



Pierce County  
Department of Public Works and Utilities  
Transportation Services

**Manual on  
Design Guidelines and  
Specifications for Road and  
Bridge Construction  
in  
Pierce County**

Prepared by  
Office of County Engineer

**Manuals available for purchase at:  
Pierce County  
Department of Public Works and Utilities  
Transportation Services  
2401 South 35th Street, Room 150  
Tacoma, Washington 98409-7485  
Cost: \$4.50 each**

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## **PREFACE**

This Manual provides uniform technical requirements to govern all new road and bridge construction and upgrading of facilities occurring within County rights-of-way; within property which is intended to become County rights-of-way; within privately owned property where the general public may reasonably be expected to operate motor vehicles upon the roads therein; and accesses to the County road system in unincorporated Pierce County. The application of this Manual has been coordinated with the requirements of State of Washington law in the establishment of standards.

This Manual is compiled and published by the Office of County Engineer for Pierce County. It represents years of field and design experience. The intent is to achieve maximum uniformity of engineering and construction practices within unincorporated Pierce County.

It should be noted that where this Manual makes reference to the “County Engineer” it is to be understood that this means the “County Engineer or authorized representative.”

It shall be the responsibility of the individual using this Manual to verify with the Office of County Engineer that all technical requirements being used are the most current.

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# Chapter 1

## Introduction

### 1-1 Authority For Document

The *Manual on Design Guidelines and Specifications for Road and Bridge Construction in Pierce County*, cited routinely in this text as, "this Manual", as published by the Pierce County Engineer has been adopted under Title 17B of the Pierce County Code by the Pierce County Council pursuant to Chapter 36.86, Revised Code of Washington.

Chapter 36.80.030, Revised Code of Washington, states in part that, "The County road engineer shall... have supervision, under the direction of the board, of establishing, laying out, construction, altering, improving, repairing [and] maintaining all County roads in the county." To this end the County Engineer for Pierce County shall oversee all design and construction work related to county roads within unincorporated Pierce County.

### 1-2 Changes to the Manual

Chapter 36.80, Revised Code of Washington, requires that Pierce County employ a full-time County Engineer who shall be a registered and licensed professional civil engineer under the laws of the State of Washington, and charges the County Engineer with the responsibility to prepare standards of construction for roads and bridges. In the event that standards change to the degree that it becomes necessary to amend this Manual, the County Engineer shall prepare and submit such recommendations for amendment to the County Council for their review and adoption in accordance with RCW 36.86.030.

It shall be the responsibility of the individual using this Manual to verify with the Office of County Engineer that all technical requirements being used are the most current.

### 1-3 Definitions

**County:** The jurisdictional boundaries of Pierce County and the Pierce County Executive or authorized representative

**County Engineer:** The Pierce County Engineer or authorized representative

**Department:** The Pierce County Department of Public Works and Utilities - Transportation Services, Office of County Engineer

**Manual:** *Manual on Design Guidelines and Specifications for Road and Bridge Construction in Pierce County*

**Engineer:** A professional civil engineer licensed in the State of Washington.

Other definitions are contained in Appendix B.

### 1-4 General

This Manual establishes uniform technical requirements for road and bridge design, construction, and reconstruction.

In establishing these uniform technical requirements, the County Engineer has sought to encourage standardization of road design elements where necessary for consistency and to assure so far as practical that motoring, bicycling, and pedestrian public safety needs are met. Considerations include safety, convenience, aesthetics, proper drainage, and economical maintenance.

The County's permitting and licensing activities require the adoption of specific, identifiable standards to guide individuals and entities in the administrative process of procuring the necessary County approval(s). Yet, the County must have flexibility to carry out its general duty to provide streets, roads, and highways for the diverse and changing needs of the traveling public and others who use the public right-of-way. Accordingly, this Manual is not intended to represent the legal standard by which the County's duty to the public is to be measured.

The decision to use a particular road design element at a particular location should be made on the basis of an engineering analysis of the location. Thus, while this document provides minimum requirements for design, it is not a substitute for professional engineering judgment. It is the intent that the provisions of this Manual be uniform requirements for road design, but may not be appropriate for all locations and existing conditions.

This Manual cannot provide for all situations. It is intended to assist, but not to substitute for, competent work by design professionals. It is expected that each professional bring to each project the best of their skills and abilities. These uniform requirements are also not intended to unreasonably limit any innovative or creative effort which could result in the more effective and appropriate combination of design, cost savings, or both.

The Engineer should take into account all available information and use the professional judgment that comes from training and experience to make the final design determination. There should be some record, not necessarily formal or cumbersome, of the matters that were considered during the design process that would justify the decisions that were made regarding the final project design.

The County Engineer will judge any proposed designs that depart from the requirements outlined in this Manual on the likelihood that such deviation will produce compensating or comparable results, adequate for the road uses and the general public. The County Engineer will be the final authority in resolving disputes concerning questions of fact in connection with standards for road and bridge construction not directly covered by this Manual.

## 1-5 Document Application

All requirements contained in this Manual, together with any and all amendments thereto, shall apply to all road, bridge, and other new construction of public and private roads in unincorporated Pierce County, and as far as practicable and feasible to reconstruction, resurfacing, restoration, and rehabilitation of existing public and private roads in unincorporated Pierce County. In case of any ambiguity or dispute over interpretation of the provisions of this Manual, the decision of the County Engineer shall be final.

## 1-6 Relationship to Other Documents

The most current edition of the following publications and manuals are approved for use by the County Engineer and may be used to supplement this Manual when a specific subject is not covered or discussed:

- *Standard Specifications for Road, Bridge and Municipal Construction*, as published by the Washington State Department of Transportation and the American Public Works Association, under No. M4-10.
- *Standard Plans for Road, Bridge and Municipal Construction*, as published by the Washington State Department of Transportation, under No. M21-01.
- *Manual on Uniform Traffic Control Devices*, as published by the U.S. Department of Transportation, Federal Highway Administration, as amended and approved by the Washington State Department of Transportation under No. M24-01; commonly known as the "MUTCD"
- *Standard Specifications for Highway Bridges*, and any interim specifications, as adopted by the American Association of State Highway and Transportation Officials.
- *Construction Manual*, as published by the Washington State Department of Transportation, under No. M41-01.
- *Pierce County Stormwater Management and Site Development Manual*, as published by Pierce County.
- *Manual on Accommodating Utilities in Pierce County Right-of-Way*, as published by Pierce County.
- *Local Agency Guidelines*, as published by the Washington State Department of Transportation, under No. M36-62, commonly known as the "LAG Manual."
- *Circular 209 - Highway Capacity Manual*, as published by the Transportation Research Board.
- *Trip Generation*, as published by the Institute of Transportation Engineers.

The most current edition of the following publications are recognized by the County Engineer as industry authorities and may be consulted on specific subjects not covered or discussed in this Manual or the above supplemental documents:

- *A Policy on Geometric Design of Highways and Streets*, as published by the American Association of State Highway and Transportation Officials, commonly known as the "AASHTO Green Book."
- *Plans Preparation Manual*, as published by the Washington State Department of Transportation, under No. M22-31.
- *Design Manual*, as published by the Washington State Department of Transportation, under No. M22-01.
- *Bridge Design Manual*, as published by the Washington State Department of Transportation, under No. M23-50.
- *Roadside Design Guide*, as published by the American Association of State Highway and Transportation Officials.
- *Hydraulic Manual*, as published by the Washington State Department of Transportation, under No. M23-03.

The Engineer may need to consult not only this Manual, but a number of other Pierce County documents. All road plans submitted to the County for review and approval shall be consistent with these other adopted County standards or ordinances. These documents or standards include, but are not limited to:

- Pierce County Comprehensive Plan.
- Pierce County Development Regulations - Storm Water Management and Site Development Manual
- Pierce County Uniform Fire Code
- Sensitive Areas Ordinances
- Washington State Environmental Policy Act (SEPA)
- Pierce County Non-Motorized Transportation Plan
- Pierce County Wetland Regulations.
- Pierce County Transportation Plan.

## **1-7 Deviation From Manual**

No deviation from the technical requirements contained in this Manual may be made without first obtaining the written approval of the County Engineer in accordance with Section 17B.10.090 of the Pierce County Code.

The minimum technical requirements contained in this Manual represent reasonable approaches to design and construction of roads and bridges, which indicate the appropriate engineering practice under most conditions. However, engineering design is an endeavor that examines alternative solutions in real world situations and accordingly, this Manual is not provided to hamper those creative engineered solutions. Situations will present themselves where alternatives may be preferred to allow conformance with existing conditions, to overcome adverse topography or to allow for more affordable solutions without adversely affecting safety, maintainability or aesthetics.

**1-7.1 Process** The following process is to be used to review a request to gain approval for alternative designs which deviate from Pierce County standards adopted in Section

17B.10.060 of the Pierce County Code, under the authority contained in Section 17B.10.090 of the Pierce County Code, but which will serve to accomplish the intent of standards, criteria, and established minimum technical requirements contained in this Manual.

Requests for deviations should be submitted by the Engineer directly to the Office of County Engineer where they will be accepted, logged in, and assigned to the investigating staff via the Development Engineering Supervisor. The Engineer shall provide the following information:

Requestor's name, address and phone number, date of request, title of project, Pierce County Development Engineering file number, project application numbers, relevant standard at issue, nature of requested deviation, and any other comments of relevance, together with the information required below in Section 1-7.2 of this Manual. The request package shall be stamped by an Engineer.

The Development Engineering Supervisor will investigate the request and coordinate with the Engineer and affected county staff as necessary. For deviation issues relating to Fire Districts, the staff shall notify the affected Fire District(s) and request comments and concerns prior to issuing a staff recommendation. For deviation issues relating to School Districts, the staff shall notify the affected School District(s) and request comments and concerns prior to issuing a staff recommendation. The staff will in turn prepare a draft findings of fact and draft recommendations with regard to denial or approval in the form of a draft response letter to the Engineer to be signed by the County Engineer responding to the deviation request.

The County Engineer will review the Engineer's deviation request, together with all supportive material provided to justify the deviation request, and the draft finding of facts prepared by the staff and any staff recommendations included in the draft response letter.

When reviewing a deviation request, the County Engineer will evaluate the request to determine if the proposal produces a compensating or comparable result which is in the public interest and that the proposal meets the requirements for safety, function, fire protection, appearance and maintainability utilizing the evaluation criteria outline in Section 1-7.2 below. The County Engineer shall then make a final determination and file a written finding of facts concerning the deviation request. The County Engineer will grant or deny a deviation request in full or in part based on these findings. When granting a deviation, the County Engineer may attach specific conditions to the deviation which will serve to accomplish the intent of standards, criteria, and established policies. Deviations must receive the approval of the County Engineer before road construction plans can be approved.

The County Engineer will return the determination and findings to the Department of Planning and Land Services for transmitting to the Engineer and filing. Every effort will be made to complete the review process within three weeks from acceptance of the deviation request by the County Engineer.

**1-7.2 Evaluation Criteria** The County Engineer recognizes that State of Washington has set minimum standards in accordance with RCW 35.78.030 and is required to meet these standards when granting a deviation. The County Engineer has, for certain design items, established policy criteria which are used to assist in determining the appropriateness of granting a deviation from related County standards. Many of these policy criteria are contained in the documents outlined in Section 1-6 of this Manual.

Before any deviation may be granted, it shall be shown that:

- A. The granting of such deviation will produce compensating or comparable results, adequate for the road users and the general public;
- B. The granting of such deviation will not violate any development related conditions imposed upon the project;
- C. The granting of such deviation will not be materially detrimental to the public welfare or injurious to the property or improvement in such vicinity in which the subject property is located;
- D. Such deviation is based on sound engineering judgement, and that requirements for safety, function, appearance, environmental protection, and maintainability are fully met.

The County Engineer may grant a deviation from the minimum technical requirements contained in this Manual only upon submittal of additional information, plans and/or design data by an Engineer showing that the requested deviation is safe, in the best interest of the public, and will not impose undue maintenance costs on Pierce County, if applicable.

**1-7.3 Re-Examination** The requesting party may seek a re-examination of the original request by transmitting a letter to the County Engineer outlining exceptions taken to the County Engineer's findings. The requesting party shall provide additional details specifically addressing the exceptions being taken in order to enable the County Engineer to conduct additional evaluation of the request.

The County Engineer will be the final authority in resolving disputes concerning questions of fact in connection with standards for road and bridge construction not directly covered by this Manual, as set forth in RCW 36.75.020 County roads—County legislative authority as agent of state—Standards.

## 1-8 Legal References

The following governmental codes establish the County's right to establish design and construction standards. The text of these codes can be found in Appendix A as shown on the following table:

<b>Table 1 Governmental Code References</b>			
<b>Page</b>	<b>Code</b>	<b>Title of Code</b>	<b>Description</b>
A-1	RCW 36.75.020	County Roads - Standards	Sets requirements to utilize adopted County road design standards under the direction of the County Engineer.
A-1	RCW 36.75.140	Approaches to County Roads	Outlines rules for construction of approaches to County roads and supervised by County Engineer.
A-2	RCW 36.80	Roads and Bridges - Engineer	Outlines role of the County Engineer and duties including preparation of design standards.
A-4	RCW 36.86	Roads and Bridges - Standards	Outlines minimum standards for counties to utilize.
A-6	RCW 43.32	County Road Design Standards	Establishes design standards for County primary road system.
A-7	PCC 12.08	Road Classification Plan	Classifies all County roads.
A-8	PCC 12.24	Acquisition of Rights-of-Way	Sets minimum right-of-way widths.
A-9	PCC 17B	Road and Bridge Design and Construct Standards	Establishes design standards for public/private roads and driveways.



## Chapter 2

# Design Control

### 2-1 Functional Classification

The first step in the design process is to identify the functional classification of the roadway. The functional classification of existing Pierce County roadways are established by ordinance by the Pierce County Council and are identified in Chapter 12.08, Pierce County Code. A narrative of the existing and future adjacent land use and environment must accompany the proposal for functional classifications of new facilities. This narrative should answer questions such as: Is the roadway in an urban environment? Are schools or parks nearby? What is the expected pedestrian and bicycle activity? Will the roadway serve an industrial or commercial site?

Existing and future traffic volumes must be documented. The estimated future traffic volumes serve as the design year for the roadway. Interim designs are based on a 5- or 10-year traffic study. All interim designs must contribute to the 20-year roadway design.

**2-1.1 Functional Classification System.** Roads and highways are most effectively classified by their function, according to the character of service they are intended to provide. The primary functions of roads and highways are to provide mobility and to provide access, and the degree to which these functions are provided is considered an integral part of classifying roads. The functional classification system creates a hierarchy of classified roads.

For example, a freeway provides a high degree of mobility but very limited access, which is available only at interchanges that could be spaced several miles apart. Higher vehicle speeds and volumes are typical on these types of facilities and are, in fact, desirable. On the other hand, a local road within a residential neighborhood provides a high degree of access by way of numerous driveways to adjacent lots, and lower vehicle speeds and volumes are desired. Between these two extremes are the remainder of the roads, commonly called the arterial system, that must provide both mobility and access.

