

## **13.0 ROADWAYS**

The Contractor shall conduct all Work necessary to meet the requirements of Roadways.

### **13.1 Administrative Requirements**

The Contractor shall comply with the requirements of the following manuals and standards (latest versions at Proposal Due Date) for the design and construction of the Work of this Section.

#### **13.1.1 SH-128, SH-121, and US-36**

- Roadway Design Criteria Table\*
- CDOT, CDOT Design Guide, 2005.
- AASHTO, A Policy on Geometric Design of Highways and Streets, 2004 (PGDH).
- AASHTO, Roadside Design Guide, Third Edition, 2006.
- CDOT, Standard Plans, M & S Standards, July 2006
- CDOT, Standard Specifications for Road and Bridge Construction, 2005.
- AASHTO, Guide for the Development of Bicycle Facilities, 1999.
- United States Access Board, ADA Accessibility Guidelines for Buildings and Facilities, current edition.
- United States Access Board, Revised Draft Guidelines for Accessible Public Rights-of-Way, November 23, 2005.
- State Highway Access Code, Volume 2, March 2002

\* Exhibit 13-1

#### **13.1.2 Wadsworth Boulevard, Wadsworth Place, 118<sup>th</sup> Avenue, Commerce Street, Destination Drive, and other Local Streets**

- Roadway Design Criteria Table\*
- City and County of Broomfield Standards and Specifications
- AASHTO, A Policy on Geometric Design of Highways and Streets, 2004 (PGDH).
- AASHTO, Roadside Design Guide, Third Edition, 2006.
- CDOT, Standard Plans, M & S Standards, July 2006
- CDOT, Standard Specifications for Road and Bridge Construction, 2005.
- AASHTO, Guide for the Development of Bicycle Facilities, 1999.
- United States Access Board, ADA Accessibility Guidelines for Buildings and Facilities, current edition.

- United States Access Board, Revised Draft Guidelines for Accessible Public Rights-of-Way, November 23, 2005.
- State Highway Access Code, Volume 2, March 2002
  - \* Exhibit 13-1

## **13.2 Design Requirements**

Design of the Project shall be in accordance with the Roadway Design Criteria Table as provided in Exhibit 13-1, as well as Book 2, Section 1 - General. The general configuration of the roadways and associated improvements (curb and gutter, sidewalks, radii, accesses, etc.) shall comply with the requirements of the Basic Configuration.

### **13.2.1 Design and Plan Submittals**

In addition to the submittal requirements specified in this Section, the Contractor shall submit all design and plan documents to CDOT per Book 2, Section 3.7

### **13.2.2 Alignments**

Horizontal and vertical alignments of roadways as shown in the Reference Drawings may be modified as follows:

- A. Any geometric changes shall meet all contract design criteria.
- B. Any geometric changes shall be compatible with the future Phase 2 project and future US-36 Configuration.
- C. The horizontal alignment of SH-128 (120<sup>th</sup> Avenue Connection), Wadsworth Blvd., 118<sup>th</sup> Avenue, Commerce Street, and US-36 shall not be changed.
- D. The vertical alignment of SH-128 (120<sup>th</sup> Avenue Connection), as shown in the Reference Drawings, may be raised a maximum of 1.0 (one) foot between Stations 50+00 and 60+00.
- E. Profile grade between 120<sup>th</sup> Avenue Connection bridges over US36 and Commerce Street shall not be greater than 4.0%

### **13.2.3 Cross Slope and Superelevation**

#### **13.2.3.1 Normal Cross Slope**

For widening of US-36, widening of mainline lanes shall match the cross slope of the existing mainline lane pavement. Shoulder overlays and widening may match the cross slope of the existing shoulder pavement. For other pavement widening sections, the cross slope of the widened section shall match the existing cross slope of the roadway being widened.

Constructed sections of Wadsworth Boulevard, Wadsworth Place, 118<sup>th</sup> Avenue, and Commerce Street, shall have a normal cross slope of 2%.

