

RESOLUTION NO. 23-248

BOARD OF COUNTY COMMISSIONERS  
COUNTY OF EL PASO, STATE OF COLORADO

RESOLUTION TO APPROVE VARIOUS AMENDMENTS TO THE EL PASO COUNTY  
ENGINEERING CRITERIA MANUAL AND ADOPTION FOR IMPLEMENTATION  
(ECM-23-001)

WHEREAS, Colorado Revised Statutes, Article 28 of Title 30, authorize the State of Colorado and its political subdivisions to enact subdivision regulations in the unincorporated areas of the County through planning and building codes, and other regulatory documents or references as necessary; and

WHEREAS, El Paso County has adopted an Engineering Criteria Manual (ECM) for the purpose of setting and revising standards for the design and construction of public improvements and common subdivision or private development improvements to serve new development, and for repair and reconstruction of existing public improvements, finding that these standards are necessary to protect and promote health, safety, and general welfare of the public, ensure that public infrastructure meets commonly accepted engineering standards, and provide for consistency and fairness in development review; and

WHEREAS, the purposes of the ECM amendments attached hereto are to:

- Amend Chapters 1, 2 and 4 of the ECM to remove incorrect references, add correct references, update definitions, reflect current practices already in use, and clarify design requirements; and
- Amend Appendix F of the ECM to add El Paso County Standard Specifications and moving El Paso County Standard Specifications and Standard Specifications as stand-alone document(s). In addition, the amendment would include the ability to revise the El Paso County Standard Specifications administratively (as currently allowed with the Standard Drawings). ; and

WHEREAS, the ECM applies to all subdividers, developers, landowners, owners of facilities located in El Paso County rights-of-way, tracts or easements, and El Paso County, and their employees, agents, or contractors designing, constructing, and maintaining facilities or conducting activities subject to review and approval under the provisions of the ECM in unincorporated El Paso County; and

WHEREAS, the responsible authority for setting these standards and providing revisions to the standards is the Board of County Commissioners, who may delegate authority to apply and interpret these standards to the County Engineer in his or her capacity as the ECM Administrator; and

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WHEREAS, the responsible authority for application of these standards is the County Engineer, who may delegate responsible authority for the application of these standards pursuant to Section 1.16.2 of the ECM; and

WHEREAS, the standards presented within the ECM are the minimum requirements necessary to accomplish the purposes of the ECM, and when situations arise where the application of individual standards from the ECM will not ensure the protection of public health, safety and welfare, the ECM Administrator may require the modification of plans, specifications or operations to achieve the necessary public health, safety, and welfare; and

WHEREAS, the proposed changes were endorsed by the Colorado Springs Housing and Building Association on May 25, 2023; and

WHEREAS, the proposed amendments were presented to and endorsed by the El Paso County Planning Commission on June 1, 2023.

NOW, THEREFORE, BE IT RESOLVED by the Board of County Commissioners of El Paso County, Colorado that the amendments to the El Paso County Engineering Criteria Manual attached hereto are acceptable, authorized, and hereby adopted for implementation.

BE IT FURTHER RESOLVED that County staff is authorized to edit the revisions as necessary to correct any non-substantive errors or to reformat text.

BE IT FURTHER RESOLVED, this Resolution shall become effective immediately upon approval by the El Paso County Board of Commissioners.

DONE THIS 18<sup>th</sup> day of July 2023 at Colorado Springs, Colorado.

ATTEST

Steve  
County



BOARD OF COUNTY COMMISSIONERS  
OF EL PASO COUNTY, COLORADO

By:

*Cami Bremer*  
Cami Bremer, Chair

**ENGINEERING CRITERIA MANUAL  
COUNTY OF  
EL PASO, COLORADO**

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Adopted: December 23, 2004

Revised: December 13, 2016

Published in 2018

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**municode**



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**SUPPLEMENT HISTORY TABLE**

The table below allows users of this Manual to quickly and accurately determine what resolutions have been considered for codification in each supplement. Resolutions that are of a general and permanent nature are codified in the Code and are considered "Includes." Resolutions that are not of a general and permanent nature are not codified in the Code and are considered "Omits."

In addition, by adding to this table with each supplement, users of this Manual will be able to gain a more complete picture of the Manual's historical evolution.

Res. No.	Date Adopted	Included/Omitted	Supp. No.
19-245	7- 2-19	Included	1
Res. No. 20-222	6-23-20	Included	2

**Chapter 1 GENERAL PROVISIONS**

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- new construction and modification of transportation facilities, storm drainage facilities, utilities, and any facility located in County rights-of-way or easements, whether occurring under permit or franchise, and other transportation facilities, storm drainage facilities, utilities and any facilities mandated by the LDC.
  - facilities outside County rights-of-way (such as private roads or drainage systems), which are regulated through the LDC and County's police power authority to ensure public health, safety, and welfare, and Title 30, Article 15, Colorado Revised Statutes.
  - every new placement and every planned, non-emergency replacement of existing utility poles and other utility structures within the County's rights-of-way.
  - reconstruction, resurfacing, restoration, and rehabilitation of existing transportation facilities, storm drainage facilities, utilities and any other facilities located in County rights-of-way or easements, as well as other transportation facilities, storm drainage facilities, utilities, and facilities mandated by the LDC, as far as practicable and feasible.

#### **1.4.2. Jurisdiction**

The ECM applies to all subdividers, developers, landowners, owners of facilities located in the County's rights-of-way or easements and their employees, agents or contractors that design, construct, and maintain facilities or conduct activities subject to review and approval under the provisions of the ECM or where required by the LDC in El Paso County. The ECM further applies to the County and their employees, agents or contractors.

#### **1.5. STANDARDS ADOPTED BY REFERENCE**

The BOCC hereby adopts the following documents and standards by reference:

- Colorado Department of Transportation (CDOT) Standard Specifications for Road and Bridge Construction;
- Colorado Department of Transportation (CDOT) State Highway Access Code;
- Colorado Department of Transportation (CDOT) Field Materials Manual;
- Colorado Department of Transportation (CDOT) LRFD Bridge Design Manual;
- American Association of State Highway & Transportation Officials (AASHTO) including Roadway Design Guide and Bicycle Design;
- Institute of Transportation Engineers (ITE) Trip Generation Manual;
- American Society for Testing Materials (ASTM);
- Manual on Uniform Traffic Control Devices (MUTCD);
- Colorado Springs and El Paso County Drainage Criteria Manual Volume 1 (DCM1);
- City of Colorado Springs' Drainage Criteria Manual Volume 2 (DCM2): Stormwater Quality Policies, Procedures and Best Management Practices;
- The State of Colorado, Department of Transportation M&S Standards;
- El Paso County's Road Impact Fee Program;
- ASCE Code of Ethics;
- City of Colorado Springs Drainage Criteria Manual Volume 1, 2014 Update: Chapter 6 and Section 3.2.1 of Chapter 13;

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## 1.10. CONFLICTING PROVISIONS

The following standards shall apply in considering conflicts between provisions of the ECM:

- Whenever any provision of the ECM conflicts with a provision in any federal, state or local law, ordinance, resolution, rule, or regulation, the more restrictive or higher standard shall be used.
- Whenever any provision of the ECM conflicts with another provision of the ECM, the more restrictive or higher standard shall be used.
- Whenever any provision of the ECM conflicts with any provision of the documents and standards adopted by referenced, the provision of the ECM shall be used.

## 1.11. PERMITS REQUIRED

No owner, permit holder, developer, contractor, and their agents shall do or cause to be done any work governed by the ECM without first having obtained a permit to do the work in accordance with the provisions of Chapter 5. All work shall be done in accordance with the ECM, approved plans, and the conditions of the required permits. In many cases, a Notice to Proceed is also required before beginning work in accordance with the terms and conditions of a permit issued under the provisions of Chapter 5.

Other permits, approvals or agreements may be required by the County or others having jurisdiction before initiating any activities subject to the ECM. It is the responsibility of the owner, permit holder, developer, contractor and their agents to identify and secure all required permits, approvals, or agreements required to do the work.

## 1.12. PLAN REVIEW PROCEDURES, GENERAL

For County-constructed roads and drainage projects, plan review requirements are governed by the ECM and the policies and procedures of the ECM Administrator. For owner, permit holder, and developer-constructed public improvements and development or subdivision related improvements, all plans, reports, drawings, and specifications that support permit or land use applications are governed by the LDC, ECM and the policies and procedures of the ECM Administrator.

Construction plans are required ~~(sheets shall be 11" x 17" - half size)~~ for all proposed road and drainage-related improvements. Chapter 5 of the ECM outlines the submittal requirements. In some cases, additional engineering data may be required to be submitted. Construction documents will be valid for a period of 2 years from the date signed by the El Paso County Engineer. If construction has not started within 2 years of being signed by the El Paso County Engineer, the plans will need to be resubmitted for approval. Fees for the re-approval will be in accordance with the fee schedule current at the time of plan re-approval.

Engineering Record Drawings (also known as "as-built" plans) for roads and drainage facilities must be submitted before final acceptance of any public facility and release of the required surety.

## 1.13. PROFESSIONAL QUALIFICATIONS

Professionals in the fields of engineering, architecture, geology or surveying who prepare or are responsible for preparing plans, drawings, specifications, calculations, technical reports, etc., for the purpose of obtaining County permits or approvals, shall be registered or authorized to practice in the state of Colorado. Registration or authorization to practice shall be in the specific technical area pertinent to the documents being prepared. In some cases, specific additional or special professional qualifications are required for preparing specific studies or plans. Any specific additional or special professional qualifications are identified in those sections of the ECM specifically governing preparation of the study or plan.

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**County** — El Paso County, Colorado.

**County Attorney** — El Paso County Attorney.

**County Engineer** — The County Road Engineer for El Paso County with authority and duties as designated in Colorado Revised Statutes or his/her authorized designee.

**Deceleration Lane** — A speed change lane including tapered areas, to enable a turning vehicle to slow to a safe turning speed after it has left the mainstream of faster moving traffic.

**Defect Warranty Period** — Shall be the time frame during which the permit holder is held liable for all work performed and materials utilized prior to final acceptance by El Paso County.

**Design Engineer** — The engineer who directly prepared plans and calculations or who directly supervises the preparation of project plans and calculations. The Design Engineer seals, signs, and dates the plans and calculations certifying that they meet the required standards.

**Design Speed** — A selected speed used to determine the various geometric design features of the roadway.

**Developer** — A property owner, or his/her agents or contractors, who are responsible for applying for or receiving a permit or approval for development.

**Development Agreement** — An agreement with the County which clearly establishes the terms and conditions of the approval, including the applicant's responsibility regarding project phasing, the provision of public and private facilities and improvements, and any other mutually agreed to terms and requirements. The agreement may also serve to implement the site specific development plan which establishes vested rights under Article 68 of Title 24, C.R.S.

**Deviation** — A technical adjustment from these Standards approved by the ECM Administrator due to unusual circumstances.

**Driveway** — A physical access that connects a private property or properties to the County road system. These accesses are typically privately owned and privately maintained. El Paso County permits where driveways connect to the public road system and how they connect to the road. All driveway maintenance is the responsibility of the property owner(s).

**Easement** — A right granted by a property owner to specifically named parties or to the public for the use of certain land for specified purposes. Where appropriate to the context, easement may also refer to the land covered by the grant.

**ECM** — The El Paso County Engineering Criteria Manual.

**ECM Administrator** — The County Engineer or his/her authorized designee.

**Encroachment** — Occupancy of a County right-of-way by non-roadway structures or other objects.

**Emergency Work** — Construction work that responds to an unforeseen combination of circumstances or the resulting conditions that call for immediate action to restore utility service, pedestrian and traffic flow, or mitigate a safety hazard.

**Encroachment** — Occupancy of the County right-of-way by non-County-owned non-roadway structures or other objects.

**Engineer** — A Professional Engineer licensed by the State of Colorado.

**EPC ~~PSD-DPW~~** — El Paso County ~~Public Services Department~~ Department of Public Works.

**FEMA** — Federal Emergency Management Agency.

**FHWA** — Federal Highway Administration.

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**Final Acceptance** — The acknowledgement by the County that the defect warranty period has expired and there are no outstanding items to be corrected under the provisions of the defect warranty.

**Franchise** — A document granted by the County authorizing the use of County right-of-ways by public or private entities, subject to specified conditions in accordance with State law.

**Full Movement Intersection or Access** — An intersection or access that allows a full range of turn movements between the two intersecting roads or access.

**Inspector** — The authorized representative of the County Engineer assigned to make detailed inspection of construction work to assure compliance with these Standards and the plans as approved by the County.

**ITE** — Institute of Transportation Engineers.

**Intersection** — The area embraced within the prolongation or connection of the lateral curb lines, or if none, the lateral boundary lines of the roadways of two roads that join one another at, or approximately at, right angles, or the area within which vehicles traveling on different roads that join at any other angle may come into conflict. The junction of an alley or driveway access with a roadway or highway shall not constitute an intersection.

**Land Development Code or LDC** — The zoning, subdivision, and other land development regulations adopted by the Board of County Commissioners.

**Land Disturbing Activity** — Any activity that results in a change in the existing land surface (both vegetative and non-vegetative). Land disturbing activities include, but are not limited to clearing, grading, excavation, demolition, installation of new or improved haul roads and access roads, staging areas, stockpiling of fill materials, and borrow areas. Compaction that is associated with stabilization of structures and road construction shall also be considered a land disturbing activity.

**Level of Service or LOS** — A qualitative measure of traffic flow. Six levels are defined as A through F with A being the best operating conditions and F being the worst (See Highway Capacity Manual).

**Manual** — El Paso County Engineering Criteria Manual.

**Maximum Extent Feasible**— Where existing physical constraints make it impracticable for altered elements, spaces, or facilities to fully comply with the ADA and PROWAG requirements for new construction, compliance is required to the extent practicable within the scope of the project. Also referred to as "Maximum Extent Practicable".

**MPH** — Miles per hour.

**MTCP** — The El Paso County Major Transportation Corridors Plan Update.

**MUTCD** — The Manual on Uniform Traffic Control Devices, published by the U.S. Department of Transportation.

**Municipal Separate Storm Sewer System (MS4)** — The system of conveyances owned or operated by El Paso County designed or used for collecting or conveying stormwater, including but not limited to roads with drainage systems, inlets, catch basins, curbs, gutters, pipes, man-made channels, ditches, detention and water quality basins, or storm drains.

**Neighborhood Path** — A local pathway system that may or may not connect to a larger regional trail network.

**Notice to Proceed** — A document issued by the ECM Administrator authorizing a permit holder to begin construction of common development, subdivision or public improvements in accordance with an approved set of plans.

**NPDES** — National Pollutant Discharge Elimination System.

**Owner** — Any individual, corporation, partnership or other legal entity holding controlling title on property that is the subject a permit or improvements covered by these Standards.

**Warrant** — A threshold condition that, if found to be satisfied as part of an engineering study, shall result in analysis of other traffic conditions or factors to determine whether a traffic control signal or other transportation system improvement is justified.

(Res. No. 19-245 , 7-2-19; Res. No. 20-222 , 6-23-20)

## Chapter 2 TRANSPORTATION FACILITIES

### 2.1. OVERVIEW

This chapter addresses the standards and technical criteria to be used to plan, design, construct, choose materials, locate, repair, maintain, reconstruct, and use roadways and other transportation facilities and the associated extrinsic structures.

#### 2.1.1. Purpose

The purpose of this chapter is to provide detailed design guidelines and criteria for the preparation of plans for all County-owned and maintained transportation facilities and access to those facilities. These facilities include roadways and their structures, as well as extrinsic structures that support the use of the transportation facility.

#### 2.1.2. Chapter Content and References

Table 2-1 outlines the chapter content and references used as a basis for the standards established in Chapter 2.

**Table 2-1. Contents and Basis of Transportation Facility Standards**

Intent Use	ECM Content	ECM Section(s)	Reference Document(s)
<b>Planning</b>			
	Roadway	2.2.1 - 2.2.4 and Appendix B	1, 2, 3
	Access	2.2.5	2
	Soils Investigations	2.2.6 and Appendix C and D	
	Pavement Design	2.2.7	8
<b>Design</b>			
	Roadway	2.3.1 - 2.3.9	3, 7, 9, 11, 12, 13
	Access	2.4.1 - 2.4.2	2, 12
	Extrinsic Structures	2.5.1 - 2.5.7	7, 11
	Structures	2.6.1 - 2.6.10	4, 5, 6, 9, 10
<b>Construction</b>			
	Permitting	5.3 and 5.4	1
	Inspections	5.115.10 and Appendix J	1
	Acceptance	5.3	1

#### References

1. El Paso County Land Development Code

2. El Paso County Major Transportation Corridor Plan
3. AASHTO, A Policy on Geometric Design of Highways and Roadways
4. AASHTO, Standard Specifications for Highway Bridges
5. AASHTO, LRFD Bridge Design Specifications
6. AASHTO, LRFD Bridge Construction Specifications
7. AASHTO, Roadside Design Guide
8. AASHTO, Standard Specifications Material, Sampling and Testing
9. CDOT, Standard Specifications for Road and Bridge Construction
10. CDOT, Bridge Manual
11. CDOT, M&S Standards
12. US Department of Transportation, Manual on Uniform Traffic Control Devices
13. FHWA, Roundabouts: An Informational Guide

### **2.1.3. Standard Drawings**

Table 2-2 identifies the EPC Standard Drawings that are included in Appendix F as an enforceable part of these Standards. The Standard Drawing shall be used when designing improvements for County-owned and maintained facilities. Any change to a Standard Drawing shall be approved by the ECM Administrator and noted in the construction plans.

**Table 2-2. Standard Drawings**

<b>File Name</b>	<b>Detail/Description</b>	<b>Approval Date</b>
SD_2-1	Urban Local Roadway (low volume)	06/23/2020
SD_2-2	Urban Local Roadway	06/23/2020
SD_2-3	Urban NonResidential Collector Roadway	06/23/2020
SD_2-4	Urban Residential Collector Roadway	06/23/2020
SD_2-5	Urban Minor Arterial Roadway	06/23/2020
SD_2-6	Urban Principal 4-Lane Arterial Roadway	06/23/2020
SD_2-7	Urban Principal 6-Lane Arterial Roadway	06/23/2020
SD_2-8	Urban Expressway 4-Lane Roadway	06/23/2020
SD_2-9	Urban Expressway 6-Lane Roadway	06/23/2020
SD_-2-10	Rural Gravel Local Roadway	12/31/2005
SD_2-11	Rural Local Roadway	<del>12/31/2005</del> 07/18/2023
SD_-2-12	Rural Minor Collector Roadway	<del>12/31/2005</del> 07/18/2023
SD_2-13	Rural Major Collector Roadway	<del>12/31/2005</del> 07/18/2023
SD_2-14	Rural Minor Arterial Roadway	<del>12/31/2005</del> 07/18/2023
SD_2-15	Rural Principal 4-Lane Arterial Roadway	<del>12/31/2005</del> 07/18/2023
SD_2-16	Rural Principal 6-Lane Arterial Roadway	<del>12/31/2005</del> 07/18/2023

SD_2-17	Rural Expressway 4-Lane Roadway	<del>12/31/2005</del> 07/18/2023
SD_2-18	Rural Expressway 6-Lane Roadway	<del>12/31/2005</del> 07/18/2023
SD_2-20	Typical Curb and Gutter Details	<del>6/23/2020</del> 07/18/2023
SD_2-21	Patterned Concrete Median Paving	01/18/2011
SD_2-22	Plowable Median Nose Detail	01/12/2016
SD_-2-23	Driveway Cut Detail	08/11/2011
SD_-2-24	Driveway Detail w/ Attached Sidewalk	06/23/2020
SD_2-25	Driveway Detail w/ Detached Sidewalk	06/23/2020
SD_2-26	Typical Cross Pan Layout Detail	08/11/2011
SD_2-40	Pedestrian Curb Ramp Detail	06/23/2020
SD_2-41	Pedestrian Curb Ramp Detail	06/23/2020
SD_2-42	Detectable Warning Surface Details	06/23/2020
SD_2-50	Parallel Pedestrian Curb Ramp Detail	06/23/2020
SD_2-70	Type C Aluminum Bridge Railing	08/11/2011
SD_2-71	Oklahoma TR-1 Bridge Railing	08/11/2011
SD_2-72	Nevada Concrete Safety Bridge Railing	08/11/2011
SD_2-73	Safety Shaped Concrete Bridge Railing	08/11/2011
SD_2-74	Texas Type TT Bridge Railing	08/11/2011
SD_2-75	Urban Cul-de-Sac Details	01/01/2008
SD_2-76	Rural Cul-de-Sac Details	01/01/2008 07/18/2023
SD_2-77	Urban <del>Knuckle</del> Local and Low-Volume Local Knuckle	07/09/2009 07/18/2023
SD_2-78	Urban <del>Local Low-Volume Knuckle</del> Eyebrow Local and Low-Volume Local Eyebrow	07/09/2009 07/18/2023

#### **2.1.4. Relationship Between ECM and El Paso County Road Impact Fee Program**

El Paso County approved a Road Impact Fee Program in 2012 pursuant to Resolution ~~12-38219-471~~, as amended. The Fee Program establishes an impact fee applicable to subdivision and certain zoning actions, and it provides a method of establishing credit for the construction of certain transportation improvements identified in the EPC Major Transportation Corridors Plan. Construction of roads that do not meet these criteria may not be eligible for credit under the Road Impact Fee Program.

(Res. No. 20-222 , 6-23-20)

## **2.2. PLANNING**

### **2.2.1. Basis for Planning**

Proper planning of traffic systems helps to provide a safe and effective transportation network to meet existing and future demands within the County. All transportation system components shall be designed to promote:

- Safety - for vehicular and other modes of travel

(Supp. No. 2)

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- C. **Qualifications to Prepare a TIS.** A TIS shall be prepared under the supervision of, and sealed by, a licensed Professional Engineer in the State of Colorado with experience in traffic engineering and transportation planning.

## **2.2.4. Roadway Functional Classifications and Urban/Rural Designations**

Roadway functional classification is one parameter used to determine appropriate road design. The function of a road is determined by the volume of traffic, length of vehicle trips, and whether the road provides service primarily for vehicular movement or access to abutting land uses. For example, arterial roadways generally carry significantly greater traffic volumes and variety of traffic types at higher speeds than collector roads. Similarly, collector roads will carry greater traffic volumes at higher speeds than local roads.

Roadway functional classifications for regional based facilities are established by the most recently adopted MTCP. Other roadways are classified by the BOCC based on whether the adjoining land uses are rural or urban in nature (i.e. developments with lots greater than or equal to 2.5 acres), along with the existing and projected objectives of the roadway.

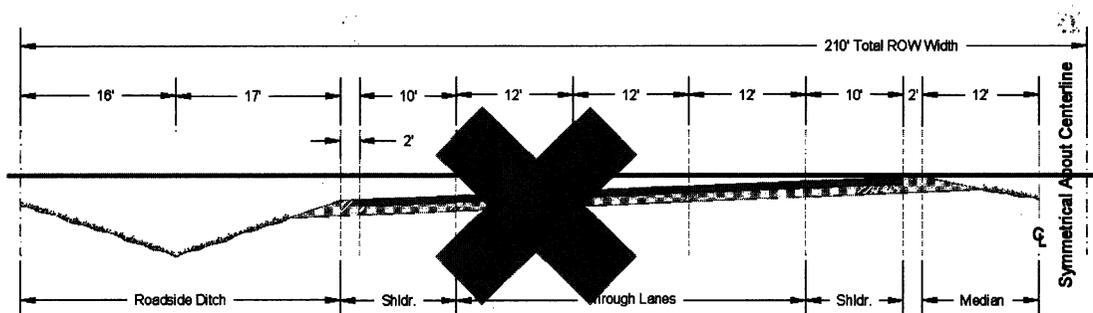
The County recognizes six roadway functional classifications within the rural designation: expressways, principal arterials, minor arterials, major collectors, minor collectors, and locals. The County recognizes seven roadway functional classifications within the urban roadway designation: expressways, principal arterials, minor arterials, nonresidential collectors, residential major collectors, residential minor collectors, and locals.

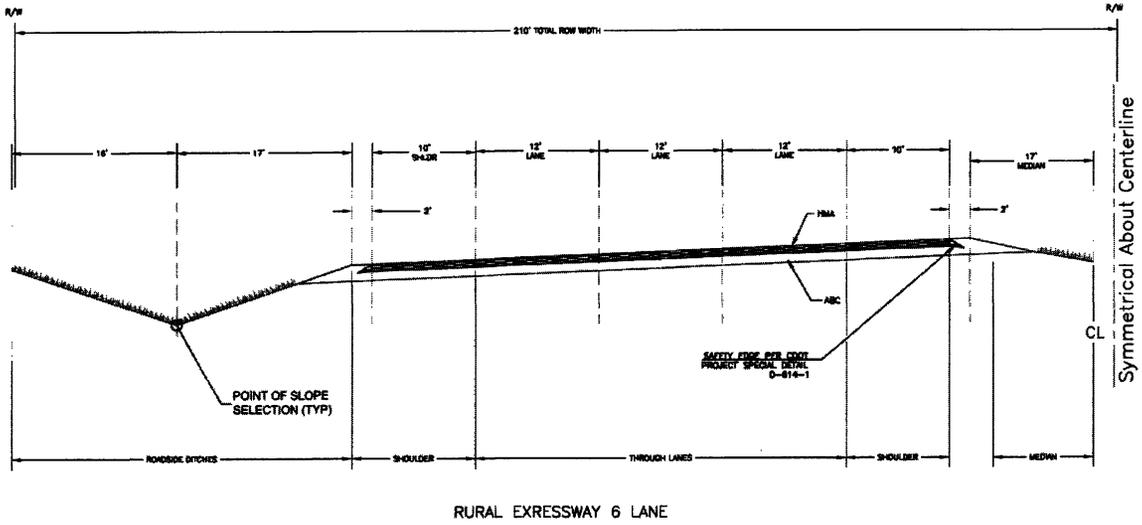
These Standards have been developed in support of the County roadway functional classification system.

### **A. Rural Roadways.**

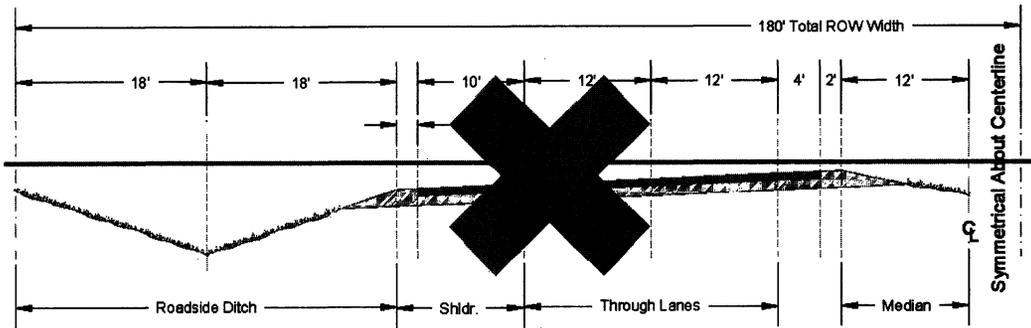
1. **Expressway.** Expressways serve high-speed and high-volume traffic over long distances. Access is highly controlled and may have both grade-separated interchanges and full movement signalized intersections. Adjacent, existing and future, land uses shall be served by other network roadways, no direct parcel access is permitted (See Figure 2-1 and Figure 2-2).

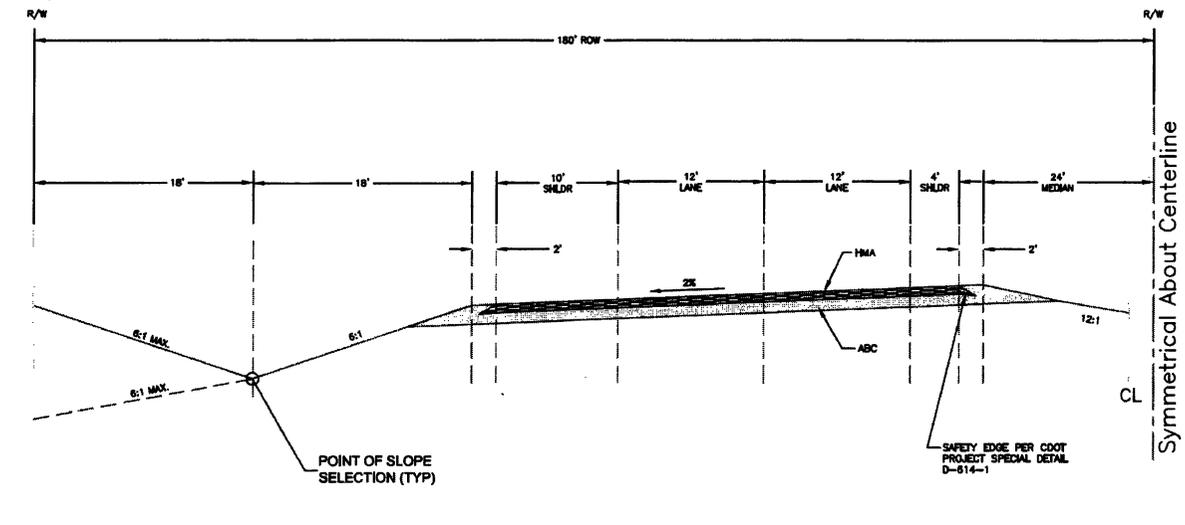
**Figure 2-1. Typical Rural Expressway Partial Cross Section (6 Lane)**





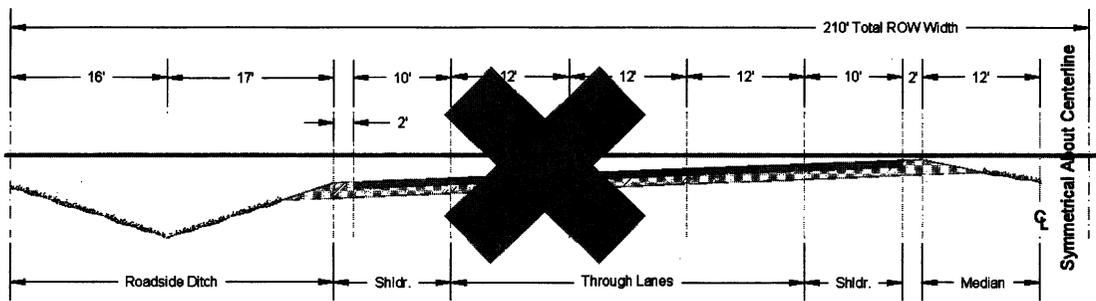
**Figure 2-2. Typical Rural Expressway Partial Cross Section (4 Lane)**





2. **Principal Arterial.** Principal arterials serve high-speed and high-volume traffic over long distances. Access is highly controlled with a limited number of full movement intersections and medians with infrequent openings, and no direct parcel access. Adjacent, existing and future, land uses shall be served by other network roadways, service roads, and inter parcel connections (See Figure 2-3 and Figure 2-4).

