5.22 Summary of Impacts and Mitigations

This section presents the impacts and mitigations anticipated for each of the alternatives—including both the Build Alternatives and the No-Action Alternative—divided by resource type. The following tables summarize the anticipated impacts and mitigation measures by resource.

Exhibit 5.22-1. Summary of transportation impacts and mitigations

Alternative/Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	Adverse effects to mobility, access, safety, and operations since no changes to capacity, interchanges, or other facilities will be made	• Reroute traffic to north-south streets that remain open, since most of the discontinued streets are low-volume local streets that do not connect across 46th Avenue • Coordinate with RTD for phasing of improvements to minimize disruptions to transit operations • Coordinate with UPRR, BNSF, and Denver Rock Island Railroads for phasing of improvements to minimize disruptions to railroad operations
Revised Viaduct Alternative	• Improved pedestrian/bicycle facilities • Improved traffic operations due to the addition of new lanes, improvement to ramps, adding auxiliary lanes, improvements to roadways, and modification of interchanges • Impacts to local traffic volumes caused by removal of the York Street interchange and changes to the Steele Street/Vasquez Boulevard interchange and the Colorado Boulevard interchange	
Partial Cover Lowered Alternative	• Improved pedestrian/ bicycle facilities • Improved traffic operations due to the addition of new lanes, improvement to ramps, adding auxiliary lanes, improvements to roadways, and modification of interchanges • Impacts to local circulation since some of the north-south street connectivity is being discontinued due to design restrictions • Impacts to local traffic volumes caused by removal of the York Street interchange and changes to the Steele Street/Vasquez Boulevard interchange and the Colorado Boulevard interchange	
Managed Lanes Option (option to Build Alternatives)	• Improved transportation operations, preservation of transportation capacity, and providing reliable travel times	

Exhibit 5.22-2. Summary of social and economic conditions impacts and mitigations

Alternative/Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	• 13 to 14 residential relocations • 5 to 15 business relocations • $912 to $943 million of regional economic output (4,900 to 5,100 person years of employment) • Temporary road closures and traffic detours may have impacts on access to certain public services	• Compensate and assist those relocated according to the Uniform Act • Provide safe and efficient connections through the neighbourhood during construction for all modes of transportation, including bicycles and pedestrians • Coordinate with emergency service providers during construction to minimize effects on response times • Use standard measures such as phased construction, advance notice of road closures and detours, and fixed and variable signage, to reduce effects on local residents and I-70 motorists • Coordinate with RTD to minimize temporary disruptions to service areas and schedules • Use signs and notifications to reduce adverse effects on access to homes, businesses, and services during the construction period from temporary and/or permanent detours • Notify public transit users well in advance of any temporary or permanent closure or change in bus or rail routes, stops, or stations • Provide opportunities for local residents and businesses to take part in designing and/or providing input, advice, and/or artwork on non-structural design elements of the highway
Revised Viaduct Alternative	• 39 to 44 residential relocations • 15 to 24 business relocations • $2,547 to $2,557 million of regional economic output (13,800 to 15,200 person years of employment) • Temporary road closures and traffic detours may have impacts on access to certain public services	

Exhibit 5.22-2. Summary of social and economic conditions impacts and mitigations

Alternative/Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
Partial Cover Lowered Alternative	• 49 to 53 residential relocations • 20 business relocations • $2,823 to $2,842 million of regional economic output (15,000 to 16,600 person years of employment) • Temporary road closures and traffic detours may have impacts on access to certain public services	• CDOT also is planning to hold job fairs in the area to encourage residents to apply for various construction jobs • CDOT is planning a replacement housing effort with partners such as Community Resources and Housing Development Corporation (CRHDC), Denver Housing Authority and Denver Office of Economic Development to assist in housing improvement loans and grant programs in the impacted area • To improve the health conditions in the area, CDOT is researching contributions to GrowHaus programs for access to fresh food