Roads are grouped into a number of different classifications for administrative, planning, and design purposes. For example, the classification system can be used for planning for new routes, improvements to existing roads, and planning for area development in concert with the transportation network and providing minimum design standards or criteria to encourage the use of the road as intended.

The main considerations for classifying roads into functional groups are the travel desires of the public, land service needs based on existing and expected land use, and the overall continuity of the system. A classification plan which fits the various classes of roads together into a logical pattern and assigns realistic improvement standards to each class will promote the highest overall level of service for the funds that are available.

Pierce County definitions for each functional classification are presented below. The Pierce County Transportation Plan includes transportation plans for modes other than passenger vehicles. These modal plans are intended to overlay onto the functional classification system. For example, the bicycle plan would overlay the functional classification system to identify those roadways that should include bicycle facilities as a design element of the roadway.

The Pierce County functional classification system directly addresses all roads in unincorporated Pierce County that are under the jurisdiction of Pierce County. State highways under the jurisdiction of the Washington State Department of Transportation are all legally designated arterials (RCW 46.61.195). In some cases, particularly in rural areas of the County, no major County arterials are designated since this function is served by the state highway route.

## **2-1.2 Functional Classification Definitions**

**2-1.2.1 Major Arterials.** Major arterials provide service for major traffic movements within the County. They serve major centers of activity; intra-area travel between suburban centers, between larger communities, and between major trip generators. Major arterials serve the longest trips and carry the major portion of trips entering and leaving the overall area. Typically they are one of the highest traffic volume corridors in the County. The design year ADT is approximately 5,000 to 30,000 vehicles per day or more. They frequently carry important intra-urban and inter-city bus routes.

The spacing of major arterials usually varies from about 1 mile in highly developed business areas to 5 miles or more in rural areas. Service to abutting land should be subordinate to the provision of travel service to major traffic movements; this service should be incidental to the primary functional responsibility of the road. Desirably it is located on community and neighborhood boundaries or adjacent to but not through major shopping centers, parks, and other homogeneous areas.

**2-1.2.2 Secondary Arterials** Secondary arterials interconnect with and augment the major arterial system. Secondary arterials connect major arterials to collector arterials and small generators. They provide service to medium-size trip generators, such as less intensive commercial development, high schools and some junior high/grade schools, warehousing areas, active parks and ballfields, and other land uses with similar trip generation potential. They distribute travel to smaller geographic areas and communities than those identified with the major arterial system. They provide service to trips of moderate length of a somewhat lower level of travel mobility than major arterials. The design year ADT is approximately 2,500 to 15,000 vehicles per day.

Spacing of secondary arterials usually varies from less than 1 mile in fully developed areas to about 3 miles or more in rural areas. They provide intra-community continuity and are typically a continuous road with a direct rather than a meandering alignment. They may carry local bus routes.

Secondary arterials allow for more emphasis on land access than the major arterial system. They usually do not penetrate identifiable neighborhoods.

**2-1.2.3 Collector Arterials** Collector arterials distribute trips from major and secondary arterials to the ultimate destination, or may collect traffic from local roads and channel it into the major and secondary arterials systems. They carry a low proportion of traffic traveling through the entire subarea; carry a high proportion of local traffic with an origin or destination within that area. The design year ADT is approximately 1,000 to 4,000 vehicles per day. They may be on a somewhat meandering alignment and need not be particularly long or continuous.

Spacing ranges from 1/4 mile in developed areas to 3 miles in rural areas. Collector arterials provide both land access service and traffic circulation within residential neighborhoods, commercial, and industrial areas. They may penetrate identifiable residential neighborhoods.

**2-1.2.4 Local Road System** The local road system provides circulation and access for residential neighborhoods away from the arterial system. The local road system consists of the Local Road Feeder, Local Road Minor, and Local Road Cul-de-sac. Figure 2-1 presents conceptual example of each local road classification as a local road system.

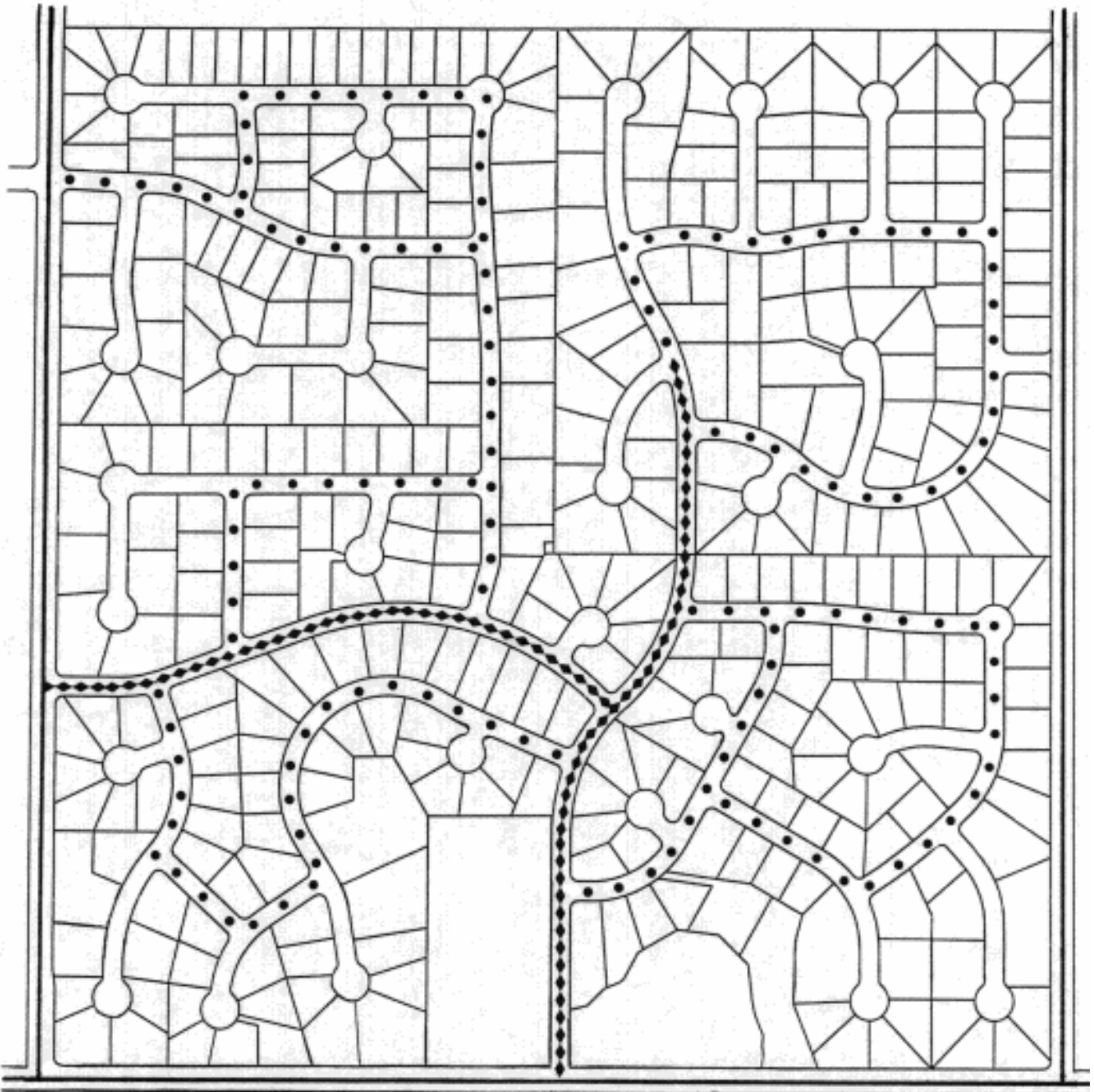
For developments or neighborhoods of moderate size or larger, the roads serving as primary access to and from the bordering arterial system should be considered for local road feeder classification with no direct lot access and abutting residences oriented away from it. Traffic generators, such as schools or churches, within residential areas should be considered within the local circulation pattern, not only from within the subdivision, but from adjacent neighborhoods as well.

There should be a limited number of access points with the arterial roads that border the subdivision. Local roads should be designed for relatively uniform low volume of traffic upon full development, particularly for Local Road Minor and Cul-de-sacs. The system should be designed to discourage excessive speeds and should minimize the necessity for traffic control devices. Internal roads with direct lot access should be discontinuous so as to discourage through traffic.

- A. A Local Road Feeder serves as primary access to the development from the adjacent street system. It distributes traffic from the Local Road Minor in residential neighborhoods and channels it to the arterial system. There are usually no bus routes, with the exception of possible school buses. There is no direct lot access from local road feeders. It directly serves any major traffic generators within the neighborhood, such as an elementary school or a church. It usually serves one moderate size neighborhood or a combination of a few small developments, rather than interconnecting two or more larger neighborhoods. It serves little, if any, through traffic generated outside the neighborhood. Typical ADT may

range from about 400 to 1,500 vehicles per day. Abutting residences are oriented away from the feeder road.

- B. A Local Road Minor provides direct access from abutting land to the Local Road Feeder. There are usually no bus routes on local road minors. They are typically an internal subdivision road providing circulation within the subdivision or between subdivisions. Service to through-traffic is deliberately discouraged. A Local Road Minor is designed so that it can never become a higher classification roadway. Typical ADT may range from about 300 to 1,000 vehicles per day.
- C. A Local Road Cul-de-sac is an internal subdivision road with a single outlet. It is less than 700 feet in total length as measured along the roadway centerline from the center of the cul-de-sac to the nearest right-of-way line extension of the first intersection, excluding "L" intersections. Direct lot access is provided from the stem and the bulb. It serves less than 21 residences and has a typical ADT of 200 vehicles per day or less. A Local Road Cul-de-sac is designed so that it can never become a through road or a road of a higher classification.



KEY

- Arterial
  - Local Road Feeder
  - • • • Local Road Minor
- remaining roads are local road cul de sacs

**Figure 2-1**

## 2-2 Right-of-Way

The road right-of-way width shall be determined by the roadway characteristics involved in the design. However, pursuant to RCW 36.86.010, the Pierce County Council has set the minimum right-of-way width to be 60 feet, except a local road may utilize a 50-foot wide right-of-way provided all utilities are located underground. The minimum right-of-way width for a local road located within a plat may be reduced to 40 feet, provided a non-exclusive utility easement is provided abutting the right-of-way on one or both sides such that the total width of right-of-way and easement be no less than 60 feet, or 50 feet when all utilities are located underground.

In addition, it is recommended that the minimum right-of-way widths used for the design of arterial roads be as follows:

<u>Arterials</u>	
Major.....	80 feet
Secondary.....	70 feet
Collector.....	60 feet

Additional right-of-way or easements may be necessary to accommodate the roadway construction. In any event the final right-of-way width shall exceed the roadway width by a minimum of 4 feet on each side.

## 2-3 Design Vehicle

The physical characteristics of vehicles and the proportions of variously sized vehicles using the road system are positive controls in geometric design. Therefore, it is necessary to examine all vehicle types, select general class groupings, and establish representatively sized vehicles within each class for design use. Design vehicles are selected motor vehicles with the weight, dimensions, and operating characteristics used to establish road design controls for accommodating vehicles of designated classes. For purposes of geometric design, each design vehicle has larger physical dimensions and larger minimum turning radius than those of almost all vehicles in its class.

Three general classes of vehicles have been selected, namely, passenger cars, trucks, and buses/recreational vehicles. The passenger car class includes compacts and subcompacts plus all light vehicles and light delivery trucks (vans and pickups). The truck class includes single-unit trucks, truck tractor-semitrailer combinations, and trucks or truck tractors with semitrailers in combination with full trailers. Buses/recreational vehicles include single unit buses, articulated buses, school buses, motor homes, and passenger cars or motor homes pulling trailers or boats. In addition, where provision is made for bicycles on a road, the bicycle should also be considered a design vehicle.

The dimensions for 15 design vehicles representing vehicles within these general classes are given in the AASHTO Green Book. In the design of any road facility the largest design vehicle likely to use that facility with considerable frequency or a design vehicle with special characteristics that must be taken into account in dimensioning the facility is used to determine

the design of such critical features as radii at intersections and radii of turning roadways. Design vehicle profiles can be determined from the dimensions in the AASHTO Green Book.

Although the Engineer should develop a design in accordance with the anticipated composition of traffic likely to use the facility, the typical design vehicle using AASHTO Green Book nomenclature for each road class is as follows:

<u>Arterials</u>	
Majors .....	Bus/WB-50
Secondary.....	Bus/WB-50
Collector.....	SU/Bus
<u>Local</u>	
Feeder.....	SU/P
Minor .....	P
Cul-de-sac .....	P

## 2-4 Design Speed

Geometric design features of a road facility should be consistent with the design speed appropriate for the facility. It should be noted, however, that the design speed does not necessarily represent the anticipated operating or posted speed.

The Design Speed for each road class is as follows:

<b>Arterials</b>	<b>Urban</b>	<b>Rural</b>
Major .....	45 mph .....	45 mph
Secondary.....	40 mph .....	45 mph
Collector.....	35 mph .....	40 mph
<b>Local Road</b>		
Feeder .....	30 mph .....	30 mph
Minor .....	25 mph .....	25 mph
<b>Cul-de-sac</b>		
Stem over 250 feet in length .....	25 mph .....	25 mph
250 feet or less in length .....	20 mph .....	20 mph

## 2-5 Traffic Characteristics

**2-5.1 Trip Generation** *Trip Generation*, as published by the Institute of Transportation Engineers shall be used when developing traffic generation volumes.

**2-5.2 Design Volumes** Roads and streets should be designed for a specific traffic volume range, using the projected ADT for some future design year, preferably 20 years hence. Current and future land use trends should also be considered in making these decisions. On some low volume facilities, traffic volumes may not normally change

significantly for the foreseeable future. In an urban environment these would typically be relatively short streets that are not likely to be extended. In rural areas they most likely would be remote agriculture or natural resource access roads where there is little or no likelihood of land use change.

**2-5.3 Capacity - Level of Services** *Circular 209 - Highway Capacity Manual* shall be used when analyzing capacity of roadway or intersection operation. Left turn pockets and left turn lanes shall utilize Highway Research Record (HRR) 211 methodology for analysis of needs at unsignalized intersection locations.

**2-5.4 Truck Facilities** Truck turning radii as detailed in the AASHTO Green Book should be provided where significant volumes of heavy trucks are expected. Truck climbing lanes, where warranted, shall be provided as detailed in the AASHTO Green Book.

**2-5.5 Bus Turnouts** If required by the County, bus turnouts shall conform to the design requirements of the County Engineer.

## 2-6 Pedestrians

Pedestrian facilities should be provided where significant numbers of children are walking to and from school, or where other pedestrian traffic warrants, such as in commercial areas of Major Urban Centers or Community Centers. Section 17B.30.040 of the Pierce County Code requires sidewalks be provided in all new urban developments located in urban growth areas.

