

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



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Pierce County
Public Works and Utilities
Office of the County Engineer



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Acknowledgments

Pierce County Executive

Pat McCarthy

Pierce County Council

Roger Bush, Council Chair, District #3
Shawn Bunney, Councilmember, District #1
Joyce McDonald, Councilmember, District #2
Timothy M. Farrell, Councilmember, District #4
Barbara Gelman, Councilmember, District #5
Dick Muri, Councilmember, District #6
Terry Lee, Councilmember, District #7

Pierce County Planning Commission

Malcolm Russell, Chair, District #6
Gerald Gustafson, District #1
Richard Carkner, District #2
Richard Thurston, District #3
Jessyn Farrell, District #4
Claudia Finseth, District #5
Andy Markos, District #6

Pierce County Public Works & Utilities

Brian Ziegler, P.E., Director
Brian Stacy, P.E., County Engineer

Pierce County Contributing Staff

Rory Grindley, P.E., Traffic Engineer
James Ellison, P.E., Traffic Engineer
Mitchell Brells, P.E., Engineering Manager
Ramiro Chavez, P.E., Engineering Manager
Jerry Bryant, P.E., Engineering Manager
Dawn Anderson, CE 2
Paul Barber, CE 2
Jeff Kidston, CE 2
Dave Peterson, CE 2
Lynn Ross, P.E.
Jeff Sharp, CE 2
Ken Cook, P.E.
Pat Baughman, P.E., P.M.P.
Kraig Shaner, P.E.
Jackie Spears, P.E.
Sean Gaffney, Principal Planner
Deirdre Wilson, Senior Planner
Janice Brevik, Admin. Svcs. Supervisor
Linda Lyman, Office Assistant

External Stakeholders Group

Member & Affiliation

Elliott Barnet, City of Tacoma
Rick Brunaugh, Uniland
John R. Caris, Terra NW Engineers, Inc.
Scott Danielson, JKA
Craig Deaver, C.E.S. NW Inc
Damon Derosa, LeRoy & Associates
Paul Green, Azure Green Consultants
Rich Larson, Larson & Associates
William Lynn, Gordon, Thomas, Honeywell
Corey Maki, WestSound Engineering
Mark Palmer, KPFF Consulting Engineers
Tiffany Speir, Master Builders Association
Jeff Sutton, Apex Engineering
Douglas Tooley, Resident
Kurt Wilson, Soundbuilt

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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, constructing, 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 the County Engineer that all technical requirements being used are the most current.

1-3 General

This Manual establishes uniform standards for the design of road and bridge construction or reconstruction.

In establishing these uniform standards, 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 Manual 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 standards for road design, but may not be appropriate for all locations and existing conditions.

This Manual 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 standards 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.

In some cases where the proposed project does not easily fall within all the preferred design standards contained in this Manual, the Engineer is encouraged to have the design parameters for the project approved prior to submittal of the preliminary design plans. In this way the Engineer can avoid delays and increased project costs associated with the design deviation process during the project development stage.

The County Engineer will judge any proposed designs that depart from the requirements outlined in this Manual in accordance with the required deviation showings in 17B.10.090. 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.

Approval of the County Engineer can be accomplished by submitting a request in writing to the Development Engineering Section of Planning and Land Services. Such submittal shall be completed by the applicant's engineer and shall include a narrative outlining the relevant facts of the matter and a justification supporting the request. The request when submitted must include four copies of the supporting documents (maps, drawings, calculations, etc.). The County Engineer shall make a final determination regarding the request and will provide a written response to the applicant's engineer.

When one provision of this Manual conflicts with another provision of this Manual, the more protective restriction shall control. In cases of ambiguity or difference of meaning or inconsistencies between the text of this Manual and the illustrations or graphics contained in the *Standard Drawings*, as published by the Office of the County Engineer, Pierce County, the *Standard Drawings* shall control. In case of any other ambiguity or

dispute over interpretation of the provisions of this Manual, the decision of the County Engineer shall be final.

1-4 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
- *Standard Drawings*, as published by the Office of the County Engineer, Pierce County
- *Standard Plans for Road, Bridge and Municipal Construction*, as published by the Washington State Department of Transportation
- *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; 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
- *Pierce County Stormwater Management and Site Development Manual*, as published by Pierce County
- *Manual on Accommodating Utilities in Pierce County Rights-of-Way*, as published by Pierce County
- *Local Agency Guidelines*, as published by the Washington State Department of Transportation, commonly known as the “LAG Manual”
- *Special Report 209 - Highway Capacity Manual*, as published by the Transportation Research Board
- *Trip Generation*, as published by the Institute of Transportation Engineers.
- *Americans with Disabilities Act Accessibility Guidelines (ADAAG)* as published by the U.S. Access Board
- *Highway Runoff Manual* as published by Washington State Department of Transportation

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”
- *Guide for Development of Bicycle Facilities*, as published by the American Association of State Highway and Transportation Officials
- *Plans Preparation Manual*, as published by the Washington State Department of Transportation
- *Design Manual*, as published by the Washington State Department of Transportation
- *Bridge Design Manual*, as published by the Washington State Department of Transportation
- *Roadside Design Guide*, as published by the American Association of State Highway and Transportation Officials
- *Stormwater Management Manual for Western Washington*, as published by the Washington State Department of Ecology
- *Hydraulic Manual*, as published by the Washington State Department of Transportation

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:

- *Land Division and Boundary Changes*--Title 18F Pierce County Code
- *Pierce County Construction and Infrastructure Regulations*--Site Development and Storm Drainage - Title 17A Pierce County Code
- *Pierce County International Fire Code*--Chapter 17C.60 Pierce County Code
- *Development Regulations – Environmental*--Title 18D Pierce County Code
- *Washington State Environmental Policy Act (SEPA)*--Title 18D Pierce County Code
- *Development Regulations - Critical Areas*--Title 18E Pierce County Code
- *Pierce County Development Regulations - Design Standards and Guidelines*--Title 18J Pierce County Code
- *Pierce County Comprehensive Plan*--Title 19A Pierce County Code

1-5 Deviation from Manual

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

1-6 Legal References

The following governmental codes establish the County's right to create and enforce design and construction standards.

Governmental Code References		
Code	Title of Code	Description
RCW 36.75.020	County Roads - Standards	Sets requirements to utilize adopted County road design standards under the direction of the County Engineer.
RCW 36.75.130	Approaches to County Roads	Outlines rules for construction of approaches to County roads and supervised by County Engineer.
RCW 36.80	Roads and Bridges - Engineer	Outlines role of the County Engineer and duties including preparation of design standards.
RCW 36.86	Roads and Bridges - Standards	Outlines minimum standards for counties to utilize.
RCW 43.32	County Roads Design Standards	Establishes a State design standards committee.
PCC 12.08	Road Classification Plan	Classifies all County roads.
PCC 12.24	Acquisition of Rights-of-Way	Sets minimum right-of-way widths.
PCC 17B	Road and Bridge Design and Construction Standards	Establishes design standards for public/private roads.

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Chapter 2 Design Control

2-1 Layout

2-1.1 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 of the 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 include, but not limit itself to, the following items:

- Urban or rural environment
- Proximity to schools or parks
- Expected pedestrian and bicycle activity
- Industrial or commercial sites to be served

Existing and future traffic volumes must be documented. The estimated future traffic volumes serve as the design year for the roadway. All interim designs must contribute to the long-range or ultimate roadway design.

2-1.2 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 driveway approaches 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, which 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. It can also be used for 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.

2-1.3 Functional Classification Definitions

2-1.3.1 Major Arterials

Major arterials provide service for major traffic movements within the County. They serve major centers of activity and offer 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. They frequently carry important bus routes within urban areas and between urban communities. Typically they are one of the highest traffic volume corridors in the County. Examples of major arterials are Canyon Road East, Spanaway Loop Road, and 112th Street East in the urban area, and Key Peninsula Highway and Orting-Kapowsin Highway in the rural area. Traffic volumes commonly range from 7,000 to 40,000 or more vehicles per day in the urban area, and from 1,000 to 10,000 or more vehicles per day in the rural area.

The spacing between 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. Major arterials would preferably be located on community and neighborhood boundaries or adjacent to but not through major shopping centers, parks, and other homogeneous areas.

2-1.3.2 Secondary Arterials

Secondary arterials interconnect with and augment the major arterial system. Secondary arterials connect major arterials to collector arterials and small trip 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 ball fields, 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. Examples of secondary arterials are Golden Given Road, “C” Street South, and 138th Street South in the urban area, and South Prairie Road and Webster Road East in the rural area. Traffic volumes commonly range from 4,000 to 15,000 vehicles per day in the urban area, and from 500 to 5,000 vehicles per day in the rural area.

Spacing between 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.

2-1.3.3 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, but carry a high proportion of local traffic with an origin or destination within that area. They may be on a somewhat meandering alignment and need not be particularly long or continuous. Examples of collector arterials are “A” Street and “B” Street in the urban area, and Mathias Road, Prairie Ridge Drive, and 36th Street NW / Horsehead Bay Road in the rural area. Traffic volumes commonly range from 2,000 to 6,000 vehicles per day in the urban area, and from 300 to 3,000 vehicles per day in the rural area.

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

2-1.3.4 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, Local Road Cul-de-sac, Neighborhood Street, and Access Lane.

- 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. They directly serve any major traffic generators within the neighborhood, such as an elementary school or a church. They usually serve one moderate size neighborhood or a combination of a few small developments, rather than

interconnecting two or more larger neighborhoods. Local road feeders serve little, if any, that is traffic generated outside the neighborhood. Typical Average Daily Traffic (ADT) may range from about 800 to 2,000 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 and between subdivisions. Higher speeds and traffic volumes are deliberately discouraged. A Local Road Minor is designed so that it can never become a higher classification roadway. Typical ADT may range from about 200 to 800 vehicles per day.
- C. A **Local Road Cul-de-sac** is an internal subdivision road with a single outlet. It is greater than 100 feet and less than 700 feet in total length as measured along the roadway centerline from the center of the cul-de-sac bulb 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 should not be designed so that its first intersection is another Local Road Cul-de-sac.
- D. A **Neighborhood Street** is a local road allowed only within a Small Lot development (see Chapter 18J.17 of the Pierce County Code). A Neighborhood Street is intended to: provide-circulation between clusters of dwelling units; and to provide for access to higher classified roads, such as a Local Road Feeder or an arterial. A Neighborhood Street operates similarly to a Local Road Minor except it has lower operating speeds and lower traffic volumes. Typical ADT may range from 200 to 600 vehicles per day. On-street parking is provided.
- E. An **Access Lane** is a local road allowed only within a Small Lot development (see Chapter 18J.17 of the Pierce County Code). An Access Lane provides for circulation and access within clusters of dwelling units. The Access Lane operates similarly to a Local Road Cul-de-sac, with a typical ADT of 200 vehicles per day or less. Cul-de-sac bulbs are prohibited for access lanes and more than a single outlet is commonly provided.

2-1.3.5 Alley and Shared-Access Facility

- A. An **Alley** is a privately-owned vehicle driving surface not designated for general travel that is primarily used as a means of access to the rear of residences. An alley can only connect to the local road system. Dead end alleys are strongly discouraged. Alleys are less than 750 feet in total length. Alleys must serve a minimum of two lots. With the exception of

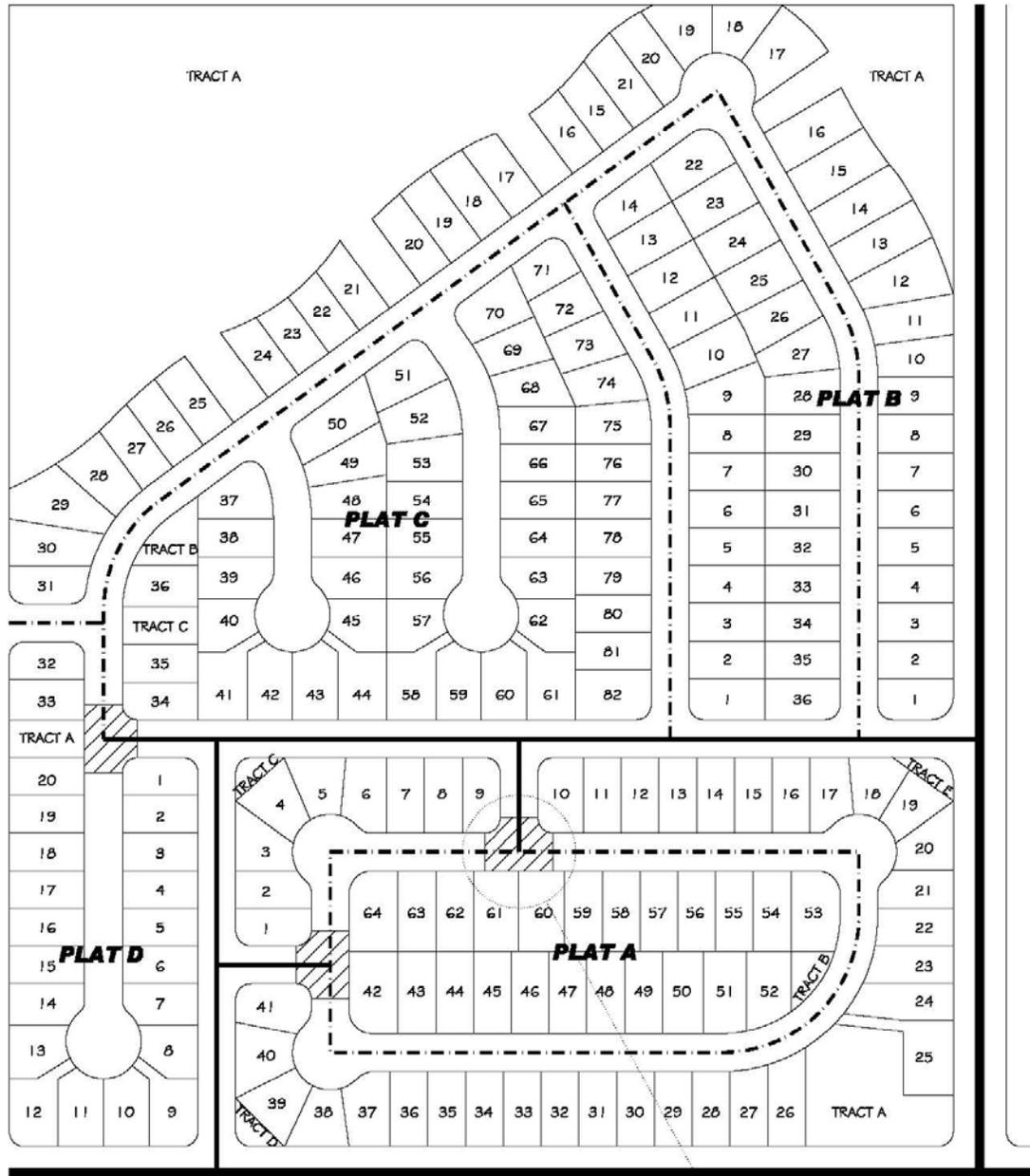
lots within a Small Lot Development (reference Title 18J), lots served by alleys must also abut a local road.

- B. A **Shared Access Facility** is a privately-owned driving surface which provides vehicular access to at least two lots.

For single-family and two-family dwelling unit lots, a shared-access facility carries a maximum of 60 ADT and is a maximum of 500 feet in length.

A shared-access facility may serve any number of commercial use or industrial use lots when the intent of the shared-access facility is to provide access through interlinked or shared parking facilities as are common in commercial centers (e.g., shopping malls).

