Chapter 3: Affected Environment and Environmental Consequences

3-120
February 2006

CDOT will work with adjacent jurisdictions such as Douglas County, Lone Tree, Highlands Ranch, and Littleton to incorporate architectural upgrades to interchanges through the C-470 project area, while maintaining unifying elements with the rest of C-470. Such upgrades will include textured sound walls, landscaping, and bridge identification markings. In some areas, additional community input will be obtained during final design to gain public acceptance of these treatments, such as at the Santa Fe Drive Interchange. To maintain a consistent appearance, an aesthetic treatment plan or menu of design features has been set by CDOT from which stakeholders may select their upgrades. Jurisdictions wishing to upgrade architectural elements would be responsible for funding the construction of their chosen elements.

3.3.15 Utilities

The location of utility lines is an important factor to consider during roadway construction. Major utilities in the project area include water mains 60 inches or greater in diameter; electrical transmission lines; fiber optic lines, including backbone, trunk lines, and fiber considered critical to national security; and large sanitary sewer lines 60 inches or greater in diameter.

3.3.15.1 Affected Environment

Most utility infrastructure is privately owned by corporations providing telephone, communications, electrical, and gas service to communities in the C-470 project area. Local government typically provides public water and sanitary service to its respective jurisdictions. Above ground and overhead infrastructure is present throughout the project area, located within and outside the existing ROW. All major utilities in the project area were inventoried and included in the utility impact analysis.

3.3.15.2 Environmental Consequences

Table 3-41 lists potential effects to utilities from the two action alternatives. Additional detail for each utility and the respective effects can be found in the Utilities Technical Report (March 2005).

General Purpose Lanes Alternative

No effects to utilities would occur under the No-Action Alternative.

Express Lanes Alternative (Preferred Alternative)

Potential effects to utilities from the EL Alternative are generally the same as those for the GPL Alternative, except in areas where the EL Alternative is slightly wider between Quebec Street and Colorado Boulevard, where additional telephone, communication, and water utilities may be affected.

3.3.15.3 Mitigation

When a privately owned utility is located within public ROW, the owner company is responsible for relocating the utility to accommodate a public improvement project. This usually applies to telephone and communications and electrical and gas utility infrastructure. Where ROW acquisition is required, or when a publicly held utility must be relocated to accommodate a highway project, it is generally the project’s responsibility to fund the related construction for relocation. During excavation for buried utility relocation, precautions would be taken such that soil disturbance would not result in release of potential airborne asbestos.

Utility relocation requirements would be defined during final design. In most cases, private utility companies do not know the depths of their facilities. A method known as potholing would be used to determine the exact depth of utility infrastructure. Potholing uses a machine that is equipped with a high-pressure sprayer and a...
### Table 3-41
**Effects to Utilities**

<table>
<thead>
<tr>
<th>Utility Owner</th>
<th>Type</th>
<th>Buried or Overhead</th>
<th>Utility Location</th>
<th>Potential Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>City of Englewood</td>
<td>Ditch (City Ditch)</td>
<td>Buried</td>
<td>Crosses C-470 at Santa Fe Dr west ramps</td>
<td>Santa Fe Drive overpass support/C-470 roadway/ROW</td>
</tr>
<tr>
<td></td>
<td>Fiber optic cable</td>
<td>Overhead</td>
<td>Crosses C-470 at Garrison Street, on Xcel Energy poles</td>
<td>Possible pole relocation(s)</td>
</tr>
<tr>
<td></td>
<td>Fiber optic cable</td>
<td>Buried</td>
<td>Crosses C-470 at Santa Fe Dr, west ramps</td>
<td>Santa Fe Drive overpass support/ C-470 roadway/ROW</td>
</tr>
<tr>
<td></td>
<td>Fiber optic cable</td>
<td>Buried</td>
<td>North-south in southbound lanes of Santa Fe Drive; crosses C-470 at Santa Fe Dr, attached to bridge</td>
<td>Santa Fe Drive overpass modifications</td>
</tr>
<tr>
<td></td>
<td>Fiber optic cable</td>
<td>Buried</td>
<td>Parallels C-470 on south side within proposed footprint, on Xcel Energy poles</td>
<td>C-470 roadway/ ROW</td>
</tr>
<tr>
<td></td>
<td>Fiber optic cable</td>
<td>Overhead</td>
<td>Crosses C-470 at High Line Canal tunnel</td>
<td>C-470 roadway/ ROW</td>
</tr>
<tr>
<td></td>
<td>Fiber optic cable</td>
<td>Buried</td>
<td>Crosses C-470 between High Line Canal and Lucent Blvd</td>
<td>C-470 roadway/ ROW</td>
</tr>
<tr>
<td></td>
<td>Fiber optic cable</td>
<td>Buried</td>
<td>Crosses C-470 under Broadway</td>
<td>C-470 overpass support</td>
</tr>
<tr>
<td></td>
<td>Fiber optic cable</td>
<td>Buried</td>
<td>Crosses C-470 under University Blvd</td>
<td>C-470 overpass support</td>
</tr>
<tr>
<td></td>
<td>Two fiber optic cable runs</td>
<td>Buried</td>
<td>Crosses C-470 under Yosemite St</td>
<td>C-470 overpass support</td>
</tr>
<tr>
<td>Denver Water</td>
<td>90&quot; raw water main</td>
<td>Buried</td>
<td>Crosses C-470 at Wadsworth Blvd, east ramps</td>
<td>C-470 roadway/ ROW</td>
</tr>
<tr>
<td></td>
<td>Ditch (High Line Canal)</td>
<td>n/a</td>
<td>Crosses C-470 between Santa Fe Dr and Lucent Blvd</td>
<td>C-470 roadway/ ROW</td>
</tr>
</tbody>
</table>
### Table 3-41
Effects to Utilities (continued)

