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## 4.27 SUMMARY OF SUGGESTED MITIGATION MEASURES AND RESIDUAL IMPACTS

### INTRODUCTION

This section summarizes potential mitigation measures discussed through the development of this document. Potential mitigation measures for the build alternatives are identified by the resource area. Some references to federal and state regulations and requirements remain for clarity or consistency, but these should not be viewed as commitments by any entity for any project. A full understanding can be attained by reading the individual sections by referencing supporting text, data, and graphics.

*Table 4.27-1 Summary of Suggested Mitigation Measures and Residual Impacts*

Resource Area	Suggested Mitigation Measures
Land Use	<p>Suggested mitigation measures that could be employed by the local planning jurisdictions include:</p> <ul style="list-style-type: none"> <li>• Control the location of development through the local planning process, so that sensitive environmental resources are protected.</li> <li>• Stipulate in zoning and land use plans that development occurs in designated growth areas or in currently developed areas.</li> <li>• Coordinate between land use and transportation planners for more integrated approaches to land use, transportation, and environmental planning and review, including implementation of smart growth policies to encourage density in development.</li> <li>• Plan future infrastructure needs to allow higher-density development.</li> <li>• Use open space set-asides (or acquired open space) as areas develop to preserve sensitive areas such as wetland and wildlife habitat areas.</li> <li>• Protect agricultural land through zoning and/or easements.</li> </ul>
Social	<ul style="list-style-type: none"> <li>• In order to minimize the effects on people through property acquisitions and displacements, for any project utilizing federal or state funding, eligible displacees would be offered assistance in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended and other applicable relocation assistance programs.</li> <li>• Maintain lines of communication with the public.</li> <li>• Incorporate improved bike/pedestrian access into design.</li> <li>• Create improved connectivity and mobility in the project area through enhanced trails and crossings.</li> </ul>
Minority and Low Income Communities	<p>The tolled portions of the Tollway Alternative and Combined Alternative may be considered to have potentially disproportionate effects on minority or low-income populations in terms of effects of tolling on transportation equity. However, because travel options would continue to exist, including the existing general purpose (i.e., “free”) lanes, and because options for alternative purchasing of tolling transponders would exist, there do not appear to be any equity issues.</p> <p>Future studies and observations regarding tolling equity issues, including the Colorado Tolling Enterprise amendment to the 2030 Regional Transportation plan, should be reviewed as available to ensure the latest state of the practice may be incorporated or cited in future documentation. If either the Tollway Alternative or Combined Alternative is chosen and constructed, ways to make tolling more fair and equitable should be sought. For example, issues related to credit cards and account debits should be considered in order to permit the broadest opportunity as possible to use toll facilities. This might entail providing alternative payment options for transponder purchases and toll replenishment using cash or employer-based payroll deductions. All segments of the population should continue to be properly involved throughout the process of identifying projects and considering the impacts on their communities.</p>



<b>Resource Area</b>	<b>Suggested Mitigation Measures</b>
<b>Value of Private Residential Areas</b>	Additional collaboration with communities on aesthetics of facilities and noise mitigation measures should occur during final design in order to minimize and mitigate impacts to residential property values.
<b>Access to retail areas</b>	Some businesses would be affected by access changes. Improved signage in these areas should be explored during final design.
<b>Right-of-Way</b>	Acquisition of land for right-of-way would begin when the project is funded and moves toward construction. For any project utilizing federal or state funding, right-of-way acquisition must comply with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646), as amended and the Uniform Relocation Act Amendments of 1987 (Public Law 100-17), which contains specific requirements that govern the manner in which a government entity acquires property for public use.
<b>Air</b>	Since motor vehicle emissions in the study area would not result in any exceedance of NAAQS, no direct project air quality mitigation would be required. However, dust emissions during construction should be minimized by implementing techniques to control dust, such as regular watering of construction areas, and practical measures to control construction dust. Though studies show air-deposited radionuclide concentrations in surface soil to be below relevant health-based clean-up levels in the eastern Rocky Flats area, excavation should be minimized and rigorous dust suppression measures should be implemented.
<b>Noise</b>	Noise mitigation would be recommended in seven areas for the Tollway Alternative, five areas for the Freeway Alternative and the Combined Alternative (Recommended Alternative), and four areas for the Regional Arterial Alternative. Some receivers would not receive mitigation because of inadequate results from a cost-benefit analysis to construct walls.
<b>Water</b>	Areas for water quality detention/retention ponds and/or grass swales have been incorporated into the preliminary designs of the alternatives. Exact locations, types, and sizes of water quality features would be identified during final design. Additional water quality features would be needed for the principal arterial alignment down Indiana Street/McIntyre Street.
<b>Wetlands</b>	All impacted wetlands should be mitigated on a 1:1 basis. During construction, existing wetlands should be protected by BMPs for control of sedimentation and erosion, and/or by protective fencing. Impacted wetland soils should be stockpiled and utilized for on-site mitigation.
<b>Floodplains</b>	Final design would include riprap bridge abutments and piers. Channel stabilization, drop structures, and cutoff walls should be modeled, as needed, to address flood protection and floodplain mitigation.
<b>Vegetation</b>	All CDOT revegetation BMPs and guidelines should be followed to ensure timely revegetation of the project area. All disturbed areas should be replanted as soon as possible following construction with drought tolerant, native vegetation appropriate for replacement of the impacted vegetation type. A specific native tall grass vegetation mix should be used in areas of impacted tall grass prairie. An Integrated Weed Management Plan should be developed and implemented prior to construction.