**Figure 2-3. Typical Rural Principal Arterial Partial Cross Section (6 Lane)**



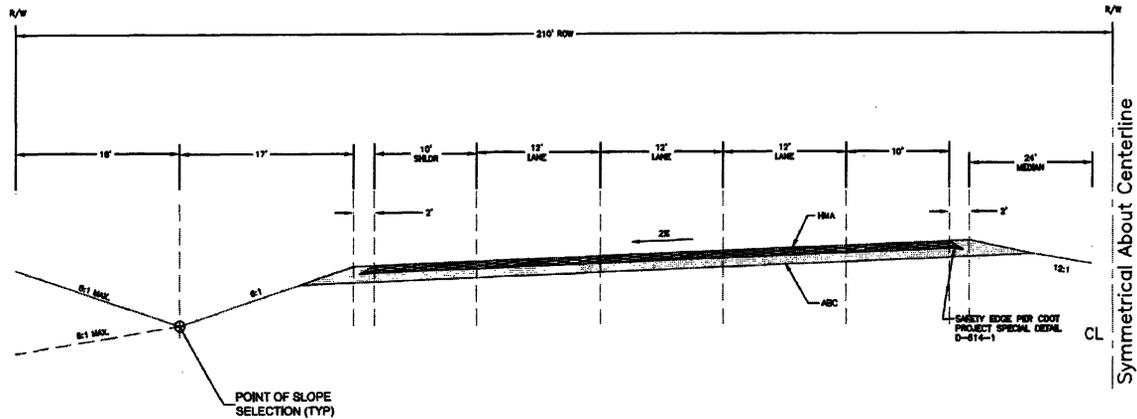
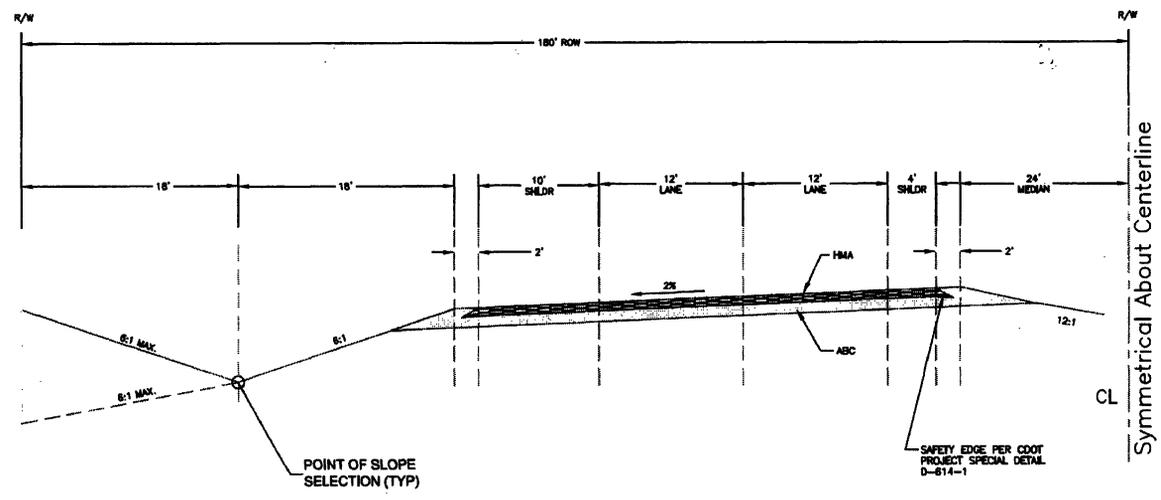
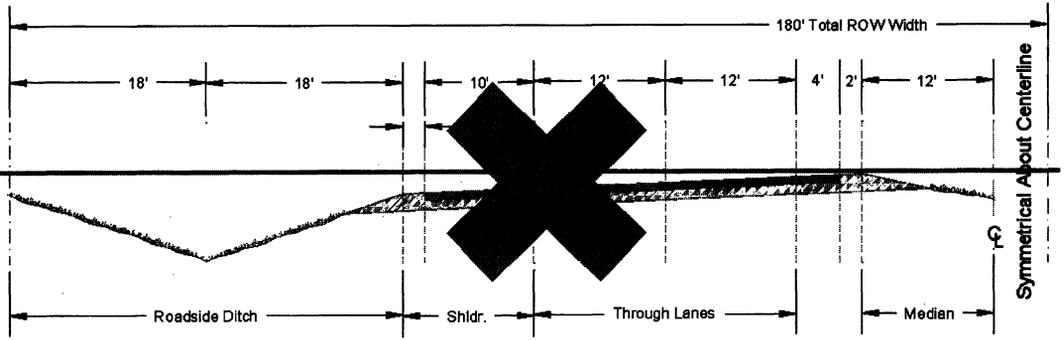


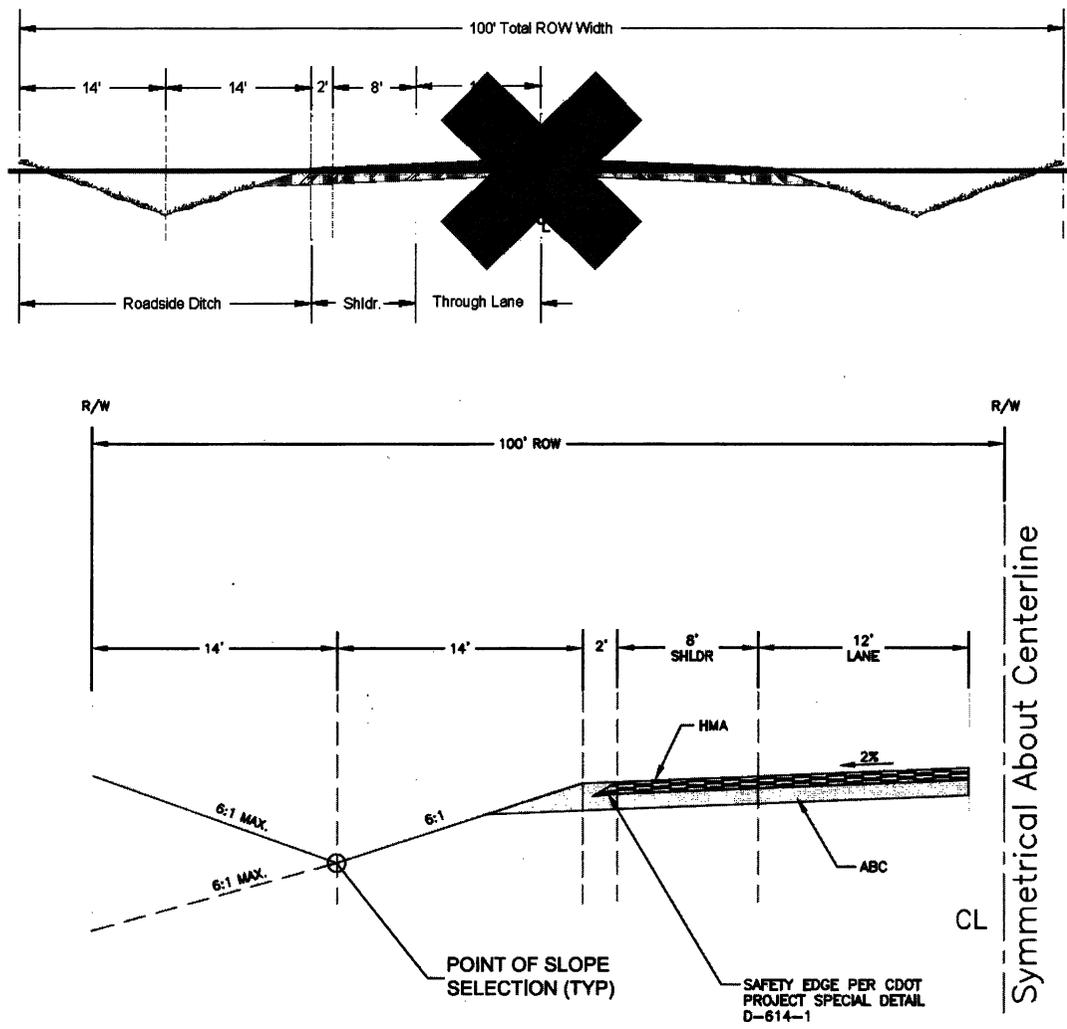
Figure 2-4. Typical Rural Principal Arterial Partial Cross-Section (4 Lane)



- 3. **Minor Arterial.** Minor arterials serve high-speed and high-volume traffic over medium distances, or are anticipated to serve this kind of traffic within a twenty-year period. Access is restricted

through prescribed distances between intersections, use of medians, and no full movement parcel access (See Figure 2-5). Minor arterial status is assigned to rural roadways where the probability of significant travel demand in the future is high. Rights-of-way, easements, setbacks, and access limitations shall be pursued through the land development process on properties adjacent to minor arterials.

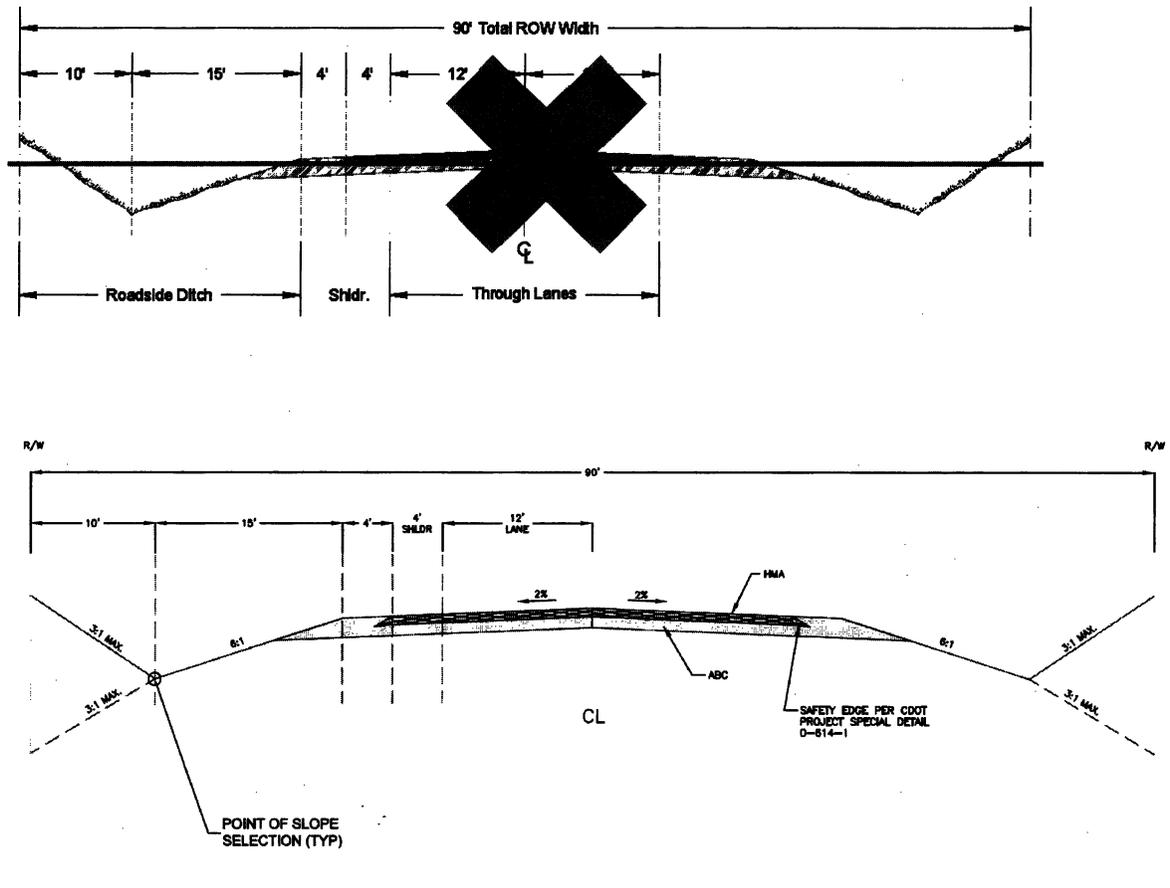
**Figure 2-5. Typical Rural Minor Arterial Partial Cross Section**



4. **Major Collector.** Major collectors serve as links between local access and arterial facilities over medium-to-long distances. Major collectors are managed to maximize the safe operation of through-movements at speed. No full movement access is permitted where the local roadways can be expected to provide access (See Figure 2-6). Where no local public roadway can provide

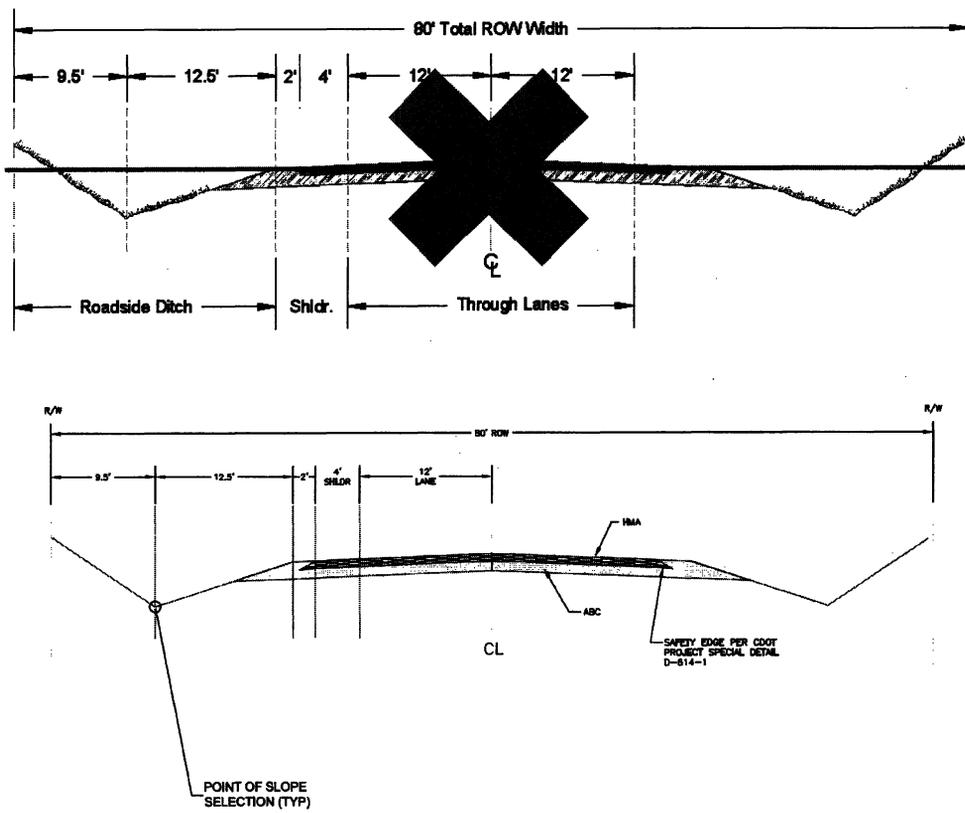
access, temporary direct parcel or partial turn movement access may be permitted, provided the design meets requirements presented in these Standards.

Figure 2-6. Typical Rural Major Collector Cross Section



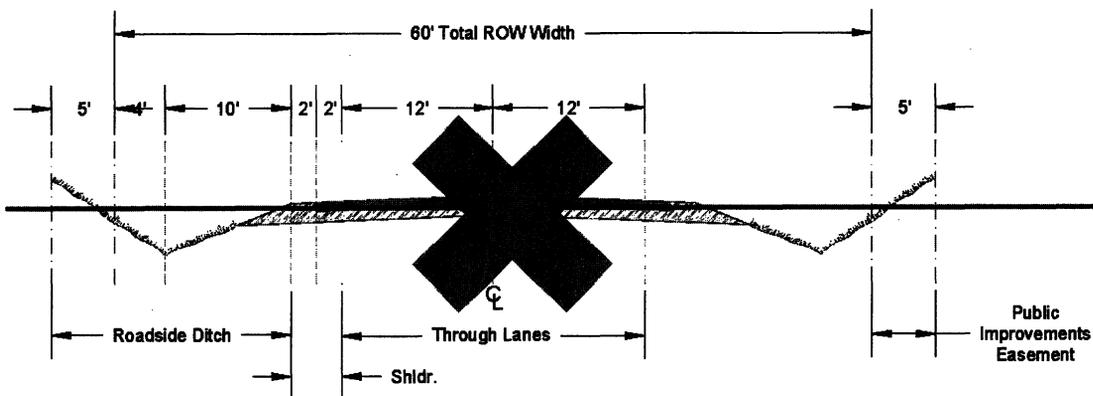
- 5. Minor Collector.** Minor collectors link local roadways to major collectors or arterial roadways. No full movement access is permitted where local roadways can be expected to provide access (See Figure 2-7). Where no local public or private roadway can provide access or where lot size is five acres or more, temporary direct parcel or partial turn movement access may be permitted. Access location and design are to be reviewed by the ECM Administrator to ensure roadway objectives are being met.

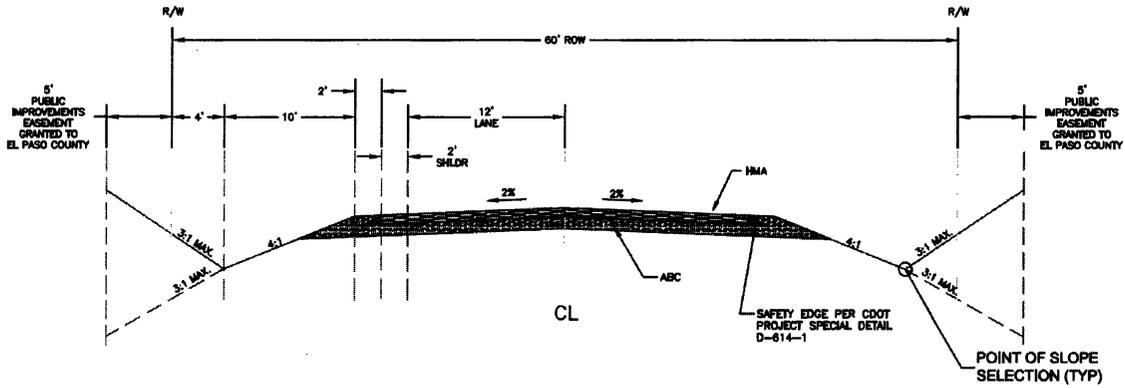
**Figure 2-7. Typical Rural Minor Collector Cross Section**



6. **Local.** Local roadways provide direct lot access and deliver lot-generated trips to collector roadways. Although access needs are high, accesses shall not be allowed to compromise the safety, health or welfare of roadway users (See Figure 2-8).

**Figure 2-8. Typical Rural Local Cross Section**

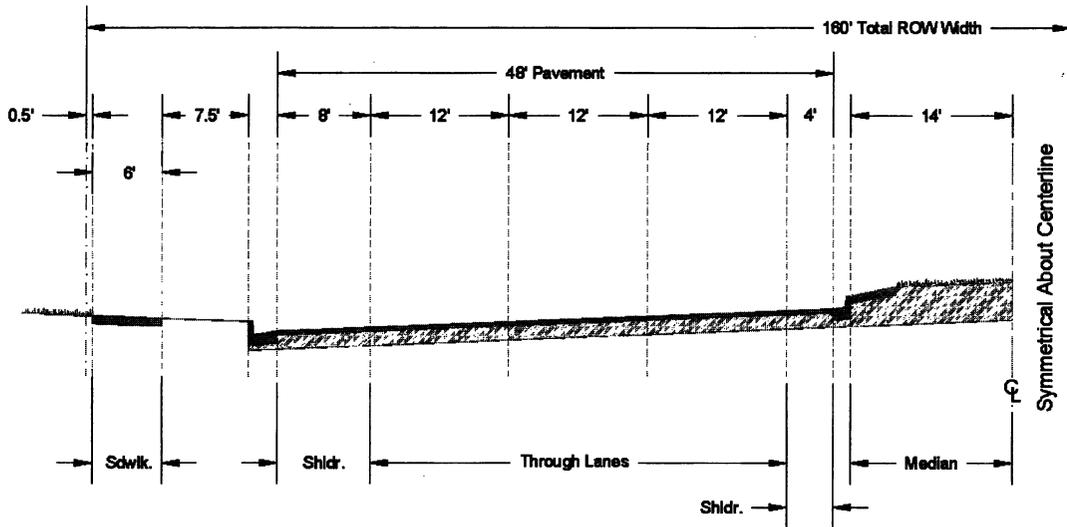




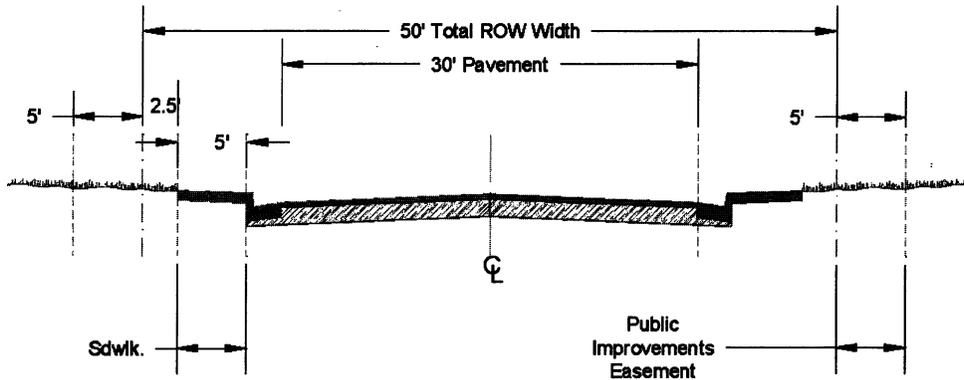
**B. Urban Roadways.**

1. **Expressway.** Expressways serve high-speed and high-volume traffic over long distances. Access is highly controlled and may have both grade-separated interchanges and full movement signalized intersections. Adjacent, existing and future, land uses shall be served by other network roadways, no direct parcel access is permitted (See Figure 2-9 and Figure 2-10).

**Figure 2-9. Typical Urban Expressway Cross Section (6 Lane)**

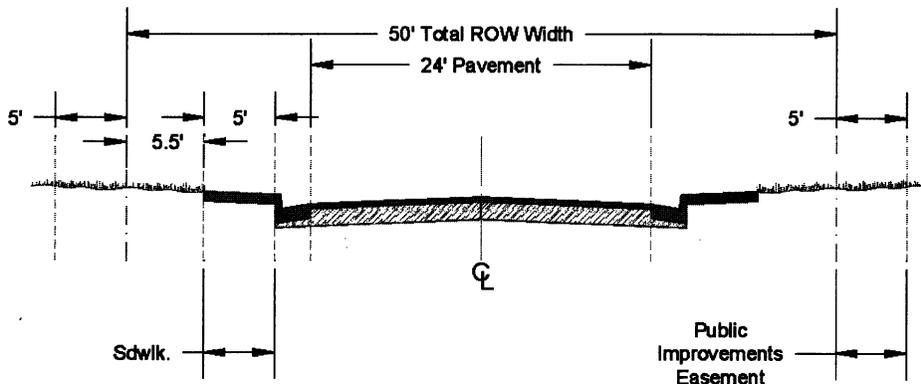


**Figure 2-16. Typical Urban Local Cross Section**



7. **Local (low volume).** Local (low volume) roadways provide direct lot access and deliver lot-generated trips to collector roadways. Although access needs are high, accesses shall not be allowed to compromise the safety, health or welfare of roadway users (See Figure 2-17).

**Figure 2-17. Typical Urban Local (low volume) Cross Section**



### **2.2.5. Roadway Access Criteria**

All new or modified accesses to the County roadways shall meet the requirements of the ECM. Standards and technical criteria not specifically addressed in the ECM shall follow the provisions of the AASHTO, A Policy on Geometric Design of Highways and Roadways ("Green Book") and the Colorado State Highway Access Code. In addition, should any access request fall within the preview of the Major Thoroughfare Task Force (MTTF) per their adopted bylaws, then the request shall be brought before the MTTF for a recommendation. When CDOT State Highway Access Permit is required, or access is located within the influence zone of an intersection, interchange or as determined by the ECM Administrator, CDOT concurrence shall be provided by the applicant.

#### **A. Rural and Urban Expressway Access Criteria.**

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4. **Inspection and Testing Report.** The inspection and testing report is prepared following construction. It is based on the construction inspections and tests performed under the direct supervision of a Professional Engineer licensed in the State of Colorado, who must sign the report as defined by Colorado State Statutes. Analysis results of all fill material shall be included in the report.

D. **Report Preparation Guidelines.** All reports shall be prepared in conformance with the guidelines in Appendix C.

### **2.2.7. Pavement Design**

A. **General.** Pavement design is a critical component of roadway design. Proper pavement design helps to ensure roadway performance and reduce the lifecycle costs associated with maintaining the roadway system.

B. **Road Paving Policy.** Paved roads meet the paving requirements established by Roadway Functional Classifications in Section 2.2.4.

1. **New Roads.** New roadways shall be paved if it connects to an existing roadway that is paved at the time of final approval of the development or it connects to a roadway internal to the development that is required to be paved. New roadways are not required to be paved where:

- The new roadway has a projected ADT of less than 200 ADT within the proposed 20-year design life and the new road connects to an existing gravel road or
- The new road is located in an area of gravel roads and, to reduce the cost of maintenance, the ECM Administrator has determined that a gravel road is the most appropriate application.

2. **Existing Roads.** Existing roadways shall be paved where:

- Any development causes an existing gravel road to exceed a projected ADT of 200 (Note: the extent of paving will be determined by the ECM Administrator based on the Transportation Impact Study [Section 2.2.3]).
- In accordance with the terms and conditions of BoCC Resolution 07-495 regarding the Resident Participation Program.

3. **New Gravel Roads.** New gravel roads may be permitted in accordance with the allowances in Section 2.2.7B.1 except where:

- The road is projected to have an ADT of 200 or more. All roads with a projected ADT of 200 or more shall be paved to facilitate compliance with Colorado Air Quality Control Commission Regulation No. 1, Emission Control Regulations for Particulates, Smokes, and Sulfur Oxides for the State of Colorado.
- The new gravel road would be an extension of an existing paved road.

C. **Pavement Design Report.** A Pavement Design Report is required to be submitted and approved before paving any County road. The final pavement design may be submitted after the ECM Administrator approval of the associated roadway, profile, drainage, and final construction plans. The Pavement Design Report shall conform to the requirements of Appendix D. The soil investigation associated with this report occurs after the roadways are graded and the deepest utility is installed.

D. **Safety Edge.** Shoulders should be paved equivalent depth in accordance with the functional or physical characteristic of the roadway. The use of a safety edge (Project Special Detail D-514-1 of the CDO I Standard Plans - M & S Standards) is required in all projects having roadway pavement including but not limited to new construction and modification of transportation facilities, repair, reconstruction,

resurfacing, restoration, and rehabilitation of existing transportation facilities. Instead of a vertical drop-off, the safety edge shapes the edge of the pavement to 30 to 35 degrees.

(Res. No. 20-222-, 6-23-20)

## 2.3. ROADWAY DESIGN

### 2.3.1. Roadway Design Criteria

Table 2-3 outlines the general roadway design criteria that shall guide roadway design and layout. All proposed roadway designs and layouts shall conform to the general roadway design criteria; the MTCP; and all other applicable criteria, standards, and regulations.

**Table 2-3. Roadway Design Criteria**

Criteria	Concern	Guideline
Ensure Vehicular and Pedestrian Access	The primary function of local roads is to serve abutting properties.	Road widths, placement of sidewalks, patterns of roads, and number of intersections are related to safe and efficient access to abutting lands.
Minimize Through Trips	Through traffic on local and collector roads potentially increases the average speed and volume. Therefore increasing the potential for accidents and reducing residential amenities.	Through traffic can be discouraged between neighborhoods and higher volume roads by creating a circuitous route, channeling or controlling median crossings along peripheral routes.
Control Access to Arterials	Local circulation systems and land development patterns should not detract from the efficiency of peripheral arterial facilities. The local roads that intersect arterial systems will tend to have higher volumes since they tend to be primarily exit points.	The number of access points between local circulation systems and adjacent arterial roads should be minimized. Intersections along arterial routes should be properly spaced for efficient signalization and traffic flow.
Discourage Speeding	Residential roads should be designed to discourage fast movement.	Use of curvilinear alignments, traffic calming devices, and circuitous routes in the road system.
Minimize Modal Conflicts (bike, pedestrian, transit, low speed vehicles)	Pedestrian travel from within the area to points outside should require a minimal number of road crossings.	Typical methods include use of cul-de-sacs and looped roads, special pedestrian routes or walkways, and the proper placement of high pedestrian traffic generators. In general, vehicular flow must be outward oriented to the peripheral arterials and pedestrian travel should be inward-oriented to avoid these heavier vehicular flows.
Minimize Space Devoted to Road Use	It is desirable to minimize local road mileage, thereby reducing construction and maintenance costs, as well as permitting the most efficient use of land. Roads should also have an appearance commensurate with their function.	Roads should be designed to complement local character.

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Relate Road to Topography	Local roads are more attractive and economical if constructed to closely adhere to topography (minimize cut and fill).	The important role that roads play in the overall storm drainage system can be enhanced by closely following existing topography.
Layout Road to Achieve Optimum Subdivision of Land	The arrangement of roads should allow for economical and practical patterns, shapes, and sizes of adjacent lots. Roads as a function of land use must not unduly hinder the development of land.	Distances between roads, number of roads, and related elements all have a bearing on efficient subdivision of an area. Access to adjoining properties should also be encouraged.

### 2.3.2. Design Standards by Functional Classification

Section 2.2.4 of these standards identifies the Roadway Functional Classifications recognized and used by the County. Table 2-4 through Table 2-7 summarize many of the minimum roadway design standards by category and functional classification. Detailed road EPC Standard Drawings are available provided in Appendix F.

**Table 2-4. Roadway Design Standards for Rural Expressways and Arterials**

Criteria	Expressways		Arterials		
	6 Lane	4 Lane	6 Lane Principal	4 Lane Principal	Minor
Design Speed/Posted Speed (MPH)	70/65	70/65	70/65	70/65	60/55
Clear Zone	See Table 2-1634 <sup>1</sup>	See Table 2-1630 <sup>1</sup>			
Minimum Centerline Curve Radius	2,050 <sup>1</sup>	2,050 <sup>1</sup>	2,050 <sup>1</sup>	2,050 <sup>1</sup>	1,505 <sup>1</sup>
Number of Through Lanes	6	4	6	4	2
Lane Width	12'	12'	12'	12'	12'
Right-of-Way	210'	180'	210'	180'	100'
Paved Width (excluding safety edge)	56' <sup>2</sup>	38' <sup>2</sup>	56' <sup>2</sup>	38' <sup>2</sup>	40'
Median Width	24'	24'	24'	24'	n/a
Outside Shoulder Width (paved/gravel)	12'(10'/2')	12'(10'/2')	12'(10'/2')	12'(10'/2')	10'(8'/2')
Inside Shoulder Width (paved/gravel)	12'(10'/2')	6'(4'/2')	12'(10'/2')	6'(4'/2')	n/a
Design ADT		48,000		40,000	10,000
Design Vehicle	WB-67	WB-67	WB-67	WB-67	WB-67
Access Permitted	No	No	No	No	No
Access Spacing	n/a	n/a	n/a	n/a	n/a
Intersection Spacing	1 mile	1 mile	½ mile	½ mile	¼ mile
Parking Permitted	No	No	No	No	No
Minimum Flowline Grade	1%	1%	1%	1%	1%
Centerline Grade (Min.—Max.)	1—5%	1—5%	1—5%	1—5%	1—6%
Intersection Grades (Min.—Max.)	1—2%	1—2%	1—3% <sup>3</sup>	1—3% <sup>3</sup>	1—4% <sup>3</sup>

<sup>1</sup> Assumes 4% superelevation, 6% for 70 MPH design speeds

<sup>2</sup> Pavement width in each direction for divided roadways  
<sup>3</sup> Where pedestrian crosswalks are anticipated at intersections, maximum grade at crosswalks with stop/yield control is 2%

**Table 2-5. Roadway Design Standards for Rural Collectors and Locals**

Criteria	Collectors		Local	
	Major	Minor	Local	Gravel
Design Speed/Posted Speed (MPH)	50/45	40/35	30/30	50/30/45-30 <sup>5</sup>
Clear Zone	See Table 2-1620 <sup>1</sup>	See Table 2-1644 <sup>1</sup>	See Table 2-167 <sup>1</sup>	See Table 2-1642 <sup>1</sup>
Minimum Centerline Curve Radius	930 <sup>2</sup>	565'	300'	As Approved
Number of Through Lanes	2	2	2	2
Lane Width	12'	12'	12'	12'
Right of Way	90'	80'	70' <sup>3</sup>	70' <sup>3</sup>
Paved Width (excluding safety edge)	32'	32'	28'	n/a
Median Width	n/a	n/a	n/a	n/a
Outside Shoulder Width (paved/gravel)	8'(4'/4')	6'(4'/2')	4'(2'/2')	4'(0'/4')
Inside Shoulder Width (paved/gravel)	n/a	n/a	n/a	n/a
Design ADT	3,000	1,500	750	200
Design Vehicle	WB-67	WB-67	WB-50	WB-50
Access Permitted	No	Yes	Yes	Yes
Access Spacing	n/a	Frontage	Frontage	Frontage
Intersection Spacing	¼ mile	660'	330'	330'
Parking Permitted	No	Yes	Yes	No
Minimum Flowline Grade	1%	1%	1%	1%
Centerline Grade (Min.-Max.)	1-8% <sup>1</sup>	1-8% <sup>1</sup>	1-8% <sup>1</sup>	1-8%
Intersection Grades (Min.-Max.)	1-4% <sup>4</sup>	1-4% <sup>4</sup>	1-4% <sup>4</sup>	1-4% <sup>4</sup>
<sup>1</sup> 10% maximum grade permitted at the discretion of the ECM Administrator				
<sup>2</sup> Assumes 4% superelevation, 6% for 70 MPH design speeds				
<sup>3</sup> 60-foot right-of-way plus two 5-foot Public Improvements Easements granted to El Paso County				
<sup>4</sup> Where pedestrian crosswalks are anticipated at intersections, maximum grade at crosswalks with stop/yield control is 2%				
<sup>5</sup> For existing gravel roads, design and posted speeds may exceed this criterion at the ECM Administrator's discretion.				