<table>
<thead>
<tr>
<th>Utility Owner</th>
<th>Type</th>
<th>Buried or Overhead</th>
<th>Utility Location</th>
<th>Potential Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denver Water</td>
<td>108” water main</td>
<td>Buried</td>
<td>Crosses C-470 at University Blvd, west ramps; parallels north ROW to east ramps</td>
<td>C-470 roadway/ ROW</td>
</tr>
<tr>
<td></td>
<td>60” water main</td>
<td>Buried</td>
<td>Crosses C-470 at University Blvd. under east ramps; parallels south ROW to Colorado Blvd</td>
<td>C-470 roadway/ ROW</td>
</tr>
<tr>
<td></td>
<td>60” water main</td>
<td>Buried</td>
<td>Parallels C-470 on south side entering and exiting footprint in several locations from east of University Blvd to Quebec Street</td>
<td>C-470 roadway/ ROW</td>
</tr>
<tr>
<td></td>
<td>60” water main</td>
<td>Buried</td>
<td>Crosses C-470 at Quebec Street, west ramps</td>
<td>C-470 roadway/ ROW</td>
</tr>
<tr>
<td>Lockheed Martin</td>
<td>Critical fiber optics</td>
<td>Buried</td>
<td>Parallels south C-470 within areas of proposed footprint between Wadsworth Blvd and Platte Canyon Rd</td>
<td>C-470 roadway/ ROW</td>
</tr>
<tr>
<td></td>
<td>Critical fiber optics</td>
<td>Buried</td>
<td>Parallels south C-470 ROW between Platte Canyon Rd and Santa Fe Dr</td>
<td>C-470 roadway/ ROW</td>
</tr>
<tr>
<td></td>
<td>Critical fiber optics</td>
<td>Buried</td>
<td>Crosses C-470 at Santa Fe Dr, attached to bridge</td>
<td>Santa Fe overpass modifications</td>
</tr>
<tr>
<td>MCI</td>
<td>Fiber optic communications</td>
<td>Buried</td>
<td>Crosses C-470 on BNSF bridge (easternmost track)</td>
<td>BNSF bridge modifications</td>
</tr>
<tr>
<td>Northern Douglas County Water and Sanitation District</td>
<td>Sanitary sewer</td>
<td>Buried</td>
<td>Barely enters footprint on south side, at Dry Creek; golf course</td>
<td>C-470 roadway/ ROW</td>
</tr>
<tr>
<td>Qwest Local Area Network</td>
<td>Fiber optic communications</td>
<td>Buried</td>
<td>Crosses C-470 at Ute Ave</td>
<td>C-470 roadway/ ROW</td>
</tr>
<tr>
<td></td>
<td>Fiber optic communications</td>
<td>Buried</td>
<td>Crosses C-470 at Quebec St</td>
<td>Quebec Street overpass modification/C-470 roadway/ ROW</td>
</tr>
<tr>
<td>Utility Owner</td>
<td>Type</td>
<td>Buried or Overhead</td>
<td>Utility Location</td>
<td>Potential Effect</td>
</tr>
<tr>
<td>-----------------------</td>
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<td>----------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------</td>
</tr>
<tr>
<td>Qwest Communications</td>
<td>Critical fiber optics</td>
<td>Buried</td>
<td>Crosses C-470 on BNSF bridge (easternmost track)</td>
<td>BNSF bridge modifications</td>
</tr>
<tr>
<td></td>
<td>Critical fiber optics</td>
<td>Buried</td>
<td>Crosses C-470 on west side of Lucent Blvd overpass</td>
<td>Lucent Blvd overpass modifications/ C-470 roadway/ROW</td>
</tr>
<tr>
<td>Touch America</td>
<td>Fiber optic communications</td>
<td>Buried</td>
<td>Crosses C-470 in bridge at Colorado Blvd</td>
<td>Colorado overpass modifications</td>
</tr>
<tr>
<td>US Sprint</td>
<td>Fiber optic communications</td>
<td>Buried</td>
<td>Crosses C-470 on UPRR bridge (western most track)</td>
<td>UPRR bridge modifications</td>
</tr>
<tr>
<td>Xcel</td>
<td>HP gas</td>
<td>Buried</td>
<td>Parallels north C-470 ROW and crosses C-470 at gravel pit between Platte Canyon Rd and Santa Fe Dr; HP line continues east approximately 500 feet beyond crossing</td>
<td>C-470 roadway/ ROW</td>
</tr>
<tr>
<td></td>
<td>Electric transmission</td>
<td>Overhead</td>
<td>Crosses C-470 at Platte River Greenway</td>
<td>Possible pole relocation(s)</td>
</tr>
<tr>
<td></td>
<td>HP gas</td>
<td>Buried</td>
<td>North-south on west side of Santa Fe Dr north of C-470, in southbound lanes south of C-470, crosses C-470 at Santa Fe Dr, west ramps</td>
<td>Santa Fe Drive overpass support/ C-470 roadway/ ROW</td>
</tr>
<tr>
<td></td>
<td>Electric transmission</td>
<td>Overhead</td>
<td>Crosses C-470 west of Broadway</td>
<td>Possible pole relocation(s)</td>
</tr>
<tr>
<td></td>
<td>Electric transmission</td>
<td>Overhead</td>
<td>Crosses C-470 at Quebec St</td>
<td>Possible pole relocation(s)</td>
</tr>
<tr>
<td>XO Communications</td>
<td>Fiber optic communications</td>
<td>Buried</td>
<td>Crosses C-470 under Yosemite St</td>
<td>C-470 overpass support</td>
</tr>
</tbody>
</table>
vacuum hose. The sprayer is used to loosen soil from around utilities, and the vacuum hose carries away the loosened material. This is an effective, low-risk method for finding buried utilities.

