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Community Neighborhood Development

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IX. Summary

I. Introduction

Community neighborhood development consists of designers balancing the needs of through traffic, commercial areas, public areas and residential areas (subdivisions). This often becomes a balancing act considering that not all areas are “new” development areas. Most areas consist of existing community neighborhood developments that require retrofitting the existing uses with the most current roadway design.

Traffic volume, trip characteristics, speed, level of service and other factors are all related to the functional classification system as they relate to the mobility of motor vehicles and must be integrated with the needs of bicyclists or pedestrians and consider the context of land use of the surrounding environment.

Before the sub classification of roadways, all community roadways were considered thoroughfares.

The thoroughfare types described here provide mobility for all modes of transportation with a greater focus on the pedestrian. The functional classification system can be generally applied to the thoroughfare types in this chapter. Designers should recognize the need for greater flexibility in applying design criteria, based more heavily on context and the need to create a safe environment for pedestrians, rather than strictly following the conventional application of functional classification in determining geometric criteria.



A. General Principles

- The thoroughfares are intended for use by motor vehicle, transit, bicycle and pedestrian traffic and to provide access to lots and open spaces.
- The thoroughfares consist of travel lanes and public frontages. The lanes provide the traffic and parking capacity. Thoroughfares consist of travel lanes in a variety of widths for parked and for moving vehicles. The public frontages contribute to the character of thoroughfare. They may include swales, sidewalks, curbing, planters, shared use paths and landscaping.
- Thoroughfares should be designed in context with the urban form and desired design speed of the community zoning area through which they pass. The public frontages that pass from one zoning area to another should be adjusted accordingly.

B. Design Principles

The principles for designing streets in community neighborhood developments are similar in many respects to designing streets for conventional transportation.

- Providing mobility for users
- Creating a safe street for users
- Accommodating movement of goods
- Providing access for emergency services, transit, waste management and delivery trucks
- Providing access to property

When designing features and streets for community neighborhood developments in a redevelopment site, designers need to understand that they will have to provide the best design they can to promote safety and access considering the existing infrastructure. Flexibility is required in the approach to design in what is a constrained environment. Creativity and careful attention to safety for pedestrians and bicyclists must be balanced with the operational needs of motor vehicles.

Another key component community neighborhood development is providing access for emergency services, transit, waste management, and delivery trucks. Items which need extra attention include:

- Vehicle width (with mirrors) and length
- Turning radius
- Overhead Clearance

- Angle of approach for dumpster and roll off trucks to facilitate direct contact with containers

Care should also be taken to avoid having service vehicles back across walkways or into traffic.

C. Design Process

The design process for community neighborhood developments treats streets as an important part of the public realm, which is the totality of space used by the general public, such as streets, plazas, parks and other public infrastructure. Community neighborhood developments balance the mobility of all users and pay a great deal of attention to the context of crossing the community in which the street is located. The process also pays attention to creating a high degree of connectivity and an extensive network of streets.

D. Cross-Section Elements

Community neighborhood development street design places importance on how the streets are treated since they are part of the public realm. The street portion of the public realm is shaped by the features and cross section elements used in creating the street. For this reason, more attention to what features are included, where they are placed and how the cross-section elements are assembled is necessary.



E. Traveled Way

The traveled way is the central part of the thoroughfare between the curb faces where vehicle movement and on street parking occurs. The traveled way can be supplemented with sidewalks, bike lanes and landscaping.

F. Other Design Considerations

Every community has different equipment in service for transit, waste collection and emergency services, and coordination with operators should occur early in the planning process to ensure that those service providers can operate their equipment on the streets. The frequency of access by these vehicles should be considered when setting lane widths. The use of narrower lane widths requires that designers recognize the impacts on turning at intersections and U-turns for multi-lane roads.

II. Community Roadway System

The community roadway system has evolved over the decades. Traditional grid systems were used in early community neighborhood development to provide easy access to all locations when traffic volumes were low. As traffic volumes increased and other factors (pedestrians, bicyclist, transit) were introduced, the traditional grid system morphed into curvilinear roadway systems and cul-de-sacs.

Traditional grid design (Pre 1900) consisted almost entirely of through streets providing the ultimate vehicle connectivity in a community.



TRADITIONAL GRID
DESIGN (PRE-1900)

Curvilinear loop design (1930-1950) consisted largely of through streets with a few curvilinear loops and circles connecting one through street to another.



