

## 4.0 EXISTING CONDITIONS

The existing conditions analysis included extensive data collection of current highway geometry, traffic conditions, safety concerns, and planned transportation improvements. The analysis was the basis for identifying problem areas along the corridor and developing recommendations for improvements.

### 4.1 HIGHWAY GEOMETRIC FEATURES

Analysis of existing roadway geometrics involved identifying areas where deficiencies existed based on applicable design standards. The review included typical sections, horizontal and vertical alignment, interchange and ramp configurations, and pavement conditions, each of which is described below.

#### 4.1.1 Typical Section

The existing C-470 roadway typical section is comprised of 10-foot outside shoulders, two 12-foot travel lanes, and 4-foot inside shoulders in both directions. The existing median is 34 feet wide and was designed to accommodate widening for an additional 12-foot travel lane with an 8-foot inside shoulder in each direction and a 2-foot center barrier. The segment between I-70 and Morrison Road was widened in 2001 to provide a third lane in each direction to accommodate auxiliary lanes. Auxiliary lanes were also added to the segment between Quebec Street and I-25, creating a three-lane cross section in each direction.

#### 4.1.2 Horizontal Alignment

At four locations along the corridor, the tangent length between horizontal curves is deficient based on current American Association of State Highways and Transportation Officials (AASHTO) design standards for a 70 mile per hour (mph) design speed. These locations include tangents:

- Across the South Platte River
- Between the Lucent and Broadway interchanges
- Directly west of the Colorado Boulevard overpass
- Within the Yosemite Street Interchange

#### 4.1.3 Vertical Alignment

The C-470 corridor lies within rolling terrain with maximum grades of approximately 4 percent. One exception is the approximately 7 percent grade from Santa Fe Drive (US 85) to just west of Lucent Boulevard. The Highline Canal and Trail crosses under C-470 just west of the crest vertical curve between Lucent Boulevard and Santa Fe Drive, reducing the potential of flattening the grade in this location. Crest and sag vertical curves meet design standards for 70 mph along the corridor, with the exception of the areas around Santa Fe Drive and Kipling Parkway.

For a design speed of 70 mph, a K value of 247 is required. The curve west of Santa Fe Drive has a K value of 175, which is adequate only for 60 mph design speed. The curve at Kipling Parkway has a K value of 241, which is adequate only for a design speed of 65 mph.

In addition to the substandard vertical curves, the gradient immediately east of Santa Fe Drive does not meet AASHTO criteria. The current desirable design criteria for gradients is 4 percent. The existing gradient greatly exceeds this, at 7 percent.

An additional safety concern relates to the sight distance for westbound traffic approaching the Santa Fe Drive Interchange, which is obstructed by the Union Pacific Railroad freight rail bridges crossing over C-470. This obstruction reduces the stopping sight distance for the sag vertical curve and reduces the visibility of the westbound on-ramp merge. Because this merge point is frequently the site of merge turbulence and queuing, the lack of sight distance causes most drivers to approach the interchange cautiously, creating queuing on the westbound mainline through the interchange area. The need for improved sight distance for the westbound direction is evident based on these considerations.

#### **4.1.4 Interchange and Ramp Configurations**

Interchange ramp configurations vary throughout the corridor. The C-470 Interchanges with I-70 and I-25 exclusively use directional ramps for all movements. The C-470/US 285 Interchange uses a cloverleaf design. The Morrison Road Interchange is a single point urban interchange. The Platte Canyon Road access is a right-in/right-out for westbound traffic. The remainder of corridor interchanges have diamond interchanges with C-470 crossing either over or under the surface streets. The interchange with Santa Fe Drive (US 85) is being evaluated as part of the C-470 EA to determine whether a reconfigured interchange with possible directional ramps for high-volume movements is needed.

#### **4.1.5 Pavement Conditions**

The pavement type varies throughout the corridor. Originally, the entire corridor was constructed with a concrete wearing surface. Over time, the concrete has deteriorated and cracked due to the expansive soils and natural aging of the roadway. To extend the lifespan of the roadway, portions were overlaid. The segment from I-25 to Santa Fe Drive is concrete pavement. From Santa Fe Drive to Morrison Road asphalt pavement is used, and from Morrison Road to I-70, concrete pavement is used. All the bridge decks on C-470 have also been overlaid with asphalt pavement. Most notably, in the southwest corner of C-470 from Wadsworth Boulevard to Ken Caryl Avenue, sections of pavement are “pumping” due to the expansive soils resulting in uneven pavement. Sections of concrete pavement from Lucent Boulevard to I-25 have extensive cracking.

Most of the aggregate in the concrete pavement is showing on the wearing surface, leading to a rougher and louder than normal pavement.

#### **4.1.6 Structure Conditions**

Most of the structures on the C-470 corridor are in generally good condition. Sufficiency ratings for bridges vary from the high 70s to 100, with no major bridge structure deficiencies. The Santa Fe Drive bridge over C-470 was recently rehabilitated to raise its sufficiency rating. The C-470 bridge over the Platte River does not have a current sufficiency rating; and it has been identified as having hydraulic capacity problems. Both locations are described below.