3.3.16 C-470 Trail
This section discusses the character of the C-470 trail and the role it plays in a multi-modal transportation system, the effects of the alternatives on the trail, and mitigation for these effects.

3.3.16.1 Affected Environment
The C-470 trail is a 10-foot wide concrete trail which runs the entire 26-mile length of C-470 from I-70 to I-25 and is part of a longer trail system that extends into Golden on the west and continues along E-470 on the east. The trail connects to several other trails and bikeways to produce a network of multi-modal transportation access for many types of users, primarily bicycles. It was constructed by CDOT along with C-470 as the backbone of a multi-modal transportation facility. As a component element in a multi-modal transportation system, the trail is not a protected resource under Section 4(f).

Appendix D shows the location of the trail within the EA limits. It is generally within the existing ROW; however, there are two locations where the trail is outside the CDOT ROW. Where C-470 crosses Chatfield State Park, CDOT has been granted an easement for the roadway on USACE property. The trail through this area meanders in and out of the CDOT easement. Although this section of the trail is on USACE property and within Chatfield State Park, CDOT funded and constructed this section of trail and Chatfield State Park maintains it.

East of Santa Fe Drive, the trail diverts from C-470 and follows the High Line Canal easterly to about Broadway, at which point it returns to the CDOT ROW where it continues to I-25 and beyond. The C-470 trail originally followed the High Line Canal trail in order to avoid building a redundant parallel trail and thus save cost.

The trail profile generally follows the same profile as the roadway, with some variation due to horizontal alignment differences. Most of the arterial street crossings are accomplished with at-grade crossings, except at Wadsworth Boulevard and Lucent Boulevard, where the trail passes under the roadway. Several sections of the trail have poor pavement conditions, with cracking or faulting pavement.

3.3.16.2 Environmental Consequences

No-Action Alternative
The No-Action Alternative has no affect on the C-470 trail. At-grade crossings of arterial streets would remain. Existing surface condition problems would also persist.

General Purpose Lanes Alternative
The GPL Alternative would require that 7.5 miles of trail be reconstructed a sufficient distance outward from the new roadway to allow for the widening. The distance the trail would be relocated outward is generally on the order of 45 to 50 feet, but the actual range of displacement varies from 0 feet to 167 feet. Additional ROW acquisition would be required for portions of the trail relocation. Appendix D shows the location of the relocated trail relative to the existing and proposed ROW.