For formal plats located in the urban area that contain up to 35 lots, up to 20 percent of the lots within the plat may be served by a shared-access facility. For formal plats located in the urban area with more than 35 lots, up to 10 percent of the lots within the plat may be served by a shared-access facility.



NOTE: FIGURE NOT TO SCALE. THE PURPOSE OF FIGURE IS TO SHOW ROAD CLASSIFICATIONS AND NOT TO DEPICT RECOMMENDATIONS FOR PLAT LAYOUT.

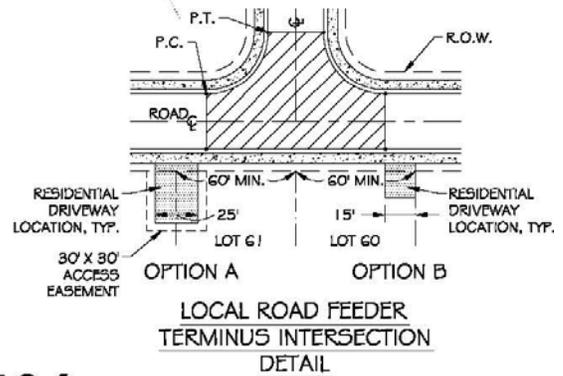
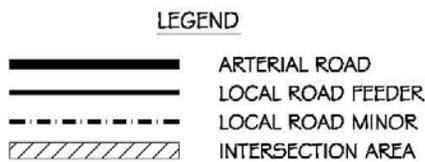


FIGURE 2-1

2-1.4 Subdivision Road and Access Layout

Subdivision road and access layout is guided by a few basic principles such as, (1) safety for both the vehicular and pedestrian traffic, (2) efficiency of services for all users of the roadway, (3) livability of the residential environment, and (4) economic use of the land, construction of the infrastructure, and maintenance of the facilities.

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 within residential areas, such as schools or churches, should be considered within the local circulation pattern, not only from within the subdivision, but from adjacent neighborhoods as well.

The roads, shared accesses, and alleys that provide access to lots within a proposed subdivision or proposed Planned Development District shall be designed in a way to ensure that emergency vehicles can legally and physically access each lot.

There should be a limited number of access points with the arterial roads that border the subdivision. The subdivision road layout should be designed to maintain relatively uniform low volumes of traffic upon full development, particularly for Neighborhood Streets, Access Lanes, Shared-Access Facilities, Alleys, and Cul-de-sacs. The system should be designed to discourage excessive speeds and should minimize the necessity for traffic control devices, particularly for internal roads with direct lot access.

Figure 2-1 presents a conceptual example of each local road classification working together as a local road system.

2-1.5 Connectivity

Developments should be designed in a manner that maximizes opportunities for connectivity. Connectivity Standards promote a system of streets that offer multiple routes and connections allowing ease of movement for cars, bikes and pedestrians with frequent intersections and few closed-end streets (cul-de-sacs). A highly connected transportation system within the County will provide choices for drivers, bicyclists, public transit passengers, and pedestrians; promote walking, bicycling and public transit; connect neighborhoods to each other and to local destinations such as schools, parks, and shopping centers; reduce vehicle miles of travel and travel times; improve air quality; reduce emergency response times; increase effectiveness of municipal service delivery; and free up arterial capacity to better serve regional long distance travel needs.

It is recognized that applying connectivity standards to individual projects can be complex. For this reason the following standards should be applied only after an assessment is performed of a particular development's: geographic, environmental, and legal constraints; level of projected traffic volumes; traffic impacts; and affects on developable land within the development and neighborhood. Each of the following standards should be met, unless it is determined that there are barriers that make it unreasonable, or implementation of the standard will produce an undesirable impact.

The final determination of unreasonableness or undesirable impact will be made by the County Engineer or his/her designee.

The following standards should apply:

- A. Roadway connectivity should be accomplished through the design and connection of arterials, local road feeders, or local road minors, rather than cul-de-sacs. Arterials and local road feeders are recommended as a means of safely accommodating the projected traffic volumes while minimizing impacts of through traffic to those residing in the subdivision prior to the connection. Local road minors may be utilized for connectivity of small subdivisions under low volume, low speed situations.
- B. With the exception of arterial classified roads, a connection should be made to all roads that abut developing property.
- C. When there is an opportunity to extend a public road to provide a future connection to an adjacent parcel or development the new road should be public.
- D. When new development abuts land where road stub-outs, easements, or right-of-way has been used to provide the opportunity for future road connections, the development should be designed to utilize these connections.
- E. When new development abuts vacant or underdeveloped parcels of land the development should provide for future connection to its interior road and sidewalk network by constructing a road stub to the property line of the abutting property.
- F. When multiple vacant or underdeveloped parcels abut a new development a connection to each parcel may not be required. Connection points will be determined based upon an overall consideration of existing and desired circulation patterns in the area. Emphasis should be given to connections with larger parcels and parcels which would permit future connections to other existing roadways.
- G. New private roads are allowed when it is determined that there is no opportunity for a connection to a neighboring parcel or development, or when there is not a public road available for providing access to a development.
- H. A road connection between residential developments and abutting commercial or industrial zones is not required, however, pedestrian connections should be provided.
- I. It is understood that there will be some parcels where connectivity is not possible due to existing development, geography, unique parcel configuration, environmental considerations, and other barriers.

The following additional standards should apply for Commercial, Office/Business, and Civic Uses:

- J. Vehicular and pedestrian connections to adjacent non-residential or non-industrial properties should be provided through the use of cross access easements, common entryways, shared internal roadways, shared parking lots, or similar techniques.
- K. Frontage roads and/or parking access roads should be established.
- L. Parking lots should be designed to connect to adjacent parcels. In situations where a connection will not be immediately obtained, the parking should be designed to connect in the future.
- M. Connections between parking areas should be provided by utilizing shared access facilities such that there can be movement between neighboring properties and businesses without needing to utilize adjacent arterial roadways.

2-1.6 Temporary Cul-de-Sac

A Temporary Cul-de-sac shall only be allowed when the road will likely be extended to connect to another road, thus making it a future through road. Temporary cul-de-sacs shall be provided for all roadways longer than 100 feet that will be extended in the future. Construction plans shall include an end-of-roadway marker (OM4-3) at the end of the driving surface. Above the end-of-roadway marker a regulatory sign with the following legend "THIS ROAD IS PLANNED TO BE EXTENDED IN THE FUTURE" shall be placed. At the roadway end, a row of fast-growing evergreens (hedge variety of *American Arborvitae*) shall be installed along the property line. The developer shall be responsible to ensure the establishment and survival of the evergreen trees prior to the release of the 18-month financial guarantee. When conditions such as a non-traversable slope past the pavement warrant a stronger treatment, a Type 3 barricade shall be used in lieu of the trees. When using the Type 3 barricade the sign with the legend "THIS ROAD IS PLANNED TO BE EXTENDED IN THE FUTURE" shall be placed in the middle of the barricade, immediately above the top rail. All barricades shall meet the MUTCD Section 3F.01.

When an asphalt concrete raised edge or cement concrete rolled curb roadway is proposed the roadway cross section (including any curbing and sidewalks) shall be constructed through the temporary cul-de-sac area.

When a cement concrete traffic curb and gutter or asphalt concrete barrier curb roadway is proposed the roadway cross section shall terminate at the beginning of the temporary cul-de-sac.

Appropriate provisions for storm drainage runoff shall be provided for the temporary cul-de-sac.

When the roadway is extended the temporary cul-de-sac shall be removed and the applicable full roadway section (including any applicable curbing, sidewalks, shoulder, etc.) within the temporary cul-de-sac area shall be completed. This work shall be completed by the proponent of the roadway extension.

2-1.7 Small Lot Roads

Chapter 18J.17 of the Pierce County Code provides for unique roadway cross sections to be allowed for certain development types and areas of the County. These requirements provide for public road designations of Neighborhood Street and Access Lane.

Neither a Neighborhood Street nor an Access Lane shall be longer than 150-feet in length without a turn-around at the end of the street or lane, or a through connection to another road. The use of cul-de-sac bulbs are prohibited. Acceptable turnarounds for neighborhood streets and access lanes can be found in the Standard Drawings.

2-2 Right-of-Way and Easements

2-2.1 Roads

County-operated and maintained roads must be dedicated to the County as right-of-way. Roads that are to be operated and maintained by a private organization such as a homeowner’s association must be located in an easement or tract. The road right-of-way, easement, or tract width shall be determined by the roadway characteristics involved in the design.

The minimum right-of-way, easement, or tract widths for roads shall be as follows:

Arterials	Urban	Rural
Major	90 feet	80 feet
Secondary	70 feet	70 feet
Collector	60 feet	60 feet

Local Road System	Urban	Rural
Feeder	60 feet^a	60 feet^a
Minor	60 feet^a	60 feet^a
Cul-de-sac	60 feet^a	60 feet^a
Neighborhood Street	50 feet^b	n/a
Access Lane	40 feet^b	n/a

^a A 50-foot-wide right-of-way, easement or tract may be used when all utilities are located underground.

^b All utilities must be located underground.

Additional right-of-way, easement, or tract width may be required to accommodate all planned roadway improvements (including shoulders, drainage facilities, buffers, sidewalks, walkways, traffic control devices, utilities, intersections, design sight lines, all necessary outer slopes and maintenance of the roadway). The overall right-of-way, easement, or tract width shall also provide a minimum of 4 feet behind the

shoulder/sidewalk/walkway/ditch (on each side of the roadway) to assure accommodation of all traffic control devices, utilities, roadway appurtenances, stopping sight distance and entering sight distance requirements. When a buffer width of 6 feet or more is provided which can accommodate all the necessary traffic control devices, utilities, roadway appurtenances, stopping sight distance and entering sight distance requirements, the County Engineer may reduce this required 4 feet of right-of-way to only 1 foot.

Right-of-way, easement, or tract widths are typically provided in 5-foot increments; however, the County Engineer may approve other incremental widths as deemed appropriate for the circumstance at hand.

2-2.2 Projects with Frontage on County Right-of-Way

In instances where a development generates additional traffic onto a public roadway and said development has frontage on that roadway, the County Engineer will require the right-of-way to meet the above minimum widths in accordance with RCW 82.02.020, which shall be processed as either a dedication or deed action and shall occur at the earliest of any of the following development actions:

- Prior to, or concurrent with, the recording of a subdivision of land, alteration of subdivisions, or a Binding Site Plan.
- Prior to issuance of a Site-Development Permit; if none of the above land use actions apply.
- Prior to issuance of either a residential or commercial Building Permit.

2-2.3 Conveyance

Any conveyance instrument delivered to Pierce County related to any County road shall be recorded at the Pierce County Auditor's Office. Such recording process shall be administered by the County Engineer.

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 19 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:

Arterials	
Major	Bus/Intermediate Semitrailer Truck (Wheelbase-40)
Secondary	Bus/Intermediate Semitrailer Truck (Wheelbase-40)
Collector	Single Unit Truck / Bus

Local Road	
Feeder	Single Unit Truck / Passenger Car
Minor	Single Unit Truck / Passenger Car
Cul-de-Sac	Passenger Car
Small Lot Design	Passenger Car

2-4 Design Speed

Design speed is a selected speed used to determine the various design features of the roadway. 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.

Design speed for the arterial road system should be selected as high as appropriate for the facility character so as to provide for the safe free flow of vehicles and commerce. Since the function of local roads is to provide access to adjacent property, all design elements should be consistent with the character of activity on the adjacent road and should encourage speeds generally not exceeding 30 mph. The Design Speed for each road class, unless otherwise approved by the County Engineer, is as follows:

Arterials	Urban	Rural
Major	45 mph	45 mph
Secondary	40 mph	45 mph
Collector	35 mph	40 mph

Local Road	Urban	Rural
Feeder	30 mph	30 mph
Minor	25 mph	25 mph
Cul-de-Sac		
Stem over 250 feet in length	25 mph	25 mph
250 feet or less in length	20 mph	20 mph
Small Lot Design		
Neighborhood Street	25 mph	N/A
Access Lane	20 mph	N/A

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

Road and street capacities 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."

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

Minimum Stopping Sight Distance shall be designed for wet pavement; the effects of grade shall also be accounted for grades steeper than 3 percent as follows:

**Stopping Sight Distance (SSD)
(feet)**

Design Speed	Minimum SSD	Downhill Grade				
		3%	6%	9%	12%	15%
20 mph	115	116	120	126	132	141
25 mph	155	158	165	173	183	197
30 mph	200	205	215	227	242	262
35 mph	250	257	271	287	308	335
40 mph	305	315	333	354	381	417
45 mph	360	378	400	427	462	507

For the purpose of assessing Stopping Sight Distance, Pierce County has maintained an object height of 0.5 feet and a driver’s eye height of 3.5 feet.

Stopping sight distance shall be achieved without the need for additional easements or right-of-way, unless otherwise approved by the County Engineer.

Entering Sight Distance (ESD) for a residential driveway approach to a local road within a subdivision is not required if the road has been designed and constructed to meet stopping sight distance requirements.

Entering Sight Distance (ESD)

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

Entering Sight Distance values are based on an object height of 4.25 feet and a driver’s eye height of 3.5 feet set back from the edge of the travel way at least 10 feet for residential and minor driveway approaches, and 14.5 feet for major driveway and road approaches. (See Details in Appendix “C”). Special consideration shall be given when stop bars are used, ESD shall be measured 8 feet back from such stop bars. Further, ESD must be calculated for situations that involve road approach grades in excess of 6 percent 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.

Locations along a through road from which vehicles are permitted to turn left across opposing traffic, including intersections and driveway approaches, should have sufficient sight distance to accommodate the left-turn maneuver. Exiting Sight Distance along the through road shall be as follows, based on a left turn by a stopped vehicle:

**Exiting Sight Distance (ExSD)
Left Turns from the Through Road**

Posted/Legal Speed (mph)	25	30	35	40	45
ExSD (feet)	205	245	285	325	365
For each additional opposing through lane (feet)¹	+19	+22	+26	+30	+33

¹ Adjustment for multi-lane roads: For left-turning vehicles that cross more than one opposing lane, add distance shown for each additional lane to be crossed.

Passing Sight Distance shall be provided 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. When widening existing roads, the Engineer is strongly encouraged to provide the additional widening symmetrical about the existing centerline alignment. Road curves should be designed with as large a radius curve as practical, with a minimum radius controlled by the appropriate design speed. Road alignment within plat boundaries should closely fit the existing topography to minimize cuts and fills.

On most roads, especially those classified as local roads where design speeds are in the 20 to 25 mph range, short radius curves may be tolerated and 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 (mph)	Rural "f"	Urban "f"
20	0.170	0.270
25	0.165	0.230
30	0.160	0.200
35	0.155	0.180
40	0.150	0.160
45	0.145	0.150

The normal roadway crown slope for new construction is 2 percent 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 percent 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 and Small Lot Roads	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 the “AASHTO Green Book”, and distributed in accordance with Design “A”, Superelevation Transitions for Highway Curves, contained in the WSDOT *Design Manual*.

The use of reverse curves and compound curves is strongly discouraged. The Engineer shall provide adequate tangent lengths between reverse curves when superelevation is used.

Curve widening shall be considered and designed, 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:

Arterials:	
Major	8%
Secondary	8%
Collector	10%

Local Road	
Feeder	10%
Minor	12%
Cul-de-Sac Stem	15%
Cul-de-Sac Turnaround	6%
Small Lot Design	12%

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

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

3-4 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 symmetrical parabolic curves. Design speeds for vertical curves located within the area controlled by a STOP sign or on the perpendicular street approaching a "T" intersection can be reduced in accordance with the anticipated speed of the vehicle approaching the STOP control or the Yield condition of the "T" intersection.