Exhibit 5.22-3. Summary of environmental justice impacts and mitigations

Alternative/Option	Impacts and/or Benefits	Mitigation Measures Specific to Alternatives
All Alternatives	**Benefits** • New construction jobs will be created • Building the highway to new standards and improve mobility **Impacts** • Relocation of Denver Rescue Mission (except for No-Action Alternative, South Option) • Noise and dust during construction could be particularly problematic for residents in the neighborhoods who do not have air conditioners and ventilate their homes by opening windows • Mobility impacts during construction due to detours • Potential for disturbance of hazardous material sites during construction • Permanent or temporary closures, delays, or reroute of public transit services in the area	• Compensate any person(s) whose property needs to be acquired for the Preferred Alternative according to the U.S. Constitution and the Uniform Act of 1970, as amended • Provide homeowners the opportunity to improve homes that are close to the highway construction between 45th Avenue and 47th Avenue • Coordinate with RTD to minimize disruptions to service areas and schedules • Notify public transit users well in advance of any temporary or permanent closure or change in bus or rail routes, stops, or stations • Provide opportunities for local residents and businesses to take part in designing and/or providing input, advice, and/or artwork on non-structural design elements of the highway • Prepare additional resources for low-income homeowners, tenants, and business owners to help them make sure their relocations are successful; some of these efforts include loan assistance and loan guarantees for those who have difficulty qualifying in traditional markets • Provide a new HVAC system, doors, and windows for the school to block the dust and noise expected during the construction period • Provide safe and efficient connections through the neighborhoods and across the highway, including access to Swansea Elementary School, during construction for vehicles, bicycles, and pedestrians • Use best available construction practices to avoid harmful releases of hazardous materials • Replace some lost low-income housing units in the community

Exhibit 5.22-3. Summary of environmental justice impacts and mitigations

Alternative/Option	Impacts and/or Benefits	Mitigation Measures Specific to Alternatives
No-Action Alternative	**Benefits** • No benefits specific to this alternative **Impacts** • Relocate 13 to 14 residences • Relocate 5 to 15 businesses	No mitigation measures specific to this alternative
Revised Viaduct Alternative, North Option	**Benefits** • Preserves north-south connectivity • Keep the Nestlé Purina Petcare Company at its existing location • Displace Pilot Travel Center truck stop and eliminate a point-source **Impacts** • Increased physical barrier effect • Displace Stop N Shop and impacted Pilot Travel Center truck stop • 32 relocated households are expected to be Hispanic or Latino • 17 relocated households are expected to be low income • Highway moves 125 feet closer to Swansea Elementary School • Exceed NAC	• Develop the open space under the viaduct on the north side based on community needs. CDOT will work with the community and Denver to define and finalize this space, which can include an urban gathering area, play area, or recreational park • Provide targeted assistance to encourage businesses that are crucial to low-income and minority populations to find new locations in the same neighborhoods • Redesign and reconstruct the school playground. The redesign of the school will include the adjacent parcels as part of the elementary school site and will eliminate Elizabeth Street between 46th Avenue and 47th Avenue • Improve aesthetic quality with the new structure and provide more open space with longer bridge spans under the viaduct. • Build noise walls to reduce noise • Replace some lost low-income housing units in the community

Exhibit 5.22-3. Summary of environmental justice impacts and mitigations

Alternative/Option	Impacts and/or Benefits	Mitigation Measures Specific to Alternatives
Revised Viaduct Alternative, South Option	**Benefits** • Preserves north-south connectivity • Displace Nestle Purina Petcare Company **Impacts** • Increased barrier effect • El Tepetate Market and El Rinconcito Mini Market impacted and displaced • 37 relocated households are expected to be Hispanic or Latino • 20 relocated households are expected to be low-income	• Provide targeted assistance to encourage businesses that are crucial to low-income and minority populations to find new locations in the same neighborhoods • Improve aesthetic quality with the new structure and provide more open space with longer bridge spans under the viaduct

