14.0 Roadways

This Section includes the requirements for the Roadway Work for the US 160 Elmore's Corner to Dry Creek Design-Build Project (Project). This Work shall be completed in accordance with the Contract Documents.

14.1 Administrative Requirements

14.1.1. Standards

The Contractor shall design and construct the Project in accordance with the requirements of the Contract, including the Project Special Provisions and Standard Special Provisions in Book 2, Section 21, standards in the documents listed in Table 14-1 and those referenced in Book 3. The Contractor shall use the latest adopted edition at the time of the Proposal Due Date.

14.1.1.1 US 160

Table 14-1: Standards for US 160

Author or Agency	Title
Request for Proposal US 160 Elmore's Corner to Dry Creek	Roadway Criteria Table (Exhibits 14-A, 14-B, and 14-C to this Section)
American Association of State Highway and Transportation Officials (AASHTO)	A Policy on Geometric Design of Highways and Streets, 7th Edition (PGDHS, 2018)
AASHTO	Roadside Design Guide
Colorado Department of Transportation (CDOT)	Roadway Design Guide
CDOT	Standard Plans, M&S Standards
CDOT	Standard Specifications for Road and Bridge Construction (Standard Specifications)
Federal Highway Administration (FHWA)	FHWA-CFL/TD-11-003, Wildlife Crossing Structures Handbook, Design and Evaluation in North America
International Code Council (ICC)	International Fire Code (IFC)
National Cooperative Highway Research Program (NCHRP)	Report 1043 Guide for Roundabouts
State of Colorado	State Highway Access Code
Department of Justice	2010 ADA Standards for Accessible Design

14.1.1.2 Local Roadways

Local Roadways include La Plata County Roads CR 229, CR 222, CR 223 Elmore's, CR 225, and other non-CDOT Roadways impacted by the Project including Mesa Heights, Florida Acres Drive, Wageman Road, C Bar K Lane, Cole Ranch Road, Encantado Lane, Lone Pine Gulch Road, gas well accesses, Via Visa Circle, Kirk Lane, Wasinger Drive, and Silver Hills Road.

Roadways controlled or maintained by Local Agencies, other than CDOT, shall be designed and constructed according to the Local Agency's standards and requirements. In addition to the documents referenced in Table 14-1 and Book 3, Local Agency manuals and standards are in Table 14-2.

Table 14-2: Standards for Local Roadways

Author or Agency	Title
Request for Proposal US 160 Elmore's Corner to Dry Creek	Roadway Design Criteria Table (Exhibit 14-B and Exhibit 14-C to this Section)
La Plata County	La Plata County Code Development Standards and Specifications

14.2 Design Requirements

14.2.1. Submittals

All submittals shall be prepared, reviewed, and submitted in accordance with the requirements set forth in Book 2, Section 4.

14.2.2. General Design Requirements by Project Element

14.2.2.1 Intersection at US 160 and CO 172/CR 234

Only the east leg of the intersection of US 160 and CO 172/CR 234 is impacted by the Project. The existing lane configuration consists of two 12-foot thru lanes, a right-turn acceleration lane, and a 4-foot Shoulder in the eastbound direction, and two 12-foot thru lanes, a 12-foot left turn lane, a 12-foot right-turn lane, and 6-foot Shoulder in the westbound direction.

The raised median shall be configured to develop the two-way left-turn (TWTL) prior to the driveway on the north side of US 160 at MP 91.71. Center median shall be a minimum of 4-feet wide, including the width of the curb and gutter. No inside Shoulder is required.

As the eastbound right-turn acceleration lane terminates, the Shoulder shall transition from 4-feet adjacent to the acceleration lane to 12 feet paved width to the Mesa Heights access. East of the Mesa Heights access, the outside Shoulder will resume the standard 10-foot composite width.

14.2.2.2 Florida Canal Ditch Rider Road

Access to the existing ditch rider Road for the Florida Canal at MP 91.83, on the north side of US 160, shall be constructed along the fill slope no steeper than a 10 percent vertical grade behind the guardrail. This access Road shall be 10-foot-wide.

14.2.2.3 CR 229

Construct a paved Shoulder on the north side of US 160, a minimum width of 12 feet from the end of the guardrail over the Florida Canal (approx. MP 91.88) to the first driveway east of CR 229 (approx. MP 91.99).

14.2.2.4 Wageman Road

The two adjacent access point at MP 92.17, shall be consolidated to a single access point intersecting US 160 up until the deer guard. The access point will diverge into two accesses, one for each parcel, within the CDOT ROW.

14.2.2.5 Field Access at MP 92.50 South

The existing field access at MP 92.50 will no longer have direct access to US 160. Grading and vehicle access gates shall be provided in the deer fence such that the property owner can traverse along the toe of slope and up a reasonable grade back to their main access point. The gate configuration shall accommodate CDOT maintenance access to the wildlife underpass Structure.

14.2.2.6 Lone Pine Gulch Road

Access to both the north-south and the east-west access points must be maintained. Design vehicle to access the east-west movement shall be a multi-unit truck (PU) and a 30-foot trailer. The vehicle turning movement shall be able to be completed in one continuous smooth movement to/from US 160. Provide a vehicle access gate along the east-west access in a similar configuration to the existing configuration. The new gate on secondary access is not required to match the height of the deer fence.

14.2.2.7 US 160 and CR 223 Elmore's

The existing cul-de-sac and approximately 650 feet of CR 223 will be reconfigured further north to accommodate the widened section of US 160. The existing emergency vehicle gates shall be removed and replaced with new vehicle gates and shall match the height of the deer fence. The emergency access to US 160 shall be maintained. The eastern centerline curve radius along CR 223 Elmore's shall be maintained, or flattened, and it is desirable to include a tangent west of that curve to provide a more direct travel path. The CR 223 section includes two 12 foot travel-lanes and 2 foot outside Shoulders. The cul-de-sac diameter shall accommodate fire truck and school bus turn-around maneuver.

14.2.2.8 McClean Spring and Unnamed Seep

There is a known spring and seep between MP 93.2 and MP 93.5, that starts on the north side of the Highway and then crosses to the south side, with existing pipes and underdrain systems. Permanent design solutions shall meet clear zone requirements and care should be taken to protecting the integrity of the embankment and other improvements. Additional design requirements are per Book 2, Sections 6, 9, 11, 13, and 16.

14.2.2.9 Access to Mouse Mitigation Areas

Provide a 10 foot wide maintenance access Road near MP 93.7 from US 160 to the bottom of the mouse mitigation area west of the Florida river. Provide an additional 10 foot wide maintenance access Road and gate from US 160 through the ROW fence between MP 93.95 and MP 93.97 that extends across existing ditch crossing located approximately 310 feet due south of MP 93.95 from the edge of pavement, and then routes this access down into the proposed mouse mitigation area.

Provide vehicle access gates in deer fence at both locations. Grades along access Roads shall be no steeper than 10 percent, shall extend past catch point to habitat elevation, and shall be located within permanent CDOT ROW. Additional requirements for the mouse mitigation areas are described in Book 2, Section 6, Book 2, Section 13, Book 2, Section 18, and Book 2, Section 21.

14.2.2.10 Existing Intersection at US 160 and CR 225

The intersection of US 160 and CR 225 shall be reconfigured to a high-speed approach roundabout including two-lane entries and exists for US 160 and one-lane entry and exits for CR 225. See Section 14.2.11 for additional design requirements.