**Table 2-6. Roadway Design Standards for Urban Expressways and Arterials**

Criteria	Expressways		Arterials		
	6 Lane	4 Lane	6 Lane Principal	4 Lane Principal	Minor
Design Speed/Posted Speed (MPH)	60/55	60/55	50/45	50/45	40/35

Clear Zone	See Table 2-1630 <sup>1</sup>	See Table 2-1630 <sup>1</sup>	See Table 2-1620 <sup>1</sup>	See Table 2-1620 <sup>1</sup>	See Table 2-1644 <sup>1</sup>
Minimum Centerline Curve Radius	1,505 <sup>1</sup>	1,505 <sup>1</sup>	930 <sup>1</sup>	930 <sup>1</sup>	565'
Number of Through Lanes	6	4	6	4	4
Lane Width	12'	12'	12'	12'	12'
Right-of-Way	160'	140'	160'	130'	100'
Paved Width (Excluding Gutter Pan)	48' <sup>2</sup>	36' <sup>2</sup>	48' <sup>2</sup>	36' <sup>2</sup>	62'
Median Width (Including Curb & Gutter)	31'	23'	31'	19'	14'
Shoulder Width (Ext., Excluding Gutter)	8'	8'	8'	8'	n/a
Shoulder Width (Int., Excluding Gutter)	4'	4'	4'	4'	n/a
Required Curb/ Gutter Type	6" ramp	6" ramp	6" vertical	6" vertical	6" vertical
Sidewalk Width (@ FL)	6' detached				
Design ADT		48,000		40,000	20,000
Design Vehicle	WB-67	WB-67	WB-67	WB-67	WB-67
Bike Lanes Permitted	No	No	Yes	Yes	No
Access Permitted	No	No	No	No	No <sup>3</sup>
Access Spacing	n/a	n/a	n/a	n/a	See Table 2-35
Intersection Spacing	1 mile	1 mile	½ mile	½ mile	¼ mile
Parking	No	No	No	No	No
Minimum Flowline Grade of Curb	.50%	.50%	.50%	.50%	.50%
Centerline Grade (Min.-Max.)	0.5—5%	0.5—5%	0.5—6%	0.5—6%	0.5—6%
Intersection Grades (Min.-Max.)	0.5—2%	0.5—2%	0.5—3% <sup>4</sup>	0.5—3% <sup>4</sup>	0.5—4% <sup>4</sup>
<sup>1</sup> Assumes 4% superelevation, 6% for 70 MPH design speeds					
<sup>2</sup> Pavement width in each direction for divided roadways					
<sup>3</sup> Where no local public or private roadway can provide access, temporary or partial turn movement parcel access may be permitted					
<sup>4</sup> Maximum grade at crosswalks with stop/yield control is 2%					

**Table 2-7. Roadway Design Standards for Urban Collectors and Locals**

Criteria	Collectors		Local	
	Non-Residential	Residential	Local	Local <sup>a</sup> (low volume)
Design Speed/Posted Speed (MPH)	40/35	40/35	25/25	20/20
Clear Zone	See Table 2-1644 <sup>1</sup>	See Table 2-1644 <sup>1</sup>	See Table 2-1642 <sup>1</sup>	See Table 2-167 <sup>1</sup>
Minimum Centerline Curve Radius	565'	565'	200'	100'
Number of Through Lanes	2	2	2	2
Lane Width	12'	12'	12'	12'

Right-of-Way	80'	60'	60' <sup>3</sup>	60' <sup>3</sup>
Paved Width (Excluding Gutter Pan)	48'	36'	30'	24'
Median Width (Including Curb & Gutter)	12'	n/a	n/a	n/a
Shoulder Width (Ext., Excluding Gutter)	6'	6'	n/a	n/a
Shoulder Width (Int., Excluding Gutter)	n/a	n/a	n/a	n/a
Required Curb/ Gutter Type (Vertical)	6"	6"	6" (or ramp)	6" (or ramp)
Sidewalk Width (@ 4' from top back of curb when attached)	5' detached	5' detached	5' attached	5' attached
Design ADT	20,000	10,000	3,000	300
Design Vehicle	WB-50	WB-50	WB-50	SU-30
Bike Lanes Permitted	No	Yes	No	No
Access Permitted	No <sup>5</sup>	No <sup>5</sup>	Yes	Yes
Access Spacing	See Table 2-35	See Table 2-35	Frontage	Frontage
Intersection Spacing	660' <sup>2</sup>	660' <sup>2</sup>	175'	150'
Parking Permitted	No	No	Yes	Yes
Minimum Flowline Grade of Curb	.50%	.50%	.50%	.50%
Centerline Grade (Min.-Max.)	0.5—6% <sup>1</sup>	0.5—8% <sup>1</sup>	0.5—8% <sup>1</sup>	0.5—8% <sup>1</sup>
Intersection Grades (Min.-Max.)	0.5—4% <sup>6</sup>	0.5—4% <sup>6</sup>	0.5—4% <sup>6</sup>	0.5—4% <sup>6</sup>
<sup>1</sup> 10% maximum centerline grade permitted (ADA accessibility requirements shall still be met) at the discretion of the ECM Administrator				
<sup>2</sup> 330 feet when intersecting local roadways				
<sup>3</sup> 50-foot right-of-way plus two 5-foot Public Improvements Easements granted to El Paso County				
<sup>4</sup> Section can be used for cul-de-sacs, or roads with two ways out having a maximum of 300 ADT and a maximum length of 1,200 feet				
<sup>5</sup> Where no local public or private roadway can provide access, temporary or partial turn movement parcel access may be permitted				
<sup>6</sup> Maximum grade at crosswalks with stop/yield control is 2%				

### 2.3.3. Horizontal Alignment

- A. **General Criteria.** Proper roadway alignment provides for safe and continuous operation at a uniform design speed. Proposed road layouts shall have a logical relationship to existing or platted roads and fit within the overall transportation plan.
- B. **Intersections.** All new roadways must intersect at or nearly at right angles. Modified roadways shall intersect at or nearly at right angles or otherwise allow for safe operation as determined by the ECM Administrator.
- C. **Design Speed.** Design speed is a speed selected to determine the various geometric design features of a roadway. Design speed shall be used to determine stopping sight distance and intersection sight distance requirements for new road facilities. The design speeds by functional classification are provided in Table 2-4 through Table 2-7.
- D. **Superelevation.**

Design Speed (MPH)	Stopping Sight Distance (feet)	Rate of Vertical Curvature, K <sup>1</sup>	
		Calculated	Design
25	155	11.1	12
30	200	18.5	19
40	305	43.1	44
50	425	83.7	84
60	570	150.6	151
70	730	246.9	247

<sup>1</sup> Assumes an eye height of 3.5 feet and an object height of 0.5 feet under open road conditions.

**Where:**  
K = rate of vertical curvature  $K = L/A$ , the length of curve per percent algebraic difference in intersecting grades)  
L = length of vertical curve, feet  
A = algebraic differences in intersecting grades  
S = estimated sight distance, feet

**Table 2-13. Design Controls for Passing Sight Distance on Crest Vertical Curves**

Design Speed (MPH)	Minimum Passing Sight Distance (feet)	Rate of Vertical Curvature, K <sup>1</sup>
25	900	289
30	1090	424
40	1470	772
50	1835	1203
60	2135	1628
70	2480	2197

<sup>1</sup> Assumes an eye height of 3.5 feet and an object height of 0.5 feet under open road conditions.

**Where:**  
K = rate of vertical curvature ( $K = L/A$ , the length of curve per percent algebraic difference in intersecting grades)  
L = length of vertical curve, feet  
A = algebraic differences in intersecting grades  
S = estimated sight distance, feet

2. **Sag Vertical Curves.** Table 2-14 and Figure 2-20 show the required lengths of sag vertical curves for different algebraic differences in grade to provide required stopping sight distances for each design speed.

	1,500— 6,000	16—18	20—26	<sup>2</sup>	12—14	14—16	16—18
	Over 6,000	18—20	24—28	<sup>2</sup>	14—16	18—22	20—22
60 mph	Under 750	16—18	20—24	<sup>2</sup>	10—12	12—14	14—16
	750—1,500	20—24	26—32*	<sup>2</sup>	12—14	16—18	20—22
	1,500— 6,000	26—30	32—40*	<sup>2</sup>	14—18	18—22	24—26
	Over 6,000	30—32*	36—44*	<sup>2</sup>	20—22	24—26	26—28
70 mph	Under 750	18—20	20—26	<sup>2</sup>	10—12	14—16	14—16
	750—1,500	24—26	28—36*	<sup>2</sup>	12—16	18—20	20—22
	1,500— 6,000	28—32*	34—42*	<sup>2</sup>	16—20	22—24	26—28
	Over 6,000	30—34*	38—46*	<sup>2</sup>	22—24	26—30	28—30

<sup>1</sup> Distances are provided in feet from the edge of the through lane.

<sup>2</sup> Since recovery is less likely on the unshielded, traversable 1V:3H slopes, fixed objects should not be present in the vicinity of the toe of these slopes. Recovery of high-speed vehicles that encroach beyond the edge of the shoulder may be expected to occur beyond the toe of the slope. Determination of the width of the recovery area at the toe of slope should take into consideration right-of-way availability, environmental concerns, economic factors, safety needs, and crash histories. Also, the distance between the edge of the through-traveled lane and the beginning of the 1V:3H slope should influence the recovery area provided at the toe of slope.

### 2.3.6. Sight Distance

Sight distance is the length of roadway that is clearly visible to the driver and is dependent upon the height of the driver's eye above the road surface, the specified object height above the road surface, and the height of sight obstructions within the line of sight. The minimum sight distance available on a roadway should be sufficient to enable a vehicle traveling at or near the design speed to stop before reaching a stationary object. In evaluating the overall performance of a roadway, both the horizontal and vertical sight distances should be considered.

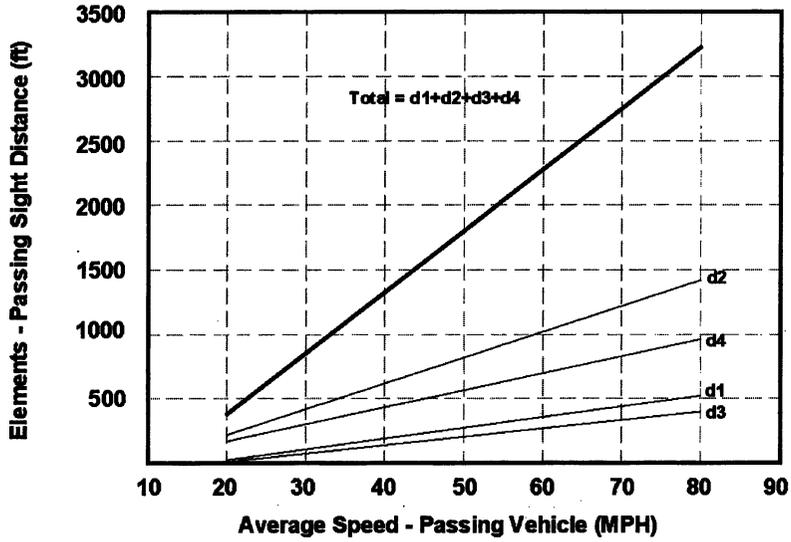
- A. **Sight Distance Calculations.** For general sight distance calculations, the height of the driver's eye is considered to be 3.5 feet above the road surface and the object is considered to be 0.52-feet above the road surface. However, for passing sight distance calculations, the height of the object is considered to be 4.25 feet above the road surface.

The sight distance design shall assume that a 6-foot-high fence (as measured from actual finish grade) exists at all property lines except where a sight distance easement has been established.

- B. **Stopping Sight Distance on Straight Roadways.** The minimum stopping sight distance is the distance required by the driver of a vehicle traveling at the design speed to bring the vehicle to a stop after an object on the road becomes visible. Stopping sight distance is the sum of the braking distance and the brake reaction time (the interval between the instant that the driver recognizes the existence of an object on the roadway and the instant the driver applies the brakes). The braking distance is related to the initial speed and the coefficient of friction between the tires and the roadway. The wet condition governs the stopping distances for purposes of design. Table 2-17 provides the required minimum stopping sight distances on straight roadways with grades of less than 3%. In no case shall the stopping sight distance be less than as specified in Table 2-17. For grades in excess of 3%, refer to Table 2-18.

**Table 2-17. Stopping Sight Distances**

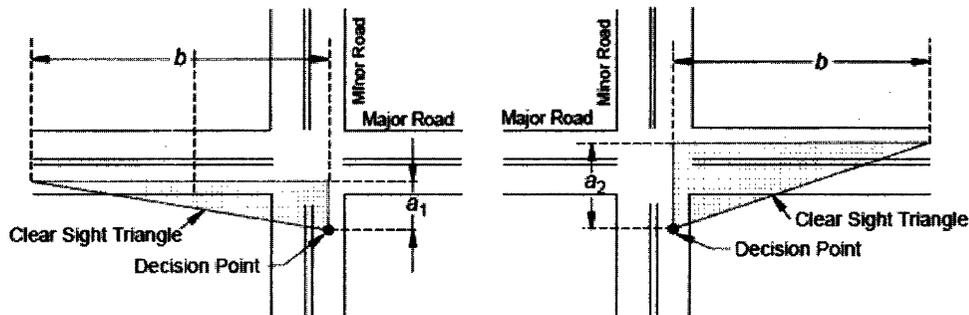
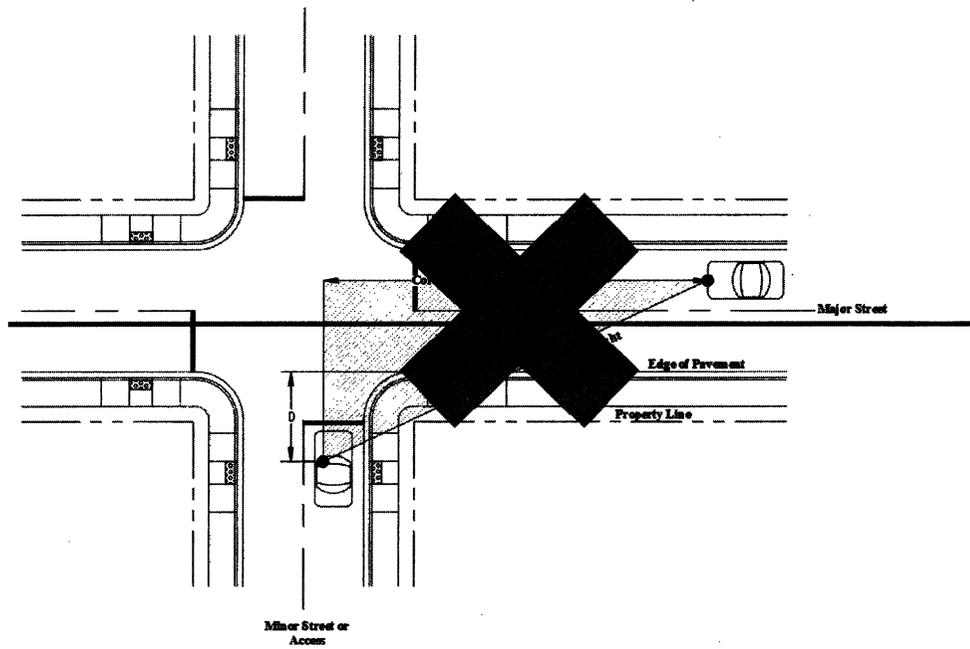
Figure 2-22. Total Passing Sight Distance for Two-Lane Roads



- d1 - distance traversed during perception and reaction time and during initial acceleration to the point of encroachment on the left lane
- d2 - distance traveled while the passing vehicle occupies the left lane
- d3 - distance between the passing vehicle at the end of its maneuver and the opposing vehicle
- d4 - distance traversed by an opposing vehicle for two-thirds of the time the passing vehicle occupies the left lane, or 2/3 of d2

G. **Intersection sight distance.** This section applies to intersections where one public road meets a second public road. The intersection sight distance provides for vehicles to enter traffic and accelerate to the average running speed. Intersection sight distances shall be measured as shown on Figure 2-23. The intersection sight distance shall be Intersection sight distance shall be per AASHTO Green Book as shown in Table 2-21.

Figure 2-23. Sign Distance Triangle (Stop Controlled)



Departure Sight Triangle for Viewing Traffic Approaching the Minor Road from the Left

Departure Sight Triangle for Viewing Traffic Approaching the Minor Road from the Right

Table 2-21. Intersection Sight Distance

Higher Functional Classification Roadway Design Speed (MPH)	Intersection sight distance (feet) <sup>1,2</sup>
50	555

40	445
30	335 <sup>2</sup>
25	280 <sup>2</sup>
<sup>1</sup> Intersection sight distance measured from a point on the minor road at 13 feet back from the edge of the major road pavement ("D") and measured from a height of eye at 3.5 feet on the minor road to a height of object at 3.5 feet on the major road.	
<sup>2</sup> At local/local-road intersections only, "D" shall be 10 feet and the sight distance shall be measured to the centerline of the road per AASHTO 9.5.3.	
<sup>3</sup> These values only apply to two-lane roads with stop control, all other situations require special design considerations.	

1. **Sight Distance Triangles within Easements.** There shall be an unobstructed sight distance along both approaches and both sides at an intersection (within the right-of-way) for distances sufficient to allow the operators of vehicles, approaching simultaneously, to see each other in time to prevent collisions at the intersection.  
  
All sight distance triangles must be within the public right-of-way or a sight distance easement (See Figure 2-23). If the line of sight crosses onto private property, a "Sight Distance Easement" shall be dedicated to provide the required sight distance. The easement or right-of-way shall be dedicated to the County. Maintenance of a sight distance easement shall be the responsibility of the property owner or the homeowners' association unless otherwise approved by the County.
2. **Encroachment into Sight Distance Triangles or Easements.** Any object within the sight distance triangle or easement more than 30 inches above the flowline elevation of the adjacent roadway shall constitute a sight obstruction, and shall be removed or lowered. The objects may include but are not limited to berms, buildings, parked vehicles on private property, cut slopes, hedges, trees, bushes, utility cabinets or tall crops. Trees may be permitted at the discretion of the ECM Administrator if pruned to at least 8 feet above the flowline elevation of the adjacent roadway.
3. **On-Roadway Parking within Sight Distance Triangles.** The ECM Administrator may limit on-street parking to protect visibility and enhance roadway capacity.

### 2.3.7. Intersections

- A. **Intersection Design Guidelines.** Intersections shall be designed to provide safe movement for all those using roadways within the County (motorists, pedestrians, and bicyclists). By their nature, intersections are conflict locations. Vehicles, pedestrians, and bicycles all cross paths. Each crossing is a conflict point. The basic design of intersections includes the following objectives:
  - Minimize points of conflict
  - Simplify areas of conflict
  - Limit conflict frequency
  - Limit conflict severity
- B. **Intersection Spacing and General Access Standards.** Full movement intersections and major accesses spacing shall meet the requirements in Section 2.2.5. While access to a major roadway should be avoided, right-in/right-out and three quarter movement accesses may be permitted as a deviation if they meet the criteria for sight distances, turn lane requirements, grades and do not negatively impact traffic operations or safety. The applicant shall have the burden of proof that no other "viable or practical" property access is available. A deviation request should be supported by a traffic study or memorandum that provides information to assist the ECM Administrator in determining the proposed

deviation minimizes negative safety and other operational impacts along upstream and downstream roadway segments. The addition of such an access shall minimize impacts to queuing or blocking of lane entries or access points and minimize impacts to progression. The access must be in a location such that any necessary turn lanes and acceleration/deceleration lanes can be accommodated to maintain safe operations and capacity. The analysis should consider all potential future additional requirements for to accommodate traffic generated by adjacent land uses. Buildout design hour/peak hour projected traffic volumes should be used.

**C. Intersection Alignment.**

1. **Offset.** All lanes traversing an intersection shall be in alignment. A maximum 2-foot lane offset may be approved by the ECM Administrator if no other alternative exists.
2. **Angle.** Crossing roadways shall intersect at 90 degrees whenever possible. In no case shall roadways be permitted to intersect at less than 80 degrees or more than 100 degrees.
3. **Horizontal Alignment.** The horizontal alignment of roadways through an intersection shall be designed in conformance with this chapter depending on the classification of the roadways intersecting. Intersections may be placed on horizontal curves, provided the minimum tangent lengths shown in Table 2-11 are provided on the lower functional classification roadway and the required sight distance is met.
4. **Vertical Alignment.** The roadway profile grade shall not exceed the value presented in Table 2-22 on the approach to the intersection, as measured along the centerline of the roadway for a minimum distance equal to the grade lengths presented in Table 2-23 for each of the roadway functional classifications.

The grade of the roadway with the higher functional classification shall prevail at intersections. Grading of lower functional classifications, adjacent property, private access shall adapt to the higher functional classification roadway grade.

In cases where the natural grade for which a roadway is to be constructed is steeper than 4 percent (hillside areas). A deviation from the presented standards may be requested for to accommodate these conditions up to a maximum of 8 percent.

Where crosswalks are provided at intersections, roadway grades shall be set to provide compliant crosswalk cross slopes. On approaches with stop or yield control, roadway grades shall be 2% maximum. On uncontrolled approaches or at traffic signals designed to permit arrival during the green phase, roadway grades shall be the maximum permitted for that functional classification, but in no case greater than 5%. See Section 6.3.2.

5. **Intersection Sight Distance.** The sight distance at intersections shall be shown geographically on the construction plans. A note shall be added to each leg of the intersection stating that intersection sight distance exceeds the minimum sight distance for \_\_\_ mph design speed.

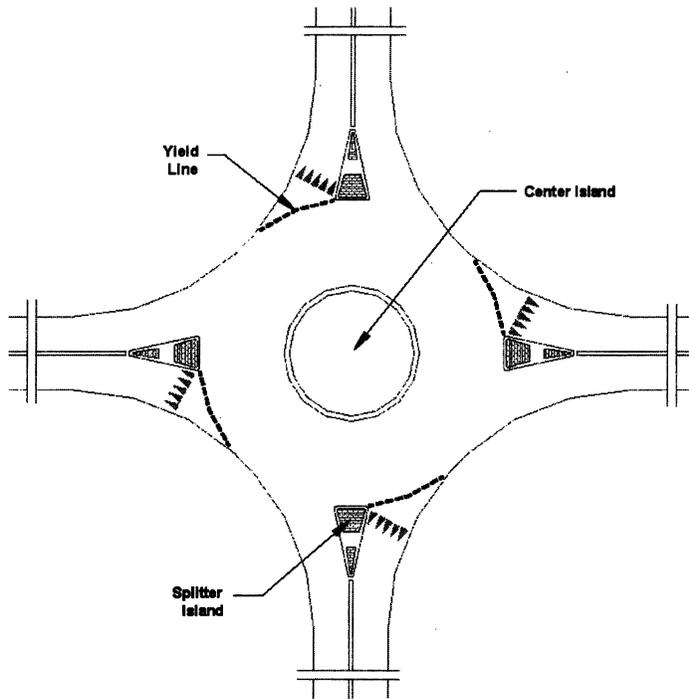
**Table 2-22. Intersection Grades by Roadway Functional Classification**

Functional Classification	Maximum Intersection Grade (%)	Minimum Intersection Grade (%)
Expressway (Urban/Rural)	2/2	0.5/1
Arterial (Urban/Rural)	3/3 (4 for minor) <sup>1</sup>	0.5/1
Collector (Urban/Rural)	4/4 <sup>1</sup>	0.5/1
Local (Urban/Rural)	4/4 <sup>1</sup>	0.5/1

<sup>1</sup> Maximum grade at crosswalks with stop/yield control is 2%

**Table 2-23. Intersection Profile Grade Lengths<sup>1</sup>**

**Figure 2-29. Typical Design Elements of a Modern Roundabout**



- The design of the center island will be in accordance with the Roundabout Design Guide and approved by the ECM Administrator. Should a truck apron be warranted based on site-specific design parameters, the width shall be selected based on what is appropriate to accommodate the free circulation of the design vehicle.
- The circulatory roadway width shall be a minimum of 1.2 times the width of the widest entering roadway or 20 feet, whichever is greater. The width may include the apron when approved by the ECM Administrator.
- The roundabout design shall be completed with the aid of computer software. The ECM Administrator is authorized to require the use of a specific software package when warranted by the needs of a specific intersection.
- Roundabout designs shall conform with NCHRP Report 572 – Roundabouts: An Informational Guide, Second Edition (2010), the Wisconsin DOT Facilities Development Manual (FDM) (as amended), found at <http://wisconsin.gov/pages/doing-business/eng-consultants/cns/consultants/rdwy/fdm.aspx>. Any other criteria proposed for use shall be confirmed by the ECM Administrator prior to design. The design process shall be iterative with submittals generally conforming with the Wisconsin DOT design procedures as directed by the ECM Administrator. The Wisconsin DOT details, signing and striping recommendations, and lines of sight, should be utilized to the extent practicable. (The design shall conform with the FHWA Roundabout Design Guide or other design criteria approved by the ECM Administrator).
- Raised splitter islands are required on all approaches.

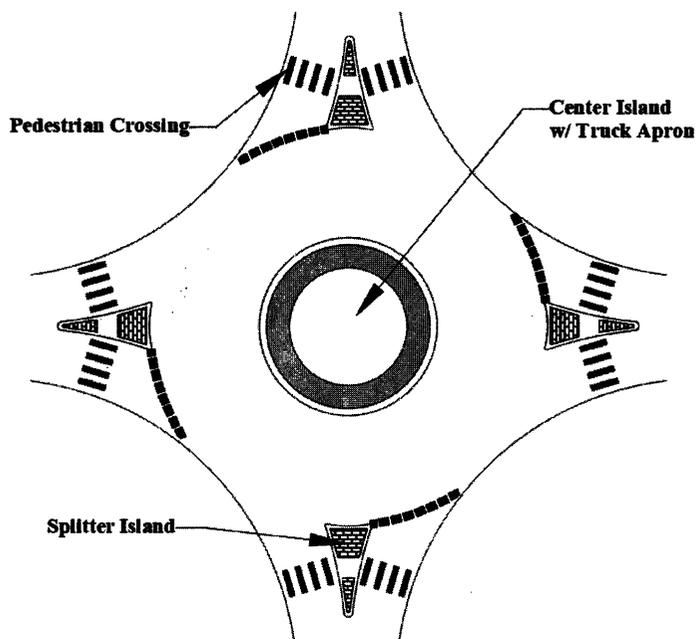
- Roundabout signage and markings Signage shall conform with the requirements of the MUTCD.

- Roundabout lighting shall be provided and conform with the 2019 CDOT Lighting Design Guidelines, as amended.

2. **Mini Roundabouts Design Guidelines.** Mini roundabouts may be allowed in a neighborhood setting for traffic calming. Mini roundabouts may be used on urban local roadways. Mini roundabouts are prohibited in areas without curb and gutter. Specific guidelines for designing the main elements of a mini roundabout shown in Figure 2-30 include:

- The design shall conform with the Roundabout Design Guide, FHWA Standards or other design criteria approved by the ECM Administrator.
- The circular roadway shall be a minimum of 20 feet wide flowline to flowline, and the approach legs shall be a minimum of 16 feet wide.
- Mini roundabouts shall be designed to accommodate WB-50 vehicles.
- To enhance truck movement through smaller-diameter roundabouts, a concrete truck apron may be used to assist with tracking.

**Figure 2-30. Typical Mini Roundabout Cross Section**



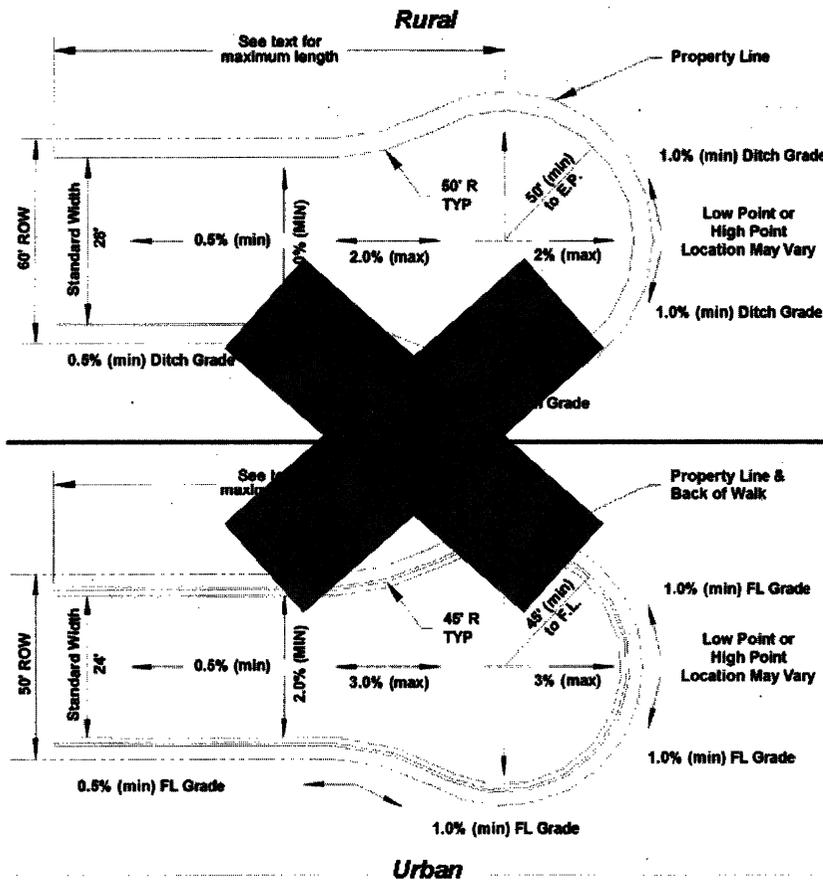
### **2.3.8. Roadway Terminations**

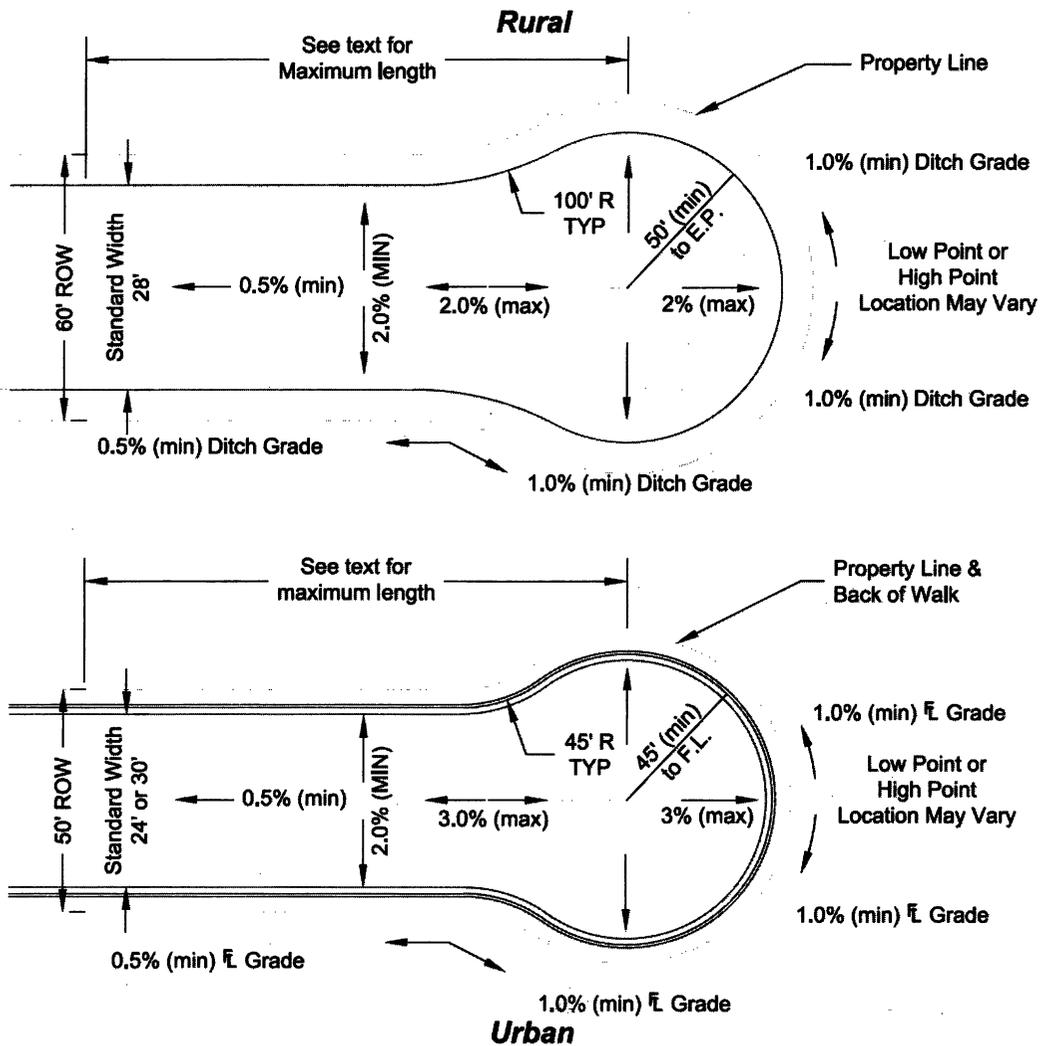
- A. **Cul-de-Sacs.** Cul-de-sacs shall be used only where absolutely necessary. Cul-de-sacs shall have a minimum radius of 45 feet and a maximum length of 750 feet for urban conditions and a minimum radius of 50 feet and a maximum length of 1,600 feet for rural conditions, be designed in conformance with Figure 2-31. The maximum length of cul-de-sac shall be measured from the right-of-way of the intersecting street to the center of the cul-de-sac bulb. Hammerhead turnarounds are not permitted as

permanent roadway terminations. The cul-de-sac right-of-way width shall be consistent with the right-of-way associated with the roadway functional classification and provide for the turnaround, sidewalks, utilities, and necessary drainage facilities. A request for a deviation from the maximum length criteria will not be considered without an express written endorsement from the Fire District in which the proposed cul-de-sac is located.

