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4.18 Construction Impacts

This section identifies the impacts that would be expected during the construction phase and identifies mitigation measures to address these impacts. Specific construction methods will be addressed during development of the final construction plans. In general, highway construction would include demolition, bridge construction/widening, excavation and grading, utility relocations and adjustments, retaining wall construction, storm sewer installation, and paving.

Construction sequencing and duration strategies would take into account minimization of construction impacts, as well as other important considerations, such as funding and coordination with local communities.

4.18.1 Consequences of the Alternatives

4.18.1.1 No Action Alternative

The No Action Alternative would involve no additional construction over what is currently programmed, approved, and funded. Therefore, the No Action Alternative would result in no construction or utility impacts.

4.18.1.2 Construction Impacts Common to System Alternatives 1, 2, 3, and the Preferred Alternative

Reconstruction and widening of I-25 and US 6 would present the potential for increased dust, noise, runoff, traffic congestion, restricted access to residences and businesses, and visual intrusions to motorists and residents. It is likely that hazardous materials may be encountered during construction activities based on information gathered during this study (see **Section 4.13** *Hazardous Waste*).

Air Quality

Without mitigation, excavation, grading, and fill activities could increase local fugitive dust emissions. Fugitive dust is airborne particulate matter, generally of a relatively large particle size (greater than 100 microns in diameter). Because of the large size, these particles typically settle within 30 feet of their source. Smaller particles could travel as much as several hundred feet depending on wind speed. Through the use of mitigation measures described later in this section, fugitive dust emissions could be effectively controlled.

Noise

Construction noise would present the potential for short-term impacts to those receptors located along the corridor and along the designated construction access routes. The primary source of construction noise is expected to be diesel-powered equipment, such as trucks and earth moving equipment.

Section 36-6(b)(7) of the Denver code, from the Department of Environmental Health, states that the maximum permissible sound pressure levels specified in the code do not apply to sound emitted from construction equipment operated between the hours of 7:00 a.m. and 9:00 p.m. (City and County of Denver, 1973). However, operation of construction equipment between the

hours of 9:00 p.m. and 7:00 a.m. may not exceed the following maximum sound pressure levels or the ambient sound levels when they are equal to or exceed the noted sound levels, unless a noise variance has been granted, as per Section 3-6(2) specified as follows:

- 50 dB at the property line of a residential premise
- 60 dB at the property line of a commercial premise
- 75 dB at the property line of an industrial premise
- 70 dB anywhere on a public premise

Demolition and pile driving could be the loudest construction operations. Demolition of structures, such as existing bridges, is generally conducted at night because of safety issues requiring full or partial closure of the highway and local streets. Piles could be required at most major bridge installations. Alternative construction methods could replace pile driving in noise sensitive locations. The majority of noise receptors are located greater than 50 feet from areas where pile driving, or other high-noise activities, are expected. Noise impacts are expected to occur only in isolated areas along the project corridor.

Vibration

Vibration caused by construction activities would present the potential for short-term impacts in areas where pile driving and compaction equipment are being used. The potential for building damage from pile driving vibration is estimated to exist only within about 50 feet. Vibration from compaction equipment is less severe. Construction activates in close proximity to buildings (within 50 feet) must be sensitive to vibration damage risks. Details would be developed during subsequent design efforts.

Water Quality

During construction, stormwater runoff would present the potential for violations of water quality standards in adjacent waterways and groundwater. Without mitigation measures, stormwater runoff could cause erosion and sedimentation, and transport of spilled fuels or other hazardous materials. For the most part, this project would parallel and drain into the South Platte River. Groundwater could be encountered during relocation of deep utilities, excavation, and construction of tunnels and below-grade roadways. Dewatering and treatment would probably be required where groundwater is present. Mitigation measures for contaminated groundwater potentially encountered during construction are discussed in **Section 4.13** *Hazardous Waste*.

Traffic Impacts

Construction detours would be expected to create short-term impacts on local traffic circulation and congestion. For this project, these impacts would be substantial. Delays to the traveling public and inconvenience to corridor residents would occur. A primary goal of CDOT during construction of the project would be to minimize inconvenience to the public.

