

1 **3.29 MITIGATION SUMMARY**

2 This section summarizes the recommended mitigation measures to be implemented by CDOT and FHWA  
3 to eliminate or minimize social and environmental impacts from each of the build packages. The impacts  
4 are summarized in **Section 3.28**.

5 Impacts to social and environmental resources are discussed earlier in this chapter. Transportation  
6 improvements and impacts are presented in **Chapter 4 Transportation Impacts**.

7 **Table 3.29-1 Summary of Mitigation Measures and Monitoring**

Resource	Mitigation Measures
<b>Land Use and Zoning</b>	No mitigation measures will be required for the build packages. Once the Preferred Alternative is identified and decision documents finalized, CDOT/FHWA will encourage the local governments to address incompatibilities between the proposed transportation improvements and land use/zoning through their existing land use processes.
<b>Social Conditions</b>	<p>If either of the build packages are implemented, a traffic maintenance plan will be developed to minimize interference to traffic flow from construction equipment and activities.</p> <p>CDOT/FHWA will provide advance notice to emergency service providers, local schools, home owners associations, and the public of upcoming activities that are likely to result in traffic disruption. Such notifications will be accomplished through radio and public announcements, newspaper notices, on-site signage, and CDOT’s website.</p> <p>Where feasible, retaining walls will be constructed along I-25 and the BNSF rail corridor to minimize impacts to residential development.</p> <p>If toll lanes are constructed, ways to make tolling more equitable will be sought.</p> <p>Also see mitigation measures associated with Noise/Vibration, and Right-of-Way for property acquisition, provided later in this table.</p> <p>Mitigation for construction related impacts to minority and low-income populations could include the provision of reduced price bus passes during construction, acceptable access modifications, and translated information on construction processes and alternate modes available during construction and pre-opening day.</p> <p>Efforts will continue to be made to ensure meaningful opportunities for public participation during the development and review process. Additional meetings with the Mountain Range Shadows subdivision and El Comite de Longmont will be held to invite participants to comment on the analysis, identify additional concerns, and propose additional mitigation measures.</p>
<b>Economic Conditions</b>	<p>If possible, businesses that need to be acquired will be relocated near their current location.</p> <p>New access will be provided for properties where existing accesses are removed. To avoid disruption of business activities during construction, the new access will be provided before the existing access is removed.</p> <p>A traffic control plan will be developed to minimize interference to traffic flow from construction equipment and activities. CDOT/FHWA will provide advance notice to emergency service providers, local businesses, rail operators, and residents with regard to road delays, access, and special construction activities.</p> <p>To minimize disruption to traffic and local businesses, construction activities will be staged and work hours varied. Throughout the construction stage, access will be preserved for each affected business.</p> <p>Where feasible, retaining walls will be constructed along I-25 and the BNSF rail corridor to minimize impacts to commercial development.</p>

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<p><b>Right-of-Way</b></p>	<p>Acquisition of those property interests required for the project will comply fully with the <b><i>Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (the Uniform Act)</i></b>.</p> <p>The Uniform Act also provides for numerous benefits to individuals who occupy improvements that must be acquired, to assist them both financially and with advisory services related to relocating their residence or business operation to a replacement site.</p>
<p><b>Air Quality</b></p>	<p>Items related to <b>commuter rail</b>:</p> <p>New commuter rail, BRT, and feeder bus vehicles will be required to meet Tier III and Tier IV standards.</p> <p>Alternative bus fleet vehicle selections will be investigated for more energy and emissions efficient vehicles, such as hybrids, electric buses, etc.</p> <p>Items related to temporary construction activities associated with <b>either of the build packages</b>:</p> <p>Project sponsors must prepare an air quality mitigation plan that describes all feasible measures to reduce air quality impacts from their project. CDOT/FHWA staff must review and endorse construction mitigation plans prior to work on a project site.</p> <p>Acceptable options for reducing emissions could include use of late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, and after-treatment products.</p> <p>The contractor will ensure that all construction equipment is properly tuned and maintained.</p> <p>Idling time will be minimized to 10 minutes – to save fuel and reduce emissions.</p> <p>An operational water truck should be on site at all times. Water will be applied to control dust as needed to prevent dust impacts off site.</p> <p>There will be no open burning of removed vegetation. Vegetation should be chipped or delivered to waste energy facilities.</p> <p>Existing power sources or clean fuel generators will be used rather than temporary power generators.</p> <p>A traffic plan will be developed to minimize traffic flow interference from construction equipment movement and activities. The plan may include advance public notice of routing, use of public transportation, and satellite parking areas with a shuttle service. Operations will be scheduled for off-peak hours whenever reasonable.</p> <p>Obstructions of through-traffic lanes will be minimized. A flag person will be provided to guide traffic properly minimizing congestion and to ensure safety at construction sites.</p>