### 13.2.3.2 Superelevation Rates

Superelevation rates for SH-128 shall follow the M & S Standards for Superelevation Streets (6% maximum superelevation table).

Superelevation runout and runoff lengths shall be designed based on the 6 through lane configuration of SH-128, with additional auxiliary lanes, as required. Superelevation transition design shall comply with the design criteria and methodology of the PGDH

### 13.2.4 Stopping Sight Distance

Stopping sight distances and decision sight distances shall meet or exceed the requirements of Roadway Design Criteria Table, Exhibit 13-1. Stopping sight distances shall be determined in accordance with the PGDH.

### 13.2.5 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 AASHTO, Roadside Design Guide.

#### 13.2.5.1 Roadside Slopes Adjacent to Pavement

*(Note: All slopes stated herein are in terms of horizontal:vertical)*

The Point of Slope Selection (POSS) is defined as the location at which the roadside slope adjacent to the pavement ends, and the cut, or fill slope begins. Width and slope of the area between the edge of pavement (or sidewalk) and the POSS shall be as follows:

1. Mainline US-36: 12 feet at a 6:1 slope.
2. Non-curbed areas of Wadsworth Blvd.: 6 feet at a 6:1 slope.
3. Wadsworth Place: 4 feet at a 4:1 slope.
4. Curb and sidewalk areas: 2 feet at a 50:1 slope.

#### 13.2.5.2 Fill Slopes

Fill slopes beyond the POSS shall be designed and constructed in accordance with the following priority.

1. Use 6:1 slopes where fill heights are less than 4 feet, and matches with existing conditions that can be obtained within the Project limits.
2. Use 4:1 slopes where fill heights are greater than 4 feet for all roadways except as noted below.
3. Slopes up to 3:1 may be used on Wadsworth Place, Commerce Street, and 118<sup>th</sup> Avenue.

4. Where the above conditions cannot be obtained the Contractor may use any of the following design approaches:
  - A. Use 3:1 to 2:1 slopes with guardrail protection. Slopes of 2:1 to 3:1 shall incorporate the use of soil retention blankets in compliance with the requirements of Section 17, Landscaping.
  - B. Use retaining walls as necessary, with guardrail protection, to obtain matches with existing conditions within the Project limits.

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

All fill slopes shall be rounded at their matches to provide for a pleasing appearance

### **13.2.5.3 Cut Slopes**

Cut slopes shall be designed and constructed in accordance with the following priorities:

1. Cut slopes must be transitioned at the match with the 6:1 slopes adjacent to roadway pavement in such a manner to comply with the recommendations of the AASHTO Roadside Design Guide.
2. Use 4:1 or flatter slopes for cut slopes for all roadways where matches with existing conditions can be obtained within the Project limits.
3. Slopes up to 3:1 may be used on Wadsworth Place, Commerce Street, and 118<sup>th</sup> Avenue.

All cut slopes shall be rounded at their matches to provide a pleasing appearance.

### **13.2.6 Guardrail**

Guardrail shall be required wherever clear zone requirements cannot be achieved.

### **13.2.7 Access Design**

The Contractor shall construct connecting roads, driveways, or curb cuts to provide access to property parcels at the locations shown on the Reference Drawings. Connecting roads and driveways shall be paved to the ROW limits using similar pavement as the adjacent roadway, and shall be replaced in kind beyond the right-of-way line to the limits required to match existing grade. Curb return openings that are provided for future connections shall be paved through the curb returns.

### **13.2.8 Design Exceptions**

#### **13.2.8.1 Design Exception Process – Basic Configuration**

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

1. The Contractor shall submit five (5) copies of design exception requests in the form of a letter addressed to the CDOT Project Manager.

