creating a fee-in-lieu-of-parking option				
k. Provisions to add flexibility				
l. Redevelopment of parking spaces				
3. PARKING LOT DESIGN	5A(3) Requires that no space be more than 600' from bldg or use. 4H(1)(c)(iv)3 says that pedestrian and vehicular traffic in parking lots should be separated.	7B(1)(3) emphasizes autos in design.		32.369(11) required spaces shall be located no more than 600' from the facility they serve
a. Facilitating pedestrian circulation through the parking lot				32.369(4)(f) and (6) recommend functionally separating veh. for peds. and "parking areas shall provide attractive...safe ped. access to parking spaces..."
b. Minimizing obstructions				
c. Lighting and safety		7B(9)(a) and (b) address lighting of pedestrian walkways in/and parking lots.		
4. DESIGN MEASURES TO MAKE PARKING LESS VISIBLE AND MORE PEDESTRIAN FRIENDLY	5A(5) Landscaping shall not obscure sight distances or interfere w/veh. or ped. safety.			
a. Reducing parking lot size				

MOBILITY-FRIENDLY OBJECTIVES AND EXISTING TOWN AND COUNTY REGULATIONS: A COMPARISON

Objectives	Middletown Zoning	Middletown Subdivision	New Castle Zoning	New Castle Subdivision
b. Requiring interior landscaping	Shopping centers in C-3 must provide 10% of area as landscaped.			32.371 to improve landscape maintenance and appearance of parking lots and to improve pedestrian safety
c. Requiring perimeter landscaping and screening	Most zoning districts require a buffer between res. and non-res. uses, walls and fences permitted, six feet in height. No requirement that access between parcels exist.			32.371 same as above
d. Parking structures			40.672 no public garage entrance/exit shall be closer than 200' from a church, library, school, etc.	
5. BICYCLE PARKING				
a. Minimum required bicycle parking			40.635(i) parking lots w/10+ spaces shall provide one bike parking space for every 10 cars up to 20 spaces	
b. Location of bicycle parking				32.369(14) racks shall be located so that they're highly visible, near main entrances, and convenient...
c. Bicycle Parking Design Standards				
d. Provisions for flexibility				
MIXED-USE DEVELOPMENT AND LAND USE OBJECTIVES				
1. LOCATIONS WHERE MIXED-USE CAN SUCCEED				
a. Mixing uses in CBDs				
b. Other commercial districts				

MOBILITY-FRIENDLY OBJECTIVES AND EXISTING TOWN AND COUNTY REGULATIONS: A COMPARISON

Objectives	Middletown Zoning	Middletown Subdivision	New Castle Zoning	New Castle Subdivision
2. MIXING USES WITHIN THE SAME BUILDING				
a. Ground-floor commercial requirements				
b. Designating Mixed-Use Development Zones	R-2 and R-3 allow some mixing. C-2 allows some vertical mixing. Public uses/facilities are permitted in R districts.			
3. PROVIDING SUPPORTING USES IN EMPLOYMENT CENTERS OUTSIDE OF CENTRAL CITIES				
4. PROVISIONS TO IMPROVE COMPATIBILITY OF MIXED USES				
a. Separating uses while maintaining practical walking distances				
5. PROHIBITING USES IN MIXED USE ZONES				
6. CREATING TRANSITION AREAS BETWEEN RESIDENTIAL AND NON-RESIDENTIAL USES	Non-res. districts are required to provide either a wall, a landscape buffer, or both when adjacent to res. zones		Non-res. districts are required to provide either a wall, a landscape buffer, or both when adjacent to res. zones	
a. Performance standards to ensure compatibility				
b. Design Standards/Guidelines to promote compatibility				
c. Requiring conditional or special permit approval				
7. PROVIDING FOR A BALANCE OF USES				

MOBILITY-FRIENDLY OBJECTIVES AND EXISTING TOWN AND COUNTY REGULATIONS: A COMPARISON

Objectives	Middletown Zoning	Middletown Subdivision	New Castle Zoning	New Castle Subdivision
a. Limits to maintain a balanced mix of uses				
b. Provisions allowing incidental or accessory uses				
8. MEASURES TO PROVIDE AMENITIES				
a. Requirements for incentives for amenities				
b. Uses that attract people and serve the district				
9. MAINTAINING FLEXIBILITY TO MATCH MARKET DEMAND				
a. Responsiveness to market demand				
b. Design standards to encourage flexibility and improve market success				
c. Provide incentives and options rather than mandatory requirements				
10. LAND USE				
a. A fine-grained mix of land uses (not just a balanced and compatible one)				
b. Higher density housing near commercial centers, transit lines and parks				
c. Commercial centers or districts (rather than strips)				
d. Moderate density in ped/transit served areas				

Bold type indicates a significant objective

Prepared by LDR International, Inc. February, 1997

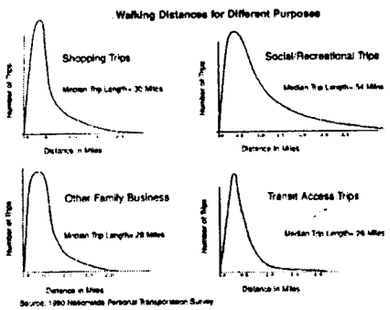
Appendix C: Summary Boards

WILMAPCO - MOBILITY FRIENDLY DESIGN STANDARDS STUDY
STREET NETWORK AND DESIGN STANDARDS - PART 1

Purpose of Study

This study supports the long-range transportation goals of WILMAPCO, New Castle County and the Delaware Department of Transportation. These goals include increasing mobility and accessibility by providing people with travel options other than driving alone in their cars. Transportation improvements should be integrated into the social fabric of communities to help create livable neighborhoods and provide an expanded network of connections within and between communities. The goal is to provide an excellent transportation system that is sustainable and provides access and mobility options.

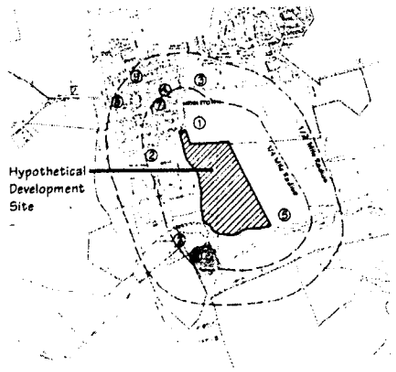
If we are to provide mobility options to pedestrians, bicyclists and transit users, we must provide a convenient, direct and continuous pathway network linking the places people want to go.



The routes must be safe and should be interesting. Pedestrian, bicycle and transit facilities must provide an acceptable level of convenience if they are to provide a realistic alternative to the car. Studies indicate that, on average, people are willing to walk about 1500 feet (1/4 mile or a 5 minute walk) to shopping or a bus stop.

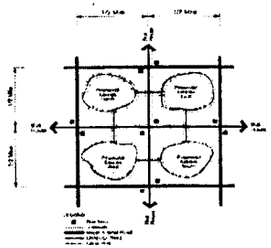
To minimize travel distances, routes must be as direct as possible. They will appear significantly less convenient if there are gaps or missing links in the network.

To link the places people want to go, we should identify those desired destinations as part of the development process and ensure that appropriate connections are made to the existing pedestrian and bicycle systems.



Identify Local Trip Generators

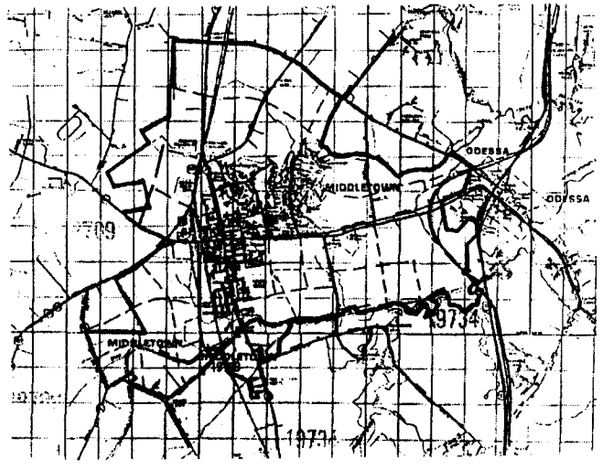
A continuous network of street right-of-ways is important to support a continuous network of pathways. Higher order streets, collectors and arterials, should be planned at 1/2 mile average intervals.



The shift away from a grid street pattern has resulted in a loss of through traffic capacity. More closely spaced streets provide the following benefits:

- Safety: Motorists will only travel at restrained speeds for a minute or two on local streets before they are tempted to speed.
- Community Streets: A denser network of through-streets can better disperse traffic, avoiding the need for multi-lane streets, preserving more of the network as local/community streets.
- Transit Use: Through streets allow transit vehicles to move through communities without back tracking.

Middletown's current codes require arterials only to be planned through proposed developments. This would result in very few through streets, forcing all traffic (even local) onto Routes 71 and 299.



Middletown should consider a 1/2 mile through street network (shown conceptually dashed in red) as part of their expanded town planning.

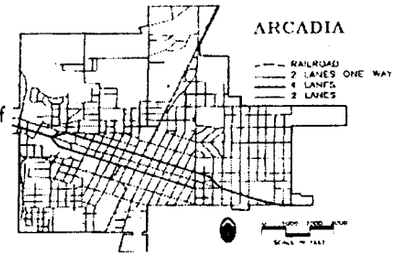
WILMAPCO - MOBILITY FRIENDLY DESIGN STANDARDS STUDY
STREET NETWORK AND DESIGN STANDARDS - PART 2

Street Network Design

The network or pattern, of local streets, should provide an adequate level of mobility as well as an acceptable level of safety.

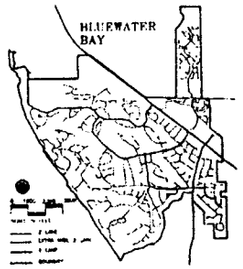
Traditional Grids provide the following benefits:

- Disperse traffic rather than concentrate it at a handful of intersections.
- Provide more direct routes. This results in fewer vehicle miles of travel.
- Encourage walking through direct routing.
- More transit friendly. Transit vehicles avoid back tracking and frequent turns. Users have more direct access.



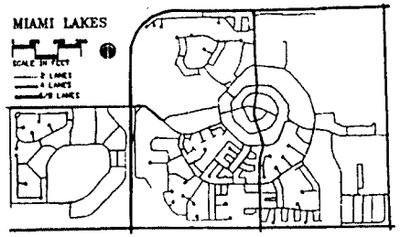
Contemporary networks, curvilinear alignments with more cul-de-sacs, provide the following benefits:

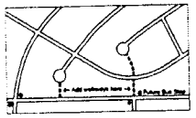
- Keep through-traffic out of neighborhoods, thus creating safer and quieter local streets.
- Roads can better respond to natural features and topographic constraints.



The best of both worlds can be achieved.

A system of through-streets is maintained while local street patterns are a combination of grids and short cul-de-sacs.





Through connections for pedestrians and bikes should be planned as part of cul-de-sac layout.

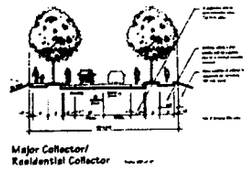
Street Design Criteria

As part of this study, the consultant team will be exploring opportunities to provide flexibility in neighborhood street design through reduced lane width and other tighter geometric design criteria. The benefits of this include:

- Traffic Calming: narrower streets with tighter radius on curves result in cars driving slower.
- Enhanced Pedestrian Environment: less paving and slower moving traffic creates a more pedestrian and bicycle friendly environment.
- Lower construction and maintenance costs.
- Reduced storm water runoff.

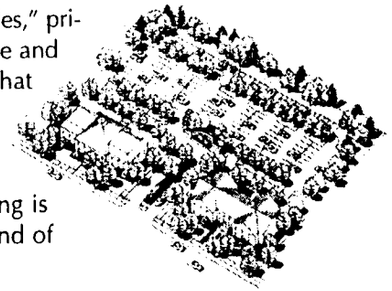
Before and After of same street, 20 years later.

Street trees add to the sense of enclosure on the street, enhancing the objective of reducing the speed of vehicles. When located between the curb and sidewalk, they provide a sense of separation between automobiles and pedestrians. Street trees should be required for all new development at a minimum 40' on-center average spacing. They should be planted in a minimum 5' wide green strip. Middletown's current codes do not specify spacing or quantity required.



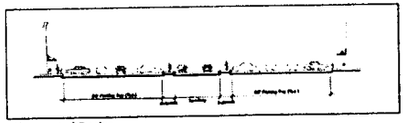
WILMAPCO - MOBILITY FRIENDLY DESIGN STANDARDS STUDY
DEVELOPMENT REGULATIONS AND SITE DESIGN

Development regulations are those "rules," primarily outlined in the zoning ordinance and subdivision regulations, that govern what uses may be placed on a given site. Development regulations dictate how far buildings must be set back from property lines, how much parking is required and how much and what kind of landscaping is to be provided.

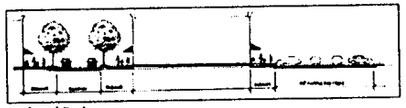


We can create a more pedestrian and transit friendly environment by allowing buildings to be placed closer to the street because:

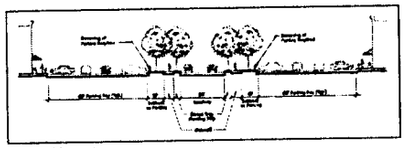
- Travel distances for pedestrians are minimized by providing direct access.
- The impact of parking is minimized by placing it beside or behind buildings.
- Appropriately scaled buildings reinforce the human scale of the street and the supporting pedestrian network.



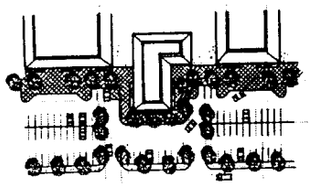
Discouraged Design.
• Parking in front of buildings with no setback from street creates a negative pedestrian environment.



Preferred Design.
• Buildings pulled toward street with parking located in the rear.



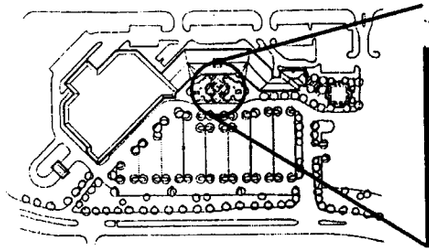
Acceptable Design.
• Parking setback from street with additional landscape buffer.



Walkways Linking Buildings

Provide pedestrian connections between buildings and uses within sites as well as between sites.

People will be more likely to walk or bicycle if the route is more interesting. Measures to add interest include an increased level of detail in the building articulation. This can be accomplished by breaking up large, blank facades with a variety of materials, breaks in the plane of the facade or interesting roof lines. Also including window treatments and providing added detail at doorways is effective.



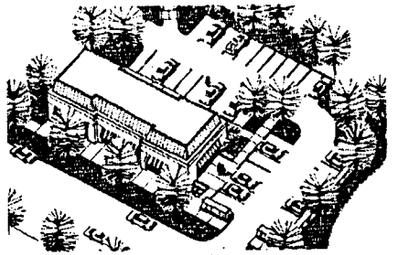
Providing for public spaces and plazas provides pedestrians with additional points of interest as well as places to stop and rest. In pedestrian oriented areas, public spaces should be provided as part of all new development.

PARKING DESIGN

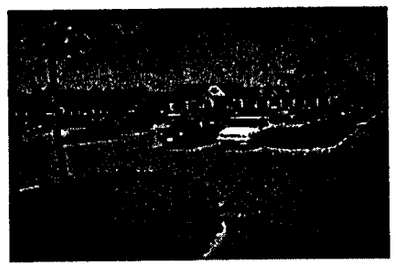
The objective of parking design should be to reduce the impact of parking lots on the pedestrian. This can be accomplished in a number of ways:

- Break up the large areas of parking by locating it to the side and behind buildings.
- Reduce the amount parking required. Often more parking is required than is needed for 99% of the year. *(Middletown's requirement for 5.5 parking spaces per 1000 s.f. of building area for commercial areas is excessive.)*
- Parking lot layout and design. Parking should be setback at least 10' from property lines and screened with a wall, fence or landscaping that will provide a year round visual buffer. In addition, interior parking lot landscaping should be required to reduce the visual impact of large expanses of parking. In residential areas, landscape islands should be required at the rate of 1 island per 10 parking spaces. In commercial and retail areas, landscape islands should be required at the rate of 1 island per 20 parking spaces.

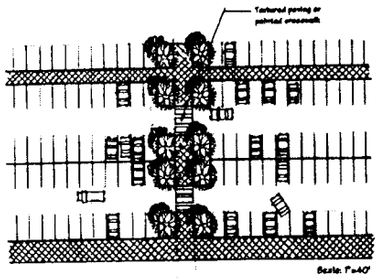
Pedestrian circulation should be provided within parking areas connecting parking to buildings or providing connections through parking lots.



Parking located to the side and behind.



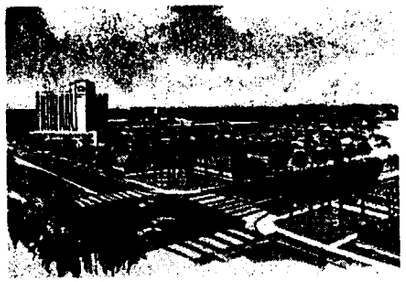
Internal parking lot landscaping.



Walkways through Parking Area

Example of Existing Conditions.

The amount of parking typically required and where it is located is overwhelming to the pedestrian environment and at odds with the goal of creating an environment conducive to walking and biking.



Conceptual Sketch.

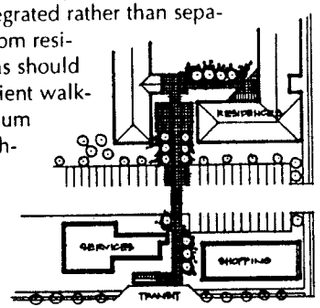
This is an example of reducing parking requirements in exchange for buildings that reinforce the street and providing additional landscaping.

WILMAPCO - MOBILITY FRIENDLY DESIGN STANDARDS STUDY

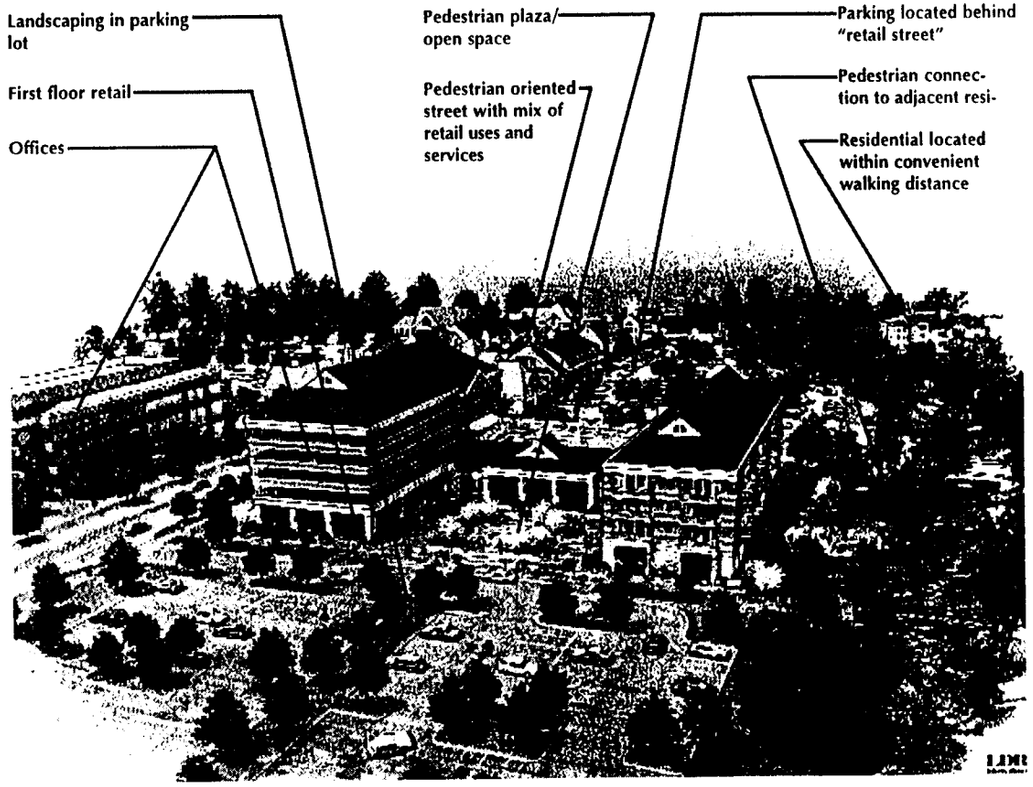
MIXED USE DEVELOPMENT

MIXED-USED DEVELOPMENT

When a variety of land uses are located near one another, walking, bicycling and transit use become a practical means of travel. The mixed use concept does not have to be a complex vertical mix of uses, usually associated with an urban setting. Mixing uses on a single site or within the same area can also stimulate pedestrian activity. The key is to create communities where daily activities are integrated rather than separated. Popular destinations from residential and employment areas should be provided within a convenient walking distance (1/4 mile maximum preferred). Uses such as neighborhood commercial, banks, day care, restaurants and dry cleaning to name a few may be appropriate. Direct pathway connections should be provided between uses.