Resource Area	Suggested Mitigation Measures
Wildlife	<p><b>Big Game and Other Wildlife</b> Suggested mitigation measures for wildlife include:</p> <ul style="list-style-type: none"> <li>• Impacts to big game and other wildlife species should be minimized by constructing crossing structures designed to maintain or improve wildlife movement corridors at Ralston Creek and northwest of North Table Mountain.</li> <li>• Specific designs for improved wildlife crossings and fencing should be developed during final design of the selected alternative.</li> <li>• Based on concerns of agency wildlife specialists, the design of the crossing northwest of North Table Mountain should be further evaluated prior to construction, and if appropriate, modified to better accommodate wildlife movement.</li> <li>• To reduce human-wildlife conflict, wildlife use of the movement corridor at Kinney Run to the Fossil Trace Golf Course should be discouraged. Designing an underpass that would deter elk and deer movement eastward, while allowing them to return to the west side of the roadway, would minimize movement to the golf course and reduce wildlife/vehicle collisions.</li> <li>• Specific mitigation measures for impacts to wildlife should be developed in coordination with CDOT and CDOW wildlife biologists.</li> <li>• To reduce visual impacts on wildlife from the build alternatives, final designs should include lighting plans that minimize glare and illumination beyond the ROW.</li> <li>• Residual impacts include further disruption of elk and deer east-west movement at Big Dry Creeks near Standley Lake; Van Bibber Creek; and between the foothills and Fossil Trace Golf Course.</li> </ul> <p><b>Birds</b> To avoid impacting active migratory bird nests, construction activities and vegetation removal should be conducted outside of the breeding season (April 1 to August 31), whenever possible. If construction must occur during the breeding season, nest surveys would be conducted, and nesting deterrents, such as netting under bridges and culverts, would be installed before April 1st, prior to construction. If active nests are found during pre-construction surveys, they would be left undisturbed and “no-work” zones would be established around the nests until the breeding season is over or until fledging has occurred.</p> <p>A raptor nest survey should be conducted prior to construction to identify raptor nests in the vicinity of the build alternatives. Once nests have been identified, CDOT, CDOW, and the USFWS would assess which nests would be directly impacted by removal and which nests would likely be rendered unproductive because of the proximity of the proposed improvements. The assessment of nest productivity would take into account circumstances such as landforms and surrounding land uses that might warrant making nest-specific modifications to buffer distances. Construction within buffers would be limited to non-nesting seasons.</p> <p>CDOW has developed recommended buffer zones and seasonal restrictions for disturbance within certain distances of nest sites of several raptor species. The USFWS typically considers implementing the CDOW buffers and seasonal restrictions for raptors as compliance with the MBTA.</p> <p>If disturbing raptor nests is unavoidable, mitigation measures should be developed in coordination with the CDOW and the Service prior to construction.</p>