The trail would be similar in character to the existing trail, but would be closer to adjacent private property and improvements by the distances noted above. Other than the lateral displacement described above, the general location of the trail would remain the same, as would the profile. The reconstruction of the trail would provide for a new, improved wearing surface.

Express Lanes Alternative (Preferred Alternative)
The EL Alternative would have similar effects as the GPL Alternative, except that 8.1 miles of trail would need to be reconstructed.
3.3.16.3 Mitigation

No-Action Alternative

The No-Action Alternative would not reconstruct any of the existing trail, so all existing trail surface deficiencies and at-grade street crossings would remain.

General Purpose Lanes Alternative

The GPL Alternative would relocate and reconstruct 7.5 miles of the trail with a new surface, correcting the existing surface deficiencies. Three grade separated trail crossings would be constructed to alleviate bicycle/pedestrian interactions with traffic at grade-crossings of arterial streets that intersect C-470. These new grade separations are being proposed at Santa Fe Drive, Colorado Boulevard, and Quebec Street. Construction of grade separations with the new Santa Fe Drive interchange at all conflict points, would eliminate the existing at-grade street crossing

- Relocation of the trail under the Colorado Boulevard overpass would eliminate the existing at-grade street crossing
- Relocation of the trail under the Quebec Street overpass and construction of grade separations at ramp conflict points would replace the existing at-grade street crossing

Reconstruction of the trail and proximity to roadway construction would require that detours be provided to ensure uninterrupted service to trail users. CDOT would coordinate with trail user groups to keep them informed of construction activity and detour routes as it relates to the C-470 trail.

Express Lanes Alternative (Preferred Alternative)

The EL Alternative would have similar mitigation as the GPL Alternative, with 8.1 miles of new trail surface. Three grade separated trail crossings would be constructed to alleviate bicycle/pedestrian interactions with traffic at grade-crossings of arterial streets that intersect C-470. These new grade separations would be located at Santa Fe Drive, Colorado Boulevard, and Quebec Street, consistent with the mitigation proposal for the GPL Alternative. Detours would be provided to ensure uninterrupted service to trail users. CDOT would coordinate with trail user groups to keep them informed of construction activity and detour routes as it relates to the C-470 trail.

3.3.17 Construction

Construction-related effects relate to maintenance of traffic during construction, the potential for diversion of traffic onto the arterial street network, relocation of access, temporary construction easements, water quality, noise, air quality, availability of construction materials, and vibration due to construction activities.

3.3.17.1 Affected Environment

Additional highway widening and reconstruction is the major component of the GPL and EL Alternatives presented for C-470. Heavy equipment operation and earth moving machinery creates exhaust emissions, dust, water runoff, traffic congestion, and undesirable noise and vibration. Businesses located near the interchanges along C-470 may be affected by potential access restrictions. CDOT implements a communications program with affected businesses and the public to keep them informed of construction schedules.

While detailed construction phasing plans would not be completed until final design, a phasing scheme was developed as part of the conceptual design for this EA that provides a qualitative assessment of potential effects that might be produced as a result of implementing one of the action alternatives. Because the GPL and EL Alternatives are similar with regard to typical section and width, the same construction phasing scheme is applicable to both alternatives.
Construction Phasing

It is anticipated that the mainline portion of either action alternative would be constructed in three phases. The Santa Fe Drive and I-25 interchanges would require more detailed construction phasing.

A three-phase construction sequence would involve shifting traffic on the existing pavement toward the outside while building a portion of the median area. The second phase would shift traffic to the partially constructed median and construct the outside portion. The final phase would shift traffic to the outside and complete the interior sections.

Final construction phasing and traffic control requirements would be determined during the final design process. To minimize traffic delays and congestion during the construction of either alternative, the following steps would be taken:

- Develop detailed construction phasing and traffic control plans
- Maintain two 12-foot travel lanes in each direction
- Maintain a minimum of two-foot shoulders throughout the construction zone
- Provide emergency pullout areas when shoulders are less than eight feet wide
- Provide a construction zone assistance vehicle to assist motorists with vehicular problems
- Use signing to announce and advertise timing of road closures
- Maintain existing exits and entrances to and from C-470 at all times during morning and evening peak hour traffic

3.3.17.2 Environmental Consequences

No-Action Alternative

The No-Action Alternative would have no construction effects.

General Purpose Lanes Alternative

TRAFFIC DIVERSION ONTO ARTERIAL STREET NETWORK. A qualitative assessment of potential effects was performed to determine areas where traffic diversion may occur during construction. Congestion on C-470 would increase during construction due to slower design speeds and narrower shoulders. As a result, traffic would divert from C-470 to alternative routes to avoid this congestion. Any intersections that are currently at or over capacity and operating at poor levels of service would get worse during construction activity.