Exhibit 5.22-3. Summary of environmental justice impacts and mitigations

Alternative/Option	Impacts and/or Benefits	Mitigation Measures Specific to Alternatives
Partial Cover Lowered Alternative	**Benefits** • Removes the viaduct's visual barrier between Brighton Boulevard and Colorado Boulevard • Presence of highway minimized since the highway in this area is below grade and is covered with an urban landscape • Reduce highway noise impacts to the school and adjacent properties by placing a cover over the highway • Keep the Nestlé Purina Petcare Company at its existing location **Impacts** • Limited north-south pedestrian and bicycle connectivity compared to the existing conditions 40 to 44 relocated households are expected to be Hispanic or Latino • 22 to 24 relocated households are expected to be low-income • Displace the Stop N Shop and impacted Pilot Travel Center truck stop • The safety barriers create visual obstruction, eliminating views across the highway	• Design an urban area on top of the 900-foot-long highway cover between Columbine Street and Clayton Street that will be placed adjacent to Swansea Elementary School • Redesign and reconstruct the school playground. The redesign of the school will include the adjacent parcels as part of the elementary school site and will eliminate Elizabeth Street between 46th Avenue and 47th Avenue • Provide safety barriers between the new 46th Avenue and the below-grade I-70 to protect the at-grade traveling public from the below-grade highway • Build noise walls to reduce noise
Managed Lanes (option to Build Alternatives)	**Benefits** • Reliable travel time • Congestion-free lanes • Reduced-congestion travel lanes **Impacts** • Cost to use the managed lanes may propose a burden to low-income community	Possibility of offering a monetary incentives policy for the low-income population in the study area

Exhibit 5.22-4. Summary of land use impacts and mitigations

Alternative	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	4.0 acres to 6.0 acres converted to transportation use	Continue to coordinate with local jurisdictions to ensure compatibility with land use plans and to address any inconsistency that may arise due to the project alternatives
Revised Viaduct Alternative	• 76.2 acres to 77.5 acres converted to transportation use • If the Managed Lanes Option is selected with this alternative, an additional 14.7 acres would be required, resulting in 91.2 acres to 92.5 acres converted to transportation use	
Partial Cover Lowered Alternative	• 88.9 acres to 89.1 acres converted to transportation use • If the Managed Lanes Option is selected with this alternative, an additional 14.7 acres would be required, resulting in 103.6 acres to 103.7 acres converted to transportation use	

Exhibit 5.22-5. Summary of relocations and displacements impacts and mitigations

Alternative/Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative, North Option	• 5 business relocations • 14 residential relocations • 1 non-profit relocation	• Compensate any person(s) whose property needs to be acquired for the Preferred Alternative according to he U.S. Constitution and the Uniform Relocation Assistance and Real Property Acquisition Policies Act (Uniform Act) of 1970, as amended • Provide all impacted owners notification of the acquiring agency's intent to acquire an interest in their property, including a written offer letter of just compensation specifically describing those property interests; assign a ROW specialist to each property owner to assist them with this process • Provide detailed information to any person scheduled to be displaced related to eligibility requirements, advisory services and assistance, payments, and the appeal process • Provide bilingual services for any of the relocated and displaced businesses or households that need them • Hold an informational meeting for businesses being relocated to provide an introduction and overview of the process associated with the Uniform Act, as well as consolidated information on resources available, including assistance from local, state, and federal agencies and private agencies in the community; the meeting will not provide details related to individual eligibility • CDOT will provide targeted assistance to encourage businesses to find new locations in the same neighborhoods and provide special assistance to minority or woman-owned businesses through the Civil Rights and Business Resource Center and programs offered through the City and County of Denver
No-Action Alternative, South Option	• 15 business relocations • 13 residential relocations	
Revised Viaduct Alternative, North Option	• 15 business relocations • 39 residential relocations • 1 non-profit relocation	
Revised Viaduct Alternative, South Option	• 24 business relocations • 44 residential relocations • 1 non-profit relocation	
Partial Cover Lowered Alternative, Basic Option	• 20 business relocations • 53 residential relocations • 1 non-profit relocation	
Partial Cover Lowered Alternative, Modified Option	• 20 business relocations • 49 residential relocations • 1 non-profit relocation	