A community may craft a mix of uses to meet specific objectives. For example, a mix of uses may be developed to provide some flexibility in preserving the viability of significant historic structures or entire historic areas.



The following check list should be used to guide decision making related to developing a mix of uses.

- Are the uses complementary?
- Are the uses linked by sidewalks or paved paths?
- Are they within convenient walking distance of each other?
- Are the walking routes short and direct?
- Do the buildings fit with and complement each other?
- Do the uses create activity at different times of day?
- Is parking kept out of the pedestrian's path of travel?
- Do they support one another economically?

Provide a variety of housing types to accommodate a range of income levels.

Appendix D: Agency and Public Involvement Process

The Process

February 4, 1997	Consultant meets with the Project Management Committee in Middletown's town offices to initiate project. Following the meeting consultant tours town with Mayor to review local examples of new and old, good and bad.
February 25, 1997	Presentation to DelDOT Working Group, Land Use Design Subcommittee and Project Management Committee to present analysis of findings based upon review of existing county and town zoning and subdivision documents. Findings presented in a matrix format and compared to criteria for pedestrian and transit friendly design (see appendix A for matrix). Reid Ewing gives slide presentation on and leads discussion of the principles of pedestrian and transit friendly design and their associated community benefits.
March 5-6, 1997	Consultant attends Land Use Summit at University of Delaware
March 13, 1997	Consultant attends Middletown Comprehensive Plan presentation by the Institute of Public Administration for coordination purposes.
April 17, 1997	Presentations to DelDOT Working Group and Middletown Council and Planning and Zoning Committee to review outline of recommended changes to the state road design manual as well as the town zoning and subdivision regulations to introduce mobility friendly design elements and options into the built environment.
April 22, 1997	Presentation to New Castle County staff to review outline of recommended changes to the state road design manual as well as the Middletown zoning and subdivision regulations to introduce mobility friendly design elements and options into the built environment. Particular attention given to Middletown's regulations as they may relate to New Castle Counties impending efforts. Reid Ewing conducts evening workshop on traffic calming practices.
April 23, 1997	Public workshop conducted at Middletown Public Works Building. Presentation of outline of recommended concepts to the Subdivision Streets Design Manual as well as the Middletown Zoning and Subdivision ordinances to introduce mobility friendly design elements and options into the built environment. Presentation prepared in overhead projector format as well as outlined on a series of 5 illustrative boards.

June 2, 1997	DelDOT Working Group meeting to debate and discuss the specifics of recommended modifications to the DelDOT Subdivision Streets Design Manual.
July 7, 1997	Presentation to DelDOT and Middletown Council to review specific recommendations for modifications to the DelDOT Subdivision Streets Design Manual and the Middletown Zoning and Subdivision Ordinances.
July 10, 1997	Presentation to New Castle County and Land Use Design Subcommittee to review specific recommendations for modifications to the DelDOT Subdivision Streets Design Manual and the Middletown Zoning and Subdivision Ordinances.
July 23, 1997	Public Workshop at Middletown Town Offices to present specific recommendations for modifications to the DelDOT Subdivision Streets Design Manual and the Middletown Zoning and Subdivision Ordinances.

Additional outreach efforts conducted by WILMAPCO

May 1, 1997	New Castle Co. Chamber of Commerce Local Government Committee
May 1997	The Consulting Engineers Council is asked to provide input on street design standards.
May 17, 1997	Outline of recommendations is presented at the Transportation Festival in Wilmington.
July 9, 1997	Conducted 3 separate meetings to reviewed draft recommendations with Delaware State Chamber of commerce staff, Consulting Engineers Council of Delaware and New Castle County Chamber of Commerce.
July 25, 1997	WILMAPCO sent letter to New Castle County Elected and Appointed Officials offering presentation to all elected and appointed officials in the County. Also sent letter to New Castle County Civic Association Leaders offering presentation to all civic associations and umbrella organizations in New Castle County.
July 28, 1997	Present draft recommendations to Pike Creek Valley Civic League.
August 13, 1997	Present draft recommendations to New Castle County Community Design Working Group.

August 25, 1997	Meet with Lt. Governor Minner to review draft recommendations.
August 27, 1997	Meet with Middletown Fire Chief Frank bailey to review draft recommendations.
August 28, 1997	Meet with State Senator Steven Amick to review draft recommendations .
Sept. 3, 1997	Meet with Delaware Health and Social Services, Division of State Service Centers to review draft recommendations.
Sept. 16, 1997	Meet with New Castle County Council Land Use Committee to review draft recommendations.
Sept. 22, 1997	Present draft recommendations to Newark City Council.
Oct. 7, 1997	Present draft recommendations to New Castle County Executive, Tom Gordon.
Oct. 8, 1997	Present draft recommendations to New Castle County Historic Review Board.
Oct. 14, 1997	Presentation to Land Use Design Subcommittee of revised recommendations. Subcommittee recommends approval to WILMAPCO Technical Advisory Committee and Council.
Oc. 16, 1997	Presentation to WILMAPCO Technical Advisory Committee (TAC). TAC recommends approval to Council.
Oct. 20, 1997	Present draft recommendations to the Villages of Arden, Ardencroft and Ardentown planning committee.
Oct. 27, 1997	Review with State Agencies and Middletown as part of Delaware's Land Use Planning Act process.
Oct. 27, 1997	Present to Port Deposit , Maryland Planning and Zoning Committee.
Nov. 5, 1997	Presentation to DelDOT Division Directors, Engineers and Planners to review final recommendations and receive final comments.
Nov. 6, 1997	Approval by WILMAPCO Council.

Appendix E: Middletown Zoning Recommendations

Zoning Regulations

Key: ~~Strike through~~ = delete struck through text
underline = new text inserted
italics = existing or recommended policy regulation

Section 4. Use and Area Regulations and Requirements for Zoning Districts

Statement of Intent: Residential Generally

The Town's intent within the standard residential zoning districts (R-1A, R-1B, R-2, R-3) is to create a variety of residential environments that offer housing choices and that complement the Town's historic character and development patterns, and promote the objectives of the Middletown Comprehensive Development Plan..... **[Town to insert additional intent language as appropriate] ....** It is intended that residential neighborhoods be connected, by a network of roads, sidewalks, interior pedestrian ways and bike facilities, to adjacent neighborhoods, commercial and retail uses and public facilities such as schools and libraries.

The town encourages the location of limited neighborhood retail and services within residential developments through the conditional use process, in support of *the mobility friendly policies* of the Middletown Comprehensive Development Plan.

A. R-1A Single Family Residential (low density)

In an R-1A District no building or premises shall be used....

(1) Permitted Uses

(k) Detached garage, as an accessory use **(See Exhibit 12)**

(2) Conditional Uses Subject to Special Requirements

(d) Neighborhood retail and services uses to support the surrounding residential community. The site and architectural design shall be compatible with the residential scale, massing, and architectural articulation of the surrounding community and shall be easily accessible by pedestrians, bicycles and transit.

(I) Permitted Uses

(a) Offices for professional and administrative services
(b) Financial institutions and banks
(c) Barbershops and beauty shops
(d) Medical clinics
(e) Studios for art, music and dance, workshop and sales
(f) Retail food stores such as bakeries, candy and convenience stores, grocery and meat markets
(g) restaurants, excluding "drive thru" fast food service restaurants
(h) retail sales and specialty stores
(I) indoor repair and services, with no outdoor storage
(j) antique shop
(k) bookstore
(l) laundromats
(m) resident apartments located above any non-residential use

(ii) Area regulations

(a) Maximum lot size for the grouping of stores shall be one and one-half (1½) acres.

(b) Maximum floor area for any single permitted establishment within the neighborhood center shall be ten thousand (10,000) square feet.

(c) Minimum lot width shall be at least sixty-five (65) feet.

(d) Maximum percentage of impervious surface shall be seventy (70%) percent.

(e) Minimum distance between any access driveway (including ingress or egress points) and residential district shall be thirty-five (35) feet.

(f) Height of buildings shall not exceed three (3) stories or 35 feet.

(g) Minimum front yard building and parking setback shall be ten (10) feet.

(h) Side yards shall be required equal to the minimum side yard required for the residential district and subject to the landscape screening provisions as specified in Section 6 of this ordinance.

(I) Parking shall comply with the requirements provided in Section 5 of this code.

(3) Area Regulations

(e) Minimum building setback line shall be ~~twenty-five (25)~~ ten (10) feet for residential structures and twenty (20) feet for garages. **(See Exhibit 13)**

(f) Minimum rear yard shall be twenty-five (25) feet for residential structures, and five feet for accessory structures and detached garages. For corner lots the rear yard may be reduced twenty (20) percent in depth to allow the "skewing" of a residential dwelling on the lot.

(g) Side yards shall be provided as follows: for residential structures each lot shall have two (2) side yards a minimum of ten (10) feet with a minimum aggregate width of two (2) side yards of twenty-five (25) feet. The minimum side yard for accessory structures and detached garages

shall be zero (0) feet. **(See Exhibit 12)**

(k) Open space set asides and dedications shall comply with Section 7G Open Space, Planting and Landscape Conservation of the Middletown Subdivision Ordinance.

B. R-1B Single Family Residential (lower density)

(1) Permitted Uses

(k) Detached garage, as an accessory use

(2) Conditional Uses

(d) Neighborhood retail and services uses to support the surrounding residential community. The site and architectural design shall be compatible with the residential scale, massing and architectural articulation of the surrounding community and shall be easily accessible by pedestrians, bicycles and transit.

(l) Permitted Uses

(a) Offices for professional and administrative services
(b) Financial institutions and banks
(c) Barbershops and beauty shops
(d) Medical clinics
(e) Studios for art, music and dance, workshop and sales
(f) Retail food stores such as bakeries, candy and convenience stores, grocery and meat markets
(g) restaurants, excluding "drive thru" fast food service restaurants
(h) retail sales and specialty stores
(i) indoor repair and services, with no outdoor storage
(j) antique shop
(k) bookstore
(l) laundromats
(m) resident apartments located above any non-residential use

(ii) Area regulations

(a) Maximum lot size for the grouping of stores shall be one and one-half (1½) acres.

(b) Maximum floor area for any single permitted establishment within the neighborhood center shall be ten thousand (10,000) square feet.

(c) Minimum lot width shall be at least sixty-five (65) feet.

(d) Maximum percentage of impervious surface shall be seventy (70%) percent.

(e) Minimum distance between any access driveway (including ingress or egress points) and residential district shall be twenty-five (25) feet.

(f) Height of buildings shall not exceed three (3) stories or 35 feet.

(g) Minimum front yard building and parking setback shall be ten (10) feet.

(h) Side yards shall be required equal to the minimum side yard required for the residential district and subject to the landscape screening provisions as specified in Section 6 of this ordinance.

(I) Parking shall comply with the requirements provided in Section 5 of this code.

(3) Area Regulations

(e) Minimum building setback line shall be ~~twenty-five (25)~~ ten (10) feet for residential structures and twenty (20) feet for garages. **(See Exhibit 13)**

(f) Minimum rear yard shall be twenty-five (25) feet for residential structures, and five feet for accessory structures and detached garages. For corner lots the rear yard may be reduced twenty (20) percent in depth to allow the "skewing" of a residential dwelling on the lot.

(g) Side yards shall be provided as follows: for residential structures each lot shall have two (2) side yards a minimum of ten (10) feet with a minimum aggregate width of two (2) side yards of twenty-five (25) feet. The minimum side yard for accessory structures and detached garages shall be zero (0) feet. **(See Exhibit 12)**

(k) Open space set asides and dedications shall comply with Section 7G Open Space, Planting and Landscape Conservation of the Middletown Subdivision Ordinance.

C. R-2 District Single Family Residential (medium density)

(3) Area Regulations

(e) Minimum building setback line shall be ~~fifteen (15)~~ ten (10) feet for residential structures and twenty (20) feet for garages. **(See Exhibit 13)**

(f) Minimum rear yard shall be twenty (20) feet for residential structures, and five feet for accessory structures and detached garages. For corner lots the rear yard may be reduced twenty (20) percent in depth to allow the "skewing" of a residential dwelling on the lot.

(g) Side yards shall be provided as follows: for residential structures each lot shall have two (2) side yards a minimum of ten (10) feet on each side, except for a semi-detached residential dwelling which shall have one side yard a minimum of ten (10) feet. The minimum side yard for accessory structures and detached garages shall be zero (0) feet. **(See Exhibit 12)**

(k) Open space set asides and dedications shall comply with Section 7G Open Space, Planting and Landscape Conservation of the Middletown Subdivision Ordinance.

D. R-3 Multi-Family Residential

(1) Permitted Uses

(b) Garden apartments subject to the following special requirements.

(viii) Parking shall comply with the requirements provided in Section 5 of this code.

(ix) Landscape screening shall comply with the requirements provided in Section 6 of this code.

(x) Sidewalks and internal pedestrian ways shall conform to Section 7B(5) of the Subdivision Regulations

Statement of Intent: Commercial Generally

The Town's intent within the standard commercial zoning districts (C-2 and C-3) is to create retail and employment environments that complement the Town's historic character and development patterns, and promote the objectives of the Middletown Comprehensive Development Plan.... **[Town to insert additional intent language as appropriate]**..... It is intended that commercial uses be connected, by a network of roads, sidewalks, interior pedestrian ways and bike facilities, to adjacent neighborhoods, other commercial and retail uses and employment centers.

~~F. C-1 District--Neighborhood Commercial~~

To create an opportunity to provide neighborhood-serving commercial/retail in or near residential communities the existing C-1 zoning district has been rewritten so that it is no longer a separate district. Instead, the uses and structure of the old C-1 have been incorporated into the residential districts as a conditional use; some of the uses in the C-1 were shifted to the C-2 or C-3. This will allow for a mix of residential uses and neighborhood serving commercial/retail uses in the neighborhood and within walking/biking distance. Using the conditional use process will allow the Town and the public some discretion in the type, location and appearance of the neighborhood serving commercial. Land currently zoned C-1 should be re-categorized on a case by case basis as part of a comprehensive zoning revision subsequent to adoption of the new comprehensive plan.

G. C-2 District Downtown Commercial

Statement of Intent. The purpose of the C-2 zoning district regulations is to promote a traditional downtown that reinforces the historic character and scale of Middletown and encourages a mixed use pedestrian environment..... **[Town to insert additional intent language as appropriate]** ..... Development in this zone should be pedestrian-friendly. This character can be achieved through the use of sidewalks, street trees, public spaces, building massing, articulation and orientation, signage, land uses, traffic calming and scale and location of parking. Land uses should be both residential and non-residential. Business should be both neighborhood, community and tourist-serving including specialty retail, personal and professional services.

Development applications for new uses and renovations in the C-2 zoning district must submit a site development plan as set forth in Section 11(D) of this ordinance.

In a C-2 District no building or premises shall be used and no building shall be erected or altered which is arranged, intended, or designed to be used, except for one or more of the following uses and complying with the requirements so indicated.

(1) Permitted Uses

(a) Single family detached residences (as permitted in the R-2 zoning district), townhouses or row dwellings (as permitted in the R-3 zoning district), conversion of existing single family residences to apartments, and residence apartments located above any non-residential use.

(3) Area Regulations

(f) Minimum building and parking setback shall be ~~fifteen (15)~~ ten (10) feet. **(See Exhibits 14, 15 & 16)**

(h) Parking shall comply with the requirements provided in Section 5 of this code. Shared parking, off-site parking, and on-street parking is encouraged as outlined in the Parking Plan Option Section of Section 5.

(i) Pedestrian walkways shall form an on-site circulation system that minimizes the conflict between pedestrians and traffic at all points of pedestrian access to on-site parking and building entrances. Pedestrian walkways shall connect building entrances with the public right-of-way and existing or planned transit stops. **(See Exhibit 17)**

(j) To create a visual and economic link between pedestrians and businesses, the ground floor street frontage of each structure shall be pedestrian-oriented and windows shall be provided rather than blank walls. A minimum of sixty (60) percent of ground-floor facades facing streets shall be in non-reflective, transparent glazing.

(k) Landscape screening...

(l) Signs shall ...

H. C-3 District ~~Shopping Center Commercial~~ Employment/Regional Retail

Statement of Intent. The purpose of the C-3 district regulations is to create local, neighborhood, community and regional shopping and employment opportunities in an environment that provides internal and inter-parcel vehicular and pedestrian circulation, transit accessibility, and visually pleasing surroundings through the use of site design, architectural detail, form and massing, and landscaping. Development design within the C-3 district will provide service and retail environments and employment/office opportunities in a manner compatible with the historic character, scale, and architectural style of Middletown.

The C-3 District allows both retail and office uses and allows for office uses to locate on the second floor in combination with retail uses.

Development applications for new uses and renovations in the C-3 zoning district must submit a site development plan as set forth in Section 11(D) of this ordinance.

(1) Permitted Uses

(a) Any use permitted in a C-2 District subject to the area regulations of that district.

(b) Service station, automobile sales agency, public garage, parking garage or lot, but not including storage of wrecked cars, subject to the following special requirements:

(c) Restaurants, except that "fast food"restaurants and drive-thru restaurants must be part of a comprehensively designed shopping center, as described in (e) below.

(d) Offices for professional services and administrative activities both as employment centers or as second floor uses in conjunction with retail uses.

(e) Shopping centers and employment centers subject to the following special requirements:

(iv) Traffic, Transit, Pedestrians and Parking

1. The internal circulation of traffic shall be ~~separated from~~ similar to the external street system, ~~and~~ where pedestrian and vehicular traffic shall be separated but meet at safe intersections through traffic control devices

and appropriate site design. The site design and internal circulation pattern shall allow for the through movement of transit vehicles and short average walking trips (less than 300') from transit stops to building portals.
(See Exhibit 18)

2. Pedestrian walkways shall form an on-site circulation system that minimizes the conflict between pedestrians and traffic at all points of pedestrian access to on-site parking and building entrances. Pedestrian walkways shall provide direct connections from building entrances to sidewalks along streets and to existing or planned transit stops. Pedestrian walkways shall be provided when the pedestrian access point or any parking space is more than 75 feet from the building entrance or principal on-site destination as follows:

   a. All developments which contain more than one building shall provide walkways between the principal entrances of the buildings; and

   b. All non-residential buildings set back 100 feet or more from the public right-of-way shall provide for direct pedestrian access from the building to buildings on adjacent lots.

3. To enhance the pedestrian environment and create visual interest, long facades should be divided into shorter segments a maximum of forty (40) feet and preferably twenty-five (25) feet in width. Techniques to segment the facade can include varying setbacks of sections, varying architectural elements, using windows, or varying the color of individual segments, using harmonious colors.

~~2.~~ 4. Access to state highways...

~~3.~~ 5. Minimum distance between...

~~4.~~ 6. Spacing of accessways...

~~5.~~ 7. ~~5.5~~ A minimum of 3.0 parking spaces shall be provided per one thousand (1,000) feet of leasable area plus one parking space for each two (2) employees.

~~6.~~ 8. ~~Parking lots shall be attractively landscaped as shown on the general site plan.~~ Parking lots shall be landscaped in accordance with Section 5. Off-Street Parking.

(vi) Buffering ~~and~~ , landscaping and public space

1. There shall be a minimum ten (10) foot landscaped buffer...

2. Vehicular and pedestrian access points at property edges and to adjacent lots shall be coordinated with existing development to provide circulation patterns between developments. Buildings, landscaping, fences and other improvements shall be located so that adequate area shall be reserved for future connections to adjacent properties and as not to preclude future site-to-site connections.

~~2.~~ 3 ~~Ten percent (10%) of the site shall be landscaped and may include features such as pedestrian walking or rest areas and courtyards.~~

Public space shall be provided as part of all new shopping center and office development in an amount that covers no less than five (5) percent of the total site area. Public space includes parks and plazas, pedestrian amenities such as seating, lighting, special paving, planting, artwork and special recreational features but excludes pedestrian walkways and required buffer areas. **(See Exhibit 18)**

(vii) Transit Accessibility. All developments must coordinate with the Delaware Transit Corporation regarding existing and future transit routes and transit facility standards. Preferred design elements include expanded pads, benches, shelters and direct access for transit vehicles. See Section 11(D)(3)(c).