3-5 Roadway Widening and Overlay

For roadway widening, the improvement shall be constructed to full width to the end of the required channelization of taper transitions. Additional storm drainage improvements may be required as a result of required roadway widening in order that the additional storm runoff generated by the widening will be satisfactorily controlled per County storm drainage requirements.

When the widening provided is symmetrical around the centerline of the existing roadway, then a full width overlay shall be provided. When the widening provided is on only one side of the existing roadway, then an overlay of that half of the road that has been widened shall be provided. In this case, the existing pavement shall be ground down near the old centerline where the overlay would match the untouched half of the traveled way to provide a good match without the need to feather the overlay depth. Where widening is provided for a right-turn lane and there is no relocation of the existing, adjacent through lane, no overlay should normally be required.

When a roadway is widened (such as for a turn lane construction), additional standard roadway elements (such as curbs, gutters, and sidewalks within an urban area) shall be included in the improvement unless otherwise approved by the County Engineer. In any event, existing roadway elements (i.e., paved shoulders, sidewalks, drainage, etc.) shall be replaced in kind or better.

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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 culvert headwalls are usually in the clear area, 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

The primary purpose of right-of-way is to serve vehicular and non-motorized travel. In accordance with state law, utility facilities may be accommodated in road right-of-way. Use of the right-of-way by utilities should be planned to minimize interference with traffic using the road. Industry-recognized principles provide for general location and construction of utilities to minimize conflict between the use of the road right-of-way for vehicular and non-motorized travel and for its secondary purpose of providing space for location of utilities. However, all public or private utility installations within the County road right-of-way shall conform to the requirements outlined in the *Manual on Accommodating Utilities in Pierce County Rights-of-Way*, as adopted in Pierce County Code 17B.10.060.

It will be the Engineer's responsibility to coordinate with all utilities to see that the utilities are located in accordance with Pierce County Public Works and Utilities Department adopted standards, and that the installation work is coordinated with the road construction work. Above-grade utility facilities shall be located such that they do not interfere with sight distance, traffic signing and signals, drainage culverts, or other roadway features (including shoulders and sidewalks). Further, utility poles are not permitted within any roadway shoulder, buffer, or sidewalk area without approval of the County Engineer.

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 an alternative such as boring, jacking, or relocating outside the paved roadway area is not feasible. Utility trenching or transverse cuts may be allowed if 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 Rights-of-Way*.

4-3 Pavement

Paving and subgrade material for non-arterial roads shall be in accordance with the *Standard Drawings*. 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 Hot Mix Asphalt Class 1/2 inch.

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 material characteristics of the existing soil conditions for the pavement design.

4-4 Lane Widths

Unless otherwise approved or required by the County Engineer, lane widths shall be in accordance with the Roadway Design Parameters table:

Roadway Design Parameters

	Chapter reference <i>Manual on Design Guidelines</i>	Local Roads					Arterials		
		Small Lot Developments		Cul-de-sac	Minor	Feeder	Collector	Secondary	Major
		Access Lanes ^(a)	Neighborhood Streets ^(a)						
Design Vehicle	2-3	P	P	P	SU/P	SU/P	SU/BUS	BUS/WB-40	BUS/WB-40
Design Speed	2-4								
Urban		20 mph	25 mph	25 mph ^(b)	25 mph	30 mph	35 mph ^(c)	40 mph ^(c)	45 mph ^(c)
Rural		n/a	n/a	25 mph ^(b)	25 mph	30 mph	40 mph ^(c)	45 mph ^(c)	45 mph ^(c)
Lane widths ^(d)									
Exterior ^(e)		10ft ^(f)	11ft ^(g)	see note (l)	see note (l)	12ft	11ft ^(h)	11ft ^(h)	11ft ^(h)
Interior		n/a	n/a	n/a	n/a	n/a	11ft	11ft	11ft
TWLTL		n/a	n/a	n/a	n/a	n/a	12ft	12ft	12ft
Exclusive Turn Lane		n/a	n/a	n/a	n/a	n/a	12ft	12ft	12ft
Exclusive Bike Lane ⁽ⁱ⁾	4-7	n/a	n/a	n/a	n/a	n/a	5'	5'	5'
Geometrics									
Max. Super Rate	3-2	Not Allowed		Not Allowed	0.02 ft/ft	0.02 ft/ft	0.04 ft/ft	0.04 ft/ft	0.04 ft/ft
Max. Profile Grade ^(j)	3-3	12%	12%	15% ^(k)	12%	10%	10%	8%	8%

- (a) In accordance with Small Lot Developments per 18J.17.
- (b) 20 mph for stems 250 feet or less in length.
- (c) Design speeds shown are a guide only. The County Engineer will establish design speeds for all arterials.
- (d) All lane widths are exclusive of the curb and gutter sections, except as noted.
- (e) Widened curb lane, when required by the County Engineer, shall be 15 feet for 2- and 3-lane roadways and 14 feet for multi-lane roadways.
- (f) Lane width inclusive of the gutters.
- (g) Neighborhood Streets shall be 28 feet wide, which includes the gutters and 6-foot parking areas. Where curb bulb outs are used to delineate parking bays, the width shall be 22 feet inclusive of the gutter.
- (h) For two- and three-lane roadways, lane widths shall be 12-foot wide.
- (i) Lane widths inclusive of the gutters and delineated from through vehicle movement by a 4-inch white edge line.
- (j) Minimum centerline and gutter line grade shall be 0.7 percent with asphalt concrete gutter or uncontained drainage and 0.4 percent with cement concrete gutter.
- (k) Turnaround grade shall be 6 percent maximum.
- (l) For local road minor and cul-de-sacs, the roadway width shall be 28 feet except when open drainage, asphalt raised edge or parking is included (see *Standard Drawings*).

All intersection departure lanes (i.e., the egress lanes for traffic leaving the intersection) shall be designed with sufficient width to accommodate the vehicle tracking path of the appropriate design vehicles. For intersections along an arterial, all legs that have a single departure lane shall have a minimum pavement width of 15 feet for this departure lane, and shall then taper to the normal lane width over a distance of 100 feet on arterials and 50 feet on local roadways. At intersections where double left or right turn lanes are being constructed, the departure lanes that receive these turning movements shall be flared or widened as necessary to be consistent with the tracking needs of the design vehicle for the intersection.

4-5 Shoulders

Shoulders shall be provided consistent with the requirements of the County Engineer and the roadway cross-sections shown in the *Standard Drawings*.

Shoulders provide the following advantages:

- Space for vehicles to make emergency stops away from the traveled way.
- Enhanced safety, roadway capacity, and sight distance.
- Lateral clearance from signs, ditches, above-ground utilities, and potential roadside obstacles.
- Structural support for the pavement and storm water is discharged farther from the traveled way.
- Improved maintenance operations.
- Space for pedestrian and bicycle use.
- Space for occasional encroachment of vehicles, such as mail delivery vehicles.

In particular, shoulders are an important and integral part of roadways in rural areas and in areas where curb, gutter, and sidewalk is not provided.

If a roadway designed with shoulders has been identified for use as a part of the non-motorized, bicycle facility network, the shoulders shall be paved. In urban areas where curb, gutter, sidewalk is provided and where future bike lanes or restriping for additional traffic lanes are envisioned, paved shoulders shall be provided between the traveled way and the curb and gutter as required by the County Engineer.

4-6 Curbs

Acceptable curb designs for cement concrete curb and gutter, and cement concrete rolled curb, are provided in the *Standard Drawings*.

Asphalt concrete raised edges and asphalt concrete barrier curbs are not intended for use in urban growth areas, unless otherwise approved by the County Engineer. When used, they must be constructed integrally with the pavement construction.

4-7 Pedestrian and Bicycle Facilities

Sidewalks, walkways, and shared-use paths, when used, shall conform to design parameters and direction provided by the County Engineer. Storm drain percolation systems shall not be permitted under any sidewalk or walkway.

Pedestrian facilities shall be provided in urban growth areas as a part of any newly constructed or reconstructed road. Shared-use paths or walkways shall be constructed in compliance with any applicable adopted County plan. The shared-use path or walkway may be located within the area of the road itself, or be separated from the road by a buffer, or be outside the roadway altogether.

4-7.1 Sidewalks

Sidewalk facilities shall be constructed of cement concrete materials. Curb ramps and sidewalk facilities shall meet the requirements of the “Americans with Disabilities Act” and conform to the design requirements of the County Engineer. Sidewalks are 6 feet wide when adjacent to an arterial road, 5-feet-wide when separated by a buffer or drainage ditch from an arterial road or included in a local roadway, and 4-feet-wide when used in a small lot design. A sidewalk shall not be placed immediately adjacent to an asphalt-raised edge or asphalt-barrier curb.

4-7.2 Walkways

Walkway facilities shall be constructed of asphalt concrete materials. Curb ramps and walkways shall meet the requirements of the “Americans with Disability Act” and conform to the design requirements of the County Engineer. The width of an asphalt walkway shall be the same as used for a sidewalk. An asphalt walkway shall not be placed immediately adjacent to an asphalt raised edge or asphalt barrier curb.

4-7.3 Shared-Use Paths

Shared-Use Paths are not normally expected within the road right-of-way, except in situations where the facility is part of an adopted plan. Minimum width of a shared-use path is 10 feet when the grade is equal or less than 5 percent and 13 feet if over 5 percent. There shall be a 2-foot graded area on each side of the shared-use path. If required by the County, such a pedestrian and/or bicycle facility design shall be coordinated with the County Engineer in order to receive specific design direction and parameters. When preparing a shared-use path design, the Engineer should consult the *Guide for the Development of Bicycle Facilities*, as published by the American Association of State Highway and Transportation Officials.

When pedestrian or bicycle facilities are provided as an independently constructed improvement along the frontage of property abutting an existing road, such improvement shall be constructed in accordance with the provisions outlined in this Manual in a location approved by the County Engineer.

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 24 inches above the roadway surface provided no safety related concern is created. Street trees conforming to the type and size outlined in Pierce County Code 18J.15.050, “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. Placement of street trees within the buffer will not be allowed if safety or visibility issues will result. Utility poles shall not be located within the buffer area unless there are no other viable locations, and the placement of said poles can be accommodated in such a way as to not create a safety or visibility concern.

A median is that raised area within the roadway separating opposite directions of vehicular traffic. A travel lane of 18-feet in width shall be used when a two-lane roadway includes a raised median. The maximum width of any median shall be 16 feet from back of curb to back of curb. The maximum height of vegetation, except for street trees, placed in the median shall be 24 inches above the roadway surface. 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 Pierce County Code 18J.15.050, “Landscaping and Buffering”. Placement of street trees within the median will not be allowed if safety or visibility issues will result. The placement of utility poles in the median area is not allowed under any circumstances. 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 is also located within the median. The minimum length for a median is 200 feet.

Storm drain infiltration systems may be allowed within a buffer or median provided adequate soils exist (as determined by the County Engineer) and accessibility can be achieved.

4-9 Clear Areas

The designer must be aware of the extensive tables of recommended clear area distances both in the “AASHTO Green Book” and WSDOT *Design 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 area 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 areas should be recognized as idealistic objectives. 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 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 may be 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 of pertinent published recommendations and associated research. 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

Fill slopes shall be constructed no steeper than 2 H: 1 V for curbed sections and 4 H:1 V on shoulder sections. Cut slopes shall be no steeper than 1 H: 1 V. 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 appropriate materials, compaction methods, and construction techniques to ensure stability.

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 be flattened to accommodate utility placement. Side slopes higher than 15 feet shall be terraced with 5-foot minimum wide bench for every 15 feet of vertical height sloped to drain properly.

4-10.2 Mailboxes

Mailboxes shall be installed as far removed from the driving portion of the right-of-way as possible, so as not to obstruct sight distance, yet still be accessible to the U.S. Postal carrier. Mailbox supports shall be of breakaway design. U.S. Postal Service approval of type and design shall be required and any details provided by the U.S. Postal Service shall be included in the set of construction plans. Mailboxes shall maintain minimum clearances in accordance with ADA requirements and shall not obstruct sidewalks and/or walkways.

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 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 in these two situations: for arterial road classifications and for local road classifications that are not within the boundaries of a subdivision. Street trees shall conform to the type and size outlined in Title 18J of the Pierce County Code. Street trees shall be placed a minimum of 3 feet

from any sidewalk or walkway. 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, shared-use paths, 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 guardrail design and need.

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.

4-11 On-Street Use

At times the roadway area provides for additional secondary on-street uses. Such uses include on-street parking and bus turnouts.

4-11.1 Parking

When properly located, on-street parking can supplement off-street parking facilities. However, it should be allowed only where conditions are safe and where the impact on traffic flow is acceptable. On-street parking shall be allowed only with the approval of the County Engineer. Inappropriate on-street parking may impede traffic flow, contribute to accidents, or cause congestion. On-street parking will not be permitted along arterial roads unless the function of the arterial is low traffic volume and low operating speed. When used in residential developments, parallel parking areas or bays shall be delineated by the use of curb and gutter; Curb bulb-outs may be used at the intersections and other appropriate locations to separate the parking area from the through vehicular lanes of travel. The Engineer's design for on-street parking and curb bulb-outs shall be consistent with typical design layouts provided by the County Engineer.

4-11.2 Bus Turnouts

The need for bus turnouts should be established at the discretion of the County Engineer in concert with the provider of the bus service such as a transit agency or school district. When provided, the bus turnout shall incorporate curb and gutter to define the limits of the bus turnout area. Storm drainage facilities must be included as required by the existing topographic conditions. Acceptable designs for bus turnouts are provided by the County Engineer.

4-12 Cul-De-Sac Bulbs

When designing a local road opened at one end only, the Engineer shall provide for a vehicle turnaround area typically referred to as a cul-de-sac bulb. The bulb area should be circular and have a radius appropriate for emergency vehicles. Acceptable designs for cul-de-sac bulbs are provided in the *Standard Drawings*. Cul-de-sac bulbs are prohibited on Neighborhood Streets and Access Lanes.

4-13 Turnarounds for Neighborhood Streets and Access Lanes

Turnarounds for Neighborhood Streets and Access Lanes shall be in accordance with the applicable detail in the *Standard Drawings* as prepared by the County Engineer.

4-14 Vertical Clearance

All roads, cul-de-sacs, and turnarounds must have a minimum vertical clearance of 16.5 feet.

4-15 Obstructions in Public Road Right-of-Way or Private Road Easements

Obstructions normally located on private property, including but not limited to fences, landscaping retaining walls, basketball hoops, or yard fixtures are not allowed within the public road right-of-way or private road easement.

Obstructions such as street lighting poles, power poles, utility boxes, telephone boxes, street trees, and/or landscaping material shall not be allowed in a manner or location that will interfere with the traveled surface, pedestrian area, and shoulder area.

Sight obscuring objects must be located so that required sight distances are still provided as required in this Manual.

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Chapter 5

Access and Intersections

5-1 Access Control

Driveway approaches and 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 Engineer may be required to furnish an access plan that will be used by the County to review what impact the proposed access will have on the road system.

Design criteria used for residential, minor or major driveway approaches are 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. Roadway and driveway approaches, public or private, should be designed so as not to interfere with drainage.

For intersections and driveway approaches, the following general design criteria shall apply:

- A. Intersections shall not be located on curves with radii that are less than the minimum required for 5 mph above the design speed. Intersections shall be located a sufficient distance along or away from all curves to provide and maintain proper sight distance for vehicles on the intersecting road or driveway approach and on the through road.
- B. Intersections within a local road system should be of the “T” type; for lower speed-facilities of minor or cul-de-sac classification, “L” type intersections are acceptable. Four-leg intersections within a local road system may be permitted only along feeder roads but must receive the approval of the County Engineer.