Exhibit 5.22-6. Summary of historic preservation impacts and mitigations

Alternative	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	• Adverse Effect—1 to 7 historic resources • No Adverse Effect—41 to 47 historic resources • No Historic Properties Affected—15 historic resources • Temporary impacts may include dust and debris, visual and auditory degradation related to construction activities, and decreased access	• Establish a Memorandum of Agreement or Programmatic Agreement with all parties • Provide Level II archival documentation for adversely affected resources • If possible, relocate structures on a case-by-case consultation basis • Implement precautionary measures, such as temporary shields to reduce the impact of dust • Train contractors to prevent effects of flying debris • Provide plan construction staging to avoid these effects wherever possible • Provide signage and well-marked alternate routes for access • Consult on each resource on a case-by-case basis • Construct noise walls, as applicable, to minimize noise impacts • Provide funding and participation in a documentary covering the history of I-70 East and its relationship to Elyria and Swansea and Globeville neighborhoods • Implement other mitigation measures, as identified, in consultation with SHPO and consulting parties
Revised Viaduct Alternative	• Adverse Effect—7 to 8 historic resources • No Adverse Effect—52 to 53 historic resources • No Historic Properties Affected—3 historic resources • Temporary impacts may include dust and debris, visual and auditory degradation related to construction activities, and decreased access	
Partial Cover Lowered Alternative	• Adverse Effect—13 historic resources • No Adverse Effect—47 historic resources • No Historic Properties Affected—3 historic resources • Temporary impacts may include dust and debris, visual and auditory degradation related to construction activities, and decreased access	

Exhibit 5.22-7. Summary of paleontological resources impacts and mitigations

Alternative	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	Minimal deep surface disturbance	• Perform a preconstruction paleontological survey • Perform continuous paleontological monitoring during all phases of construction
Revised Viaduct Alternative		
Partial Cover Lowered Alternative	Increased potential for encountering paleontological resources	

Exhibit 5.22-8. Summary of visual resources and aesthetic qualities impacts and mitigations

Alternative/Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	• Replacing the highway will improve the visual quality of the area • Replacing the old viaduct with a new infrastructure will improve the visual quality • The new noise walls on the viaduct will obstruct the view of the downtown skyline • Relocating the Nestlé Purina PetCare Company and removing the facility will open up some views to the downtown Denver skyline (South Option only)	Seek community input to help develop requirements that define the aesthetic quality of the area, such as artistic design elements
Revised Viaduct Alternative, North Option	• Replacing the highway will improve the visual quality of the area • Replacing the old viaduct with a new infrastructure will improve the visual quality • The new noise walls on the viaduct will obstruct the view of the downtown skyline	
Revised Viaduct Alternative, South Option	• Replacing the highway will improve the visual quality of the area • Replacing the old viaduct with new infrastructure will improve the visual quality • The new noise walls on the viaduct will obstruct the view of the downtown skyline • Relocating the Nestlé Purina PetCare Company and removing the facility will open up some views to the downtown Denver skyline	
Partial Cover Lowered Alternative	• Introducing public space to the area and reducing the roadway's visual domination in the area by removing the existing viaduct will greatly improve the visual quality of the area • Ground-level noise walls or safety barriers are less intrusive to viewers' eyes compared to the No-Action and Revised Viaduct Alternatives, but they also introduce a new visual impact to the area by blocking the view across the highway • The views for the vehicles traveling eastbound and westbound will be entirely different from the existing conditions	
Managed Lanes Option (option to Build Alternatives)	• Additional visual barriers will be created with the direct connections at I-270, I-225, and Peña Boulevard	

Exhibit 5.22-9. Summary of parks and recreational areas impacts and mitigations

Alternative	Impacts and/or Benefits	Mitigation Measures Specific to Alternatives
All alternatives	• South Platte River Greenway Trail closures may occur during construction • Easement required from South Platte River Greenway Trail	• Provide trail detours and ADA-compliant detour signage during construction • Return trails to existing or comparable state following construction
No-Action Alternative	• 0.39 acre of impact to Swansea Elementary School with the North Option	No mitigation measures specific to this alternative
Revised Viaduct Alternative	• 0.76 acre of impact to Swansea Elementary School playground with the North Option • Minor realignment of Sand Creek Greenway Trail • Sand Creek Greenway Trail closures may occur during construction	Redesign school site to increase playground size
Partial Cover Lowered Alternative	• 0.75 acre – 1.11 acres of impact to Swansea Elementary School playground • Minor realignment of Sand Creek Greenway Trail • Part of Globeville Landing Park will be closed during construction • Minor realignment of Sand Creek Greenway Trail • Sand Creek Greenway Trail closures may occur during construction	• Redesign school site to increase playground size • Return Globeville Landing Park to pre-construction state • Maintain trail flow and access during construction