I. MI District Manufacturing-Industrial

1. Permitted Uses

(k) Services and retail (e.g. delis, office products, day care, dry-cleaning, and similar type uses) incidental to the primary permitted use not to exceed ten (10) percent of the total building area.

Section 5. Off-Street Parking

A. General Provisions

(1) Parking Space Size

A parking space shall not be less than one hundred ~~eighty (180)~~ sixty-two (162) square feet with a minimum of nine (9) feet wide for any use permitted in this code. ~~Upon appeal, however, the Board of Adjustment may grant variances from this size if a particular hardship will occur, or if the design of a parking arrangement may be more appropriate determined to justify a small parking space size.~~

(3) Location of Parking Spaces

...To minimize the impact of large expanses of parking on the pedestrian environment, parking spaces shall be located to the rear and sides of buildings **(See Exhibit 14 & 15)**. In the C-3 District limited parking shall be allowed in front of uses with a significant loading requirement such as grocery stores or home improvement centers **(See Exhibit 16 &18)**. Upon appeal, however, the Board of Adjustment may grant variances from these configurations if a particular hardship will occur.

(8) Parking Lots: Layout and Design.

Parking shall be setback at least 10' from property lines and screened from the public street right-of-way with a wall, fence or landscaping that will provide a year-round visual buffer.

(9) Parking Lots: Interior Landscaping

To reduce the visual impact of large expanses of parking and to create a more pedestrian-friendly environment, interior parking lot landscaping is required.

Green space in the form of landscape islands and/or peninsulas are required to break up rows of parking spaces as follows:

(a) If the total number of parking spaces is less than 100 the minimum requirement is:

- Islands at both ends of each row of parking (minimum of 9 x 18')
- One island or peninsula (min 9 x 18') for every 10 contiguous spaces (avg)
- No more than 2 contiguous bays (60' width) without a (9' wide island separating the 2 bays from additional parking bays or drive aisles
- Minimum of one (1) 2-1/2" caliper shade tree 12' feet in height shall be provided per 200 square feet of interior green space

(b) If the total number of parking spaces is 100 or greater the minimum requirement is:

- Islands at both ends of each row of parking (minimum of 9 x 18')
- One island or peninsula (min 9 x 18') for every 12 contiguous spaces (avg)
- No more than 3 contiguous bays (60' width) without a (9' wide island separating the 2 bays from additional parking bays or drive aisles
- Minimum of one (1) 2-1/2" caliper shade tree 12' in height shall be provided per 200 square feet of interior green space **(See Exhibit 19)**

(10) Parking Lot Buffers: Landscaping

Landscape screening in required buffers shall consist of evergreen shrubs planted a maximum of three feet on center, be installed at a minimum 18" height, and be capable of achieving an ultimate 36" height. Plantings at intersections and driveways shall not interfere with adequate sight distances as defined by the Delaware Department of Transportation.

(11) Bicycle Parking Facilities

All parking facilities containing less than ten parking spaces shall provide one bicycle rack with no less than five (5) spaces. For parking facilities containing more than ten parking spaces the applicant shall provide one bicycle rack with no less than five spaces plus one bicycle parking space for each additional ten

parking spaces in the lot. No more than 20 bicycle parking spaces shall be required in any one parking facility.

The Town shall provide bicycle parking facilities at public uses such as schools, town hall, recreation facilities and libraries in accordance with the above standards.

B. Parking Standards

(1) Design Standards

Parking spaces and aisle ways shall be designed in accordance with the following dimensional standards:

Parking Angle	Stall Width	Aisle way To curb	Aisle way Width
90°	9 ft.	~~20~~ 18 ft.	~~24~~ 20 ft. For one-way traffic

Section 6. Landscape Screening

For all land uses, access points at property edges and to adjacent lots shall be coordinated with existing development to promote vehicular and pedestrian circulation patterns between developments. Landscaping, walls and fences shall be located so as not to preclude future site-to-site connections.

Section 9. General Provisions

~~G. All accessory structures and/or buildings, shall be set back from the rear lot line a minimum distance of ten feet (10') and a minimum distance of four feet (4') from the side lot line.~~

Section 11. Interpretation and Administration

D. Site Development Plans

The purpose of the site development plan is to show the proposed site design and the recommended design elements and to indicate the location of buildings, structures, paved areas, grading, drainage, on-site utilities, sidewalks, public spaces and trails, within a site proposed for development.

(1) When required

(a) A site development plan, approved by the Subdivision Review Committee, is required prior to issuance of grading permits or building permits for new or expanded nonresidential development including commercial, industrial, institutional and utility development, new or expanded residential that does not include a subdivision, plus public buildings, schools and other public facilities excluding road, water, sewer or drainage improvements.

(b) Changes in use. A site development plan is required unless the Subdivision Review Committee determines that there is less than 5,000 square feet of site disturbance and no significant alteration to access, parking, circulation, drainage, landscaping, structures, or other site features are required.

(2) Application, Review and Approval

(a) The applicant shall file twelve (12) copies of the official application form and twelve (12) copes of the proposed site development plan.

(b) The proposed site development plan shall show the same information as required for minor subdivisions under the procedures set forth in Section 4(B)(2)a-l of the Middletown Subdivision Ordinance.

(c) The proposed site development plan will be reviewed under the procedures set forth in Section 4(C)(1), (2) and (3) of the Middletown Subdivision Ordinance. In addition, all applicants shall coordinate with the Delaware Transit Corporation regarding placement of transit facilities for existing and future transit routes.

(d) The proposed site development plan will be approved under the procedures set forth in Section 4(D)(1)-(4) of the Middletown Subdivision Ordinance.

Appendix F: Middletown Subdivision Recommendations

Subdivision regulations

Key: ~~Strike through~~ = delete struck through text
underline = new text inserted
italics = existing or recommended policy regulation

Section 5. MAJOR SUBDIVISION SUBMISSION PROCEDURES AND REVIEW PROCESS

C. SUBMISSION PROCEDURES FOR PRELIMINARY PLAN REVIEW (REQUIRED)

(2) The preliminary plan for a major subdivision shall show the following information:

(o) The location of each school, recreation facility, church, commercial area, post office, transit stop/station or other public or community facility (trip generators) within a one-half (½) mile radius of the perimeter of the proposed subdivision and a written or graphic description of the proposed connections between the proposed development and the trip generators.

(See Exhibit 1)

(p) For residential developments, the calculated connectivity index for the proposed development including the connections to the immediately adjacent road network.

The connectivity index is a ratio of the number of street links (road sections between intersections and cul-de-sac heads) divided by the number of street nodes, or link ends (intersections and cul-de-sac heads). The more links relative to nodes, the more connectivity. A connectivity ratio of 1.4 or greater is required. (Note: Count only one half of the connections to the existing network).

(See Exhibit 2)

(r) The location of all existing and proposed bike paths/routes within the proposed development and within one mile of the development and how the proposed development will be connected to them.

Section 7. Design Standards

A. GENERAL STANDARDS

(2) Subdivision plans should shall take into account proposals of the Middletown Comprehensive Development Plan (MCDP) and *the mobility-friendly design policies of the MCDP* for streets, parks, schools, and open space, as appropriate in the area of the proposed development, and should relate to existing and proposed adjoining land uses.

B. STREET CONSTRUCTION

(1) General Street Requirements. All new streets not intended to be private in nature and ~~widened~~ reconfigured portions of all existing dedicated public rights-of-way shall be dedicated to public use, subject to final inspection and acceptance by the Town of Middletown. In the case of local, collector or marginal access streets, construction and design of such streets or portions of streets shall be in accordance with the *mobility friendly design policies of the Middletown Comprehensive Development Plan,* ~~the Subdivision Regulations of~~ the ~~State~~ Delaware Department of Transportation, Rules and Regulations for Subdivision Streets; ...

(a) The location and function of proposed streets shall be coordinated with *the mobility friendly policies,* plans, and proposals contained in the Middletown Comprehensive Development Plan, ~~and~~ with the State Department of Transportation Plans and with the Wilmington Area Planning Council Metropolitan Transportation Plan,....

(b) Local streets shall be designed to discourage through traffic~~:~~, but to encourage linkages between neighborhoods, and access to community facilities, shopping, and schools. ~~However, p~~ Provisions for the extension and continuation of arterial streets and collectors into and from adjoining areas with an average one-half mile grid or equivalent route density is required in reasonable conformity to the Middletown Comprehensive Development Plan, ~~and~~ to the ~~Metropolitan Highway Plan~~ Delaware Department of Transportation Long Range Transportation Plan and the Wilmington Area Planning Council

Metropolitan Transportation Plan. Marginal access streets should be provided where necessary, based on proposed uses and loadings. **(See Exhibit 3)**

Local Street patterns should be comprised of short inter-connected streets with direct routes. Loops are preferred to cul-de-sacs. **(See Exhibit 4)**

(c) Streets in commercial and industrial areas should be laid out so as to create to the greatest extent possible a pedestrian circulation pattern and scale while still accommodating truck traffic, especially with regard to ~~curb~~ corner and horizontal curve radii, and intersection design~~, etc.~~

(d) Building setbacks, ~~and~~ orientation, curbcut location, connections to the streets, and internal vehicular circulation patterns should be designed with full consideration for future rights-of-way, future right-of-way widenings, interchanges and intersections in accordance with the general requirements *and mobility friendly policies* of the Middletown Comprehensive Development Plan, ~~and~~ the ~~WILMAPCO Regional~~ Wilmington Area Planning Council Metropolitan Transportation Plan and the Delaware Department of Transportation Long Range Transportation Plan ~~as specified by the State Department of Transportation~~; and pertaining to a route alignment, shall conform to the specific requirements of the State Department of Transportation.

(e) Commercial, industrial, and multi-family parking lots shall be designed with due consideration for proper traffic flow and channelization while minimizing conflicts between pedestrians and vehicles. Pedestrian paths of travel are to be conveniently located and clearly identifiable and shall link buildings with parking, other buildings and other off-site designations as outlined in Section 5C(2)(o).

(See Exhibit 5)

(f) Normally acceleration and deceleration lanes are not required. In rare cases, ~~W~~where necessary, the subdivider shall provide acceleration/deceleration lanes along major roads...As part of any road configuration change, due consideration shall be given

to pedestrian and bicycle mobility. Paths of travel and crossings shall be planned for in a safe and convenient manner.

(g) Subdividers/developers shall make provisions for bicycles along arterials and collectors. Bikeways and bike lanes shall be designed according to the adopted Delaware Department of Transportation Guidelines and Standards and any adopted (state or local) bicycle plan.

(See Exhibit 6)

(2) Private Streets, ~~and~~ Driveways, and Curb Cuts

(f) No more than one curb cut shall be allowed per lot for lots with less than 100' of frontage. A maximum of one curb cut for every 100 feet of street frontage or portion thereof shall be allowed for lots having frontage in excess of 100 feet.

(3) Marginal Access Streets and Service Streets (Alleys)

~~(c) Service streets (alleys) are prohibited in subdivisions of single-family detached residences.~~

~~(d) Private service streets may be permitted in other types of residential subdivisions provided that the subdivider produces evidence of their need satisfactory to the Committee.~~

~~(e)~~(c) Where service streets (alleys) are proposed in residential areas they shall be at least twenty feet wide and paved for a width of at least ~~fifteen~~ twelve feet.... **(See Exhibit 7)**

~~(f)~~ (d) Where required, service stations...

(5) Sidewalks and Pedestrian Ways

(a) Whenever the ~~State~~ Delaware Department of Transportation or the Town of Middletown ~~widens~~ reconfigures, constructs, or reconstructs any major arterial, minor arterial, collector road, or local road ~~or proposed road in an urbanized area,~~ it ~~may~~ shall also construct sidewalks, designed as set forth in the following sections, on both sides of the street~~, provided there is or will be~~

~~a need for such sidewalks, such determination to be made by the State Department of Transportation or the Town after consultation with other appropriate agencies, including the Subdivision Review Committee.~~

(b) Subdividers/developers shall provide sidewalks on ~~the street~~ public streets in subdivisions/developments as follows: ~~In other cases, where not otherwise provided by interior pedestrian ways or similar means, sidewalks shall be provided by the subdivider~~

More than 2 units/acre - sidewalks required on both sides of the street

1 to 2 units/acre - sidewalks required on one side of the street

Less than 1 unit/acre - no sidewalks required

All cul-de-sacs - sidewalks required on both sides of the street

(c) Subdividers/developers shall provide sidewalks or internal pedestrian pathways linking the proposed development with adjacent subdivisions/developments and ~~in the vicinity of schools and~~ other public facilities as identified in Section 5(C)(2)(o) of this ordinance~~, except where residential development results in an average net density of less than one dwelling unit per acre~~. (Formerly part of b.)

(See Exhibit 5)

~~(e)~~(d) Sidewalks ~~when authorized~~ are to be constructed within the right-of-way of the street or in a permanent easement. Sidewalks in residential developments shall be a minimum of six feet wide where a green strip is provided between the curb and the sidewalk and a minimum of 8 feet wide where the sidewalk is paved from the back of the street curb; sidewalks in non-residential areas shall be a minimum of five feet wide where a green strip is provided between the curb and the sidewalk, and a minimum of eight feet wide where the sidewalk is paved from the back of the street curb. Where a green strip is provided between the back of the street curb and the front edge of the sidewalk, it shall be at least ~~three~~ five feet in width. Where residential units front onto collector streets, the minimum width of the green strip shall be ten (10) feet. **(See Exhibit 8)**

~~(d)~~(e) Sidewalks shall be constructed...

~~(e)~~(f) Pedestrian ways shall provide a minimum...

~~(f)~~(g) For blocks greater than 500 feet in length, ~~in exceptionally long blocks (1,500 feet or more in length)~~, or where access to a school or shopping center is necessary, a mid-block crosswalk with a minimum right-of-way of ten feet and a paved walk of five feet in width shall be provided~~, as determined by the Subdivision Review Committee~~.

~~(g)~~(h) Shopping center shall provide...

~~(h)~~(j) Sidewalks ~~when required to be installed in any subdivision or land development~~ shall be shown on the Record Plan by either graphic representation or appropriate notes.

(6) Blocks and Cul-de-sacs

(a) Block length shall be between two hundred (200) and five hundred (500) feet. The length, width, and shape of blocks should be determined with due regard to *the mobility friendly policies* of the Middletown Comprehensive Development Plan, provision of adequate sites for buildings of the type proposed, zoning requirements, topography, attractiveness, and requirements for safe and convenient vehicular and pedestrian circulation~~, including the reduction of intersections with major streets~~.

(c) Cul-de-sacs shall not exceed two-hundred and fifty (250) to five-hundred (500) feet in length depending on density and topography. A less dense development may have longer cul-de-sacs.

(d) Pedestrian connections shall be provided between cul-de-sacs and other cul-de-sacs, collectors, and minor arterials, and between public facilities as identified in Section 5(C)(2)(o) of this ordinance.

(See Exhibit 9)

© (e) Blocks for commercial and industrial areas...

~~(d)~~ (f) Commercial and industrial blocks should...

C. UTILITIES

All electrical, telephone, and communication service facilities...The preferred location for street trees is between the back of the curb and the sidewalk. The subdivider shall coordinate the location of utilities with the location of proposed street trees to eliminate future conflicts between tree roots and utility service or maintenance requirements. If the conflict can not be resolved, the alternative location for street trees will be immediately behind the right-of-way and no closer than three (3) feet from the sidewalk.

(See Exhibit 10)

G. OPEN SPACE, PLANTING, AND LANDSCAPING CONSERVATION

2. The subdivider shall provide dedicated public or required private open space...

(d) Fifty (50)percent of the required open space should be usable, visible and accessible to all residents within the neighborhood. These areas shall be less than ten (10) percent slopes, contain no wetlands or floodplain, and be suitable for active recreation. Appropriate connections shall be made to accommodate pedestrian and bicycle access. Consideration should be given to incorporating this open space into the neighborhood as a focal point such as a public square or neighborhood park.

(See Exhibit 11)

(9) ~~...It is strongly recommended that trees be not less than two inches to two and one half inches in caliper at the time of planting measured one foot above the ground.~~

(10) The preferred location of street trees is between the back of curb and sidewalk. Trees to be planted along streets ~~shall not be planted within the right-of-way line, if such planting will interfere with underground utilities; and~~ shall not obstruct vehicular sight distances at driveways and intersections (see

~~"Subdivision Regulations" State~~ Delaware Department of Transportation, Rules and Regulations for Subdivision Streets). The number of street trees required shall be calculated based upon one (1) tree per forty (40) linear feet of right-of-way frontage for the site. All trees to be planted shall be a minimum of two and one half inch (2 ½") caliper with a height of at least twelve (12) feet and shall be adequately supported until firmly rooted.

Appendix I Landscaping

A. Screening

(2nd paragraph) The intent of the landscape planting screen is to create a continuous visual barrier. For all land uses, access points at property edges and to adjacent lots shall be coordinated with existing development to promote circulation patterns between developments. Landscaping, walls and fences shall be located so as not to preclude site-to-site connections. The spacing...

(See Exhibit 5)

B. Street Tree Planting

All trees to be planted should be adequately supported by guy wires until firmly rooted. The same species should be used in any one block (species in one block should not be mixed); spacing should be based on the characteristics of the species; and species used should be in accordance with the type, scale and intensity of adjacent land uses and the topography of adjacent land. A list of trees suitable for street tree planting follows:

1. Large Trees (over 40 feet)* - space 40' on center average)

~~a.~~	~~Cercidiphyllum japonicum~~	~~Katsura Tree[1,3]~~
~~b.~~	~~Fraxinus americana~~	~~White Ash~~
~~c.~~	~~Ginkgo biloba~~	~~Gingko or Maidenhair Tree[2,4]~~
~~d~~a.	Cleditsia triacanthos "inermis"	Thornless Honey Locust[1,2,4]
~~e.~~	~~Liquidambar styraciflua~~	~~Sweet Gum[†]~~
~~f~~b.	Platanus acerifolia (Liberty or Columbia varieties)	London Plane Tree[1,2,4]
c.	Celtis occidentalis	Common Hackberry
d.	Quercus phellos	Willow Oak
e.	Quercus rubra	Northern Red Oak
f.	Quercus shumardii	Shumard Oak

g.	Quercus palustris	Pin Oak
h.	Quercus coccinia	Scarlet Oak
I.	Tilia cordata	Littleleaf Linden
j.	Zelkova serrata	Japanese Zelkova
k.	Acer rubrum 'Red Sunset'	Red Maple
l.	Acer saccharum 'Green Mountain'	Sugar Maple

Note: Maples to be planted in 8' wide green strip minimum or behind the sidewalk.