Construct a widened paved Shoulder on the north side of US 160 for the intended use of an informal chain up area for westbound vehicles prior to the steep roadway grade on US 160 west of the Florida River. Minimum dimensions shall be 12 feet wide, as measured from the edge of traveled way, and a length of 150 feet but note that a length of 200 feet is desired. The preferred location is west of intersection prior to the Florida River Bridge. There are no associated lighting requirements. The final location of the widened paved Shoulder shall be submitted to CDOT for Acceptance prior to the Pre-RFC Document submittal.

14.2.2.11 CR 225 Park and Ride

The rehabilitation and reconfiguration of the existing park and ride in the northeast corner of US 160 and CR 225 is required per this Section, Book 2, Section 2 and Book 2, Section 11.

The park and ride area shall have a minimum of 40 total parking spaces, with 2 ADA accessible spaces, and a transit loading area for Road Runner Transit.

Parking spaces shall be 9-foot wide and 20-foot long perpendicular. Two-way aisles between the two rows of 90 degree, perpendicular parking shall be a minimum of 24-feet wide. Alternative parking orientations shall comply with La Plata County Land Use Code Chapter 70-18. No raised islands or parking bumpers shall be used to allow for snow removal.

The two ADA accessible spaces shall be provided next to the transit loading area. The Contractor shall provide one van accessible space and this space shall be located closest to the transit loading area. An accessible route shall be provided from the ADA accessible spaces to/from the transit loading area. The ADA spaces, accessible route, and transit loading area shall comply with the 2010 ADA Standards for Accessible Design.

The transit loading area shall be a minimum of 12 foot wide in accordance with La Plata County Land Use Code Chapter 70-18. The transit design vehicle shall be a route bus per Road Runner Transit and is 7-foot wide and 30 foot long.

Parking spaces shall be striped 4 inch wide with reflectorized white paint.

If there are existing asphalt areas remaining that are not needed for the parking spaces and the transit loading area, the asphalt may remain intact as long as it is designated a snow accumulation area by signing and striping. Alternatively, the area may be sawcut from the rest of the park and ride, obliterated, disposed of, graded into surrounded areas, and reseeded.

The Contractor shall submit the design for the park and ride area to CDOT for Acceptance prior to the RFC Documents submittal.

14.2.2.12 Via Vista Circle (MP 94.41)

Place deer guard as close to the ROW fence as possible without impacting the waterline. Adjust drainage crossing access as necessary.

14.2.2.13 Englishman and Narrow Gauge Mobile Home Park Accesses

A consolidated access point for the Englishman and Narrow Gauge mobile home parks shall be constructed as shown in Book 2, Section 1. The new alignment shall be configured to include 4-foot outside Shoulders and two 12-foot through lanes. Existing access points to US 160 for each mobile home park shall be maintained as emergency access points and will be closed to general use by installing a gate at each access point. Extra width or clear area shall be provided to accommodate a large vehicle with a mobile home turning movements and additional Shouldering Material shall be provided for any off-tracking that occurs.

Each emergency access shall meet La Plata County Code requirements for emergency access. The Contractor shall ensure fire protection is provided through fire hydrants for each individual mobile home park meeting current fire code requirements. One existing fire hydrant to the west is to be protected in place, with the wildlife mitigation fencing bumped around the existing fire hydrant ensuring the fire hydrant is accessible from the private side of the fence. A new fire hydrant shall be placed adjacent to the eastern emergency access (Englishman Mobile Home Park) on the private side of the ROW line/wildlife mitigation fence. The fence shall not be bumped out around the new fire hydrant. Fire hydrants are served by the La Plata Archuleta Water District (LPAWD), refer to Book 2, Section 8 and Exhibit 8-E, Preliminary Utility Relocation Schedule. Tie-in requirements are per LPAWD standards.

An eastbound right-turn deceleration lane from US 160 into the new access is required. The eastbound passing lane shall be fully ended a minimum of 200 feet prior to beginning the right-turn lane.

14.2.2.14 Access at MP 95.49 North

The existing gravel turnaround shall be constructed with similar size and grades to the existing condition and shall be adjusted, as necessary to tie into the new driveway profile. Additional requirements are shown in Book 2, Section 9.

14.2.2.15 Lon's Salvage Yard (MP 96.86)

The final configuration shall be designed to accommodate WB-67 vehicle turning movements for exiting and entering westbound US 160, while remaining in the outside lane. If necessary, provide additional Shouldering Material in any areas with off-tracking. See Section 14.3.5.7 for additional design requirements. Shouldering Material shall consist of 6-inches of Aggregate Base Course (Class 6).

14.2.2.16 Encantado Lane to CR 222

An ADA-compliant pathway is required for the residents of the Los Prados neighborhood to connect from Encantado Lane to CR 222. There is no requirement for this pathway to be separate from other facilities and it may route along Encantado Lane, the shoulder of US 160, and emergency access to CR 222. Pedestrian gates shall be installed to support this ADA pathway as described in Book 2, Section 14.3.6. If a separate pathway is provided, a firm, stable, and slip-resistant ADA accessible path with a minimum width of 6-feet is required.

14.2.3. Cross Slope and Superelevation

14.2.3.1 Normal Cross Slope

All new and reconstructed pavement sections shall have a normal cross slope of 2 percent.

When overlay areas are needed, the sections where the existing cross slope is equal to or greater than 2 percent, the Contractor shall maintain the existing pavement cross slope. For overlay sections where the existing cross slope is less than 2 percent, the cross slope shall be built up through the use of a variable thickness overlay to a minimum of 2 percent.

14.2.3.2 Superelevation Rates

Superelevation transitions for US 160 shall be designed based on the typical sections (number of lanes). Superelevation transition design shall comply with the design criteria and methodology of the current AASHTO PGDHS, 2019 CDOT Standard Plans, M&S Standards, and the CDOT Roadway Design Guide based on an e_{max} of 8 percent.

Superelevation diagrams shall be provided in the Roadway plans to verify that edge profiles (at the location of the Shoulder/lane line) meet design criteria. Superelevation transitions shall be modified if necessary to meet these criteria.

Superelevation transitions shall be designed to eliminate 0.0 percent cross slopes on Bridge decks or on profile crest and sag curves where grades flatter than 0.5 percent occur.

For sections where the existing superelevation is less than required by current design standards, the cross slope shall be built up through the use of a variable thickness overlay to achieve the appropriate cross slope. Where matching existing horizontal radius, the Contractor shall coordinate with CDOT for needed superelevation corrections prior to the Preliminary Design Documents submittal.

14.2.4. Stopping Sight Distance

Stopping sight distances and decision sight distances shall meet or exceed the requirements of Exhibits 14-A, 14-B, and 14-C in this Section. Stopping sight distances shall be determined in accordance with the CDOT Roadway Design Guide and AASHTO PGDHS.

The Contractor shall evaluate and correct known vertical sight distance issue at CR 225.

14.2.5. Intersection Sight Distance

Intersection sight distances shall meet or exceed the requirement of Exhibits 14-A, 14-B, and 14-C in this Section. Intersection sight distances shall be determined in accordance with the CDOT Roadway Design Guide and AASHTO PGDHS.