Resource Area	Suggested Mitigation Measures
<p><b>Wildlife</b> <b>(Continued)</b></p>	<p><b>Reptiles and Amphibians</b> Mitigation measures described above and for wetlands and water quality would reduce potential impacts to reptiles and amphibians. Additionally, mesh fencing overlain on the lower portions of the wildlife fencing may be considered to minimize the number of reptiles and amphibians crossing roadways.</p> <p><b>Aquatic Resources</b> Erosion control measures should be implemented, such as immediately reseeding disturbed areas after construction and, if necessary, applying mulch and mulch tackifier to stabilize slopes. CDO's water quality BMPs should be applied, and would include installing mechanisms to collect, contain, and treat roadway run-off prior to discharge. Mitigation measures designed to offset impacts to wetlands and Preble's, including habitat replacement and enhancement and replacing existing culverts with larger or more numerous culverts or bridges, would also improve fish habitat.</p> <p><b>Wildlife Refuges</b> Implementation of mitigation measures described for noxious weeds, deer, elk, and general wildlife would reduce indirect impacts to Rocky Flats Wildlife Refuge. For the Freeway Alternative, Tollway Alternative and Combined Alternative (Recommended Alternative), mitigation for impacts to prairie dogs at the Great Western Reservoir Prairie Dog Relocation Area could include relocation of prairie dogs to another site in Broomfield County. Specific mitigation measures should be determined in coordination with the City and County of Broomfield.</p> <p><b>Preble's meadow jumping Mouse and Ute-ladies' tresses Orchid</b> Specifics of the conservation measures should be developed in coordination with the USFWS during final design and prior to construction. Documentation of the final conservation measures would include plans and specifications for creation/enhancement of Preble's and/or Ute-ladies' tresses orchid habitat.</p> <p><b>Bald Eagle</b> For unavoidable impacts to bald eagle foraging areas in black-tailed prairie dog colonies, individual prairie dogs should be relocated when possible. If relocation within the foraging area is not possible, alternative mitigation measures should be discussed with CDOW and the USFWS.</p> <p><b>Species of State Concern</b> In areas where avoidance of prairie dog colonies is not possible, suitable prairie dog relocation sites should be identified and approved removal methods should be coordinated with CDOW. To help determine adequate mitigation measures, an assessment of habitat quality and number of individual prairie dogs would be conducted for prairie dog colonies that would be directly affected by construction. Prairie dogs should only be removed in areas where they might be directly affected. Some areas temporarily disturbed during construction would likely be recolonized by prairie dogs.</p> <p>Prairie dog colonies would be surveyed for burrowing owls prior to any work that would disturb them between March 1 and October 31. Prairie dog removal and construction would be scheduled to occur outside the burrowing owl breeding season. If burrowing owls were found within the construction footprint, nests would be left undisturbed during construction.</p> <p>No mitigation measures are specifically recommended for state-listed butterflies; however, implementing BMPs such as using native seed mixes, including grasses and forbs commonly occurring in butterfly habitat, to revegetate areas disturbed as a result of construction would help minimize impacts to these butterflies. Wetlands, Ute ladies'-tresses orchid, and Preble's impacts mitigation measures, including habitat replacement/enhancement and the replacement of existing culverts with larger or more numerous culverts or with bridges, would also mitigate potential impacts to sensitive reptiles and amphibians.</p>



Resource Area	Suggested Mitigation Measures
<b>Visual Quality</b>	<ul style="list-style-type: none"> <li>• Final grading and the revegetation plan, to be completed during final design, should seek to incorporate the visual character of the disturbed area.</li> <li>• Public and local jurisdiction input should be solicited on aesthetic issues such as bridge design treatments at grade-separated intersections and retaining and noise walls. These could include facing materials, colors, textures, and aesthetic elements.</li> <li>• The visual character disturbances and loss of scenic integrity associated with the Combined Alternative (Recommended Alternative) typical roadway width along the rural sections of McIntyre Street may not be mitigated. The extensive right-of-way impacts and change in land use remove the elements that define this rural character of the corridor. Local jurisdictions should be involved with planning to determine if effective mitigation could be identified.</li> </ul>
<b>Historic and Archaeological Resources</b>	<p>Mitigation of impacts to specific sites should be determined through consultation between parties. Unavoidable direct impacts and substantial indirect (visual or auditory) impacts to resources could be mitigated by providing SHPO Level II Documentation.</p> <p>Indirect impacts could be minimized through context sensitive design, such as screening by trees where possible.</p>
<b>Paleontological Resources</b>	<p>A supplemental pre-construction survey and impact assessment, pre-construction fossil collection, and construction monitoring should be prescribed to reduce adverse impacts of project construction on paleontological resources to an acceptable level. Impacts should also be minimized by following the guidelines of the Society of Vertebrate Paleontology (1995, 1996) and meeting the standards of federal agencies and the State of Colorado.</p>
<b>Hazardous Materials</b>	<p>The following are suggested mitigation measures for hazardous materials encountered during right-of-way acquisition and construction:</p> <ul style="list-style-type: none"> <li>• Conduct Initial Site Assessment (ISA) for properties to be acquired and those that have the potential to impact construction.</li> <li>• Sites with soil and/or groundwater contamination should be further studied and analyzed prior to acquisition and for materials management provisions.</li> <li>• Permits would be obtained for construction dewatering discharges.</li> <li>• Sites with existing remedial measures such as environmental media monitoring stations (i.e. sediment, surface water, groundwater, and air) and engineered controls (i.e. capped waste facilities) may require coordination with applicable regulatory agencies to avoid, minimize or mitigate impacts from the proposed action.</li> <li>• Because construction may occur overlying and within 1000 feet of abandoned landfills or coal mines, the health and safety plan may need to include assessing and monitoring air quality at all utility trenches, drainage structures and similar underground construction (i.e. caissons) areas prior to and during intrusive activities to assure worker safety.</li> <li>• Asbestos surveys would be needed at sites with building impacts, buried landfill debris, bridges, and disturbed utilities prior to disturbances proposed under the alternatives. Other regulated materials would need to be surveyed and removed from all the properties impacted under the alternatives.</li> <li>• Discussions will be conducted with CDPHE to define activities necessary to protect public health and the environment from potential soil contamination near the Rocky Flats Wildlife Refuge resulting from construction activities.</li> <li>• A materials management plan and health and safety plan may be necessary for the proposed actions in the RFETS area where actinides are present in soil and possibly surface water. Site-specific health and safety plans would also be necessary for landfill and mine sites where methane gas is a potential concern.</li> </ul>