The beginning of the cul-de-sac era (1930-1950) consisted of one major arterial through the middle of the community with multiple collector roads servicing the local streets (cul-de-sacs).



The conventional cul-de-sac era (post 1950) consisted of a major arterial around a community with multiple collector roads servicing the local streets (cul-de-sacs).

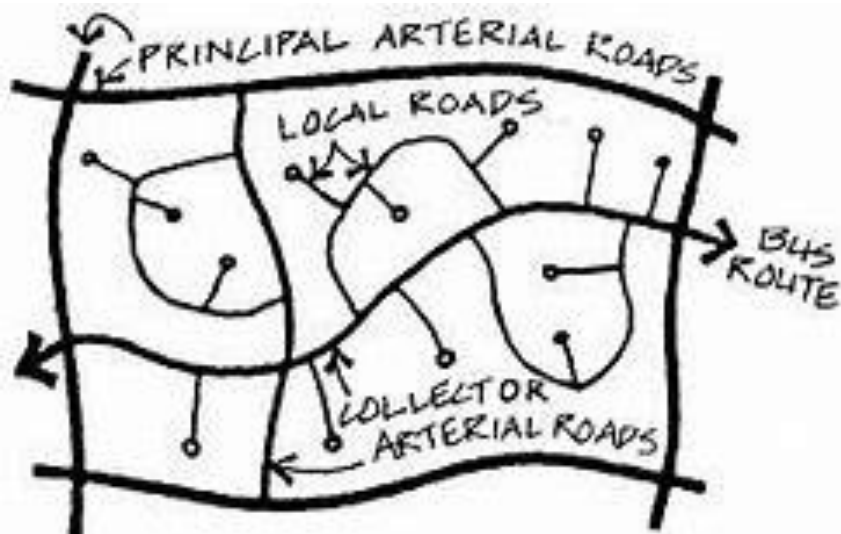


More recent design consists of increased community land use planning utilizing strategically placed arterials to serve commercial district and connector roads to serve local streets in the residential district (subdivisions).

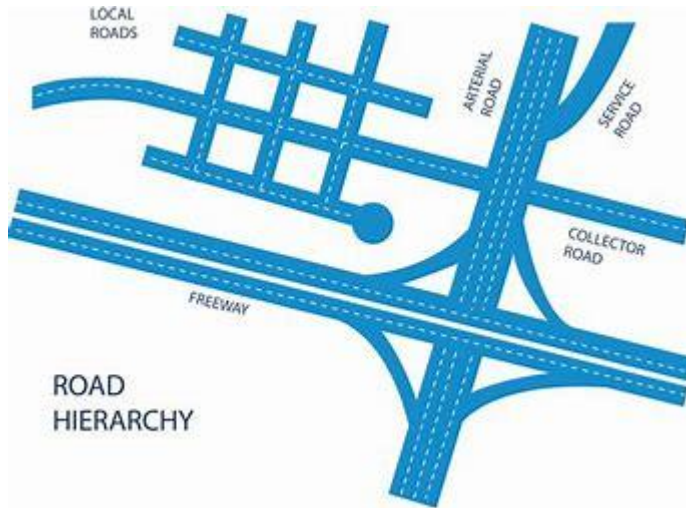
The following illustration shows the use of arterials to provide high speed access to the adjacent separate land uses. Residential areas (subdivisions) can be seen utilizing collector roadway from the arterial. More commercial uses show direct access to the arterial providing easy access. An interstate interchange can be found on the west side of the community providing a vital link to the limited access facility to promote movement of goods and services.



The following illustration shows how arterial roadways are used to “feed” the collector roads serving the local roads. The local roads then “feed” the neighborhood cul-de-sacs. A transit road is also built into the roadway system.



Neighborhood roadways can be further dissected by roadway hierarchy. The roadway system is hierarchal and much like a plumbing system, where “local” streets with lower traffic volumes feed into “collector” streets with high levels of traffic, then finally onto the “arterial,” where speeds and volumes are typically much higher.



The following are descriptions of the terms for thoroughfare types that are used in community neighborhood developments include:

A. Freeway

A freeway is an express highway, usually with limited controlled access on and off ramps located at greater distance spacing. Freeways provide high speed travel between adjacent community neighborhood developments.



Interchanges are utilized where freeways connect with other freeways or arterials. They allow vehicles to change directions or exit the system to access surrounding nodes.



B. Arterial Road

An arterial road is a high-capacity urban road. The primary function of an arterial road is to deliver traffic from collector roads to freeways and between urban centers at the highest level of service possible. They generally provide access between residential and commercial zones. These facilities are generally high speed facilities promoting the movement between different areas.