2. The design exception request submittals shall consist of the following items:
  - A. A letter identifying the exception(s) by number, Project number, location, and status (new submittal, re-submittal, etc.).
  - B. Supporting documentation indicating the justification for the exception. Justification shall address the following items:
    - (1) Site conditions of the exception.
    - (2) Compelling reason for the exception, including which standard is not being met, if the exception affects any other standards, and what will be done to mitigate the effects of the exception.
    - (3) Effects of the exception on safety and operation of the facility.
    - (4) Previous crash history near the location of the exception.
    - (5) Calculations estimating the cost of attaining the design standard and costs of exception as proposed.
    - (6) Effect on scenic, historical, or other environmental features.
  - C. Plan and profile drawings depicting the exception.

#### **13.2.8.2 Approved Design Variances**

The following design variance has been approved by CDOT for this project:

Use of Type 8 Bridge Rail on the 120<sup>th</sup> Avenue Connection bridges over US-36 and Commerce Street with no barrier separation between the traffic/bicycle lanes and sidewalk.

### **13.3 Construction Requirements**

#### **13.3.1 Removals**

The Contractor shall be responsible for the removal of all items on the Project designated for removal or found to conflict with Project design elements. Removal items shall become the property of the Contractor unless designated to remain property of CDOT. Removal items shall include, but not be limited to: structures/portions of structures and obstructions, signs designated for removal, asphalt mat, curbs, median fill, guardrail, fencing, and pavement markings. All removals shall be performed in accordance with Book 2, Section 19 (Section 202).

##### **13.3.1.1 RTD Park-n-Ride**

The Contractor shall remove all features (pavement, concrete, structures, etc.) within the 120<sup>th</sup> Avenue ROW at the existing RTD Park-n-Ride. Contractor shall also remove remaining surface and pavement features of the RTD Park-n-Ride outside the 120<sup>th</sup> Avenue ROW. Contractor may remove existing embankment material for use on the project. Completed site must be finished graded in uniform fashion to control and outlet site drainage at the existing drainage pipe outfall location. Area must be topsoiled and seeded.

**13.3.1.2 Roadways**

The Contractor shall remove abandoned portions of Allison Street, smooth the area to blend into adjacent terrain, and topsoil and seed.

The Contractor may remove the existing pavement from abandoned portions of the frontage road between 120<sup>th</sup> Avenue Connection and the RTD Park-n-Ride use removed materials on the project. The existing roadway berm must be left in place to control drainage at existing culvert crossing of US-36.

**13.3.2 Guardrail**

The Contractor shall use galvanized (Standard Plan No. M606-1) steel posts with composite block for all guardrail installations (except US-36 concrete median barrier replacement) unless otherwise Approved by CDOT. The Contractor shall pave asphalt a minimum of 1-foot behind the new guardrail.

**13.3.3 Median Cover Material**

Median cover material for all medians shall match color and texture of the medians constructed as a part of the SH-128/SH-121 (Wadsworth Parkway) intersection project.

**13.3.4 Fencing**

**13.3.4.1 Temporary Fencing**

Provide temporary fencing on temporary easement lines for TE-8, TE-8A and TE-9. Temporary fencing shall be three-strand barbed wire fence with metal posts. Temporary fence shall be installed prior to commencing any construction on adjacent parcels.

**13.3.4.2 Permanent Fencing**

Provide permanent fencing of types and at locations as follows:

(to be determined based on ROW agreements)

Location	Type	Remarks

## 13.4 Deliverables

At a minimum, the Contractor shall submit the following to CDOT for review, Approval and/or Acceptance:

Deliverable	Acceptance or Approval	Schedule
Design exceptions	Approval	As part of the ACC Process, and Prior to issuance of applicable Released for Construction Documents