14.2.6. Vehicle Turning Movements for Access Points

The land use along the corridor is primarily residential and agricultural with some commercial use. Vehicle turning movements for access points need to take into account property use. At a minimum, access points shall accommodate a design vehicle of a pickup truck with a trailer. Access points requiring larger design vehicles are identified in Exhibits 14-A, 14-B, and 14-C. Access geometry shall accommodate the design vehicle turning movements into and out of property from US 160 and shall be able to pass through the deer guard without encroachment into adjacent US 160 travel lanes.

The turning movements for a large vehicle with a mobile home is allowed to encroach into the adjacent US 160 travel lanes for the Englishman and Narrow Guage Mobile Home Park access point. A short-term lane closure on US 160 can be assumed.

The Contractor shall coordinate with the respective fire districts for their emergency vehicle templates. Access points shall accommodate access by emergency vehicles. Some pavement off-tracking is acceptable when an SU-33 is the most restrictive design vehicle.

As described in Section 14.2.2, a stabilized gravel Shoulder defined as 6-inches of Aggregate Base Course (Class 6), shall be utilized to accommodate use by a larger design vehicles or to negotiate within tight geometric constraints.

Vehicle turning template exhibits for all access points shall be submitted to CDOT for Acceptance prior to RFC. The vehicle turning templates shall show both the tire path and vehicle overhang for ingress and egress for the design vehicle and SU-33. The exhibits should clearly indicate location of access, scale, edge of pavement, design vehicle, tire path, vehicle overhang, and all pertinent design features (edge of pavement/gravel, fencing, deer guards, gates, drainage, etc.) to demonstrate access functionality.

14.2.7. Fill and Cut Slopes and Clear Zones

The Contractor shall design cut and fill slopes to obtain clear zones and avoid the need for guardrail wherever possible. Where clear zones cannot be obtained within CDOT ROW, guardrail shall be required.

Clear zones shall be designed in accordance with the recommendations of the AASHTO Roadside Design Guide and a minimum clear zone of 30 feet shall be used on US 160 per Table 3-1 Note A. The horizontal curve adjustment factor shall be calculated per Table 3-2. All other guidelines within the AASHTO Roadside Design Guide shall apply. Clear zones for County Roads and other named Roads shall be calculated in accordance with the recommendations of the AASHTO Roadside Design Guide. Clear zone for all other driveways shall be 2-feet in accordance with La Plata County Code Development Standards and Specifications.

14.2.7.1 Roadside Slopes Adjacent to Pavement

The Point of Slope Selection (POSS) is defined as the location at which the Roadside slope, also known as the z-slope, adjacent to the pavement ends and the cut or fill slope begins. Width and slope of the area between the edge of pavement (EOP) (or curb and gutter, or Sidewalk) and the POSS shall be as follows:

1. US 160: 10 feet minimum at a 4:1 or flatter slope, US 160 curb areas: 4 feet at a 2 percent slope toward the gutter pan

2. La Plata County Roads: 8 feet at 4:1 or flatter slope

14.2.7.2 Fill Slopes

Fill slope areas shall be designed with ditches and storm sewer as necessary to prevent Roadside and slope drainage from flowing onto adjacent properties.

Fill slopes and height beyond the POSS shall be designed and constructed in accordance with the following priorities:

1. Use 4:1 slopes where fill heights are less than 6 feet and match with existing conditions that can be obtained within the Project limits.
2. Use 4:1 slopes then break to 3:1 slopes where fill heights exceed 6 feet, match with existing conditions can be obtained within the Project limits, and clear zone can be obtained within the Project limits.
3. Where the above conditions cannot be obtained, the Contractor may use any of the following design approaches.
    A. Use 3:1 slopes with barrier protection or appropriate runout.
    B. 2:1 slopes with barrier protection allowable from MP 93.35 to MP 93.61 and at major Structures.
    C. Use retaining walls or reinforced soil slopes, as necessary, with barrier protection to match with existing conditions within the Project limits. Where retaining walls or reinforced soil slopes in fill condition are used, locate to avoid maintenance areas less than 10 feet in width with a maximum 6:1 cross slope between the face of wall or slope and ROW or permanent Easement (PE) line, fence line, or other obstruction.

Additional design requirements related to Materials and reinforcement as shown in Book 2, Section 11, Book 2, Section 12, and Book 2, Section 16.

14.2.7.3 Cut Slopes

There are at least two different native Materials that will be encountered within the Project. The two Materials consist of surficial soil and bedrock of the Animas Formation, as defined in Book 2, Sections 11 and 12. The surficial soil is at the top near existing ground and the bedrock is below the surficial soil. Each of the Material layers have different requirements for cut slopes. In certain instances, all Material types will be encountered.

All tops of cut slopes at the existing ground shall be rounded to provide a pleasing appearance.

Cut slopes in surficial soil beyond the POSS shall be designed and constructed in accordance with the following priorities:

1. Cut slopes shall be transitioned at the match with the z-slope adjacent to Roadway pavement in such a manner to comply with the recommendations of the clear zone requirements and the AASHTO Roadside Design Guide.
2. The bottom of the Roadside ditch must be a minimum of 1 foot below the bottom of the Aggregate Base Course (Class 6) per Book 2, Section 11, and meet freeboard requirements per Book 2, Section 13.

3. Use 4:1 or flatter slopes for cut slopes where matching with existing conditions can be obtained within the Project limits.
4. Use 3:1 slopes beyond the clear zone for cut slopes where such slopes steeper than 4:1 are necessary to match with existing conditions within the Project limits.
5. Where the above conditions cannot be obtained, the Contractor may use any of the following design approaches.
    A. Use 3:1 foreslopes with barrier protection.
    B. Use retaining walls, as necessary, to match with existing conditions within the Project limits.

Cut slopes in the bedrock in the Animas Formation beyond the POSS shall be designed and constructed in accordance with the following priorities:

1. Cut slopes shall be transitioned at the match with the z-slope adjacent to Roadway pavement in such a manner to comply with the recommendations of the clear zone requirements and the AASHTO Roadside Design Guide.
2. The bottom of the Roadside ditch must be a minimum of 1 foot below the bottom of the Aggregate Base Course (Class 6) per Book 2, Section 11, and meet freeboard requirements per Book 2, Section 13.
3. Use 3:1 or flatter slopes for cut slopes.
4. Use retaining walls, as necessary, to match with existing conditions within the Project limits.
5. When competent and durable sandstone is encountered in cut sections, it may be cut at a steeper slope than 3:1 and left exposed. The Contractor's Geotechnical Engineer will determine the allowable cut slope of the exposed rock and CDOT will be given opportunity to accept or comment on the recommended cut slope.
6. Paleontological monitoring will be required when excavating within the Animas Formation east of CR 225 as shown in Book 2, Section 6.

14.2.7.4 Retaining Walls

Refer to Book 2, Section 16, for retaining wall requirements. Retaining walls shall be used as necessary. Where retaining walls are used in a fill condition, locate to avoid maintenance areas less than 10 feet in width with a maximum 6:1 cross slope between the wall and ROW or PE line, fence line, or other obstruction. Where retaining walls are used in a cut condition directly adjacent to the Roadway, a 10 foot access width can include the Shoulder.

14.2.8. Guardrail

All Guardrail Type 3 W Beam shall be Midwest Guardrail System (MGS) 31-inch with steel posts. Guardrail Type 3 W Beam shall include hot mix asphalt (HMA) as shown on M-606-1. Wooden curb and earthen Shoulder is not allowed.