Resource Area	Suggested Mitigation Measures
Utilities	It is anticipated that utility impacts would be minimized and mitigated through close coordination with utility owners during final design.
Parks and Recreational Lands	Close coordination should occur with property owners for mitigation on a parcel-by-parcel basis. See section 4-17 for discussion of specific recreational resources.
Farmlands	Coordination with the Natural Resources Conservation Service (NRCS) may be required for documenting impacts to prime farmland.. Lost or damaged irrigation pipes and ditches should be replaced. Any payment for crops damaged during construction should be considered. Access to fields would continue to be provided even if the access is moved or modified.
Geology and Soils	Detailed engineering/geology assessments would be necessary during final design to assess the need for mitigation resulting from underground mines, expansive soils, fault areas, and areas of steeply dipping bed.
Aggregate Resource Areas	Opportunities to remove and utilize aggregate resources within the right of way should be considered during final design.
Agricultural Soils	Opportunities to utilize agricultural soils within the right of way for revegetation should be considered during final design.
Construction	<p><b>Many standard best management practices exist that could be implemented during construction, such as:</b></p> <p><b>Public Awareness</b> Implement and maintain a construction hotline to inform the public and receive complaints regarding construction activities. Information could be sent to affected public before construction, using advertising/public relations. Work activities could be coordinated to ensure they do not coincide with sporting, school or special events.</p> <p><b>Noise</b> Methods include use of temporary noise walls/screens, noise blankets on equipment, and quiet-generators. Scheduling construction during less noise-sensitive times and combining noisy operations to occur in the same time period may also be beneficial.</p> <p><b>Vibration</b> Perform vibration studies for sensitive structures within 50 feet of the roadway or construction activities.</p> <p><b>Access</b> Use enhanced signing and alternate access, and do not close multiple interchanges concurrently.</p> <p><b>Traffic</b> Limit detours and construction traffic, utilizing major arterials where possible. Schedule construction during periods of least traffic. Use intelligent management systems and variable message signs to advise/redirect traffic.</p> <p>Enforce speed restrictions and provide adequate space for enforcement. Use a Courtesy Patrol and enhanced signing. Work with Regional Transportation District to offer enhanced operations during peak construction.</p> <p>Develop traffic management plans to maintain access to local businesses/residences and coordinate with emergency service providers to minimize delay and ensure access to properties.</p>



Resource Area	Suggested Mitigation Measures
<b>Construction (Continued)</b>	<p><b>Modified Pedestrian/Bike Mobility</b> Provide well defined detours with adequate signing, fencing, and lighting for pedestrians/bicyclists.</p> <p>Comply with American Disability Act requirements. Construct new bike/pedestrian overpass as a detour before old one is demolished.</p> <p><b>Environmental</b> Use wetting/chemical inhibitors for dust control.</p> <p>Provide early investigation of subsurface conditions and prepare a well-defined materials handling plan. Require prompt and safe disposal of waste products.</p> <p>Prepare a well-defined stormwater management plan and implement water quality best management practices early in project. Minimize off-site tracking of mud and debris by washing construction equipment in contained areas and via temporary access stabilization. Control and prevent concrete washout and construction wastewater.</p> <p>Recycle materials and use recycled materials as possible.</p>



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