The following intersection locations would likely see an increase in traffic during construction, and due to their limited reserve capacity, may present some operational problems:

- Lucent Boulevard/County Line Road
- Broadway/County Line Road
- University Boulevard/County Line Road
- Colorado Boulevard/County Line Road
- Quebec Street/County Line Road
- Yosemite Street/County Line Road
- University Boulevard/Dry Creek Road
- Colorado Boulevard/Dry Creek Road
RELOCATION OF RESIDENTIAL OR BUSINESS ACCESESSES. Reconstruction of the Santa Fe Drive interchange and associated work on Santa Fe Drive may require the temporary closure of some access points for reconstruction. A closure without provisions for temporary access would have adverse social and economic effects on the users of these accesses.

TEMPORARY CONSTRUCTION EASEMENTS. Although all permanent improvements would be located on public ROW, often times there is a need to gain access to adjacent property to construct the improvements that are very close to the ROW interface, or which connect to some other improvement on the adjacent property. Temporary easements are obtained to allow access onto the adjacent property for a short duration of time during construction of the improvements. The land so acquired is minimally disturbed and is returned to its original condition prior to the lease termination.

The level of design undertaken for an EA such as the C-470 Corridor EA is usually not detailed enough to identify all the potential temporary easements that might be necessary to construct a project, so it is not possible to identify all the potential temporary easements in this EA document. However, the following temporary easement has been identified.

Construction of the new Santa Fe Drive interchange requires that a retaining wall be built very close to the existing USACE ROW in the southwest quadrant of the interchange. Due to the preliminary nature of ROW information in the EA, the actual location of ROW is subject to change. Based on the best information to date, it is believed that the finished wall will be entirely contained within CDOT’s ROW and/or USACE Easement. However, if the ROW location is closer to the wall than expected, construction of the wall may require temporary use of a small portion of USACE property.

Should a temporary easement be required to construct the wall, it would not constitute a 4(f) use in accordance with 23 CFR 771.135, which states, “A temporary occupancy of land is so minimal that it does not constitute a use within the meaning of section 4(f) when the following conditions are satisfied: (i) Duration must be temporary, i.e., less than the time needed for construction of the project, and there should be no change in ownership of the land; (ii) Scope of the work must be minor, i.e., both the nature and the magnitude of the changes to the section 4(f) resource are minimal; (iii) There are no anticipated permanent adverse physical impacts, nor will there be interference with the activities or purpose of the resource, on either a temporary or permanent basis; (iv) The land being used must be fully restored, i.e., the resource must be returned to a condition which is at least as good as that which existed prior to the project; and (v) There must be documented agreement of the appropriate Federal, State, or local officials having jurisdiction over the resource regarding the above conditions.”

If such a temporary easement should be needed, CDOT would ensure that the above conditions would be met.

The easement would be used to gain access to the work zone in front of the retaining wall, and for continuous access along the retaining wall for the purpose of stockpiling and accessing materials needed for construction of the wall. The land acquired by this temporary easement would be fenced off from the remainder of Chatfield State Park land and would not be available for use. Construction machinery traveling over this land would cause some minor disturbance of the soil and existing grass.
WATER QUALITY. Due to the nature of disturbing the existing soil for construction purposes, storm runoff has the potential to create erosion and degradation of water quality if proper BMPs are not employed and maintained.

NOISE. Short-term noise may be generated by stationary and mobile construction equipment. Elevated noise levels would be expected to occur in proximity to noise receptors during both day and night. Construction of the project will generate noise from diesel-powered earth moving equipment such as dump trucks and bulldozers, back-up alarms on certain equipment, compressors, and pile drivers (near bridge abutments and retaining walls, if necessary). Construction noise at off-site receptor locations would be dependent on the loudest one or two pieces of equipment operating at any given time. Noise levels from diesel-powered equipment range from 80 to 95 dBA at a distance of 50 feet. Equipment such as rock drills and pile drivers would generate even louder noise levels.

AIR QUALITY. Airborne dust caused by vehicles on dirt and paved roads would be the primary source of PM$_{10}$ but dust created from active construction sites can also be a main contributor. Increased PM$_{10}$ concentrations due to construction would be temporary. Furthermore, these emissions from numerous mobile and stationary sources are considered during the formulation of the SIP, and therefore have already been accounted for in the air quality modeling for this project.

CONSTRUCTION MATERIAL AVAILABILITY. The availability of construction material would be the same for the EL Alternative as for the GPL Alternative.

VIBRATION. The EL Alternative vibration effects from construction activity would be the same as the GPL Alternative.

C-470 TRAIL. Reconstruction of the trail and proximity to roadway construction would require that detours be provided to ensure uninterrupted service to trail users.