**2-6.1 Sidewalks** Curb ramps shall meet the requirements of the Americans with Disability Act and conform to the design requirements of the County Engineer.

**2-6.2 Walkway and Trails** Walkway and trails are not normally expected, except in situations where the facility is part of an adopted plan. If required by the County, such a facility design shall be coordinated with the County Engineer in order to receive specific design direction and parameters.

## 2-7 Bicycles

Bicycle facilities are not normally expected except in situations where the facility is part of an adopted bicycle trail plan. It may be necessary to provide a widened lane or shoulder, appropriate drainage grates, or other bicycle facilities as required by the County's Non-Motorized Transportation Plan. If required by the County, such a facility design shall be coordinated with the County Engineer in order to receive specific design direction and parameters.

## **2-8 Safety**

When designing a road for new construction or reconstruction, the Engineer must keep in mind the desire to provide opportunities to enhance safety of the roadway operation. This is particularly important when designing minor reconstruction, resurfacing, restoration, or rehabilitation projects on existing roads.

Potential safety enhancements can be achieved through examining the following possibilities:

- Upgrading existing design elements such as alignment, grades, widths, sight distance, clearances, bridges, and the pavement structure including surface texture.
- Upgrading existing operational features such as traffic control devices, left and right turn lanes, and pedestrian/non-motorized element accommodations that provide for the safe and efficient movement of vehicles and pedestrians/non-motorize elements.
- Reducing the potential hazard of existing roadside features such as side slopes, ditches, drainage facilities, trees, and other features adjacent to the road.
- Upgrading bridge safety features such as bridge rails, approach rails, connections, and terminals.

## **2-9 Environmental**

An environmental checklist shall be submitted to the County Environmental Official for the work shown on the road and/or storm drainage construction plans submitted to the County for review and approval unless the proposed work is part of a project for which an environmental checklist has already been submitted or the work is categorically exempt per Pierce County Environmental Regulations, Chapter 17.08 or Chapter 197-11 WAC. An environmental determination must be issued for the work and any comment period and appeal periods must have expired before the project plans are given final approval by the County.

## **2-10 Economic Analysis**

While economic analysis is not in itself a design element, the concept is important when dealing with the design of a low volume road and street. While it might be desirable from strictly an engineering viewpoint to construct or reconstruct all improvements to full design standards, the reality is that there are not nearly enough funds available at the local level to do so. Federal fuel tax funds are available for construction on designated arterials only and must be matched with local funds. Most state fuel tax special programs funds are similarly earmarked for construction on designated arterials with local matching funds required. No special program funds are available for routine maintenance activities.

The Engineer must apply some sort of economic analysis to each project and determine how to strike the best balance between the desired design standards, the safety and mobility of the traveling public, and the available funds. The exact manner in which such an analysis is done is up to the professional judgment and experience of the Engineer and should be appropriately documented.



## Chapter 3 Roadway Geometrics

### 3-1 Sight Distance

The AASHTO Green Book contains a discussion of the factors and assumptions associated with the calculation of stopping, passing, and intersection sight distance. Stopping sight distance is a vital consideration for both urban and rural situations. Passing sight distance will likely be pertinent only in rural arterial situations. Intersection sight distance must be considered in light of the terrain in which the facility is located, and in urban situations to what extent parking is permitted. Where the improvement contemplates some kind of pavement, the simplest approach is to base the design on stopping sight distance and intersection sight distance, and to control passing situations with appropriate striping.

Stopping Sight Distance shall be available throughout all horizontal and vertical curves.

Minimum Stopping Sight Distance (SSD) shall be designed for wet pavement as follows:

Design Speed (mph)	20	25	30	35	40	45
SSD (feet)	125	150	200	250	325	400

Values are based on an object height of 0.5 feet and a driver's eye height of 3.5 feet.

The effects of grade must be accounted for through the use of a correction factor for grades steeper than 3% as follows:

Design Speed	Increase (feet) for Downhill		
	3%	6%	9%
20 mph	10	20	30
25 mph	15	30	45
30 mph	20	40	70
35 mph	25	55	
40 mph	30	70	
45 mph	40	90	

Entering Sight Distance must be equal to or exceed the required entering sight distance listed below for the legal posted speed limit. Sufficient entering sight distance in each direction along a public or private road, or from a major or minor driveway must be provided to permit vehicles to safely enter the roadway. Entering Sight Distance for all movements shall be designed for the posted speed of the facility being entered as follows, unless unusual design or safety

considerations warrant increased sight distance requirements as determined by the County Engineer:

Postal Speed (mph)	25	30	35	40	45
ESD (feet)	295	355	415	470	530

Values are based on drivers eye height of 3.5 feet set back at least 10.0 feet from the edge of traveled way and an object height of 4.25 feet as illustrated in Details C-1 and C-2 in Appendix "C". Entering Sight Distance must be calculated for situations that involve road approach grades in excess of 6% to account for the reduction in vehicle acceleration and deceleration.

In situations where the entering sight distance is questionable, the County Engineer may require the Engineer to prepare an entering sight distance diagram, together with appropriate field measurements, and submit them for review prior to the approval of the construction plans. The diagram and measurements shall be stamped and signed by the Engineer.

Exiting Sight Distance for vehicles on the major road to view an oncoming vehicle traveling at the speed limit and turn safely onto a minor road or driveway shall be made available. Design analysis should be similar to that used for Entering Sight Distance.

Passing Sight Distance shall be provided for where determined by the County Engineer.

### 3-2 Horizontal

The road construction centerline must match as much as possible the right-of-way centerline, unless otherwise approved by the County Engineer.

On most roads, especially those classified as local roads where design speeds are in the 20-25 mph range, short radius curves may be tolerated and the superelevation may not be necessary. On roads where design speeds may be over 35 mph, horizontal alignment becomes a most important consideration. Each individual road, however, is unique and must be carefully evaluated to ensure appropriate alignment. The computations involving curve radius and superelevation are important elements in the design process and are well detailed in the AASHTO Green Book.

The design for horizontal curvature shall be determined using the following formula:

$$R_{\min} = V^2/15 (e+f)$$

Where  $R_{\min}$  = minimum radius

V = Design speed

e = Superelevation

f = Maximum side friction factor

The design shall conform to the use of the following maximum side friction factor values:

Design Speed	Rural	Urban
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(mph)	"f"	"f"
20	0.170	0.300
25	0.165	0.252
30	0.160	0.221
35	0.155	0.197
40	0.150	0.178
45	0.145	0.145

The normal roadway crown slope for new construction is 2% unless the road is in superelevation or an intersection design requires a varying slope. When widening of an existing road is being done, a maximum of 4% cross slope will be permitted. Grinding and/or overlaying as applicable will be required if the cross slope will exceed this amount. The maximum superelevation rates "e" are as follows:

Road Class	Max "e" (feet/foot)
Major	0.04
Secondary	0.04
Collector	0.04
Feeder	0.02
Minor	0.02
Cul-de-sac	No super allowed

Superelevation is not recommended for use on non-arterials. When superelevation is used, the required superelevation runoff length shall be provided in accordance with AASHTO Green Book, and distributed in accordance with Design "A" contained in the WSDOT *Design Manual*.

Curve widening shall be considered and design, when warranted, in accordance with the AASHTO Green Book.

### 3-3 Vertical

In an urban curbed low volume street situation the minimum acceptable grade to assure proper drainage is an important consideration. Tolerable maximum grades will vary with road use. A steeper grade may be acceptable on an urban residential street than on a rural road serving heavy trucks. Intersections on steep grades should be avoided whenever possible, especially in areas with recurring snow and ice problems. In urban areas ease of access for emergency vehicles is also to be considered when establishing grades. For rural projects, the AASHTO Green Book includes tables of maximum grades related to design speed and terrain. The design of crest and

sag vertical curves is related to design speed and is important in rural projects with higher design speeds. The AASHTO Green Book is the best source for this process and for the integration of vertical and horizontal curvature.

**3-3.1 Grade** The maximum gradient on any new or reconstructed road shall not exceed the following:

<u>Arterials:</u>	
Major .....	8%
Secondary .....	8%
Collector .....	10%

<u>Local Road:</u>	
Feeder .....	10%
Minor .....	12%
Cul-de-sac Stem .....	15%
Cul-de-sac Turnaround .....	6%

The centerline and gutterline gradient of any road shall not be less than 0.7% when an asphalt concrete gutterline is used, and not less than 0.4% when a cement concrete gutterline is used. The centerline gradient of any road shall not be less than 0.7% when drainage is not contained.

All changes in grade greater than 1% shall be connected by a vertical curve.

**3-3.2 Curves** Vertical Sag Curve design shall be based on an assumed non-illuminated roadway's visibility which should be long enough so that the automobile light beam distance is nearly the same as the stopping sight distance. Vertical Crest Curve design shall be based on stopping sight distance for wet pavement. All vertical curves shall be designed per the AASHTO Green Book. All vertical curves must be symmetrical parabolic curves. Design speeds for vertical curves located within the area controlled by a STOP sign can be reduced in accordance with the anticipated speed of the vehicle approaching the STOP control.

## Chapter 4

# Roadway Elements

### 4-1 Drainage

All roadways must have adequate crown or adequate cross-slope to get water off the roadway. Careful cross-slope design is especially important at the ends of horizontal curves with superelevation and at intersections. It must be recognized that many drainage ditches and headwalls are usually in the clear zone, or recovery area, which is an important roadway safety feature. In curb and gutter situations, especially where grades are at or near recommended minimums, the location and design of inlets becomes very important.

All drainage elements associated with the roadway design and construction or draining into or out of the roadway and within the project boundaries shall be designed in accordance with the requirements of Pierce County Code Title 17A and the Pierce County Stormwater Management and Site Development Manual.

### 4-2 Utilities

All public or private utility installations shall conform to the requirements outlined in the *Manual on Accommodating Utilities in Pierce County Right-of-Way* as adopted in Pierce County Code 17B.10.060.

It will be the Engineer's responsibility to contact all utilities to see that the utilities are located in accordance with these or other adopted standards and that the installation work is coordinated with the road construction work.

Improper location or construction of utilities will be sufficient reason for the refusal of the County to accept a road for dedication and maintenance.

Utility trenching or transverse cuts in new County roads will be discouraged. They will not be permitted unless it can be shown that alternatives such as boring or jacking or relocating outside the paved roadway area is not feasible unless the utility can be installed just prior to reconstruction or overlay of the road.

Utility patches shall be constructed in accordance with the standards set forth in the *Manual on Accommodating Utilities in Pierce County Right-of-Way*.

### 4-3 Pavement

Paving and subgrade material for non-arterial roads shall be made up of a minimum of 2 inch compacted depth of asphalt concrete Class "B", 2 inch compacted depth of crushed surfacing top course, and 6 inch compacted depth of gravel base. Paving and subgrade material for arterial

roads will be based on a pavement design analysis made by the Engineer. Supporting design criteria and calculations must be submitted to verify the design, however, in no case shall the design be less than that required for non-arterial roads. Paving for all roads shall be asphalt concrete Class "B."

Pavement design for a major arterial road shall be for a 30-year performance period. Pavement design for all other arterial roads shall be for a 20-year performance period. Design criteria and standards established by AASHTO, WSDOT, the Asphalt Institute, or other nationally recognized organizations may be used to determine paving and subgrade depths and types of materials for the roadway section. Non-destructive testing or a falling weight deflectometer or a modulus value established by a geotechnical engineer should be used to determine the materials characterization of the existing soils conditions for the pavement design

#### **4-4 Lane Widths**

All through travel lanes shall be 12 feet wide for two and three lane roadways and 11 feet wide for multi-lane roadways and two-lane local road cul-de-sac roadways.

Exclusive turn lanes or two-way left-turn lanes shall be 12 feet wide, or as directed by the County Engineer.

Widened curb lanes, when required, shall be 15 feet wide for two- and three-lane roadways, and 14 feet wide for multi-lane roadways.

A combination of lane width and shoulder area of 20 feet in width shall be used when a two-lane roadway includes a raised median as provided in Section 4-8.

Single egress lanes on an arterial road, for traffic leaving a roadway intersection, shall have an initial width of 15 feet, tapering to the normal lane width in 100 feet. Egress lanes accepting double left turn or right turn lane movements shall be widened consistent with tracking of the design vehicle for the intersection.

#### **4-5 Shoulders**

Shoulders, when required by the County Engineer shall be 6 feet wide, measured from the back of curb when a curb section is used, and shall be 6 feet wide measured from the outside of the outside lane, when no curb is used.

#### **4-6 Curbs**

Asphalt concrete raised edges and asphalt concrete barrier curbs must be constructed integrally with the pavement construction. Acceptable curb designs for these and cement concrete curb and gutter, and cement concrete rolled curb are provided for by the County Engineer. Curb and gutters are required by Section 17B.30.040 of the Pierce County Code, in all new urban

developments located in urban growth areas of Pierce County on both sides of any newly constructed road.

## **4-7 Sidewalks and Pathways**

Cement concrete sidewalks, walkways, and trails (see Section 2-6), when used, shall conform to design parameters and direction provided by the County Engineer. Sidewalks are required by Section 17B.30.040 of the Pierce County Code, in all new urban developments located in urban growth areas of Pierce County on both sides of any newly constructed road. Storm drain percolation systems shall not be permitted under any sidewalk, walkway, or trail.

## **4-8 Buffers and Medians**

A buffer is that area between the back of curb and near edge of sidewalk or walkway. The maximum width shall be 12 feet and the minimum width shall be 4 feet. The maximum height of vegetation, except for street trees, placed in a buffer shall be 18 inches above the top of curb provided no safety related concern is created. Street trees conforming to the type and size outlined in PCC 18A.35.030 Landscaping and Buffering, are allowed within the buffer area on a local road within the boundary of a plat provided no safety or visibility related concern is created. Street trees are not allowed within the buffer area on an arterial road without the permission of the County Engineer. The County Engineer shall not allow placement of street trees within the buffer area if safety or visibility concerns exist. Storm drain percolation systems shall not be permitted under or within any buffer.

A median is that raised area within the roadway separating opposite direction of vehicular traffic. The maximum width of any median shall be 16 feet from back of curb to back of curb. The maximum height of medians shall be 18 inches above the top of curb. The maximum height of vegetation, except for street trees, placed in the median shall be 24 inches above the top of the curb. Street trees are allowed within the median on a local road within the boundary of a plat, provided the trees conform to the type and size outlined in PCC 18A.35.030 Landscaping and Buffering. The County Engineer shall not allow placement of street trees within the median area if safety or visibility concerns exist. Where the median is privately owned from back of curb to back of curb, installation of privately-owned irrigation systems are acceptable provided the irrigation water meter must be located within the median. The minimum length for a median is 200 feet. Storm drain percolation systems shall not be permitted under or within any median.