- C. The intersection of two local roads should be designed to operate without any traffic control device (e.g., Stop or Yield signs) whenever possible.
- D. Multi-leg intersections (i.e., those with more than four legs) are not permitted.
- E. 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.
- F. Whenever 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.
- G. Access to corner lots should be from the lesser-classified road at the greatest distance possible from the intersection.
- H. 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.
- I. 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 approach shall be permitted a minimum of one residential driveway approach.
- J. Entering sight distance for a proposed intersection (public or private) or driveway approach shall be in accordance with Section 3-1.
- K. Access to the abutting property shall be controlled along the access centerline from the right-of-way or easement into the property for a distance of 80 feet on a major driveway approach and 20 feet on a minor driveway approach unless otherwise approved by the County Engineer.
- L. The minimum distance between the paved edge of a driveway approach and the face of an obstruction, including above-grade utility appurtenances, shall be no less than 4 feet without curbing and no less than 3 feet with curbing on the approach.
- M. The outer edge of a proposed driveway approach or roadway shall not be constructed closer than 70 feet to a bridge, culvert, or other structure that may warrant end protection using guardrail in accordance with the most current criteria adopted by the Washington State Department of Transportation.

Notwithstanding the requirements of this section, the number and location of driveway approaches and 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/signalization on the existing

County road, turning movements generated by the existing and/or proposed project(s), the amount of lot frontage along the road, and other applicable traffic design criteria, as well as other driveway approaches in the vicinity of the proposed access.

In order to minimize the number of conflicts between vehicles entering and exiting the roadway and vehicles traveling along the roadway, the Engineer is encouraged to exceed the minimum distances between a proposed driveway approach or proposed road intersection and existing intersections and driveway approaches along either side of the roadway.

5-2 Driveway Approaches

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. 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 driveway approach will require the obtaining of a new Driveway Approach Permit and must otherwise comply with all standards.

No driveway approach shall be permitted to undeveloped parcels of land without first securing, in writing, the approval of the County Engineer.

Driveway approaches 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 approach design needs to address the type of vehicle composition anticipated, traffic volume, and land use activities being accessed. Driveway approach placement needs to be carefully determined to minimize interference with normal roadway operation. Closely spaced driveway approaches are discouraged.

The design of the driveway approach is broken into three general classifications, which are:

- Residential Driveway Approach serves up to two single-family residences or one duplex unit and infrequently used accesses such as drainage pond maintenance accesses.
- Minor Driveway Approach serves multi-family and commercial uses with approach traffic volumes of up to 1,500 vehicle trips per day or up to 150 vehicles trips per peak hour, or for alleyways and shared access facilities (the design and usage criteria for the alleyway and the shared-access facility shall conform to the requirements contained in Pierce County Code 17B.20).

- Major Driveway Approach serves 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 allowed to serve one site, then each driveway approach should conform to the applicable driveway approach classification.

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 an access beyond the end of the driveway approach shall be done to provide a smooth, passable, and safe transition.

There shall be no more than one residential driveway approach onto any road for any one residence unless otherwise approved by the County Engineer. When it is shown by the applicant that there is a need for the additional residential driveway approach and that the safety on the road system will be improved by the granting of a second residential driveway approach, the County Engineer may approve the second residential driveway approach.

Residential Driveway approaches shall be constructed the maximum practical distance from an intersection. At least 35-foot separation shall be provided between a Residential Driveway Approach and either an arterial or local road feeder intersection; this distance is measured from the road right-of-way or easement/tract line of the adjacent intersection to the nearest edge of the access. In the case where adequate lot frontage is not sufficient to provide the required separation from an intersection, the driveway approach should be located the maximum practical distance away from the intersection.

When lots are created or altered, through a land use process, Residential Driveway Approaches will not be permitted onto roadways with either an arterial or local road feeder classification. Further, particularly when lots with minimal frontage are used, the layout and design of the lots should use creative techniques to maximize access spacing from intersections. Techniques for maximizing this spacing may include a shared facility with an adjacent lot away from the intersection; locating property lines such that any lot extends no further than halfway into an intersection; and, providing open space (or other use) tracts between lots at intersections. On local road minors or cul-de-sacs, Residential Driveway Approaches shall not be permitted to be located within an intersection area of a local road feeder. On a Neighborhood Street or Access Lane, lots must be designed to achieve access locations as far as practical from the center of a roadway intersection.

For existing lots with no alternative access to a lower classified roadway, Residential Driveway Approaches on a local road feeder or an arterial roadway shall be located a minimum of 10 feet from the side property line, as measured from the property line to the nearest edge of the access.

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 access 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 shall be located a minimum of 125 feet from an intersection. Along an arterial roadway they may also be located directly across from a local road minor or cul-de-sac intersection. Physical site conditions and spacing of existing driveway approaches may cause the County Engineer to require another location. The 125 feet is measured from the intersecting road right-of-way line to the nearest edge of the access. 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.

Minor Driveway Approaches on a local road feeder or an arterial roadway shall be located a minimum of 20 feet from the side property line, as measured from the property line to the nearest edge of the access.

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 access 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 shall be located a minimum of 125 feet from an intersection. Along an arterial roadway they may also be located directly across from a local road feeder, minor, or cul-de-sac intersection. Physical site conditions and spacing of existing driveway approaches may cause the County Engineer to require another location. The 125 feet is measured from the intersecting road right-of-way line to the nearest edge of the access. 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.

Major driveway approaches on a local road feeder or an arterial roadway shall be located a minimum of 30 feet from the side property line, as measured from the property line to the nearest edge of the access.

5-2.4 Construction Criteria

All driveway approaches shall be constructed in accordance with the applicable Pierce County detail contained in the Pierce County *Standard Drawings*.

Driveway approaches along roadways being widened or reconstructed shall, where practical, be improved to current standards, but in no case shall be less than pre-existing substandard conditions.

5-2.5 Temporary Driveway Approach

Temporary Driveway Approaches require permit approval from the County Engineer for all purposes including, but not limited to, logging or other temporary access needs to a parcel of land.

Temporary Driveway Approaches shall be located such that the required entering sight distance for the road being accessed is met. In the event entering sight distance is not achievable, traffic control shall be provided in accordance with the MUTCD whenever the access is in use. The County may also set requirements for traffic control as needed dependent on the type of vehicles entering the County road system (i.e., large trucks may require flaggers even though entering sight distance is available).

Temporary Driveway Approaches in general shall be gravel, but the County may require paved approaches to avoid damage to the existing roadway edge, or to minimize the tracking of gravel onto the road surface.

All Temporary Driveway Approaches must be removed and the right-of-way restored within 90 days from the date of permit approval. One 90-day extension may be granted by the County Engineer provided the written request for extension is submitted 15 days in advance of the original permit expiration date, and provided that good cause for delay is demonstrated.

Restoration of the County right-of-way means to restore the County road, shoulder, and storm drainage system to the condition they were in prior to construction of the Temporary Driveway Approach.

Removal of the Temporary Driveway Approach means to permanently close the approach by blocking, berming, fencing, or other method suitable to the County.

No site work may commence until a permit for the Temporary Driveway Approach has been issued by the County Engineer and the temporary approach has been constructed and inspected.

Prior to approval of a Temporary Driveway Approach, a financial guarantee shall be provided in accordance with Title 17A "Construction and Infrastructure Regulations – Site Development and Stormwater Drainage".

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 Spacing

The minimum distances between any roadway approach onto any other roadway, measured from centerline to centerline of the roadway, 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
Alleys Intersecting Local Roads or Arterials	60 Feet

A new Local Road Feeder roadway that creates a four-leg intersection shall be permitted along an arterial roadway when located directly opposite either a local or arterial roadway; it shall also be permitted along a local (non-arterial) roadway when located opposite an arterial roadway.

A new Local Road Minor roadway that creates a four-leg intersection shall be permitted only along an arterial roadway when located directly opposite a local (non-arterial) roadway.

A new Arterial roadway that creates a four-leg intersection opposite a local (non-arterial) roadway requires the approval of the County Engineer.

5-3.2 Angles

Proposed roads should intersect one another at 90-degree angles. In order to achieve the desired vehicle orientation to the roadway being entered, a minimum tangent length shall be provided between the roadway intersection and the beginning of any horizontal curve for the entering road. This minimum tangent length shall be 30 feet from the point of intersection of the roadways to the point of curvature of the horizontal curve. If a 90-degree angle is not possible, the variation shall not be more than 15 degrees without the approval of the County.

5-3.3 Corner Radii

At road intersections, the following typical ranges of flow line radii are permitted:

Local Road - Local Road Intersection	25-30 Feet
Local Road - Arterial Intersection	30-35 Feet
Arterial - Arterial Intersection	35-40 Feet

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

5-3.4 Grades

When either of the road centerline profile grades within 35 feet of an intersection have a gradient of 8 percent 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 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.

Roadway intersections shall be designed with landings that shall not exceed 1-foot difference in elevation for a distance of 30 feet approaching an arterial or 20 feet approaching a local road, measured from the nearest right-of-way (extended) or private road easement/tract (extended) of the intersecting roadway.

Profile grades for all road intersections (existing or proposed) shall be designed and constructed so that adequate entering sight distance is available at the intersection.

5-3.5 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*.

5-3.6 Extending Dead End Public Roads

Private road approaches shall not be directly extended from the end of a public road along the same alignment. Private road approaches to a public road at the public road terminus shall meet the "L" or "T" intersection criteria. In the event that there is not an existing public turnaround available (public cul-de-sac, public "T" intersection, or looped public road system) at the terminus of the existing public road, the "L" or "T" intersection area shall be dedicated to the public.

Minor and major driveway approaches shall not be directly connected to the end of a public road. Minor and major driveway approaches must connect to public roads at approximately a right angle to the roadway centerline in accordance with the applicable driveway approach standard details.

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.

5-5 Gates

Standards for vehicular gates are intended to assure that:

- Emergency vehicles can physically and quickly gain access.
- Emergency vehicles are able to exit the gate.
- Safe ingress and egress is provided for the regular user.
- Vehicles that are rejected at a gate have a turnaround available so they do not have to back into traffic.
- Vehicles can pull out of the traveled way of the road they are exiting as they wait for the gate to open.

Appendix A of this Manual contains standards for gates. Gates proposed to be located across private roads; shared access facilities; driveways to residential, commercial, or industrial structures; maintenance driveways to stormwater facilities; an easement or tract that provides vehicular access, access driveways to agricultural uses such as crops or livestock; shall comply with the standards and process contained in Appendix A.

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Chapter 6

Shared-Access Facilities and Alleys

Design and Construction of shared-access facilities and alleys shall conform to the requirements of this chapter.

6-1 Drainage

All storm drainage elements associated with shared-access facilities and alleys must be designed and constructed in accordance with the requirements of Title 17A PCC and the *Pierce County Stormwater Management and Site Development Manual*.

6-2 Length

The maximum length of a shared-access facility serving single-family, or two-family, dwelling unit lots is 500 feet. The length of a shared-access facility serving commercial or industrial use lots shall not be greater than 500 feet, unless provisions are implemented that assure vehicle speeds of less than 20 miles per hour.

The maximum length of an alley is 750 feet.

The maximum length of an alley that is intended to provide emergency vehicle access to lots is 150 feet.

Lengths are measured from the centerline/centerline intersection of the shared-access facility or alley with the public or private road.

6-3 Connection

Shared-access facilities must connect to one of the following road classifications: arterial, local road feeder, local road minor, or local road cul-de-sac. Shared-access facilities are not allowed in a Small Lot Development. Alleys must connect only to the local road system or a shared access facility (Ref. 2-1.3.5).

6-4 Width

The driving surface width of a shared-access facility shall not be less than 24 feet. The driving surface width of a one-way alley shall not be less than 12 feet. The driving surface width of a two-way alley shall not be less than 16 feet. Alleys that serve as emergency vehicle access to lots must have a 24-foot-wide driving surface width.

6-5 Easement or Tract Width

Shared-access facilities and alleys are required to be in private easements or private tracts. The easement or tract widths must exceed the driving surface width by two feet on each side.

6-6 Vertical Clearance

Shared-access facilities and alleys shall have an unobstructed vertical clearance of not less than 13 feet 6 inches.

6-7 Driving Surface Structural Section

The driving surface structural section for shared-access facilities must be designed to support the imposed loads of fire apparatus. The driving surface structural section for shared-access facilities must be paved if they are located in the urban area. A gravel structural section may be used in rural areas.

Urban area exception: A subdivision that proposes the creation of not more than two lots and limits each lot to not more than one primary dwelling unit and one accessory dwelling unit is not required to pave the shared-access facility except when the grade of the shared-access facility exceeds 12 percent.

The driving surface structural section for alleys that are intended to provide emergency vehicle access must be designed to support the load of fire apparatus. All alleys must be paved.

Unless otherwise approved by the County, the minimum “paved” driving surface structural section for alleys and shared access facilities is as follows:

- 2 inches minimum compacted depth hot mix asphalt class 1/2 inch.
- 2 inches minimum compacted depth crushed surfacing top course.
- 6 inches minimum compacted depth gravel base.
- 8 inches of crushed surfacing base course may be used in lieu of crushed surfacing top course and gravel base.

6-8 Turning Radii

For shared-access facilities and alleys that are intended to provide access for emergency vehicles, the minimum outside turning radii for the driving surface shall be 45 feet for all curves.

For alleys that are not intended to provide access for emergency vehicles, the driving surface must be designed to allow for reasonable ingress and egress from each lot or garage. To be considered reasonable, the alleys must be designed to minimize turning movements by a passenger vehicle (P vehicle as per the American Association of State Highway and Transportation Officials).

6-9 Turnarounds

A cul-de-sac is required at the end of any dead end, shared-access facility which is longer than 150 feet. Cul-de-sacs are not allowed on alleys.

6-10 Bridges and Structures

All bridges and structures (including non-standard drainage structures such as custom vaults) that are necessary to provide structural support to the driving surface width must be designed to meet HL-93 live loading.

6-11 Gates

Gates on shared-access facilities and alleys must meet the requirements of Chapter 5, Section 5 of this Manual.

6-12 Grade

The maximum longitudinal gradient of the driving surface of a shared-access facility is 15 percent. Any shared-access facility with grades over 12 percent must be paved.

The maximum longitudinal gradient of the driving surface of an alley is 15 percent.

6-13 Obstruction

The required driving surface width for alleys and shared-access facilities is not intended for parking. The minimum required width and vertical clearance must be maintained at all times.

6-14 Signs

When required by the County, approved signs or other approved notices shall be provided and maintained for the purposes of identifying such shared access facility or alley. One-way alleys must have a "Do Not Enter" sign installed, meeting the requirements of the *"Manual on Uniform Traffic Control Devices"*.

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Chapter 7 Bridges and Walls

7-1 Bridges

Design of bridges 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:

- Deck Width:** 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 the 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.
- Live Loading:** HL-93
- Other Loading:** AASHTO LRFD Bridge Design Specifications (Current Edition)
- Vehicular Railing:** AASHTO LRFD Bridge Design Specifications (Current Edition)
- Pedestrian Railing:** AASHTO LRFD Bridge Design Specifications (Current Edition)
- Approach Railing:** AASHTO Crash Tested Rail, or Approved Crash Tested Rail
- Vertical Clearance:** 16.5-foot minimum over roadways; 23.5-foot minimum over railroads, unless additional clearance is required by railroad company. Clearances shall also be in accordance with Pierce County Flood Hazard regulations. Additional clearance may be required by the County Engineer.

Requirements for future resurfacing shall be duly considered.

Utility accommodation shall be in accordance with the *Manual on Accommodating Utilities in Pierce County Rights-of-Way*, as published by Pierce County.