1. Service Road

A service road or frontage road is a subsidiary road running parallel to a main road or highway and giving access to houses and businesses.



C. Collector Road

A collector road or distributor road is a low to moderate capacity road which serves to move traffic from local streets to arterial roads. Unlike arterial roadways, collector roads are designed to provide access to residential properties (subdivisions). The facilities are generally lower speed facilities because they connect the local roadways with the arterials.



D. Local Road

Local roads serve primarily to provide access to the traffic from adjacent properties onto collectors. They service a minor role in the classification system and usually have low traffic. Speed is usually kept low due to the frequent movements of both children and adults in the residential area.



E. Pedestrian Passage

A pedestrian passage is a narrow connector restricted to pedestrian use and limited vehicular use that passes between buildings or between a building and a public, open space. Passages provide shortcuts through long blocks and connect rear parking areas with frontages. Passages may be unpaved and informally landscaped.



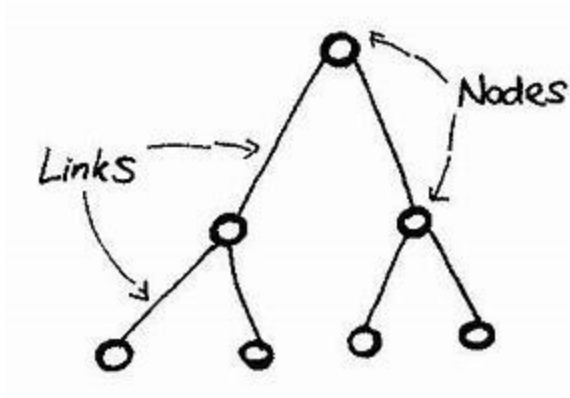
F. Alley

An alley is a narrow vehicular access-way at the rear or side of buildings providing service and parking access and utility easements. Alleys have no sidewalks, landscaping or building frontage requirements. They accommodate trucks and dumpsters and may be paved from building face to building face, with drainage by an inverted crown using impervious or pervious pavement. In older residential neighborhoods, alleys may be unpaved.



III. Links and Nodes

A roadway is defined by the links along its path. The links are connected to various nodes (service points). The links represent roadways of various definition (interstates, arterials, collectors) that are used to connect residential (subdivisions), commercial (shopping centers, malls, gas stations) and public use nodes (parks, government offices).



IV. On Street Parking

There are a variety of different on street parking designs. They can all be designed to include or exclude parking meters. They include:

- Pull in angle parking
- Back-in angle parking
- Parallel parking

A. Pull-In Angle Parking

Where right of way width is not an issue, generally pull-in angle parking is preferred.



B. Back-In Angle Parking

Designers can also consider the use of back-in angle parking, also called head-out angle parking, instead of pull-in angle parking. Back-in angle parking has the following advantages:

- Loading and unloading of passengers naturally encourages passenger movement towards the sidewalk.
- Loading and unloading from the trunk or tailgate occurs at the sidewalk.
- When the vehicles leave, the driver has a better view of oncoming traffic, reducing the risk of crashes.

Back-in-angle parking also provides increased visibility of on-coming traffic and bicyclists. Traditional pull-in angle parking forces the driver to back out of the parking space and look past the adjacent parked vehicle to see any conflicts.



C. Parallel Parking

Where right of way width is limited, parallel parking is the preferred design. It provides the greatest number of spaces while maintaining a condensed roadway cross section.

When designated bike lanes are needed in conjunction with on street parking (for speeds greater than 25 mph), designers should consider increasing the bike lane to 6 feet, instead of increasing parallel parking width from 7 to 8 feet. This helps encourage vehicles to park closer to the curb and provides more room for door swing, potentially reducing conflict with cyclists.