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Resource	Mitigation Measures
<p><b>Noise &amp; Vibration</b></p>	<p>There are several existing traffic noise barriers in the project area. If any of these barriers must be removed for construction, the old barrier will be replaced with an equivalent or better barrier as part of either Package A or Package B.</p> <p>From the feasibility and reasonableness evaluations for the barriers, new traffic noise barriers are recommended for the following locations along the two build alternatives:</p> <ul style="list-style-type: none"> <li>▶ Wellington East (10-foot to 12-foot barrier) – Packages A and B</li> <li>▶ Mountain Range Shadows (12-foot barrier) – Packages A and B</li> <li>▶ Thorncreek Village (14-foot barrier) – Package B only</li> <li>▶ Stone Mountain Apartments (14 foot barrier) – Package B only</li> <li>▶ Greens of Northglenn (10-foot to-12-foot barrier) – Package B only</li> <li>▶ Badding Reservoir extension (12-foot barrier) – Package B only</li> <li>▶ Brittany Ridge extension (12-foot barrier) – Package B only</li> </ul> <p>The preferred mitigation measures for Package A transit rail impacts are quiet zones at the rail crossings for noise and 8,400 lineal feet of tire-derived aggregate (shredded tires) at six locations for vibration. Tire-derived aggregate could eliminate all of the projected vibration impacts, and so it is the preferred mitigation action. As an alternative, under-tie pads could eliminate all but 13 of the vibration impacts. These measures will be further investigated during final design to evaluate their true feasibility.</p> <p><b>CONSTRUCTION NOISE</b></p> <p>Construction noise would be subject to relevant local regulations and ordinances, and any construction activities would be expected to comply with them. To address the temporary elevated noise levels that may be experienced during construction, standard mitigation measures would be incorporated into construction contracts, where it is feasible to do so. These would include:</p> <ul style="list-style-type: none"> <li>▶ Exhaust systems on equipment would be in good working order. Equipment would be maintained on a regular basis, and equipment may be subject to inspection by the project manager to ensure maintenance.</li> <li>▶ Properly designed engine enclosures and intake silencers would be used where appropriate.</li> <li>▶ New equipment would be subject to new product noise emission standards.</li> <li>▶ Stationary equipment would be located as far from sensitive receivers as possible.</li> <li>▶ Most construction activities in noise-sensitive areas would be conducted during hours that are least disturbing to adjacent and nearby residents.</li> </ul>
<p><b>Water Resources</b></p>	<p>A combination of mitigation measures consisting of permanent structural, nonstructural, and temporary construction BMPs will be implemented in the project area, in compliance with the Clean Water Act and CDOT's MS4 permit requirements. BMPs will include water collection and passive treatment of stormwater, which is currently being directly discharged into existing water systems.</p> <p>Extended detention/retention ponds have been identified as the primary structural BMP for this project. With Package A, water quality ponds will treat approximately 1,765 (90.7%) of the impervious surfaces within the project area. With Package B, about 2,509 acres (125%) will be treated. Locations of water quality ponds have been identified throughout the project area. Placement of the BMPs is provided in the <i>Water Quality and Floodplain Technical Report</i> (FHU, 2008b).</p>

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<p><b>Water Resources (Con't.)</b></p>	<p>Stormwater management plans (silt fence, inlet protection, containerization of wastes, etc.) will be developed during design, implemented during construction, and updated as needed.</p> <p>Riprap will be placed at bridge abutments, piers, and at critical portions of channels or floodplains.</p> <p>When possible, passive BMPs (e.g., grass swales or natural infiltration) will be used for ephemeral streams.</p> <p>A Spill Prevention Plan will be prepared.</p> <p><b>TEMPORARY CONSTRUCTION BMPs</b></p> <p>In-stream activities will be minimized.</p> <p>CDOT's specifications for managing stormwater at a construction site (currently specifications 107.25, 212, 213, and 216) will be followed.</p> <p>Construction BMPs will be implemented and maintained in compliance with the CDPHE general construction permit. Construction plans must adhere to a stormwater management plan (Section 402, Clean Water Act CDPHE Regulation 61).</p> <p>A Senate Bill 40 (SB40) permit from the CDOW will be obtained. It will include measures to protect existing riparian areas, such as mitigating stormwater runoff or replacing riparian vegetation (on a 1:1 basis for trees and a square footage basis for shrubs).</p> <p>Vegetation or other erosion control techniques (as indicated by CDOT erosion control practices) will be established to prevent sediment loading in compliance with the general stormwater construction permit.</p> <p>Construction activities will be phased to minimize effects associated with large areas of exposed ground and with soil compaction from heavy machinery use.</p> <p><b>GROUNDWATER QUALITY</b></p> <p>If groundwater is encountered during activities associated with excavations for caisson/retaining walls, the discharge of groundwater is authorized when the following conditions are met:</p> <ul style="list-style-type: none"> <li>▶ the source is groundwater and/or groundwater combined with stormwater that does not contain pollutants in concentrations exceeding the State groundwater standards in Regulations 5 CCR 1002-41 and 42;</li> <li>▶ the source is identified in the Stormwater Management Plan (SWMP);</li> <li>▶ dewatering BMPs are included in the Stormwater Management Plan (SWMP), and</li> <li>▶ these discharges do not leave the site as surface runoff or to surface waters.</li> </ul> <p>If these conditions are not met, then a separate Clean Water Act Section 402 Construction Dewatering Permit or Individual Construction Dewatering Permit will be required to be obtained from the CDPHE - WQCD.</p> <p>If dewatering is necessary, groundwater brought to the surface will be managed according to Section 107.25 of the CDOT <i>Standard Specifications for Road and Bridge Construction</i> (CDOT, 2005).</p> <p>If active wells are present prior to construction, status of groundwater well use will have to be determined. Active wells within the right-of-way will be relocated, replaced, or supplemented if a reduction in the water table is anticipated.</p>