#### **4.1.7 Santa Fe Drive over C-470**

Santa Fe Drive is carried over C-470 by means of a two-span cast-in-place box girder bridge. The bridge, originally constructed in 1970, is approximately 232 feet 8 inches long and 86 feet 6 inches wide. The skew between the control lines of C-470 and Santa Fe Drive is about 70 degrees. The cross slope on the bridge is approximately 4.1 percent and drops to the west. The width accommodates six traffic lanes; two through-lanes in each direction and two shared left-turn lanes. In November 1996, CDOT rehabilitated this bridge, which now carries a sufficiency rating of 97.1

#### **4.1.8 C-470 over the Platte River**

This is one of the few structures on the four-lane parkway facility that predates C-470. A sufficiency rating on this structure is yet to be obtained. Discussions at the early environmental scoping meeting suggested that the hydraulic capacity of the structure is inadequate for handling certain flood flows. These flows are currently handled by a low-profile section of C-470 that would be inundated during flood events. It is likely that this bridge would need to be replaced to accommodate additional travel lanes on C-470.

#### **4.1.9 Planned Transportation Improvements**

With the exception of the Santa Fe Drive/C-470 Interchange reconstruction and the proposed interchanges at Yale and Alameda, no planned transportation improvements are in DRCOG's RTP that would have a direct impact on the operations of the C-470 corridor. However, various improvements along many adjacent arterial streets within the study area have been identified in local city, county, and agency plans. The improvements shown below were included in the regional travel demand model as committed projects. Also shown are the agencies responsible for implementing the improvements.

**Douglas County Capital Improvement Plan (CIP)**

1. Quebec Street and C-470
  - a. Widen Quebec Street to provide for two left-turn lanes in both directions at ramp terminals.
2. University Boulevard and C-470
  - a. Widen University Boulevard to provide for two left-turn lanes in both directions at ramp terminals.
3. Broadway and C-470
  - a. Widen Broadway to provide for two left-turn lanes in both directions at ramp terminals.

**Douglas County 2020 Transportation Plan Improvements**

1. Blakeland Drive Extension – four-lane road between Santa Fe Drive and Plaza Drive.
2. Plaza Drive Extension – four-lane road to County Line Road.
3. County Line Road – Santa Fe Drive to Broadway/S. Park Lane improve from two to four lanes. City of Littleton will require two-lanes in each direction for this section as development occurs.
4. Colorado Boulevard – County Line Road to University Boulevard - improve from two to four lanes.
5. Yosemite Street – County Line Road to C-470 - improve from four to six lanes
6. Lincoln Avenue – I-25 to Quebec Street - improve from four to six lanes.

**DRCOG 2025 RTP**

1. Santa Fe Drive – Mineral Avenue to Highlands Ranch Parkway, improve from four to six lanes.
2. I-25 – North of C-470, improve from either six or eight lanes to ten lanes.
3. I-25 – South of C-470, improve from six lanes to eight lanes.
4. Broadway – C-470 to Highlands Ranch Parkway, widen to six-lanes.

**US 85 Access Management Plan (2001)**

1. Santa Fe Drive and Town Center Drive
  - a. Southbound Santa Fe Drive will have two left-turn lanes and an exclusive right-turn lane.
  - b. Northbound Santa Fe Drive will have one left-turn lane and an exclusive right-turn lane.
2. Santa Fe Drive and Highlands Ranch Parkway
  - a. Southbound Santa Fe Drive will have two left-turn lanes.
  - b. Northbound Santa Fe Drive will have one left-turn lane and an exclusive right-turn lane.

## County Line Road EA I-25 to Santa Fe Drive (1998)

1. Broadway and County Line Road
  - a. All approaches will have two left-turn lanes.
  - b. All approaches, except Southbound Broadway, will have exclusive right-turn lanes.
2. University Boulevard and County Line Road
  - a. All approaches will have two left-turn lanes
  - b. All approaches, except Southbound University Boulevard, will have exclusive right-turn lanes.
3. Colorado Boulevard and County Line Road
  - a. Eastbound and Westbound approaches will have two left-turn lanes and exclusive right-turn lanes.
  - b. Northbound and Southbound approaches will have exclusive right-turn lanes.
4. Holly and County Line Road
  - a. Eastbound & Southbound approaches will have two left-turn lanes.
  - b. All approaches, except Eastbound County Line Road, will have exclusive right-turn lanes.
5. Quebec Street and County Line Road
  - a. All approaches will have two left-turn lanes.
  - b. All approaches, except Southbound Quebec Street, will have exclusive right-turn lanes.

## Jefferson County Countywide Transportation Plan

1. Chatfield Avenue - Ken Caryl Avenue to Platte Canyon Road, widen to four-lanes.

## 4.2 EXISTING TRAFFIC CONDITIONS

The analysis of existing traffic conditions identified current traffic problems and generated a basis from which a future traffic model could be developed. Areas where traffic problems were identified were used to calibrate the model. Model calibration ensured existing conditions were replicated before introducing projected traffic volumes and planned transportation improvements into the network. The analysis included evaluating historical trends, peak hour and average daily traffic volumes, vehicle classifications, travel times, levels of service, speeds, queuing, and safety. The traffic conditions analyzed are described below.

### 4.2.1 Existing Average Daily Traffic Volumes

The average daily traffic (ADT) volumes were collected along C-470 and the major arterial streets. Figures 4.1 and 4.2 show ADT volumes collected in 2003. The ADT volumes in both directions along C-470 in the vicinity of I-70, Platte Canyon Road, and Yosemite Street are 73,000, 71,000, and 104,000 vehicles, respectively. These figures

show that the eastern segment of the corridor carries approximately 30,000 more vehicles daily than the western segment.

**Figure 4.1**  
**Existing Freeway Volume (View 1)**