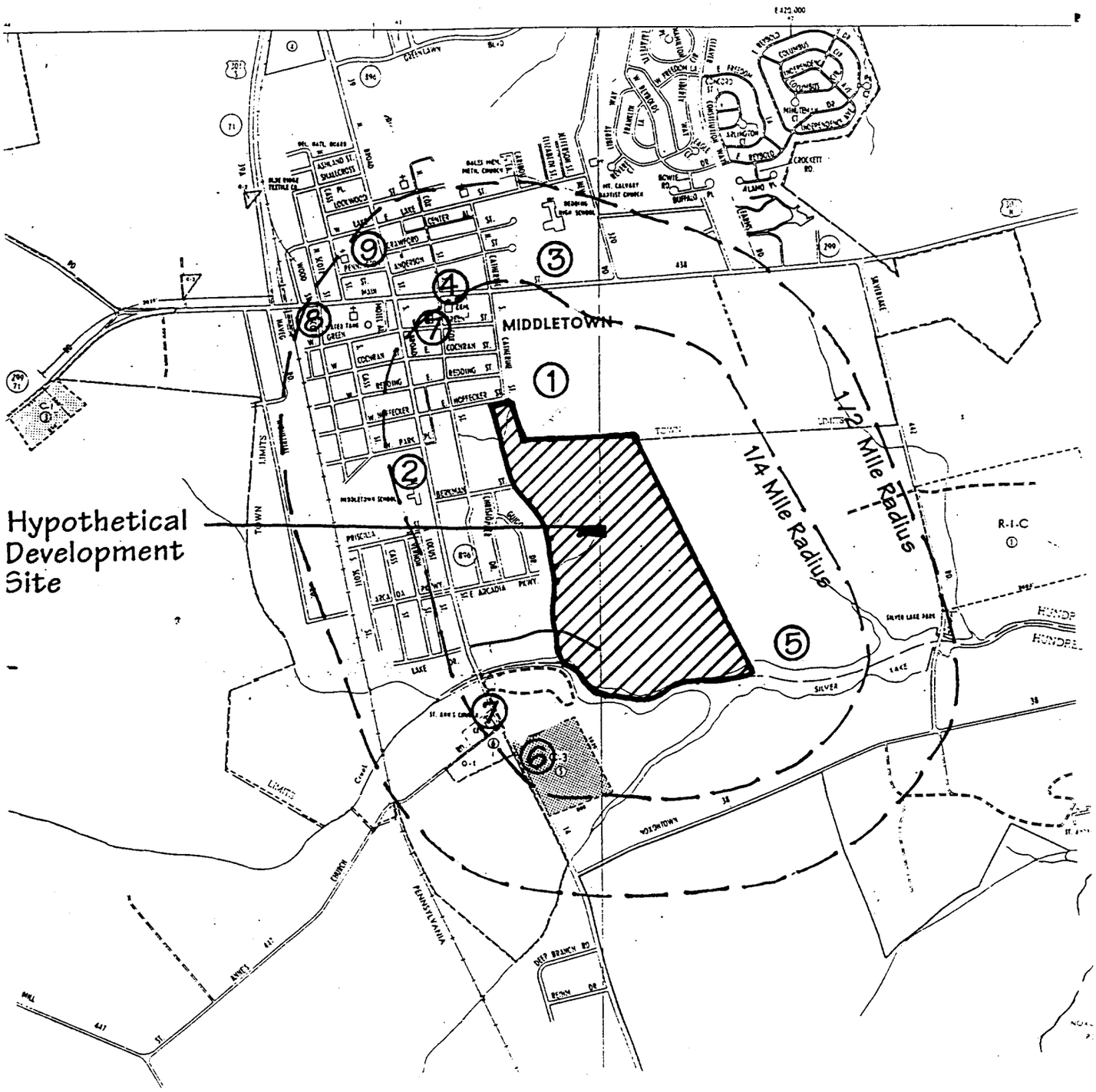
2. Medium-sized Trees (30 to 40 feet)* - space 30' on center average)

~~a.~~	~~Aesculus carnea brioti~~	~~Ruby Red Horse Chestnut~~
~~b.~~	~~Alnus glutinosa~~	~~European Alder~~
~~c.~~	~~Alnus incana~~	~~Speckled Alder~~
~~d.~~	~~Alnus rubra~~	~~Red Alder~~
~~e.~~	~~Carpinus japonica~~	~~Japanese Hornbeam~~
~~f.~~	~~Grataegus Crus-galli~~	~~Cockspur Thorn~~
~~g.~~	~~Prunus subhirtella~~	~~Higan Cherry~~
~~h.~~	~~Pyrus Calleryana~~	~~Callery Pear~~
~~I.~~	~~Quercus borealis~~	~~Red Oak~~
~~j.~~	~~Quercus coccinia~~	~~Scarlet Oak~~
~~k.~~	~~Quercus palustris~~	~~Pin Oak~~
~~l.~~	~~Quercus phellos~~	~~Willow Oak~~[1,3]

a.	Acer campestre	Hedge Maple
b.	Carpinus betulus	European Hornbeam
c.	Carpinus carolinian	American Hornbeam
d.	Crataegus crusgalli inermis	Thornless Cockspur Hawthorn
e.	Koelreuteria paniculata	Goldenrain Tree
f.	Prunus serrulata "Kwanzan"	Kwanzen Cherry
g.	Prunus sargenti	Sargent Cherry
h.	Pyrus calleryana "Aristacrat"	Aristocrat Pear
I.	Pyrus calleryana "Redspire"	Redspire Pear
j.	Sophora japonica	Scholar Tree
k.	Syringa reticulata	Japanese Tree Lilac

1. *Trees that tolerate poor drainage*
2. *Trees that withstand droughts*
3. *Trees that perform best in acid soils*
4. *Trees for extreme city conditions*

Appendix G: Supporting Graphics to Middletown Ordinances

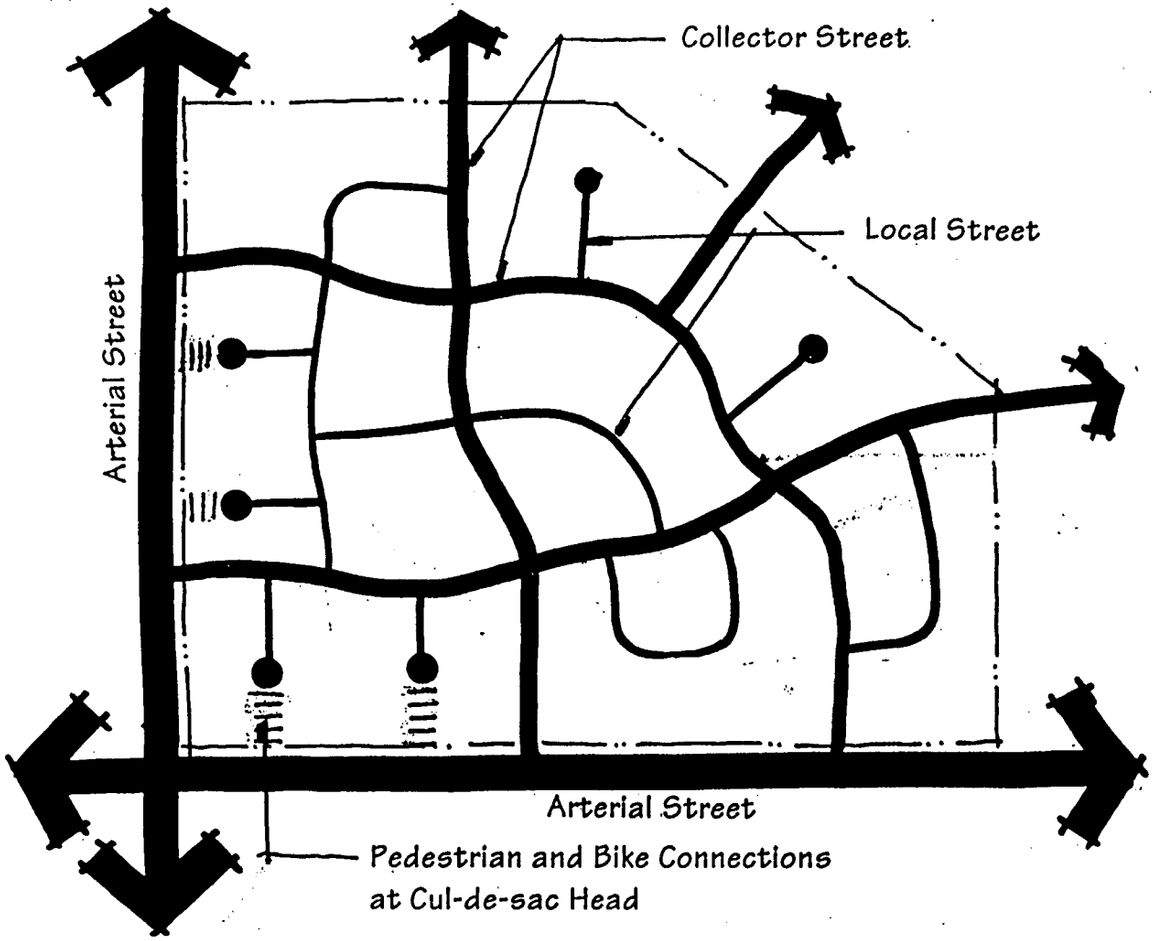


1. Silver Lake Elementary School and Park
2. Middletown High School
3. Redding Middle School
4. Main Street Commercial District
5. Proposed Park
6. Future Neighborhood Commercial
7. Churches
8. Post Office
9. Library/Town Hall

Identify Local Trip Generators

Scale: 1"=1600

Exhibit 1



Typical "Node": Intersection or Cul-de-sac head

Typical "Link": Road segment Between intersection And Cul-de-sac heads

A simple measure of connectivity is the number of street links divided by the number of nodes(intersections) or link ends (including cul-de-sac heads). The more links relative to nodes, the more connectivity.

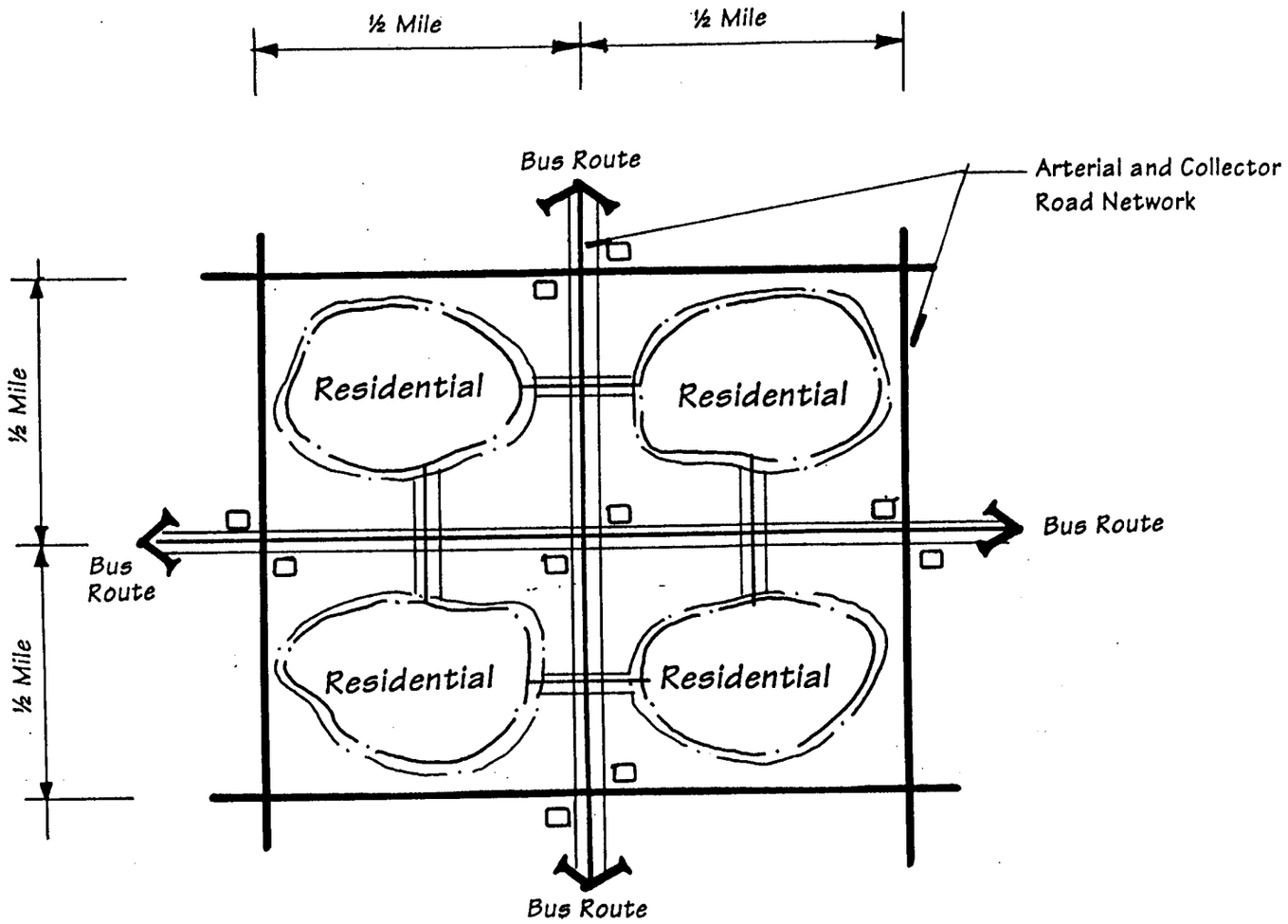
$\frac{\text{Links}}{\text{Nodes}} = 1.4 +$ Desired Ratio

$\frac{38}{27} = 1.4\pm$

Note: Only count one half of the nodes that connect to the existing network

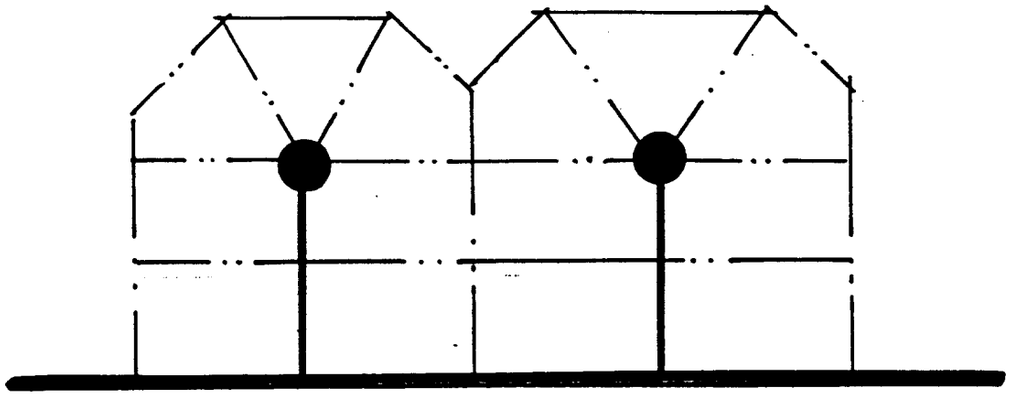
Alternative Desired Development Pattern

Exhibit 2

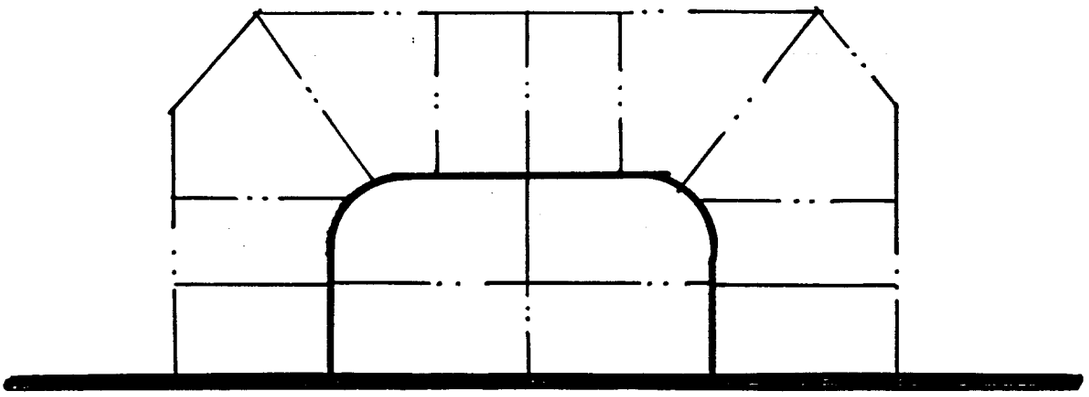


From: Suburban Mobility Design Manual

Exhibit 3



Cul-de-sac

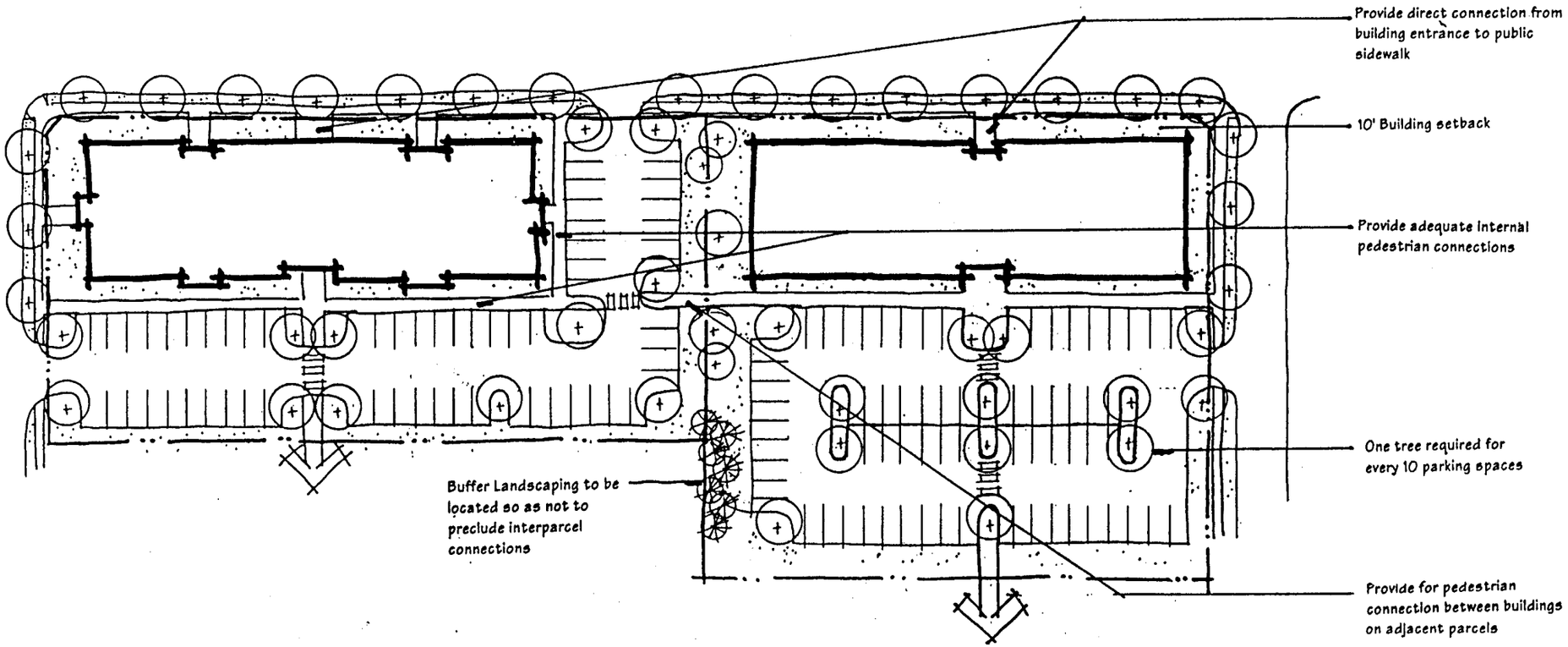


Loop

Loops Preferred to Cul-de-sacs

N.T.S.