## **4-9 Clear Areas**

The designer must be aware of the extensive tables of recommended clear zone distances both in the AASHTO Green Book and LAG Manual. It must also be recognized, however, that serious accidents on low volume roads, especially on those below 200 ADT, are rare occurrences. At this low end of the scale, the cost of providing the recommended clear zone may be prohibitive. Research undertaken to re-evaluate the safety needs on low volume rural roads states that the suggested values for side slopes and clear zones should be recognized as idealistic objectives and that a more realistic approach to roadside safety on low volume roads should depend on achieving a balance between the cost and the safety effectiveness of the design treatment.

It is further stated that, while the application of such an analysis to low volume roads indicates that individual roadside safety treatments yield very small safety contributions, some low cost improvements do appear to be cost effective especially on the outside of curves. The removal of certain trees and relocation of utility poles are recommended. Also cited as being cost effective are the placement of guardrail on steep slopes, removal of unnecessary guardrail on flat slopes, and the flattening of steep but low embankments. In this regard it is most important that the designer is aware not only of pertinent published recommendations, but also of research done subsequent to their adoption. In the final analysis the designer must apply his or her own professional judgment in making the final design decisions, and be prepared to defend and justify them if necessary.

## **4-10 Roadside Control**

**4-10.1 Cut/Fill Slopes** Side slopes shall be constructed no steeper than 2 H:1 V for curbed sections and 4 H:1 V on shoulder sections on fill slopes and 1 H:1 V on cut slopes. Flatter slopes are preferred and will be required if there are indications that the earth is unstable and subject to sliding, sloughing, or erosion. Fills are to be constructed using materials, compaction methods, and construction techniques so that stable fills are created.

Side slopes shall be stabilized by grass sod, hydroseeding, by other planting, or surfacing materials, or by the use of other material types acceptable to the County. Side slopes may also have to be flattened to accommodate utility placement. Placement of utilities outside of their standard location as per other adopted standards due to steep side slopes shall not be permitted. Side slopes higher than 15 feet shall be terraced with 5 feet minimum wide bench for every 15 feet of vehicle height, sloped to drain properly.

**4-10.2 Mailboxes** Mail boxes shall be installed in such a manner as to be placed as far removed from the driving portion of the right-of-way as possible.

**4-10.3 Landscaping** Street trees and other vegetation over 18 inches in height located within the County right-of-way for a local road within the boundaries of a plat shall be placed a minimum of 6 feet back from the gutter line when a curbed section is used and shall be placed a minimum of 6 feet back from the back of shoulder when no curb is used. Street trees and other vegetation over 18 inches in height located within the County right-of-way for an arterial or local road not within the boundaries of a plat shall be placed a minimum of 12 feet back from the gutter line when a curbed section is used and shall be placed a minimum of 12 feet back from the back of the shoulder when no curb is used. Street trees shall conform to the type and size outlined in PCC 18A.35.030 Landscaping and Buffering. Street trees shall be placed a minimum of 3 feet from any paved surface. Additionally, street trees used within County right-of-way shall not conflict with overhead utilities, traffic control devices, sight distance or visibility requirements, and root development shall not conflict with underground utilities, pavement, curbs, sidewalks, walkways, trails, or storm drainage facilities. Irrigation systems not specifically permitted or licensed by the County Engineer must be installed on private property.

**4-10.4 Guardrails** AASHTO, *Roadside Design Guide*, and WSDOT's design manuals should be used as a guide to determine the need for guardrail and for the design.

If it has been established that guardrail is justified on a particular improvement the designer must determine the best location, type of construction, and post-spacing that would be most appropriate for the function and anticipated traffic volume of the facility. The designer should be aware that warrants and designs developed for high volume, high speed facilities are not necessarily appropriate for low volume and/or low speed locations.



## Chapter 5

# Access and Intersections

### 5-1 Access Control

Intersection location, spacing, and design are fundamental to the management of access and preservation of capacity provided for in the roadway design. The functional classification of each roadway addresses the appropriate level of access control for that roadway. The County Engineer may require the Engineer to furnish an access plan that will be used by the County to review what impact the proposed access will have on the County road system.

For proposed access approaches on to any road, the intersections created are classed into two types, roadways and driveways. Driveway design criteria are to be used for residential, minor or major driveway approaches as outlined below. Roadway intersection design criteria are to be used whenever an approach roadway intersects another road, or if traffic signalization is warranted as defined in the current edition of the *Manual on Uniform Traffic Control Devices*. All roadway intersections, public or private, will use roadway intersection design criteria.

When a three or more lane approach is requested, a traffic engineering study along with a signing, striping and traffic channelization plan shall be completed by the Engineer.

The adequacy of all criteria given in this section to the particular situation in question should be checked by a proper engineering analysis. These criteria are minimum guidelines only and may be modified according to traffic volumes and mix, topography, design speed, design vehicle requirements, and other conditions.

**5-1.1 General Criteria** The County Engineer shall provide specific geometric requirements for residential driveway approaches, minor driveway approaches, and major driveway approaches which are contained in Chapter 9. Roadway and driveway approaches, public or private, should be designed so as to provide adequate entering sight distance in both directions on the roadway being accessed (see Details C-1 and C-2 in Appendix "C"), and so as not to interfere with drainage.

For both roadway and driveway intersections, the following general design criteria for roadway and driveway intersections also shall apply:

- A. Intersections should not be located on or near sharp curves, i.e., curves with radii close to the AASHTO Green Book minimums. Intersections should be located sufficient distance from all curves to provide proper sight distance for vehicles on the intersecting road or driveway and on the through road.
- B. Multi-leg intersections (i.e., those with more than four legs) are not permitted within local road networks. In local road networks "T" and "L" intersections only are encouraged. For arterial access, four-leg intersections are encouraged.

- C. Whenever a potential feasible access exists to any property from two or more roads, the County Engineer may refuse access to the higher classified road.
- D. Wherever a potential feasible access exists to any property from both a public road and private easement, the County Engineer may refuse access to the public road.
- E. New access locations internal to the platting of property shall be unified whenever possible to create the fewest number of access points onto a road if they access roads of a classification higher than a local road minor. Lots of record in existing formal plat subdivisions, short plats and large lots not served by a minor or major driveway shall be permitted a minimum of one residential driveway.
- F. The intersection of two local roads should be designed to operate without any traffic control device (e.g., Stop or Yield signs) whenever possible.
- G. Intersections within the subdivision should be of the "T" type; for lower speed facilities of minor or cul-de-sac classification "L" type intersections are acceptable. Four legged intersections within the subdivision must receive the approval of the County Engineer.
- H. Access to corner lots should be from the lesser-classified road, at the greatest distance possible from the intersection.
- I. The number of intersections should be minimized as much as possible, particularly as classification of the affected roads increases. Intersection spacing should be maximized wherever possible.
- J. All gates shall meet the requirement outlined in Title 17B of the Pierce County Code. Gates on residential driveways or minor driveways used for access to Shared Access Facilities must be set back from the right-of-way line a minimum of 20 feet. Gates on private roads, minor driveways for multi-family or commercial uses, or major driveways must be set back from the right-of-way line by a minimum of 60 feet in which adequate turn-around area shall be provided for vehicles that are not allowed to enter the gate. All gates shall meet emergency vehicle access requirement for gates as provided in Title 17C of the Pierce County Code.

Notwithstanding the requirements of this section, the number and location of intersections may be more restrictive than described herein if deemed necessary by the County Engineer. The County Engineer shall base the determination on existing and projected traffic volumes and channelization and signalization on the existing County road, traffic, and turning movements generated by the existing and/or proposed project(s), and other applicable traffic design criteria, as well as other driveways in the vicinity of the proposed access approach, the amount of lot frontage along the road, and channelization/traffic control.

**5-1.2 Spacing** In order to minimize the number of conflicts between vehicles entering and existing the roadway and vehicles traveling along a roadway, the Engineer should maximize the distances between driveways along the roadway.

The minimum spacing distance for non-residential driveway approach to any roadway is 125 feet. As well, minimum distances between roadways, measured from the centerline of the roadway at the extension of the right-of-way line, should apply for either same side or opposite sides of the primary street:

Local Roads Intersecting Local Roads .....	125 Feet
Local Roads Intersecting Arterials .....	250 Feet
Arterials Intersecting Arterials .....	1/4 Mile

## 5-2 Driveways

No person, party, firm, corporation, or entity shall construct, repair, alter, maintain or use any approach from any abutting property to any public or private road located in unincorporated Pierce County, permanently or on a temporary basis, without first obtaining or having a Driveway Approach Permit from the County Engineer. A copy of each Driveway Approach Permit shall be available for inspection at the site during the life of the permit. Any change of use or any improvement that increases the traffic volumes using an existing road approach, will require the obtaining of a new Driveway Approach Permit and must otherwise comply with all standards.

Driveways are deceptively simple in appearance and often do not receive the design consideration that they merit. Commonly overlooked design issues include inadequate radii at the intersection with the roadway, excessive approach grades and grade changes within the driveway approach area, inadequate width, and inadequate entering sight distance.

Driveway design needs to address the type of vehicle composition anticipated, traffic volume, and land use activities being accessed. Driveway placement needs to be carefully determined to minimize interference with normal roadway operation. Driveways need to be constructed where entering sight distance in conjunction with driveway access would be adequate for safe traffic operations. Closely spaced driveways are discouraged.

The design of the driveway approach is broken into three general classifications which are, Residential Driveway Approach, Minor Driveway Approach, and Major Driveway Approach.

A Residential Driveway Approach is used to serve up to two single family residences or one duplex unit. A Minor Driveway Approach is used for a single driveway approach which serves a shared access facility. The design criteria for the shared access facility created by this usage shall conform to the requirements contained in Pierce County Code 17B.20. A Minor Driveway Approach is used for multi-family and commercial uses with an approach traffic volumes of up to 1,500 vehicle trips per day or up to 150 vehicles trips per peak hour. A Major Driveway Approach is used to serve multi-family and commercial uses with an approach traffic volume of 1,500 or more vehicle trips per day or 150 or more vehicle trips per peak hour. When multi-access points are desired to serve one site then each driveway approach should conform to the applicable use criteria.

**5-2.1 Residential Driveway Approach** Residential Driveway Approaches shall be constructed in accordance with the specific geometric requirements provided by the County Engineer. Grading and restoration of the driveway beyond the end of the driveway approach shall be done to provide a smooth, passable, and safe transition to the existing facility.

Residential Driveway Approaches shall be constructed the maximum practical distance, but in no event, less than thirty-five feet from an arterial or local road feeder intersection; or less than twenty-five feet from a local road minor or cul-de-sac intersection. The distance is measured along the property line from the intersecting road right-of-way line to the nearest edge of the driveway width. All Residential Driveway Approaches which serve two lots or a duplex on one lot must be constructed to the maximum width as specified in the specific geometric requirements provided by the County Engineer.

**5-2.2 Minor Driveway Approach** Minor Driveway Approaches shall be constructed in accordance with the specific geometric requirements provided by the County Engineer. Grading and restoration of the driveway beyond the end of the driveway approach shall be done to provide a smooth, passable, and safe transition to the existing facility.

Minor Driveway Approaches must be located a minimum of 125 feet from an intersection, except where physical site conditions and spacing of existing driveway approaches may cause the County Engineer to require another location. The 125 feet is measured along the property line from the intersecting road right-of-way line to the edge of the driveway width. New driveway approaches that would create a four-legged intersection are undesirable except on roads which have an arterial classification. Access to a corner lot with a frontage less than 155 feet in width will be established on a case-by-case basis by the County Engineer and the driveway approach shall be placed at such a location to maximize safety.

**5-2.3 Major Driveway Approach** Major Driveway Approaches shall be constructed in accordance with the specific geometric requirements provided by the County Engineer. Grading and restoration of the driveway beyond the end of the driveway approach shall be done to provide a smooth, passable, and safe transition to the existing facility.

Major Driveway Approaches must be located a minimum of 125 feet from an intersection, except where physical site conditions and spacing of existing driveway approaches may cause the County Engineer to require another location. The 125 feet is measured along the property line from the intersecting road right-of-way line to the edge of the driveway width. New driveway approaches that would create a four-legged intersection are undesirable, except on roads which have an arterial classification. Access to a corner lot with a frontage less than 155 feet in width will be established on a case-by-case basis by the County Engineer and the driveway approach shall be placed at such a location to maximize safety.

The number, location, and size of Major Driveway Approaches shall be determined by the volume and type of traffic generated by the development, other driveway approaches in the vicinity of the proposed approach, the amount of lot frontage along the road, and channelization/traffic control on the road along the lot frontage. When multiple Major Driveway Approaches to one parcel or development are permitted, they shall not be less than 125 feet apart, measured from centerline to centerline. A minimum of two driveway

approaches (combination of minor and/or major) will be required for developments that will generate 3000 ADT or more unless other mitigating measures are approved by the County Engineer.

**5-2.4 Construction Criteria** The outer edge of a driveway approach shall not be constructed closer than 70 feet to a bridge, culvert, or other structure that may warrant end protection using guard-railing in accordance with the most current criteria adopted by the Washington State Department of Transportation.

All driveway approaches shall be paved to the right-of-way line or 3 feet beyond the end of the radius, whichever is greater, with a minimum of 2 inch compacted depth of asphalt concrete over 2 inch compacted depth crushed surfacing top course, or 6 inch Portland Cement concrete, if the existing road is paved. If the existing road is gravel, a driveway constructed of 4 inch compacted depth crushed surfacing top course is acceptable.

Driveway approaches on Anderson Island may be constructed of bituminous surface treatment, Class A, in accordance with the latest edition of the *Standard Specifications for Road, Bridge, and Municipal Construction*, as published by the Washington State Department of Transportation.

Access from the driveway to the abutting property shall be controlled along the driveway from the end of the driveway radius into the property for a distance of 80 feet on a major driveway approach and 20 feet on a minor driveway approach.

The minimum distance between the paved edge of a driveway approach and the face of an obstruction, including existing utility appurtenances which may cause a traffic safety concern may be no less than four feet without curbing and three feet with curbing on the approach. Obstructions located closer than these distances which may cause a traffic safety concern must be relocated.

**5-2.5 Temporary Driveway Approach** A Temporary Driveway Approach shall be constructed in accordance with the requirement contained in the Pierce County Stormwater Management and Site Development Manual. Grading and restoration of the driveway beyond the end of the driveway approach shall be done to provide a smooth, passable, and safe transition to the existing facility.

Prior to the approval of a Temporary Driveway Approach, a financial guarantee must be submitted in an amount established in Chapter 17A.20 of the Pierce County Code, sufficient to cover all costs of removing the temporary driveway approach and restoring the right-of-way. No site work may commence until a permit for the temporary driveway approach has been issued by the County Engineer and the temporary driveway constructed.

All temporary driveway approaches must be removed and the right-of-way restored within ninety days from the date of its approval. One extension of this time limit may be granted in writing by the County Engineer for a period not to exceed ninety days.

## 5-3 Roadway Intersections

Roadway intersection guidelines encourage the preservation of capacity and safe operation of roadways. The following subsections provide the guidelines for roadway intersection location and design.