Exhibit 5.22-10. Summary of potential air quality impacts and potential emission reduction strategies

Impacts and/or Benefits (All alternatives)	Potential Emission Reduction Strategies Applicable to All Alternatives
• MSAT emissions could increase temporarily during construction • Construction fugitive dust could cause temporary impacts • No violation of the NAAQS for the No-Action Alternative and the Partial Cover Lowered Alternative (Basic Option with Managed Lanes)	During construction, best management practices could include the following measures and others, if applicable, as identified during project development (per the fugitive dust control plan): • Monitor for PM_{10}, which will allow for the real-time modification or implementation of various dust control measures during construction • Cover wet, compact or use chemical stabilization binding agent to control dust and excavated materials at construction sites • Use wind barriers and wind screens to prevent spreading of dust from the site • Have a wheel wash station and/or crushed stone apron at egress/ingress areas to prevent dirt being tracked onto public streets • Use vacuum-powered street sweepers to remove dirt tracked onto streets • Cover all dump trucks leaving sites to prevent dirt and dust from spilling onto streets • Minimize disturbed areas particularly in winter • Prohibit unnecessary idling of construction equipment • Locate construction diesel engines as far away as possible from residential areas • Locate staging areas as far away as possible from residential uses • Require heavy construction equipment to use the cleanest available engines or be retrofitted with diesel particulate control technology • Use alternatives to diesel engines and/or diesel fuels such as: biodiesel, LNG or CNG, fuel cells, and electric engines, if applicable. • Install engine pre-heater devices to eliminate unnecessary idling for wintertime construction • Prohibit tampering with equipment to increase horsepower or to defeat emission control devices effectiveness • Require construction vehicle engines to be properly tuned and maintained • Use construction vehicles and equipment with the minimum practical engine size for the intended job Post construction, best management practices could include the following measures and others as identified during project development: • Perform routine street sweeping to reduce fugitive particulate dust emissions and enhance street sweeping after snow events to reduce the particulate matter accumulation during operations • Optimize signal timing at intersections and along arterial streets near the freeway to reduce vehicle delay and tailpipe emissions • Implement congestion pricing and commuter incentive programs that reduce peak period freeway congestion and emissions • Encourage TDM options such as high-occupancy vehicle lanes and agreements with major employers to promote and implement flexible work programs

Exhibit 5.22-11. Summary of energy impacts and mitigations

Alternative/ Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	• 65.9 billion BTUs consumed per day • 2,590 billion BTUs to 2,690 billion BTUs consumed during construction	• Follow procedures set forth in CDOT's *Environmental Stewardship Guide* (2003b) • Limit idling of construction equipment • Encourage employee carpooling and vanpooling for construction workers • Encourage use of closest material sources • Locate construction staging areas close to work sites • Encourage use of cleaner and more fuel-efficient construction vehicles (for example, low sulfur fuel, biodiesel, or hybrid technologies) • Implement traffic management schemes that minimize delays and idling • Where appropriate, implement energy conservation measures, such as energy-efficient electrical system specifications, lighting, mechanical equipment, and building insulation
Revised Viaduct Alternative	• 67.4 billion BTUs consumed per day • 7,130 billion BTUs to 7,150 billion BTUs consumed during construction	
Partial Cover Lowered Alternative	• 67.4 billion BTUs consumed per day • 8,630 billion BTUs to 8,690 billion BTUs consumed during construction	
Managed Lanes Option (option to Build Alternatives)	• 65.2 billion BTUs consumed per day • 7,890 billion BTUs to 8,700 billion BTUs consumed during construction	