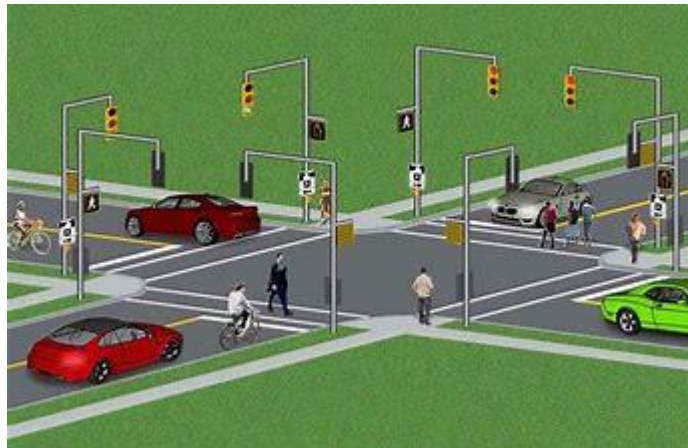
V. Pedestrian Crossings

Depending on the speed of a roadway and number of conflict points, there are several different pedestrian crossing designs to choose from. They include:

- Signal Controlled Pedestrian Crossings
- Mid-Block Crossings
- Pedestrian Overpass

A. Signal Controlled Pedestrian Crossings

As part of the signalized intersection, timed crosswalks can be included to provide safe crossing time for the pedestrians utilizing the sidewalks adjacent to the intersection.



Countdown pedestrian heads can be utilized to provide more positive guidance to the pedestrians utilizing the crosswalk.



B. Mid-Block Crossings

In communities that cannot utilize shorter block lengths, mid-block crossings are necessary. These crossings are generally not signalized. Solar powered flashing beacons can be utilized to notify the drivers when a pedestrian is using the crosswalk.



The use of curb extensions or bulb-outs should be considered to reduce the crossing distance for pedestrians. The reduction in distance reduces the time in the crossing and causes a roadway width constriction resulting in lower speeds which increases pedestrian safety.



C. Pedestrian Overpass

Pedestrian overpasses can be utilized to facilitate highly travelled pedestrian paths over high volume roadways. The use of pedestrian overpasses allows safe pedestrian crossings without delaying the roadway traffic below.



D. Shared Use Path

Shared use paths can be considered in areas with high bicycle and pedestrian usage to remove those users from the direct roadway conflict.

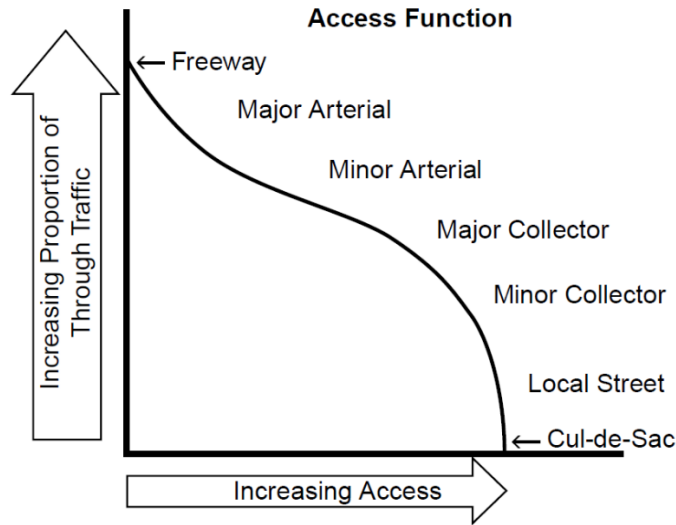
Shared use paths away from the road help many people make their everyday journeys safely and they are also important for leisure. Many people including young, elderly and disabled people benefit from shared use paths. They provide valuable opportunities to travel in a traffic-free environment, and to relax, unwind and play.



VI. Access Management

The philosophy of short block lengths is intended to reduce travel speeds, increase access to properties and improve circulation for all users. This is in contrast to the use of access management which has the goal of keeping vehicles moving at higher speeds.

The greater the roadway speed, the less access can be provided to that roadway. For example, a limited access freeway is a high speed facility in which the access is controlled by on and off ramps. In contrast, a local roadway is a low speed facility in which there is a high degree of accessibility with multiple driveway connections.



VII. One-Way Streets

A one-way street is a roadway that moves in a single direction. One-way streets typically result in high traffic flow as drivers may avoid encountering oncoming traffic or turns through oncoming traffic. Residents may dislike one-way streets due to the circuitous route required to get to a specific destination.



One-way streets can be arranged in such a fashion as to eliminate right turns (for driving on left) or left turns (for driving on the right). Traffic signalization systems at such junctions may be simpler and may be coordinated to produce a “green wave,” which results in the platooning of vehicles through a series of blocks.