<b>Exhibit 13.1 ROADWAY DESIGN CRITERIA TABLE</b>											
<b>DESIGN DATA</b>	<b>120th Ave. Connection (SH- 128)</b>		<b>US-36</b>	<b>Wadsworth Blvd.</b>		<b>Commerce St.</b>		<b>118th Ave.</b>	<b>Wads. Place</b>	<b>Frontage Rd. Access</b>	<b>Remarks</b>
Roadway Classification	State Highway		State Highway	Minor Arterial		Connector		Connector	Local Res.	N/A	
Horizontal Curves	Curve 1	Curve 2		Curve 6	Curve 7	Curve 4	Curve 5	n/a	Curve 8	Curve 9	
Design Speed (MPH)	60	50	65	30 (*)	35 (*)	30 (*)	25 (*)	30 (*)	30 (*)	10	City of Broomfield Standards
Posted Speed (MPH)	45	45	55	30	35	25	25	25	25	-	
<b>GEOMETRIC STANDARDS</b>											
<b><u>Horizontal Geometry</u></b>											
Radius (ft.)	8000	3000	5729.578	333	510	400	300	-	300	32/28	
E <sub>max</sub> (%)	6%	6%		NC	NC	NC	NC	NC	NC	NC	
Pivot Point	Center	Center		Center	Center	Center	Center	Center	Center	Center	
<b><u>Vertical Geometry</u></b>											
Minimum Profile Grade (%)	0.5	0.5		1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Maximum Profile Grade (%)	5.0	5.0		5.0	5.0	7.0	7.0	7.0	7.0	7.0	
Min. Rate of Vertical Curve (K) Crest	151	84		19	29	19	12		19	3	
Min. Rate of Vertical Curve (K) Sag	136	96		37	49	37	26		37	10	

<b>Exhibit 13.1 ROADWAY DESIGN CRITERIA TABLE</b>											
<b>DESIGN DATA</b>	<b>120th Ave. Connection (SH- 128)</b>		<b>US-36</b>	<b>Wadsworth Blvd.</b>		<b>Commerce St.</b>		<b>118th Ave.</b>	<b>Wads. Place</b>	<b>Frontage Rd. Access</b>	<b>Remarks</b>
<b><u>Sight Distance</u></b>											
Min. Stopping Sight Distance (ft)	570	425	645	200	250	200	155	200	200		
<b><u>Vertical Clearance</u></b>											
Below Structure (ft)		16.5	16.5	na	na		16.5	na	na	na	
<b><u>Horizontal Clearance</u></b>	32	32	32								
<b>CROSS SECTION</b>											
<b><u>Lanes</u></b>											
Lane Widths (ft.)	12	12	12	13	13	12	12	12	12	10	
Bike Lane Widths	4	4		4	4	3	3	3			
Parking Lane						8	8	8			
<b><u>Shoulders</u></b>											
Shoulder Widths - LT/ Median (ft.)			10 6						3	2	
Shoulder Widths - RT/ Median (ft.)			10 6						3	2	
Shoulder Surface			Paved						Paved	Paved	
<b><u>Curb and Gutter</u></b>											
Curb and Gutter Required	Yes	Yes		Yes	Yes	Yes	Yes	Yes	No	No	

Exhibit 13.1 ROADWAY DESIGN CRITERIA TABLE											
DESIGN DATA	120th Ave. Connection (SH- 128)		US-36	Wadsworth Blvd.		Commerce St.		118th Ave.	Wads. Place	Frontage Rd. Access	Remarks
Gutter Width - Outside (in)	24	24		24	24	24	24	24			
Gutter Width - Inside (in)	12	12		12	12	12	12	12			
<b><u>Sidewalk</u></b>											
Width Left (ft)	6	6		8	8	8	8	8			
Width Right (ft)	12	6		8	8	8	8	8			
<b><u>Driveways</u></b>											
-											
<b><u>Median</u></b>											
Median Width (ft)	30-42	18-30			18-30						
Treatment	Colored Conc.	Colored Conc.		Colored Conc.	Colored Conc.						
<b><u>Intersection at Grade</u></b>											
Min. Curb radius (ft)				35 (*)		35 (*)		35 (*)			City of Broomfield Standards
<b><u>Design Vehicle</u></b>	WB-40	WB-40									