In special cases where a divided 4 lane roadway that terminates adjacent to a subdivision or development, the length of the collector or local roads that intersect the divide 4 lane roadway shall be measured from the point of intersection with the divided 4 lane roadway regardless of the length of the terminated divided 4 lane roadway. In all other cases, the length of the cul-de-sac or terminated road shall be measured from the point at which the road providing access to a site begins.

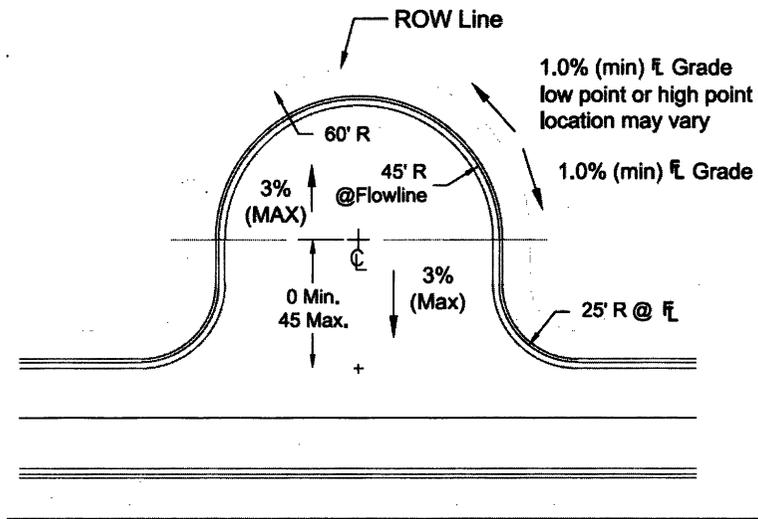
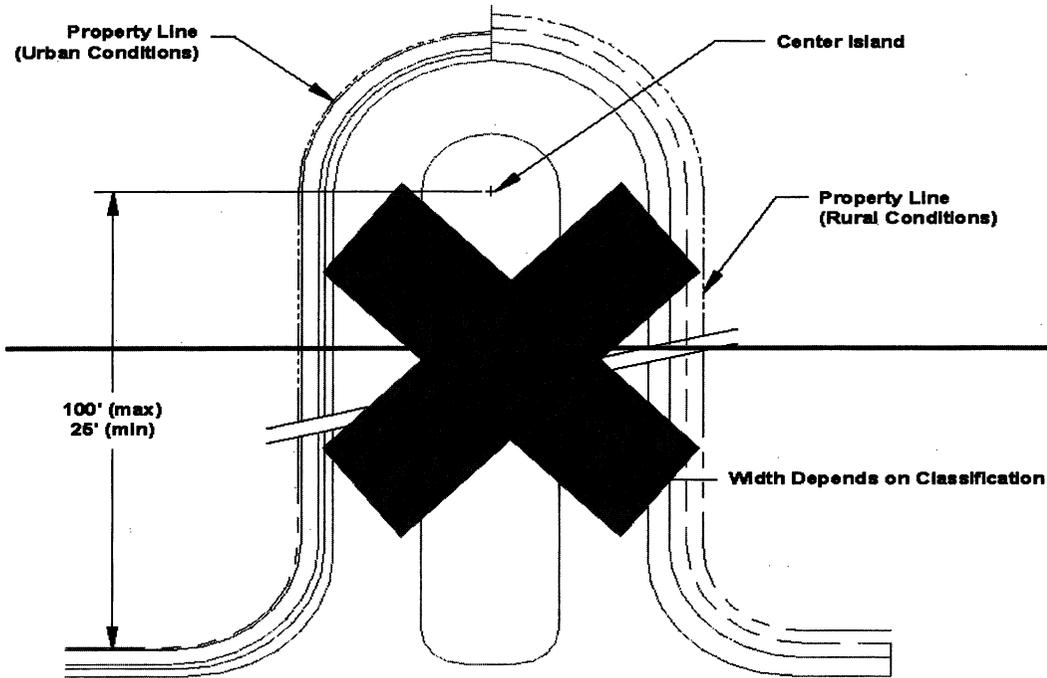
Figure 2-31. Typical Cul-de-Sac Requirements (Urban and Rural)

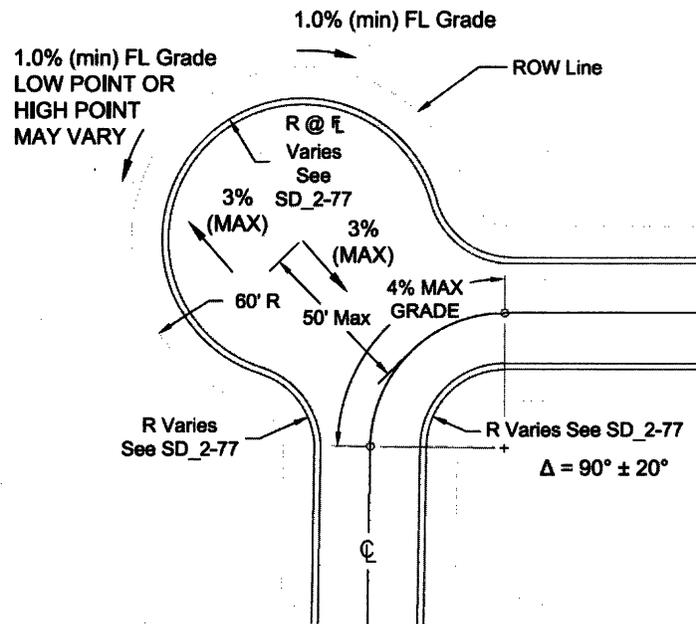




B. **Eyebrows and Knuckles.** Eyebrows and knuckles shall be permitted only on urban local roadways in conformance with Figure 2-32 and detailed standard drawings SD 2-77 and SD 2-78. Eyebrows are permitted if they are The location of the eyebrow shall be in conformance with intersection spacing requirements presented in Table 2-4 through Table 2-26. If the maximum length of the eyebrow is exceeded, the roadway design shall conform to minimum cul-de-sac requirements. Knuckles are permitted at intersections where the intersection angle is between 70-110 degrees and where each street extends in only one direction from the intersection; otherwise the roadway shall be designed in accordance with minimum centerline curve radius.

**Figure 2-32. Typical Eyebrow and Knuckle Requirements**





- C. **Temporary Cul-de-Sacs (or Hammerheads).** Where a roadway will be temporarily terminated, a temporary cul-de-sac or hammerhead turnaround shall be constructed in accordance with Figure 2-33 or Figure 2-34. No curb and gutter is required on temporary cul-de-sac or hammerhead turnaround. Temporary turnarounds shall not exceed 600 feet in length except as otherwise approved by the BOCC in association with a phased development plan. The minimum dimensions for the temporary cul-de-sacs shall follow those of Figure 2-31 in all other respects.

The following criteria language will be required for all easements.

The non-revocable public improvement easement shown at the end of \_\_\_\_ Street cul-de-sac is intended for turn around and emergency response purposes. At such a time that \_\_\_\_ Street is extended by the adjacent property owner/developer and accepted by the County, the non-revocable public improvement easement for the cul-de-sac will be vacated, leaving a standard street ROW and the cul-de-sac improvements will be removed and replaced with a standard street section. The easement vacation, cul-de-sac removal and standard street section construction and site restoration is the responsibility of the owner/developer extending \_\_\_\_ Street.

1. **Cul-de-Sac Terminates Within the Plat.** If the cul-de-sac terminates within the proposed plat, the cul-de-sac shall be dedicated as public right-of-way or non-exclusive public improvement easement. If the road right-of-way is stubbed to an adjacent property for future extension, the right-of-way width at the boundary shall match the proposed street right-of-way width. The cul-de-sac at the end of street is intended as a turn around and also is for emergency response purposes until the road is extended. The cul-de-sac shall meet all current standards. If the street is extended by the adjacent property owner/developer, the cul-de-sac right-of-way or public improvement easement may be vacated, leaving a standard street right-of-way. The cul-de-sac improvements within the right-of-way or public improvement easement will be for public use and publicly maintained.

The lot(s) adjacent to cul-de-sacs may be granted an administrative variance (minor variation during platting) and platted at less than the required minimum acreage. However, the lots will be

## 2.4. ROADWAY ACCESS DESIGN

### 2.4.1. Access Design Criteria

- A. **Access Design Guidelines.** Access points shall be designed to provide safe movement for both those entering and traveling on roadways within the County. Like intersections, access points are conflict locations. The basic design of access points includes the following objectives:
- Adequate spacing
  - Proper alignments
  - Clear sight distances
  - Coordinated widths with its intended use
  - Clearances from intersections
- B. **Access Spacing.** Accesses shall be separated by a distance equal to the entering sight distance values in Table 2-35. When turn lanes are present or will be needed in the future, the accesses shall be separated by a sufficient distance so that exclusive turn lanes including tapers will not overlap. Access shall not be permitted within a turn lane. Warrant criteria, design, and construction of turn lanes shall be governed by the requirements contained in Section 2.3.7D.
- C. **Access Alignment.**
1. **Horizontal Alignment.** Access points shall be aligned at 90 degrees to the adjacent road centerline or along a radial line in a cul-de-sac.
  2. **Vertical Alignment.** Maximum access grades are 4% for commercial and industrial properties with a required 30-foot landing length and a 4% for rural residential and multi-family properties with a required 15-foot landing length. Access point approach grades and configuration shall be designed and constructed to accommodate the ultimate road standard of the intersecting roadway to prevent major access point reconstruction. Where an access approach will cross an existing sidewalk, the access shall be designed and constructed to match the elevation of the sidewalk where the two intersect. Reverse slope private accesses may be allowed as long as sight distance requirements are met.
- D. **Access Sight Distances.** Accesses and specific turn movements shall not be permitted where the sight distance is not adequate to allow the safe movement of a motorist using or passing the access. Any potentially obstructing objects, such as but not limited to advertising signs, structures, trees, and bushes, shall be designed, placed, and maintained at a height not to interfere with the sight distance needed by any vehicle using the access. Reconstruction of the horizontal and vertical curvature along the roadway or side slopes adjacent to the roadway may be necessary to increase sight distances.
1. **Sight Distance Along Roadways.** Horizontal and vertical sight distances shall conform to Table 2-33 for the vehicle traveling on the roadway toward the access. The lengths shown in Table 2-33 shall be adjusted for any grade of 3% or greater using the figures set forth in Table 2-34.

**Table 2-33. Minimum Sight Distance Along Roadway (Horizontal and Vertical)**

Posted Speed (MPH)	25	30	35	40	45	50	55	60	65	70
Design Sight distance (feet)	150	200	250	325	400	475	550	650	725	850

Minimum Sight distance (feet) <sup>1, 2</sup>	150	200	225	275	325	400	450	525	550	625
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<sup>1</sup>To calculate sight distance at the proposed access location, a height of 3.5 feet shall be used for the driver's eyes of a vehicle on the highway approaching the access location. The driver's eyes shall be assumed to be at the centerline of the inside lane (inside with respect to the curve) for measurement purposes. A height of 3.5 feet shall be used for a vehicle assumed to be on the centerline of the access 5 feet back from the edge of the roadway.

<sup>2</sup>If an auxiliary lane is present, the entering posted speed for the deceleration lane and the posted speed at the end of the acceleration lane shall be used.

**Table 2-34. Sight Distance Adjustment Factors for Roadway Grade**

Grade	Adjustment Factor
<b>Upgrade</b>	
3% to 4.9%	0.90
5% to 7.5%	0.80
<b>Downgrade</b>	
3% to 4.9%	1.20
5% to 7.5%	1.35

Approach Grade (%)	Design Speed (mph)													
	15	20	25	30	35	40	45	50	55	60	65	70	75	80
-6	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2
-5	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.2	1.2	1.2	1.2
-4	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
-3 to +3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
+4	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
+5	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
+6	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9

Note: Based on ratio of stopping sight distance on specified approach grade to stopping sight distance on level terrain.

- Entering Sight Distance.** This section applies to entering sight distance where a non-public road or driveway meets a public road. The entering sight distance necessary for the entering vehicle shall conform to Table 2-35. These lengths shall be adjusted for any grade of 3% or greater using Table 2-34. The design vehicle used to determine the entering sight distance shall be selected from Table 2-36.

If the median provides at least 20 feet of storage for a crossing or turning vehicle and can safely store the design vehicle, then the sight distance may be calculated assuming a two-stop condition.

**Table 2-35. Entering Sight Distance for Driveways (Access Design)**

Design Vehicle <sup>1</sup>	Posted Speed of Roadway (MPH)				
	25	35	45	55	65

<b>Two Lane Roadway<sup>1,2</sup></b>					
Passenger Cars, Pickup Trucks	250	350	450	550	n/a
Single Unit Trucks	325	455	585	715	n/a
Multi-Unit Trucks	425	595	765	935	n/a
<b>Four Lane Roadway<sup>1,2</sup></b>					
Passenger Cars, Pickup Trucks	n/a	420	540	660	780
Single Unit Trucks	n/a	525	675	825	975
Multi-Unit Trucks	n/a	700	900	1,100	1,300
<b>Six Lane Roadway<sup>1,2</sup></b>					
Passenger Cars, Pickup Trucks	n/a	n/a	585	715	845
Single Unit Trucks	n/a	n/a	765	935	1,105
Multi-Unit Trucks	n/a	n/a	945	1,155	1,365
<sup>1</sup> For calculating sight distance, a height of 3.5 feet shall be used for the driver's eyes at the access location and a height of 3.5 feet for the oncoming vehicle. The entering driver's eyes shall be 10 feet behind the edge of the roadway.					
<sup>2</sup> If an auxiliary lane is present, the entering posted speed for the deceleration lane and the posted speed at the end of the acceleration lane shall be used.					
<sup>3</sup> From Table 2-36.					
<sup>4</sup> This table is for use for determining entering sight distance for driveways.					

**Table 2-36. Design Vehicle Selection**

Land Use(s) Served by Access	Design Vehicle
Residential, Non-School Bus Route	Passenger Cars, Pickup Trucks
Residential, School Bus Route	Single Unit Trucks
Office	Single Unit Trucks
Recreational	Single Unit Trucks
Commercial/Retail	Multi-Unit Trucks <sup>1</sup>
Industrial	Multi-Unit Trucks <sup>1</sup>
Agricultural Field Approaches (<1 VPD)	Single Unit Trucks
<sup>1</sup> If less than 2 multi-unit truck trips per day (average), use single-unit truck	

**E. Access Width.**

1. **Residential Access Points.** Two-way residential access points shall have a 10-foot minimum and a 24-foot maximum width.
2. **One-Way Commercial or Industrial Access Points.** One-way commercial or industrial access points shall have a minimum 15-foot and a maximum 30-foot inbound access, and a minimum 20-foot and maximum 35-foot outbound access width.
3. **Two-Way Commercial or Industrial Access Points.** Two-way commercial or industrial parcel access points shall have:
  - For Nonresidential Collector and Local Roadways: A minimum 25-foot and maximum 40-foot access width.
  - For Minor Arterial Roadways (when approved by the ECM Administrator): A minimum 35-foot and maximum 40-foot access width.

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4. **Deviations to Commercial or Industrial Access Point Widths.** Wider commercial or industrial access point widths, where necessary to accommodate buses, trucks or other oversized vehicles, may be approved through deviation. Such parcel access points shall be designed to meet the additional loading and turning radius requirements.

**F. Access Clearance from Intersections.**

1. **Residential.** Access to residential corner lots shall be located a minimum of 10 feet from the point of curvature or point of tangency of the curb line at the intersection. If no curb exists, access points shall be located not less than 35 feet from where the projected right of way lines intersect. No portion of an access will be permitted within curb returns or curb ramps.
2. **Commercial.** Access to commercial or industrial properties fronting collector or local roads shall be located a minimum of 50 feet from the point of curvature or point of tangency of the curb line at the intersection. Access to commercial or industrial parcels fronting Nonresidential Collector roadways shall be located a minimum of 115 ~~480~~ feet from the point of curvature or point of tangency of the curb line at the intersection depending on the sight distance and location with respect to the intersection, intersection control, and posted speed.

In all cases, a minimum corner clearance of 50 feet shall be provided. If the minimum corner clearance cannot be attained, the ECM Administrator may require investigation to determine if left turns should be prohibited into or out of the access point. For proposed access points near stop or signalized intersections, the ECM Administrator will require studies to determine if stopping queues will block the access point and if left turns should be prohibited into or out of the access point.

- G. **Construction of Access Points.** Prior to constructing, reconstructing, paving, altering, enlarging, or changing the use of any access point entering a County roadway, an approved Driveway Permit must be obtained. In the case of more complex access projects (i.e. commercial, industrial, or multi-family residential complexes), a Construction Permit may also be required if determined as being warranted through an Engineering Site Plan review. At a minimum, commercial, industrial, or multifamily development shall provide an asphalt or concrete apron for the first fifty (50) feet of the new access when connecting to a paved roadway.

## **2.5. EXTRINSIC STRUCTURES**

### **2.5.1. Curbs and Gutters**

- A. **Curbs and Gutters.** Curbs and gutters shall be designed and installed where required by the functional classification (See Table 2-6 and Table 2-7), the County rules and regulations including the LDC or when required by the ECM Administrator. The curb and gutter will be part of an overall surface water conveyance system. The intent of the system will be to adequately and efficiently control surface water flows during typical storm events (less than 5-year events) while still allowing proper traffic circulation. Gutter slope should be modified to provide compliant counter slope at curb ramps. See Section 6.3.3.
- B. **Curb Cuts and Accesses.** Curb cuts and accesses shall be constructed in accordance with the Standard Drawings. Radius returns are required when the number of parking spaces served by the access exceeds 10.

### **2.5.2. Pedestrian Facilities**

- A. **General.** All pedestrian facilities shall be designed in accordance with Americans with Disabilities Act (ADA) and PROWAG requirements, AASHTO Green Book, and the requirements of these Standards. The

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standard that results in the greatest overall safety of pedestrians shall prevail when designing and constructing pedestrian facilities. See Chapter 6 for requirements and guidance.

**B. Sidewalks.** All sidewalks within a development will be designed and constructed by the developer. The design of such sidewalks shall continue to be included within the construction drawings associated with the respective final plat or site development plan, as applicable, and shall comply with the following standards:

1. **Sidewalk Widths.** Minimum-required sidewalk widths by roadway classifications are specified in Table 2-4 through Table 2-7 and EPC Standard Drawings and Appendix F. The ECM Administrator may require additional width in activity areas and routes leading to and from these areas. This additional width shall be determined through additional study in higher pedestrian traffic areas.
2. **Sidewalk Crossings of Accesses.** Access crossings shall be designed in accordance with Standard Drawings SD\_2-24 and SD\_2-25 and EPC Standard Drawings in Appendix F. Sidewalk across accesses should be accessible per the requirements of Chapter 6.
3. **Sidewalks on Both Sides of the Roadway.** Sidewalks shall be installed on both sides of the roadway.
4. **In-Fill Sidewalk, Curb, and Gutter.** In developed areas, sidewalks, curbs, and gutters may be required to be upgraded to current standards at the ECM Administrator's discretion.
5. **Sidewalk Widening.** Existing sidewalks shall only be permitted to be widened if the increase in width is 4 feet or more. If an existing sidewalk is required to be widened by less than 4 feet to meet the requirements of the ECM, the existing walk shall be entirely replaced with a sidewalk meeting the minimum width requirements.
6. **Concrete Thickness.** All developments within the RS-5000 (Residential Suburban) or RS-6000 (Residential Suburban) zoning districts shall be required to construct sidewalks at a thickness of five inches (5") for all sidewalks along the entire length of any roadway from which temporary or permanent access will be provided. All other sidewalks within either the RS-5000 or RS-6000 zoning districts (e.g., sidewalks in common areas, sidewalks along identified school parcels, sidewalks in open space, etc.) may be designed and constructed to a thickness of five inches (5") but may, at the developer's discretion, be reduced to a thickness no less than four inches (4").

Developments within a Planned Unit Development (PUD) zoning district shall be required to design and construct sidewalks to a thickness of five inches (5") for all sidewalks along the entire length of any roadway from which temporary or permanent access will be provided unless an alternative thickness is approved by the Board of County Commissioners as an element of the associated PUD development standards. Under no circumstances shall any sidewalk be designed and constructed to a thickness of less than four inches (4"). All other sidewalks within a PUD zoning district (e.g., sidewalks in common areas, sidewalks along identified school parcels, sidewalks in open space, etc.) may be designed and constructed to a thickness of five inches (5") but may, at the developer's discretion, be reduced to a thickness no less than four inches (4").

Sidewalks within all other developments not located within the RS-5000 or RS-6000 zoning districts or within a PUD may be designed and constructed to a thickness of five inches (5") but may, at the developer's discretion, be reduced to a thickness no less than four inches (4").

At high volume access or alley crossings, the thickness shall be a minimum of six inches (6").

Sidewalks located at an access for commercial or industrial traffic will be terminated at the edges of the access allowing the access design to set precedence for thickness of pavement.

7. **Sidewalk Slope.**

- **Cross Slope:** Maximum cross slope for sidewalks shall be 2%. 1.5% typical cross slope is suggested to allow for construction tolerances. See Chapter 6.
- **Longitudinal Slope of Attached Sidewalks:** Longitudinal slope of attached sidewalks shall be consistent with roadway slopes. Attached sidewalk slopes greater than 5% are only permitted where adjacent roadway slopes are steeper than 5%. See Chapter 6.
- **Detached Sidewalks and ADA Requirements:** Longitudinal slope of detached sidewalks shall be flatter than 5% wherever feasible. Sidewalk slopes greater than 5% require ramp runs. See Chapter 6.

8. **Sidewalk Clearances.** Horizontal and vertical sidewalk clearances shall meet the requirements of Figure 2-35. See Section 6.3.1 for clearance requirements related to accessibility.

9. **Driveway Option.** Where five inch (5") sidewalks with mountable curb have been installed, the thickness at driveways can remain five inches (5"). As an alternative, the mountable curb and sidewalk at driveways can be poured at six inches (6"). The desired thickness must be identified on the approved construction drawings for the project. Where five inch (5") sidewalks are installed, the Cut Back Swale Standard Drawing (SD\_3-88) can be used as an acceptable stormwater BMP along the constructed five inch (5") sidewalk. The proposed stormwater BMPs will need to be provided in detail in the approved erosion control plan for the project.

Where four inch (4") sidewalks are installed, the sidewalks shall be a minimum of 4-inches thick except at driveways, high volume access, or alley crossings where the thickness shall increase to a minimum of six inches (6"). Sidewalks located at an access for commercial or industrial traffic will be terminated at the edges of the access allowing the access design to set precedence for thickness of pavement. The Cut Back Swale Standard Drawing (SD\_3-88) is not an acceptable stormwater BMP for any sidewalk that is less than five inches (5") thick.

C. **Accessible Curb Ramps.**

1. **Ramp Requirements.** Accessible curb ramps shall be installed at all intersections where pedestrian routes cross streets and at certain mid-block locations for all new construction and alteration projects to the adjacent roadway. See Chapter 6.
2. **4-Way Intersections.** Curb ramps shall be installed at all intersection corners. Access ramps shall be constructed in accordance with EPC Standard Drawings ~~in Appendix F.~~
3. **"T" Intersections.** All "T" intersections shall have a minimum of four curb ramps as shown in Figure 2-36. A private access may be used as a curb ramp provided it is designed to meet ramp requirements and it is within the intersection and directly across from other ramps.

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5. **Access, Cul-de-Sacs, Knuckles, and Eyebrows.** A curb ramp shall be provided at all accesses. ~~Either a curb ramp or a private access that meets curb ramp requirements shall be provided in all~~ **cul-de-sacs, and knuckles.** Curb ramps are not required for **eyebrows** unless there are amenities within the eyebrow; however, if they are provided, they shall be in accordance with the requirements of ECM 2-6.
  6. **Underwalk Drains (Chases).** Underwalk drains shall not interfere with the pedestrian use. The chase plate shall be flush with the sidewalk surface and be securely fastened, as specified in the EPC Standard Drawing in Appendix F. Underwalk drains shall not be located within a curb ramp, curb cut, or private access.
  7. **Inlets.** Inlets located in a sidewalk shall be integrated with sidewalks. The inlet access shall be flush with the sidewalk surface. No manholes, inlets, or other storm sewer facilities are allowed within curb ramps. Inlets shall be located at or behind the tangent points of a curb return.
- D. **Grade-Separated Roadway Crossings.** The construction of a grade-separated pedestrian crossing may be requested by the ECM Administrator when a regional trail intersects with either an Expressway or Principal Arterial. If available, existing structures should be used to accommodate the proposed grade separation. See Section 6.3.9.
  - E. **Rural Roads and Pedestrians.** Rural road sections shall provide sufficient shoulder width for pedestrian travel. Table 2-4 and Table 2-5 outline the requirements for rural roadways.
  - F. **Pedestrian Street Crossings (Crosswalks).** All crosswalks shall be properly marked to ensure safe pedestrian movement. Crosswalks will be required at all signalized intersections, school areas, and high pedestrian areas, as determined by the ECM Administrator. See Section 6.3.2.
    1. **Crosspans.** Crosswalks shall not be located in crosspans.
    2. **Maximum Crosswalk Length and Pedestrian Refuge Areas.** The maximum length for any crosswalk shall be 48 feet. Any roadway crossing longer than 48 feet shall be provided with pedestrian refuge areas. Pedestrian refuge areas shall be created in medians or splitter islands to increase pedestrian safety. Vehicle turning radii shall be considered in the design of pedestrian refuge areas.
    3. **Traffic Signals.** All pedestrian traffic signals shall be designed and installed in accordance with MUTCD and an approved TIS. See Section 6.3.6.
  - G. **Multi-Use (Shared-Use) Path Width.** Where a multi-use path is proposed, the minimum path width shall be 10 feet wide. See Section 6.3.7.
  - H. **Clear Path Pedestrian Minimum.** The minimum horizontal clearance around utility structures, furniture, and other encroachments shall be greater or equal to 4 feet (see Figure 2-35). A Work in the Right-of-Way Permit is required for any private improvements within the right-of-way.

### **2.5.3. Noise Analysis and Mitigation**

A noise study shall be prepared where a new expressway or principal arterial is planned or where roadway construction is planned which will result in changing an existing road classification from a lower classification road to an expressway or principal arterial. Noise mitigation may be required where noise levels exceed or are predicted to exceed 67 dBA Leq or exceed the current Federal Standards.

### **2.5.4. Bus Shelters**

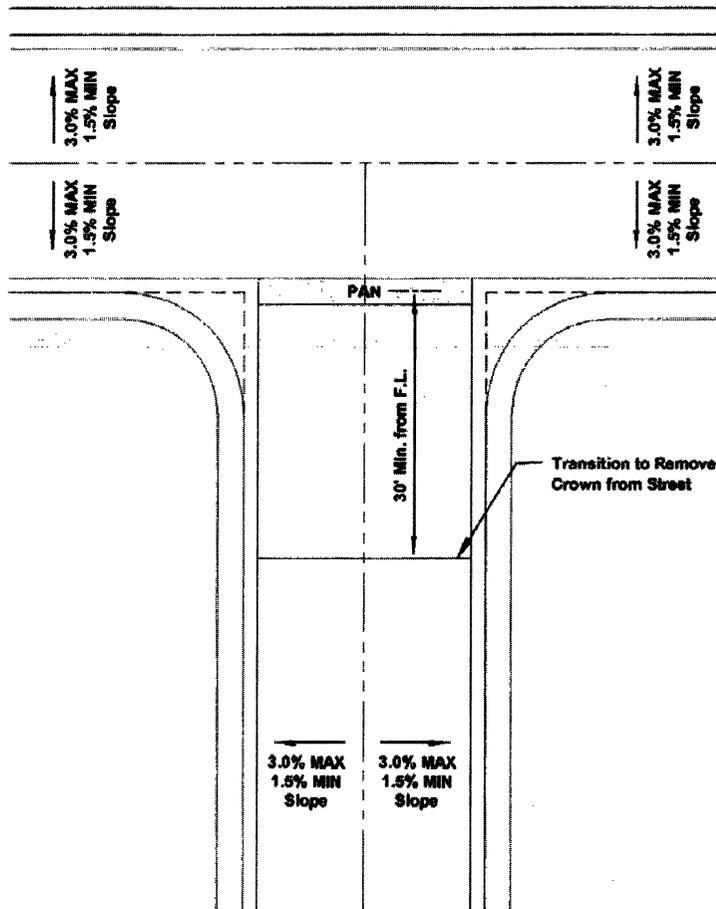
- A. **Location.** The location of a bus shelter shall be determined by the transit provider with the concurrence of the ECM Administrator.