Some of the reasons one-way traffic is specified:

- The street is too narrow for movement in both directions
- Prevent drivers from cutting through residential streets to bypass traffic signals or other requirements to stop
- Part of a one-way pair of two parallel one-way streets in opposite directions
- To calm traffic
- Increase traffic flow and potentially reduce traffic congestion
- Eliminate the need for a center turn lane (that can instead be used for a travel lane)
- Simplify pedestrian crossing of the street due to walkers only needing to look for oncoming traffic in one direction
- Eliminate cars’ driver-side doors opening into the travel lane in parallel parking spaces for parking located on the left
- Locate a one-way bike lane on the opposite side of the street from parallel parking spaces to prevent “dooring”

Another benefit is use of space. Because one-way streets move more traffic per lane than two-way streets communities with one-way systems need to devote less space to roadways. Four lanes of a one-way pair carry as much traffic as a seven-lane two-way street.

If sufficient right-of-way is available, a one-way corridor (as shown in the following illustration) can be designed to provide increased traffic flow, parallel parking on both sides of the one-way streets separated by a raised, landscaped island.



For more urbanized areas, one-way streets can provide increased traffic flow, designated transit zones and bicycle/pedestrian facilities.



VIII. Intersections

The proper design of intersections is very important to the safety of all users. Research reveals that intersections are disproportionately responsible for crashes and injuries, especially for pedestrians. This is largely due to the number of conflict points that occur.

It is best to keep intersections compact to keep vehicle speeds down and to reduce pedestrian crossing distance. The benefits of compact intersections are reduced exposure of pedestrians to vehicles and shorter cycle times for the pedestrian phase of signals.

The approach to street design with more narrow streets and compact intersections requires designers to pay close attention to the operational needs of transit, fire and rescue, waste collection and other stakeholder groups.

More regular encroachment of turning vehicles into opposing lanes will occur at intersections. Therefore, frequency of transit service, traffic volumes and the speeds at those intersections must be considered when designing intersections. For fire and rescue services, the importance of that corridor for community access should be determined.

There are a variety of intersection designs based upon the required capacity at the intersection. They include:

- T-Intersections
- Two way stop controlled
- Four way stop controlled
- Roundabout
- Signalized

A. T-Intersection

T-intersections are the most common types of intersections. They can be found in all community development areas from commercial to residential. They can join a commercial development to the street, join two residential streets or provide interconnection inside developments. They are usual stop controlled on the low speed and low volume leg.



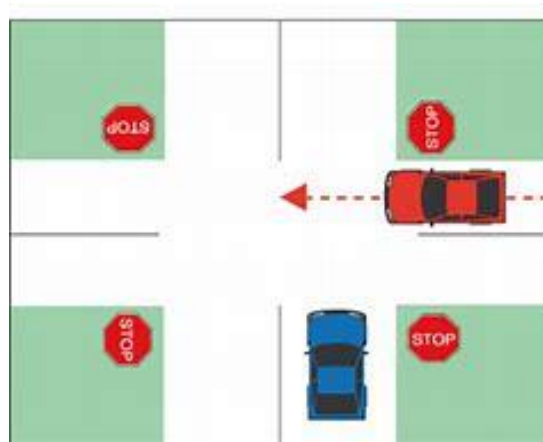
B. Two Way Stop Controlled Intersection

A two way stop controlled intersection consists of one roadway under stop sign control and one with free movement. This design is generally reserved for use when one roadway has significantly more traffic volume than the other. The roadway with the lesser traffic volume is placed under the stop sign control condition. Flashing beacons can be added to the stop sign assemblies to emphasize that the roadway is under stop control.



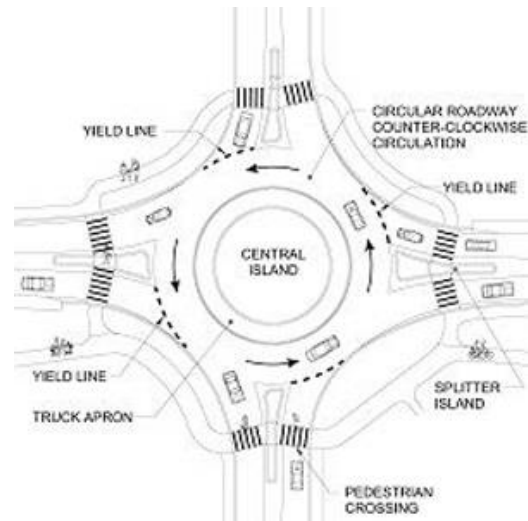
C. Four Way Stop Controlled Intersection

Four way stop controlled intersections consist of two roadways with similar traffic volumes. Each leg is controlled by a stop sign. This type of intersection control is generally used for two roadways of similar traffic volume and speed.