**5-3.1 Angles** Proposed roads must intersect one another at 90 degree angles or as close to 90 degrees as topography permits. If 90 degrees is not possible, the skew angle shall not vary more than 15 degrees from right angles without the approval of the County Engineer.

**5-3.2 Corner Radii** At road intersections, the following typical ranges of curb line radii are permitted:

Local Road - Local Road Intersection .....	25 Feet
Local Road - Arterial Intersection .....	25-30 Feet
Arterial - Arterial Intersection .....	35-45 Feet

Corner radii outside of the above ranges should be considered if the anticipated composition of traffic warrants such a need.

**5-3.3 Geometrics** When either of the road centerline profile grades within 35 feet of an intersection have a gradient of 8% or more, an intersection detail drawn to a scale of 1" = 20' must be included as a detail on the road construction plans. The detail will show spot elevations every 10-25 feet on the road centerline, around the curb return, and grate elevations for drainage structures in the intersection. The intersection plan must be clearly detailed to show flow line grades and how surface drainage will be controlled at the intersection. Curb return data for lesser gradients shall be shown on the road construction plans.

At the intersection of different classifications of roads (e.g. a secondary arterial with a collector arterial), the centerline slope and typical cross section of the higher classified road should be carried through the intersection with the lower classified road matching in a manner which will not interfere with the smooth movement of traffic in the travel lanes of the higher classified road.

Where two roads of the same classification intersect, the centerline grade shall be matched at the center of the intersection with cross slopes varying through the intersection to allow drainage. All classes of local roads shall be treated as the same classification for purposes of this paragraph.

Profile grades for all roads (public or private) intersecting onto a County road (existing or proposed) shall be designed and constructed so that adequate entering sight distance is available at the intersection.

**5-3.4 Islands and Turning Roadways** When necessary for the channelization of traffic at an arterial intersection the design of traffic islands and turning roadways should conform to the criteria contained in the AASHTO Green Book.

## **5-4 Railroad Crossings**

The roadway width across a railroad should be the same as the roadway width on each side of the crossing. Appropriate grade crossing controls should be provided (including advance warning signs) commensurate with the design speed of the facility and sight distance required. Maximum practicable sight distance at the crossing itself is desirable, especially on a mainline crossing where train speeds are high. Approval of any design affecting a railroad crossing shall be obtained from the Washington State Utilities and Transportation Commission prior to being approved by the County.



## Chapter 6 Structures

### 6-1 Bridges

Design of bridges, when required, shall be coordinated with the County Engineer in order to receive specific design direction and parameters.

Bridges shall be designed and constructed to meet the following criteria:

<b>Deck Width</b>	The minimum bridge deck width shall not be less than the design roadway width for the road being served. Roadway width includes lane width plus shoulder width. Bridge roadway width shall be measured between curbs or between face of rails, whichever is less, but in no case shall be less than 28 feet. Pedestrian facilities shall be provided on the bridge if adjoining roadway has or will have sidewalks or walkways. Additional widening shall also be provided for bicycles if the road is an established bicycle route.
<b>Loading</b>	HS 25-44.
<b>Vehicular Railing</b>	AASHTO Crash Tested Rail, or Approved Crash Tested Rail
<b>Pedestrian Railing</b>	AASHTO <i>Standard Specifications for Highway Bridges</i> .
<b>Approach Railing</b>	AASHTO Crash Tested Rail, or Approved Crash Tested Rail
<b>Vertical Clearance</b>	16.5 feet minimum over roadways. 23.5 feet minimum over railroads.

Requirements for utility accommodation shall be duly considered.

A new structure shall not create a backwater elevation rise of more than one foot. The bottom of the superstructure shall be a minimum of three feet above the 100-Year flood elevation. The aesthetic aspects of the bridge will be reviewed on a case-by-case basis.

### 6-2 Retaining Walls

For heights over 8 feet or when soil is unstable, a structural wall of acceptable design shall be used. A soils investigation and report by a geotechnical engineer may be required if soils conditions are questionable.

### **6-3 Rockfaces**

Rockfaces may be used for the containment of cut slopes or fill embankments up to a maximum height of eight feet if stable soil conditions exist.

The rock material shall be as nearly rectangular as possible with all rock extending through the wall. The rock material shall be hard, sound, durable, and free from weathered portions, seams, cracks, and other defects. The rock density shall be a minimum of 160 pounds per cubic foot.

Rock shall be placed to minimize voids and, in the exposed face of the wall, no open voids over 6 inches across in any direction will be permitted. The larger rocks shall be placed at the base of the rockery so that the wall will be stable. The rocks shall be placed so that the longitudinal axis of the rock shall be perpendicular to the rockface. The rocks shall have all inclining faces sloping to the back of the rockface. Each course of rocks shall be seated as tightly and evenly as possible on the course beneath. The final course shall have a continuous appearance and be placed to minimize erosion of the backfill material.

Backfill shall be placed to a 12-inch minimum thickness between the entire wall and the cut or fill material. The backfill material shall be placed in lifts to an elevation approximately 6 inches below the top of each course of rocks as they are placed, until the uppermost course is placed. Any backfill material on the bearing surface of a rock course shall be removed before setting the next course.

A 6-inch perforated drain pipe shall be installed behind the first course of rock and laid on original ground. Positive drainage for the perforated drain pipe shall be provided.

For rockface in fill sections all fill material placed beyond the backfill shall be placed and compacted in a maximum of 6-inch compacted lifts.

A chain link fence shall be required at the top of the rockface if the wall height exceeds 30 inches. A concrete cap is required at the top of the rockface, as directed by the County Engineer.

## Chapter 7

# Traffic Control and Lighting

### 7-1 Signs

All traffic signs must conform to the MUTCD, as modified by the Washington State Transportation Commission per RCW 47.36.030.

**7-1.1 Stop Signs** Stop signs shall be installed in accordance with the requirements of the County Engineer, on all local public road approaches to County arterials or State highways, all private road approaches to County arterial roads, and at other locations determined by the County Engineer as soon as the road under construction is opened to vehicular use. Placement of stop signs in County right-of-way shall be by General Right-of-Way Permit issued by the County Engineer or in accordance with approved road construction plans only.

**7-1.2 Street Name Signs** Street name signs for private road or driveway approaches shall be installed within County right-of-way in accordance with the requirements of the County Engineer. Street name signs for public roads will be provided and installed by the County Engineer.

### 7-2 Pavement Markings

Pavement markings are required on all County arterials and roadways having channelization, consistent with the requirements of the County Engineer. Roadway striping, buttoning or other traffic delineators shall be installed in accordance with the approved plans and the MUTCD, and the approved detail sheet.

The County Engineer reserves the right to do all striping, buttoning, and delineation work and charge the proponent for actual costs incurred by the County when said work does not exceed \$7,000.00. Reimbursement to the Department shall be made before the County accepts the overall project for dedication or maintenance and before the County releases any financial guarantee. The Engineer will indicate on the approved road construction plans that the County Traffic Engineer shall be contacted prior to construction to confirm the County's intent to do the work and charge the proponent or, if not feasible, require the proponent to do the work. If the County Engineer elects to do the work, the proponent will be required to submit a financial guarantee to the County in an amount established by the County before the work starts. Before any pavement marking work takes place, the Engineer shall contact the Pierce County Traffic Operations Center. An on-site meeting may be required to preview the work, markings, layout, and method of construction.

### **7-3 Signals**

Design of traffic signals, when required, shall be coordinated with the County Engineer in order to receive specific design direction and parameters.

### **7-4 Illumination**

Street lighting is provided as a means of further enhancing traffic safety at the following qualifying locations:

- A. Signalized intersections.
- B. When raised median channelization is installed within the traveled way of an arterial to separate opposing directions of traffic and guide or prohibit left turning traffic.
- C. As a part of major roadway construction or reconstruction projects, continuous street lighting on major and secondary County arterials that are in areas with a highly dense concentration of urban commercial development, and in areas that have a significant concentration of both commercial and high density multi-family development. Typical locations would be those areas adjacent to the County road system that are designated as Major Urban Centers or Community Centers by the County Comprehensive Plan.

Street lighting to be owned by Pierce County shall be designed by an Engineer, installed in accordance with the National Electrical Code, inspected by the Washington State Department of Labor and Industries, Electrical Inspection Division, or applicable electric utility. Design criteria and specifications shall be consistent with applicable standards outlined by the Washington State Department of Transportation as approved by the County Engineer.

At other locations, franchised electrical utilities are allowed to own, operate, and maintain street or area lights within the County right-of-way under the provisions of their franchise agreement with Pierce County. Private individuals or homeowner associations are not granted permission to install lights within the County right-of-way. Privately owned and maintained lighting shall be located on private property.

Street lighting is required by Section 17B.30.040 of the Pierce County Code, in all new urban developments located in urban growth areas of Pierce County at the following locations:

- A. Signalized intersections.
- B. Intersections controlled by a "Stop" or "Yield" sign.
- C. Uncontrolled intersections.
- D. The end of any cul-de-sac.

Street lighting required by Section 17B.30.040 of the Pierce County Code shall be located on private property or owned, operated and maintained by the franchised utility unless specifically approved in writing by the County Engineer.

## Chapter 8

# Permits, Specifications, and Construction Control

### 8-1 Permits

No person, party, firm, corporation, or entity shall conduct any construction activity within County right-of-way unless the work is in accordance with a valid General Right-of-Way Permit from the County Engineer pursuant to Pierce County Code 17B.10.100. To obtain a permit the Engineer shall make application at the Department of Public Work and Utilities - Transportation Services, Office of County Engineer. Application submittal will include a copy of the approved construction plans.

A copy of each General Right-of-Way Permit shall be available for inspection at the construction site during the life of the permit.

Fees for a General Right-of-Way permit application are set forth in Chapter 17B, Pierce County Code.

### 8-2 Specifications

All construction procedures, materials, and workmanship shall conform to the current edition of the *Standard Specifications for Road, Bridge, and Municipal Construction*, as amended by Pierce County.

When the Engineer determines that special conditions exist or nonstandard materials are needed, a Special Provision shall be written to accommodate that condition. The Special Provisions shall be made a part of the road construction plans and must be reviewed and approved by the County Engineer in conjunction with the road construction plans. In the event the Special Provisions are of such a magnitude or length that incorporation of these provisions into the construction plans is impractical, then a separate Special Provision document may be utilized, provided however, that a note identifying and referencing the Special Provisions document must be included on the cover sheet of the construction plans.

### 8-3 Traffic Control

All traffic control and traffic control devices shall be as specified in the latest edition of the MUTCD. If required by the County, the Engineer shall submit temporary traffic control plans for review and approval.

During the progress of the work, barriers and warning signs shall be erected and maintained by the Engineer as necessary or as directed by the County Engineer for the protection of the traveling public. The barriers shall be properly lighted when necessary.

## **8-4 Survey Control**

All existing survey control monuments which are disturbed, lost, or destroyed during surveying or construction shall be replaced by a Professional Land Surveyor (P.L.S.).

Survey control monuments shall be constructed as shown on the approved construction plans in conformance with the approved details for survey monuments. The location of the monuments shall be the responsibility of a P.L.S. who shall scribe the brass portion of the monument after construction in accordance with recognized good practice in land surveying.

Survey monuments shall be required at all intersections, at the Point of Curvature (PC) and Point of Tangent (PT) of all curves, centers of cul-de-sacs, and other appropriate locations as determined necessary by the County Engineer. Monuments at the PC and PT of the curve may be eliminated and replaced with a monument at the Point of Intersection, if the Point of Intersection falls within the paved roadway surface.

For formal recorded documents containing a surveyor's certificate, monumentation and staking shall be placed by the responsible surveyor in accordance with the certificate and the Survey Recording Act.

## **8-5 Changes to Approved Plans**

From time to time, field conditions encountered during construction require modification to the design contained in the approved construction plans. Prior to making any adjustments or changes to the approved construction plans the Engineer shall first receive approval from the County Engineer utilizing the procedures contained in the *Pierce County Stormwater Management and Site Development Manual*.

# Appendix A

## Legal References

### RCW Chapter 36.75 Roads and Bridges—General Provisions

**36.75.020 County Roads—County legislative authority as agent of state—Standards.** All of the county roads in each of the several counties shall be established, laid out, constructed, altered, repaired, improved, and maintained by the legislative authority of the respective counties as agents of the state, or by private individuals or corporations who are allowed to perform such work under an agreement with the County legislative authority. Such work shall be done in accordance with adopted county standards under the supervision and direction of the county engineer. [1982 c 145 § 6; 1963 c 4 § 36.75.020. Prior: 1943 c 82 § 1; 1937 c 187 § 2; Rem. Supp. 1943 § 6450-2.]

**36.75.140 Approaches to County roads—Rules regarding construction.** The boards of the several counties of the state may adopt reasonable rules for the construction of approaches which, when complied with, shall entitle a person to build or construct an approach from any abutting property to any county road. The rules may include provisions for the construction of culverts under the approaches, the depth of fills over the culverts and for such other drainage facilities as the board deems necessary. The construction of approaches, culverts, fills, or such other drainage facilities as may be required, shall be under the supervision of the county road engineer, and all such construction shall be at the expense of the person benefitted by the construction. [1969 ex.s. c 182 § 4; 1963 c 4 § 36.75.140. Prior: 1943 c 174 § 2; Rem. Supp. 1943 § 6450-96.]

**RCW Chapter 36.80**  
**Roads and Bridges—Engineer**

*Sections*

36.80.010 *Employment of road engineer.*  
36.80.015 *Office at county seat.*  
36.80.020 *Qualifications—Bond.*  
36.80.030 *Duties of engineer*  
36.80.040 *Records to be kept*  
36.80.050 *Highway plat book.*  
36.80.060 *Engineer to maintain records of expenditures for equipment, etc.—Inventory*  
36.80.070 *Plans and specifications to be prepared.*  
36.80.080 *Cost-audit examination by state auditor—Expense*

*County engineer defined for diking, drainage, or sewerage improvement district purposes: RCW 85.08.010.*

*Diking or drainage improvement district, engineer as supervisor: RCW 85.20.050.*

*Duties relating to agreements on planning, establishing, construction, etc. of city streets: RCW 35.77.020, 35.77.030. diking, drainage and sewerage improvement districts: Chapters 85.08, 85.16 RCW flood control zone districts: Chapter 86.15 RCW. Township road alterations notices given by county engineer: RCW 45.24.010.*

**36.80.010 Employment of road engineer.**

The county legislative authority of each county with a population of eight thousand or more shall employ a full-time county road engineer residing in the county.

The county legislative authority of each county shall employ a county engineer on either a full-time or part-time basis who need not be a resident of the county, or may contract with another county for the engineering services of a county road engineer from such other county. [1991 c 363 § 85; 1984 c 11 § 1; 1980 c 93 § 1; 1969 ex.s. c 182 § 6; 1963 c 4 § 36.80.010. Prior: 1943 c 73 § 1, part; 1937 c 187 § 4, part; Rem. Supp. 1943 § 6450-4, part.]