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Resource	Mitigation Measures
Wetlands	<p>Impacts to wetlands and jurisdictional open water will be avoided and minimized to the greatest extent possible during preliminary and final design.</p> <p>Impacted wetlands will be replaced with in-kind wetland plant communities with same wetland functions on site or on nearby public lands within the same drainage basin, if practicable.</p> <p>The following mitigation goals are appropriate for unavoidable impacts to wetlands within the build packages project areas:</p> <ul style="list-style-type: none"> <li>▶ Three wetland mitigation banks in the regional study area offer wetland mitigation credit for purchase to cover unavoidable impacts from construction of the Preferred Alternative.</li> <li>▶ Once a replacement site is selected and final impacts are known, a detailed mitigation plan will be developed.</li> </ul> <p>For CDOT/FHWA mitigation, final site selection will be based on the installation of groundwater monitoring wells for the purpose of assessing groundwater flow in the area. The water levels in the wells will be monitored for a minimum of one year.</p> <p>During construction, BMPs will be used to avoid indirect construction impacts to wetlands. Materials and equipments will be stored a minimum of 50 feet from wetlands, drainages, and ditches that could carry toxics materials into wetlands. Construction fencing and appropriate sediment control BMPs will be used to mark wetland boundaries and sensitive habitats during construction.</p> <p>Sediment and erosion control will be required to be placed during all phases of construction and will remain in place until all disturbed areas have reached 70% of preconstruction vegetative cover.</p>
Floodplains	<p>The following measures will be taken to mitigate floodplain impacts to the extent practicable:</p> <p>Designs will comply with federal, state, and local agency requirements.</p> <p>Design will consider the maximum allowable backwater as allowed by FEMA.</p> <p>100-year FEMA design flows will be used for freeboard determinations, scour design, and to ensure that flow velocities are acceptable.</p> <p>500-year design flows will be used for the scour design and to determine the depths of piles or caissons.</p> <p>Impacts to downstream areas must be assessed during preliminary and final design by using the guidelines described in <b>Section 3.9.1 Regulatory Framework</b>.</p> <p>Design flows will be based on the current level of development, and it will not be assumed that any inadvertent detention facilities will lower them.</p> <p>A bridge deck drainage system that controls seepage at joints should be considered. If possible, bridge deck drains will be piped to a water quality feature before being discharged into a floodplain.</p> <p>CDOT policy, to obey the Natural Flow Rule of Colorado and to hold others to the same standard (CDOT Drainage Design Manual, 2004, sec. 2.5.2 and 12.1.1), will be followed.</p> <p>Sediment and erosion will be controlled by implementing appropriate structural and non-structural BMPs during each phase of construction to avoid potential pollutants from entering state waters.</p> <p>Disturbed land will be seeded and re-vegetated in accordance with current CDOT standards and specifications.</p> <p>SB 40 requirements will be met for applicable areas.</p>

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<p><b>Vegetation</b></p>	<p>Specific BMPs will be determined during final design. Mitigation measures are anticipated to include:</p> <ul style="list-style-type: none"> <li>▶ An acceptable revegetation plan will be developed with the CDOT landscape architect and with county personnel in Adams, Boulder, Broomfield, Denver, Larimer, and Weld counties.</li> <li>▶ A Senate Bill 40 certification for stream crossings or adjacent stream banks will be obtained. In these areas, trees and shrubs must be replaced on a 1:1 basis (trees) and square-foot basis (shrubs).</li> <li>▶ CDOT standard specifications for the amount of time that disturbed areas are allowed to be non-vegetated will be followed. Existing trees, shrubs, and vegetation will be avoided to the maximum extent possible, especially wetlands and riparian plant communities. The project team will coordinate with the CDOT landscape architect before construction to determine the types of vegetation that will be protected during construction.</li> <li>▶ Weed-free topsoil will be salvaged for use in seeding.</li> <li>▶ Erosion control blankets will be used on steep, newly seeded slopes. Slopes should be roughened at all times.</li> <li>▶ All disturbed areas will be re-vegetated with native grass and forb species.</li> <li>▶ Seed, mulch, and mulch tackifier will be applied in phases throughout construction.</li> </ul>
<p><b>Noxious Weeds</b></p>	<p>An integrated weed management plan will be incorporated into the project design and implemented during construction. Specific BMPs will be required during construction to reduce the potential for introduction and spread of noxious weed species. These will include:</p> <ul style="list-style-type: none"> <li>▶ Noxious weed mapping will be included in the construction documents along with appropriate weed control methods.</li> <li>▶ Highway right-of-way areas will be inspected periodically by the associated city or its consultants during construction and during post-construction weed monitoring for invasion of noxious weeds.</li> <li>▶ Weed management measures will include removal of heavily infested topsoil, herbicide treatment of lightly infested topsoil as well as other herbicide and/or mechanical treatments, limiting disturbance areas, phased seeding with native species throughout the project, and monitoring during and after construction.</li> <li>▶ Use of herbicides will include selection of appropriate herbicides and timing of herbicide spraying and use of a backpack sprayer in and adjacent to sensitive areas, such as wetlands and riparian areas.</li> <li>▶ Certified weed-free hay and/or mulch will be used in all revegetated areas.</li> <li>▶ No fertilizers will be allowed on the project site.</li> <li>▶ Preventative control measures for project design and construction may include:</li> <li>▶ Only native species will be used to revegetate sites.</li> <li>▶ Materials used for revegetating will be inspected and regulated in accordance with provisions of the Weed Free Forage Act, Title 35, Article 27.5, CRS.</li> <li>▶ When salvaging topsoil from on-site construction locations, the potential for spread of noxious weeds will be considered. Importing topsoil onto the project site will not be allowed.</li> <li>▶ Equipment will remain on designated roadways and stay out of weed-infested areas until the areas are treated. All equipment will be cleaned of all soil and plant parts before its arrival at a project site.</li> </ul>