D. Roundabout

Roundabouts are circular intersections with specific design and traffic control features. These features include yield control of all entering traffic, channelized approaches and appropriate geometric curvature to ensure that travel speeds on the circulatory roadway are typically less than 30 mph.



E. Signalized Intersection

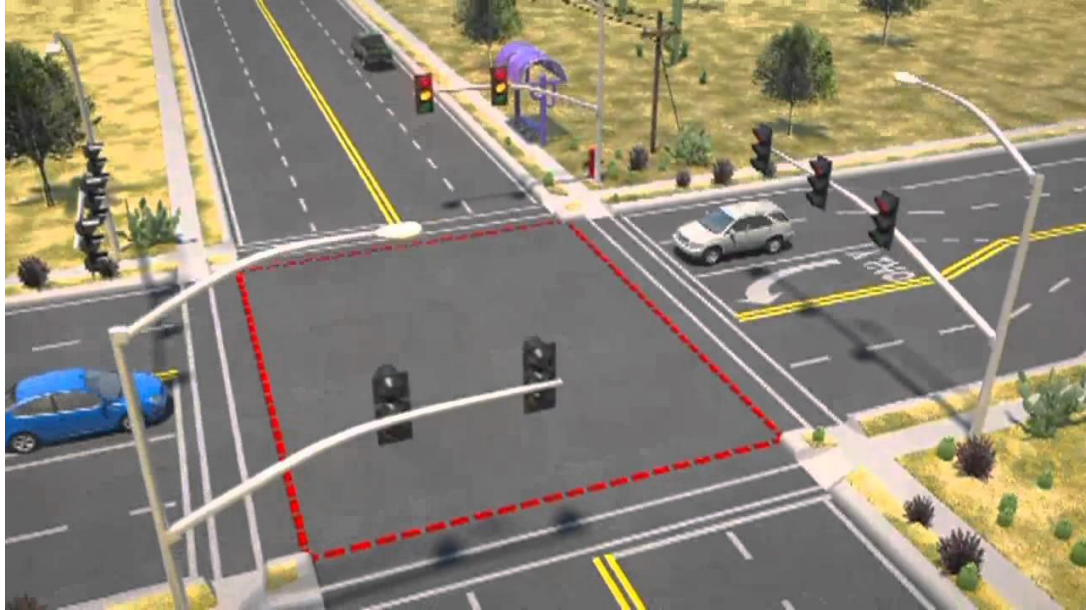
Signalized intersections are generally used in more urbanized areas where there are large traffic volumes, turning movements and pedestrian/bicyclist needs. The timed movements provide for safe movements for everyone utilizing the intersection by controlling the conflicts.

Some of the advantages of a signalized intersection include:

- Potential reduction in some types of crashes (right angle, head on, etc.)
- Provision for pedestrians to cross the street
- Provision for side-street vehicles to enter the traffic system
- Provision for the progressive flow of traffic in a coordinated signal system
- Possible improvements in capacity/reduction in delays

Some disadvantages of a signalized intersection include:

- Increased vehicle delay
- Increased rate of rear end vehicle crashes
- Disruption in traffic progression



A typical signalized intersection can provide enhanced safety with the addition of the following:

- Designated turn lanes with separate signal control
- Pedestrian crossings integrated with the traffic signal timing
- Intersection lighting

IX. Summary

Community neighborhood development consists of designers balancing the needs of through traffic, commercial areas, public areas and residential areas. Traffic volume, trip characteristics, speed and level of service and other factors in the functional classification system relate to the mobility of motor vehicles must be integrated with the needs of bicyclists or pedestrians and consider the context of land use of the surrounding environment.

Specific design principles and process must be considered in community neighborhood development to promote safe and effective movement of all thoroughfare users in the community. They must provide mobility for users, create a safe street for users, accommodate efficient movement of goods, promote access for emergency services, transit, waste management, and delivery trucks and provide access to properties.

The community roadway system was defined from high speed, low access to low speed, greater access. Definitions of the roadway types were provided to distinguish the differences between the functions of the roadway types. Parking and pedestrian crossings were discussed as they must be built into the community roadway system.

The use of one-way streets was covered to identify how they can strategically be used in community neighborhood design to attain safer and move controlled travel.

The different types of intersections were defined as they relate to traffic control in an ever-increasing usage of a roadway system.

The key to a well-planned and designed community neighborhood development is to focus on both the safe and efficient movement of the traveling public.

This course should have provided an engineer with techniques for the planning and design of community neighborhood developments.