The aesthetic aspects of the bridge will be reviewed on a case-by-case basis.

7-2 Walls

Wall installations in the public right-of-way will be discouraged, and every effort should be made by the design engineer to grade the property in such a way as to avoid the installation of walls. If a wall is determined to be necessary, consideration shall be given to the design and placement of the wall to maximize the clear area, including placement of the wall outside of the right-of-way on private property. Any wall constructed within the roadway clear area shall have the appropriate barrier protection provided as determined by the Engineer.

A chain link fence or acceptable alternative shall be required at the top of a new or reconstructed wall if the height of the exposed face of the wall exceeds 30 inches. For walls less than 30 inches, the County Engineer may require a fence or other protection.

7-2.1 Retaining Walls

For all retaining walls, a structural wall of acceptable design shall be used. Geotechnical design criteria shall be provided by a geotechnical engineer. Plans and specifications for each retaining wall to be located within the County road right-of-way shall be designed, stamped, and signed by an engineer.

Any retaining wall constructed for a roadway fill section shall provide a minimum one-foot setback from any portion of the wall to the right-of-way to allow for wall maintenance and inspection activities.

7-2.2 Rock Walls

Rock Walls may be used for the containment of cut slopes or fill embankments up to a maximum wall height of five feet (including one foot of embedment) if stable and appropriate soil conditions exist

All rock walls shall be constructed in accordance with Section 8-24 of the Washington State Department of Transportation *Standard Specifications for Road, Bridge, and Municipal Construction*.

Chapter 8

Traffic Control and Lighting

8-1 Signs

All traffic signs must conform to the MUTCD, as adopted by the State of Washington pursuant to WAC 468-95-010. All traffic signs within the County right-of-way shall be installed in accordance with the requirements of the County Engineer.

8-1.1 Stop Signs

Stop signs shall be installed by the proponent on all unsignalized 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 approach is opened to vehicular use. The stop sign for a private road approach must be maintained by the property owner(s) that have legal access to the private road. Stop sign construction and location must be in accordance with the Pierce County *Standard Drawings*.

8-1.2 Street Name Signs

Street name signs for private roads or driveway approaches shall be installed by the proponent. Street name signs for private roads and driveway approaches shall be maintained by the property owner(s) that have legal access to the road or approach. Street name signs for public roads will be installed and maintained by the County Engineer. Street name sign construction and location must be in accordance with the Pierce County *Standard Drawings*. Street names and/or numbers shall be in accordance with Title 10.44 PCC. Street name signs for private roads and driveway approaches shall be installed prior to the final inspection.

8-1.3 “No Parking” Signs in Small Lot Subdivisions

“No Parking” signs shall be installed by the County pursuant to the requirements of PCC Section 10.24.055 within developments constructed to the *Small Lot Design Standards* in PCC Chapter 18J.17 when the road under construction is accepted for County sign maintenance. All “No Parking” signs in County right-of-way will be provided by the County Engineer consistent with approved road construction plans.

8-1.4 Payment for Traffic Signs

With the exception of Stop signs required by Section 8-1.1 above, traffic signs for public roads, such as street name signs, “No Parking” signs, “Dead End”, speed limit, and other needed signs, will be provided and installed by the County Engineer. The proponent shall pay for such signing as a part of the fees per linear foot for formal plat (public) roads and offsite public road improvements pursuant to PCC Chapter 2.05.090.

8-2 Pavement Markings

Pavement markings are required on all County arterials and roadways having channelization, consistent with the requirements of the County Engineer. Roadway striping, raised pavement markers (RPMs) or other traffic delineators shall be installed in accordance with the approved plans, the MUTCD, and the *Standard Drawings*.

RPMs can only be used along the right edge line at locations where an engineering study has determined the markers are essential to preserving pedestrian, bicycle, and motor vehicle safety. At the initiation of the engineering study, local bicycling organizations, the regional member of the State Bicycling Advisory Committee, or the WSDOT Bicycle and Pedestrian Program Manager shall be notified of the study for review and comment.

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 \$8,000.00. Reimbursement to the Department shall be made before the County accepts the overall project for dedication or maintenance and before the County releases the 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 and/or Contractor shall contact the Pierce County Traffic Operations Center. An onsite meeting may be required to preview the work, markings, layout, and method of construction.

8-3 Signals

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

8-4 Illumination

Many factors go into determining the need to provide lighting, the type of lighting configuration to be used in any given condition, and the placement of the street lighting supports and fixtures; thus, street lighting should not be placed indiscriminately along the roadway and the determination to provide street lighting should be coordinated with the County Engineer.

All design plans for street lighting that will be operated by the County on arterial roads shall be specifically approved by the County Engineer prior to the beginning of construction.

For street lighting that will be operated by others (e.g., franchised utilities), the proposed roadway luminaire locations shall be shown on the roadway plans for review of compliance with any development requirements or conditions. The party responsible for operating the street lighting system shall be identified on the plans.

Street lighting systems for public roads that will be operated by parties other than the County or franchised utilities shall be located outside of the public road right-of-way.

Luminaire poles shall be placed such that the nearest face of the pole is a minimum of 6 feet back from the edge of traveled way when a curbed section is used. In no event shall the pole be placed closer than 2 feet from face of curb, such as when a paved shoulder or a parking lane is provided. When no curb is used, the nearest face of the pole shall be placed a minimum of 10 feet back from the edge of traveled way, but in no event shall the structure be placed closer than 0.5 feet from the back of shoulder. The street lighting shall not be placed within any shoulder, sidewalk, walkway, or shared-use path. Additionally, street lighting used within County right-of-way shall not conflict with overhead utilities, traffic control devices, sight distance or visibility requirements, and the base (subsurface) portion of the structure shall be flush with the surrounding ground elevation and shall not conflict with underground utilities, pavement, curbs, sidewalks, walkways, shared-use paths, or storm drainage facilities.

8-4.1 Locations

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

- A. Signalized locations.
- B. When raised median channelization is installed within the traveled way 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 all major, secondary, and collector arterials that are:
 - 1. Located 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, or
 - 2. More than two continuous lanes in width (excluding isolated turn pockets) and located in an urban growth area, or
 - 3. More than two lanes in width and located in rural areas that exhibit an urban growth pattern and urban density and are specifically identified and authorized by the County Council.

- D. Arterial locations having high reported accident histories in which a significantly large proportion of those accidents occurred at night.
- E. Intersections that have been identified for future signalization where lighting can be economically installed on a short-term basis.
- F. Locations that are identified, authorized, and funded by the Pierce County Council for traffic and pedestrian safety in the following areas:
 - 1. Established walking routes to a specific public school.
 - 2. Walking routes to a specific public park.
 - 3. Other locations determined in consultation with a school district or law enforcement agency for student safety purposes.

8-4.2 Lighting Standards

Where street lighting is required on roads, the following minimum requirements shall apply:

- A. Lighting design levels shall be consistent with the guidelines set forth in “Roadway Lighting Design Guide”, published by AASHTO.
- B. For local road intersections and cul-de-sacs within urban residential subdivisions, the minimum average maintained lighting level shall be 4 lux (0.4 footcandles) with an average to minimum uniformity ratio of 6:1. The typical lamp used should not exceed 150 watts for high pressure sodium fixture. Total downward luminaire efficiency should be at least 50 percent.
- C. For arterials and arterial intersections, lighting design levels will be provided by the Office of County Engineer.

8-4.3 Street Lighting in Developments

Street lighting is required 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.

8-4.4 Option for lighting at Non-County designated locations

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.

Chapter 9

Specifications and Construction Control

9-1 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 extent 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.

9-2 Engineer-in-Charge

All construction associated with a set of approved construction plans for a project shall be performed under the direct supervision of the Engineer in accordance with WAC 196-25-070 and P.C. Code 17B.30.050. Advance notice must be given to Pierce County in the event an Engineer of record change is required.

9-3 Traffic Control

All traffic control and traffic control devices shall be in conformance with 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 traffic signs shall be erected and maintained by the Contractor as necessary, or as directed by the County Engineer, for the protection of the traveling public. The barriers shall be properly lighted when necessary.

9-4 Survey Control

All existing survey control monuments which are disturbed, lost, or destroyed during surveying or construction shall be referenced prior to construction and replaced or raised after construction by a Professional Land Surveyor (P.L.S.) licensed in the State of Washington and in accordance with RCW 58.09.130.

Survey control monuments shall be installed as shown on the approved construction plans in conformance with the *Standard Drawings*. 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.

9-5 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*.

9-6 Record/As-Built Drawings

When a project constructed as a public facility has been completed, the Engineer shall prepare as-built drawings that document the project as actually constructed. These drawings shall be submitted to the Office of the County Engineer and made a part of the permanent record. The Engineer shall also provide to the County Engineer a report verifying that all facilities have been constructed in accordance with the approved plans or approved plan changes and specifications for that project.

Appendix A Vehicular Access Gates

A-1 Standards

Restrictions

Gates are not allowed across an opened public right-of-way. Gates are not allowed across private roads that provide access to certain public facility types pursuant to Section 17B.20.030. Gates and gate appurtenances such as keypad islands, turnaround areas, etc., shall not be located in public right-of-way.

Agricultural Gate Exemption

Gates that provide access solely to low intensity agricultural activities such as crop or livestock areas shall be exempt from the gate standards set forth herein provided, however, that such gates shall be setback from the road right-of-way and/or easement a minimum of 20 feet. Gates providing access to intense agricultural activities that allow for public access such as agricultural supply sales and agricultural services, and similar commercial activities, shall not be exempt and shall be subject to the gate standards set forth herein.

Design Vehicles

The two design vehicles used in the design of a gate are a passenger vehicle (AASHTO “P”) and a Pierce County fire apparatus having a 55-foot radius front overhang path and 25-foot radius rear wheel path. The dimension points of the fire apparatus are consistent with AASHTO design vehicles. Turnaround areas must be able to accommodate the turning movements of an AASHTO “P” vehicle. The design of a gated entry shall assure that the Pierce County fire apparatus can quickly and physically access and exit the entry.

Turnaround Area

Gates installed across a shared-access facility, private road, tract or easement that provides vehicular access, or serving any non-residential site, shall have a turnaround located in front of the gate. The turnaround shall not encroach into the intersecting right-of-way or private access easement. The turnaround shall be designed to accommodate the turn movements of an AASHTO “P” vehicle. Surfacing material shall be the same as the traveled way surfacing material.

Prescriptive Turnaround Area: Prescriptive turnaround area designs have been provided in Figures 1, 2, and 3 of this appendix in order to simplify the approval process. The circular turnaround (Figure 10) is the preferred method of providing a turnaround area. The circular turnaround maintains an unobstructed through-lane configuration for the ingress and egress lanes and allows the passenger vehicle to turn around without having to back up.

Non-Prescriptive Turnaround Area: Non-prescriptive turnaround areas are allowed, however, they must be designed by a Professional Engineer licensed in the State of Washington.

Gate Setbacks

Gates serving one single-family residence, storm drainage ponds and/or facilities or agricultural areas shall be setback from the road right-of-way and/or easement a minimum of 20 feet. All other gates shall be setback from road rights-of-ways and/or easements a minimum of 60 feet. Gates that are configured with a center post or center island shall be setback per all of the following minimum criteria: (1) 60 feet from a road right-of-way and/or easement, (2) 100 feet from the centerline of a right-of-way or easement, (3) 100 feet from the face/flowline of a median (the median side closest to the proposed gate), and (4) 100 feet from the lane divider separating opposing lanes of traffic.

Rapid Entry Capabilities

Rapid entry equipment must be provided that is compatible with Pierce County Fire Districts. Electrically operated gates shall default to the unlocked position during a loss of power. The requirement is also applicable when a backup battery system is proposed.

Rapid Entry Key Devices

Rapid entry key devices (Knox key switch, box or padlock, or approved equivalent) are required to be installed on all gates. An electrically operated gate shall be equipped with a Knox key switch. The switch shall open the gate(s) on activation of the switch and they shall remain open until reset. Manually operated gates shall be provided with an access key located in a Knox key box or a Knox padlock. Knox devices shall be located on the keypad island per Figure 4 or on the right-hand side gatepost, (see Figure 5), if a keypad island is not proposed.

Emergency Vehicle Strobe Detector

An emergency vehicle strobe detector receiver is required for gates that serve 10 or more dwelling units. Electrically operated gates on non-residential structures shall be equipped with an emergency vehicle strobe detector. Gates shall open on activation of the emergency vehicle strobe detector receiver and remain open for 30 minutes and then automatically close. The receiver shall be mounted 8 feet above the roadway and located on the gate support post located on the right side of the gate as you are entering the gated area.

Exit and Safety Loop System

An exit loop and associated detector is required when an emergency vehicle strobe detector system is required. The exit loop detector shall automatically open the exit gate as an exiting vehicle approaches. Safety loops and associated detectors are required when electrically activated gates are proposed. Safety loops shall prevent a gate from closing on a vehicle. Photo reactive and “wand” style sensors are not considered an acceptable alternative. They may be installed as a supplement to a loop system.

Key Pads and Key Pad Islands

Key pads shall be located such that a driver does not have to cross an opposing lane of traffic to operate the key pad. Key pads shall not be located on medians that divide lanes of traffic traveling in opposite directions. Key pad pedestals may be placed on key pad islands that are located in the roadway provided they are not be located in the traveled way portion of the roadway. (See Figures 4 and 7) The key pad and key pad island shall not interfere with vehicles entering or exiting the site. Mailbox kiosks shall not be located on the key pad island.

Clear Width

Minimum clear widths must be provided in accordance with Table 1 and Figure 5.

Table 1		
Roadway/Access Classification	Column “A” Minimum Clear Width between Hinge Posts (no center post)	Column “B” Minimum Clear Width between a Gate Center Post and Hinge Post
Shared-Access Facility Residential	24'	N/A
Shared-Access Facility Non-Residential	24'	12'
Local Feeder	27' or 33' (2 lanes with widened curb lanes)	13.5' or 16.5' (2 lanes w/ widened curb lanes)
PC.A3.1 - Local Minor & Cul-de-Sac PC.A3.2	31'	15.5'
PC.A3.3 - Local Minor & Cul-de-Sac PC.A3.4	32'	16'
PC.A3.5 - Local Minor & Cul-de-Sac PC.A3.6	33'	16.5'
PC.A4.1 - Arterial	24' (2 lanes) or 44' (4 lanes)	12' (2 lanes) 22' (4 lanes)
PC.A4.2 - Local Feeder or Minor PC.A4.3 - Local Cul-de-Sac	24'	12'
Residential Driveway Approach	15'	N/A
Minor or Major Approach	24'	12'

Gate Post Locations

Gateposts must be located behind the back of the curb section or edge of pavement.

Sidewalks and Walkways

The full width of a sidewalk or paved walkway must be maintained around any gate appurtenance.

Vertical Clearance

An unobstructed vertical clearance of not less than 13 feet 6 inches shall be maintained.

Gate Height

Gates or support posts that are higher than six feet are required to have project specific structural plans, details and calculations stamped by a Professional Engineer licensed in the State of Washington. The details and calculations need to address the size and specifications of gate panels, columns, support arms, welds, footings, concrete, anchor bolts and any other structural elements specific to the project. The height is measured per Figure 6.

Traveled Way

Gates must open to provide unobstructed access to all portions of the traveled way.

Snow Clearance

Swing type gates shall have a minimum of 6 inches of clearance between the bottom of gate and the traveled surface, through its entire operating arc.

A-2 Permits Required

Gate Permit

Pursuant to Section 17B.10.102, a gate permit issued by the County is required prior to beginning construction.