Express Lanes Alternative (Preferred Alternative)

TRAFFIC DIVERSION ONTO ARTERIAL STREET NETWORK. The EL Alternative would have the same affect on the arterial street network as the GPL Alternative, and the same intersections identified for the GPL Alternative would apply to the EL Alternative as well.

RELOCATION OF RESIDENTIAL OR BUSINESS ACCESSES. Closure, temporary access, and restrictions are the same as for the GPL Alternative.

WATER QUALITY. As with the GPL Alternative, storm runoff has the potential to create erosion and degradation of water quality if proper BMPs are not employed.

TEMPORARY CONSTRUCTION EASEMENTS. The EL Alternative would have the same need for temporary construction easements as the GPL Alternative, and would have the same effects as the GPL Alternative.

NOISE. Temporary noise effects generated by stationary and mobile construction equipment are the same as the GPL Alternative.

AIR QUALITY. The EL Alternative will result in similar temporary PM$_{10}$ air emissions as the GPL Alternative.

CONSTRUCTION MATERIAL AVAILABILITY. Because the study is located in the Denver area, construction materials would be
plentiful and readily available. Several aggregate quarries are located within 20 miles of the study site. Highway construction would also be able to take advantage of recycled and reusable materials in the urban area, to preserve available and ultimately limited natural resources for other uses.

**VIBRATION.** Vibration will occur from certain operations, particularly pile driving for substructure units, and also from general construction equipment usage in proximity to sensitive receptors.

**C-470 TRAIL.** EL Alternative effects would be the same as the GPL Alternative.

### 3.3.17.3 Mitigation

Mitigation for both the GPL and EL Alternatives would be similar. CDOT is committed to sustainable construction practice, such as reusing materials and recycling, waste minimization, water and energy conservation, and other measures which can minimize the cumulative effects of the project through resource conservation.

**Traffic Diversion onto Arterial Street Network**

Mitigation for the projected congestion increase at adjacent arterial intersections would include minor capacity and operational improvements at select locations within the project area. Improvements would be made at locations that provide the greatest congestion relief for the most users.

These improvements are generally considered to be minimal-action improvements, such as restriping to extend turn bay storage, or to extend acceleration/deceleration lanes inside existing ROW without incurring any direct environmental effects, as shown in Appendix D, pages D-55 through D-61. Some improvements would be performed prior to implementing traffic control plans on C-470 that would divert traffic onto the arterial street system. The timing of these improvements would be determined during final design.

The recommended intersection improvements are listed here. These actions would improve traffic operations on the arterial street network during construction with minimal effort and expense.

- **Lucent Boulevard/County Line Road** – restripe to add an additional northbound to westbound left turn lane
- **Broadway/County Line Road** – extend the existing eastbound to southbound right turn lane to a length of 375 feet; extend the existing eastbound to northbound left turn lane to a length of approximately 450 feet; add a 225-foot southbound to westbound right turn lane
- **University Boulevard/County Line Road** – extend the existing outside westbound to southbound left turn lane to approximately 375 feet; extend the existing northbound to westbound left turn lane about 200 feet, to provide approximately 500 feet of storage
- **Colorado Boulevard/County Line Road** – restripe the west leg of County Line Road to provide an additional eastbound to northbound left turn lane which could provide approximately 800 feet of storage; extend the existing southbound to eastbound left turn lane to approximately 400 feet; extend the existing northbound to westbound left turn lane to approximately 300 feet
- **Colorado Boulevard/Dry Creek Road** – restripe the west leg of County Line Road to provide approximately 600 feet of storage for the eastbound to northbound left turn lane; restripe the south leg of Colorado Boulevard to provide additional storage for the northbound to westbound left turn lane
- **Quebec Street/County Line Road** – restripe the north leg of Quebec Street to provide approximately 250 feet of storage for the
outside southbound to eastbound left turn lane

- Yosemite Street/County Line Road – restripe the west leg of County Line Road to provide approximately 425 feet of storage for the outside eastbound to northbound left turn lane; restripe the south leg of Yosemite Street to provide approximately 300 feet of storage for the outside northbound to westbound left turn lane storage

In addition to the minor capacity-related improvements described above, CDOT would investigate the practicality of requiring the contractor to:

- Develop a detailed construction phasing plan and an associated traffic control plan for all phases of work, taking into consideration the adjacent local arterial street system in addition to the C-470 mainline

- Ensure that emergency vehicle access will be maintained through all construction phases

- Perform traffic analysis to predict extent of traffic diversion from C-470 onto arterial street system, identify any potential traffic congestion areas on the arterial street system, and implement any appropriate transportation system management (TSM) improvements. These TSM strategies could consist of restriping turn bays or acceleration/deceleration lanes to improve intersection operations; retiming signals to change phasing plans or timing to improve operations; or other minor capacity improvements or management strategies to reduce congestion

- Prohibit long-term closures (beyond a typical nighttime or extended weekend closure) of any C-470 interchanges

- Develop a thorough and detailed detour signing plan for the arterial street system

- Consider restricting the contractor from working on adjacent interchanges concurrently for work that affects traffic operations.