- 
- B. **Visibility.** Bus shelters shall have maximum transparency, and be highly visible from the surrounding area to assure the users' safety. The shelter may not be located within required sight distance triangles.
  - C. **Minimum Size and Capacity.**
    - 1. **Opening Size.** Openings shall be at least 48 inches wide and shall meet PROWAG requirements. See Section 6.3.8.
    - 2. **Capacity and Size.** Capacity shall be based on maximum passenger accumulation at the stop. The shelter size shall be based on approximately 5 square feet per person.
    - 3. **Placement.** Shelters shall not obstruct pedestrian flow or motorist's sight distance. Minimum pedestrian clear path widths shall be maintained.
    - 4. **Pad Requirements.** A 6-inch thick concrete pad is required under all bus shelters. The pad shall extend at least 6 inches beyond each edge of the shelter.
    - 5. **Passenger Loading Area Width and Detached Sidewalks.** Shelters located adjacent to detached sidewalks shall include a fifteen foot wide concrete area between the sidewalk and the curb for passenger loading and unloading.
    - 6. **Relocation of Shelters.** The ECM Administrator may require a shelter to be relocated or removed in the future to accommodate other needs within the roadway right-of-way at the sole expense of the transit provider.
    - 7. **Bicycle Racks and Trash Containers.** All shelters are required to provide one trash container and one bicycle rack.
    - 8. **Sidewalk Connections.** A sidewalk connection shall be provided between the bus shelter and the existing sidewalk or nearby pedestrian destinations. The minimum width shall be as required in Sections 2.5.2.B.1 and 6.3.8.

### **2.5.5. Crosspans**

- A. **Basic Requirements.** Crosspans for passing storm drainage flow across roadways shall be constructed in accordance with the EPC Standard Drawings in Appendix F.
- B. **Dimensions and Depth.** Crosspans adjacent to local roadways shall be a minimum of 6 feet wide with a typical depth of  $\frac{7}{8}$ -inch. Crosspans adjacent to collector roadways shall be a minimum of 8 feet wide with a typical depth of 1 $\frac{1}{4}$  inches. Crosspans adjacent to arterial roadways shall be 10 feet wide with a typical depth of 1 $\frac{1}{2}$  inches.
- C. **Prohibited on Arterial and Collector Roadways.** No crosspans shall cross roadways classified as urban residential collectors and higher.
- D. **Minimum Grade.** The flowline of the crosspan shall have a minimum grade of 0.5%.
- E. **Crosspan Transitions.**
  - 1. **Design Speeds.** Pavement transition from standard crown to crosspan shall be designed using the appropriate design speeds for urban roadways in Table 2-6 and Table 2-7.
  - 2. **Intersections.** Transitions from standard crown to crosspan at intersections shall be designed in accordance with Figure 2-37.

Figure 2-37. Standard Intersection Crowns



- F. **Pavement Material.** Approaches to crosspans shall be constructed with full depth asphalt wedges on asphalt roadways per the EPC Standard Drawings in Appendix F. If pavement is concrete, crosspans may be poured monolithically with the main line paving process.

### 2.5.6. Medians and Traffic Islands

- A. **General Requirements.** The design and construction details for medians shall be in accordance with roadway cross sections presented in EPC Standard Drawings Appendix F. The minimum width of any raised median shall be 4 feet. See Section 6.3.5 for accessibility requirements.
- B. **Drainage.** Landscaped medians shall be provided with drainage facilities to handle sprinkler runoff and nuisance flows. Sprinklers shall be designed to prevent spray onto the pavement surface. A properly designed drain system shall be required. When low maintenance landscaping is used in conjunction with trickle irrigation, drainage requirements may be waived.
- C. **Curb and Gutter.** If gutters are not needed to handle drainage referenced above, medians may be constructed with outfall curb and gutter. Due to its fragility, glue-down curbs are prohibited.
- D. **Nose.** The position of the median nose shall be placed so that vehicles do not track onto the median. The minimum radius for nose curbs shall be 2 feet to flowline.

4. **Equestrian Design Loads.** A concentrated load of  $P = 1,000$  lb shall be used when horse traffic is present.
5. **Wind.** Wind load is a horizontal load. There is no required combination of wind on live loads (pedestrian or vehicular). For wind overturning force, see AASHTO Standard Specifications for Highway Bridges. Table 2-39 presents a listing of design wind loads applicable to the vertical area of PEB bridge members.

**Table 2-39. Design Wind Load for PEB Bridges**

Member Type	Design Wind Load (psf)
Truss and Arches	75
Girders and Beams	50
Open Truss	35

6. **Deflection.** Maximum deflection on a PEB bridge shall be as follows:

$$D_{\max} = S/1000$$

where:

$D_{\max}$  = deflection, feet

S = span, feet

7. **Vibrations for PEB Bridge without Live Load.** When the PEB bridge has no vehicular or pedestrian traffic, the frequency shall be greater than 3 Hz to avoid the first harmonic.
8. **Vibrations for PEB Bridge with Live Load.** When the PEB bridge has a live load (e.g., running and jumping), the frequency shall be greater than 5 Hz to avoid the second harmonic.
9. **Allowable Fatigue Stress.** Fatigue provisions are not required for pedestrian live load stresses where heavy pedestrian loads are infrequent. Fatigue provisions shall be included for wind loads.
10. **Half-through Truss Spans.** Half-through truss spans shall be designed per AASHTO Guide Specifications for Design of Pedestrian Bridges.

### **2.6.7. Railings**

- A. **Using Rigid Railings.** Railing systems can be rigid or they can allow deflection to reduce penetration. Highway structures normally warrant the use of a rigid railing.
- B. **Criteria.** Railings used on any bridge structure in the County shall comply with AASHTO and CDOT Criteria.
- C. **Traffic Railing.**
  1. **Accepted Bridge Railing Types.** Bridge railings must handle vehicles on the bridge under impact conditions. Vehicles and impact conditions are specified in the design. Table 2-40 presents the acceptable bridge railings for bridges in the County.

**Table 2-40. Acceptable Bridge Railing Types**

Type of Railing	Reference(s)
CDOT Railing Types 3, 7, 8 and 10	CDOT Standards
Oklahoma Modified TR-1	AASHTO and <a href="#">EPC Standard Drawings Appendix F</a>
BR1 Type C Aluminum Bridge Railing	AASHTO and <a href="#">EPC Standard Drawings Appendix F</a>

Safety-Shaped Concrete Bridge Railing	AASHTO and EPC Standard Drawings Appendix F
Nevada Concrete Safety Shape (w/ Steel Rails)	AASHTO and EPC Standard Drawings Appendix F
Texas Type HT (Heavy Truck)	AASHTO and EPC Standard Drawings Appendix F
Texas Type TT (Tank Truck)	AASHTO and EPC Standard Drawings Appendix F

2. **Using Other Types of Railing.** Other railings may be proposed for review and approval by the ECM Administrator. Structural calculations or crash test results shall be submitted with such proposals.
3. **Transitions.** Transitions shall be provided when a semi-rigid roadside guardrail meets a rigid bridge railing.
4. **Gradual Stiffening.** The transition shall provide a gradual stiffening of the approach by adjusting the post spacing or rail strength or by transitioning to a different, stiffer barrier.
5. **Flexible Bridge Railings.** Transitions may not be necessary when bridge railings have some flexibility. Any design without a transition shall satisfy AASHTO criteria.
6. **Alternatives in Congested Areas.** In urban areas or where roadways and sidewalks prevent installation of approach guardrail transitions, one or more of the following alternatives shall be followed:
  - Extend the guardrail or bridge rail in a manner that prevents encroachment of vehicle onto any roadway system below the bridge. A tapered end section parallel to the roadway may be an option.
  - Provide a barrier curb.
  - Restrict speed. The ECM Administrator approval is required for this option.
  - Provide a recovery area.
7. **Placement and Lateral Clearance.** The rail system shall be placed 2 feet beyond the useable shoulder.

**D. Roadside Barrier Railing.**

1. **Required Barriers.** Barriers are required only when the warrants in the AASHTO Roadside Design Guide are met.
2. **Acceptable Roadside Barriers.** Roadside barriers are flexible, semi-rigid or rigid. Table 2-41 presents the acceptable roadside barriers in the County.

**Table 2-41. Acceptable Roadside Barriers**

Category	Type of Barrier	Reference
Semi-Rigid Systems	Blocked-Out W-Beam (Strong Post)	Refer to M & S Standards
	Blocked-Out Three-Beam (Strong Post0)	Refer to M & S Standards
	Modified Three-Beam	Refer to M & S Standards
Rigid Systems	Concrete Safety Shape	Refer to M & S Standards
	Stone Masonry Wall	Refer to M & S Standards

3. **Transitions.** In the case of roadside barriers, the gradual stiffening shall decrease from structure to roadway.

10. **Pipe Diameter.** The minimum subdrain pipe diameter is 4 inches for mains and 3 inches for laterals or as determined by a completed geotechnical analysis.
11. **Subdrain Placement and Cleanouts.** The EPC Standard Drawings in Appendix F show general requirements for subdrain placement, location of cleanouts, and service.

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## Chapter 3 STORMWATER MANAGEMENT

### 3.1. OVERVIEW

This chapter provides policies and procedures to attain reasonable standardization of drainage design throughout the County.

#### 3.1.1. Purpose

The purpose of this chapter is to discuss specific drainage and grading related criteria for projects that disturb surface soils within the unincorporated areas of the County. In addition, with the issuance of a County-wide National Pollutant Discharge Elimination System (NPDES) permit, this chapter and adopted Addendum presented in Appendix I provide specific criteria and standards for the management and protection of surface water quality.

The most current version of the Drainage Criteria Manual Volume 1 (DCM1) can be found here:

<https://publicworks.elpasoco.com/policies-manuals/>

The most current version of the drainage fees and bridge fees can be found at the following website under Fees:

<https://publicworks.elpasoco.com/road-bridge-planning/>

#### 3.1.2. Chapter Content and References

Table 3-1 outlines the chapter content and references used as a basis for the standards established in Chapter 3.

**Table 3-1. Contents and Basis of Drainage Facility Standards**

Intent Use	ECM Content	ECM Section(s)	Reference Document(s)
<b>Planning</b>			
	Plan Basis	3.2.1 - 3.2.3	2
	Plan Objectives and Policies	3.2.4 - 3.2.8 and Appendix I	2, 3
<b>Design</b>			
	Storm Sewers	3.3.2	2, 3
	Culverts	3.3.3	2, 3
	Open Channels	3.3.4	2, 3
	Drainage Ditches	3.3.5	2, 3
	Roadways	3.3.6	2, 3
	Permanent Stormwater Management Facilities	3.3.7	n/a
<b>Construction</b>			

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	Permitting	5.3, 5.6 and Appendix I	1, 3
	Inspections	5.11 and Appendix I	1, 3
	Acceptance	5.3 and Appendix I	1, 3
	Site Grading	3.3.4	2.3

#### References

1. El Paso County Land Development Code.
2. City of Colorado Springs Drainage Criteria Manual Volume 1 (DCM 1).
3. City of Colorado Springs Drainage Criteria Manual Volume 2 (DCM 2).
4. City of Colorado Springs Drainage Criteria Manual 2014 Update: Chapter 6 and Section 3.2.1 of Chapter 13.
5. Urban Drainage and Flood Control District Criteria Manual Volume 3, Chapter 7.

#### 3.1.3. Standard Drawings

Table 3-2 identifies the EPC standard drawings that are included in Appendix F as an enforceable part of these Standards. The standard drawings shall be used in all applications for which a public improvement is to be designed. Any change to a standard drawing shall be approved by the ECM Administrator and noted on the construction plans.

**Table 3-2. Standard Drawings**

File Name	Detail/Description	Approval Date
SD_3-1	Storm Sewer Manhole Detail Type I	07/09/2009
SD-3-2	Storm Sewer Manhole Detail Type II	11/10/2004
SD_3-3	Storm Sewer Manhole Detail Type III	08/11/2011
SD_3-5	Storm Sewer Manhole Lid Detail	09/16/2010
SD_3-7	Storm Sewer Manhole Riser and Cover Detail	08/11/2011
SD-3-8	Grate Inlet for Common Areas (guidance)	08/11/2011
SD_3-14	Driveway Access on Rural Local Roadway	08/11/2011
SD_3-24	Sidewalk Underdrain w/ Curb Outlet Detail	08/11/2011
SD_3-25	Curb Opening w/ Drainage Chase Detail 1 of 2	08/11/2011
SD_3-25A	Curb Opening w/ Drainage Chase Detail 2 of 2	08/11/2011
SD_3-30	Desilting Basin Outlet	08/11/2011
SD_3-31	Temporary Desilting Basin at Inlet	08/11/2011
SD_3-32	Temporary Desilting Basin at Sump	08/11/2011
SD_3-33	On Street Temporary Desilting Basin Detail	
SD_3-34	Temporary Desilting Basin Detail (guidance)	08/11/2011
SD_3-35	Debris Cage for Desilting Basin Riser	08/11/2011
SD_3-36	Desilting Basin Riser Detail	08/11/2011
SD_3-41	Lined Ditch Splashwall Detail (plan and section)	08/11/2011
SD_3-44	Lined Ditch Behind Retaining Wall Detail	08/11/2011
SD_3-48	Beehive Grate Detail (guidance)	08/11/2011
SD_3-60	Temporary Street Sandbag Detail and Section	08/11/2011
SD_3-62	Typical Check Dam Detail	08/11/2011
SD_3-71	Canyon Subdrain Detail	08/11/2011

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<b>Design</b>			
	Requirements and Standards	4.3.1 - 4.3.4	1
	Utility Locations	4.3.5	2
	Installation Standards	4.3.6 - 4.3.8	2, 3
	Mailboxes	4.4	1
<b>Construction</b>			
	Permitting	5.3, 5.5 and 5.7	1
	Inspections	5.11 and Appendix K	1
	Acceptance	5.3 and 5.5	1

#### References

1. El Paso County Land Development Code
2. Utility District (location dependent) Installation Standards/Specifications
3. US Department of Transportation, Manual on Uniform Traffic Control Devices

#### 4.1.3. Standard Drawings

Table 4-2 identifies the EPC standard Drawings that are included in Appendix F as an enforceable part of these Standards. The Standard Drawings shall be used in all applications for which a public improvement is to be designed. Any deviations from a Standard Drawing shall be approved by the ECM Administrator and noted in the construction plans.

**Table 4-2. Standard Drawings**

Figure Name	Detail/Description	Approval Date
SD_4-1	Urban Local Roadway - Utility Placement	08/11/2011
SD_4-2	Urban Residential Minor Collector Roadway - Utility Placement	08/11/2011
SD_4-3	Urban NonResidential Collector Roadway - Utility Placement	08/11/2011
SD_4-4	Urban Residential Major Collector Roadway - Utility Placement	08/11/2011
SD_4-5 & 4-5A	Urban Minor Arterial Roadway - Utility Placement	08/11/2011
SD_4-6 & 4-6A	Urban Principal 4-Lane Arterial Roadway - Utility Placement	08/11/2011
SD_4-7 & 4-7A	Urban Principal 6-Lane Arterial Roadway - Utility Placement	08/11/2011
SD_4-8 & 4-8A	Urban Expressway 4-Lane Roadway - Utility Placement	08/11/2011
SD_4-9 & 4-9A	Urban Expressway 6-Lane Roadway - Utility Placement	08/11/2011
SD_4-10	Rural Gravel Local Roadway- Utility Placement	08/11/2011
SD_4-11	Rural Local Roadway - Utility Placement	<del>08/11/2011</del> 07/18/2023
SD_4-12	Rural Minor Collector Roadway - Utility Placement	<del>08/11/2011</del> 07/18/2023
SD_4-13	Rural Major Collector Roadway - Utility Placement	<del>08/11/2011</del> 07/18/2023
SD_4-14 & 4-14A	Rural Minor Arterial Roadway - Utility Placement	<del>08/11/2011</del> 07/18/2023
SD_4-15 & 4-15A	Rural Principal 4-Lane Arterial Roadway - Utility Placement	<del>08/11/2011</del> 07/18/2023

SD_4-16 & 4-16A	Rural Principal 6-Lane Arterial Roadway - Utility Placement	<del>08/11/2011</del> 07/18/2023
SD_4-17 & 4-17A	Rural Expressway 4-Lane Roadway - Utility Placement	<del>08/11/2011</del> 07/18/2023
SD_4-18 & 4-18A	Rural Expressway 6-Lane Roadway - Utility Placement	<del>08/11/2011</del> 07/18/2023
SD_4-20	Utility Trench Repair Detail (asphalt pavement)	08/11/2011
SD_4-21	Utility Trench Repair Detail (newly overlaid pavement)	08/11/2011
SD_4-22	Utility Trench Repair Detail (concrete pavement)	08/11/2011
SD_4-23	Utility Trench Repair Detail (flowable fill)	08/11/2011

## 4.2. PLANNING

### 4.2.1. Rights of Utilities

Section 38-5-101, Colorado Revised Statutes, authorizes the placement of utilities within the County's right-of-way. While the County is obligated to allow the public right-of-way to be used to provide development with sanitary and storm sewers, water mains and service lines, gas mains and service lines, electrical main lines and service lines, telephone cable lines and service lines, etc., the County must establish and enforce these Standards for design, installation, and maintenance of utilities and other facilities within the right-of-way. The County must enforce these Standards to protect the value and use of the right-of-way and roadways for transportation.

### 4.2.2. Use of Right-of-Way Policy

- A. **Coordination with Roadway Improvements.** Every attempt shall be made to coordinate proposed utility and facility installations with existing conditions and other proposed construction activities, such as utility main lines and service lines to all lots, tracts or parcels of land shall be placed prior to completion of roadways.
- B. **No Disturbance of Roadway Surface.** When roadway construction is completed, utility and facility placement shall not disturb the roadway surfaces, except for an emergency repair. Jacking or boring under the surface will be required for new utility placement in hard surfaced roadways. The size of disturbed area necessary to install a utility or facility shall be kept to a minimum.
- C. **Coordination with Other Utilities.** Each utility company or district must coordinate with the other utility companies in the location of its utility; that is, the companies shall mutually ascertain the most satisfactory location of their utility.
- D. **Impact Traffic Operations and Safety.** Accommodation of utilities and other facilities within the County's right-of-way shall not materially degrade or adversely affect traffic operations, safety, maintenance or the structural integrity of the roadway.
- E. **Impact on Accessibility.** Accommodation of utilities and other facilities within the County's right-of-way shall not materially degrade or affect accessibility of pedestrian facilities. See Chapter 6.

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with sight distance, signage, traffic signals, drainage facilities, etc. Where possible, utilities shall share facilities to minimize the number of obstructions in the County's right-of-way.

2. **Clear Zone.** The placement of aboveground utility facilities or equipment within the County's right-of-way shall conform to the "clear zone" guidelines in Chapter 2. Utility poles and other aboveground utility equipment shall be placed outside of clear zone areas unless a deviation is approved by the ECM Administrator and provisions for vehicular safety are installed.
3. **Roadway Vertical Clearances.** A 19-foot minimum vertical clearance for overhead lines shall be maintained over all County roadways. The minimum vertical clearance for overhead power and communication lines above the roadway and the minimum lateral and vertical clearance from bridges shall comply with state and federal standards.
4. **Pedestrian and Bike Path Clearances.** Utility poles and equipment shall not be placed in pedestrian or bicycle facilities, or protrude into the vertical space over sidewalks, walkways or bikeways. As specified in Chapter 2, there shall be an unobstructed vertical clearance of at least 7 feet above the surface of any sidewalk and 10 feet above any bike path. A 2-foot horizontal clearance shall be maintained between the edge of any bike path and any vertical utility obstruction. See Chapter 6.

**E. Underground Utilities.**

1. **Scoping Meeting.** A Scoping Meeting is required with the ECM Administrator for all proposals to install underground utilities in the right-of-way of any arterial or expressway roadway or in more than 2,000 feet of right-of-way of non-arterial roadway. Final approval of all utility installations within the road right-of-way rests with the ECM Administrator even if the utility ownership falls within an existing utility district.
2. **Longitudinal Placement.** Longitudinal placement of underground utilities in the County's right-of-way shall comply with the typical utility locations shown in the EPC utility Standard Drawings in Appendix F. When determining the planned longitudinal placements of utilities, the design engineer shall consider the roadway functional classification in the Major Transportation Corridors Plan to try to anticipate future roadway alterations and limit the need for relocation of utilities in the future.
3. **Lateral Placement.** Lateral placement of underground utilities across a County right-of-way shall be as near a right angle to the road centerline as practicable. Utility crossings should avoid deep cuts, bridge footings and retaining walls, or locations where roadway drainage would be affected. Utility crossings may be designated by the ECM Administrator.

#### **4.3.6. Underground Utilities Standards**

**A. Cover and Separation.** Cover over underground utilities and the separation between underground utilities shall conform to applicable federal and state regulations, these Standards, and the EPC Standard Drawings in Appendix F.

**1. Water Lines.**

- **Water Mains:** At no time shall a water main be placed less than 5 feet in depth measured perpendicularly to the ground line at any point of the road cross section.
- **Water Service Lines:** At no time shall water service lines be placed less than 5 feet in depth measured perpendicularly to the ground line, at any point of the road cross section, to the right-of-way line.

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from the ground to re-entry. Carrier pipe and casing pipe shall be properly isolated from electric power line attachments.

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## **4.4. MAILBOXES**

### **4.4.1. United States Postal Service (USPS) Coordination**

The applicant shall provide USPS approval of mailbox type and location prior to approval of the construction plans. Mailbox type and location require approval of the USPS. Discussions with the local postmaster early in the project design process are important to ensure proper coordination.

### **4.4.2. Mail Box Types**

To assist in clarifying the differences between the types of mailboxes typically installed within the County's right-of-ways, the following three descriptions were developed:

- Type 1 is a typical post mounted individual mail box
- Type 2 is an individual mail box that has been modified by the owner through the addition of a larger/permanent supportive structure
- Type 3 relates to cluster boxes (CBUs) or mailbox kiosks (multiple CBUs at one location).

These descriptions are only applicable to this section and were primarily developed to assist in determining the different levels of actions required for locating and installing these types of mailboxes within the County's right-of-way.

### **4.4.3. Work in the Right-of-Way Permit Required**

A Work in the Right-of-Way Permit shall be obtained from the ECM Administrator to locate either Type 2 or 3 mailboxes within the County's right-of-way.

### **4.4.4. Mailbox Construction Plans**

Construction plans shall clearly show the proposed location or relocation of either Type 2 or 3 mailboxes. The applicant shall provide a statement that the postmaster has approved the proposed mailbox type(s) and location(s). The statement shall be signed and dated by the local postmaster or authorized representative prior to obtaining approval of construction drawings or a Work in the Right-of-Way Permit. Construction plans shall include a statement that the postmaster has approved the proposed mailbox type(s) and location(s). The statement shall be signed and dated by the local postmaster or authorized representative prior to obtaining approval of a Work in the Right-of-Way Permit.

The relocation of Type 1 mail boxes will be done so through direct coordination between the owner and local postal carrier.

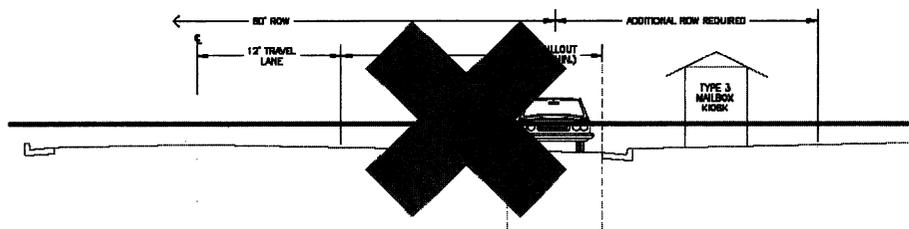
### **4.4.5. Location and Installation**

Pullouts for mail delivery vehicles shall be installed to serve cluster mailbox units located along arterial or collector roads, or any road with a posted speed of 35 MPH or above.

- A. Lower Functional Classification Roadway.** Where a choice of roadway locations exists, mailboxes shall be located on the lower functional classification roadway.

- B. **Not Impede Access or Sight Distance.** Mailboxes shall be located so as not to impede access or sight distance visibility.
- C. **Clear Zone Placement.** Type 1 or 2 mailboxes located within a roadway clear zone shall have breakaway features. Type 2 and Type 3 mailboxes shall not be located in the clear zone.
- D. **Temporary Relocation.** If it becomes necessary to remove or otherwise disturb existing mailboxes, the mailboxes shall be temporarily placed so their function will not be impaired. The boxes shall be reinstalled in accordance with the local postal carrier's requirements.
- E. **Type 3 Mailbox Placement.** Type 3 mailboxes and the pullout for the mailbox shall be located within the public right-of-way or in a public improvement easement dedication but outside the roadway clear zone. If in an easement, the easement must allow for access by the United States Postal Service. A license agreement with provisions for the structure to remain within the right-of-way is required. The Type 3 mailbox and associated structures shall be maintained by a private entity in accordance with the license agreement. Figures 4-1 and 4-2 show the required right-of-way and clear zone. The following conditions also apply:
- The Type 3 mailbox must be within the right-of-way so additional right-of-way dedication is required
  - Provisions shall include the ability to park vehicles temporarily outside the clear zone and a minimum of thirty-six (36) feet shall be provided for parking queue.
  - Pullout tapers shall be designed and constructed in accordance with Table 2-27.
  - The pavement section of the pullout shall match the pavement section for the roadway and the pavement grade shall slope away from the centerline of the road.
  - Signage (R7-6) shall be provided for the pullout area to limit extended parking in accordance with the MUTCD.
  - Attached sidewalk is allowed in the pullout area to include the pullout tapers.
  - **Discussions with Growth Management or the local Postmaster are required for mailbox location, concrete specifications, and mailbox type.** if contact with Growth Management or the local Postmaster is bypassed, you may be required to relocate the concrete pad at your own expense and mail delivery may be delayed.
  - Mailboxes shall be located along accessible pedestrian route in compliance with the requirements of Chapter 6. See Section 6.3.10.

**Figure 4-1. Mailbox Pad Pull-Out Area Detail, Urban Application**



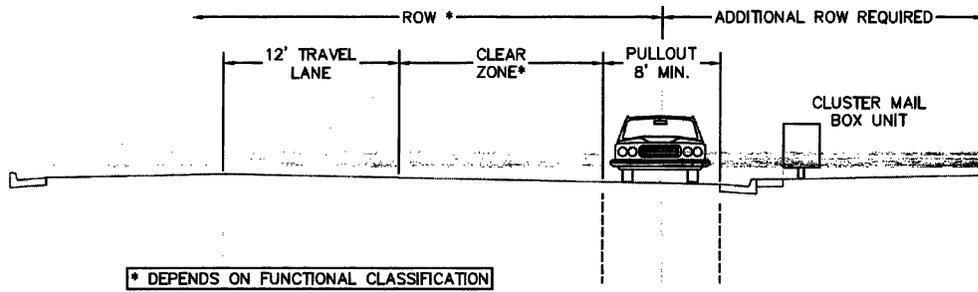
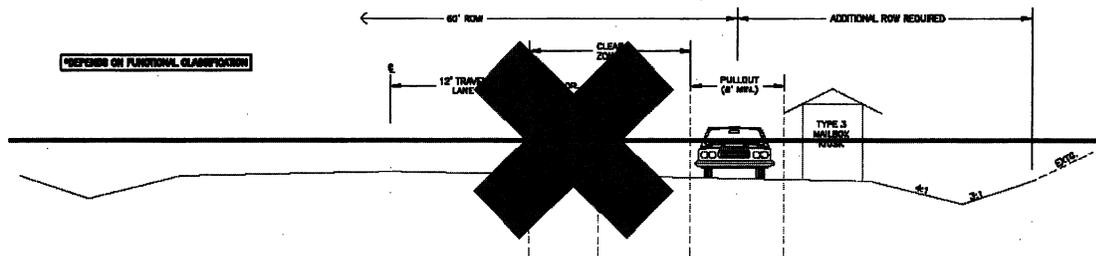
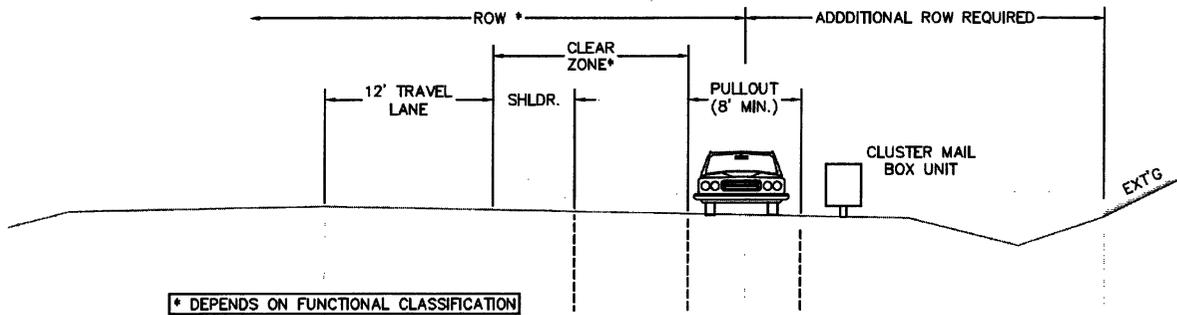


Figure 4-2. Mailbox Pad Pull-off Area Detail, Rural Application





**4.4.6. Road Improvements**

Turnouts for mail delivery vehicles shall be installed to serve cluster mailbox units located along arterial or collector roads, or any road with a posted speed of 35 MPH or above.

**4.4.7. Snowplow Activities**

If a mailbox of any type is destroyed during snowplow activities, a standard wooden post and standard mailbox will be provided to the property owner, if the budget allows.

(Res. No. 20-222, 6-23-20)

**Chapter 5 PERMITS AND INSPECTIONS**

**5.1. OVERVIEW**

This chapter addresses the review, permitting and inspection process for projects involving the use, construction, enlargement, alteration, relocation, removal, conversion, demolition, repair, maintenance and excavation of any public improvements; work within a County right-of-way (right-of-way) or easement, transport of over dimensional loads on County roads; removal of trees or plants from the County's right-of-way or easements; the discharge of stormwater from a construction site or land development activity to , deviations from ECM standards, and the construction, enlargement, alteration, relocation, removal, conversion, demolition, repair and maintenance of common development improvements governed by the ECM or LDC.

**5.1.1. Purpose**

The purpose of this chapter is to identify permit and inspection requirements and standards for activities associated with the construction, enlargement, alteration, relocation, removal, conversion, demolition, repair, maintenance and excavation of public infrastructure or common development improvements, the use

- 
- An excavation below finished grade for basements and footing of a building, retaining wall or other structure authorized by a valid building permit including any fill using material from such excavation.
  - Routine agricultural uses of agricultural land.
  - Exploratory excavations of less than 500 square feet (excluding mining activity) being performed at the direction of a professional soils engineer or engineering geologist or utility locates.
  - A fill less than one foot in depth and placed on natural terrain with a slope flatter than 5 horizontal feet to 1 vertical foot, or less than 3 feet in depth, not intended to support structures, which does not exceed 50 cubic yards on any one lot and does not obstruct a drainage course.

Even if a Construction Permit is not required, any clearing, grading, or land disturbance activities shall be in accordance with these Standards and may require an ESQCP, BESQCP or other County permits.

### **5.3.5. Relationship to Other ECM Permits**

In most cases, construction of public facilities within any County right-of-way or easement or the construction of common development improvements covered by a development agreement or subdivision improvement agreement will often require that the applicant obtain other County permits or approvals including an ESQCP or BESQCP. A Construction Permit will not be issued by the ECM Administrator until all other required County permits and approvals have been obtained.

### **5.3.6. Relationship to LDC Approvals**

A Construction Permit is generally required in connection with subdivision approvals and complex development approvals including some site development plan approvals, planned unit development approvals, and commercial and multifamily residential development approvals governed by the LDC. In most cases, construction plans are required as part of the development review process which are reviewed and approved by the ECM Administrator. Therefore, the necessary construction plans (sheets shall be 11" x 17" - half size) to obtain a Construction Permit have often already been prepared by the applicant, and reviewed and approved by the ECM Administrator. If a complete set of construction drawings have been approved by the ECM Administrator in connection with a subdivision or development review application reviewed and approved by the BOCC, no additional plan review is necessary to obtain a construction permit.