Exhibit 5.22-12. Summary of noise impacts and mitigation measures

Alternative/ Option	Impacts and/or Benefits	Mitigation Measures
All Alternatives	Construction noise will present short-term effects to those dwelling units located along the corridor and along designated construction access routes.	Implement BMPs to minimize noise during construction, as per FHWA's Highway Construction Noise Handbook (2006).
No-Action Alternative, North Option	Number of dwelling units that exceed NAC threshold • Globeville: 28 • Elyria: 90 • Swansea: 229 (3 that increase 10 dBA or more) • Stapleton: 0 • Peoria: 1 • Montbello: 0 • Aurora: 4	Location and height of feasible and reasonable walls: • Elyria: 12 feet • Swansea: 12 feet
No-Action Alternative, South Option	Number of dwelling units that exceed NAC threshold • Globeville: 28 • Elyria: 87 • Swansea: 217 (11 that increase 10 dBA or more) • Stapleton: 0 • Peoria: 1 • Montbello: 0 • Aurora: 4	
Revised Viaduct Alternative, North Option	Number of dwelling units that exceed NAC threshold • Globeville: 48-49 • Elyria: 126 (8 that increase 10 dBA or more) • Swansea: 267 (33 that increase 10 dBA or more) • Stapleton: 0 • Peoria: 1 • Montbello: 43-52 • Aurora: 3-4	Location and height of feasible and reasonable walls: • Elyria: 10 feet • Swansea: 10 to 12 feet • Montbello: 20 feet
Revised Viaduct Alternative, South Option	Number of dwelling units that exceed NAC threshold • Globeville: 48-49 • Elyria: 123 (6 that increase 10 dBA or more) • Swansea: 255 (37 that increase 10 dBA or more) • Stapleton: 0 • Peoria: 1 • Montbello: 43-52 • Aurora: 3-4	

Exhibit 5.22-12. Summary of noise impacts and mitigation measures

Alternative/ Option	Impacts and/or Benefits	Mitigation Measures
Partial Cover Lowered Alternative, Basic Option	Number of dwelling units that exceed NAC threshold • Globeville: 48-49 • Elyria: 81 (19 that increase 10 dBA or more) • Swansea: 63 • Stapleton: 0 • Peoria: 1 • Montbello: 43-52 • Aurora: 3-4	Location and height of feasible and reasonable walls: • Elyria: 10 feet • Montbello: 20 feet
Partial Cover Lowered Alternative, Modified Option	Number of dwelling units that exceed NAC threshold • Globeville: 48-49 • Elyria: 84 (14 that increase 10 dBA or more) • Swansea: 52 • Stapleton: 0 • Peoria: 1 • Montbello: 43-52 • Aurora: 3-4	

Exhibit 5.22-13. Summary of biological resources impacts and mitigations

Alternative/Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	No permanent or temporary impacts to wildlife habitat or riparian areas	• Comply with Senate Bill 40, CDOT Impacted Black-Tailed Prairie Dog Policy, and CDOT Standard Specifications for protection of migratory birds • Monitor disturbed sites during construction to identify and treat any noxious weed invasion • Do not import topsoil onsite • Reclaim disturbed areas in phases throughout construction with native grasses and forbs • Replace riparian trees at a 1:1 ratio and riparian shrubs at a 1:1 square foot ratio • If construction in prairie dog colonies will occur between February 1 and August 31, conduct a Burrowing Owl survey following CPW protocols no more than 30 days prior to construction; if a nesting pair is discovered, no construction activity will occur within 150 feet of the nest between March 15 and October 31 • Remove or trim vegetation outside of the April 1 to August 31 migratory bird-breeding season • Survey areas to be cleared and grubbed, as well as areas within 50 feet of such areas, between April 1 and August 31 for active migratory bird nests within 7 days of the work being performed • Remove existing nests from structures after August 31 and prior to April 1 • Monitor structures at least once every three days for any nesting activity between August 31 and April 1
Revised Viaduct Alternative	• 594.1 acres of permanent, direct impact to wildlife habitat • 1.05 acres of permanent and 0.10 acre of temporary impacts to riparian areas	
Partial Cover Lowered Alternative	• 596.1 acres of permanent, direct impact to wildlife habitat • 1.06 acres of permanent and 0.10 acre of temporary impacts to riparian areas	
Managed Lanes Option (Option to Build Alternatives)	• Additional 86.5 acres of permanent, direct impact to wildlife habitat • Additional 0.10 acre of permanent impact to riparian areas	