New guardrail placed shall meet the finishing requirements in accordance with Project Special Provision Section 522 Environmental Stain (Galvanized), in Book 2, Section 21.

14.2.9. Barrier

All concrete barriers shall be cast-in-place. Precast barriers are not allowed for permanent installations. All concrete barriers shall be Guardrail Type 9 Single Slope Barrier.

Colored barrier is required between MP 93.21 and MP 93.35 and shall be required to match corridor aesthetics. Center median barriers are not required to be colored and it is not required to include colored barriers at the wildlife crossing at MP 97.43.

14.2.10. End Terminals

All end terminals shall be MASH compliant.

14.2.11. Roundabouts

A roundabout shall be constructed at the US 160 and CR 225 intersection. The Contractor shall submit the roundabout design approach memo and vehicle turning templates to CDOT for Acceptance prior to the Pre-RFC Documents submittal addressing each of the criteria listed below. The roundabout shall be designed according to NCHRP Report 1043: Guide for Roundabouts, and according to the following requirements:

1. Number of lanes: The roundabout shall have two-lane entries and exits for US 160 and one-lane entry and exit for CR 225.
2. Design vehicle: The roundabout shall accommodate a WB-67 vehicle for all movements.
3. Truck apron: Provide a truck apron to accommodate a WB-67 vehicle traveling in the inside lane. The truck apron shall slope outward at 1 percent to 2 percent. Provide a 3-inch to 4-inch sloping curb between the truck apron and circulatory Roadway, as described in NCHRP Report 1043 Section 13.4 and as shown in NCHRP Report 1043 Exhibit 13.10. The pattern and color of the truck apron shall have a contrasting color from the Roadway that complements the existing Grandview interchange aesthetics as described in the Reference Documents. The color shall not be the same color used for the median cover Material. The truck apron thickness and base course under it shall be designed by the Contractor's geotechnical engineer.
4. Inscribed circle diameter: The inscribed circle diameter shall be between 165 feet and 220 feet.
5. Entry width: The entry width shall be between 24 feet and 30 feet for two-lane entries and shall be a minimum of 14 feet for the one-lane entry.
6. Circulatory Roadway width: The width of each lane in the circulatory Roadway shall be between 14 feet and 16 feet (or as needed to adjust for and allow side by side P and WB-67 turning movements) as Approved by CDOT.
7. Entry radius: The entry radius shall be 65 feet minimum for the two-lane entries as shown in NCHRP Report 1043 Exhibit 10.68. The entry radius shall be 50 feet minimum for the one-lane entry, as described in NCHRP Report 1043 Section 10.6.4.
8. Entry path overlap: To avoid entry path overlap, all two-lane entrances shall comply with vehicle path alignment criteria described in NCHRP Report 1043 Appendix A.3 and allow for side by side P and WB-67 turning movements as Accepted by CDOT.
9. Exit radius: All exit radii shall be greater than 100 feet as described in NCHRP Report 1043 Section 10.6.5.

10. Exit path overlap: To avoid exit path overlap, all two lane exits shall comply with the vehicle path alignment criteria described in NCHRP Report 1043 Appendix A.3.
11. Fastest path: The fastest path shall be drawn for all entries according to NCHRP Report 1043 Section 9.4.1. The speed for R1 of the fastest path shall be 25 mph to 30 mph for the two-lane entries and 20 mph to 25 mph for the one-lane entry. Use equation 3-7 from AASHTO PGDHS, 2018 to calculate the speed.
12. Curb: Place Curb and Gutter Type 2 on all outside edges of the roundabout, and place Curb and Gutter Type 2 on all splitter islands. The Contractor shall select the appropriate curb type based on the design speed and transitional design speeds through the roundabout approaches (Section M versus Section B). The outside Shoulder of the US 160 entries shall taper from 10 feet to 0 from the beginning of the curb to the beginning of the entry curve. For CR 225 entries and exits, the curb shall extend at least through the entry or exit curve.
13. Treatment for high-speed approaches: The splitter island on the approaches along US 160 shall be at least 200 feet long. There shall be successively tightening reversing curves approaching the roundabout on US 160, such that the speed differential between each curve is not more than 10-15 mph and appropriate tangents are present between the curves as described in NCHRP Report 1043 Section 10.14.3.
14. Grade: The maximum grade of the circulatory Roadway shall be 3 percent. The maximum profile grade of US 160 shall be 3 percent, 680 feet from the center of the inscribed circle. This requirement is not ATC eligible.
15. See Book 2, Section 18, for landscaping requirements within the roundabout.

14.2.12. Vertical Profile

14.2.12.1 US 160 Mainline Transition to Existing

At the terminus of the proposed Basic Configuration limits in accordance to Book 2, Section 1, provide a transition to the existing two-lane US 160 that meets the requirements for a design speed of 60 mph.

14.2.13. Design Considerations

Existing grades on the corridor exceed the 5 percent maximum grade in three locations (approximately MP 93.12 to MP 93.58, approximately MP 94.65 to MP 95.06, and approximately MP 96.00 to MP 96.37). In these areas, no grade correction is required and the Contractor may match the existing grade. Though not a controlling criteria, CDOT acknowledges that meeting clear zone requirements over the Florida Canal may be a competing factor with other design requirements. Guardrail protection on the south side is not desirable due to close proximity of access points.

14.2.14. Design Exception Process

Design exceptions shall be submitted to CDOT for Approval prior to the submittal of the Pre-RFC Documents. Design exceptions may be subject to the Approval of FHWA. Design exceptions that require Approvals beyond CDOT may require additional time for Approval. Delays incurred from said Approvals are non-compensable and shall not justify any additional time to the schedule.

The Contractor shall comply with the following requirements when requesting a design exception:

1. The Contractor shall submit design exception requests in the form of a letter addressed to the CDOT Project Director for Approval prior to the submittal of Pre-RFC Documents.

2. The design exception request shall consist of the following items:
    A. A letter identifying the exception(s) by number, Project number, location, and status (new submittal, resubmittal, etc.).
    B. A completed CDOT Form 464 – Design Exception Variance Request, Exhibit 14-D.
    C. Supporting documentation indicating the justification for the design exception. Justification shall address the following items:
        i. Site conditions of the exception.
        ii. Compelling reason for the exception, including which standard is not being met. If the exception affects any other standards, state what will be done to mitigate the effects of the exception on those standards.
        iii. Alternatives considered
        iv. Analysis of risk, including effects of the exception on safety and operation of the facility and previous crash history near the location of the exception.
        v. Calculations estimating the cost of attaining the design standard and costs of exception as proposed.
        vi. Effect on scenic, historical, or other environmental features.
        vii. Discussion of any proposed mitigations.
    D. Plan and profile drawings depicting the exception.

14.3 Construction Requirements

14.3.1. Median Cover Material

Median cover Material for all raised medians on mainline US 160 and CR 225 roundabout and mainline US 160 shall match the aesthetics of the corridor like at the Grandview Interchange as described in the Reference Documents via a concrete median cover Material. The Contractor shall provide a mockup (4-foot by 4-foot minimum) test panel to CDOT for all surface treatments for texture, color, and quality that will be compared to existing infrastructure for Acceptance.