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Wildlife	<p>CDOT/FHWA mitigation measures associated with wildlife impacts will include:</p> <ul style="list-style-type: none"> <li>▶ An application for Senate Bill 40 Certification will be submitted to CDOW.</li> <li>▶ CDOT/FHWA will implement three mitigation measures for projects that will have an impact to migratory birds: (1) tree trimming and/or removal activities, (2) bridge or box culvert work that may disturb nesting birds, and (3) clearing and grubbing of vegetation that may disturb ground nesting birds will all be completed before birds begin to nest or after the young have fledged.</li> <li>▶ To maximize use of movement corridors by wildlife, bridge spans and culverts should have the following features: a minimum clearance of 10 feet and width of 20 feet for deer and a minimum "openness ratio" of 0.75.</li> <li>▶ Shrubs and vegetative cover will be placed at bridge underpass openings to attract wildlife and provide a "funnel effect".</li> <li>▶ For structures that periodically convey water, ledges or shelves will provide passage alternatives during high water.</li> <li>▶ To avoid human disturbance to wildlife, trails should not be placed near wildlife crossing structures.</li> </ul> <p>Other recommended design elements include:</p> <ul style="list-style-type: none"> <li>▶ The placement of lighting should be avoided near the crossing structures.</li> <li>▶ Roadside vegetation height should be kept to a minimum.</li> <li>▶ Along the commuter rail corridor, CDOT/FHWA will seek permission from the regional transit authority to minimize the use of chain-link fencing in areas that are heavily used by wildlife.</li> <li>▶ The following design measures will be implemented to mitigate potential impacts to aquatic species, including native fish: <ul style="list-style-type: none"> <li>▶ Riffle and pool complexes should be maintained and/or created.</li> <li>▶ Natural stream bottoms will be maintained.</li> <li>▶ Culverts should be partially buried and the bottom should be covered with gravel/sand and have a low gradient.</li> <li>▶ Culverts to be replaced should be replaced with one of equal or greater size.</li> <li>▶ Culverts will not have grates, impact dissipators, or any other features that would impede fish movement.</li> <li>▶ Access points to streams during construction will be limited to minimize degradation of the banks.</li> <li>▶ No new fish passage barriers will be created.</li> <li>▶ Existing drop structures that create a barrier to fish movements will be removed or redesigned where possible.</li> </ul> </li> </ul>