### **5.3.7. Application for Permit**

#### **A. Complete Application Required**

1. **General.** Applicants shall file a complete application for a Construction Permit. Each application shall:
  - Identify and describe the work to be covered by the permit for which the application is made.
  - Describe the land on which the proposed work is to be done, by legal description, street address, or similar description that readily identifies and definitively locates the proposed work location.
  - Be accompanied by plans, diagrams, computations and specifications, and other data as required in these Standards.
  - State the valuation of the work to be performed.
  - Identify all other required County permits or approvals including permit or approval type, permit number (if permit has been approved by the ECM Administrator) or case number, date of approval (or date of application if approval has not been received), and description of work for which the permit or approval was sought.

1. United States Access Board, Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way (PROWAG), 2011
2. United States Access Board, Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way; Shared Use Paths Supplement, 2013
3. FHWA, Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), 2009 with Revisions 1 and 2, 2012
4. CDOT, Supplement to the Federal Manual on Uniform Traffic Control Devices, 2009
5. United States Department of Justice, 2010 ADA Standards for Accessible Design (ADA Standards), 2010
6. United States Department of Justice, Americans With Disabilities Act Title II Regulations (ADA Regulations), 2010
7. AASHTO, AASHTO Guide for the Development of Bicycle Facilities, 2012
8. AASHTO, AASHTO Roadside Design Guide, 4<sup>th</sup> Edition, 2011
9. CDOT, M&S Standards
10. CDOT, Roadway Design Guide, 2018

### **6.1.3. Standard Drawings**

Table 6-2 identifies the EPC's Standard Drawings that are included in Appendix F as an enforceable part of these Standards. The Standard Drawings shall be used when designing improvements for County-owned and maintained facilities. Any change to a Standard Drawing shall be approved by the ECM Administrator and noted in the construction plans. CDOT standard drawings adopted in the ECM are also applicable to the design of pedestrian facilities. Where noted in this chapter, El Paso County's Standard Drawings supersede CDOT standard drawings.

**Table 6-2. Standard Drawings**

File Name	Detail/Description	Approval Date
SD_2-1	Urban Local Roadway (low volume)	06/23/2020
SD_2-2	Urban Local Roadway	06/23/2020
SD_2-3	Urban Nonresidential Collector Roadway	06/23/2020
SD_2-4	Urban Residential Collector Roadway	06/23/2020
SD_2-5	Urban Minor Arterial Roadway	06/23/2020
SD_2-6	Urban Principal 4-Lane Arterial Roadway	06/23/2020
SD_2-7	Urban Principal 6-Lane Arterial Roadway	06/23/2020
SD_2-8	Urban Expressway 4-Lane Roadway	06/23/2020
SD_2-9	Urban Expressway 6-Lane Roadway	06/23/2020
SD_2-20	Typical Curb and Gutter Details	06/23/2020 07/18/2020
SD_2-24	Driveway Detail w/ Attached Sidewalk	06/23/2020
SD_2-25	Driveway Detail w/ Detached Sidewalk	06/23/2020
SD_2-40	Pedestrian Curb Ramp Detail	06/23/2020
SD_2-41	Pedestrian Curb Ramp Detail	06/23/2020
SD_2-42	Detectable Warning Surface Details	06/23/2020
SD_2-50	Parallel Pedestrian Curb Ramp Detail	06/23/2020

- 
- Underlying terrain that would require significant expansion of the project scope to achieve full compliance. An example would be altering an existing roadway profile to make the cross slope of a crosswalk fully compliant.

Project scope, not cost, shall determine when existing constraints make it technically infeasible to make a facility accessible. For example, if a roadway resurfacing project that does not include utility relocations would require relocating underground utilities to make a curb ramp accessible, then making the curb ramp fully accessible could be considered technically infeasible. If, however, a project requires relocation of utilities and widening of a roadway, then that same curb ramp should be made fully accessible.

- D. **Projects Solely to Improve Accessibility.** If the sole purpose of a project is to improve accessibility, the scope of the project is not required to be expanded to make other adjacent portions of the Pedestrian Access Route and/or Pedestrian Circulation Path accessible. For example, a project whose sole purpose is to repair and replace sidewalk in poor condition would not be required to be expanded to fix adjacent noncompliant curb ramps. In these cases, documentation of the sole purpose to improve accessibility shall be documented during project development and written approval obtained from the ECM Administrator.

#### **6.2.4. Accessibility for Maintenance Projects**

Traditional maintenance activities do not require that the adjacent pedestrian facilities be made accessible. These activities include crack sealing, graveling, chip sealing, cover coating, pavement patching, restriping, and similar activities meant to seal and protect the road surface and improve friction and that do not significantly affect the public's access to or usability of the road.

(Res. No. 20-222 , 6-23-20)

### **6.3. ACCESSIBLE DESIGN**

#### **6.3.1. Sidewalks (Pedestrian Access Routes/Pedestrian Circulation Paths)**

- A. **General Requirements.** Accessible sidewalks provide a safe route and continuous path for users with disabilities. All new sidewalk and sidewalk that is being replaced as part of an alteration project shall comply with the requirements contained within this section. Pedestrian Access Routes shall be provided within Pedestrian Circulation Paths to connect with accessible elements, spaces, and facilities within and adjacent to public roadways.
- B. **Clear Width.** Minimum-required sidewalk widths by roadway classification are specified in Table 2-4 through Table 2-7 and [EPC Standard Drawings Appendix F](#). The minimum clear width of accessible sidewalk is 4 feet in all cases, excluding the width of the curb. If the designer chooses to use a 4 ft. wide sidewalk, then 5 ft. x 5 ft. passing spaces are required to be included and spaced a maximum of every 200 feet, as shown in Figure 6-1. Utilizing a 5 ft. wide (or wider) sidewalk eliminates the need for passing spaces. When sidewalk wider than the minimum 4 ft. width is provided (for example in an urban commercial area), only part of the sidewalk area is classified as the Pedestrian Access Route and must comply with the requirements of Section 6.3.1. Providing at least the minimum width accessible Pedestrian Access Route ensures that persons with disabilities can access all accessible elements, spaces, and features along the roadway. If approved by the ECM Administrator, the remainder (classified as Pedestrian Circulation Path) may have street furniture, utility poles, etc. that would not be acceptable in the Pedestrian Access Route. Designers shall ensure that, where approved by the ECM Administrator, street furniture and other elements in the Pedestrian Circulation Path are detectable and will not present a hazard to pedestrians. All protruding objects within the Pedestrian Circulation

## Appendix F STANDARD DRAWINGS & SPECIFICATIONS

Note: Drawings are listed by chapter and then sequential (intentional gaps in the numbering have been placed to allow for future additions). EPC Standard Drawings remain products in progress and will continue to be updated as necessary through an administrative process. Only those with listed Approval Dates shall be considered a standard and all others are presented for "reference" purposes only until such date that they are fully accepted by the ECM Administrator. EPC Standard Specifications remain products in progress and will continue to be updated as necessary through an administrative process. Only those with listed Approval Dates shall be considered a standard and all others are presented for "reference" purposes only until such date that they are fully accepted by the ECM Administrator.

### EPC Standard Drawings

File Name	Detail/Description	Approval Date
SD_2-1	Urban Local Roadway (low volume)	06/23/2020
SD_2-2	Urban Local Roadway	06/23/2020
SD_2-3	Urban NonResidential Collector Roadway	06/23/2020
SD_2-4	Urban Residential Collector Roadway	06/23/2020
SD_2-5	Urban Minor Arterial Roadway	06/23/2020
SD_2-6	Urban Principal 4-Lane Arterial Roadway	06/23/2020
SD_2-7	Urban Principal 6-Lane Arterial Roadway	06/23/2020
SD_2-8	Urban Expressway 4-Lane Roadway	06/23/2020
SD_2-9	Urban Expressway 6-Lane Roadway	06/23/2020
SD_-2-10	Rural Gravel Local Roadway	12/31/2005
SD_2-11	Rural Local Roadway	12/31/2005 07/18/2023
SD_-2-12	Rural Minor Collector Roadway	12/31/2005 07/18/2023
SD_2-13	Rural Major Collector Roadway	12/31/2005 07/18/2023
SD_2-14	Rural Minor Arterial Roadway	12/31/2005 07/18/2023
SD_2-15	Rural Principal 4-Lane Arterial Roadway	12/31/2005 07/18/2023
SD_2-16	Rural Principal 6-Lane Arterial Roadway	12/31/2005 07/18/2023
SD_2-17	Rural Expressway 4-Lane Roadway	12/31/2005 07/18/2023
SD_2-18	Rural Expressway 6-Lane Roadway	12/31/2005 07/18/2023
SD_2-20	Typical Curb and Gutter Details	06/23/2020 07/18/2023
SD_2-21	Patterned Concrete Median Paving	01/18/2011
SD_2-22	Plowable Median Nose Detail	01/12/2016

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SD_2-23	Driveway Cut Detail	08/11/2011
SD_2-24	Driveway Detail w/Attached Sidewalk	06/23/2020
SD_2-25	Driveway Detail w/Detached Sidewalk	06/23/2020
SD_2-26	Typical Cross Pan Layout Detail	08/11/2011
SD_2-40	Pedestrian Curb Ramp Detail	06/23/2020
SD_2-41	Pedestrian Curb Ramp Detail	06/23/2020
SD_2-42	Detectable Warning Surface Details	06/23/2020
SD_2-50	Parallel Pedestrian Curb Ramp Detail	06/23/2020
SD_2-70	Type C Aluminum Bridge Railing	08/11/2011
SD_2-71	Oklahoma TR-1 Bridge Railing	08/11/2011
SD_2-72	Nevada Concrete Safety Bridge Railing	08/11/2011
SD_2-73	Safety Shaped Concrete Bridge Railing	08/11/2011
SD_2-74	Texas Type TT Bridge Railing	08/11/2011
SD_2-75	Urban Cul-de-Sac Details	01/01/2008
SD_2-76	Rural Cul-de-Sac Details	01/01/2008 07/18/2023
SD_2-77	Urban Local and Low-Volume Local Knuckle	07/09/2009 07/18/2023
SD_2-78	Urban Local Low-Volume Knuckle-Urban Local and Low-Volume Local Eyebrow	07/09/2009 07/18/2023
SD_3-1	Storm Sewer Manhole Detail Type I	07/09/2009
SD_3-2	Storm Sewer Manhole Detail Type II	11/10/2004
SD_3-3	Storm Sewer Manhole Detail Type III	08/11/2011
SD_3-5	Storm Sewer Manhole Lid Detail	09/16/2010
SD_3-7	Storm Sewer Manhole Riser and Cover Detail	08/11/2011
SD_3-8	Grate Inlet for Common Areas (guidance)	08/11/2011
SD_3-14	Driveway Access on Rural Local Roadway	08/11/2011
SD_3-24	Sidewalk Underdrain w/ Curb Outlet Detail	08/11/2011
SD_3-25	Curb Opening w/ Drainage Chase Detail 1 of 2	08/11/2011
SD_3-25A	Curb Opening w/ Drainage Chase Detail 2 of 2	08/11/2011
SD_3-30	Desilting Basin Outlet	08/11/2011
SD_3-31	Temporary Desilting Basin at Inlet	08/11/2011
SD_3-32	Temporary Desilting Basin at Sump	08/11/2011
SD_3-33	On Street Temporary Desilting Basin Detail	
SD_3-34	Temporary Desilting Basin Detail (guidance)	08/11/2011
SD_3-35	Debris Cage for Desilting Basin Riser	08/11/2011
SD_3-36	Desilting Basin Riser Detail	08/11/2011
SD_3-41	Lined Ditch Splashwall Detail (plan and section)	08/11/2011
SD_3-44	Lined Ditch Behind Retaining Wall Detail	08/11/2011
SD_3-48	Beehive Grate Detail (guidance)	08/11/2011
SD_3-60	Temporary Street Sandbag Detail and Section	08/11/2011
SD_3-62	Typical Check Dam Detail	08/11/2011
SD_3-71	Canyon Subdrain Detail	08/11/2011
SD_3-81	Lug Connection Detail (cast in place concrete pipe)	08/11/2011
SD_3-82	Plan and Section of an Extended Detention Basin Sedimentation Facility	01/01/2008

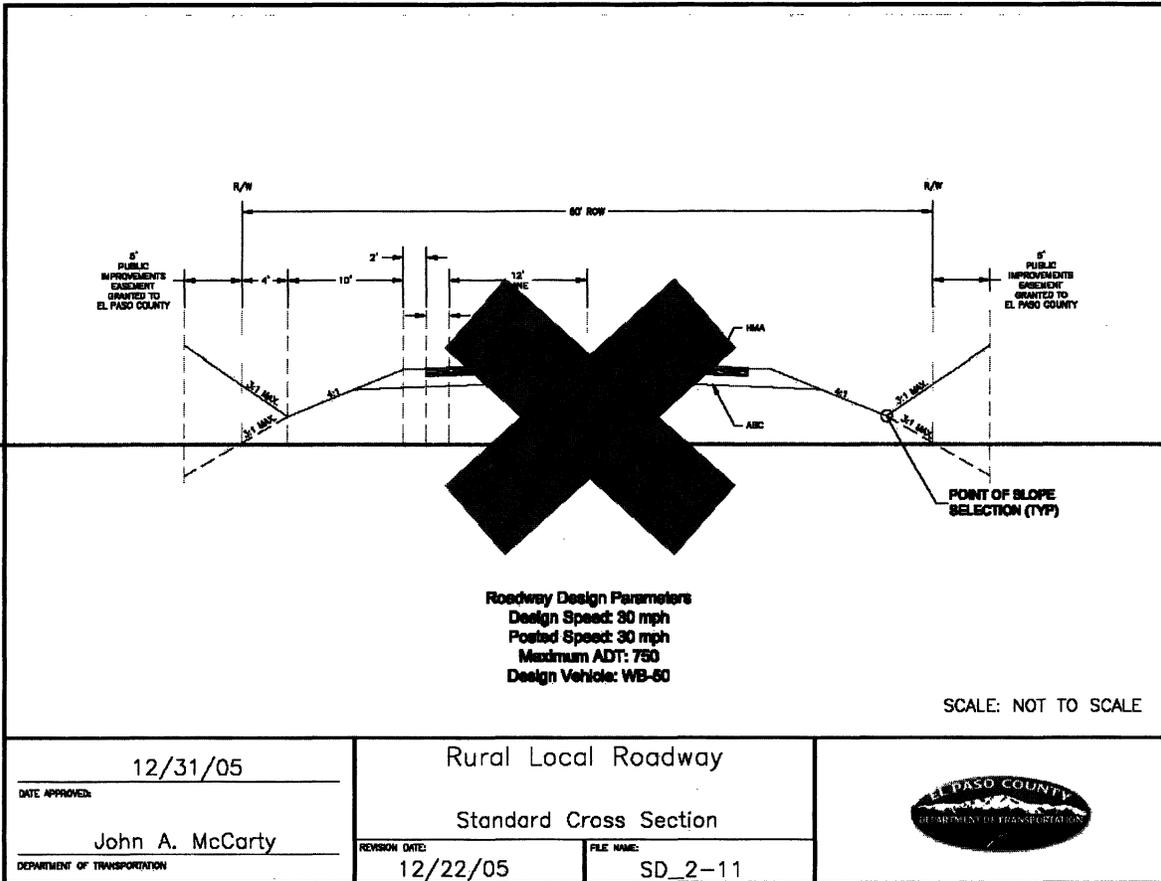
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SD_3-83	Typical WQCV Outlet Structure Profiles Including 100-Year Detention	01/01/2008
SD_3-84	Concrete Washout Structure	01/01/2008
SD_3-85	Erosion Log Check Dams	01/01/2008
SD_3-86	Culvert Inlet and Outlet Protection Erosion Logs Above Inlets and Outlets for Slope 3:1 or Steeper	01/01/2008
SD_3-87	Erosion Log Barrier	01/01/2008
SD_3-88	Cut Back Swale	12/13/2016
SD_4-1	Urban Local Roadway - Utility Placement	08/11/2011
SD_4-2	Urban Residential Minor Collector Roadway - Utility Placement	08/11/2011
SD_4-3	Urban NonResidential Collector Roadway - Utility Placement	08/11/2011
SD_4-4	Urban Residential Major Collector Roadway - Utility Placement	08/11/2011
SD_4-5 & 4-5A	Urban Minor Arterial Roadway - Utility Placement	08/11/2011
SD_4-6 & 4-6A	Urban Principal 4-Lane Arterial Roadway - Utility Placement	08/11/2011
SD_4-7 & 4-7A	Urban Principal 6-Lane Arterial Roadway - Utility Placement	08/11/2011
SD_4-8 & 4-8A	Urban Expressway 4-Lane Roadway - Utility Placement	08/11/2011
SD_4-9 & 4-9A	Urban Expressway 6-Lane Roadway - Utility Placement	08/11/2011
SD_4-10	Rural Gravel Local Roadway - Utility Placement	08/11/2011
SD_4-11	Rural Local Roadway - Utility Placement	08/11/2011 07/18/2023
SD_4-12	Rural Minor Collector Roadway - Utility Placement	08/11/2011 07/18/2023
SD_4-13	Rural Major Collector Roadway - Utility Placement	08/11/2011 07/18/2023
SD_4-14 & 4-14A	Rural Minor Arterial Roadway - Utility Placement	08/11/2011 07/18/2023
SD_4-15 & 4-15A	Rural Principal 4-Lane Arterial Roadway - Utility Placement	08/11/2011 07/18/2023
SD_4-16 & 4-16A	Rural Principal 6-Lane Arterial Roadway - Utility Placement	08/11/2011 07/18/2023
SD_4-17 & 4-17A	Rural Expressway 4-Lane Roadway - Utility Placement	08/11/2011 07/18/2023
SD_4-18 & 4-18A	Rural Expressway 6-Lane Roadway - Utility Placement	08/11/2011 07/18/2023
SD_4-20	Utility Trench Repair Detail (asphalt pavement)	08/11/2011
SD_4-21	Utility Trench Repair Detail (newly overlaid pavement)	08/11/2011
SD_4-22	Utility Trench Repair Detail (concrete pavement)	08/11/2011
SD_4-23	Utility Trench Repair Detail (flowable fill)	08/11/2011

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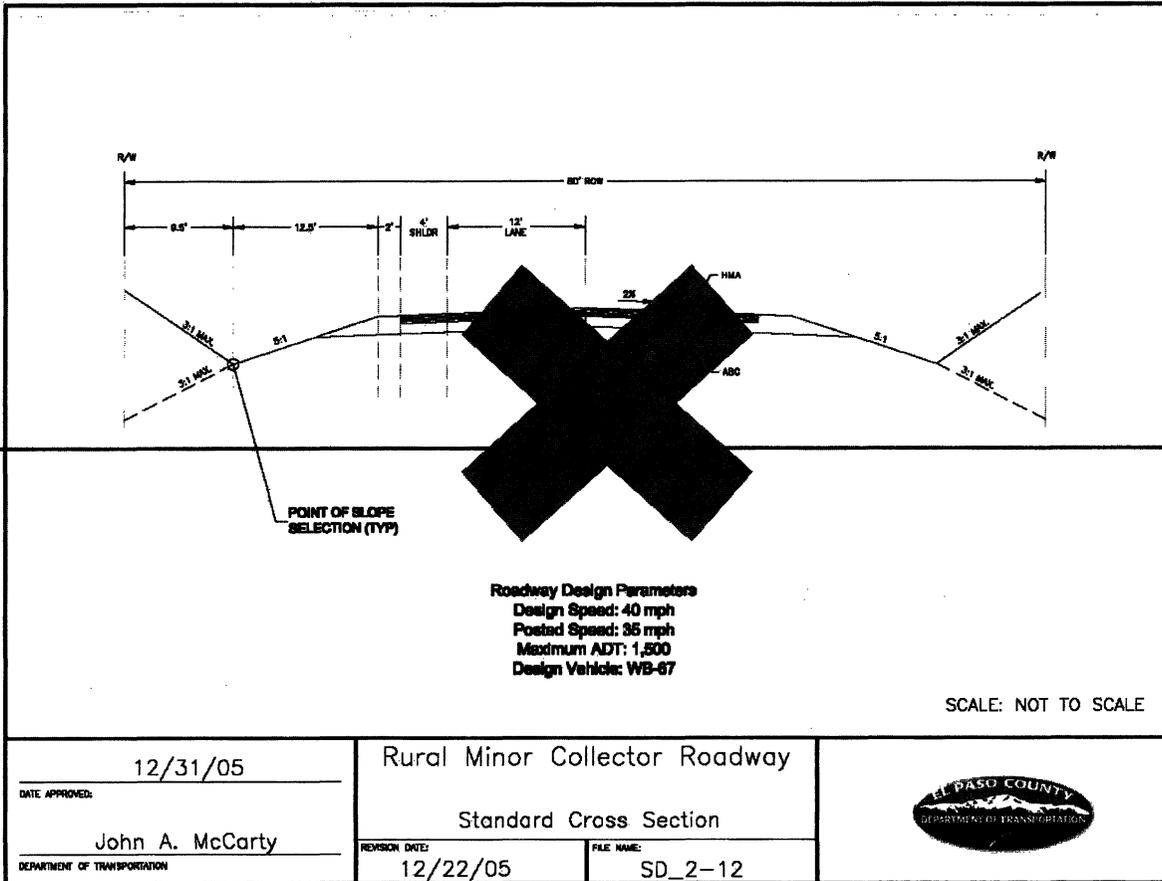
EPC Standard Specifications

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12/31/05

DATE APPROVED:

John A. McCarty

DEPARTMENT OF TRANSPORTATION

Rural Minor Collector Roadway

Standard Cross Section

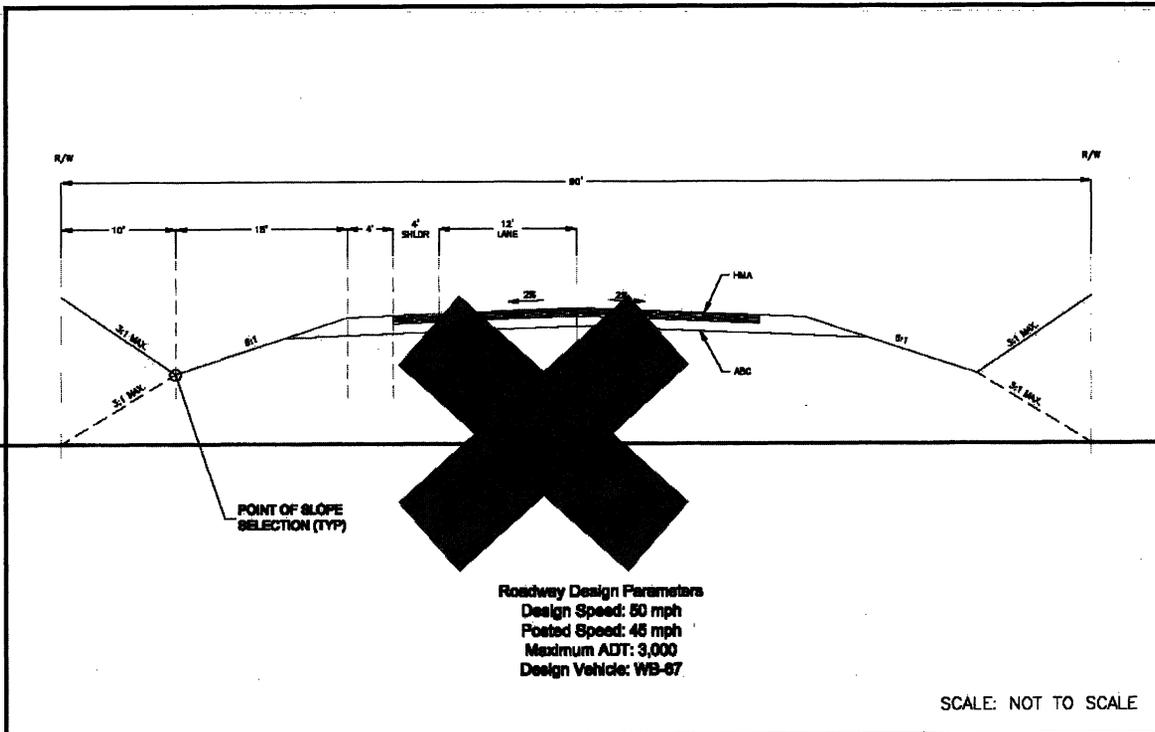
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FILE NAME: SD\_2-12



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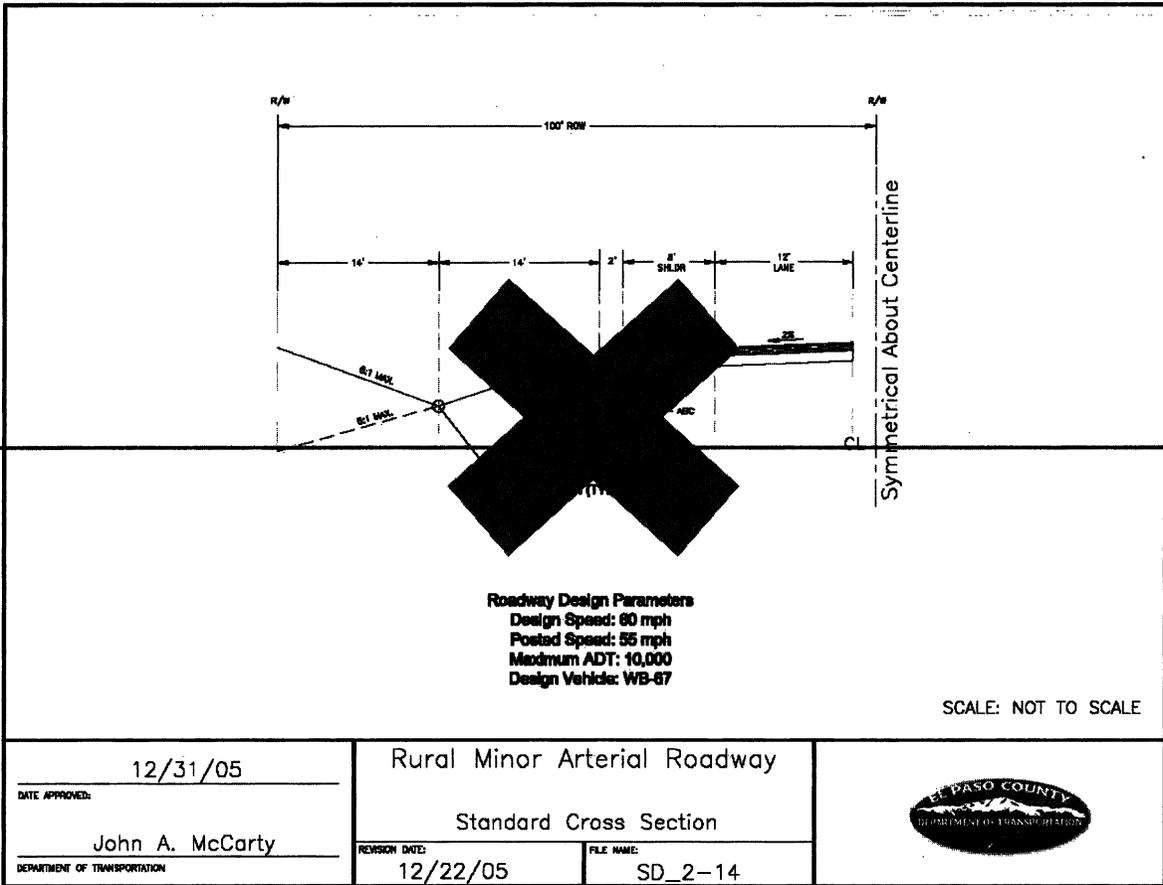
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12/31/05 <small>DATE APPROVED:</small>	Rural Major Collector Roadway Standard Cross Section	
John A. McCarty <small>DEPARTMENT OF TRANSPORTATION</small>		

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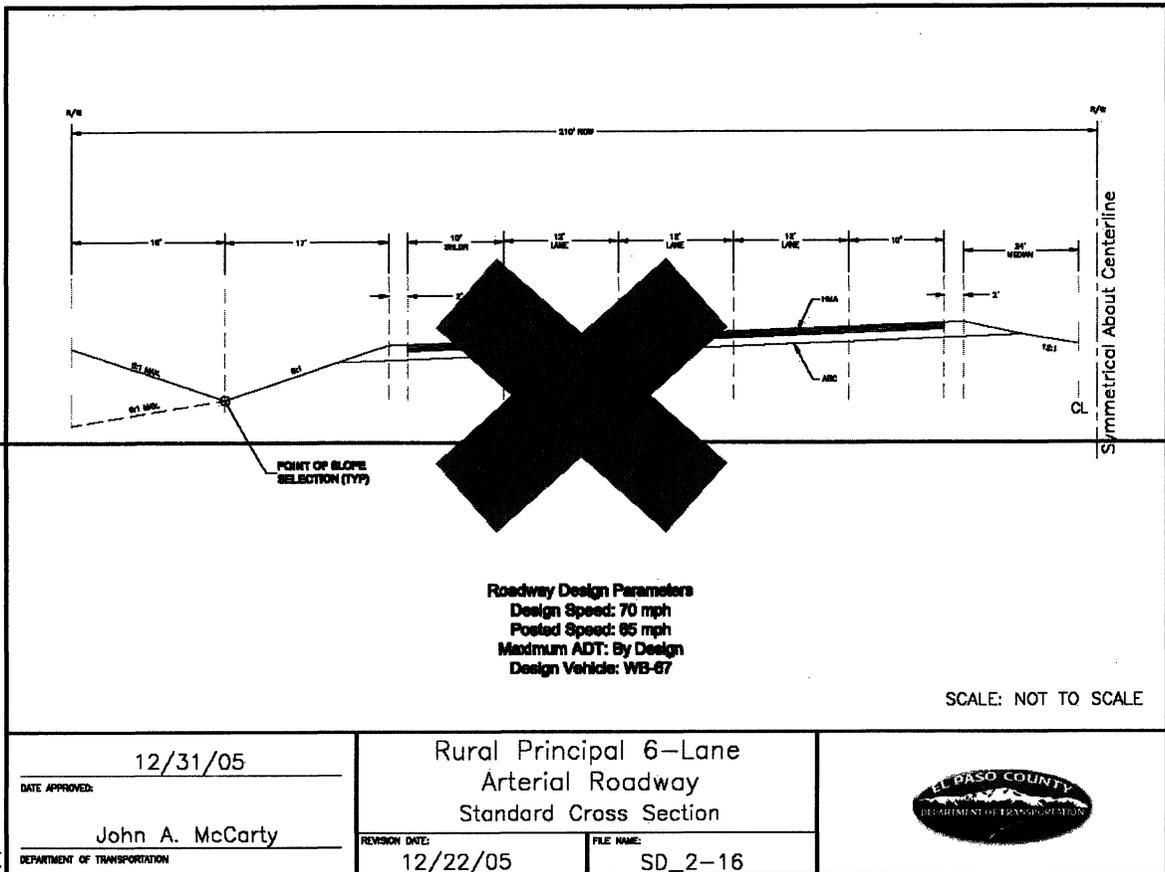
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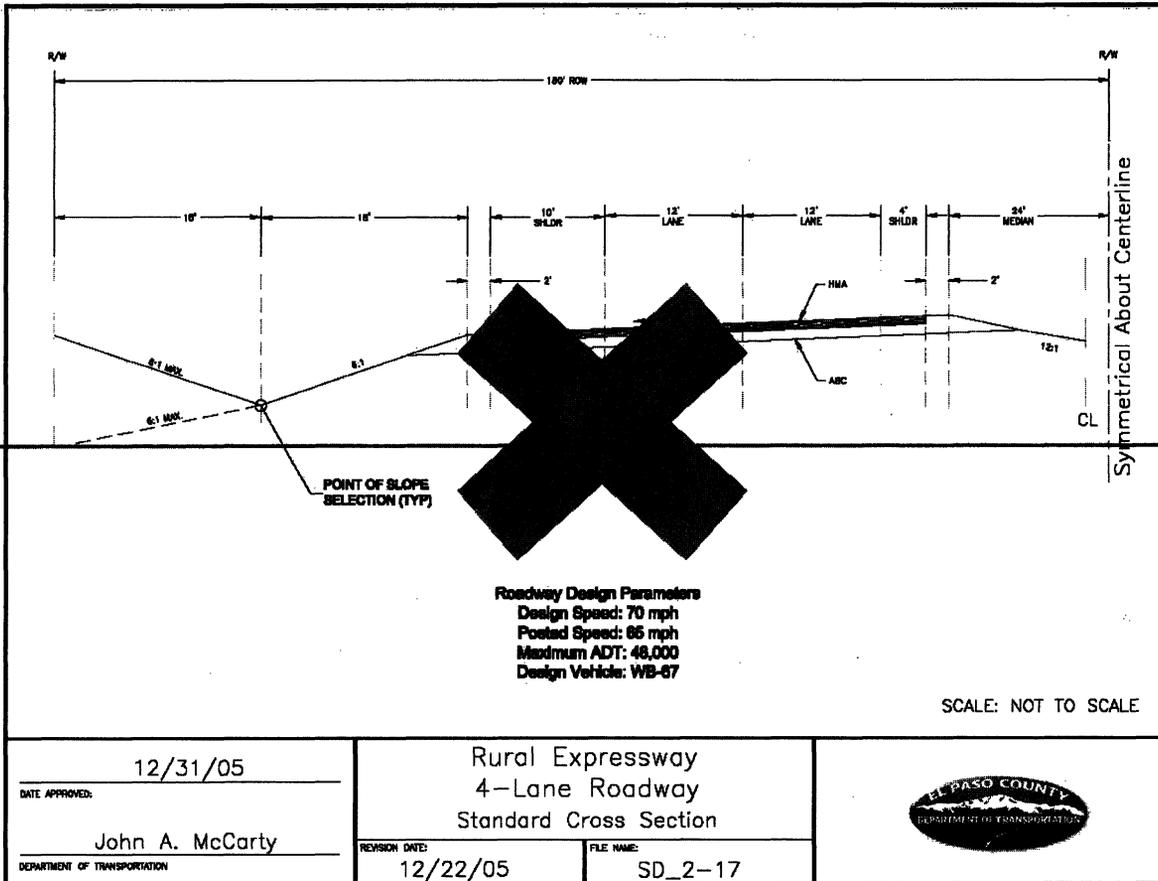