14.3.2. Safety Edge

The Contractor's design shall include safety edges. Safety edge shall be required on all mainline US 160 pavement, overlay areas, and local Roadway pavement. Other than in overlay areas, CDOT safety edge detail shall be modified such that the Base Course and Subbase (ABC Class 6 and ABC Class 2) extend to topsoil layer on fill or ditch foreslope as shown in Figure 7-2 of the CDOT Roadway Design Guide rather than a vertical face as shown in M-400-1. Safety edge is not required at the front face or under guardrail, adjacent to median barrier, or adjacent to curb and gutter.

14.3.3. Shouldering Material

Shouldering Material is required along the outside pavement edge for the outside Shoulder of US 160 and County roads as follows:

1. Topsoil may be used in lieu of Shouldering where Shoulders are 10 feet or greater.
2. 2 feet width where Shoulders are less than 10 feet.

3. Match width along US 160 to face of deer guards where they are located at clear zone.
4. Topsoil and seeding is allowable on all County Roads.

Additional requirements are shown in Book 2, Section 11.

14.3.4. Water Wells

The Contractor shall protect in place any water wells within properties acquired by the Project in accordance with Book 2, Section 9, Book 2, Section 13, and the CDOT Standard Specifications, Section 202.

14.3.5. Fencing

14.3.5.1 Temporary Fencing

Provide temporary fencing according to ROW acquisition agreements per Book 2, Section 9, to protect adjacent private property, livestock containment, and other property owner requirements.

Livestock may be pastured in various fields adjacent to the Project during construction. In order to protect and control livestock, the Contractor shall install and maintain temporary fence at locations where adjacent property has livestock and as specified in Book 2, Section 9, during construction. The Contractor shall maintain the temporary fence in such condition that it is capable of performing its intended function until such time as the permanent fence is completed. The Contractor shall give the landowner 30 Days written notice before any existing fence or gates are removed unless otherwise noted in Book 2, Section 9.

In remaining areas, temporary fencing shall be considered to control construction operations and to avoid impacts beyond ROW limits. Temporary fence shall be placed as required in any other Section of Book 2 and property-specific needs shall be coordinated with landowner prior to placement.

14.3.5.2 Permanent Fencing

The Contractor shall provide permanent ROW fencing of the types and at the locations shown in Table 14-3. See Book 2, Section 9, for additional requirements. All fencing, deer guards, and game ramps, including fencing across small mammal crossings, shall be located outside of the clear zone.

There shall be no gaps in the deer fencing along the US 160 corridor especially when there is a change in grade at wildlife underpasses, small mammal crossings, and at Bridge locations. Avoid abrupt angles where the deer fence transitions at the wildlife underpasses, small mammal crossings, and at the Bridges. Deer fence shall tie to all gates, game ramps, deer guards, and access control fence along the Project ROW. A bump out is required at a fire hydrant per 14.2.2.13 of this Section. In cut conditions, fencing shall be placed on a 4-foot bench, a minimum of 2 feet away from grade breaks to promote long term stability. Fencing shall be placed a minimum of 10 feet away from fill slope catch points to allow for maintenance access.

At deer fencing termination points, where it does not tie into existing deer fence, geocell cellular confinement system and geotextile weed barrier shall be placed from fence termination point (clear zone) to the edge of Shouldering Material or to a maximum of 5-feet from the edge of pavement where Shouldering Material is not present. The pads shall be a minimum of 20-feet wide and a minimum of 8-inches depth geocell shall be used.

The construction of game ramps and deer fencing shall be phased to construct game ramps within 10 Days of the construction of the deer fence. Deer fencing shall be constructed on both sides of the Roadway at one time. No run of permanent deer fence on one side of the Highway shall be constructed more than one quarter mile beyond the end of the permanent deer fencing on the opposite side of the Roadway. Permanent deer fencing shall be constructed after the wildlife underpasses are installed. If deer fencing is constructed prior to the construction of the wildlife underpasses, gaps in the deer fencing will be required to facilitate wildlife movement. The gaps shall be installed at proposed game ramp locations until the wildlife underpasses are completed. The gaps shall be no more than one quarter mile apart.

Any ROW and/or deer fencing that crosses perpendicular through irrigation ditches shall meet ditch company standards and no gaps shall be allowed.

Table 14-3: Permanent Fencing

Location	Type	Remarks
US 160 ROW west of MP 91.96	ROW Fence	Per CDOT Standard M-607-1
US 160 ROW east of MP 91.96[1]	Deer Fence	Per CDOT Standard M-607-4
Between CR 223 Elmore's and US 160	Deer Fence	Per CDOT Standard M-607-4
CR 223 Elmore's ROW	Barbed Wire with Metal Posts (Smooth Strand Wire - Top and Bottom)	Per CDOT Standard M 607-1 and the top and bottom strands per 710.01 without the barbs
CR 225 ROW from US 160 to deer guards	Deer Fence	Per CDOT Standard M 607-4
CR 225 ROW beyond deer guards	Barbed Wire with Metal Posts (Smooth Strand Wire - Top and Bottom) beyond deer guards	Per CDOT Standard M 607-1 and the top and bottom strands per 710.01 without the barbs
Englishman and Narrow Gauge combined access ROW	Barbed Wire with Metal Posts (Smooth Strand Wire - Top and Bottom)	Per CDOT Standard M 607-1 and the top and bottom strands per 710.01 without the barbs
Between Englishman and Narrow Gauge combined access and US 160	Deer Fence	Per CDOT Standard M 607-4
MP 95.55 to MP 95.66	Existing Fencing	Tie proposed fencing to existing deer fence. Delineate ROW with carsonite markers, if needed.

Location	Type	Remarks
BLM properties	Deer Fence with existing ROW Fence behind	Per CODT Standard M-607-4 and M-607-1
Wildlife underpasses and small mammal crossings	Deer Fence	Per CDOT Standard M-607-4
Wildlife crossing access openings at ROW	Barbed Wire with Metal Posts (Smooth Strand Wire - Top and Bottom)	Per CDOT Standard M 607-1 and the top and bottom strands per 710.01 without the barbs

1. Where existing deer fence is present, located at ROW, and in good condition, the Contractor may elect for deer fence to remain in place. There is approximately 55,000 LF of existing fencing as anticipated to remain for this Project. The Contractor shall assume a replacement of 25,000 linear feet if additional fencing is required during construction.

14.3.5.3 Emergency Access

Emergency access points along the corridor are located at CR 222, CR 223 Elmore's, Englishman and Narrow Gage mobile home parks, and the access at the north side of US 160 at MP 96.79. Emergency access points shall be gated with 12 foot gates at a minimum and shall match the height of the deer fence. Emergency access point gates shall include a locking system compatible with the local fire department requirements, Knox Padlock® eLock – Long Shackle – Exterior Use, Model: KLS-3781. Emergency access point gates do not require the installation of deer guards.

14.3.5.4 ACM Parcel (MP 91.87 to MP 91.95)

The property owner will install screening fence per LaPlata County. ROW fencing shall tie into property owner's screen fencing on either side. Markers will be in place to delineate CDOT ROW through the limits of screening fence.

14.3.5.5 Carmon Property (MP 92.41 to MP 92.53 South)

Additional access shall be provided as described in Book 2, Section 9.