Electrical Permit

Electrically operated gates require a permit for the installation of line and low voltage devices. Contact the appropriate permitting agency (state or utility company) for required permits. Pierce County does not issue electrical permits.

A-3 Construction Drawings and Calculations

Drawings for proposed vehicular access gates are required and shall include the following:

- A vicinity map must be provided. Adequate detail must be provided to show how to reach the site. A scale of 1" = 1/4 mile should be used.
- A site plan must be provided. The site plan should be drawn at a scale of 1" = 10'. A sheet size of 22 inch to 34 inch should be used. The site plan must include the following: turnaround area, north arrow, graphic bar scale, right-of-way lines, property lines, roads, edges of paving, driveway approaches, sidewalks, shoulders, buffers, medians, islands, buildings, easements, critical areas, 2-foot contours, emergency vehicle strobe detector receiver location, keypad, safety and exit loop locations, Knox device location, proposed dimensions from gate to right-of-way or gate to private road easement, proposed dimension from gate to edge of pavement, gate shown in fully open position, and gate shown in fully closed position.

- A roadway Cross-Section/Gate Elevation detail must be provided. The detail should be drawn at a scale of 1" = 5'. The detail must include the following: a combined cross sectional view of the roadway and elevation view of the gate, an elevation (front) view of the entire gate system, width of paving, width of curb sections, width of shoulders, width of sidewalks, dimensions of the maximum height and width of each gate panel and support post, materials used in the construction of the gate, height of the emergency vehicle strobe detector and Knox device. The detail should be included on the site plan sheet or on a separate 22" x 34" sheet.
- Details of the gate post(s) must be provided. The detail(s) must include the following: hinge points, swing direction, track attachments, latches and other accessory appurtenances. The detail should be included on the site plan sheet or on a separate 22" x 34" sheet.
- A detail of the gatepost footing must be provided for gates over 6 feet in height. The detail should be included on the site plan sheet or on a separate 22" x 34" sheet.

* The following standard notes should be shown on the construction drawings for all gate permit applications:

1. *The property owner is responsible for maintaining the rapid entry devices in an operable condition.*
2. *Prior to requesting a Final Inspection from the Development Engineering Section, the applicant shall submit a copy of the completed Gate Operation Test form.*
3. *All pivoting gates shall have a minimum of six inches of clearance between the bottom of gate and the traveled surface, through its entire operating arc.*

* The following standard notes should be shown on the construction drawings for all electrically operated gate permit applications:

4. *The gate lock shall default to the unlocked position in the event of a loss of electrical power.*
5. *All gates shall open on activation of the Knox key switch and shall remain open until manually reset.*
6. *The safety loop detector circuit shall prevent the gates from closing on a vehicle in its path. An exit loop detector circuit or emergency vehicle strobe detector receiver shall automatically open the gate upon emergency vehicle approach to the exit gate from inside the complex.*
7. *Electrically operated gates require a permit for the installation of line and low voltage devices. Contact the appropriate permitting agency (state or utility company) for required permits. Pierce County does not issue electrical permits.*
8. *Prior to requesting a Final Inspection from the Development Engineering Section the applicant must obtain an approval from the electrical inspector and a copy of the electrical permit must be provided to the Development Engineering Section.*

* The following standard notes should be shown on the construction drawings for all emergency vehicle strobe-detector-equipped gate permit applications:

9. *All gates shall open on activation of the emergency vehicle strobe detector and remain open for a minimum of thirty minutes and then automatically close.*

Site specific structural details and calculations, prepared by a professional engineer, are required for gates or supports that exceed 6 feet in height.

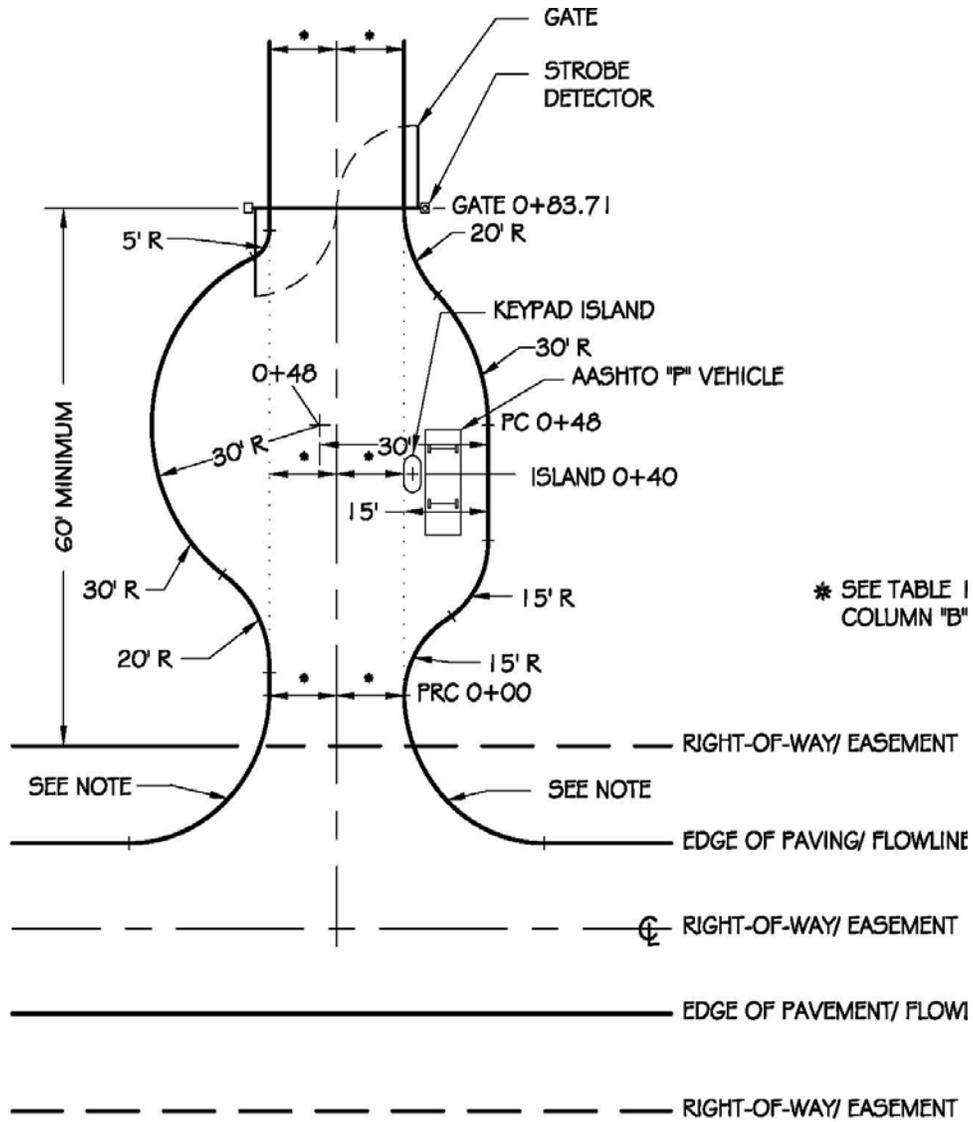
Copies of manufacturer's "cut sheets" for rapid-entry components (Knox device, emergency vehicle strobe detector) and gate operator components must be provided.

A-4 Gate Application Submittal Requirements

Submittals for gate permit applications must include five copies of the construction drawings, three copies of the manufacturer's cut sheets, and three copies of the structural calculations.

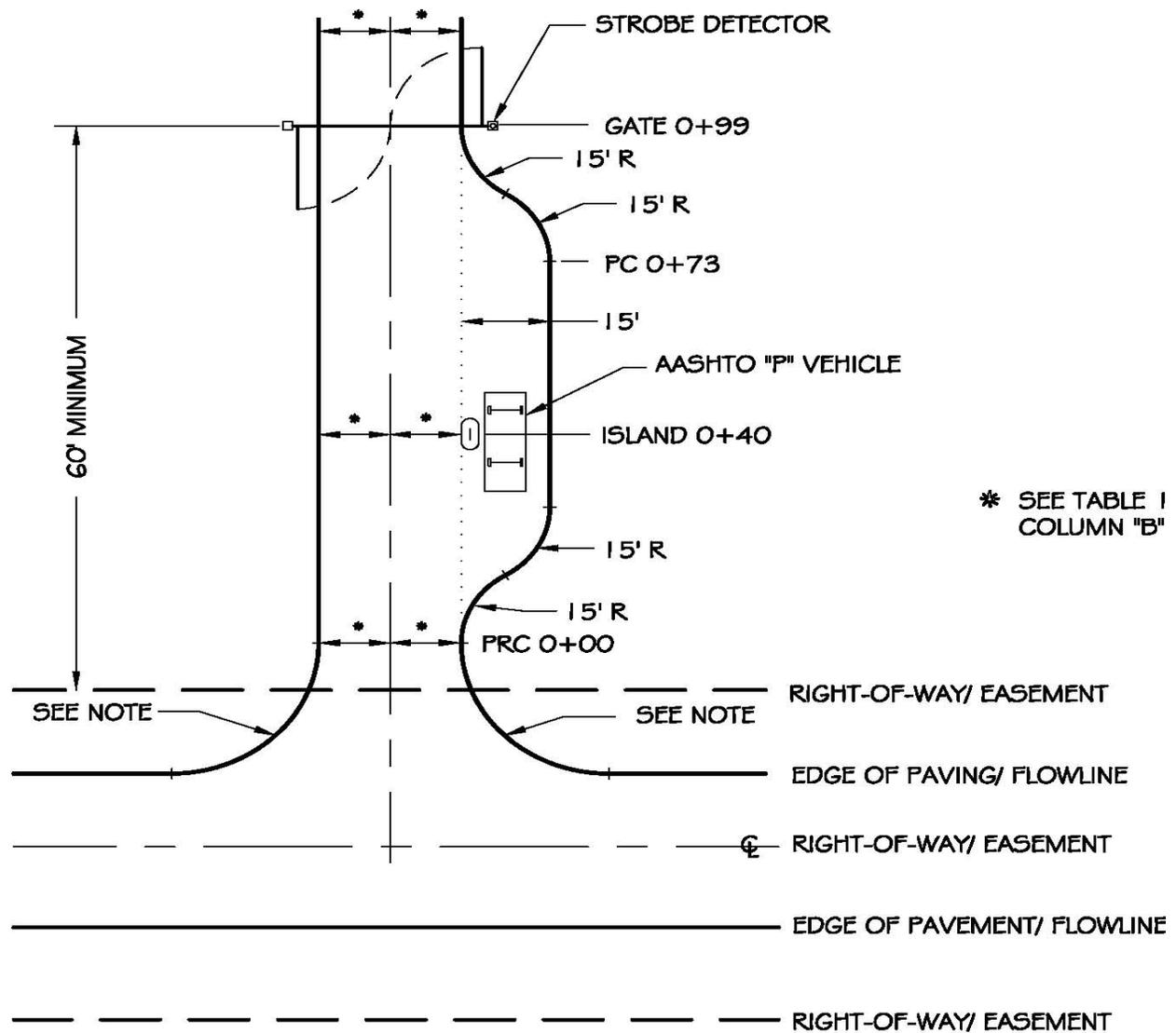
A-5 Maintenance

All required rapid entry devices including the Knox key device, emergency vehicle strobe detector receiver, and exit and safety loop systems shall be maintained in an operable condition.



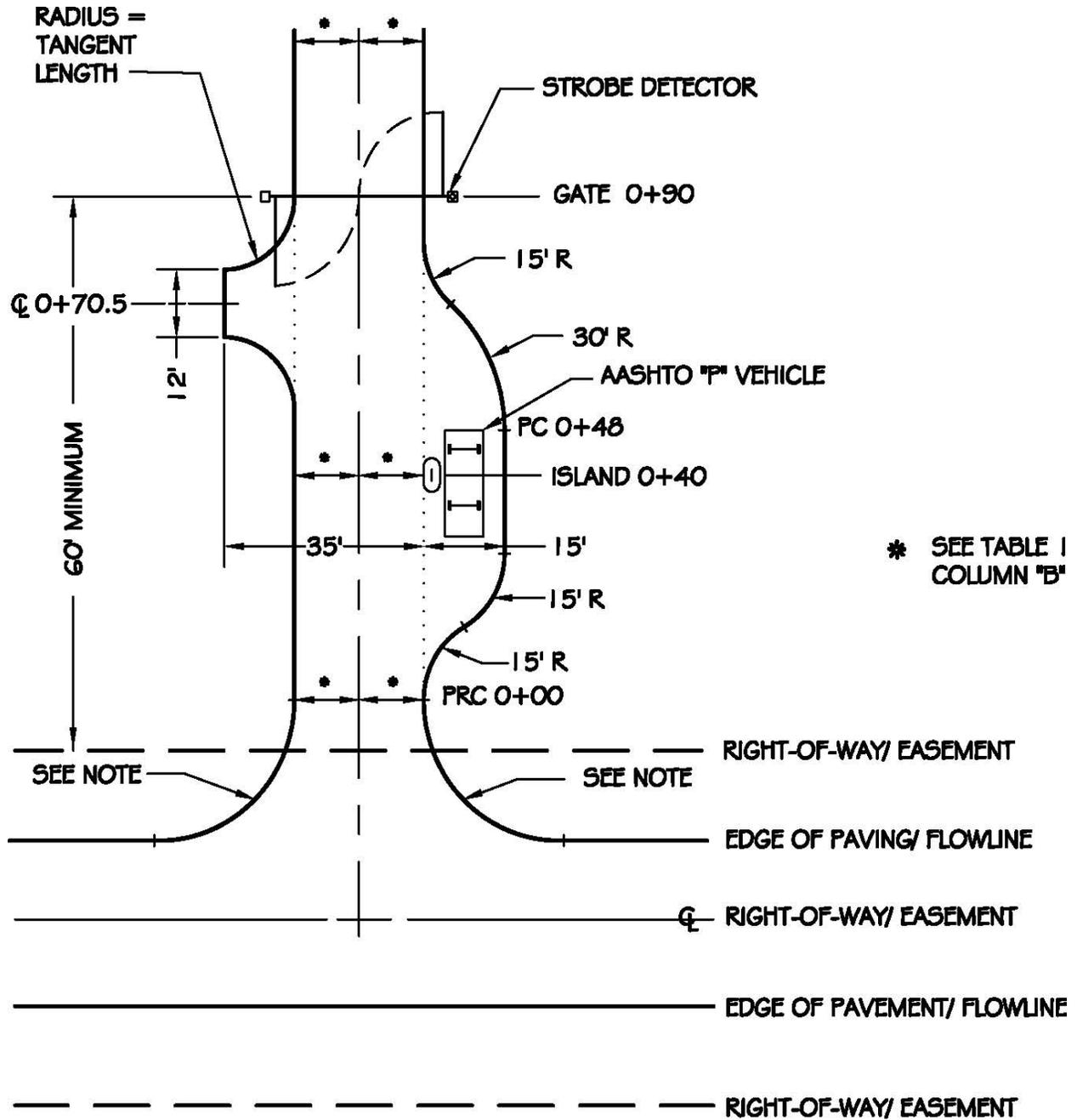
NOTE: FOR A LOCAL-LOCAL INTERSECTION THE RADIUS IS 25 FEET.
 FOR A LOCAL-ARTERIAL INTERSECTION THE RADIUS IS 25 TO 30 FEET.
 FOR AN ARTERIAL-ARTERIAL INTERSECTION THE RADIUS IS 35 TO 45 FEET.

Figure 1
 CIRCULAR TURNAROUND



NOTE: FOR A LOCAL-LOCAL INTERSECTION THE RADIUS IS 25 FEET.
 FOR A LOCAL-ARTERIAL INTERSECTION THE RADIUS IS 25 TO 30 FEET.
 FOR AN ARTERIAL-ARTERIAL INTERSECTION THE RADIUS IS 35 TO 45 FEET.