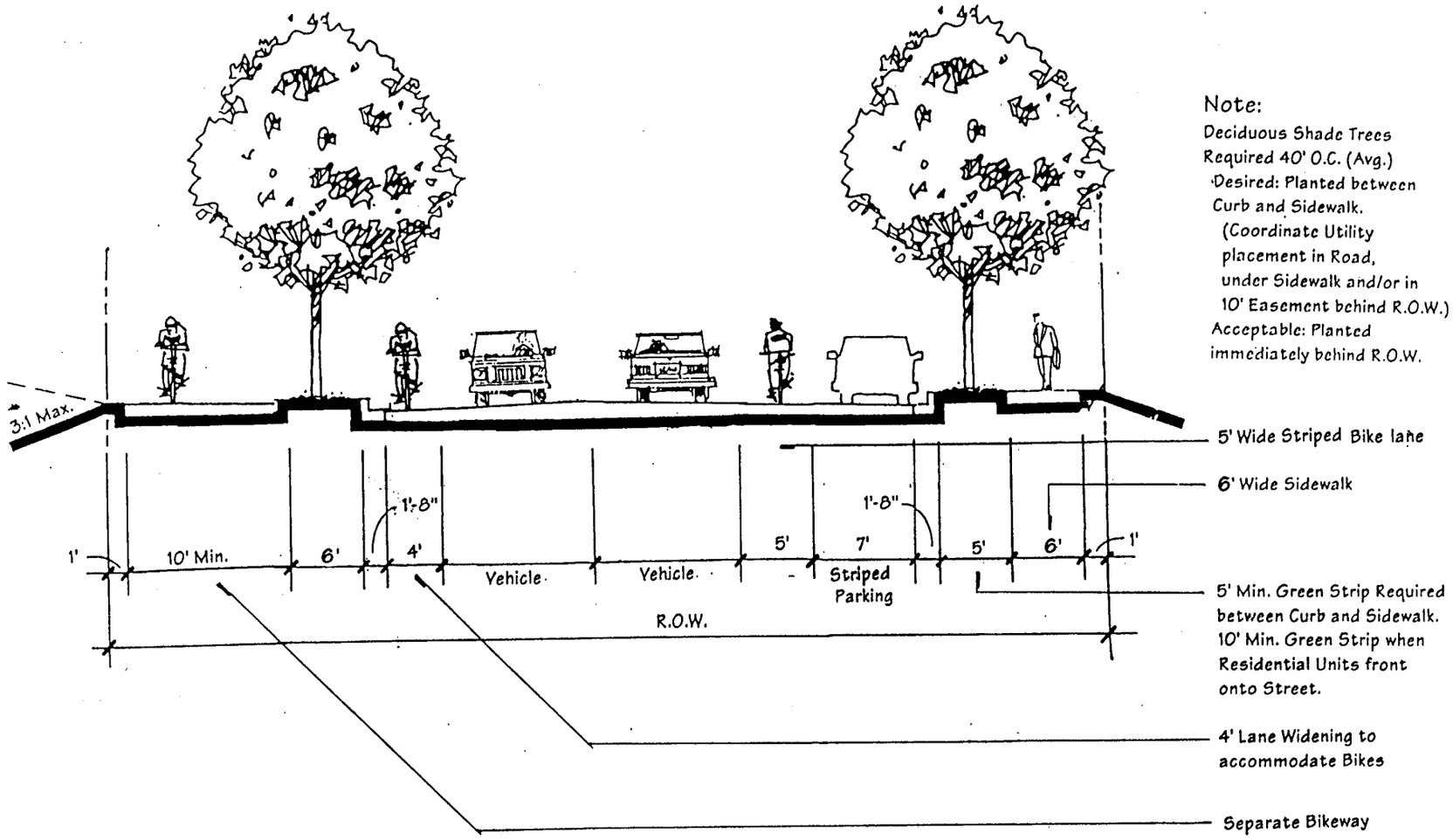
Exhibit 4



Provide Pedestrian Connections between Parcels

Scale: 1'=50'

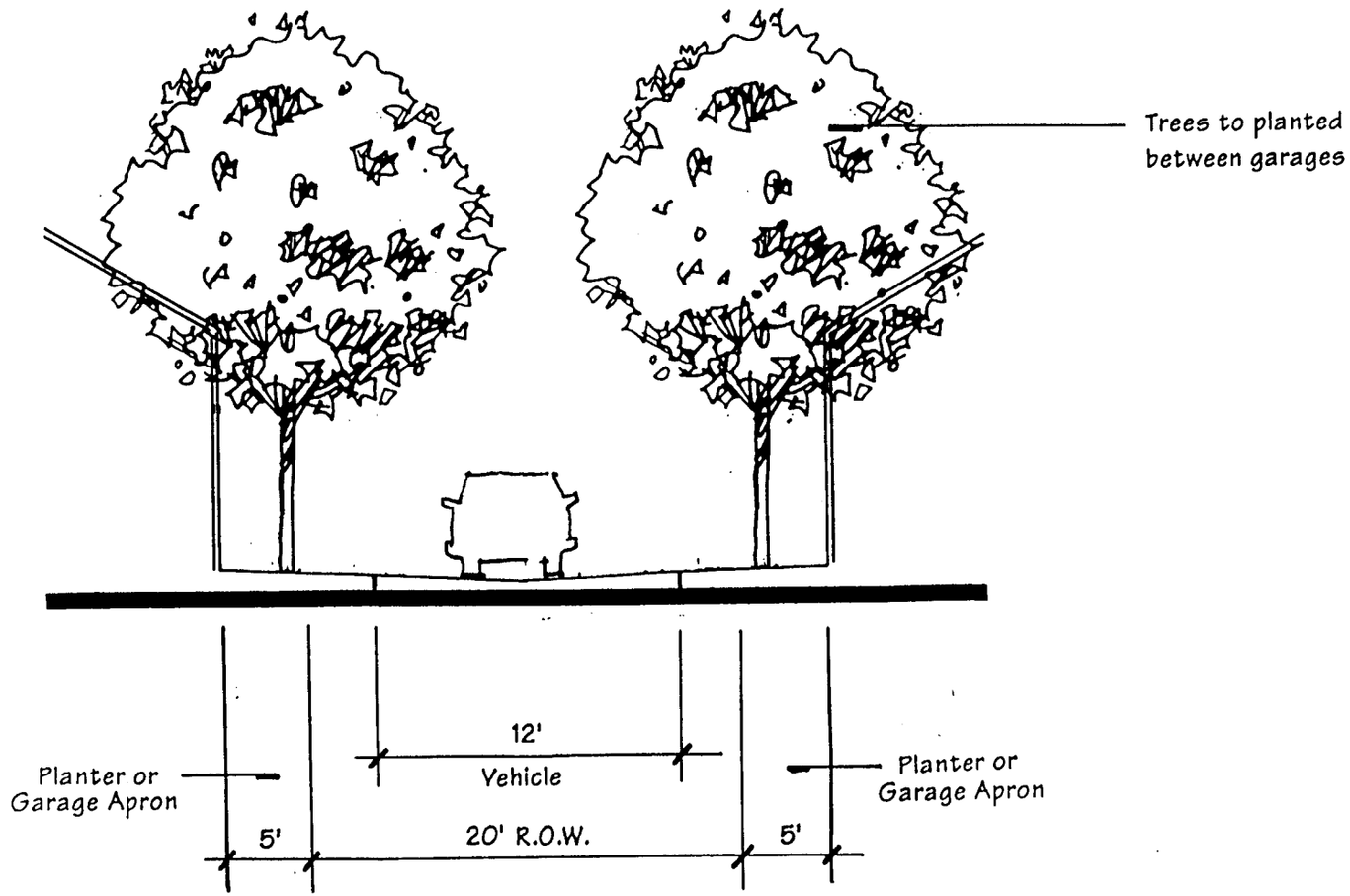
Exhibit 5



Bicycle Provision Alternatives on Collector and Arterial Streets

Scale: 1/8"=1'

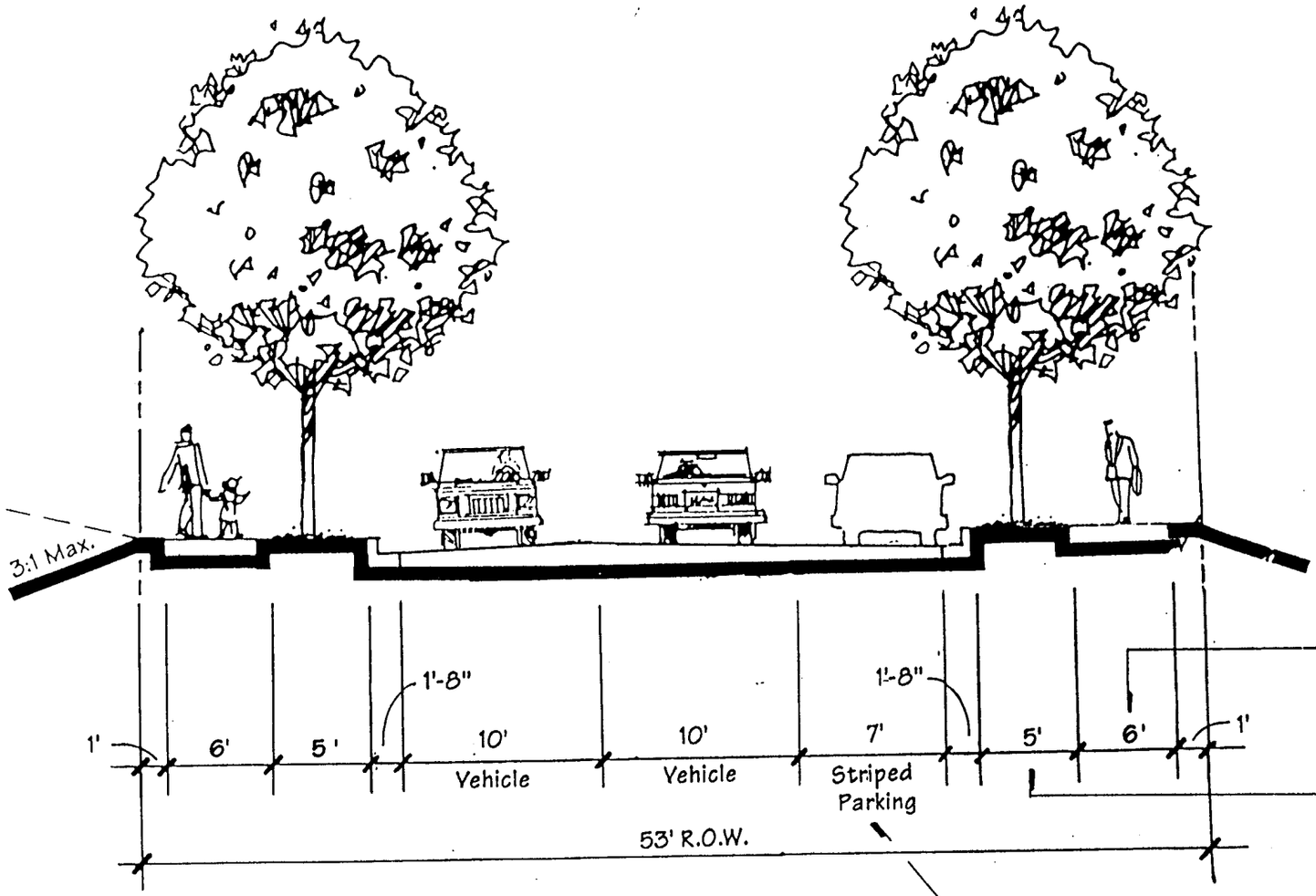
Exhibit 6



Typical Alley

Scale: 1/8"=1'-0"

Exhibit 7



Note:
Deciduous Shade Trees
Required 40' O.C. (Avg.)
Desired: Planted between
Curb and Sidewalk.
(Coordinate Utility
placement in Road,
under Sidewalk and/or in
10' Easement behind R.O.W.)
Acceptable: Planted
immediately behind R.O.W.

6' Wide Sidewalk Required
on both sides of Road.

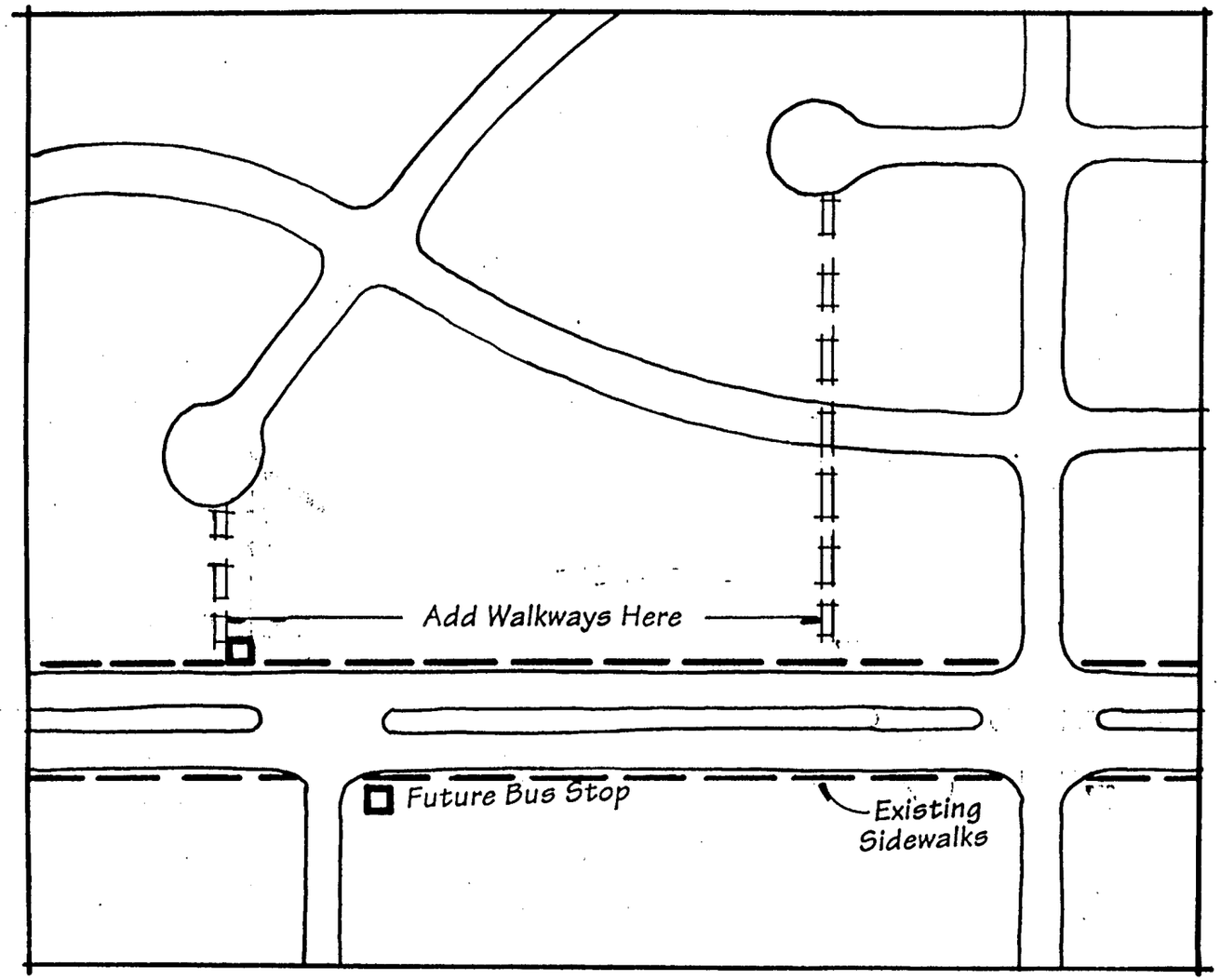
5' Min. Green Strip Required
between Curb and Sidewalk.
10' Min. Green Strip when
Residential Units front
onto Collector Street

Striped Parking on one
or both sides of Street

Proposed Collector Street

Scale: 1/8"=1'-0"

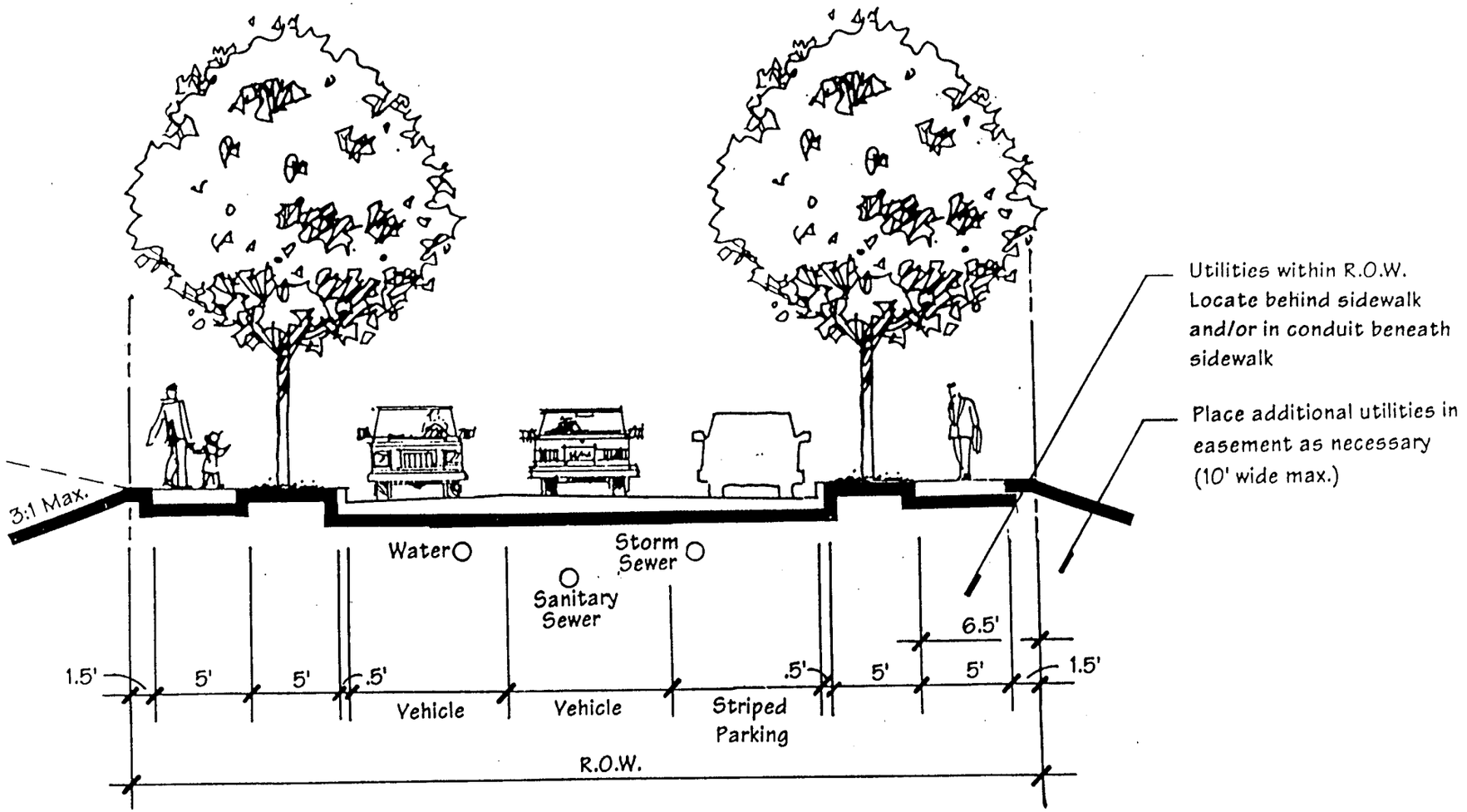
Exhibit 8



Through Movements for Pedestrians and Bicycles at Cul-de-sacs

Scale: 1'= 10'