14.3.5.6 McClure Murray Ditch MP 93.40 to MP 93.45)

Grade maintenance an access Road a minimum of 10 feet wide between the toe of slope and the fence line from the oil well pad access Road at MP 93.64 to the ditch outfall on the south side of US 160. Provide 10-foot wide vehicle gates, as required to allow passage across drainage and small mammal crossing facilities.

14.3.5.7 Lon's Salvage Yard (MP 96.78 to MP 96.91)

The fence on the Lon's Salvage Yard property shall be configured as shown in the reference design. Deer fence will run along the ROW line and turn at right angles to parallel the access and extend to the deer guard. In front of the deer guard, continue with the 4 strand ROW fencing and offset 4 feet to the clear zone.

14.3.6. Pedestrian Gates and Pedestrian Paths

A self-closing, ADA compliant pedestrian gate, shall be placed adjacent to all private, subdivision, emergency, and commercial accesses points with deer guards. A firm, stable, and slip-resistant ADA accessible path, 4 foot minimum width, must be provided through the pedestrian gate connecting the access on both sides of the fence/ROW. Pedestrian gates shall match the height of the deer fence and shall be a minimum of 4 feet wide.

Pedestrian gates shall be placed at each quadrant of the Florida River Bridge for maintenance access. The four pedestrian gates shall be self-closing, match the height of the deer fence, and shall be 4 feet wide.

For subdivisions or properties with livestock activity, a 6-foot wide self-closing gates shall be required.

The Contractor shall coordinate with property owners for specific width requirements and clearly document the requirements as part of the 138 Access Permit process described in Section 14.3.13.

See Book 2, Section 14.2.2 and Section 9, for locations of additional pedestrian gates. The locations of pedestrian gates and paths shall be submitted to CDOT for Approval prior to the RFC Documents submittal.

14.3.7. Vehicle Gates and Maintenance Access

A minimum 10-foot wide access gates are required for maintenance access to all drainage and irrigation facilities to match the height of the deer fence. Where existing gates are present, the gates shall match the existing widths. All gates for maintenance access shall be in line with a designed vehicle access path, a minimum of 10 feet wide.

Maintenance access gates, 10 feet wide, shall be installed at all wildlife underpasses. They shall be installed at each side of US 160 to match the height of the deer fence.

See Book 2, Section 14.2.2 and Section 9, for locations of additional vehicle gates. If there are discrepancies between the gate size in this Section and Book 2, Section 9, Section 9 shall have precedence.

The locations of the maintenance gates and paths shall be submitted to CDOT for Approval prior to the RFC Documents submittal.

14.3.8. Game Ramps

See Book 2, Section 6 for requirements.

14.3.9. Deer Guards

Deer guards shall be placed outside curb return radii at all private and La Plata County Road access points from mainline US 160 where the deer fence is placed. This requirement does not apply to the emergency access points listed in Section 14.3.5.3.

Deer guards and fencing must be placed outside of the clear zone limits and shall be placed to avoid impacting the LAPLAWD waterline. Deer guards that are within CDOT and La Plata County snow removal maintenance areas, shall be designed per the Contract Documents. Deer guards shall meet HL-93 loading requirements.

Deer guards shall not include wings to tie to the deer fencing. Instead, the deer fence shall abut the deer guard and run continuous along the outside edges (i.e. turn fence at a 90 degree angle perpendicular to the deer guard and run the entire length of the deer guard).

At driveway accesses, the pavement shall continue to the front side of the deer guards. At driveway accesses steeper than 8 percent, the pavement shall continue 20 feet beyond the deer guard on the property side. Pavement sections shall be in accordance with the requirements in Book 2, Section 11.

See Book 2, Section 6 for additional deer guard requirements.

14.3.10. Small Mammal Crossings

The location of the small mammal crossings shall be submitted to CDOT for Approval prior to the RFC Documents submittal. See Book 2, Section 6, and Book 2, Section 13 for requirements.

14.3.11. Wildlife Underpass

The Mesa wildlife underpass shall be placed at MP 92.52. The Valley wildlife underpass shall be placed between MP 96.05 and MP 96.13. The location of the Valley wildlife underpass shall be submitted to CDOT for Approval prior to the RFC Documents submittal. A 10-foot wide flat area with a maximum slope of 10:1 shall be provided at the openings of the wildlife underpasses. The flat area shall extend in length to be across the entire opening of the wildlife underpass.

See Book 2, Section 6 and Book 2, Section 16 for additional requirements.

14.3.12. Mailboxes

Single use mailboxes shall be reset and replaced per CDOT Standard M-210-1.

Existing community mailbox Structures shall be surveyed for existing conditions and shall be reset in the same condition on new concrete foundations at their new locations. Any damage incurred to the mailbox Structure shall be the responsibility of the Contractor.

The Contractor shall coordinate the final location and placement of mailboxes with both the United States Postal Service and CDOT.

14.3.13. 138 Access Permits

All properties impacted by modifications to their access points will be required to have a Form 138. A reference document is provided in Book 3 containing the access points that are impacted by the reference design with the requirements of the access for the Contractor's use. The following elements will be required after the preliminary Design Documents are Reviewed:

1. Key map for Project with each access point having a unique identifier
2. Exhibit for each owner showing a plan and profile view
    A. The following information shall be provided for each exhibit
        i. Unique identifier established on the key map
        ii. Physical address
        iii. LaPlata County Assessor Parcel ID

iv. Access Permit ID

v. Permitted use

vi. Permitted width and radii

vii. Existing width and radii

viii. Design width and radii

ix. Date

B. Plan View Requirements

i. Aerial imagery

ii. Scale: 1 inch = 20 feet

iii. US 160 and driveway stationing

iv. Surfacing types and limits labeled clearly

v. Label all widths and tapers

vi. Show all improvements including but not limited to: throat width, radii, profile grade, grading limits, pedestrian path, pipes, riprap, fencing, gate widths, deer guards, utilities, ROW, and Easements. Design of these elements shall be to a level where no substantial changes are expected after they are presented to the property owners.

C. Profile Requirements

i. No vertical exaggeration

ii. Label existing and proposed ground

iii. Label proposed slopes

iv. Label location and extents of deer guards, pipes, and other relevant features

v. Show Existing and Proposed ROW and Easements

3. Draft cover letter on template similar to one provided in the Reference Documents.
4. If requested, a representative from the design team shall attend in-person meetings with property owners within 2 weeksof the request. The representative shall be able to adequately describe design, familiar with design standards, understand the ROW process, and discuss potential alternatives.

The complete 138 package shall be submitted to CDOT, in groups of no more than 15 packages, for Review. The Contractor shall address comments within 7 Days. The submittal packages in groups of no more than 15 shall be submitted no closer than 2 weeks apart.

The template letter and exhibit shall be submitted to CDOT 2 weeks ahead of the distribution to the property owner. Owners will have 35 Day appeal period. In the event of an owner appeal, design and exhibit updates shall be provided within 7 Days after the end of the appeal process. Construction on the access will not commence until the appeal period is over, plus 5 Days.

See the Reference Documents for an example 138 package.