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Threatened & Endangered Species	<p>With the No-Action Alternative, routine maintenance and upgrades to I-25 would fall under the Shortgrass Prairie Initiative Biological Opinion, and mitigation measures described in the opinion could apply.</p> <p>Mitigation measures for occupied Preble's habitat may be required as part of Section 7 consultation with USFWS. Avoidance and minimization measures will include limiting timing of construction to Preble's inactive season (November through April) or use of visible barriers to limit the area of construction.</p> <p>If culverts in Preble's habitat are replaced or upgraded, the new culverts will incorporate ledges to facilitate small mammal passage.</p> <p>Where impacts are unavoidable, compensatory mitigation will be provided through replacement with suitable habitat for Preble's. Mitigation measures for Preble's could be combined with wetlands mitigation.</p> <p>A raptor nest survey will be conducted prior to construction to identify bald eagle nests in the project area. If an active bald eagle nest is found within 0.5 mile of the project area, the buffers and seasonal restrictions recommended by CDOW will be established during construction to avoid nest abandonment.</p> <p>No construction will occur within 0.25 mile of active nocturnal roosts between November 15 and March 15. If perch or roost trees are removed during construction, they will be replaced at a 2:1 ratio with native cottonwood trees.</p> <p>In areas where avoidance of prairie dogs is not possible, CDOT will follow its <i>Impacted Black-tailed Prairie Dog Policy</i>. Any prairie dog relocation or removal activities will be carried out in accordance with CRS 35-7-203, as well as any other applicable laws or regulations, and with close coordination with CDOW.</p> <p>Burrowing owl surveys will be conducted prior to any work in prairie dog colonies between March 15 and October 31. If burrowing owls are present, prairie dog removal will be scheduled to occur outside this time period. If burrowing owls are found within the construction footprint during preconstruction surveys, nests will be left undisturbed and additional avoidance measures will be developed in coordination with CDOW. Direct impacts to burrowing owls will be avoided by covering or destroying prairie dog burrows prior to construction (prior to March 15).</p> <p>Direct impacts to nesting great blue herons will be avoided by prohibiting work within the 500-meter (0.31-mile) buffer from nest sites recommended by CDOW. Impacts within this buffer will be limited during the nesting season, which occurs from mid-March through July.</p> <p>Mitigation measures for wetlands and Preble's, including wetlands replacement and riparian enhancement, will also mitigate impacts to northern leopard frogs and common gartersnakes.</p> <p>Replacement of culverts with larger culverts or free-spanning bridges will also mitigate potential impacts to northern leopard frog and common gartersnake.</p> <p>The following design measures will mitigate potential impacts to aquatic species, including native fish:</p> <ul style="list-style-type: none"> <li>▶ Riffle and pool complexes should be maintained and/or created;</li> <li>▶ Natural stream bottoms will be maintained;</li> <li>▶ Culverts should be partially buried and the bottom should be covered with gravel/sand and have a low gradient;</li> <li>▶ Culverts to be replaced will be replaced with one of equal or greater size;</li> <li>▶ Culverts will not have grates, energy dissipators, or any other features that would impede fish movement.</li> </ul>



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<b>Threatened &amp; Endangered Species (Con't.)</b>	<p>To avoid erosion-induced siltation and sedimentation, erosion control measures will be applied, such as the immediate reseeding of disturbed areas after construction and, if necessary, the application of mulch and mulch tackifier to stabilize slopes.</p> <p>Access points to streams during construction will be limited to minimize degradation of the banks.</p> <p>No new fish passage barriers will be created.</p> <p>Existing drop structures that create a barrier to fish movements will be removed or redesigned where practicable.</p> <p>CDOT's water quality BMPs will be applied, and will include installation of mechanisms to collect, contain, and/or treat roadway runoff.</p> <p>Potential Colorado butterfly plant and Ute ladies'-tresses orchid habitat within the project area, along the Cache la Poudre, Big Thompson and Little Thompson rivers, and along St. Vrain Creek will be surveyed during the flowering season just prior to construction.</p>
<b>Visual Quality</b>	<p>Mitigation measures to address visual effects of highway widening will include incorporating landscaping at interchanges and along the highway.</p> <p>Mitigation measures to address visual effects of structural elements will include providing architectural interest or color into retaining walls and sound walls, and reducing the effect of overpasses by providing architectural detailing of the railings and other features.</p> <p>Mitigation measures to soften and enhance visual effects of additional track for transit will include incorporating landscaping, considering vinyl-coated chain-link fencing, providing architectural interest or color in retaining wall and bridge design, and limiting lighting to only what is required for safety and security.</p> <p>Mitigation measures to address visual effects of stations will include providing distinctive treatments at platform station locations to designate station locations. Local communities, business districts, or other entities should be involved in upgrading or enhancing the currently proposed features. The effects of overpasses will be reduced with architectural detailing of the railing and other features. Station effects will be reduced with the use of trees in combination with shrubs to filter views to the station and parking lots, provide a human scale, and present a positive image to attract ridership. Landscape islands with shade trees will be placed in parking lots to break up the expanse of pavement and parked vehicles.</p>
<b>Historic Preservation</b>	<p>Mitigation measures to address adverse effects to historic properties will be determined by consultation between FHWA, FTA, CDOT and the Colorado SHPO, and may include:</p> <ul style="list-style-type: none"> <li>▶ Creation of a detailed narrative and photographic record prepared in accordance with the SHPO's standards for Level II Documentation:</li> <li>▶ Preparation of permanent documentation in accordance with the National Park Service standards for the Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER);</li> <li>▶ Development of public interpretation of the historic properties to be lost or substantially changed by the project, by signage, museum exhibits, other interpretive displays, brochures or publications, etc.;</li> <li>▶ Development of other creative approaches to mitigation to be determined through consultation.</li> </ul>