Figure 2
 BRANCH TURNAROUND



**NOTE: FOR A LOCAL-LOCAL INTERSECTION THE RADIUS IS 25 FEET.
 FOR A LOCAL-ARTERIAL INTERSECTION THE RADIUS IS 25 TO 30 FEET.
 FOR AN ARTERIAL-ARTERIAL INTERSECTION THE RADIUS IS 35 TO 45 FEET.**

Figure 3
L-TYPE TURNAROUND

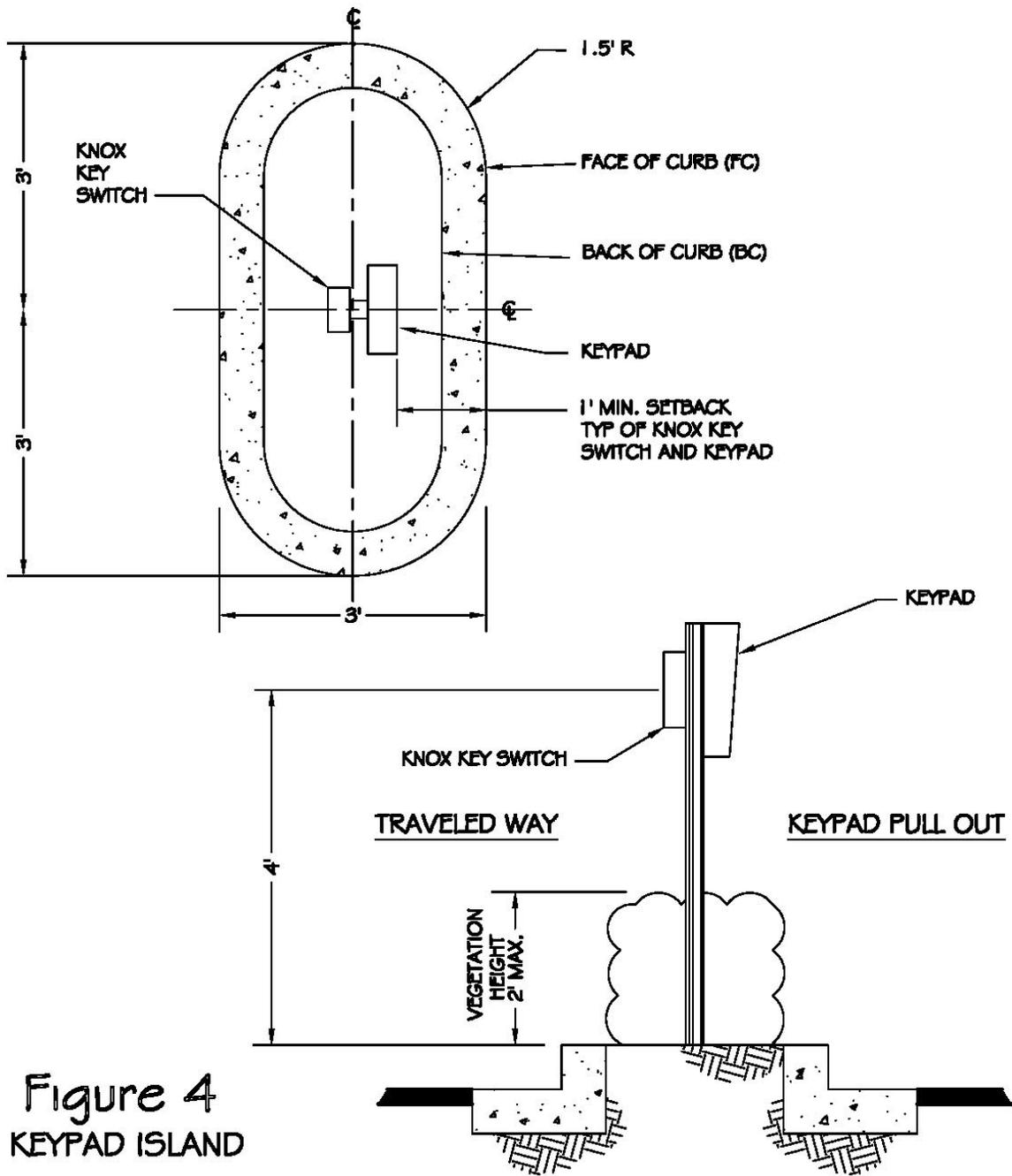


Figure 4
KEYPAD ISLAND

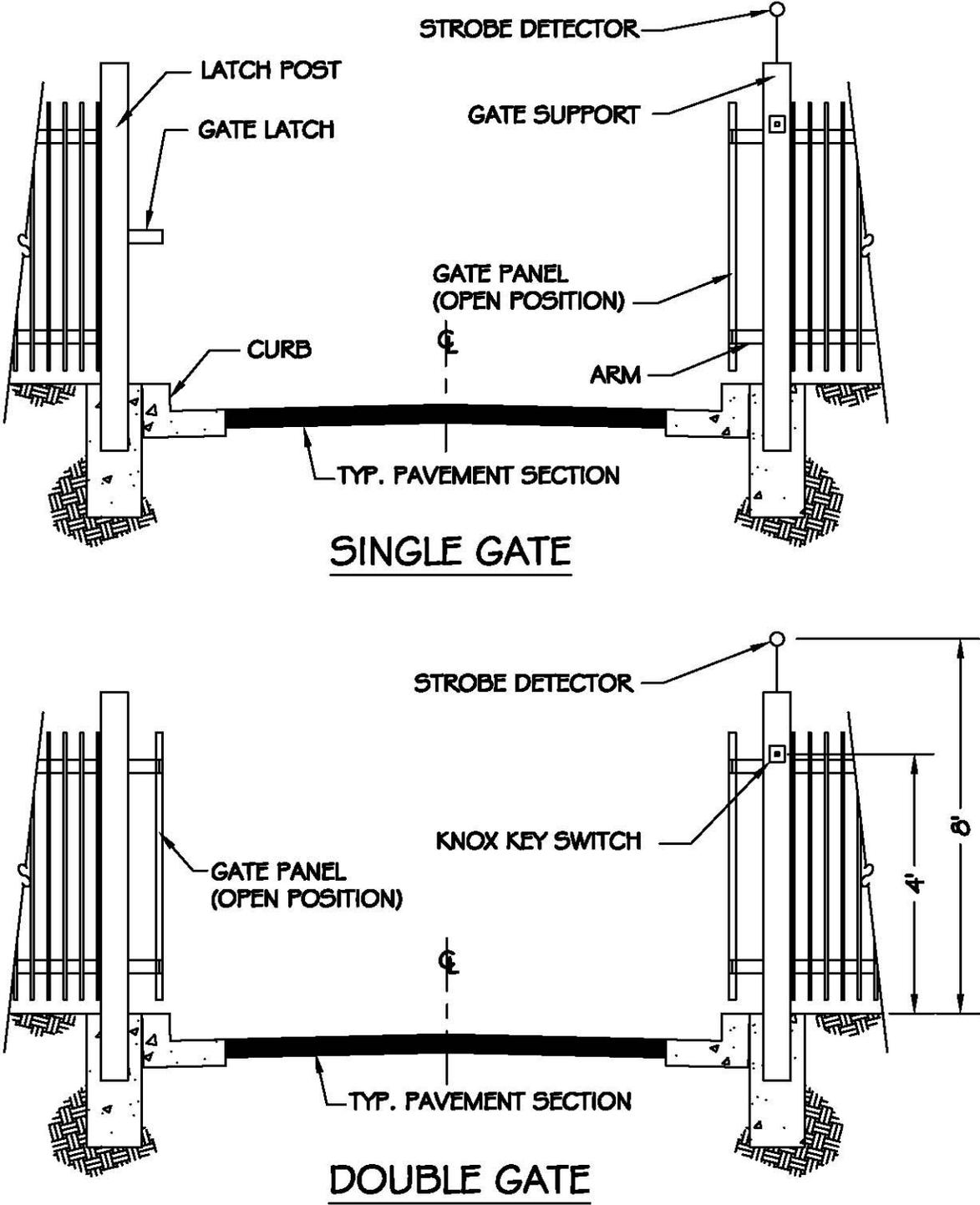


Figure 5
STROBE DETECTOR & KNOX DEVICE

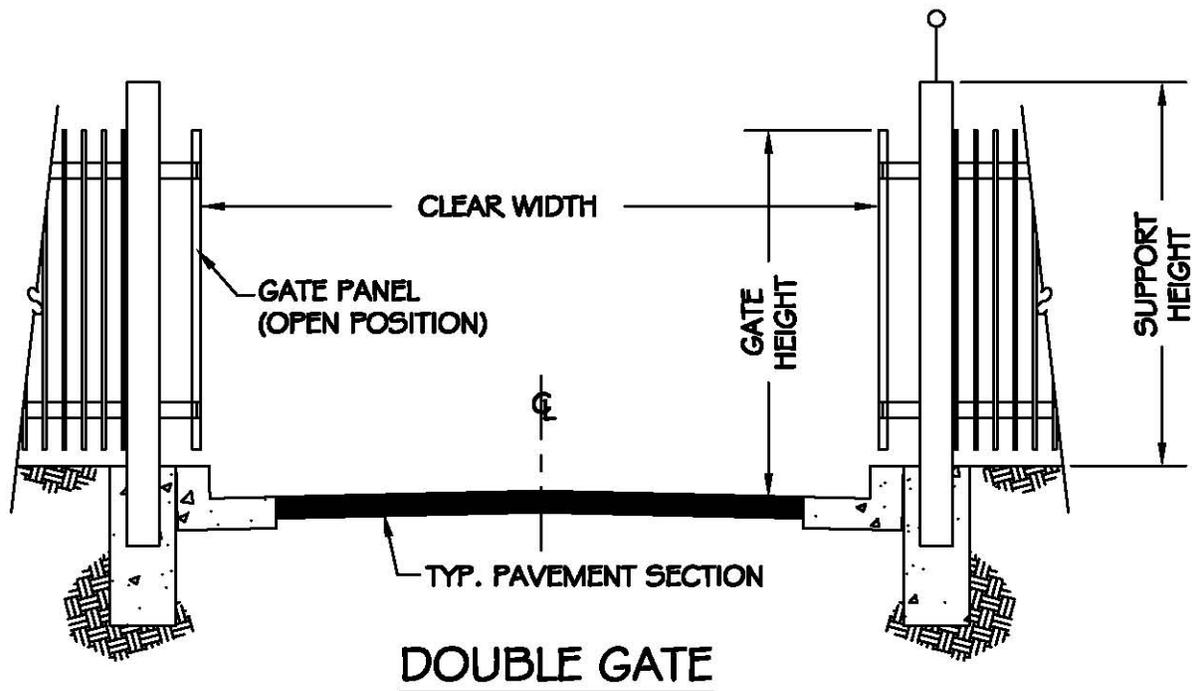
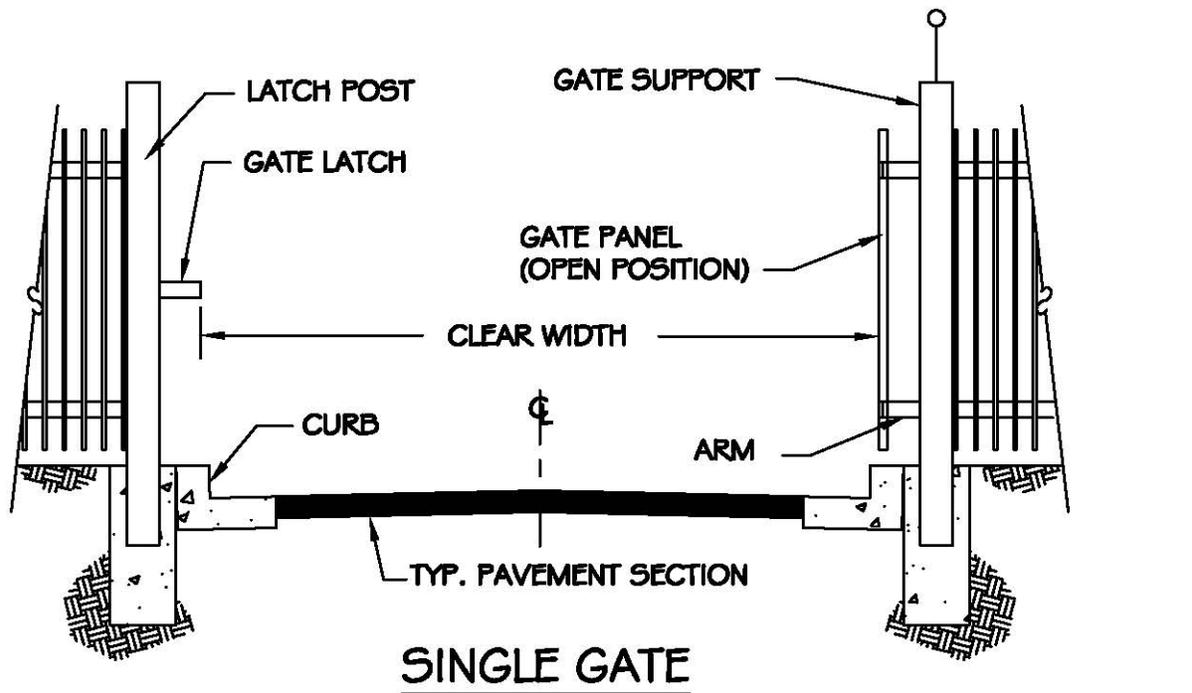


Figure 6
CLEAR WIDTH & HEIGHT

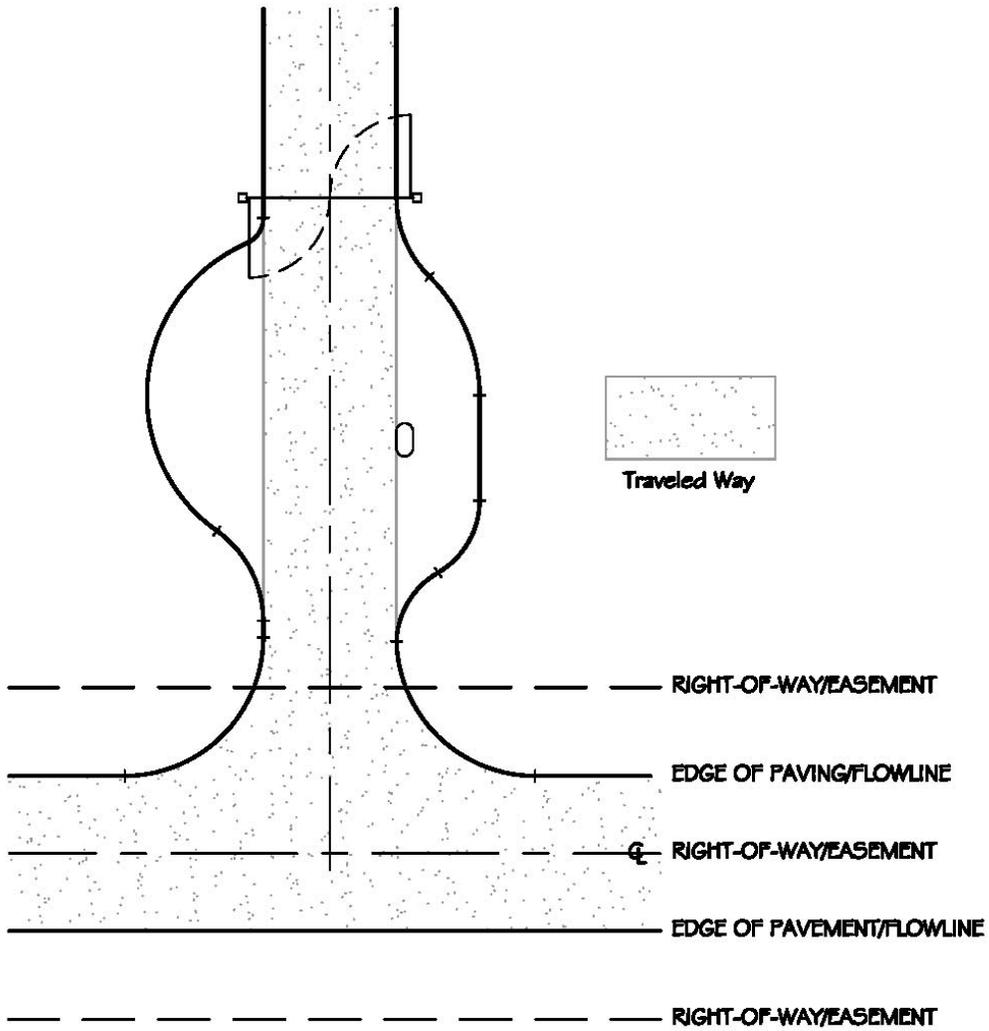


Figure 7
TRAVELED WAY

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Appendix B Glossary of Terms

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

AASHTO American Association of State Highway Transportation Officials

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

Access Access means to enter, exit, or reach a lot, parcel, building or structure.