14.4 Deliverables

The Contractor shall submit the following to CDOT for Review, Acceptance, or Approval:

Table 14-4: Deliverables

Deliverables	Review, Acceptance, or Approval	Schedule
Paved widened Shoulder near CR 225	Acceptance	Prior to the Pre-RFC Documents submittal
Vehicle turning template exhibits at all access locations	Acceptance	Prior to the RFC Documents submittal
Roundabout design approach memo and turning templates	Acceptance	Prior to the Pre-RFC Documents submittal
Design exceptions (if applicable)	Approval	Prior to the Pre-RFC Documents submittal
Median cover Material test panel (4 foot by 4 foot)	Acceptance	Prior to placement of median cover Material
Locations of pedestrian gates and pedestrian paths	Approval	Prior to the RFC Documents submittal
Location of maintenance vehicle gates and vehicle paths	Approval	Prior to the RFC Documents submittal
Location of small mammal crossings	Approval	Prior to the RFC Documents submittal
Location of the Valley wildlife underpass	Approval	Prior to the RFC Documents submittal
138 Permit Packages	Review	Varies along corridor to meet construction schedule needs. After preliminary design review and comments are addressed at each location

14.5 Exhibits

Exhibit 14-A Roadway Design Criteria Table

Exhibit 14-B Minor Roadway Criteria Table

Exhibit 14-C Local Roadway Criteria Table

Exhibit 14-D CDOT Design Exception Variance Request Form

Exhibit 14-E CDOT Design Exception Variance - Elmore's Segment Vertical Exception

Exhibit 14-F CDOT Design Exception Variance – Valley Segment Vertical Exception

Exhibit 14-A: Roadway Design Criteria

Criteria	US 160 West of MP 94.05/CR 225	US 160 East of MP 94.05/CR 225	US 160 / CR 225 RAB
Location	MP 94.05	MP 94.05	N/A
Design Criteria and Controls			
Roadway Classification	R-A (Rural Arterial)	R-A (Rural Arterial)	R-A (Rural Arterial)
Design Speed (mph)	65	65	30 [1]
Posted Speed (mph)	60	60	N/A
Terrain	Mountainous	Mountainous	Mountainous
Maximum Superelevation (e_{MAX})	8%	8%	See Note 2
Axis of Rotation	CL	CL	See Note 2
Minimum Radius (ft.)[3]	1480	1480	See Note 2
Maximum Superelevation Cross Slope at Intersection (%)	4%	4%	3% [2]
Maximum Superelevation Cross Slope at Bridges (%)	6%	6%	N/A
Use of Spirals	Permitted	Permitted	N/A
Minimum Profile Grade	0.5%	0.5% or Match Existing	See Note 2
Maximum Profile Grade (%)[4]	5%	5% or Match Existing	3% [2]

Criteria	US 160 West of MP 94.05/CR 225	US 160 East of MP 94.05/CR 225	US 160 / CR 225 RAB
Minimum K Value, Crest[5]	193	193	19
Minimum K Value, Sag[6]	157	157	37
Stopping Sight Distance (SSD) (ft.)[7]	645	645	200
Intersection Sight Distance (ISD) (ft.)[8]	Left Turn From Major =530	Left Turn From Major =530	See Note 2
Overhead Sign Structures (ft.)[9]	17	17	17
Lane Width (ft.)	12	12	See Note 2
Two-way Left Turn Lane (ft.)	14 (min)	N/A	N/A
Inside Shoulder (ft.)	N/A	10 [10]	See Note 2
Outside Shoulder (ft.)[11]	10	8	See Note 2
Normal Cross-Slope (%)	2%	2%	See Note 2
Clear Zone (ft.)[12]	30	30	30
Design Vehicle	WB-67	WB-67	WB-67
Acceleration Length (ft.)[13]	1170	1170	190
Deceleration Length (ft.)[13]	700	700	250
Redirect Taper Rate[14]	60:1	60:1	60:1

Criteria	US 160 West of MP 94.05/CR 225	US 160 East of MP 94.05/CR 225	US 160 / CR 225 RAB
Min. Return Curve Radius (ft.)	25	25	N/A

Notes:

(1) Design speed change at MP 93.8 and 94.3 to 30 MPH prior to roundabout entry curve. Roundabout circulatory design speed is 30 mph.

(2) National Cooperative Highway Research Program (NCHRP) Report 1043 Roundabouts: An Informational Guide, third edition and Book 2, Section 14.2.11.

(3) AASHTO PGDHS, 2018 Table 3-10 for curves along US 160.

(4) Existing terrain steeper than 5% at 3 locations. Designers may match existing grade in those areas. See Exhibits 14-E and 14-F.

(5) AASHTO PGDHS, 2018 Table 3-35.

(6) AASHTO PGDHS, 2018 Table 3-37.

(7) AASHTO PGDHS, 2018 Table 3-1, use AASHTO PGDHS, 2018 Table 3-2 for SSD on Grades. Table values not adjusted for grade. Allow horizontal sight distance across barriers. Use 3D graphical solutions for areas with vertical curvature. Glare screen not allowed.

(8) AASHTO PGDHS, 2018 Table 9-17 along US 160. NCHRP Report 1043 Exhibit A.15 for intersection sight distance within the roundabout

(9) AASHTO PGDHS, 2018 section 7.2.5.1.

(10) Inside Shoulder only required in divided highway condition between MP 97.1 to 97.7.

(11) Outside Shoulder can be reduced to 4 ft paved adjacent to auxiliary lanes. Shoulder width will vary on approach to roundabout.

(12) AASHTO Roadside Design Guide Table 3-1.

(13) State Highway Access Code Table 4-6.

(14) State Highway Access Code Table 4-9.

Exhibit 14-B: Minor Roadway Design Criteria

Criteria	CR 229	CR 223 Elmore's	CR 225
Location	MP 91.94	MP 93.13 - 93.3	MP 94.05
Roadway Classification	Rural Minor Collector	Rural Minor Collector	Rural Minor Collector
Design Speed (mph)	35	20	35
Posted Speed (mph)	35	20	35
Maximum Superelevation (e_{MAX})[10]	6%	6%	6%
Minimum Radius (ft.)[1, 10]	340	340	340
Minimum Stopping Sight Distance (SSD) (ft.)[2]	250	250	250
Intersection Sight Distance (ISD) (ft.)[3]	Left Turn From Stop=720 Right Turn From Stop=625	N/A	Left Turn From Major=285
Minimum Profile Grade	0.50%	0.50%	0.50%
Maximum Profile Grade	5%	5%	4% (Roundabout Approach) 3% (Roundabout)
Minimum K Value, Crest[4]	29	29	29
Minimum K Value, Sag[5]	49	49	49

Criteria	CR 229	CR 223 Elmore's	CR 225
Access Width (ft.)	28	28	36
Lane Width (ft.)	14 (28 ft. Total Width)	12	12
Minimum Shoulder Width (ft.)	Match Existing	2	6
Redirect Taper	N/A	N/A	20:1 [6]
Clear Zone Width (ft.)[7]	10	10	14
Surface Treatment[8]	HMA/Gravel	HMA	HMA
Design Vehicle[9]	WB-67	P/T, School Bus & SU-33	WB-67

Notes:

(1) AASHTO PGDHS, 2018 Table 3-9.

(2) AASHTO PGDHS, 2018 Table 3-1, use AASHTO PGDHS, 2018 Table 3-2 for SSD on Grades. Table values not adjusted for grade.

(3) AASHTO PGDHS, 2018 Table 9-7, Table 9-9 and Table 9-17.

(4) AASHTO PGDHS, 2018 Table 3-35.

(5) AASHTO PGDHS, 2018 Table 3-35.