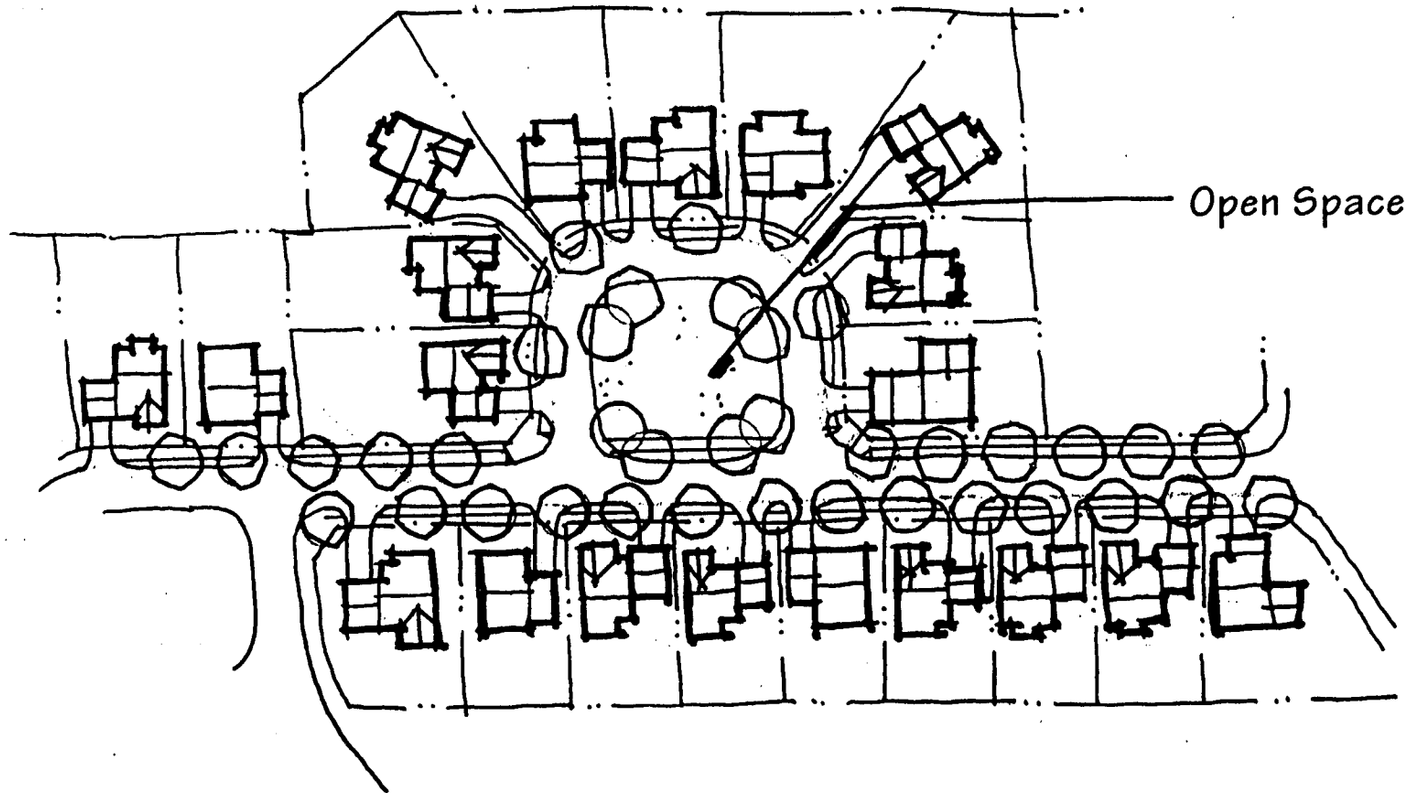
Exhibit 9



Minor Collector/ Subcollector

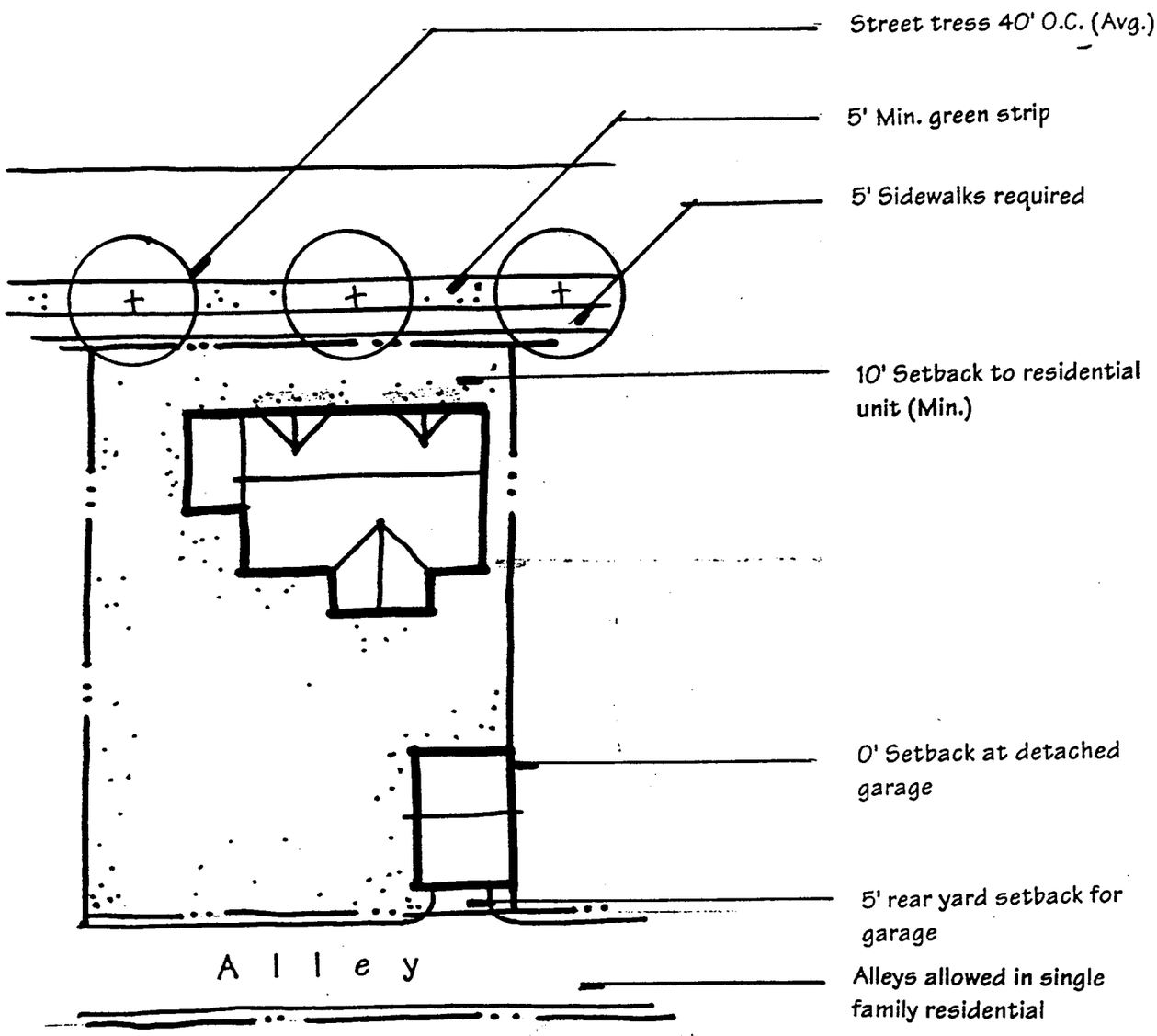
Scale: 1/8"=1'-0"

Exhibit 10



Usable Open Space Serves as Neighborhood Focal Point

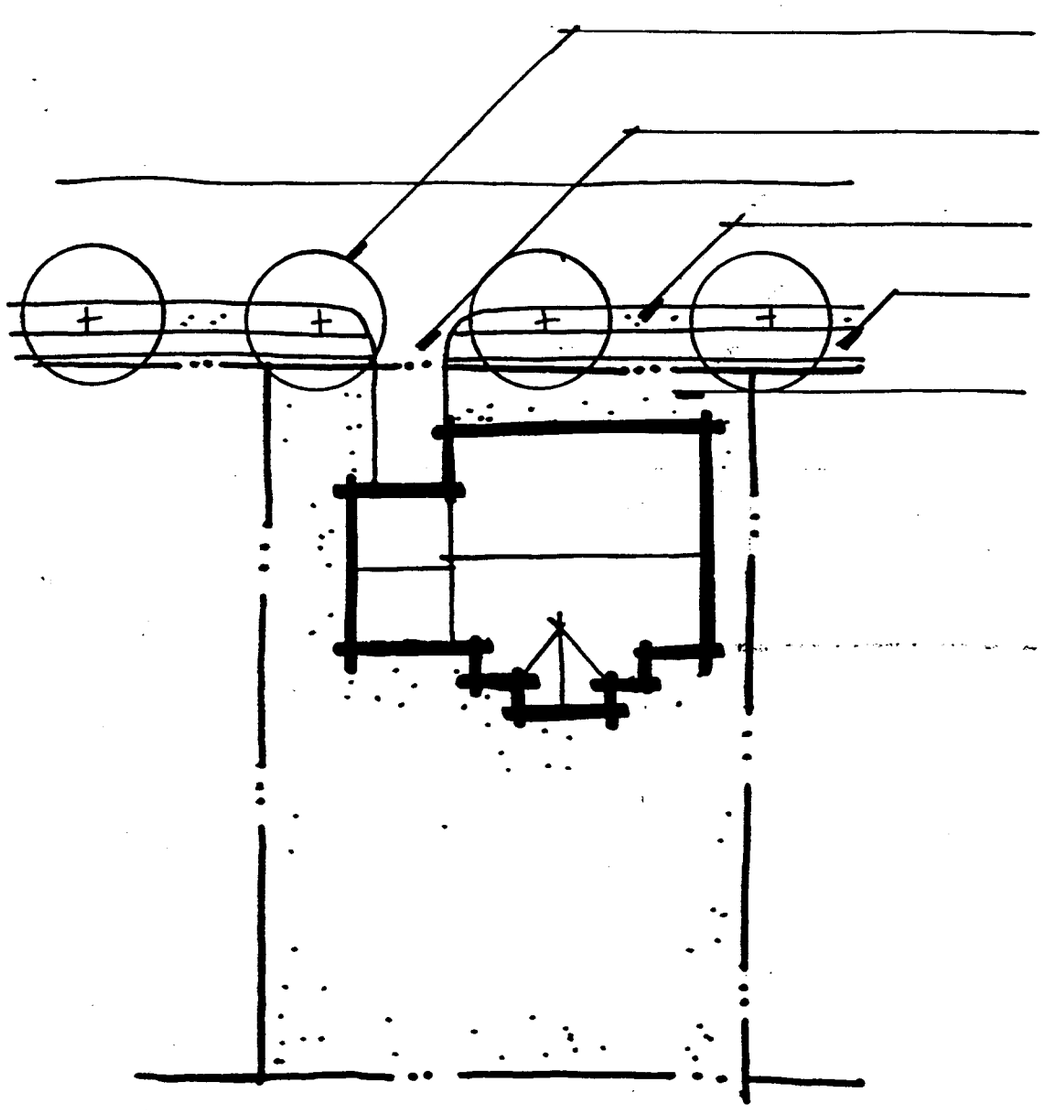
Exhibit 11



Proposed Residential Setbacks\ Permitted Alley Access and Streetscape Improvements

Scale: 1'=50'

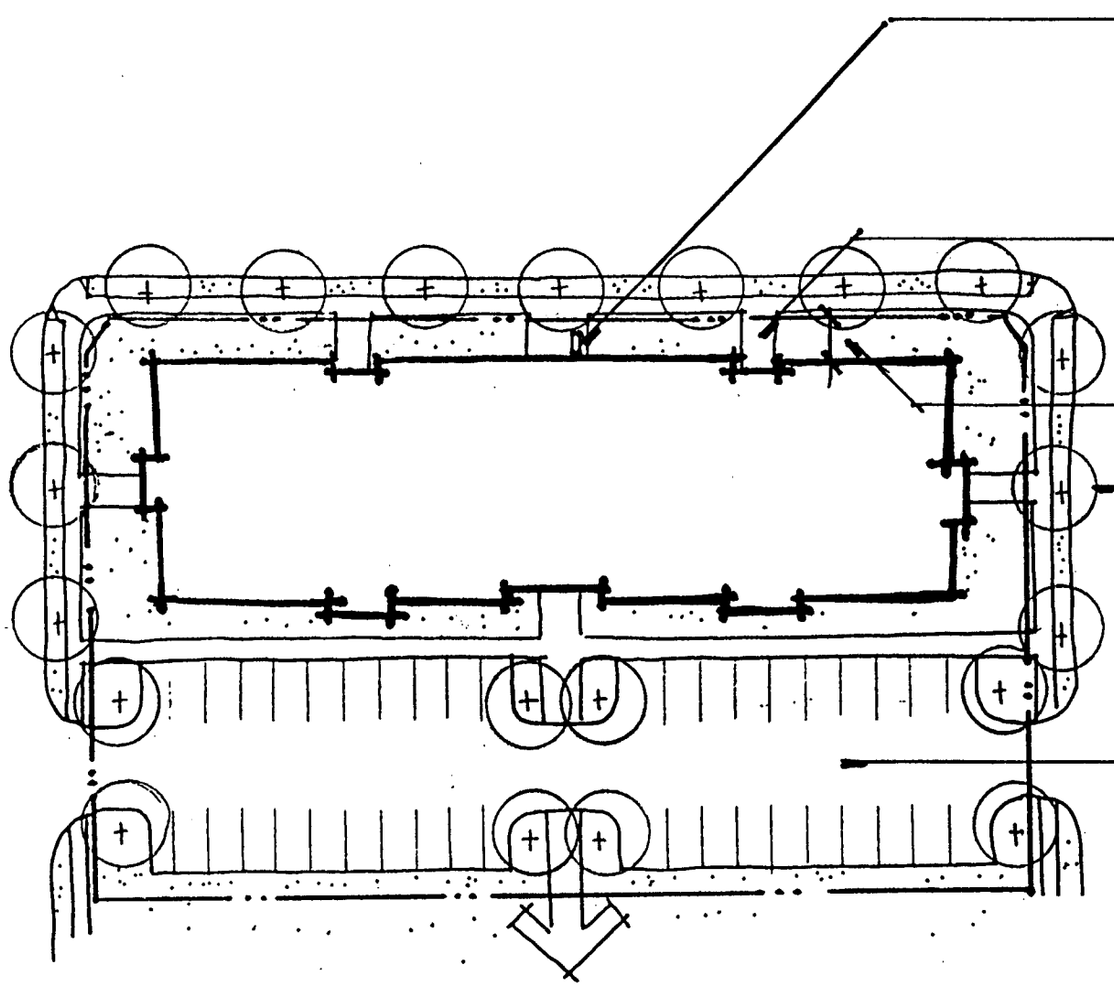
Exhibit 12



Proposed Residential Setbacks and Streetscape Improvements

Scale: 1'=50'

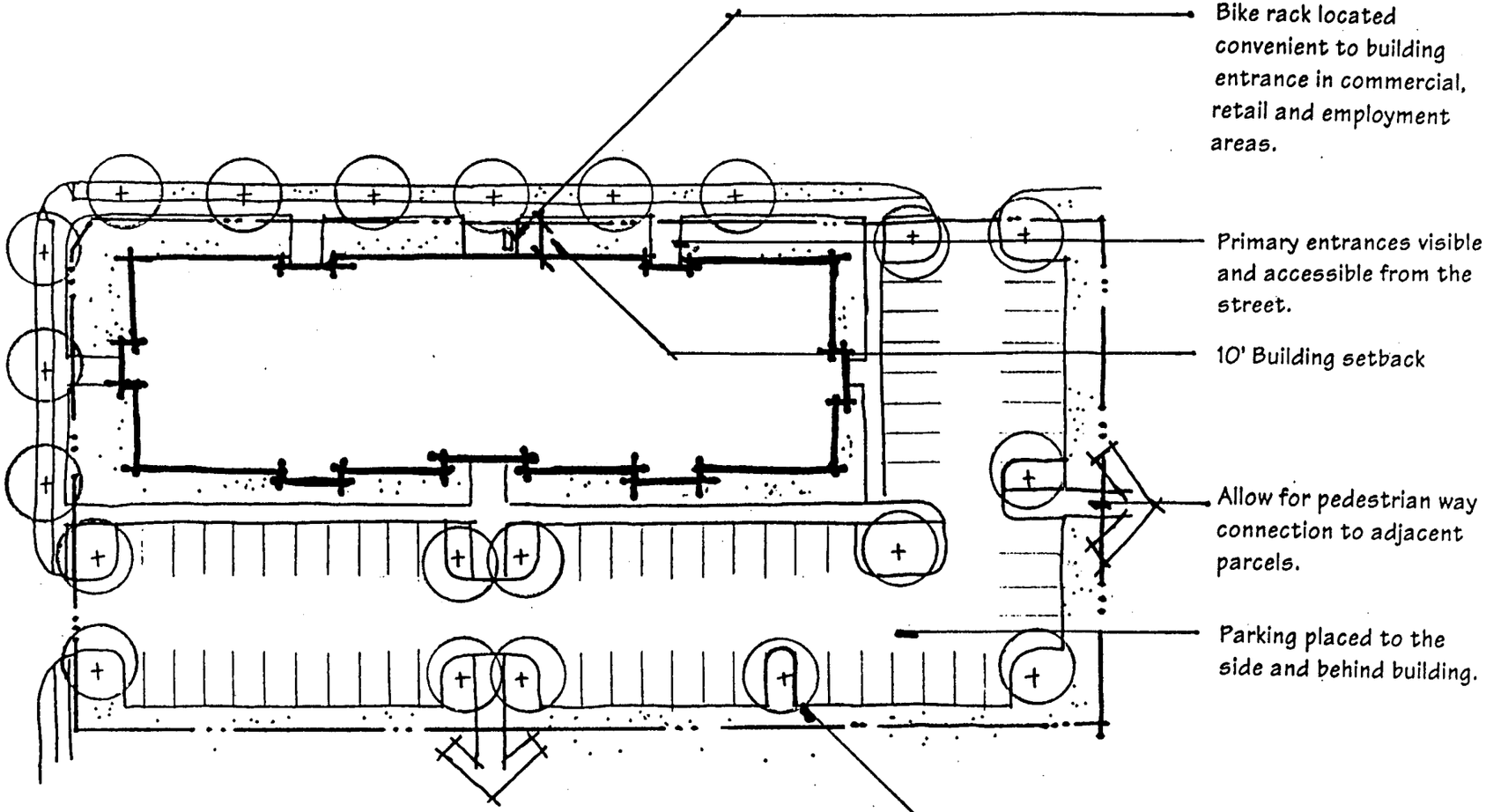
Exhibit 13



Preferred Building and Parking Layout

Scale: 1'=50'

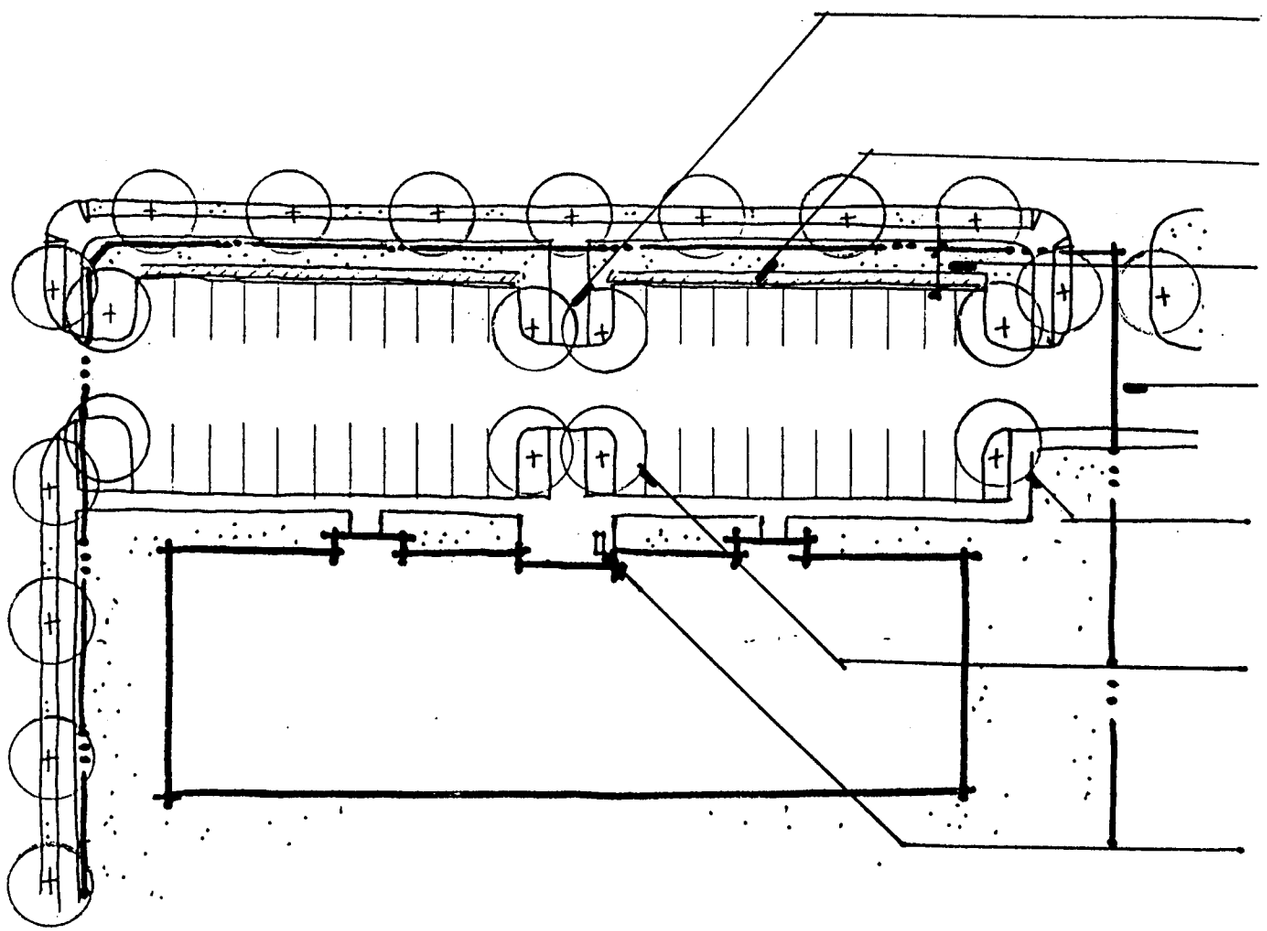
Exhibit 14



Preferred Building and Parking Layout

Scale: 1'=50'