Exhibit 5.22-14. Summary of floodplains and drainage/hydrology impacts and mitigations

Alternative	Permanent Impacts and/or Benefits	Mitigation Measures Specific to Alternatives
No-Action Alternative	Minimal impact to potential ponding areas due to the increased width of the viaduct, which may increase runoff from I-70	Create detention ponds and implement storm drainage for onsite drainage system improvements
Revised Viaduct Alternative	• May impact the floodplain for Sand Creek since bridge construction and new bridge structures will cross this waterway • Minimal impact to potential ponding areas due to the increased width of the viaduct, which may increase runoff from I-70	
Partial Cover Lowered Alternative	• Impact to potential ponding areas due to the increased width of the highway, which may increase runoff from I-70 • The potential ponding areas between Brighton Boulevard and Dahlia Street will be substantially impacted due to lowered profile of the highway	• Create detention ponds and implement storm drainage for onsite drainage system improvements • Build an offsite drainage system to reduce the risk of flooding within the lowered section of I-70, as well as the portion of the watershed between I-70 and the South Platte River

Exhibit 5.22-15. Summary of wetlands and other waters of the U.S. impacts and mitigations

Alternative/Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	• No permanent wetland or other waters of the U.S. impacts • 0.001 acre of temporary impact to other waters of the U.S.	• Mitigate unavoidable, permanent impacts at a 1:1 ratio in a wetland mitigation bank in the South Platte River watershed • Install temporary erosion control and sediment control BMPs before ground disturbing activities; stabilize completed areas permanently within seven days; proposed BMPs are listed in the Wetlands and Other Waters of the U.S. Technical Report • Restore wetlands temporarily affected during construction to pre-construction conditions
Revised Viaduct Alternative	• 4.111 acres of permanent and 0.295 acre of temporary wetland impacts • 0.0001 acre of permanent and 1.195 acres of temporary impacts to other waters of the U.S. impacts	
Partial Cover Lowered Alternative	• 4.111 acres of permanent and 0.295 acre of temporary wetland impacts • 0.012 acre of permanent and 1.195 acres of temporary impacts to other waters of the U.S. impacts	
Managed Lanes Option (option to Build Alternatives)	No additional permanent or temporary wetland or other waters of the U.S. impacts	

Exhibit 5.22-16. Summary of water quality impacts and mitigations

Alternative/Option	Permanent Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	Increase in runoff TSS loads of 15 percent to 16 percent to the South Platte River	• Construct water quality ponds as part of the project to treat stormwater runoff from the highway • Treat runoff entering the South Platte River and Sand Creek and provide 100 percent water quality capture volume • Prevent over-treating by using deicer/sand/salt products and technology in accordance with best management practices • Stockpile solid mixtures per CDOT water quality requirements such as occur at the I-70/Havana Street maintenance facility; the mixtures are kept under domes to protect them from precipitation, which prevents water high in salts from running off into receiving waters
Revised Viaduct Alternative	• Increase in runoff TSS loads of 43 percent to 46 percent to the South Platte River • Increase in runoff TSS loads of 22 percent to Sand Creek	
Partial Cover Lowered Alternative	• Increase in runoff TSS loads of 60 percent to 62 percent to the South Platte River • Increase in runoff TSS loads of 22 percent to Sand Creek	
Managed Lanes Option (option to Build Alternatives)	Additional 15 percent increase in runoff TSS loads to Sand Creek	