**Purpose—Captions not law**—1991 c 363: See notes following RCW 2.32.180.

**36.80.015 Office at county seat.** The county road engineer shall keep his office at the county seat in such room or rooms as are provided by the county, and he shall be furnished with all necessary cases and other suitable articles, and also with all blank books and blanks necessary to the proper discharge of his official duties. The records and books in the county road engineer's office shall be public records, and shall at all proper times be open to the inspection and examination of the public. [1963 c 4 § 36.80.015. Prior: 1955 c 9 § 1, prior: 1895 c 77 § 10; RRS § 4148.]

**36.80.020 Qualifications—Bond.** He shall be a registered and licensed professional civil engineer under the laws of this state, duly qualified and experienced in highway and road engineering and construction. He shall serve at the pleasure of the board.

Before entering upon his employment, every county road engineer shall give an official bond to the county in such amount as the board shall determine, conditioned upon the fact that he will faithfully perform all the duties of his employment and account for all property of the county entrusted to his care. [1969 ex. s. c 182 § 7; 1963 c 4 § 36.80.020. Prior: 1943 c 73 § 1, part; 1937 c 187 § 4, part; Rem. Supp. 1943 § 6450-4 part.]

**36.80.030 Duties of engineer.** The county road engineer shall examine and certify to the board all estimates and all bills for labor, materials, provisions, and supplies with respect to county roads, prepare standards of construction of roads and bridges, and perform such other duties as may be required by order of the board.

He shall have supervision, under the direction of the board, of establishing, laying out, constructing, altering, improving, repairing, [and] maintaining all county roads of the county. [1969 ex.s. c 182 § 8; 1963 c 4 § 36.80.030. Prior: 1943 c 73 § 1, part; 1937 c 187 § 4, part; Rem. Supp. 1943 § 6450-4, part.]

**36.80.040 Records to be kept.** The office of county engineer shall be an office of record; the county road engineer shall record and file in his or her office, all matters concerning the public roads, highways, bridges, ditches or other surveys of the county, with the original papers, documents, petitions, surveys, repairs, and other papers, in order to have the complete history of any such road, highway, bridge, ditch, or other survey; and shall number each construction or improvement project. The county engineer is not required to retain and file financial documents retained and filed in other departments in the county. [1995 c 194 § 8; 1969 ex.s. c 182 § 9; 1963 c 4 § 36.80.040. Prior: 1907 c 160 § 4; RRS § 4147.]

**36.80.050 Highway plat book.** He shall keep a highway plat book in his office in which he shall have accurately platted all public roads and highways established by the board. [1963 c 4 § 36.80.050. Prior 1907 c 160 § 2; RRS § 4149.]

**36.80.060 Engineer to maintain records of expenditures for equipment, etc.—Inventory.** The county road engineer shall maintain in his office complete and accurate records of all expenditures for (1) administration, (2) bond and warrant retirement, (3) maintenance, (4) construction, (5) purchase and operation of road equipment, and (6) purchase or manufacture of materials and supplies, and shall maintain a true and complete inventory of all road equipment. The state auditor, with the advice and assistance of the county road administration board, shall prescribe forms and types of records to be maintained by the county road engineers. [1969 ex. s. c 182 § 10; 1963 c 4 § 36.80.060. Prior: 1949 c 156 § 2; Rem. Supp. 1949 § 6450-8b.]

**36.80.070 Plans and specifications to be prepared.** All road construction work, except minor construction work, which by its nature does not require plans and specifications, whether performed pursuant to contract or by day labor, shall be in accordance with plans and specifications prepared therefor by or under direct supervision of the county road engineer. [1969 ex.s. c 182 § 11; 1963 c 4 § 36.80.070. Prior: 1949 c 156 § 3; Rem. Supp. 1949 § 6450-8c.]

**36.80.080 Cost-audit examination by state auditor—Expense.** The state auditor shall annually make a cost-audit examination of the books and records of the county road engineer and make a written report thereon to the county legislative authority. The expense of the examination shall be paid from the county road fund. [1995 c 301 § 69; 1985 c 120 § 3; 1984 c 7 § 34; 1963 c 4 § 36.80.080. Prior: 1957 c 146 § 1.]

**Effective date—1985 c 120 § 3:** "Section 3 of this act shall take effect July 1, 1987." [1985 c 120 § 4.]

**Severability—1984 c 7:** See note following RCW 47.01.141.

**RCW Chapter 36.86**  
**Roads and Bridges—Standards**

Sections

- 36.86.010 Standard width of right-of-way prescribed.
- 36.86.020 Minimum standards of construction.
- 36.86.030 Amendment of standards—Filing.
- 36.86.040 Uniform standard for signs, signals, guideposts—railroad grade crossing.
- 36.86.050 Monuments at government survey corners.
- 36.86.060 Restrictions on use of oil at intersections or entrances to county roads.
- 36.86.070 Classification of roads in accordance with designations under federal functional classification system.
- 36.86.080 Application of design standards to construction and reconstruction.
- 36.86.090 Logs dumped on right-of-way—Removal—Confiscation.
- 36.86.100 Railroad grade crossings—Obstructions.

**36.86.010 Standard width of right-of-way prescribed.** From and after April 1, 1937, the width of thirty feet on each side of the center line of county roads, exclusive of such additional width as may be required for cuts and fills, is the necessary and proper right-of-way width for county roads, unless the board of county commissioners, shall, in any instance, adopt and designate a different width. This shall not be construed to require the acquisition of increased right-of-way for any county road already established and the right-of-way for which has been secured. [1963 c 4 § 36.86.010. Prior: 1937 c 187 § 14; RRS § 6450-14.]

**36.86.020 Minimum standards of construction.** In the case of roads, the minimum width between shoulders shall be fourteen feet with eight feet of surfacing, and in the case of bridges, which includes all decked structures, the minimum standard shall be for H-10 loading in accordance with the standards of the state department of transportation. When the standards have been prepared by the county road engineer, they shall be submitted to the county legislative authority for approval, and when approved shall be used for all road and bridge construction and improvement in the county. [1984 c 7 § 38; 1963 c 4 § 36.86.020. Prior: 1943 c 73 § 1, part; 1937 c 187 § 4, part; Rem. Supp. 1943 § 6450-4, part.]

**Severability—1984 c 7:** See note following RCW 47.01.141.

**36.86.030 Amendment of standards—Filing.** Road and bridge standards may be amended from time to time by resolution of the county legislative authority, but no standard may be approved by the legislative authority with any

minimum requirement less than that specified in this chapter. Two copies of the approved standards shall be filed with the department of transportation for its use in examinations of county road work. [1984 c 7 § 39; 1963 c 4 § 36.86.030. Prior: 1943 c 73 § 1, part; 1937 c 187 § 4, part; Rem. Supp. 1943 § 6450-4, part.]

**Severability—1984 c 7:** See note following RCW 47.01.141.

**36.86.040 Uniform standard for signs, signals, guideposts—Railroad grade crossings.** The county legislative authority shall erect and maintain upon the county roads such suitable and proper signs, signals, signboards, and guideposts and appropriate stop, caution, warning, restrictive, and directional signs and markings as it deems necessary or as may be required by law. All such markings shall be in accordance with the uniform state standard of color, design, erection, and location adopted and designed by the Washington state department of transportation. In respect to existing and future railroad grade crossings over county roads the legislative authority shall install and maintain standard, nonmechanical railroad approach warning signs on both sides of the railroad upon the approaches of the county road. All such signs shall be located a sufficient distance from the crossing to give adequate warning to persons traveling on county roads. [1984 c 7 § 40; 1963 c 4 § 36.86.040. Prior: 1955 c 310 § 1; 1937 c 187 § 37; RRS § 6450-37.]

**Severability—1984 c 7:** See note following RCW 47.01.141.

**36.86.050 Monuments at government survey corners.** The board and the road engineer, at the time of establishing, constructing, improving, or paving any county road, shall fix permanent monuments at the original positions of all United States government monuments at township corners, sections corners, quarter section corners, meander corners, and witness markers, as originally established by the United States government survey, whenever any such original monuments or markers fall within the right-of-way of any county road, and shall aid in the reestablishment of any such corners, monuments, or markers destroyed or obliterated by the construction of any county road heretofore established, by permitting inspection of the records in the office of the board and the county engineering office. [1963 c 4 § 36.86.050. Prior: 1937 c 187 § 36; RRS § 6450-36.]

**36.86.060 Restrictions on use of oil at intersections or entrances to county roads.** No oil or other material shall be used in the treatment of any county road or private road or driveway, of such consistency, viscosity or nature or in such quantities and in such proximity to the entrance to or intersection with any state highway or county road, the roadway of which is surfaced with cement concrete or asphaltic concrete, that such oil or other material is or will be tracked by vehicles thereby causing a coating or discoloration of such cement concrete or asphaltic concrete roadway. Any person violating the provisions of this section shall be guilty of a misdemeanor. [1963 c 4 § 36.86.060. Prior: 1937 c 187 § 43; RRS § 6450-43.]

**36.86.070 Classification of roads in accordance with designations under federal functional classification system.** From time to time the legislative authority of each county shall classify and designate as the county primary road system such county roads as are designated rural minor collector, rural major collector, rural minor arterial, rural principal arterial, urban collector, urban minor arterial, and urban principal arterial in the federal functional classification system. [1982 c 145 § 2; 1963 c 4 § 36.86.070. Prior: 1949 c 165 § 1; Rem. Supp. 1949 § 6450-8h.]

**36.86.080 Application of design standards to construction and reconstruction.** Upon the adoption of uniform design standards the legislative authority of each county shall apply the same to all new construction within, and as far as practicable and feasible to reconstruction of old roads comprising, the county primary road system. No deviation from such design standards as to such primary system may be made without the approval of the state aid engineer for the department of transportation. [1982 c 145 § 3; 1963 c 4 § 36.86.080. Prior: 1949 c 165 § 4; Rem. Supp. 1949 § 6450-8k.]

**36.86.090 Logs dumped on right-of-way—Removal—Confiscation.** Logs dumped on any county road right-of-way or in any county road drainage ditch due to hauling equipment failure, or for any other reason, shall be removed within ten days. Logs remaining within any county road right-of-way for a period of thirty days shall be confiscated and removed or disposed of as directed by the boards of county commissioners in the respective counties. Confiscated logs may be sold by the county commissioners and the proceeds thereof shall be deposited in the county road fund. [1963 c 4 § 36.86.090. Prior: 1951 c 143 § 1.]

**36.86.100 Railroad grade crossings—Obstructions.** Each railroad company shall keep its right-of-way clear of all brush and timber in the

vicinity of a railroad grade crossing with a county road for a distance of one hundred feet from the crossing in such a manner as to permit a person upon the road to obtain an unobstructed view in both directions of an approaching train. The county legislative authority shall cause brush and timber to be cleared from the right-of-way of county roads in the proximity of a railroad grade crossing for a distance of one hundred feet from the crossing in such a manner as to permit a person traveling upon the road to obtain an unobstructed view in both directions of an approaching train. It is unlawful too erect or maintain a sign, signboard, or billboard within a distance of one hundred feet from the point of intersection of the road and railroad grade crossing located outside the corporate limits of any city or town unless, after thirty days notice to the Washington utilities and transportation commission and the railroad operating the crossing, the county legislative authority determines that it does not obscure the sight distance of a person operating a vehicle or train approaching the grade crossing.

When a person who has erected or who maintains such a sign, signboard, or billboard or when a railroad company permits such brush or timber in the vicinity of a railroad grade crossing with a county road or permits the surface of a grade crossing to become inconvenient or dangerous for passage and who has the duty to maintain it, fails, neglects, or refuses to remove or cause to be removed such brush, timber, sign, signboard, or billboard, or maintain the surface of the crossing, the utilities and transportation commission upon complaint of the county legislative authority or upon complaint of any party interested, or upon its own motion, shall enter upon a hearing in the manner now provided for hearings with respect to railroad-highway grade crossings, and make and enforce proper orders for the removal of the brush, timber, sign, signboard or billboard, or maintenance of the crossing. Nothing in this section prevents the posting or maintaining thereon of highway or road signs or traffic devices giving directions or distances for the information of the public when the signs conform to the "Manual for Uniform Traffic Control Devices" issued by the state department of transportation. The county legislative authority shall inspect highway grade crossings and make complaint of the violation of any provisions of this section. [1983 c 19 § 1; 1963 c 4 § 36.86.100. Prior: 1955 c 310 § 6.]

*Railroad crossings, obstructions: RCW 47.32.140.*

**RCW Chapter 43.32**  
**County Roads Design Standards**  
(Formerly: Design standards Committee)

Sections

- 43.32.010      Composition of committee.  
43.32.020      Duties of committee.

**43.32.010      Composition of committee.**

There is created state design standards committee of seven members, six of which shall be appointed by the executive committee of Washington state association of counties to hold office at its pleasure and the seventh to be the state aid engineer for the department of transportation. The members to be appointed by the executive committee of the Washington state association of counties shall be restricted to the membership of such association or to those holding the office and/or performing the functions of county engineer in any of the several counties of the state. [1982 c 145 § 4; 1971 ex.s. c 85 § 6; 1965 c 8 § 43.32.010. Prior: 1949 c 165 § 2; RRS § 6450-8.]

*Design standards committee for arterial streets:  
Chapter 35.78 RCW*

**43.32.020      Duties of committee.** On or before March 24, 1950, and from time to time thereafter the design standards committee shall adopt uniform design standards for the county primary road system. [1965 c 8 § 43.32.020. Prior: 1949 c 165 § 3; RRS § 6450-8j.]

*Design standards for county roads and bridges:  
Chapter 36.86 RCW*

**PCC Chapter 12.08  
Pierce County Road Classification Plan**

Sections:

- 12.08.010 Classification of County Roads.
- 12.08.020 Implementation Authority.
- 12.08.030 Plan Available at the Development Center

**12.08.010 Classification of County Roads.**

All roads within Pierce County shall be classified as major arterials, secondary arterials, collector arterials, local roads or primitive roads pursuant to RCW 36.86.070. All designations and classifications shall be contained in the Pierce County Road Classification Plan as adopted by the Pierce County Council.

(Ord. 89-149 § 3 (part), 1989; Ord. 85-43 § 1, 1985)

**12.08.020 Implementation Authority.**

The County Engineer of Pierce County is directed to implement the arterial designations described in this Chapter through the use of appropriate traffic control devices.

(Ord. 89-149 § 3, (part), 1989; Ord. 85-43 § 2 1985)

**12.08.030 Plan Available at the Development Center.**

The most recently adopted version of the Pierce County Road Classification Plan shall be available for inspection during normal business hours at the Pierce County Development Center. A copy of the Plan is available for purchase for the sum of three dollars (\$3.00). (Ord. 89-149 § 3 (part), 1989)

**PCC Chapter 12.24  
Acquisition of Right-of-Way**

Sections:

- 12.24.010 Records
- 12.24.020 Payment - Charging.
- 12.24.030 District Road Project Number Assignment.
- 12.24.040 Minimum Width Set.