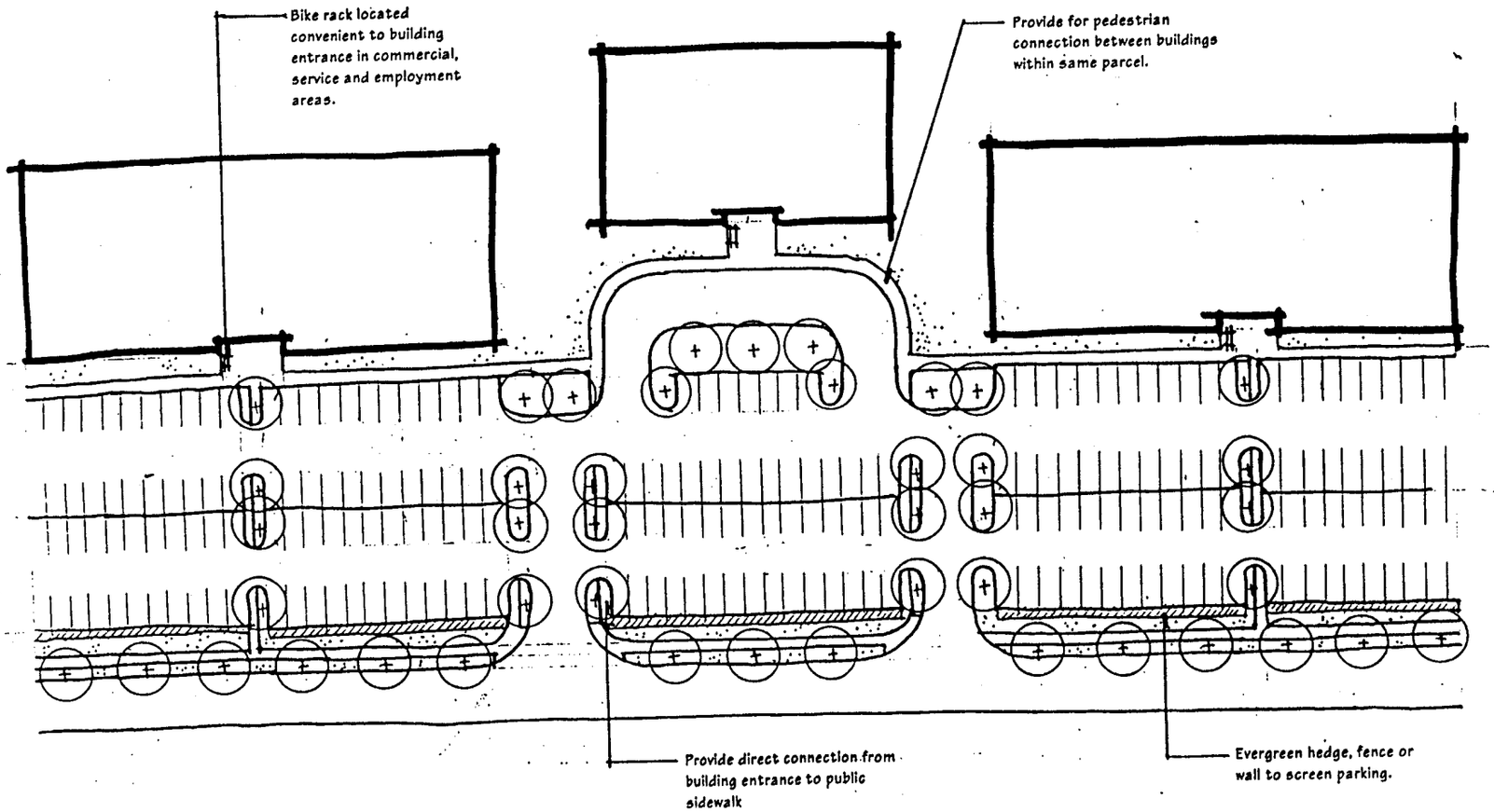
Exhibit 15



Acceptable Building and Parking Layout

Scale: 1"=50'

Exhibit 16

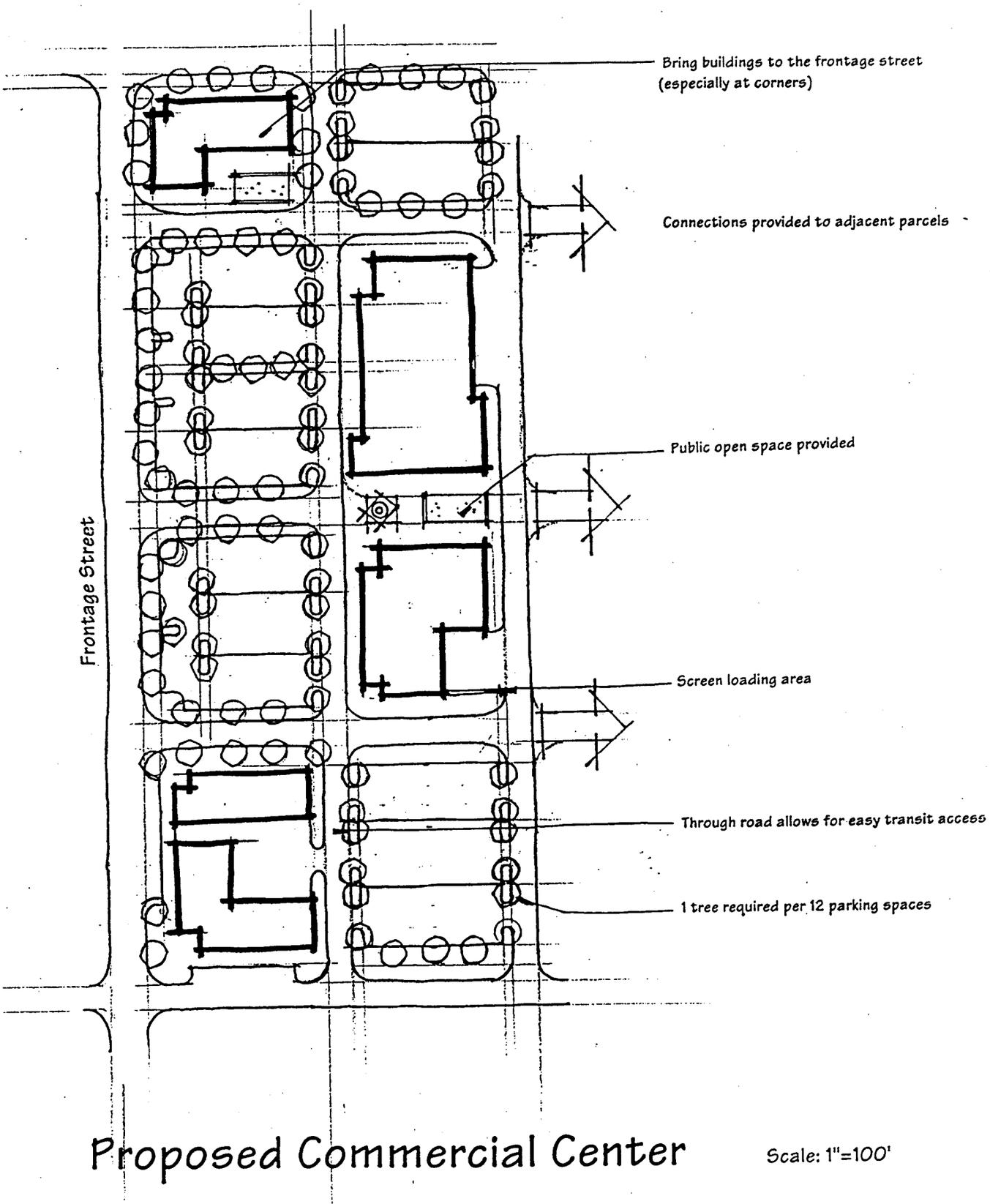


Provide Pedestrian Connections within Parcels

Scale: 1'=50'

EXHIBIT 14

Exhibit 17



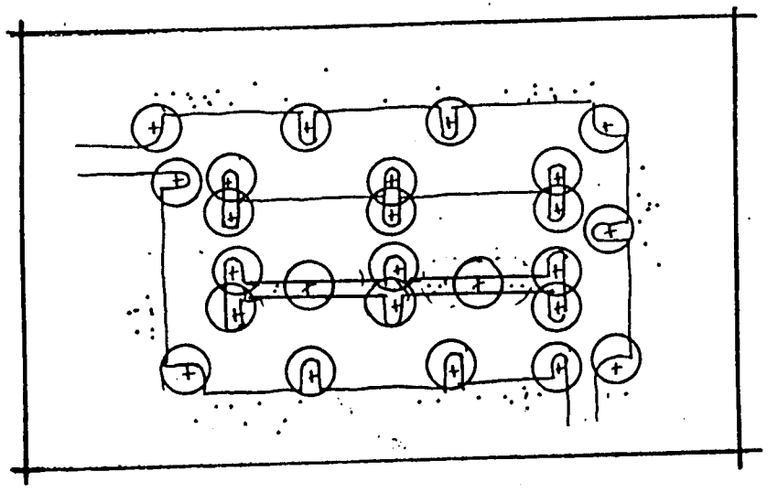
Proposed Commercial Center

Scale: 1"=100'

Exhibit 18

Internal Parking Lot Landscaping

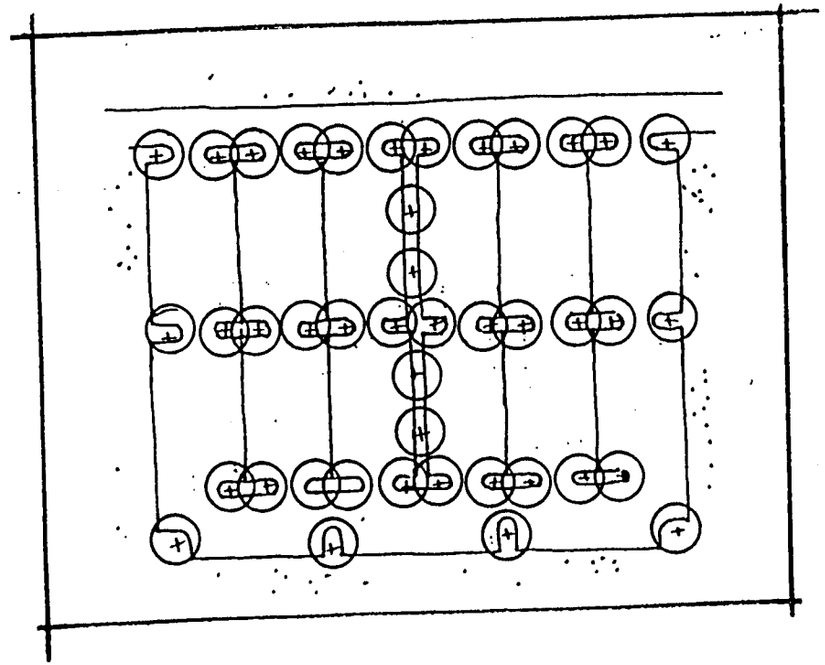
(Landscape islands and/or peninsulas are required to break up rows of parking spaces as follows:)



Example 1

If the total number of parking spaces is less than 100 the minimum requirement is:

- Islands at both ends of each row of parking(9' wide min.)
- One island or peninsula (min. 9'X18') for every 10 contiguous spaces (avg.).
- No more than 2 contiguous bays (60' width) without a 9' wide island separating the 2 bays from additional parking bays or drive aisles.
- Minimum of 2 ½" caliper shade tree shall be provided per 200 square feet of interior green space.



Example 2

If the total number of parking spaces is 100 or greater the minimum requirement is:

- Islands at both ends of each row of parking(9' wide min.)
- One island or peninsula (min. 9'X18') for every 12 contiguous spaces (avg.).
- No more than 3 contiguous bays. (60' width) without a 9' wide island separating the 3 bays from additional parking bays or drive aisles.
- Minimum of 2 ½" caliper shade tree shall be provided per 200 square feet of interior green space.

Exhibit 19

Appendix H: DelDOT Road Standards - Text

DelDOT Regulations

Key: ~~Strike through~~ = delete struck through text
underline = new text inserted
italics = existing or recommended policy or regulations

Section 2. Right-of-Way

Right-of-Way Plan

...The widths of the right-of-way shall be in accordance with the following table:

Alleys	20 feet
Minor Street - (less than 50 homes)	44 feet (w/o parking lane) ~~50~~ 51 feet (w/parking lane)
Minor Collector - (50 - 300 homes)	53 feet (w/o parking lane)* 60 feet (w/parking lane)
Major Collector - (over 300 homes)	60 feet

*If lots front minor collector, a 10' planting strip is required on each side, thus increasing the right-of-way 10'. Larger right-of-way allowed if a boulevard type median is provided.

Dedication of Right-of-Way Adjacent to a State Highway

The subdivision of property adjacent to a State Highway is subject to a dedication of right-of-way sufficient to provide a total highway right-of-way in accordance with the following minimum standards:

Department of Transportation Functional Classification Map	Minimum Dedicated Right of Way
Major ~~or Minor~~ Collector	*40 foot right-of-way from centerline
Minor Collector	*30 foot right-of-way from centerline
Local Road or Minor Street	**~~30~~ 22 foot right-of-way from centerline
Alleys	10 foot right-of-way from centerline

This width provides for future highway improvements to accommodate the forecast traffic based on the adopted land use plan. Figures II-1, II-1A, and II-2 show typical selections for various Route Types.

Residential Access Policy

3. Access for Strip Development

The DelDOT Permit for Entrance Construction will require the following:

b) The construction of roadway and drainage improvements approved by DelDOT. It is intended that this work will be shown on a construction plan showing details of driveway construction and roadway improvements necessary to upgrade the abutting road to meet the requirements of the Typical Section for Local Roads and Minor Streets shown in Figure ~~II-1~~ II-1A.

Policy on Reduced Right-of-Way

(11) Any subdivision greater than 50 dwelling units must be designed in a manner to provide a collector street system. Collector streets will be designed in accordance with the following:

(a) A collector street serving a community of 50 or more dwelling units shall have a minimum right-of-way width of fifty-three (53) or sixty (60) feet and a street width of twenty-nine (29) or thirty-six (36) feet ~~back~~ face to ~~back~~ face of curb.

Figure II-3

Local Road or Minor Street

~~4~~ 19 RESIDENTIAL ENTRANCES AT ~~200'~~ 50' MIN. *

*More narrow lots call for alley access or shared driveways.

Figure II-4

NOTES

1. Where driveway serves two adjacent residences (common driveway access) with lot widths of 30' or more, the driveway width at the right of way line may be increased to ~~20~~ 18 feet. Decrease the driveway width to 12' when lot widths are less than 30'.

Section 4. Typical Sections

Curbs

~~Two types of curing are permitted on subdivision streets; details are shown in Figure IV-3 "Alternate Subdivision Curbing"~~. The Integral P.C.C. Curb & Gutter Type 3 ~~curbing~~ (see Figure IV.-3) shall be utilized on minor streets and minor collector streets whenever sidewalk is provided or on streets having grades of 8% or greater. ADA entrances must be provided.

Curbing must always be provided on minor collector streets and cul-de-sacs. Curbing ~~in residential subdivisions~~ on minor streets may be omitted when ~~all of the following minimum conditions exist~~ lot sizes are greater than one acre:

~~1. Average lot size of ½ acre.~~
~~2. Average lot frontage (excluding cul-de-sacs) of 100 feet.~~
~~3. Average grades of streets are less than 6%.~~
~~4. Building set back of 60 feet.~~

~~An exception will be made to the above curbing policy when the existing soils are suitable for vertical drainage or the slope of the natural topography in the general area of the subdivision is less than 0.5%.~~

Sidewalks

Minor Streets - Sidewalks are required based on the following criteria:

Two lots or more/acre	- sidewalks on both sides
One - two lots/acre	- sidewalks on one side
Less than one lot/acre	- no sidewalks

Minor Collector Streets and Cul-de-sacs - Sidewalks are required on both sides

Widths

With planting buffer strip	- 5' minimum
Without planting buffer strip	- 8' minimum

Planting Buffer/Utility Strip

A 5' minimum width planting buffer is required between the back of curb and the sidewalk except as follows:

Minor Streets - The planting buffer may be eliminated with provision for an 8' minimum sidewalk extending from the back of curb.

Minor Collector Streets - Minimum width required increases to 10' if residential lots front minor collector streets.

Alley Width

12' paved alleys are recommended. Utility placement is encouraged along alleys.

Tree/Obstacle Requirements

Minor Streets - Place on tree (minimum 2.5" - 3" caliper for every forty (40) linear feet of right-of-way frontage, 2.5' from back of curb to tree centerline.

Minor Collector Streets - Place one tree (minimum 2.5" - 3" caliper for every forty (40) linear feet of right-of-way frontage, 2.5' from back of curb to tree centerline. If residential lots front minor collector streets (10' planting buffer), increase tree centerline offset to 5' from back of curb.

Section 6. Geometrics

General

The design of subdivision streets is to be in accordance...Where conflicts exist, these Rules and Regulations are to take~~n~~ precedence.

Design Criteria

Type of Subdivision Street	Design Speed	** Sight Distance	*** Maximum Grades	Minimum Horizontal Radii
Minor Streets	~~25~~ 20 mph*	150 feet	10%	~~150'~~ 90'****
Minor Collector Streets	~~30~~ 25 mph*	200 feet	8%	~~300'~~ 150'
Major Collector Streets	35 mph	225 feet	7%	500'
Industrial Park Streets	35 mph	225 feet	7%	500'

* Design speed is equivalent to the desired operating speed.

** Sufficient right-of-way dedicated to the public use shall be provided to contain the required line of site.

*** Maximum street grades can be waived on an individual basis depending on engineering judgement with respect to the severity of the topography. Minimum streets grades should be 0.5%.

**** 90' when curve is unsigned; 45' when curve is signed.

Intersection Design

1. Radii at edge of pavement: ~~- 25 feet minimum~~.

   10' (minor street - minor street)
   15' (minor street - minor collector with parking lanes)
   20' (minor collector - minor collector with parking lanes)
   40' (minor street - minor collector without parking lanes)
   40' (minor collector - minor collector without parking lanes)
   25' minimum all other intersections

3. 90 degree intersections are preferred. Roundabouts are acceptable. Intersections angles less than 60 degrees are not permitted.

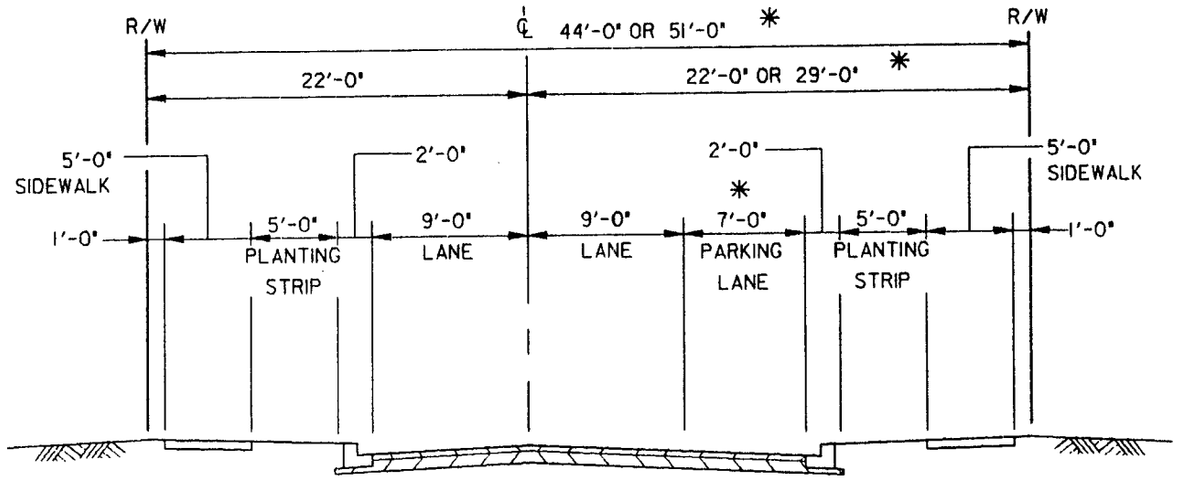
Section 10. Dead End Streets

Permanent

Cul-de-sacs must be incorporated in the design of all permanent dead end streets except those eligible to be constructed according to our Reduced Right-of-Way Policy (See Section 2). The minimum paving and right-of-way radii for cul-de-sacs are thirty-eight feet and fifty feet respectively. Cut-throughs are recommended at cul-de-sac heads for pedestrian/bicycle access. Base material...

The recommended ~~maximum~~ length for permanent dead end streets range from ~~five hundred to one thousand feet,~~ a preferred two-hundred fifty (250) to a maximum five hundred (500) feet, depending on the density of the development....

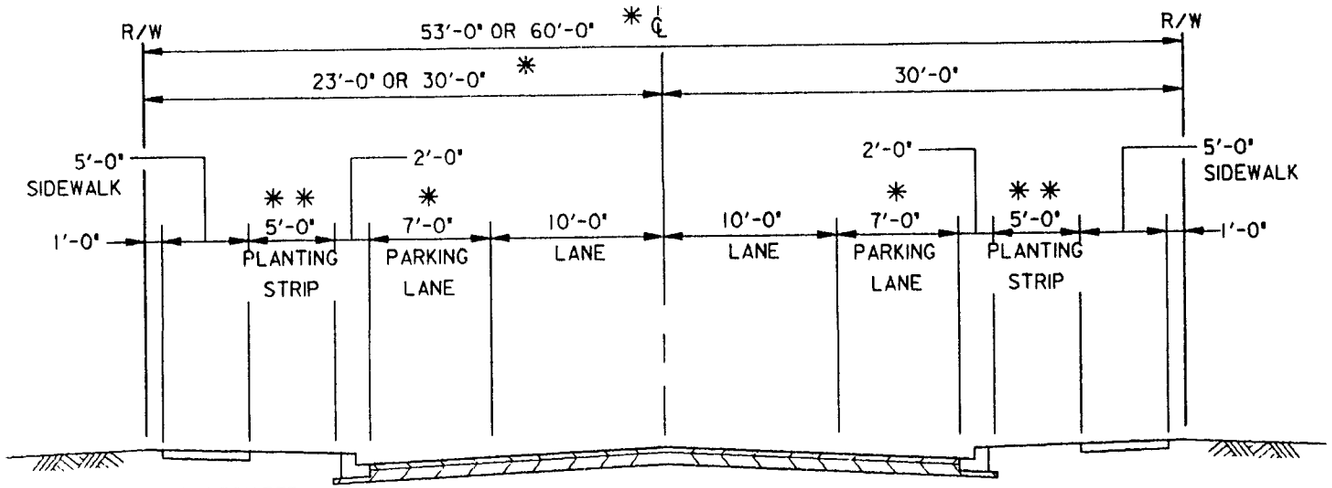
D:\2PROJECT\22106.00\REGS\NEWDDOT.WPD



* PARKING LANE OPTIONAL.