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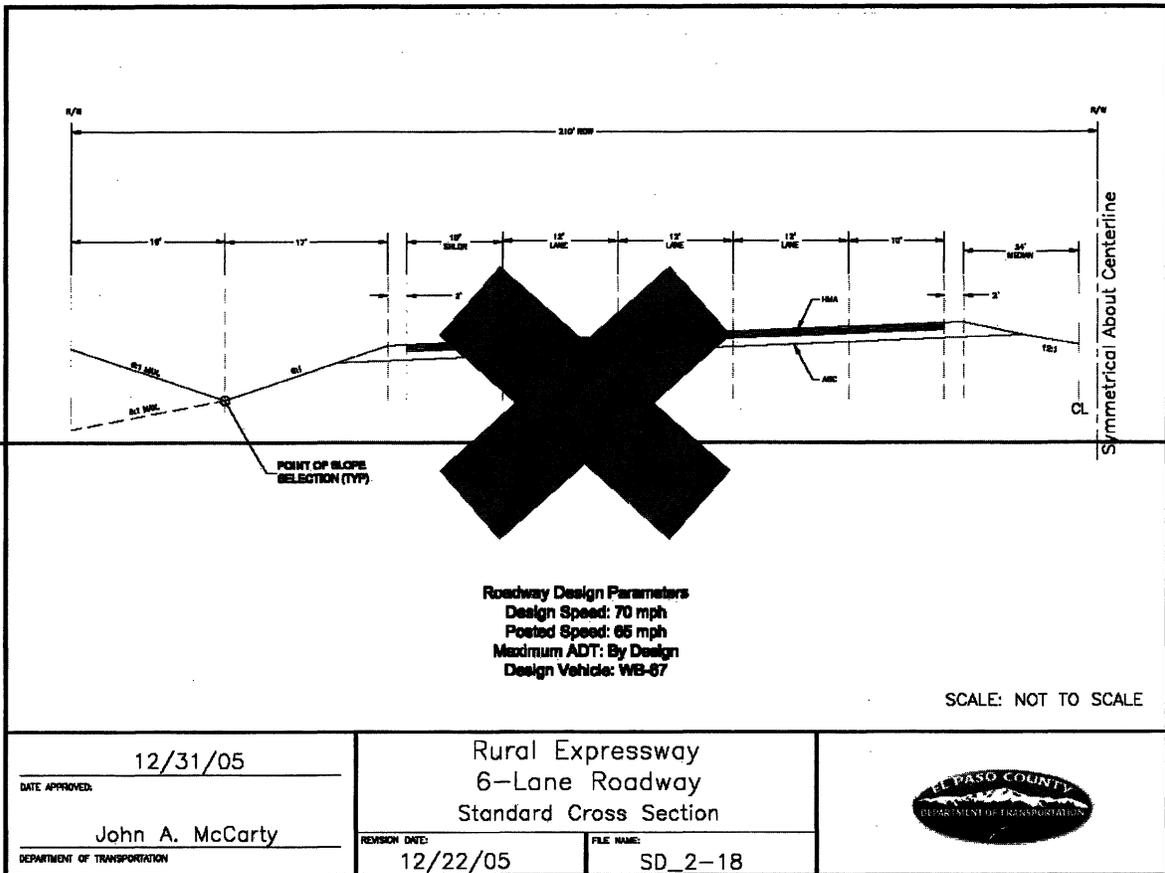
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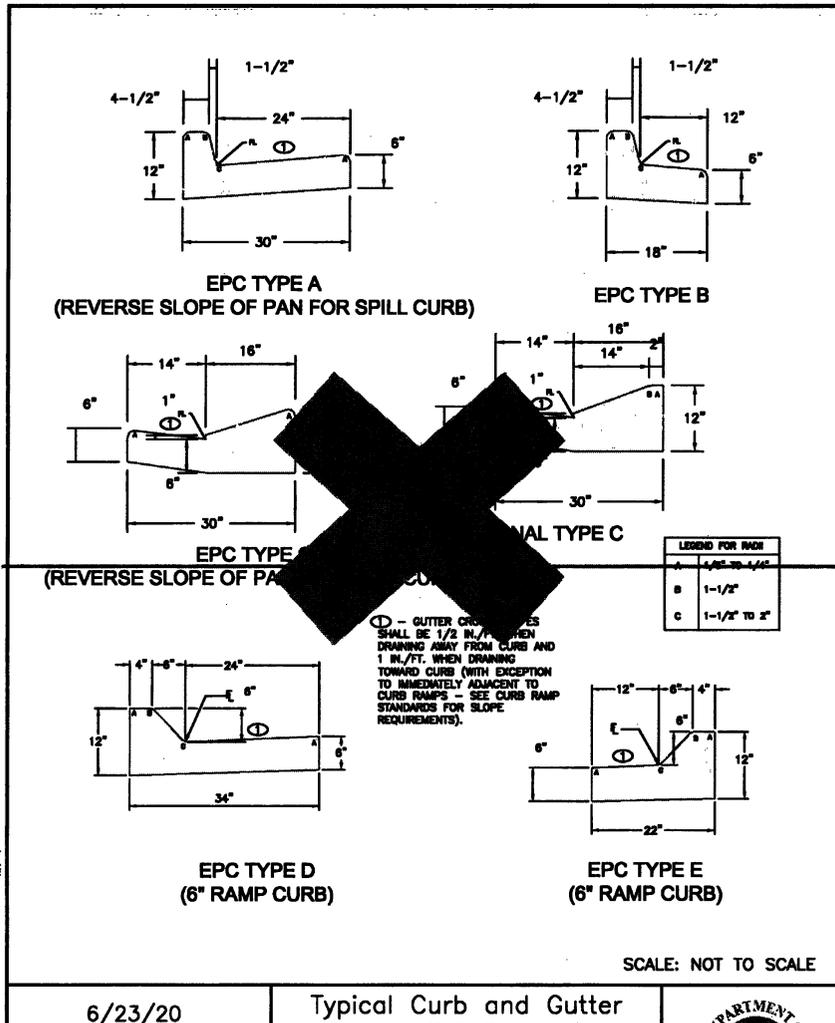
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El Paso County, Colorado, Eng  
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6/23/20

Typical Curb and Gutter

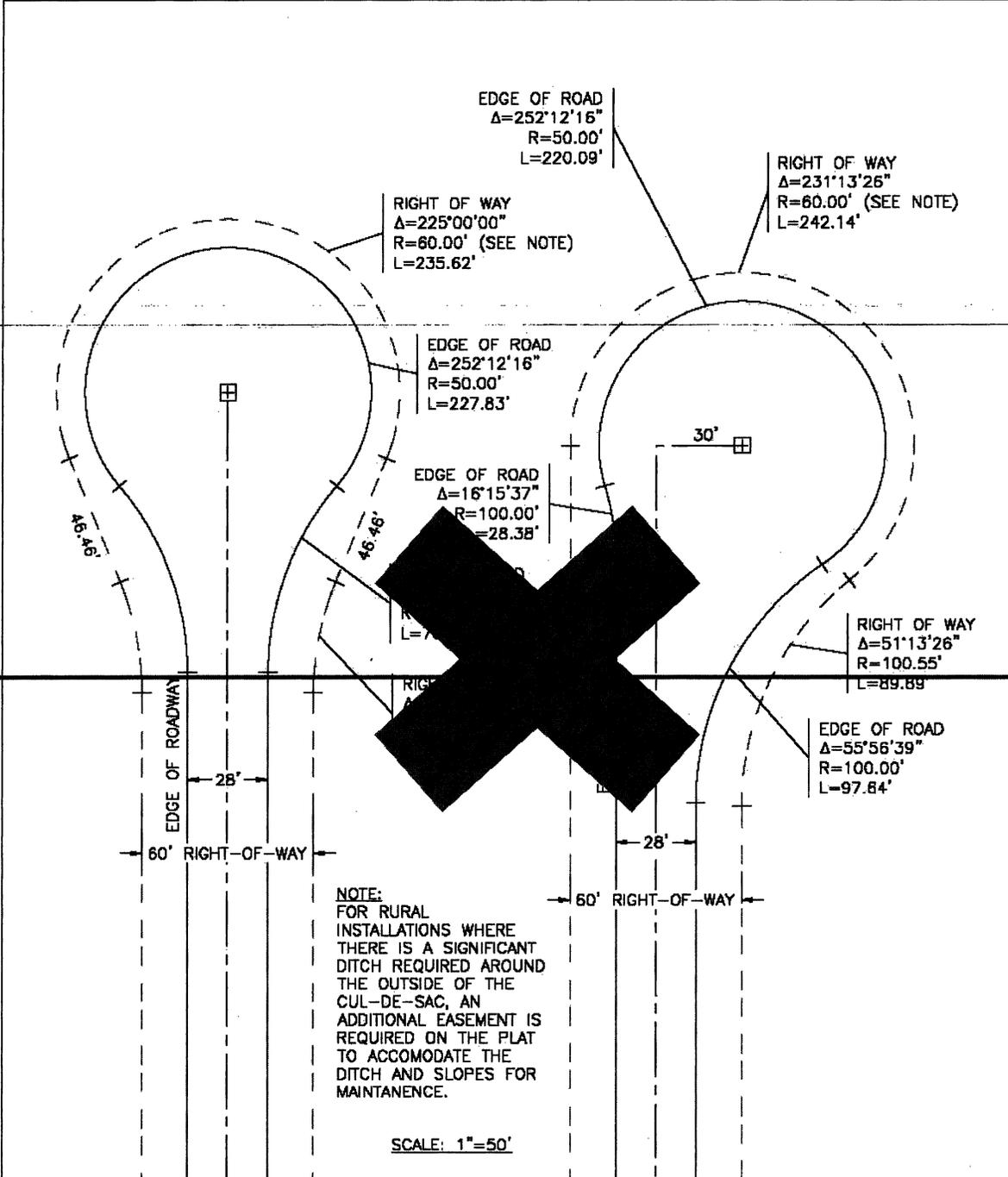


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**(Res. No. 20-222, 6-23-20)**

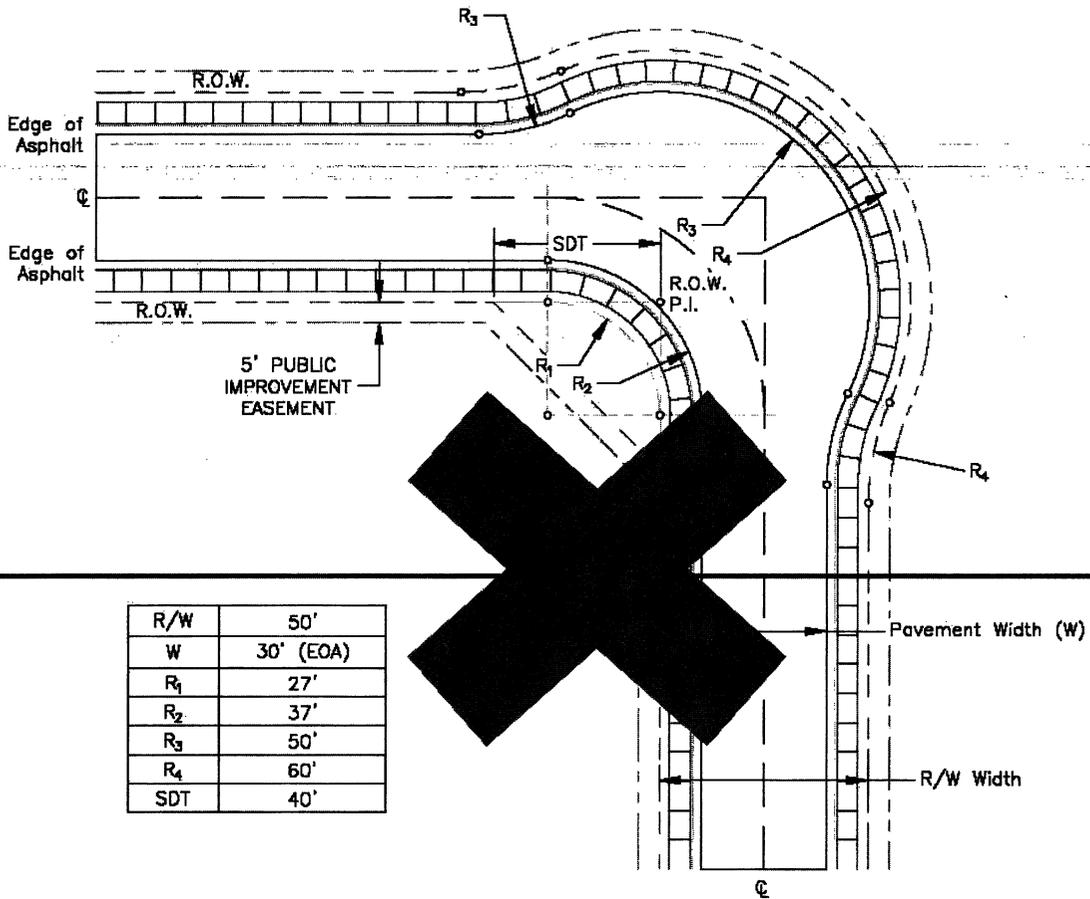
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1/1/08	Rural Cul-De-Sac Details		
DATE APPROVED:			
John A. McCarty	REVISION DATE: 12/8/15		FILE NAME: SD_2-76
DEPARTMENT OF TRANSPORTATION			

(Supp. No. 2)

## URBAN LOCAL KNUCKLE DETAILS



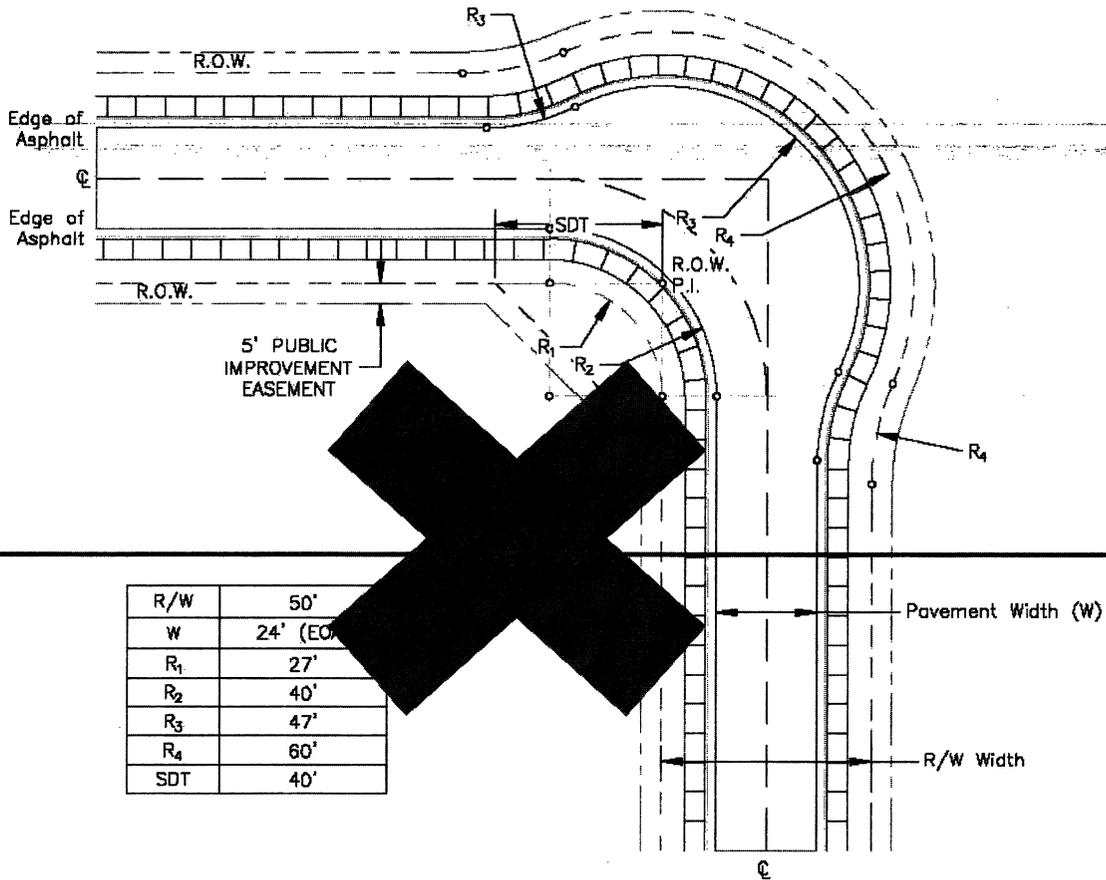
R/W	50'
W	30' (EOA)
$R_1$	27'
$R_2$	37'
$R_3$	50'
$R_4$	60'
SDT	40'

SDT = SIGHT DISTANCE TRIANGLE  
DESIGN SPEED = 25 MPH

<p>7/9/09</p> <p>DATE APPROVED:</p> <p>André Brackin</p> <p>DEPARTMENT OF TRANSPORTATION</p>	<p>Urban Local Knuckle</p> <p>Standard Drawing</p> <p>REVISION DATE: 12/8/15</p> <p>FILE NAME: SD_2-77</p>	
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(Supp. No. 2)

## URBAN LOCAL LOW-VOLUME KNUCKLE DETAILS



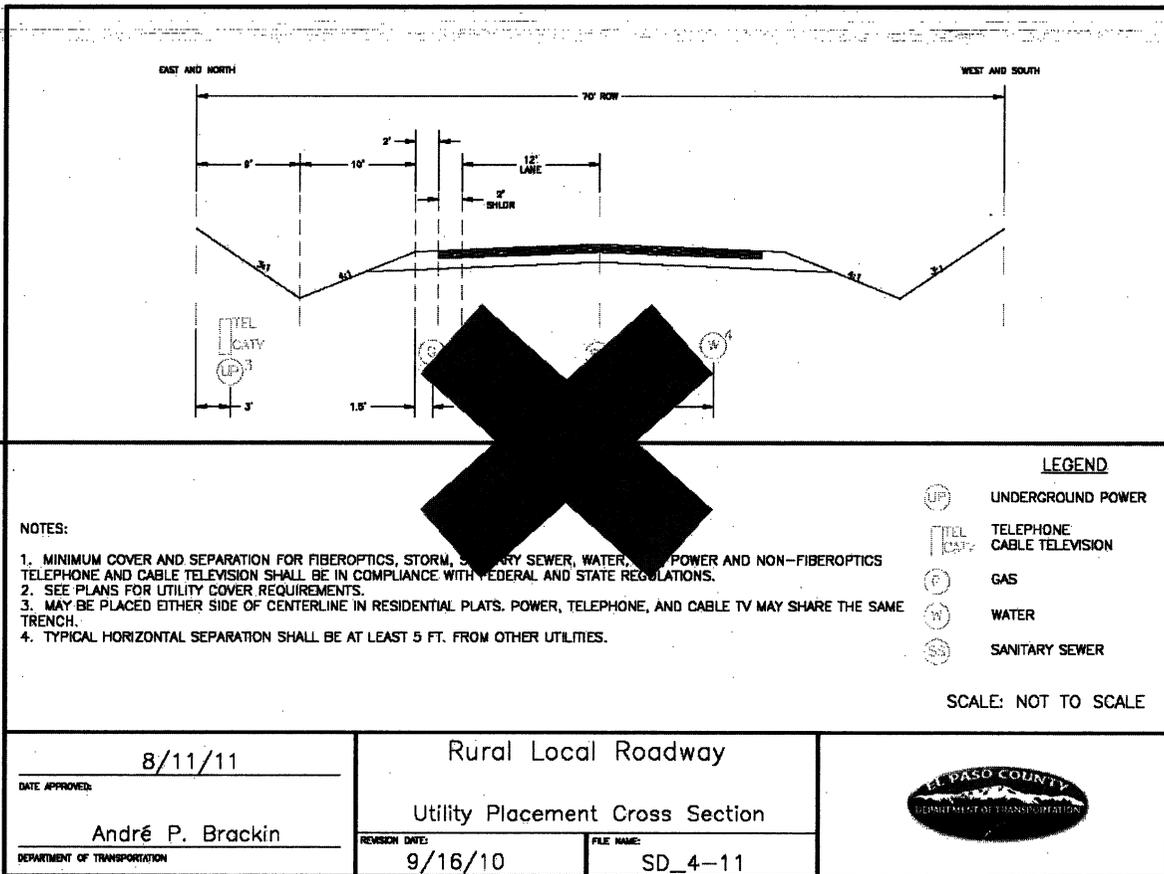
R/W	50'
W	24' (EO)
R <sub>1</sub>	27'
R <sub>2</sub>	40'
R <sub>3</sub>	47'
R <sub>4</sub>	60'
SDT	40'

SDT = SIGHT DISTANCE TRIANGLE  
DESIGN SPEED = 20 MPH

<p align="center">7/9/09</p> <p>DATE APPROVED:</p> <p align="center">André Brackin</p> <p>DEPARTMENT OF TRANSPORTATION</p>	<p align="center">Urban Local Low-Volume Knuckle Standard Drawing</p> <p>REVISION DATE: 7/9/09</p> <p>FILE NAME: SD_2-78</p>	
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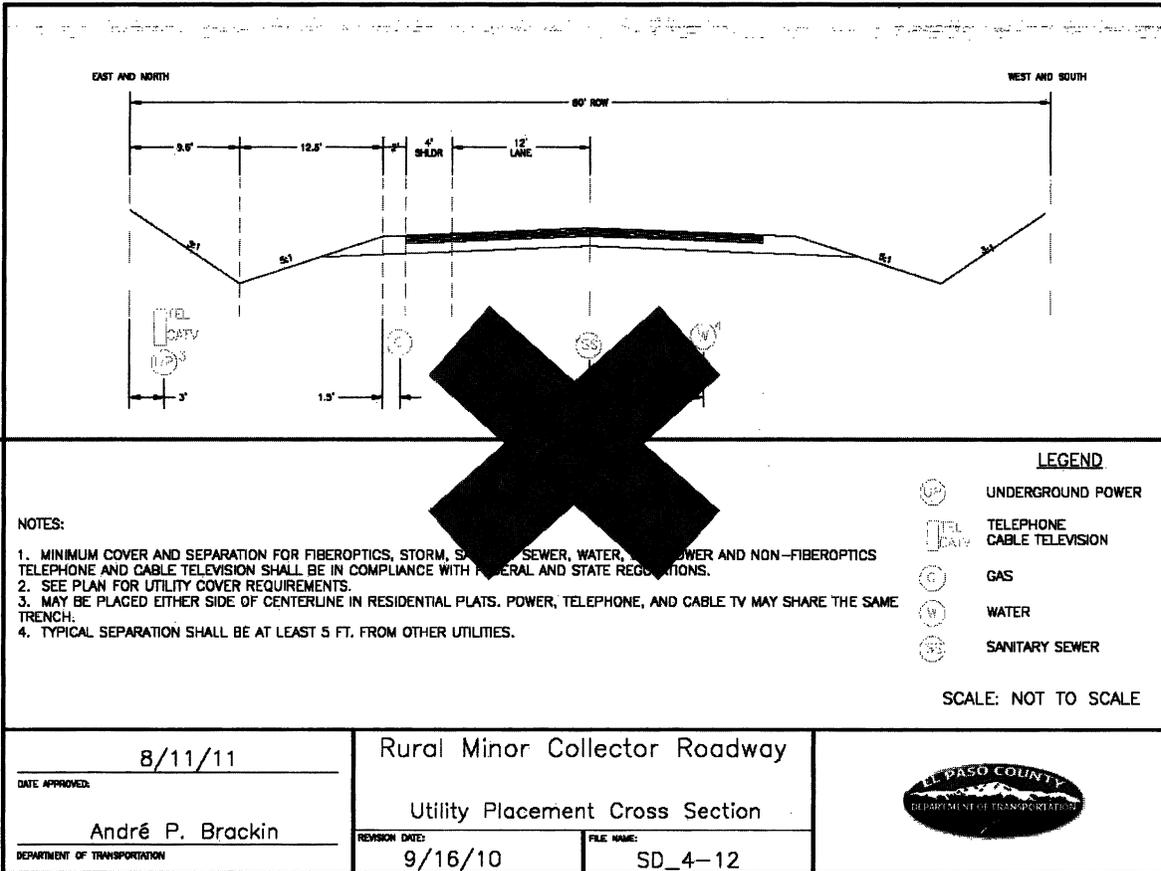
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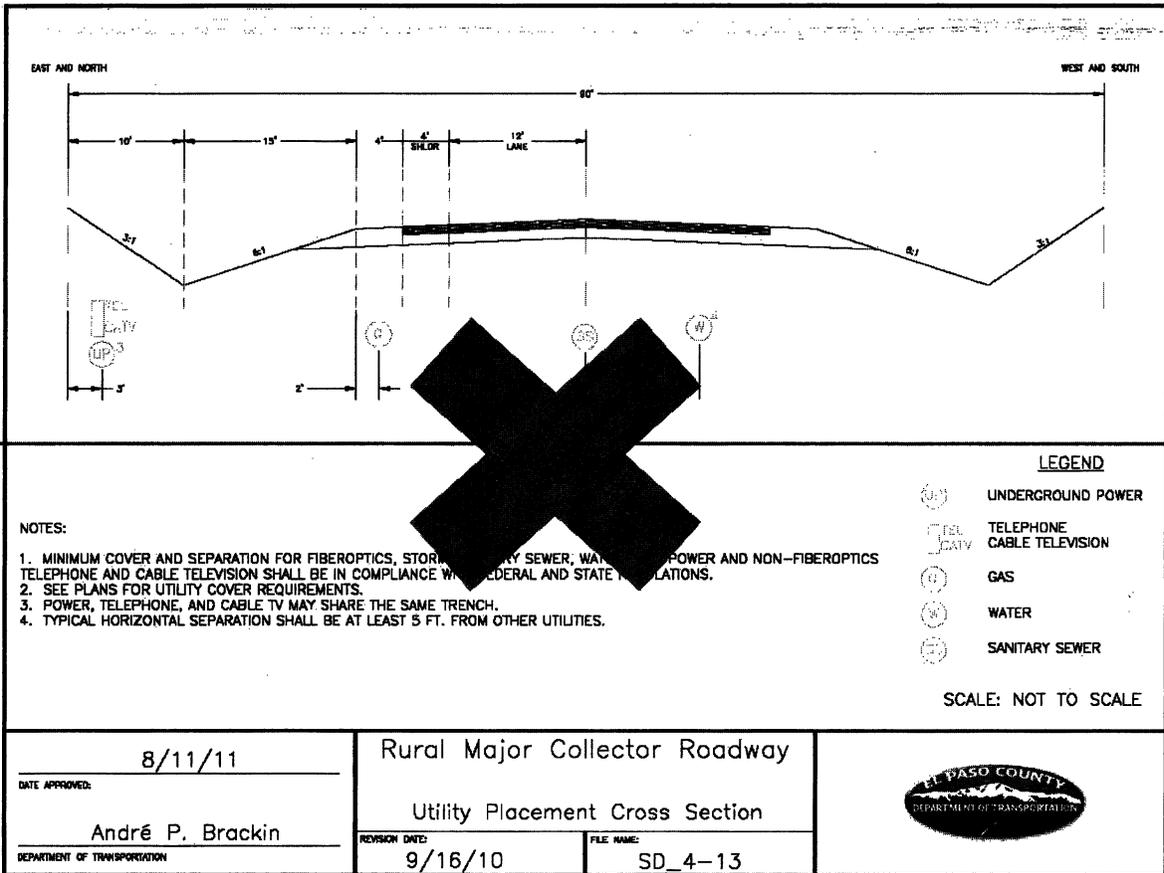
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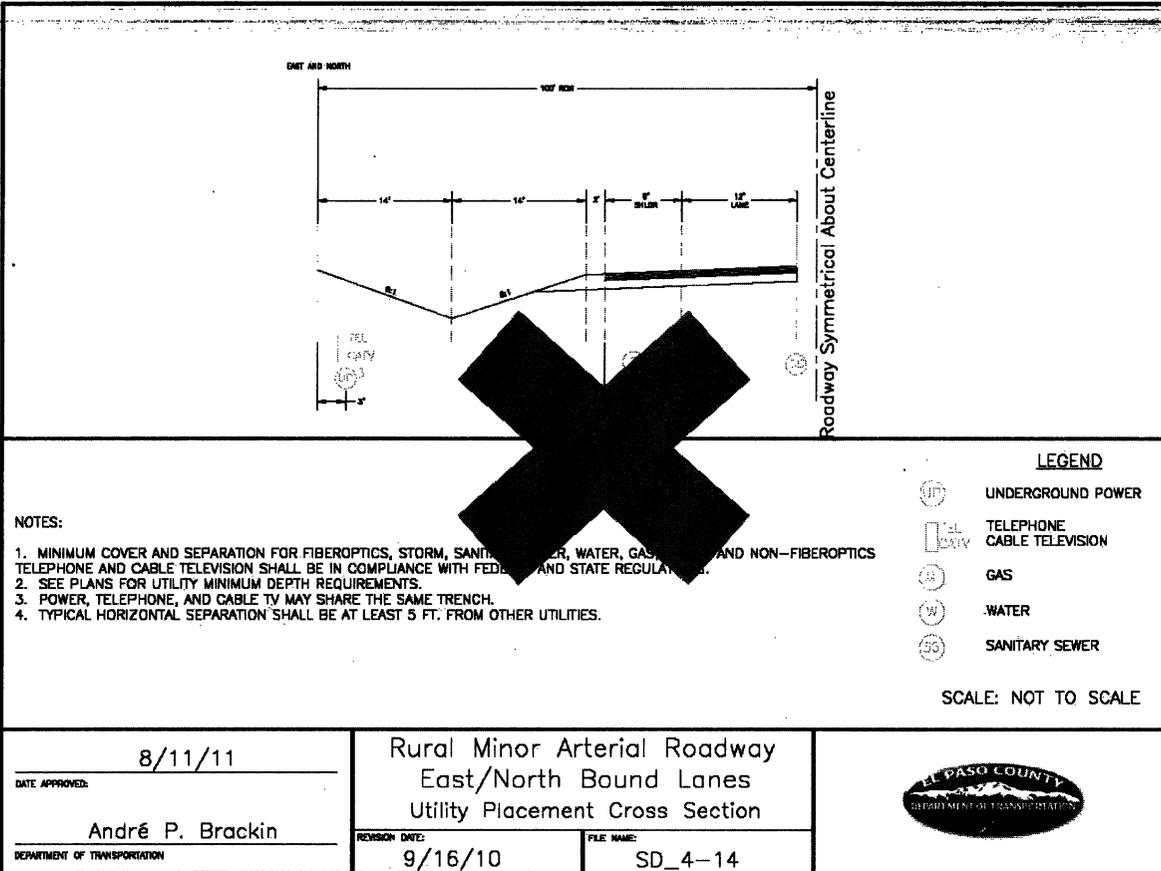
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**NOTES:**

1. MINIMUM COVER AND SEPARATION FOR FIBEROPTICS, STORM, SANITARY SEWER, WATER, GAS, AND NON-FIBEROPTICS TELEPHONE AND CABLE TELEVISION SHALL BE IN COMPLIANCE WITH FEDERAL AND STATE REGULATIONS.
2. SEE PLANS FOR UTILITY MINIMUM DEPTH REQUIREMENTS.
3. POWER, TELEPHONE, AND CABLE TV MAY SHARE THE SAME TRENCH.
4. TYPICAL HORIZONTAL SEPARATION SHALL BE AT LEAST 5 FT. FROM OTHER UTILITIES.