**12.24.010 Records.**

The County Executive's Office shall record in the Pierce County Auditor's Office all deeds, waivers, easements or other conveyance of real property with respect to the acquisition of any right-of-way, road or other property right by Pierce County, within ten days after the execution and delivery thereof. (Ord. 84-119 § 1, 1984; prior Code § 90.04.010)

**12.24.020 Payment - Charging.**

As per RCW 36.85.010, all land required for right-of-way by purchase or condemnation shall be paid out of the County Road Fund of the County and charged against the district project for which acquired. (Prior Code § 90.04.020)

**12.24.030 District Road Project Number Assignment.**

It will be the responsibility of the County Engineer to assign a district road project number to the acquisition of any property, and all costs, including acquisition costs, shall be accumulated under this number, regardless if it is a day labor or contract project. (Prior Code § 90.04.030)

**12.24.040 Minimum Width Set.**

Pursuant to Chapter 36.86.010, Revised Code of Washington, the minimum right-of-way width for any County road shall be 60 foot, except, a local road may utilize a 50 foot wide right-of-way provided all utilities are located underground.

The minimum right-of-way width for a local road located within an approved plat may be reduced to 40 foot, provided, a non-exclusive utility easement is provided abutting the right-of-way on one or both sides such that the total width of right-of-way and easement be no less than 60 foot, or 50 foot when all utilities are located underground.

This section shall not be construed to require the acquisition of increased right-of-way for any County road already established and the right-of-way for which has been secured.

**Title 17B  
Construction and Infrastructure Regulations**

**Road and Bridge Design and Construction  
Standards**

## Appendix B

# Glossary

### Definitions

Unless otherwise stated, words and phrases used herein shall have the following meanings:

**3-R** Resurfacing, restoration, and rehabilitation of existing roadways with minimal changes to alignment or grade.

**AASHTO** American Association of State Highway Transportation Officials

**AASHTO Green Book** *A Policy on Geometric Design of Highways and Streets.*

**Access** An ability to enter or leave the general public road system from an adjacent driveway, share access facility, alleyway, or private road.

**Access Improvement** Any roadway improvement which is required at the intersection(s) created by the road approach(es) of the development to a County arterial classified road, or along a County local classified road between the road approach(es) of the development and the first local road/arterial road intersection(s), including said road intersection(s), including but not limited to entering sight distance requirements.

**ADT** Average Daily Traffic

**Alleyway** A narrow passageway intended for vehicle or traffic to serve as rear access to lots or buildings within a Planned Development District.

**Applicant** The person, party, firm, corporation, or other legal entity or designee proposing to do work regulated by this Manual.

**APWA** American Public Works Association

**As-Built Drawings** See "Record Drawings".

**Auxiliary Lane** The portion of the roadway adjoining the traveled way for parking, turning or other purposes supplementary to through-traffic movement.

**Average Daily Traffic (ADT)** The general unit of measure for traffic defined as the total volume during a given time period (in whole days), greater than one day and less than one year, divided by the number of days in that time period.

**Border** The portion of a road between the edge of pavement or shoulder and the right-of-way line. This area is used for curbing, planting areas, sidewalks, utilities, etc.

**Breakaway Structure or Breakaway Design** A structure or installation that has been crash tested in accordance with National Cooperative Highway Research Program procedures. (NCHRP 230).

**Buffer** The space between the edge of the pavement or the back of the curb and the sidewalk.

**Capacity** The maximum number of vehicles that have a reasonable expectation of passing over a given roadway or section of roadway during a given time period under prevailing roadway and traffic conditions.

**Center Line** The line, marked or unmarked, parallel to and equidistant from the sides of a two-way traffic roadway except where otherwise indicated by painted lines or markers.

**Channelization** The separation or regulation of conflicting traffic movements into definite paths of travel by the use of pavement markings, raised islands or other suitable means to facilitate the safe and orderly movement of both vehicles and pedestrians.

**Clear Zone** The clear zone is that roadside border area starting at the edge of the traveled lane that is available for safe use by errant vehicles. The available clear zone is the distance, measured normal to the highway beginning at the edge of the traveled lane to the closest part of any fixed object or nontraversable obstacles.

**County** The jurisdictional boundaries of Pierce County, and the Pierce County Executive or authorized representative.

**County Engineer** The Pierce County Engineer or authorized representative, having authorities specified in RCW 36.75.050 and 36.80 and authority granted by the ordinance adopting this Manual. This meaning shall also be applied to the terms "Director" or "Engineer" as they may appear in the WSDOT/APWA Specifications or the WSDOT/APWA Standard Plans.

**County Executive** The Pierce County Executive or authorized representative.

**County Road** Every highway or part thereof, outside the limits of incorporated cities and towns and which has not been designated as a state highway.

**Cul-de-sac** Short road having one end open to traffic and ending with a vehicle turnaround, either permanent or temporary.

**Department** Pierce County Department of Public Works and Utilities - Transportation Services, Office of County Engineer.

**Design Hourly Volume (DHV)** The DHV is generally the 30th highest hourly volume (30 DHV) of the future year chosen for design. On the average rural road or arterial, DHV is about 15 percent of ADT. For urban areas, DHV is usually between 8 to 12 percent of the ADT.

**Design Speed** A speed determined for design and correlation of the physical features of a highway that influence vehicle operation; the maximum safe speed maintainable over a specified section of road when conditions permit design features to govern.

**Developer** Any person, firm, partnership, association, joint venture or corporation or any other entity who undertakes to improve residential, commercial, or industrial property or to subdivide for the purpose of resale and profit.

**Development** Any man-made change to improved or unimproved real property including, but not limited to, construction of buildings or other structures, placement of manufactured home/mobile home, mining, dredging, logging, clearing, filling, grading, paving, excavation, drilling operations, or the subdivision, short plat, and large lot division of property.

**DHV** Design Hourly Volume

**Director** The Director of the Pierce County Public Works and Utilities Department or authorized representative.

**Driveway** An access facility between the driveway approach point on a roadway, shared access facility, or emergency vehicle access and the abutting private property used by vehicular traffic.

**Driveway Approach** Any area, construction or facility between the roadway and the driveway, shared access facility, or emergency vehicle access serving the abutting private property which provides access for vehicular traffic.

**Easement** A right to use or control the property of another for designated purposes.

**Edge of Traveled Way** The face of curb for roads that are, or will be constructed to urban standards and the edge of pavement (not shoulder) for roads that are, or will be constructed to rural standards.

**Encroachment** Occupancy of county right-of-way by nonroadway structures or other objects of any kind.

**Engineer** A professional civil engineer licensed by the State of Washington.

**Entering Sight Distance** The sight distance required for a vehicle at a stopped position on the minor road to view an oncoming vehicle traveling at the speed limit on the major road and appearing after the movement has begun, and safely enter or cross the major road.

**Established Grade** The profile and cross sections approved by the County Engineer.

**FHWA** Federal Highway Administration

**Frontage Improvement** Any roadway improvement which is required by County Code along that portion of the public right-of-way immediately adjacent to the development site.

**Functional Classification** The classification of a road as established by ordinance of the Pierce County Council based upon the character of service the road is intended to provide with regard to mobility and access.

**Generator Peak Hour** The specific 60 minute period of highest traffic volume for the specific use or activity under review.

**Grade** Rate or percent of change in slope, either ascending or descending from or along the roadway. It is measured along the centerline of the roadway or access point.

**GSP** General Special Provisions

**Island** A defined area between traffic lanes for control of vehicle movements and/or for pedestrian refuge.

**ITE** Institute of Transportation Engineers

**L & I** Washington State Department of Labor and Industries

**LAG** *Local Agency Guidelines*

**Landing** A road or driveway approach area to any public or private road.

**Loop Road** Road of limited length forming a loop, having no other intersecting road, and functioning mainly as direct access to abutting properties.

**Low Volume Road** A collector arterial or lower classified road with an ADT of less than 400.

**Manual** *Manual on Design Guidelines and Specifications for Road and Bridge Construction in Pierce County.*

**Median** That portion of a divided roadway separating the traveled ways for traffic in opposite directions.

**MUTCD** *Manual on Uniform Traffic Control Devices*

**NEC** National Electrical Code

**New Construction** Construction of a new roadway or structure on substantially new alignment, or the upgrading of an existing roadway or structure by the addition of one or more through traffic lanes, excluding auxiliary lanes.

**Passing Sight Distance** The minimum sight distance required for the driver of one vehicle to pass another vehicle safely and comfortably.

**PC** Point of Curvature

**PCC** Pierce County Code or Portland Cement Concrete

**Peak-Hour** The specific 60 minute period in the day within which the highest traffic volumes occur.

**Peak-Hour Trip** A vehicle trip end generated by the development during a peak-hour period.

**Pedestrian** Any person afoot.

**PI** Point of Intersection

**Pipe Stem** A strip of land having a width narrower than that of the lot or parcel to be served and is designed for providing access to that lot or parcel.

**Posted Speed** The speed limit actually signed along the roadway.

**Primitive Road** An unmaintained or privately maintained county right-of-way that meets the requirements of RCW 36.75.300. A primitive road has gravel or earth driving surface, and has an average annual daily traffic of one hundred or fewer vehicles. A primitive road must be established by county council ordinance.

**Private Road** A roadway facility in private ownership providing private access and used for travel of vehicles by the owner(s) or those having express or implied permission from the owner(s), but not by other persons.

**Proponent** Any person, firm, partnership, association, joint venture or corporation or any other entity who undertakes or proposes to undertake the construction, reconstruction, rehabilitation, or other improvement of a public or private road.

**PS&E** Plans, Specifications and Estimate

**PT** Point of Tangent

**Radius Return Access Point** The intersection of an access point with a county road delineated by either pavement edges or curbs laid out at each edge in a curvilinear fashion between tangents formed by the edge of roadway (or curb face) and the edge of access point (driveway) pavement or curb face.

**Railroad** A carrier of persons or property upon vehicles, other than streetcars, operated upon stationary rails, the route of which is principally outside incorporated cities and towns.

**RCW** Revised Code of Washington

**Reconstruction** A reconstruction project involves major construction activity in excess of 3-R activity. Reconstruction includes significant changes in cross section, the addition of an auxiliary lane, and/or shifts in vertical or horizontal alignment. If 50 percent or more of the project length involves significant vertical or horizontal alignment changes, the project will be considered reconstruction. Reconstruction may require acquisition of additional right-of-way, and may include all items or work usually associated with new construction.

**Record Drawings** The plan set which is certified to contain a true and accurate representation of the actual field conditions for the project during construction, or upon completion of construction. Also known as "As-Built Drawings".

**Rehabilitation** Work similar to restoration except the work may include but is not limited to the following:

- Reworking or strengthening the base or subbase
- Recycling or reworking existing materials to improve their structural integrity
- Adding underdrains
- Replacing or restoring malfunctioning joints

- Substantial pavement undersealing when essential for stabilization
- Grinding of pavements to restore smoothness, providing adequate structural thickness remains
- Removing and replacing deteriorated materials
- Crack and joint sealing but only when required shape factor is established by routing or sawing
- Improving or widening shoulders

**Restoration** Work done on pavement or bridge decks to prepare them for an additional stage of construction. This may include supplementing the existing roadway by increasing surfacing and paving courses to provide structural capability, widening up to a total of ten feet, and installing localized safety improvements. Restoration will generally be done within the existing right-of-way.

**Resurfacing** The addition of a layer or layers of paving material to provide additional structural integrity or improved profile or cross section and serviceability. This includes paving existing gravel roads if the improvement is not reconstruction.

**Right-of-Way (R/W)** All property in which the county has any form of ownership or title and which is held for public road purposes, regardless of whether or not any road exists thereon or whether or not it is used, improved, or maintained for public travel.

**Road** A roadway facility providing public or private access including the roadway and all other improvements laying inside the right-of-way.

**Road Plans** A set of construction drawings and related documents which completely describe the work to be accomplished along with all needed supporting documents, maps, calculations, graphs, etc., prepared by a professional civil engineer licensed in the State of Washington.

**Roadway** An open, generally public way for the passage of vehicles, persons and animals. Limits include the outside edge of sidewalks, or curbs and gutters, or side ditches, including the appertaining shoulder and all slopes, ditches, channels, waterways, and other features necessary for proper drainage and protection within the right-of-way.

**ROW** Right-of-Way

**RR** Railroad

**Rural** Those areas not included within an urban growth area, or designated as Resource Lands as defined by the Pierce County Comprehensive Plan adopted in Pierce County Code Title 19.

**R/W** Right-of-Way

**SEPA** (Washington) State Environmental Policy Act

**Separate Turn Lane** An auxiliary lane for traffic in one direction which has been physically separated from the intersection area by a traffic island or stripe. Separate turn lanes may be included within intersections or separated from intersection areas by traffic islands.

**Shared Access Facility** A privately owned drivable surface which serves four lots in the rural area and two lots in the urban area for access to single family and two family dwelling units.

**Shoulder** That portion of the roadway contiguous with the traveled way primarily to accommodate stopped vehicles for emergency use, and for lateral support of base and surface courses.

**Sidewalk** That portion of the roadway between the curb lines or the lateral lines of a roadway, and the adjacent property, set aside and intended for the use of pedestrians or such portion of private property parallel and in proximity to a highway and dedicated to use by pedestrians.

**Single Family Dwelling Unit** A structure used to house one family, including appurtenant structures such as a garage, storage shed, or other structure not used for living purposes, all for the private, non-commercial use of the property owner or renter.

**Special Provisions** Specifications, specific to a particular project, that supplement the Standard Specifications.

**Standard Specifications** The most current edition of the "Standard Specifications for Road, Bridge, and Municipal Construction" published by the Washington State Department of Transportation and the Washington State Chapter of the American Public Works Association.

**State Highway** Every highway, or part thereof, that has been designated as a state highway, or branch thereof, by Washington State legislative enactment.

**Stopping Sight Distance** The length of roadway ahead visible to the driver which would enable the vehicle traveling at the design speed to stop before reaching a stationary object in its path.

**Surveyor** A professional land surveyor licensed by the State of Washington.

**Temporary Driveway Approach** A driveway approach that will not be in place longer than ninety (90) consecutive calendar days.

**Three R** See 3-R.

**Traveled Way** That portion of the roadway used for the movement of vehicles exclusive of the portion of the roadway width which is used, or available for parking of vehicles.

**TRB** Transportation Research Board.

**Trip** A one-direction movement which begins at the origin and ends at the destination.

**Trip Distribution** The process by which the movement of trips between zones is estimated. The data for each distribution may be measured or estimated by a growth factor process or by a synthetic model.

**Trip End** A trip origin or a trip destination. Trip ends for a location are the summation of origins and destinations. A trip has two ends, the origin and the destination. A site which has over some period of time, 2,000 trips entering and 1,800 trips leaving, has 3,800 trip ends

associated with it. The 3,800 total trips to and from the site represent a total of 7,600 trip ends. Of these, 3,800 occur at locations other than the site in question.

**Trip Generation** A general term describing the analysis and application of the relationships that exist between the trip makers, the traffic study area, and the trip making. It relates to the number of trip ends in any part of the traffic study area.