- Restrict contractor from using any daytime closures. Only nighttime closures would be allowed

- Follow CDOT Region 6 Lane Closure Strategy for all lane closure times

**Relocation of Residential or Business Accesses**

Restrictions will be placed on the contractor to provide a temporary or alternative access during construction, which will minimize effects and inconvenience to the users.

**Temporary Construction Easements**

Property owners from whom temporary construction easements are obtained would be compensated for use of the property, at a price which is mutually agreeable to CDOT and the owner. After completion of use and prior to termination of the lease, the land would be regraded and reseeded as necessary to restore it to its original condition prior to construction.

**Water Quality**

The following temporary BMPs would be used during construction of either action alternative to prevent erosion, sediment, and nutrient loading in the watershed:

- Install perimeter erosion control measures prior to grading

- Follow the spill prevention and containment procedures outlined in the spill prevention plan

- Implement stabilization BMPs such as mulching, temporary seeding, and erosion control blankets
Inspect erosion and sediment control measures at least every 14 days and after every major rain or snow event.

Avoid ground-disturbing activities or work during periods of heavy precipitation.

Till soils that have been compacted by heavy construction equipment to allow for quicker establishment of grass reseeding.

Sequence clearing so that entire site is not disturbed; stabilization of a cleared site would occur as soon as activity is completed.

Utilize a central staging area for all equipment and disposal of waste material; this staging area will not be located near streams or wetland areas.

Manage waste stockpiles of concrete, solid, sanitary/septic materials, liquids, and hazardous materials through implementation of waste management BMPs.

Locate temporary sanitation facilities a significant distance from waterways to prevent releases.

Clean and wash vehicles and equipment prior to arriving on site to avoid the importation of noxious weeds on site.

Wash concrete trucks in designated concrete washout areas at least 50 feet away from surface water sources.

Construct stabilized construction entrances to the site to limit mud and dirt deposition on local roadways.

Follow BMPs appropriate to handle the possibility of deicers used in and around the construction site.

Use erosion prevention measures to prevent the need for extensive erosion control. Erosion prevention measures include staging construction to reduce disturbance; minimizing access areas; temporary seeding; early final grading and seeding of completed areas; and clean water diversions.

Construct temporary and permanent water quality basins. Permanent water quality ponds can be constructed early and used for construction runoff.

Roughen disturbed surfaces throughout construction.

Use certified weed free mulch and hay bales.

Use temporary sediment control features such as silt fence, erosion logs, erosion bales, etc.

Reseed disturbed areas with a native grass mix that includes forbs and shrubs. The seed mix could include Oats (Avena sativa) that will be applied at a low rate to facilitate soil stabilization while native plants are establishing.

Place permanent native seeding incrementally throughout project.

Place temporary stabilization (mulch and mulch tackifier, soil binder) when native seeding is not allowed due to seasonal constraints.

Stabilize all slopes steeper than 3:1 with erosion control blankets.

**Noise**

The following measures would be considered, where feasible, to reduce the effects of noise during construction:

- Enforce more restrictive work hours, particularly daylight hours, in residential areas.
Discourage weekend work, with the exception of activities best suited for off-peak hours

Combine noisy operations to occur in the same time period

Use noise blankets or other muffling devices on equipment and quiet-use generators

Require contractor to use well-maintained equipment, especially with respect to mufflers

Conduct noise inspections

Re-route truck traffic away from residential streets, where possible

Utilize alternative construction methods, such as sonic or vibratory pile driving in sensitive areas

Require a noise monitoring and mitigation plan, such as temporary noise barriers

Air Quality
All contractors would be required to obtain a construction permit and develop a fugitive emissions particulate emissions control plan to be implemented during construction in accordance with the Colorado Air Quality Control Commission Regulation No. 1, Part 3D, and Regulation No. 3, Applicable Permit Requirements. The contractor would also be required to minimize airborne dust during construction through construction phasing to prevent exposing bare dirt on the whole site at once; stabilize soils through seeding and mulching; and suppressing dust suppression through regular watering.

Visual
Throughout the final design and construction phases of this project, cities, counties, and public stakeholders will be consulted to minimize temporarily undesirable obstructed views.