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<p><b>Paleontological Resources</b></p>	<p>All paleontological monitoring work will be performed by a qualified and State of Colorado-permitted paleontologist. Paleontological monitoring will include inspection of exposed rock units and microscopic examination of matrix to determine if fossils are present. This work would take place during surface disturbing activities, such as excavations for the construction of roads, railways, bridges, underpasses, and buildings.</p> <p>Monitoring will be scheduled to take place continuously or to consist of spot-checks of construction excavations, depending upon the paleontological sensitivity of the project area based on its geology and the types and significance of potential fossils that could be present in subsurface sedimentary deposits. Paleontological monitors will follow earth-moving equipment and examine excavated sediments and excavation sidewalls for evidence of significant paleontological resources. At the request of the monitors, the project engineer will order temporary diversion of grading away from exposed fossils in order to permit the monitors to efficiently and professionally recover the fossil specimens and collect associated data. All efforts to avoid delays to project schedules will be made.</p> <p>If any subsurface bones or other potential fossils are found by construction personnel during construction, work in the immediate area will cease immediately, and the CDOT paleontologist will be contacted to evaluate the significance of the find.</p>
<p><b>Hazardous Materials</b></p>	<p>The MESA (FHU, 2007) contains a complete listing of sites with potential and recognized environmental conditions that were identified for the project and should be referenced to verify recommended mitigation actions.</p> <p>A Materials Management Plan (MMP), as required by Section 250.03 of the CDOT <i>Standard Specifications for Road and Bridge Construction</i> (CDOT, 2005a), will be prepared for areas with known soil and groundwater contamination. Construction specifications will be written to include review of the MMP by the CDOT Regional Environmental Manager.</p> <p>If dewatering is necessary, groundwater brought to the surface will be managed according to Section 107.25 of the CDOT <i>Standard Specifications for Road and Bridge Construction</i> (CDOT, 2005a) and permitted by the CDPHE Water Quality Control Division.</p> <p>Relocation of overhead electrical utility lines and pole-mounted transformers will be conducted in accordance with any easement agreement between CDOT and/or private landowners.</p> <p>All wells within the proposed construction area will be abandoned and plugged according to CDOT Section 202.02 in <i>Standard Specifications for Road and Bridge Construction</i> (CDOT, 2005a) and in conformance with the Colorado Department of Natural Resources Division of Water Resources State Engineer Water Well Construction Rules, specifically Rule 16.</p> <p>If petroleum-contaminated soil is identified with a concentration less than 1,000 ppm but higher than 500 ppm, CDOT will be responsible for clean-up. A MMP and a Health and Safety plan, as required by Section 250.03 of the <i>CDOT Standard Specifications for Road and Bridge Construction</i> (CDOT, 2005), also is recommended for use when oil and gas facilities are encountered.</p> <p>Prior to demolition of any structures, an asbestos, lead-based paint, and miscellaneous hazardous materials survey will be conducted at each parcel, where applicable. Regulated materials abatement will be conducted in accordance with Section 250, Environmental, Health, and Safety Management, of the CDOT <i>Standard Specifications for Road and Bridge Construction</i> (CDOT, 2005a) and relevant Occupational Health and Safety (OSHA) regulatory details.</p> <p>Prior to demolition, regulated materials must be removed from any structures and appropriately recycled or disposed.</p>

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Resource	Mitigation Measures
<p><b>Hazardous Materials (Con't.)</b></p>	<p>Coordination with the Colorado Department of Labor and Employment Division of Oil and Public Safety (OPS) will be required prior to parcel acquisition of any sites that are identified as having active leaking tanks. If site characterization and/or remediation have not been completed, the OPS may require CDOT to complete these activities after acquisition. During the right-of-way acquisition process, additional properties may require other actions depending on the results of the Initial Site Assessments (ISAs).</p> <p>By law, all friable asbestos-containing materials (ACM) must be removed from structures, including bridges, prior to demolition, and soils if encountered in excavated landfill or building debris, buried utilities, or other ACM. The contractor performing the asbestos abatement is required to be licensed to perform such work and obtain permits from the CDPHE.</p> <p>Lead-based paint may need to be removed prior to demolition if the lead is leachable at concentrations greater than regulatory levels. Where lead-based painted surfaces will be removed via torching, additional health and safety monitoring requirements are applicable.</p> <p>Prior to construction activities, a Health and Safety Plan, as required by Section 250.03 of the CDOT <i>Standard Specifications for Road and Bridge Construction</i> (CDOT, 2005a), will be developed. Construction specifications shall be written to include review of the Health and Safety Plan by the CDOT Regional Environmental Manager.</p> <p>If abandoned landfills or coal mines are present below and/or within 1,000 feet of construction activities, the Health and Safety Plan will need to include provisions for 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 ensure worker safety.</p>
<p><b>Parks and Recreation</b></p>	<p>All ground disturbing and debris generating construction processes will be contained by erosion and sediment control BMPs designed as part of approved stabilization and stormwater management plans.</p> <p>All disturbed areas will be returned to their original contour, vegetation and landscape appearance in cooperation with and direction from the resource jurisdictional authorities.</p> <p>Some techniques that may be used to mitigate impacts will include, but not be limited to:</p> <ul style="list-style-type: none"> <li>▶ coordinating with the local jurisdiction to prepare for construction at the site, including public safety and security measures and providing signed detour and alternate access information;</li> <li>▶ replacing vegetation will be with native grass and shrubs; (mitigation ratios and plant selection and placement will be determined through coordination with local jurisdictional agencies);</li> <li>▶ using BMPs to limit erosion during construction;</li> <li>▶ compensating for acquisition of the resource (location of any lost access will be negotiated with park representatives during final design); and</li> <li>▶ rebuilding park features, such as trails, elsewhere on the park site.</li> </ul>
<p><b>Section 6(f)</b></p>	<p>For Package B, coordination will need to occur with the City of Northglenn and the Colorado State Parks Department. CDOT/FHWA will work with Northglenn to determine the design, construction details, and a maintenance agreement for the two water quality ponds north and south of Grange Hall Creek in Grant Park.</p>