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.

Access Plan A site plan that identifies the location of a proposed driveway approach(s) or road intersection(s) connecting to the existing public or private road system. Access plans shall be prepared at a scale of 1" = 20', 30', 40' or 50'. Access plans shall be prepared by a licensed surveyor or licensed engineer and shall show edge of pavement, right-of-way locations, all legal access easements that serve or run through the property and their associated easement recording numbers, above ground utility conflicts with any proposed driveway or roadway, existing and proposed utility easements, and any existing road and driveway intersections on each side of the existing road for a distance of at least 250 feet in each direction from the proposed access. Access plans are intended to provide the necessary data such that an informed decision can be made on the best access location(s).

ADT Average Daily Traffic

Alley An alley is a privately owned vehicle driving surface not designated for general travel that is primarily used as a means of access to the rear of residences.

Applicant The person, party, firm, corporation, or other legal entity that proposes to develop property in unincorporated Pierce County by submitting an application for any of the activities covered by these regulations.

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 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 Area The clear area is that area starting at the edge of the traveled lane that is available for safe use by errant vehicles. The available clear area is the distance, measured normal to the roadway beginning at the edge of the traveled lane to the closest part of any fixed object or non-traversable obstacles.

Connectivity The density of connections in path or road network and the directness of links and includes a system of streets with multiple routes and connections serving the same origins and destinations. Connectivity can apply both internally (streets within that area) and externally (connections with arterials and other neighborhoods).

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.

County Executive The Pierce County Executive or authorized representative.

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

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

Department Pierce County Public Works and Utilities, Office of the 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 roadway 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 A driveway is a vehicle driving surface within a single lot or parcel that connects a building or structure with a road, shared-access facility, alley, or vehicle driving surface within an ingress/egress easement (or tract). A driveway begins at the right-of-way line, private road easement (or tract) line, shared-access easement (or tract) line, alley easement (or tract) line, or ingress/egress easement (or tract) line, and extends to the building or structure.

Driving Surface That portion of the shared-access facility, alley, driveway, or driveway approach that is used for the movement of vehicles.

Driveway Approach A driveway approach is a privately-maintained vehicle driving surface that provides a transition between: a road and a driveway, a road and a shared-access facility, or a road and an alley.

Easement The legal right to use a described piece of land for a particular purpose. It does not include fee ownership, but may restrict the property owner's use of the land. All easements granted pursuant to the requirements of this manual shall be legally recorded with the County Auditor.

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.

FHWA Federal Highway Administration

Geometrics The arrangement of visible elements of a road such as alignment, grade, site distance, widths, and slope.

Grade Rate or percent of slope, either ascending or descending from or along the roadway. It is measured along the centerline of the roadway.

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.

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*

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 in accordance with the AASHTO Green Book.

PCC Pierce County Code

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.

Posted Speed The speed limit actually signed along the roadway.

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 road, private road, shared-access facility, or alley.

RCW Revised Code of Washington

Reconstruction A reconstruction project that involves major construction activity in excess of resurfacing, restoration, and rehabilitation of existing roadways. Reconstruction includes significant changes in cross-section, vertical or horizontal alignment, and/or the addition of an auxiliary lane. 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 that 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 Similar to “Restoration” except the work may include reworking or strengthening the base or subbase, recycling or reworking existing materials to improve their structural integrity, adding underdrains, improving or widening shoulders. Rehabilitation may include acquisition of additional right-of-way.

Restoration Work performed on pavement or bridge decks to render them suitable for resurfacing. This may include supplementing the existing roadway by increasing surfacing and paving courses to provide structural capability and widening up to a total of 10 feet. Restoration will generally be performed within the existing right-of-way.

Resurfacing The addition of a layer or layers of paving material to provide additional structural integrity, improved serviceability, and rideability.

Right-of-Way (R/W, ROW) All property in which the County has any form of ownership or title and that 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/Roadway “Road” or “roadway” means an open private or public way for the passage of motor vehicles, that where appropriate, may include pedestrian, equestrian, and bicycle facilities. Elements of a road/roadway typically include, but are not limited to; traveled way, sidewalks, curbing, paths, walkways, shoulders, ditches, culverts, conveyance piping, retaining walls, and slopes necessary for structural stability.

Road Plans A set of construction drawings and related documents that 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.

RR Railroad

Rural Those areas not included within an urban growth area.

SEPA (Washington) State Environmental Policy Act

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.

Stopping Sight Distance The length of roadway ahead visible to the driver that 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.

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

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.

Unopened Right-of-Way A County right-of-way that exists by dedication or deed-but which no road has been constructed for the purpose of public use, or with which any constructed road is not maintained by the County.

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

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, sanitary sewer, storm drainage, surface water drainage 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

C-1 Entering Sight Distance Guidelines for Granting Deviations

A deviation request to allow a lesser distance than the requirement for entering sight distance outlined in Section 3-1 of this Manual is typically granted under the following conditions:

1. Existing/previously approved approaches

- a. Residential use only for the approach.
- b. No more than four total dwelling units that can potentially be served by the approach.
- c. No other potential approach location available that meets or exceeds entering sight distance standards at the existing approach.

2. New/proposed approaches

- a. Residential use only for the approach.
- b. No more than one dwelling unit that can potentially be served by the approach.
- c. No other potential approach location available that meets or exceeds entering sight distance standards at the new approach.
- d. Denial of access due to entering sight distance standards would cause an undue burden to the property owner.

A deviation may also be considered in some cases where vehicles traveling on the through County road are physically constrained from traveling at the posted speed limit by a horizontal curve or turn in the road alignment. In these cases, a deviation for developments larger than those outlined above could be approved to use a lesser minimum distance, if it can be shown that the calculated, anticipated speed of a vehicle traveling toward the road approach location is lower than the posted speed limit because of a curve or turn in the road. The example on the next page shows a sample analysis that would substantiate a deviation request for these conditions.

Deviation requests must be stamped and signed by a licensed professional engineer.

Engineering analysis provided in conjunction with a request for a deviation should be similar in approach to that outlined in the following example. The reduced average vehicle speeds on the County road must be due to physical roadway geometric conditions that require traffic to travel below the posted speed limit. The following are not acceptable engineering approaches to be used with sight distance deviation requests: use of stopping sight distance in lieu of intersection entering sight distance, use of posted advisory speeds other than those for curves or turns, installation of new or reliance upon existing traffic signs such as "Limited Sight Distance".

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 =

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

* 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) =

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

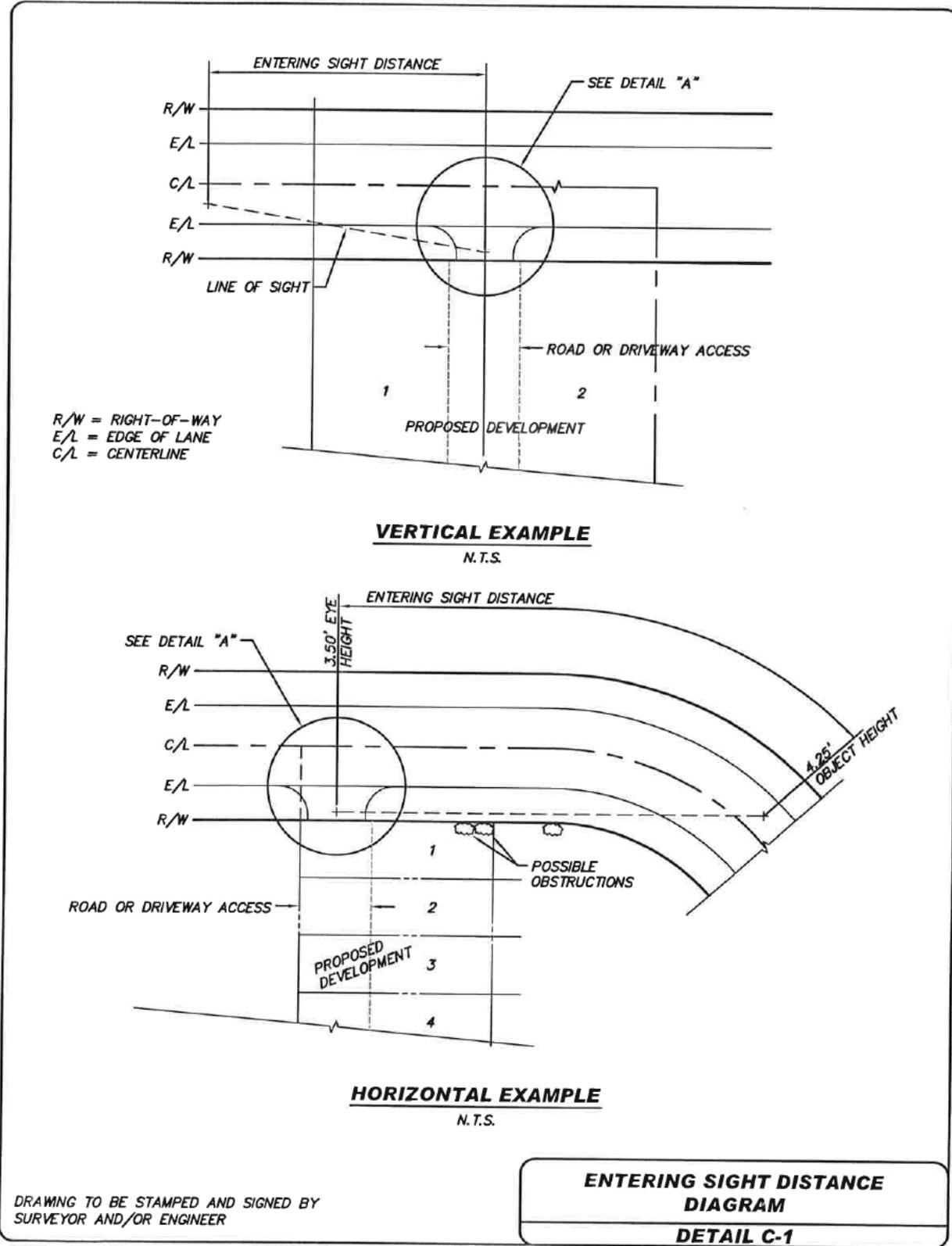
(c) Length of time vehicle is visible while traveling at speed limit before getting to approach location =

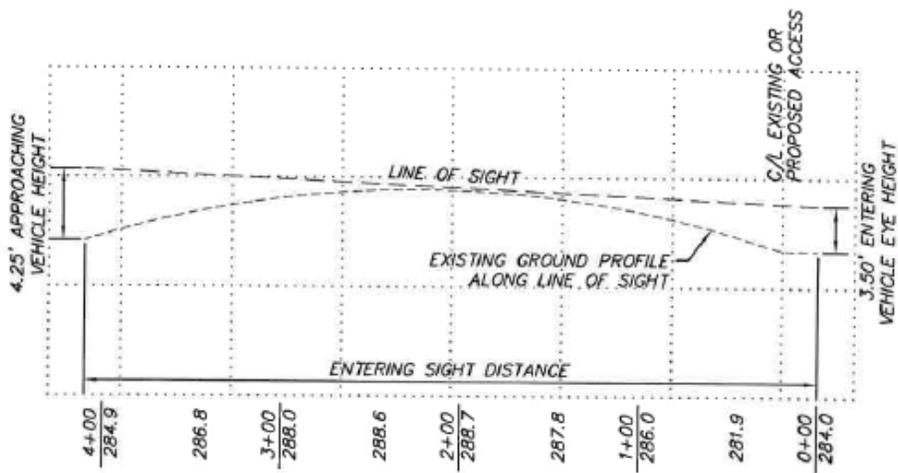
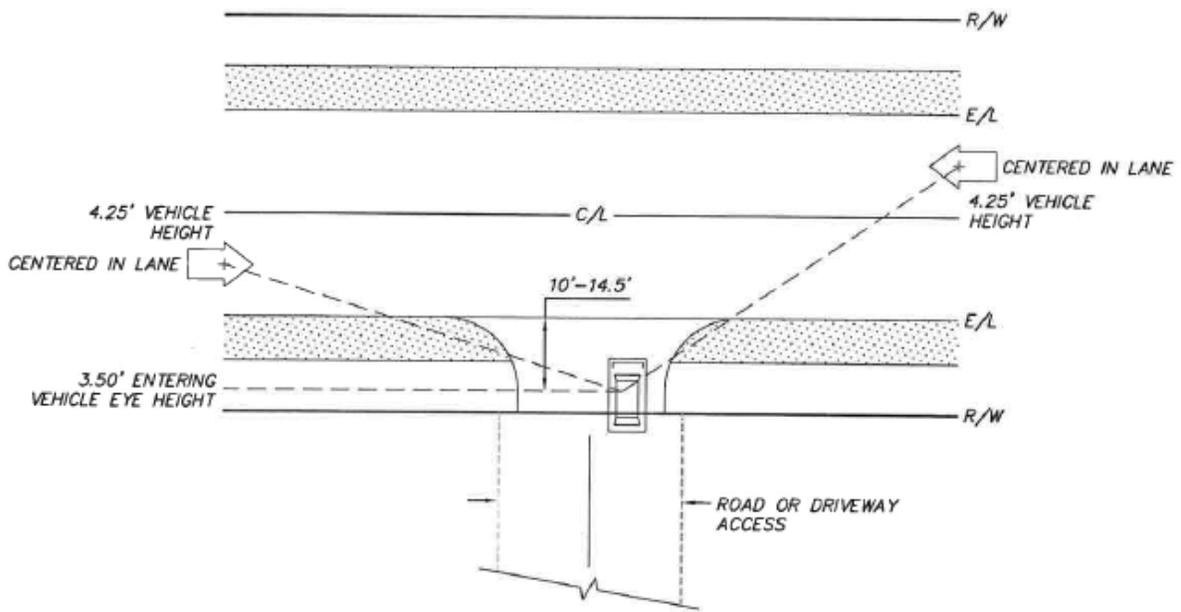
$$(325\text{ft} - 66\text{ft} - 183\text{ft}) / (35\text{mph})(1.47 \text{ ft/sec/mph}) = \mathbf{1.47 \text{ seconds}}$$

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

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

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





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

**ENTERING SIGHT DISTANCE
DETAIL "A" / PROFILE**

DETAIL C-2