**LEGEND**

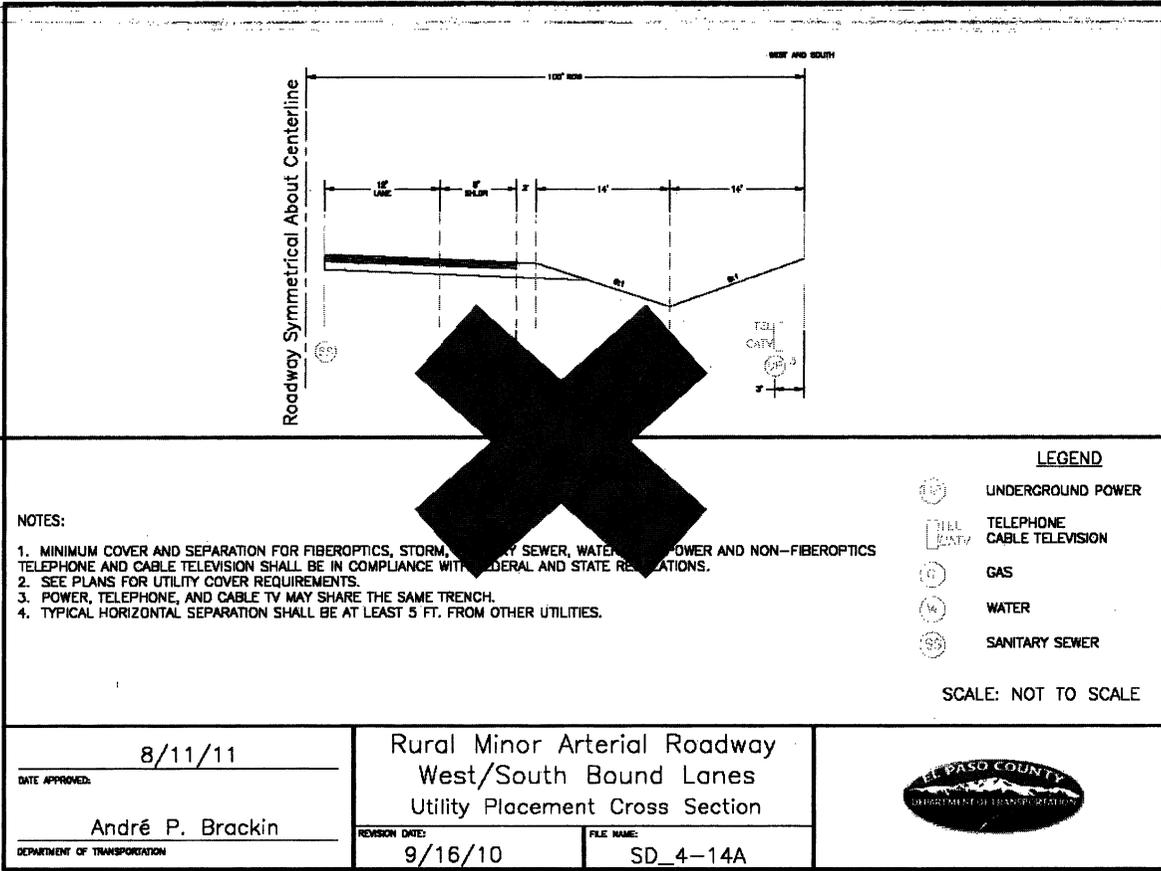
- UNDERGROUND POWER
- TELEPHONE CABLE TELEVISION
- GAS
- WATER
- SANITARY SEWER

SCALE: NOT TO SCALE

<p align="center">8/11/11</p> <p>DATE APPROVED:</p> <p align="center"><b>André P. Brackin</b></p> <p>DEPARTMENT OF TRANSPORTATION</p>	<p>Rural Minor Arterial Roadway East/North Bound Lanes Utility Placement Cross Section</p>	
	<p>REVISION DATE: 9/16/10</p>	<p>FILE NAME: SD_4-14</p>

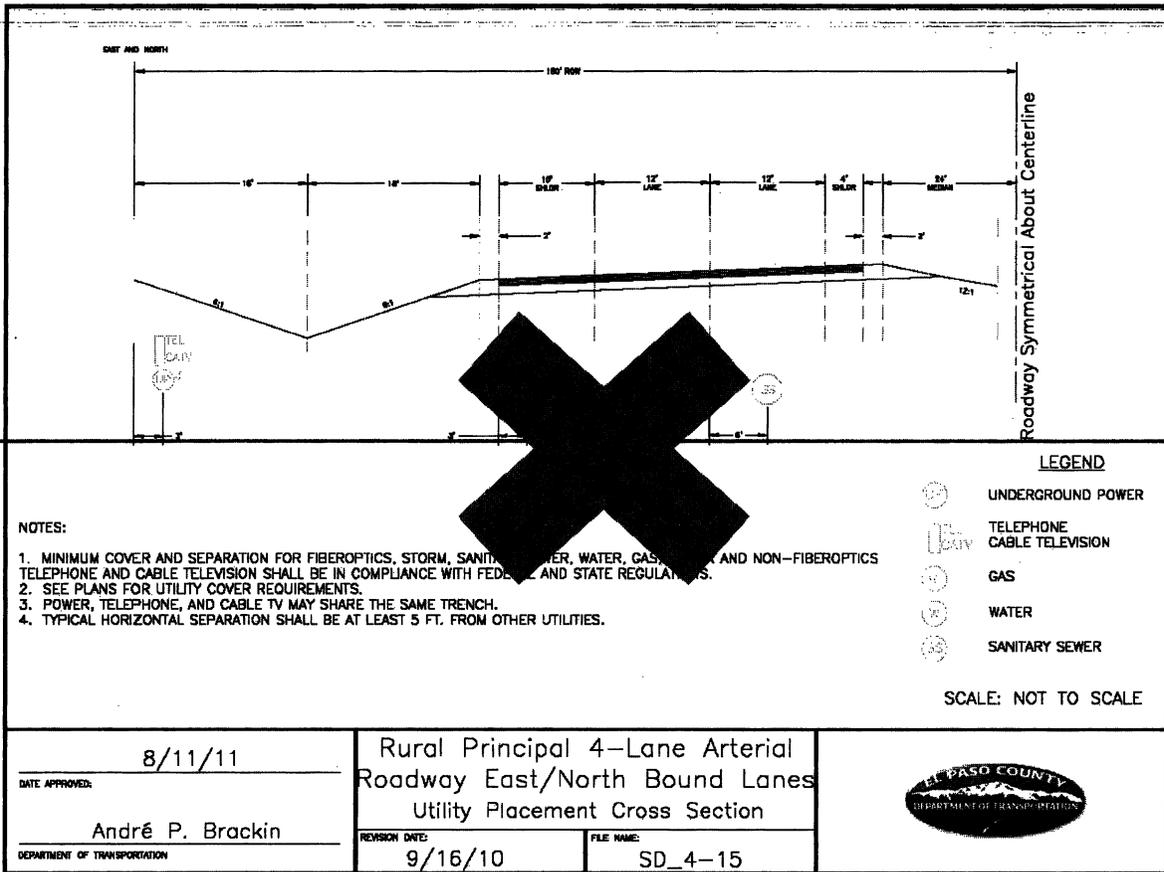
El Paso  
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- ENGINEERING CRITERIA MANUAL  
Appendix F STANDARD DRAWINGS



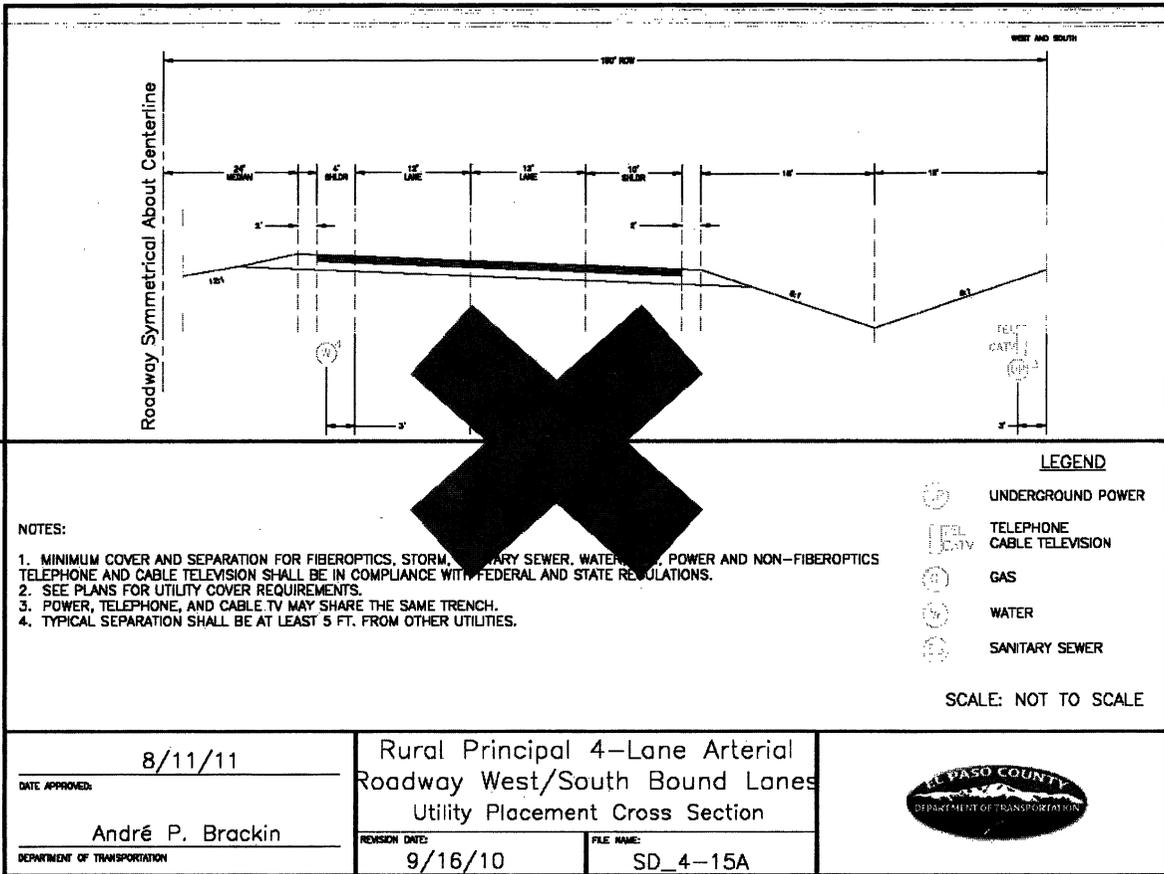
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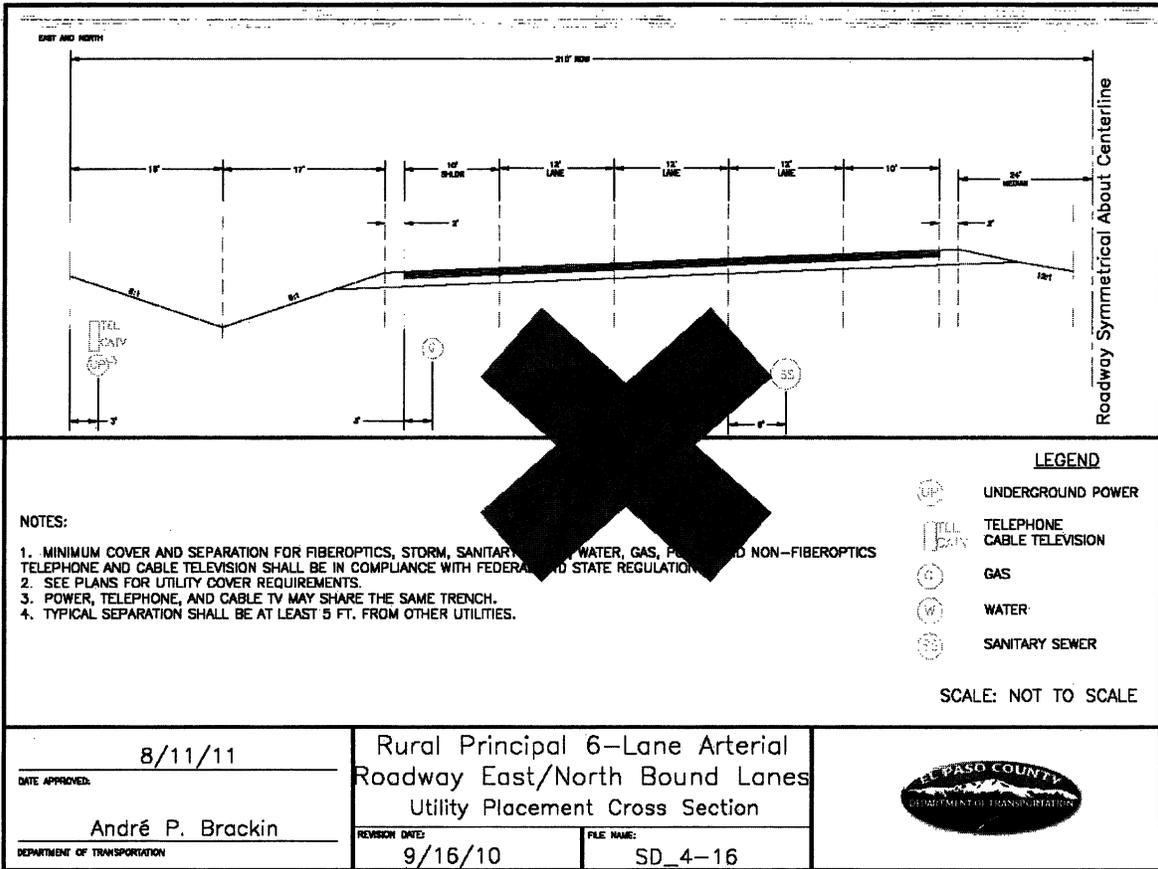
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Appendix F STANDARD DRAWINGS



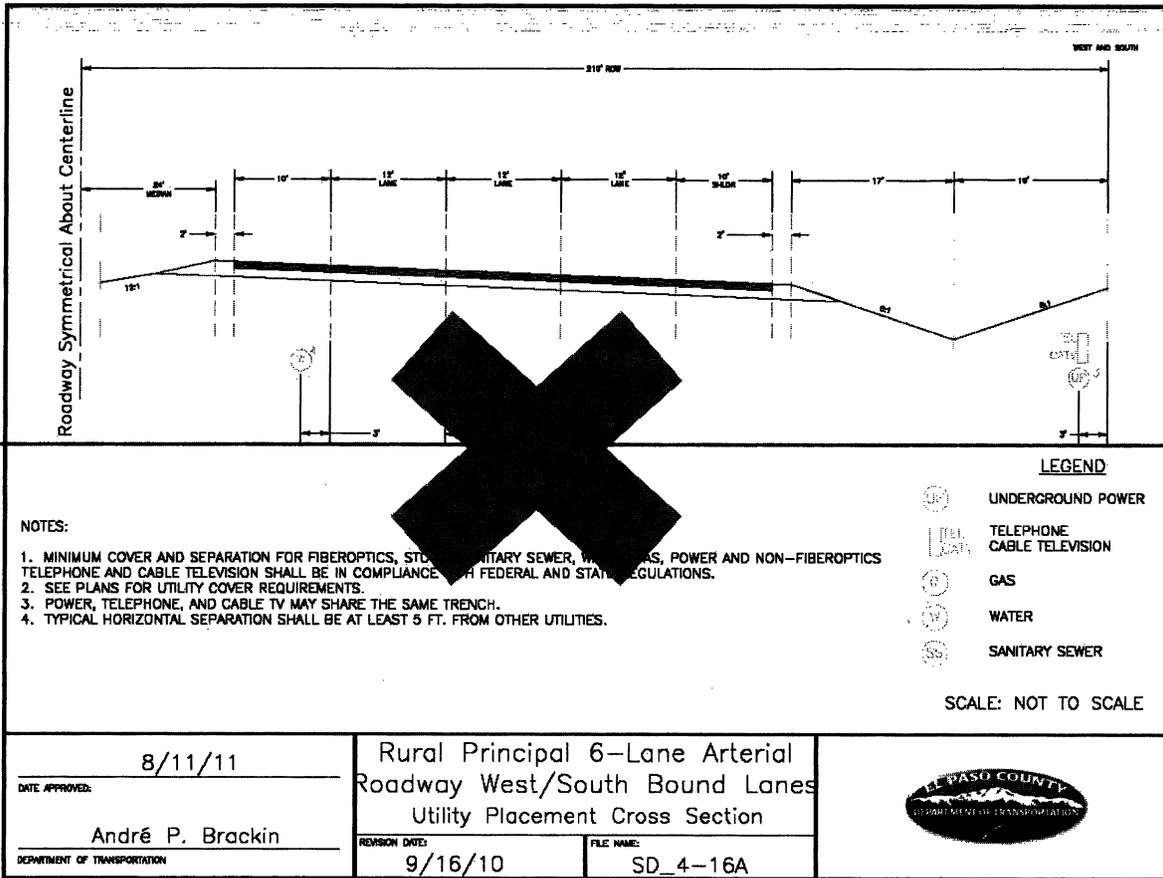
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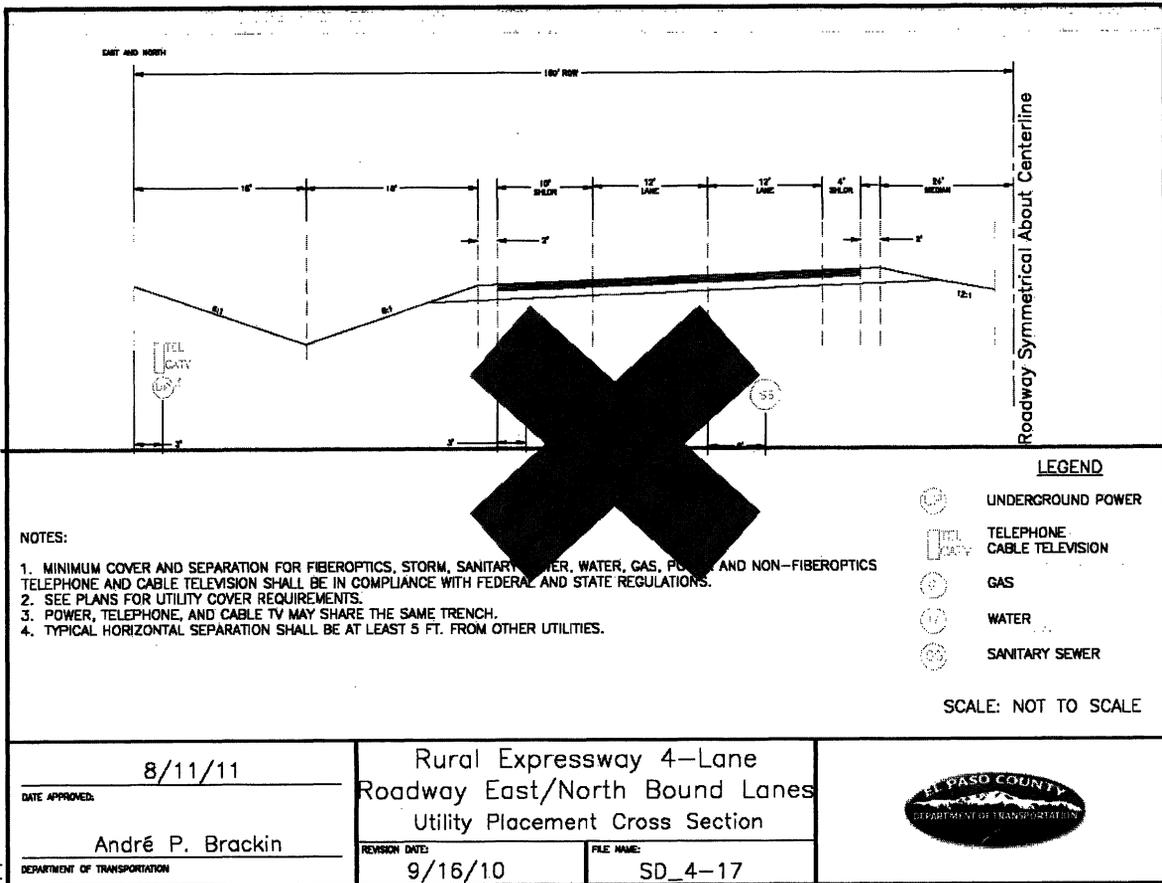
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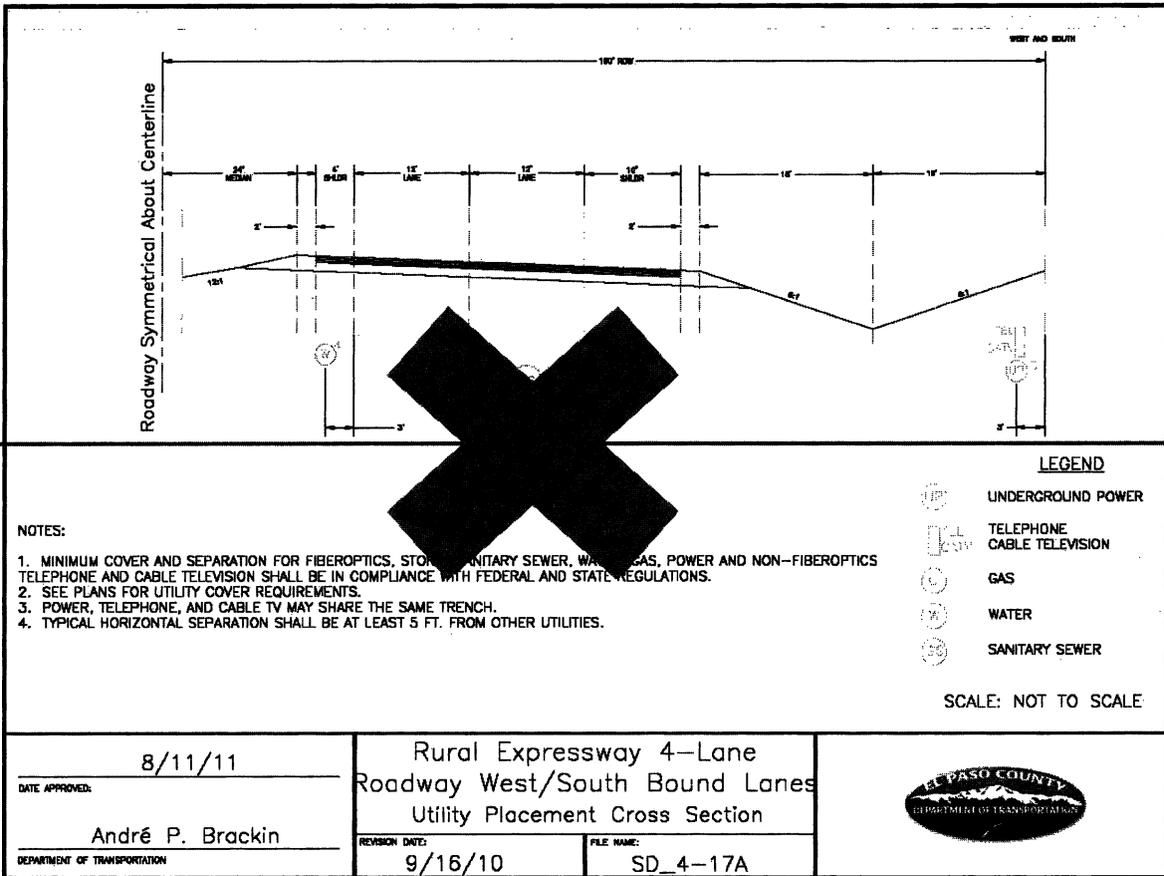
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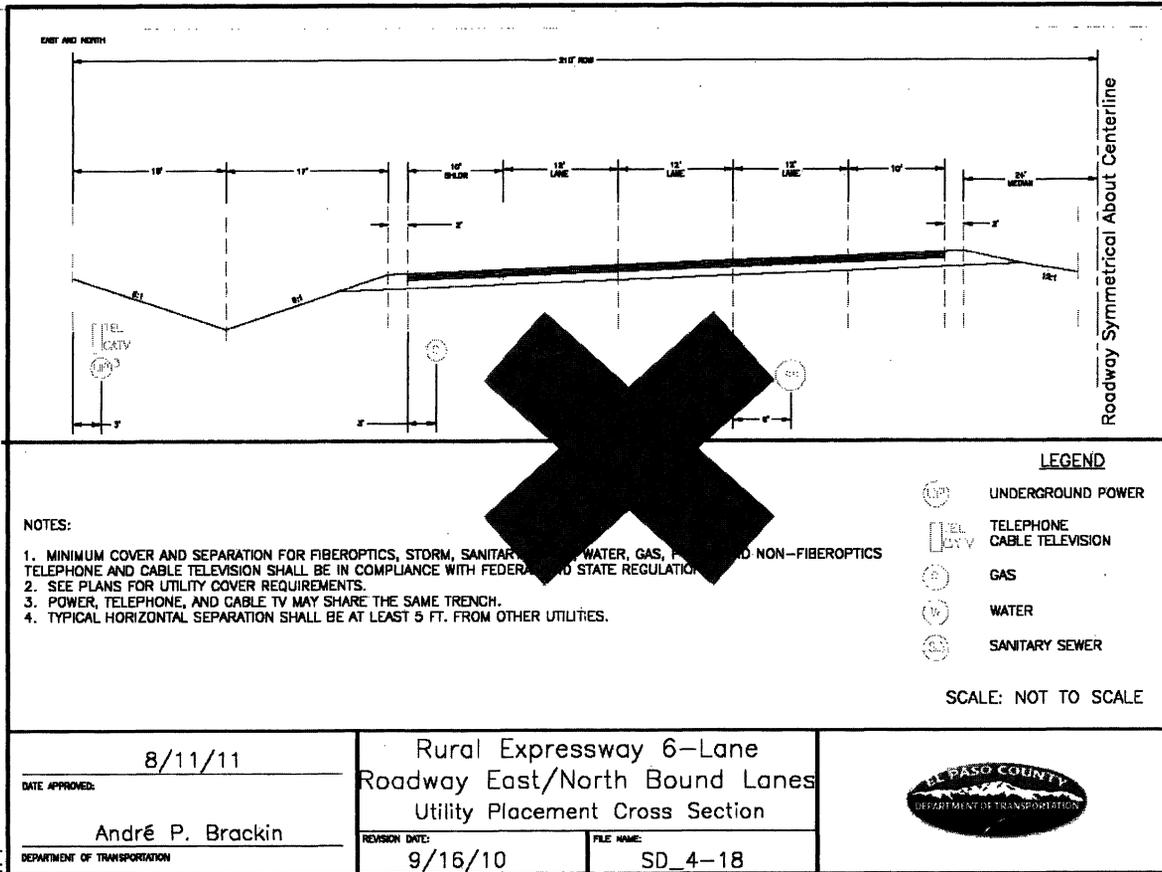
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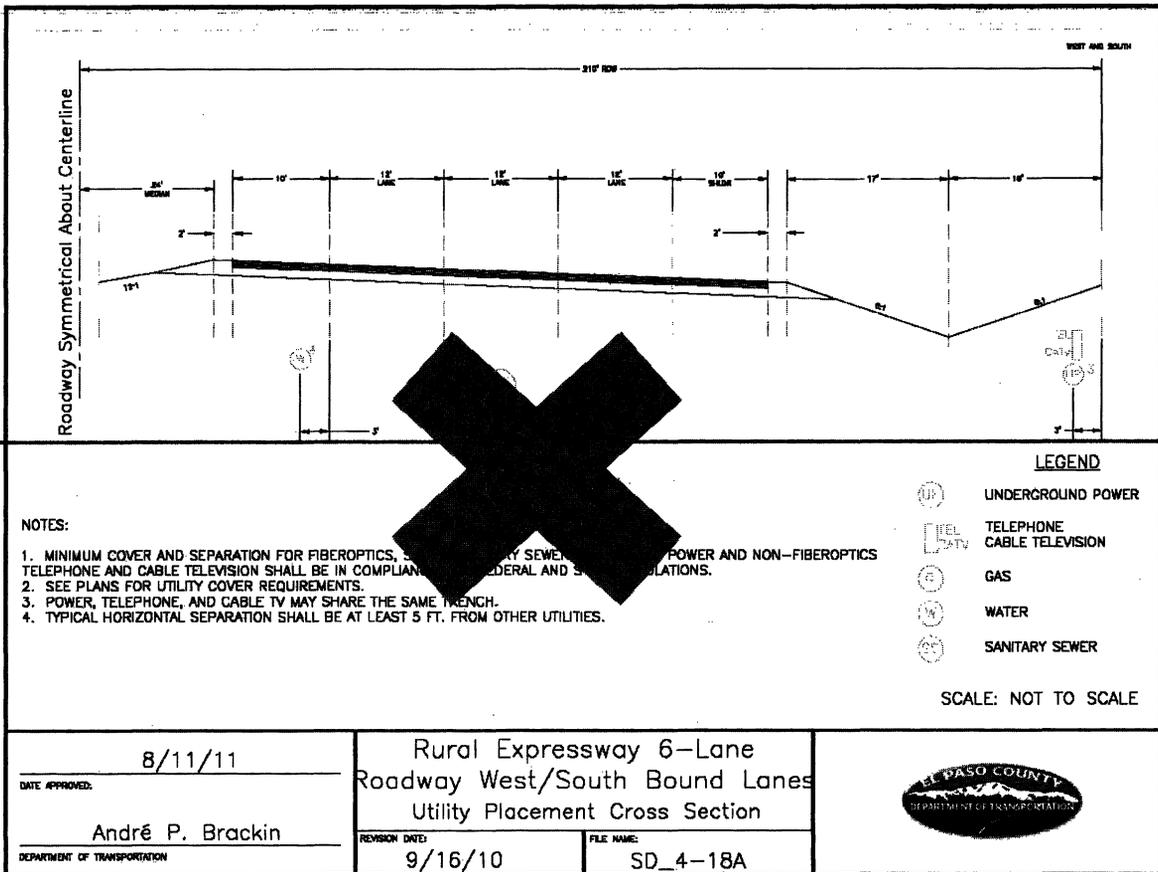
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