Exhibit 5.22-17. Summary of geology and soils impacts and mitigations

Alternative	Impacts and/or Benefits	Mitigation Measures Specific to Alternatives
No-Action Alternative	• Excavation below groundwater for construction of the viaduct structure foundations • Temporary impacts to groundwater during excavation	• Dewater structure foundations during construction
Revised Viaduct Alternative	• Excavation below groundwater for construction of the viaduct structure foundations • Temporary impacts to groundwater during excavation	
Partial Cover Lowered Alternative	• Excavation is anticipated to extend below the depth of groundwater from approximately the UPRR to Columbine Street • Temporary impacts to groundwater during excavation	• Prevent groundwater infiltration into the lowered section of the highway • Install storm drain pipes below the pavement to drain any additional groundwater that still enters the lowered section • Dewater during the construction process

Exhibit 5.22-18. Summary of hazardous materials impacts and mitigations

Alternative/Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	• 7 hazardous materials sites affected • 41 acres of land disturbed • Construction activities at hazardous materials sites have the potential to spread soil or groundwater contamination • Construction at hazardous materials sites also may affect the construction budget and schedule, particularly if previously unidentified contamination is found	• Before right-of-way acquisition, conduct a Phase I Environmental Site Assessment for those properties identified for acquisition • Avoid contaminated sites wherever practical; where unavoidable, initiate further site investigation and coordination with affected property owners • Conduct appropriate surveys for asbestos, lead-based paint, and universal wastes prior to demolition of any building structures; if these materials are encountered, they will be removed and disposed of in accordance with applicable regulations and guidelines • Prepare and implement site-specific health and safety plans and material management plans to address potential hazardous materials encountered during construction; these plans will consist of specific measures to protect worker and public health and safety, as well as programs to manage contaminated materials during construction • Implement standard construction measures for fugitive dust control, as well as stormwater erosion and sediment controls, to minimize the spread of contaminated soil • In the event that unknown contaminated media is encountered during construction, stop work until the contamination is property evaluated and measures developed to protect worker health and safety • Obtain a CDPHE Discharge Permit System Construction Dewatering Permit, for Remediation Activities Discharging to Surface Water or Construction Activities Discharging to Ground Water by the contractor, as required, utilizing readily available data. The selected contractor will follow the permit requirements; source water will either be treated and discharged onsite in accordance with the permit or characterized and removed offsite to a permitted disposal facility • Properly close monitoring wells or septic systems disturbed during construction activities, in accordance with regulations and guidelines
Revised Viaduct Alternative	• 21 to 22 hazardous materials sites affected • 575 acres of land disturbed • Construction activities at hazardous materials sites have the potential to spread soil or groundwater contamination • Construction at hazardous materials sites also may affect the construction budget and schedule, particularly if previously unidentified contamination is found	
Partial Cover Lowered Alternative	• 26 hazardous materials sites affected • 614 to 616 acres of land disturbed • Construction activities at hazardous materials sites have the potential to spread soil or groundwater contamination • Construction at hazardous materials sites also may affect the construction budget and schedule, particularly if previously unidentified contamination is found	

Exhibit 5.22-19. Summary of utilities impacts and mitigations

Alternative/Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	• All utility types will be affected • Construction impacts to utilities, mainly adjustments, will be limited to the section of the existing viaduct and realigned ramps	• Minimize service disruptions by connecting to active utilities, and scheduling to coincide with periods of lower demand • Encase or provide protective cover over any impacted underground utilities • Coordinate with utility owners and operators to identify construction requirements and financial responsibilities for relocations • Identify and improve any utility concerns that can be addressed as part of project implementation • Integrate above-ground utilities that are impacted by the project into the design, hide them from sight within the design, and/or design them to be aesthetically pleasing to the greatest extent practical • Move above-ground utilities underground to the greatest extent practical
Revised Viaduct Alternative	• All utility types will be affected • Construction impacts to utilities, mainly adjustments, are estimated to be somewhat higher than the No-Action Alternative due to wider construction impacts and reconfiguration of ramps	
Partial Cover Lowered Alternative	• All utility types will be affected • Construction impacts to utilities, mainly relocations, will be substantial to accommodate the lowered highway • Offsite stormwater drainage system south of I-70 will result in major benefit to address an existing deficiency	
Managed Lanes Option (option to Build Alternatives)	There will be minimal additional temporary impacts to Build Alternatives only at locations of direct connections to I-270, I-225, and Peña Boulevard	