1 **Table 3.29-1 Summary of Mitigation Measures and Monitoring (Con't.)**  
2

Resource	Mitigation Measures
<b>Farmland</b>	If any important agricultural features are affected as design is further defined, mitigation measures, such as replacement of irrigation ditches and pipes, will be considered as appropriate. Loss or damage to crops resulting from construction activities will be compensated.
<b>Energy</b>	Mitigation of energy consumption during operations will focus on a reduction in daily vehicle miles of travel. This reduction can be achieved through successful transit-oriented development, congestion management, and effective improvements to the roadways. These measures all work to increase travel efficiency and save energy.
<b>Public Safety and Security</b>	<p>The design of bus stations will incorporate life-safety standards, similar to RTD's Comprehensive Safety Certification Program. To ensure consistency of service across the transit corridor, the commuter rail operating authority will be expected to adhere to these same standards. These include measures such as fencing to protect patrons from the track area; well-designed pedestrian underpasses; lighting as a deterrent to crime and to ensure good visibility in stations and parking areas; and, where walls and elevator shafts are constructed, the use of transparent materials to provide better sight lines and reduce concealment areas for criminals.</p> <p>Prior to operation of commuter rail with Package A, the operational authority will host training sessions for all affected police, fire, emergency response teams, schools, and employers who either are responsible for police or emergency response or are located in the immediate project corridor. These training sessions will cover the details of commuter train and bus operations, potential security issues, and agency responsibilities.</p> <p>Potential losses at construction sites will be mitigated through fencing and on-site security provided by contractors. All construction contractors will be responsible for safety at their respective sites and will be required to follow all OSHA requirements applicable to construction site safety. The appropriate agencies will provide a site safety officer to monitor site safety.</p>
<b>Construction</b>	<p>CDOT's <i>Standard Specifications for Road and Bridge Construction</i> (2005) and CDOT's <i>Construction Manual</i> (2002a) outline basic mitigation measures that contractors are required to take on any construction project. Appropriate application of these mitigation strategies will be defined during the final engineering phase of this project.</p> <p><b>Noise</b></p> <ul style="list-style-type: none"> <li>▶ Implement construction best management practices.</li> <li>▶ Use noise blankets on equipment and quiet-use generators.</li> <li>▶ Combine noisy operations to occur in the same time period.</li> <li>▶ Use alternative construction methods, such as sonic or vibratory pile-driving in sensitive areas, when possible.</li> <li>▶ In residential areas, construction activities will be minimized during the evening, nighttime, weekends, and holidays when receptors are usually in these areas.</li> <li>▶ Nighttime construction will be desirable (e.g., commercial areas where businesses may be disrupted during daytime hours) or necessary to avoid major traffic disruption.</li> </ul>

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1 Table 3.29-1 Summary of Mitigation Measures and Monitoring (Con't.)  
2

Resource	Mitigation Measures
<p><b>Construction (Con't.)</b></p>	<ul style="list-style-type: none"> <li>▶ The major noise source on construction sites is typically diesel motors; therefore, all engines will use commercially available effective mufflers and enclosures, as possible.</li> <li>▶ Modern equipment will be used with improved noise muffling and all equipment items will be evaluated to ensure that they have the manufacturers' recommended noise abatement measure, such as mufflers, engine covers, and engine vibration isolators intact and operational. Generally, newer equipment would create less operational noise than older equipment. All construction equipment should be inspected at periodic intervals to ensure proper maintenance and presence of noise-control devices (e.g., mufflers and shrouding).</li> <li>▶ The use of impact pile driving will be avoided near noise-sensitive areas, where possible. Alternative foundation preparation technologies will be used, such as vibratory pile driving or cast in drilled hole.</li> <li>▶ Temporary barriers will be used and relocated, as required, to protect sensitive receptors from excessive construction noise. Noise barriers should be made of heavy plywood or moveable insulated sound blankets.</li> <li>▶ Plans will be made to conduct truck loading, unloading, and hauling operations so that noise will be kept to a minimum.</li> <li>▶ Frequent updates of all construction activities will be provided to the public.</li> <li>▶ A community noise and vibration monitoring plan and a noise and vibration control plan will be prepared before initiating any construction.</li> </ul> <p><b>Access</b></p> <ul style="list-style-type: none"> <li>▶ Use enhanced signing.</li> <li>▶ Use alternate access enhancements.</li> <li>▶ Use advertising/public relations.</li> <li>▶ Do not close multiple interchanges concurrently.</li> </ul> <p><b>Highway</b></p> <ul style="list-style-type: none"> <li>▶ Limit detours.</li> <li>▶ Place detours on major arterial streets and ensure no local street detours are implemented.</li> <li>▶ Schedule construction during periods of least traffic.</li> <li>▶ Use geometric enhancements including wider lanes and better visibility.</li> <li>▶ Limit construction vehicles to major arterials.</li> <li>▶ Enforce speed restrictions; provide adequate space for enforcement; make prime contractor accountable.</li> <li>▶ Use courtesy patrol.</li> <li>▶ Use enhanced signing.</li> <li>▶ Phase construction to limit traffic in neighborhoods.</li> <li>▶ Comply with AASHTO guidance and Manual on Uniform Traffic Control Devices.</li> <li>▶ Coordinate work activities to ensure they do not coincide with sporting, school, or special events.</li> <li>▶ Implement advanced traffic diversion.</li> </ul>