**TWLTL** Two-way Left-turn Lane

**Two Family Dwelling Unit** A structure used to house two families, including appurtenant structures such as a garage, storage shed, or other structure not used for living purposes, all for the private, non-commercial use of the property owner or renter.

**Unmaintained Road** A road within county right-of-way which is accessible to public travel but is not maintained by the county.

**Unopened Right-of-Way** A county right-of-way that exists by dedication or deed, but for which no vehicular roadway has been constructed by the county or other parties.

**Urban** All areas identified within urban growth areas as defined by the Pierce County Comprehensive Plan adopted in Pierce County Code Title 19, meeting the statutory requirements of urban as defined by the Growth Management Act, RCW 36.70A.

**Utility** (1) A privately, publicly, or cooperatively owned line, facility, or system for producing, transmitting, or distributing communications, cable television, power, electricity, light, heat, gas, oil, crude products, water, steam, waste, or any other similar commodity which directly or indirectly serves the public. (2) The privately, publicly, or cooperatively owned company that owns the line, facility, or system.

**VPD** Vehicles Per Day

**VPH** Vehicles Per Hour

**WSDOT** Washington State Department of Transportation

**WUTC** Washington State Utilities and Transportation Commission





## Appendix C

# Miscellaneous Information

### ENTERING SIGHT DISTANCE DEVIATION REQUEST - EXAMPLE

Given: County road with posted 35 mph speed limit has a horizontal curve that is signed with turn warning signs and 20 mph advisory speeds. The rest of the road is relatively straight and level.

The proposed approach location is 260 feet from the beginning of the curve. The entering sight distance for the approach is 325 feet looking toward the curve and 450 feet looking in the other direction. The approach will serve a total of eight lots if the development is approved.

Analysis: Based on a 35 mph speed limit, 415 feet of entering sight distance would typically be required. This distance equates to an 8 second gap in traffic traveling on the County road, based on the posted speed limit. However, in this case, the anticipated travel speed is less than the posted speed limit during the period of time an oncoming vehicle is visible in the available line of sight:

Sight distance available - 325 feet, of which 65 feet is with the oncoming vehicle in the 20 mph curve.

(a) Length of time vehicle in curve =

$$\left[ \frac{65 \text{ ft}}{(20 \text{ mph}) (1.47 \text{ ft/sec/mph})} \right] = \mathbf{2.21 \text{ seconds}}$$

(b) Length of time vehicle is visible while accelerating from 20 mph up to speed limit =

$$\left[ \frac{(35-20) \text{ mph}}{3.3 \text{ mph/seca}} \right] = \mathbf{4.54 \text{ seconds}}$$

<sup>a</sup>Use of an acceleration rate of 3.3 mph per second is based on normal acceleration rates published in *Transportation and Traffic Engineering Handbook* as published by the Institute of Transportation Engineers.

Distance traveled during (b) =

$$\frac{\left[ (35 \times 1.47)^2 - (20 \times 1.47)^2 \right] \text{ ft}^2 / \text{sec}^2}{\left[ 2(3.3 \text{ mph/sec}) (1.47 \text{ ft/sec/mph}) \right]} = \mathbf{183 \text{ seconds}}$$

(c) Length of time vehicle is visible while traveling at speed limit before getting to approach location =

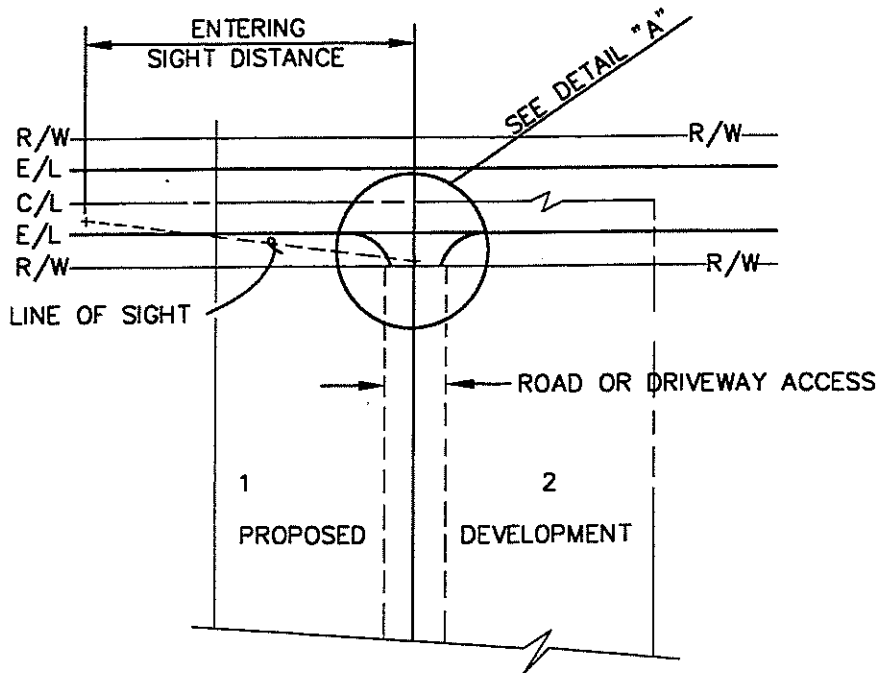
$$(325\text{ft}-66\text{ft}-183\text{ft})/(35\text{mph})(1.47 \text{ ft/sec/mph}) = \mathbf{1.47 \text{ seconds}}$$

Total length of time vehicle is visible when looking from proposed approach location =

$$2.21\text{sec} + 4.54\text{sec} + 1.47 \text{ sec} = \mathbf{8.22 \text{ seconds}},$$

which exceeds the 8 second gap required; therefore, adequate entering sight distance is available.

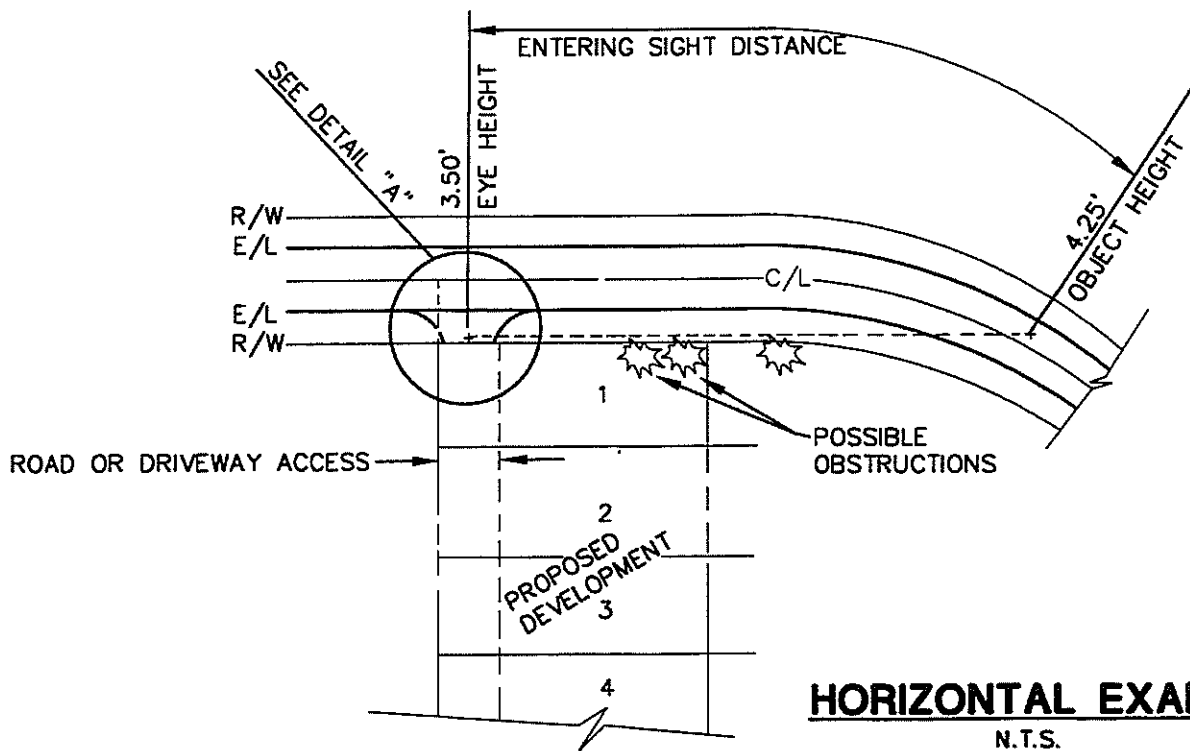
***(2 PAGES OF TECHNICAL DRAWINGS TO FOLLOW)  
(HARD COPIES ONLY)***



**VERTICAL EXAMPLE**

N.T.S.

R/W = RIGHT-OF-WAY  
 E/L = EDGE OF LANE  
 C/L = CENTERLINE



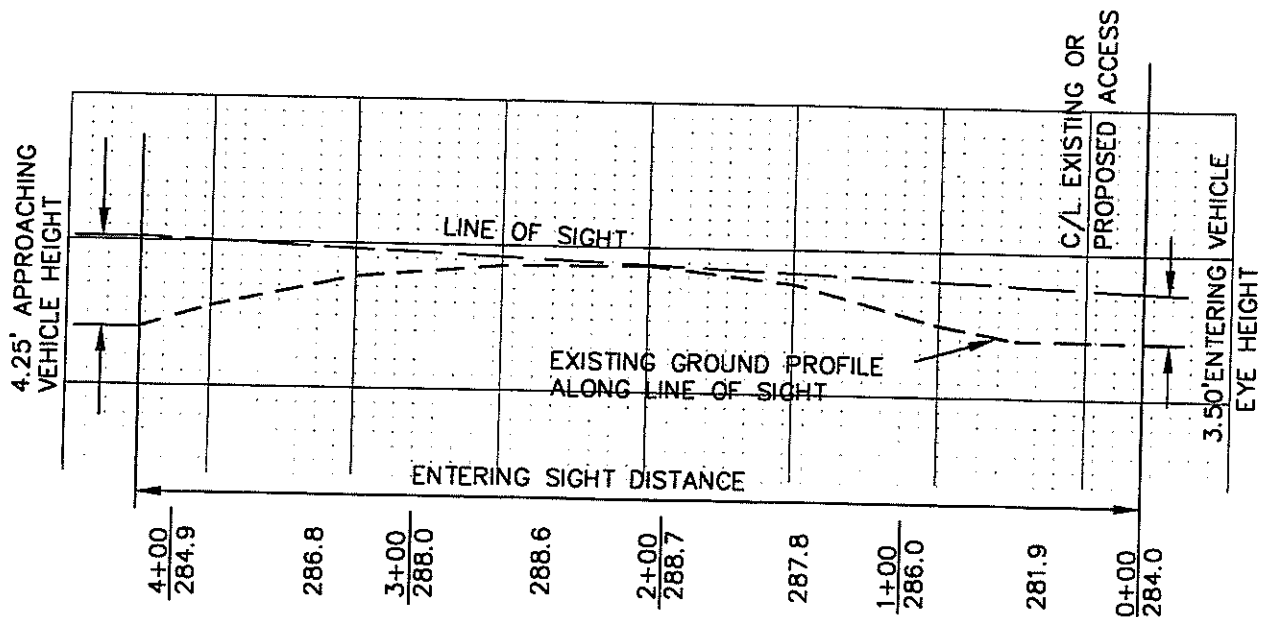
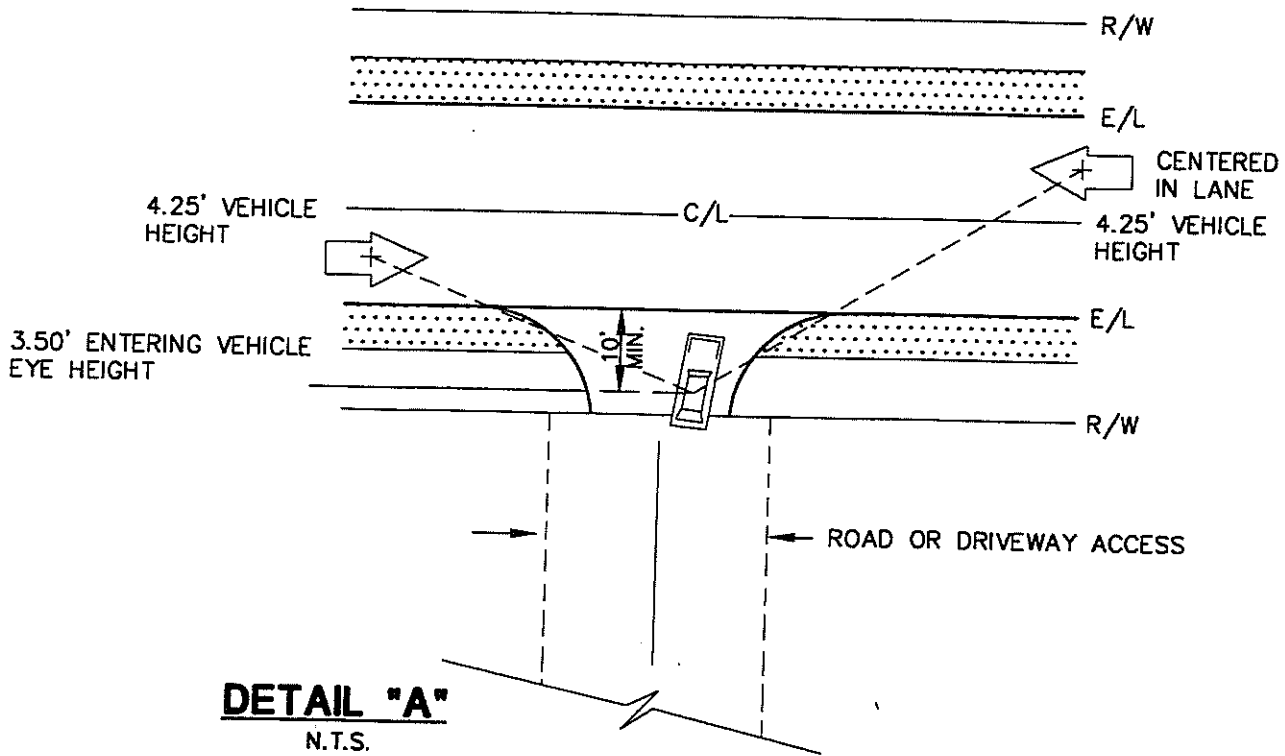
**HORIZONTAL EXAMPLE**

N.T.S.

DRAWING TO BE STAMPED AND SIGNED BY SURVEYOR AND/OR ENGINEER

ENTERING SIGHT DISTANCE DIAGRAM

DETAIL C-1



**PROFILE EXAMPLE**  
N.T.S.

DRAWING TO BE STAMPED AND SIGNED BY SURVEYOR AND/OR ENGINEER

ENTERING SIGHT DISTANCE  
DETAIL "A" / PROFILE  
DETAIL C-2