Vibration
An attempt will be made to minimize nighttime activities in residential areas. Vibration causing operations would occur in the same time period. Alternative construction methods, such as sonic or vibratory pile driving in sensitive areas, would be utilized whenever possible. Pile driving and other high-noise activities would also occur during daytime hours, where possible.

C-470 Trail
In order to provide uninterrupted service to trail users, various strategies would be employed. In no case would the trail be closed without providing adequate detour routes. Adequate signing of trail closures and detours would be required. A minimum of two week’s notice would be provided for potential closures and detours. These detours would be posted and presented to trail user groups. Where possible, the trail would be reconstructed in its new location prior to closing the existing trail. In some locations, a temporary trail surface may need to be provided as a detour around work zones. In other locations, an off-site detour may be required if sufficient room is not available to safely pass through the roadway construction zone.

3.4 BIOLOGICAL ENVIRONMENT
The biological environment within the project area is composed of the natural resources within one mile of C-470. These resources include wildlife, threatened and endangered species, wetlands and waters of the U.S., prime and unique farmlands, and vegetation.

3.4.1 Wildlife
Although much of the project area is highly developed, a large number of wildlife species make use of riparian habitat and undeveloped or protected areas. Most of the species likely to be found in the study are well adapted to human disturbance. Common mammal species include mule deer (Odocoileus geminosus), elk (Cervus elaphus), coyote (Canis latrans), red fox (Vulpes vulpes), raccoon (Procyon lotor), cottontail rabbit
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Most of the stream crossings along C-470 serve as wildlife corridors under the highway. The most significant wildlife corridors are along the South Platte River and Big Dry Creek, where highway bridges allow for wildlife passage. Other wildlife crossings include Willow Creek, Dad Clark Gulch, and the High Line Canal, where box culverts allow for some wildlife movement. Fifteen culverts have been inventoried along C-470 between Kipling Parkway and Broadway, with an additional eight culverts east of Broadway. The smallest of these is 36 inches in diameter. These culverts often serve as small mammal crossings. Figure 3-37 shows habitat areas for wildlife species found in the project area.

3.4.1.1 Affected Environment

Mule Deer and Elk

Mule deer (Odocoileus hemionus) is an important big game species found in most habitat types in Colorado. They are most common in shrublands on rough, broken terrain that provides abundant browse and cover. Mule deer are especially common along the foothills of the Front Range. Mule deer are likely to occur in and near the western portions of the C-470 project area, especially in the South Platte River floodplain and along the Dakota hogback.

American elk (Cervus elaphus) are commonly found in semi-open forest or along forest edges above 6,000 feet. Elk are known to migrate through the Chatfield Basin to the southwest of the C-470 project area and along the Dakota hogback to the west of the project area, and may occasionally venture into the C-470 project area, particularly in the winter.

The existing C-470 highway poses a substantial barrier to movement by both of these species. Mule deer are likely to use the South Platte River and Big Dry Creek bridges as movement corridors, while the likelihood of elk crossing C-470 to the north and east is small due to the absence of suitable habitat in the urbanized areas. Although the South Platte River bridge is likely a major movement corridor, it provides little room for wildlife movement along the river banks due to the existing trail and riprap. An existing chain link fence extending east and west from the South Platte River currently serves as deer fence. Mule deer also may occasionally cross the C-470 surface during low traffic periods. Historic accident data obtained from the Safety Chapter for the C-470 Corridor Environmental Assessment (February 2005), indicates that vehicle collisions due to wild animals is slightly below the statewide average for similar type highway facilities.

Black-tailed Prairie Dog

During the 2003 field review, 21 black-tailed prairie dog colonies covering about 90 acres were observed on vacant land throughout the C-470 project area. The black-tailed prairie dog (Cynomys ludovicianus) is a burrowing mammal that forms large colonies in shortgrass or mixed prairie along the Colorado Front Range. In August 2004, the U.S. Fish and Wildlife Service (USFWS) removed the prairie dog from consideration as a candidate for listing as a threatened species under the Endangered Species Act (ESA). However, the Colorado Division of Wildlife (CDOW) lists it as a state species of special concern. This category does not provide statutory protection. The CDOT Impacted Black-tailed Prairie Dog Policy (March 2005) requires implementing conservation measures including avoiding impacts and relocating individuals when possible. Prairie dogs can play an important role in grassland ecosystems by contributing to nutrient cycling and grassland regeneration, and by providing habitat for numerous other vertebrate species.

Raptors

During the 2003 field surveys, six active red-tailed hawk (Buteo jamaicensis) nests and one active prairie falcon (Falco mexicanus) nest were observed in the C-470 project area. These nests were inactive in 2003, but have been active in the last three years. Known nest sites for great...