(6) State Highway Access Code Table 4-9.

(7) AASHTO Roadside Design Guide Table 3-1.

(8) Match existing conditions.

(9) All access points from US 160 with a deer guard must accommodate a SU-33 for Fire Department access.

(10) 20 mph Design and Posted speeds on CR 223 Elmore's apply to limits of construction shown in the Basic Configuration, including full curve at east tie in. Superelevation in excess of 6% is allowed through transition to existing curve and eastern curve radius may match existing condition.

Exhibit 14-C: Local Roadway Design Criteria

Criteria	Access West of MP 94.05/CR 225[11]	Mesa Heights Dr	Florida Acres Dr	Wageman Rd	C Bar K Ln	Cole Ranch Rd
MP	N/A	MP 91.81	MP 91.84	MP 92.17	MP 92.28	MP 92.65
Design Criteria and Controls						
Roadway Classification	Local Road	Local Road	Local Road	Local Road	Local Road	Local Road
Design Speed (mph)	15	15	15	15	15	15
Posted Speed (mph)	15	15	15	15	15	15
Maximum Superelevation (e_{MAX})	N/A	N/A	N/A	N/A	N/A	N/A
Minimum Radius (ft.) [1]	82	82	82	82	82	82
Minimum Stopping Sight Distance (SSD) (ft.) [2]	80	80	80	80	80	80
Intersection Sight Distance (ISD) (ft.) [3]	Left Turn From Stop=720 Right Turn From Stop=625	Left Turn From Stop=720 Right Turn From Stop=625	Left Turn From Stop=720 Right Turn From Stop=625	Left Turn From Stop=720 Right Turn From Stop=625	Left Turn From Stop=720 Right Turn From Stop=625	Left Turn From Stop=720 Right Turn From Stop=625
Minimum Profile Grade	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%

Criteria	Access West of MP 94.05/CR 225[11]	Mesa Heights Dr	Florida Acres Dr	Wageman Rd	C Bar K Ln	Cole Ranch Rd
Maximum Profile Grade	5% [9]	5%	5%	5%	5%	6.50%
Minimum K Value, Crest[4]	40 ft Vertical Curve	3	3	3	3	3
Minimum K Value, Sag[5]	40 ft Vertical Curve	10	10	10	10	10
Access Width (ft.)	See Access Permit and MOAs					
Lane Width (ft.)		13 (26 ft. Total Width)	12 (24 ft. Total Width)	10 (20 ft. Total Width)	9 (18 ft. Total Width)	11 ft (22 ft. Total Width)
Redirect Taper	N/A	N/A	N/A	N/A	N/A	N/A
Clear Zone Width (ft.)[6]	10	10	10	10	10	10
Surface Treatment[7]	See Book 2 Section 14.3.8	HMA/Gravel	HMA	HMA/Gravel	HMA/Gravel	HMA/Gravel
Design Vehicle[8]	P/T SU-33	P/T SU-33	P/T SU-33	P/T SU-33	P/T SU-33	P/T SU-33

Exhibit 14-C: Local Roadway Design Criteria (cont.)

Criteria	Lone Pine Gulch Rd	Encantado Ln	Driveways East of MP 94.05/CR 225 [11]	Via Vista Cir	Kirk Lane	Wasinger Dr	Silver Hills Road
MP	MP 92.97	MP 93.0	N/A	MP 94.41 & MP 94.92	MP 94.61	MP 96.30	MP 97.05
Design Criteria and Controls							
Roadway Classification	Local Road	Local Road	Local	Local Road	Local Road	Local Road	Local Road
Design Speed (mph)	15	15	15	25	15	15	15
Posted Speed (mph)	15	15	15	25	10	15	15
Maximum Superelevation (e_{MAX})	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Minimum Radius (ft.)[1]	82	82	82	292	82	82	82
Minimum Stopping Sight Distance (SSD) (ft.)[2]	80	80	80	155	80	80	80
Intersection Sight Distance (ISD) (ft.)[3]	Left Turn From Stop=720 Right Turn	Left Turn From Stop=720 Right Turn	Left Turn From Stop=720 Right Turn	Left Turn From Stop=720 Right Turn	Left Turn From Stop=720 Right Turn	Left Turn From Stop=720 Right Turn	Left Turn From Stop=720 Right Turn

Criteria	Lone Pine Gulch Rd	Encantado Ln	Driveways East of MP 94.05/CR 225 [11]	Via Vista Cir	Kirk Lane	Wasinger Dr	Silver Hills Road
	From Stop=62	From Stop=625	From Stop=625	From Stop=625	From Stop=625	From Stop=625	From Stop=625
Minimum Profile Grade	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%
Maximum Profile Grade	5%	5%	8% [10]	5%	5%	12.5%	5%
Minimum K Value, Crest[4]	3	3	40 ft Vertical Curve, or K-Value of 3	12	3	3	3
Minimum K Value, Sag[5]	10	10	40 ft Vertical Curve or K-Value of 10	26	10	10	10
Access Width (ft.)	See Access Permit and MOAs						
Lane Width (ft.)	8 (16 ft Total Width)	12 (24 ft Total Width)	M.E.	12 (24 ft. Total Width)/ 15 (30 ft. Total Width)	12 (24 ft Total Width)	8 (16 ft Total Width)	8 (16 ft Total Width)
Redirect Taper	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Clear Zone Width (ft.)[6]	10	10	10	10	10	10	10

Criteria	Lone Pine Gulch Rd	Encantado Ln	Driveways East of MP 94.05/CR 225 [11]	Via Vista Cir	Kirk Lane	Wasinger Dr	Silver Hills Road
Surface Treatment[7]	HMA/Gravel	HMA	M.E	HMA/Gravel	HMA/Gravel	HMA/Gravel	HMA/Gravel
Design Vehicle[8]	P/T SU-33	P/T SU-33	P/T SU-33	P/T SU-33	P/T SU-33	P/T SU-33	P/T SU-33

Notes:

1. AASHTO PGDHS, 2018 Table 3-9.
2. AASHTO PGDHS, 2018 Table 3-1.
3. AASHTO PGDHS, 2018 Table 9-7, Table 9-9.
4. AASHTO PGDHS, 2018 Table 3-35.
5. AASHTO PGDHS, 2018 Table 3-37.
6. AASHTO Roadside Design Guide Table 3-1.
7. Match existing conditions.
8. All access points from US 160 must accommodate a SU-33 for Fire Department access.
9. All driveways West of CR 225 (MP 94.05) except as noted shall have a maximum driveway grade of 5% unless noted: 126+06 LT (MP 91.59), 142+01 RT (ACM) (MP 91.89).
10. All driveways East of CR 225 (MP 94.05) except as noted shall have a maximum driveway grade of 8% unless noted: 335+40 RT (MP 95.49), 339+44 RT (MP 95.57), 373+43 RT (MP 96.22), 398+66 LT (MP 96.72), 402+58 LT (MP 96.79), 416+09 LT (MP 97.05).
11. Driveways with different turning requirements: 142+01 RT (ACM) (MP 91.89) = WB-50, 183+87 LT (MP 92.62)= WB 67, Englishman/Narrow Gauge (MP 95.28) = firetruck/school bus/Mobile Home, 406+35 LT (Lon's) (MP 96.86) = WB-67. Must provide turning template and clear distance. Supplement off-tracking areas with stabilized Shoulder.