1 Table 3.29-1 Summary of Mitigation Measures and Monitoring (Con't.)

Resource	Mitigation Measures
<p>Construction (Con't.)</p>	<ul style="list-style-type: none"> <li>▶ Use intelligent management systems and variable message signs to advise/redirect traffic.</li> <li>▶ Work with RTD to offer enhanced operations during peak construction.</li> <li>▶ Develop traffic management plans.</li> <li>▶ Maintain access to local businesses/residents.</li> <li>▶ Coordinate with emergency service providers to minimize delay and ensure access to properties.</li> </ul> <p><b>Pedestrian/bicycle mobility</b></p> <ul style="list-style-type: none"> <li>▶ Provide well-defined detours for pedestrians/ bicyclists.</li> <li>▶ Enhance safety through the use of adequate signing, fencing, and lighting.</li> <li>▶ Implement a public relations program.</li> <li>▶ Comply with American Disability Act requirements.</li> <li>▶ Construct new bike/pedestrian overpass as a detour before old is demolished.</li> </ul> <p><b>Environmental Impacts</b></p> <ul style="list-style-type: none"> <li>▶ Use wetting/chemical inhibitors for dust control.</li> <li>▶ Provide early investigation of subsurface conditions.</li> <li>▶ Prepare a well-defined materials handling plan.</li> <li>▶ Employ educated contractor with trained personnel.</li> <li>▶ Require prompt and safe disposal of waste products.</li> <li>▶ Implement water quality best management practices.</li> <li>▶ Prepare well-defined stormwater management plan.</li> <li>▶ Conduct monitoring.</li> <li>▶ Institute resource reuse and allocation.</li> <li>▶ Ensure regulatory compliance.</li> <li>▶ Cover trucks hauling soil and other materials.</li> <li>▶ Stabilize and cover stockpile areas.</li> <li>▶ Minimize offsite tracking of mud, debris, hazardous material, and noxious weeds by washing construction equipment in contained areas.</li> <li>▶ Avoid impacts to wetlands or other areas of important habitat value in addition to those impacted by the project itself.</li> <li>▶ Control and prevent concrete washout and construction wastewater. As projects are designed, ensure that proper specifications are adhered to and reviewed to ensure adequacy in the prevention of water pollution by concrete washout.</li> <li>▶ Store equipment and materials in designated areas only.</li> <li>▶ Promptly remove any unused detour pavement or signs.</li> <li>▶ Follow CDOT <b>Standard Specifications for Road and Bridge Construction (2005)</b>, including sections regarding water quality control, erosion control, and environmental health and safety.</li> </ul>

1 Table 3.29-1 Summary of Mitigation Measures and Monitoring (Con't.)

Resource	Mitigation Measures
<p><b>Construction (Con't.)</b></p>	<ul style="list-style-type: none"> <li>▶ Prepare or revegetate exposed areas as soon as possible after construction.</li> <li>▶ Remove soil and other materials from paved streets.</li> <li>▶ Incorporate recommendations as appropriate from the Regional Air Quality Council (RAQC) report, <i>Reducing Diesel Emissions in the Denver Area</i> (RAQC, 2002).</li> <li>▶ Operate equipment mainly during off-peak hours.</li> <li>▶ Limit equipment idling time.</li> <li>▶ Use recycled materials for project activities to the extent allowed by good practice and CDOT construction specifications.</li> <li>▶ Use construction equipment that use ultra-low sulfur fuels to the extent practicable.</li> </ul> <p><b>Floodplains and Water Resources</b></p> <ul style="list-style-type: none"> <li>▶ Best management practices used will be consistent with the MS4 permitting requirements, requirements of Northern Front Range flood control districts, as well as practices mentioned in CDOT's <i>Erosion Control and Stormwater Quality Guide</i> (CDOT, 2002b).</li> <li>▶ Section 107.25 of CDOT's <i>Standard Specifications for Road and Bridge Construction (2005)</i> deals with contractor's requirements for water quality control.</li> </ul>

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