TYPICAL SECTION
MINOR STREET

SCALE 1"=10'-0" ±



* ONE PARKING LANE IS REQUIRED, THE SECOND IS OPTIONAL.

* * PLANTING STRIP INCREASES FROM 5' TO 10' ON BOTH SIDES IF LOTS FRONT MINOR COLLECTOR. R/W INCREASES BY 10'.

TYPICAL SECTION
MINOR COLLECTOR STREET

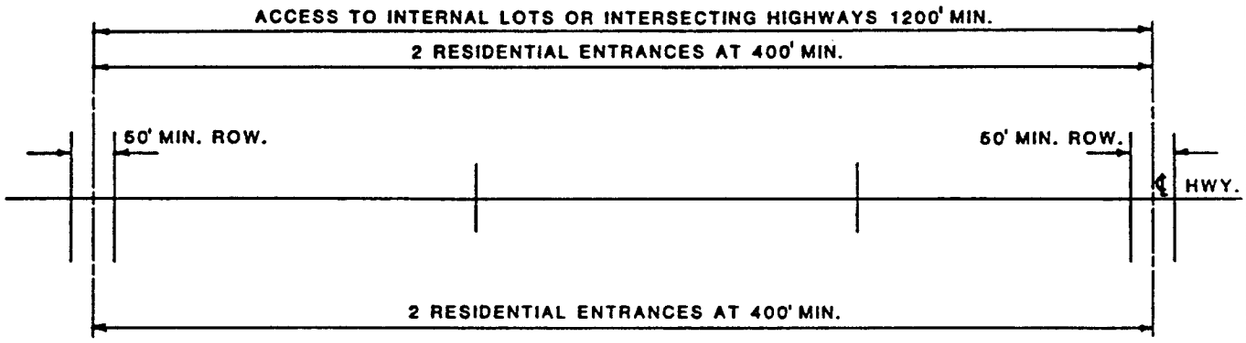
SCALE 1"=10'-0" ±

FIGURE 11-1A

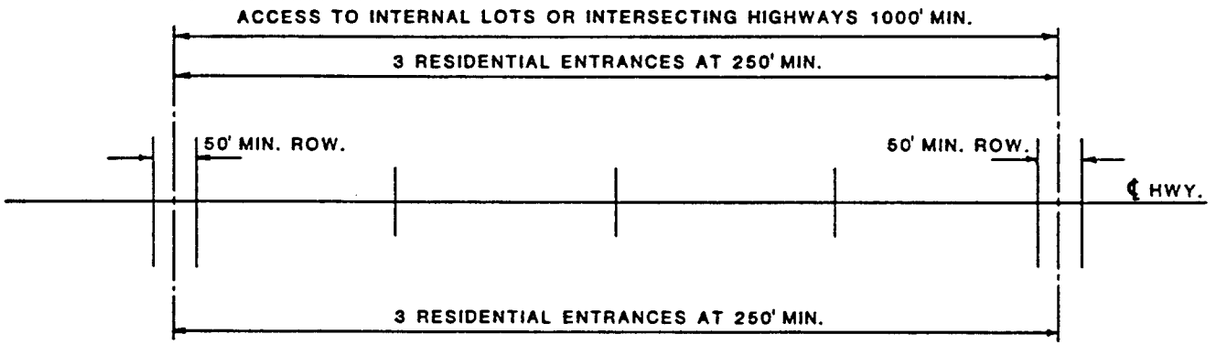
FIGURE II-3

SPACING OF RESIDENTIAL ACCESS POINTS

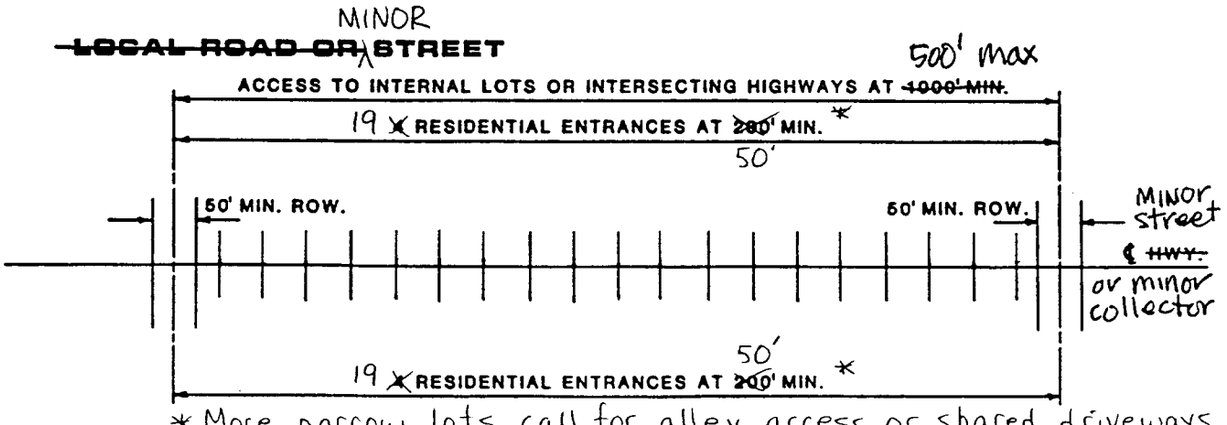
FREEWAY OR EXPRESSWAY
PRINCIPAL ARTERIAL



MINOR ARTERIAL
MAJOR OR MINOR COLLECTOR



~~LOCAL ROAD OR~~ MINOR STREET

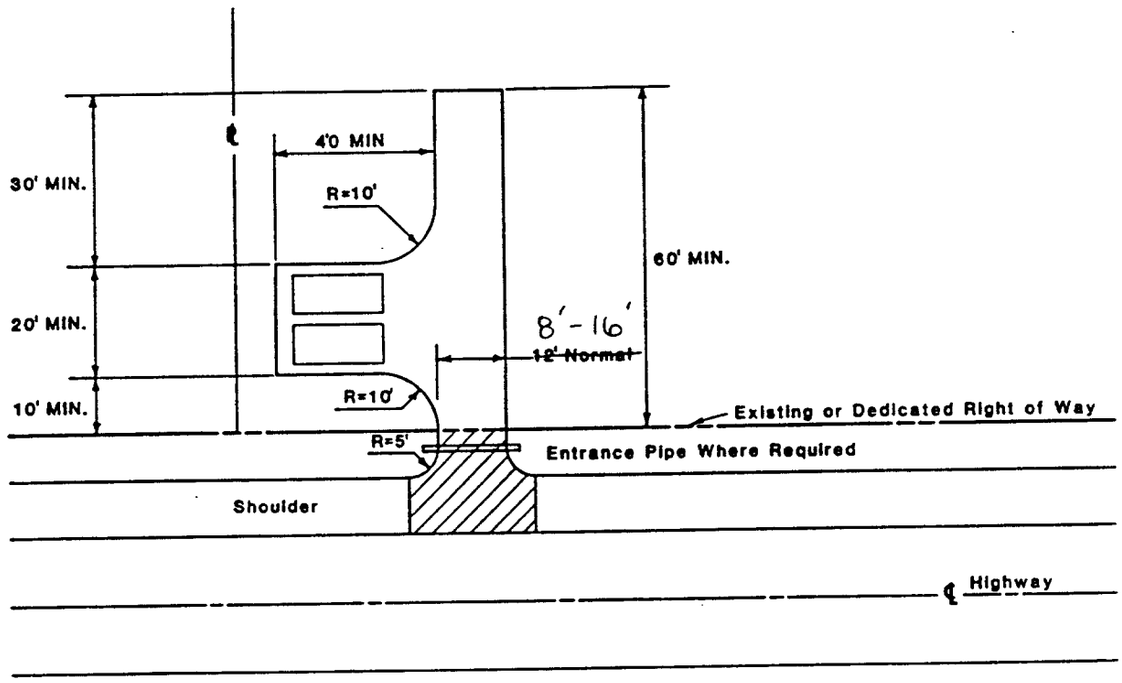


* More narrow lots call for alley access or shared driveways.

Reference to highway type refers to DOT. Functional Classification Map

FIGURE II-4

TYPICAL RESIDENTIAL ACCESS

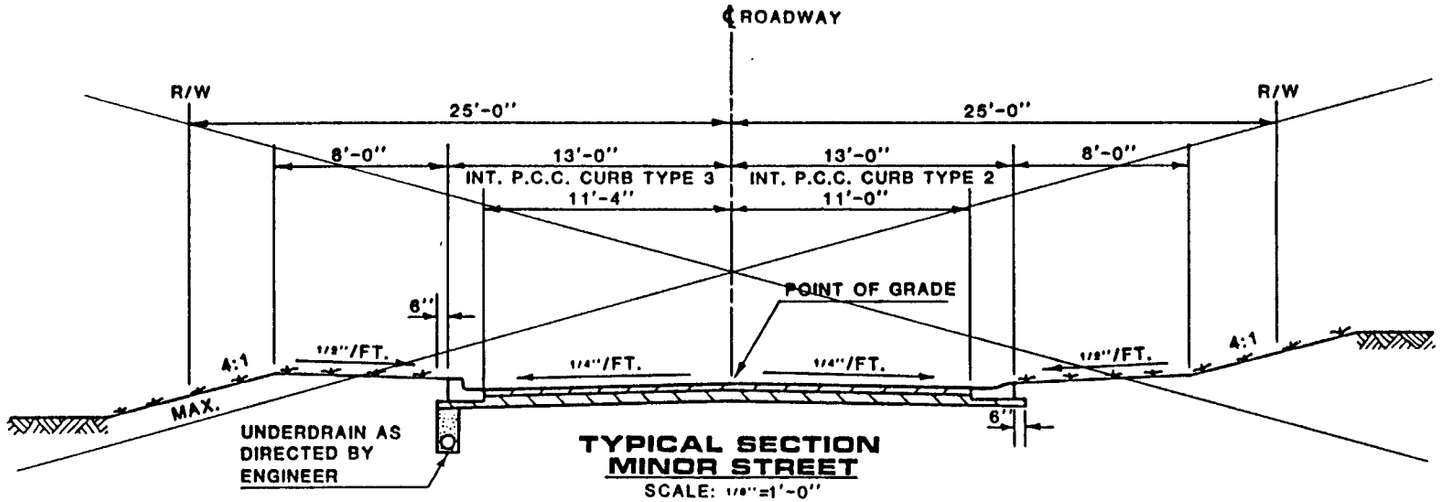


TYPICAL RESIDENTIAL ACCESS

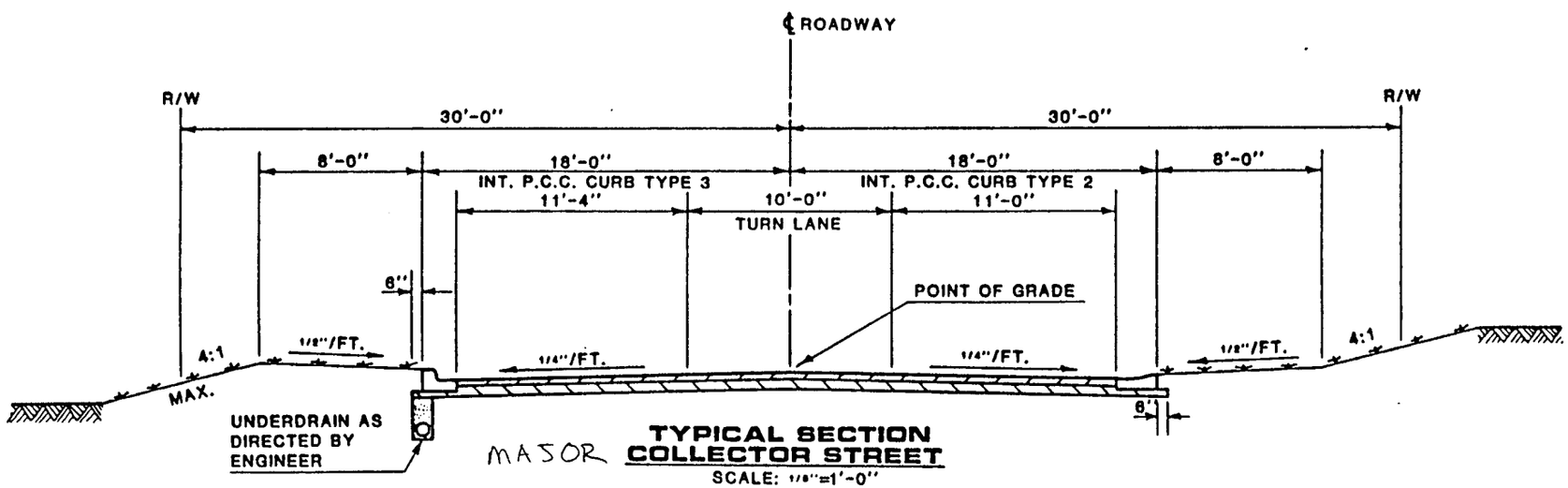
SCALE: 1"=30'-0"±

NOTES

1. Where driveway serves two adjacent residences (common driveway access) with lot widths of 50' or more, the driveway width at the right of way line may be increased to ~~20~~ 18 feet. Decrease the driveway width to 12' when lot widths are less than 50'.
2. Driveway widths may be increased with Division of Highway approval for special purpose vehicles i.e. farm vehicles.
3. Entrance Pipe furnished by the property owner will be installed by the Division of Highways on request.
4.  Minimum residential pavement section–Bituminous Surface Treatment on 6" Select Borrow Base Course.
5. Access to residential lots shall be limited to one access point.



TYPICAL SECTION
MINOR STREET
SCALE: 1/8"=1'-0"



MAJOR **TYPICAL SECTION**
COLLECTOR STREET
SCALE: 1/8"=1'-0"

1. ~~~4" topsoil seed and mulch.
2. Subgrade to be prepared in accordance with Division of Highways Standard Specifications.

FIGURE IX-1

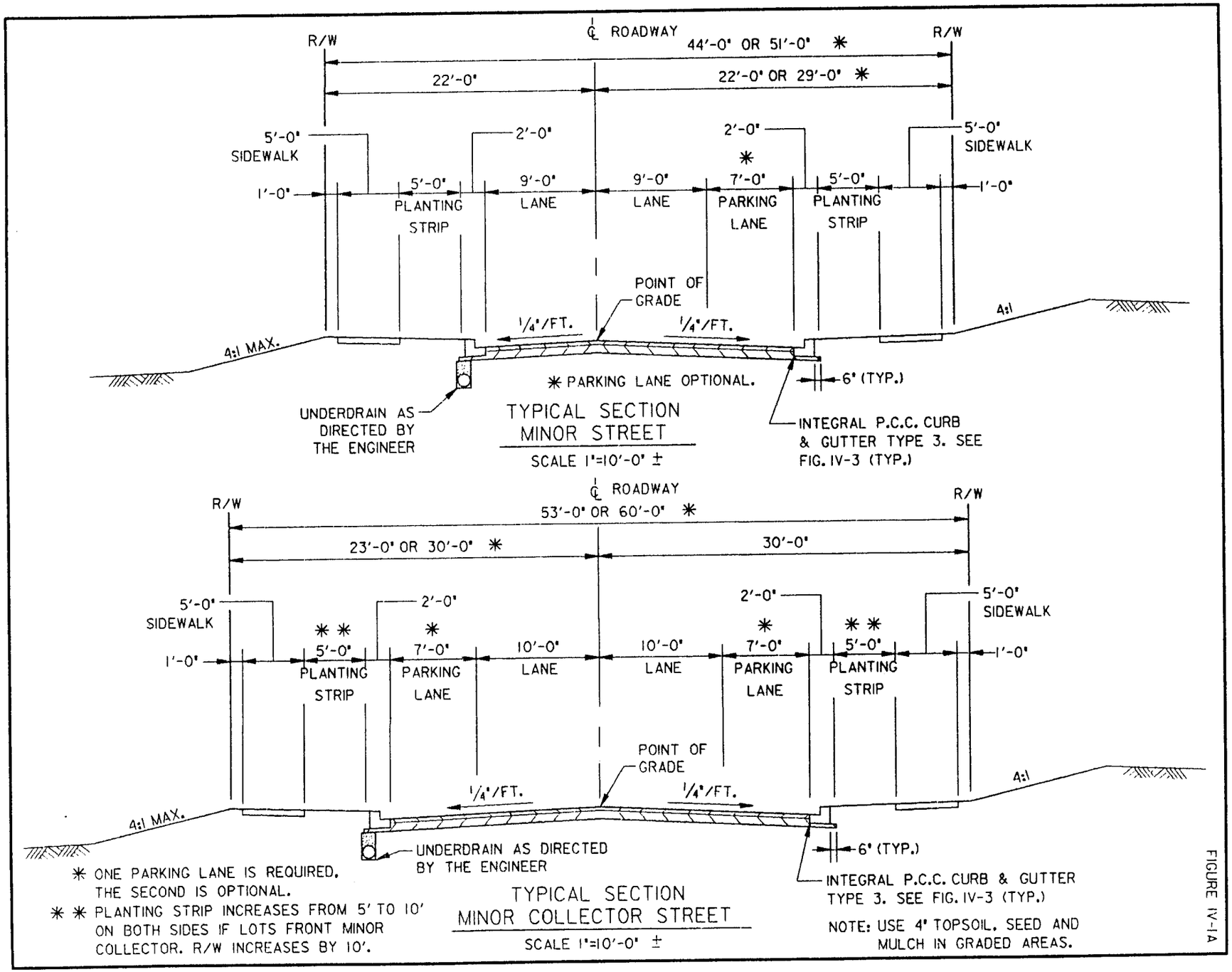

℄ ROADWAY
R/W
44'-0" OR 51'-0" *
R/W
22'-0"
22'-0" OR 29'-0" *
5'-0" SIDEWALK
2'-0"
2'-0"
*
5'-0" SIDEWALK
1'-0"
5'-0" PLANTING STRIP
9'-0" LANE
9'-0" LANE
7'-0" PARKING LANE
5'-0" PLANTING STRIP
1'-0"
POINT OF GRADE
1/4"/FT.
1/4"/FT.
4:1
4:1 MAX.
* PARKING LANE OPTIONAL.
6" (TYP.)
UNDERDRAIN AS DIRECTED BY THE ENGINEER
INTEGRAL P.C.C. CURB & GUTTER TYPE 3. SEE FIG. IV-3 (TYP.)
TYPICAL SECTION
MINOR STREET
SCALE 1"=10'-0" ±
℄ ROADWAY
R/W
53'-0" OR 60'-0" *
R/W
23'-0" OR 30'-0" *
30'-0"
5'-0" SIDEWALK
2'-0"
2'-0"
*
5'-0" SIDEWALK
* *
* *
1'-0"
5'-0" PLANTING STRIP
7'-0" PARKING LANE
10'-0" LANE
10'-0" LANE
7'-0" PARKING LANE
5'-0" PLANTING STRIP
1'-0"
POINT OF GRADE
1/4"/FT.
1/4"/FT.
4:1
4:1 MAX.
6" (TYP.)
UNDERDRAIN AS DIRECTED BY THE ENGINEER
INTEGRAL P.C.C. CURB & GUTTER TYPE 3. SEE FIG. IV-3 (TYP.)
* ONE PARKING LANE IS REQUIRED. THE SECOND IS OPTIONAL.
* * PLANTING STRIP INCREASES FROM 5' TO 10' ON BOTH SIDES IF LOTS FRONT MINOR COLLECTOR. R/W INCREASES BY 10'.
TYPICAL SECTION
MINOR COLLECTOR STREET
SCALE 1"=10'-0" ±
NOTE: USE 4" TOPSOIL, SEED AND MULCH IN GRADED AREAS.

FIGURE IV-1A