Visual Impacts

Short-term construction-related visual impacts would likely occur as a result of this project. These impacts would include the presence of construction equipment and materials, temporary

barriers, guardrail, detour pavement and signs, temporary shoring and retaining walls, lighting for night construction, and removal of vegetative cover.

4.18.1.3 SPECIFIC CONSTRUCTION IMPACTS OF SYSTEM ALTERNATIVES 1, 2, 3, AND THE PREFERRED ALTERNATIVE

Construction of System Alternatives 1, 2, 3, or the Preferred Alternative would be expected to create short-term impacts throughout the construction period. Descriptions of construction methods and related construction and utility impacts are provided below.

- ***I-25 Mainline –*** Reconstruction of I-25 would require careful planning to maintain traffic flow and ramp connections to existing interchanges during construction. Current concepts envision work progressing from the east to the west with an initial relocation of the railroad and then phased widening with traffic shifts onto new pavement. Construction of the underpass at Alameda Avenue would be integrated with the Alameda Avenue bridge replacement. A longer or/and wider structure here would offer flexibility for traffic diversion and allow larger construction areas. Replacement of the drainage system in this location would be staged to ensure that an operating system remains in place as the new system is constructed. The I-25 bridge over Santa Fe Drive would be constructed as a single structure placed in the "gap" between the existing southbound and northbound I-25 roadway. Ramp closures and detours along local arterial streets would be likely here as the new interchange is phased. The same number of existing lanes would be maintained in each direction on I-25 during construction except during short periods of time when partial closures would be required. These would be staged during periods of low traffic on the system, which would likely occur on nights and weekends. Narrow shoulders and lanes are anticipated.
- ***US 6 –*** Reconstruction of US 6 is complicated by the raised road profile at the South Platte River to provide for improved river flow under the highway. It is envisioned that construction would begin on the north and progress south with traffic shifts on to the new pavement and structures as they are completed. Temporary closure of ramps and detours are anticipated, using Federal Boulevard/Alameda Avenue and 8th Avenue as the principal routes. No detours would be allowed through residential neighborhoods.
- ***Santa Fe Drive Kalamath Street / Railroad Grade Separation –*** Construction of the grade separation at the railroad would require detouring of the arterial streets. For System Alternatives 1, 2, and the Preferred Alternative current phasing concepts anticipate that these detours could occur adjacent to the construction using alternating closure of Kalamath Street and Santa Fe Drive from Ellsworth Avenue to Byers Place with consolidation of two-way traffic on the non-closed street. This would require reconfiguring the at-grade railroad crossing with new gate arms and signals. Key to the success of these options would be constructing new railroad bridges offset from the existing rail in order to avoid detouring the railroad itself during construction. This traffic detour would be implemented in concert with a public information program and advanced notice of roadway closures and recommendations for alternate routes. Maintenance of access to existing businesses during construction would be a challenge requiring negotiations and special directional signing.

System Alternative 3 offers more flexibility in that a single bridge would be constructed between Kalamath Street and Santa Fe Drive for the railroad crossing. This would allow traffic on Kalamath Street and Santa Fe Drive to remain on the existing roads until the structure is completed.

- ***Santa Fe Drive / Kalamath Street / Alameda Avenue –*** Construction of Alameda Avenue would be complex for each alternative under consideration. System Alternative 1 and the Preferred Alternative generally would widen Alameda Avenue while leaving intersections at the same elevations and would be accommodated through the closing and or narrowing of lanes to provide room for construction.

  System Alternatives 2 and 3 would consolidate Santa Fe Drive and Kalamath Street at Alameda Avenue and would grade separate them. Systems Alternative 2 would take Santa Fe Drive/Kalamath Street over Alameda Avenue, while System Alternative 3 would take Santa Fe Drive and Kalamath Street under Alameda Avenue. System Alternative 3 is more complex and would require relocating utilities and constructing substantial drainage structures. This alternative would preserve more businesses than System Alternative 2, which would require access to be maintained through construction. In either case, construction of the bridge would be the first action, followed by utility relocations, storm sewer construction, earthwork, and construction of the new roadway.

  Under System Alternatives 2 and 3, reconstruction of Alameda Avenue between Santa Fe Drive and Cherokee Street would require new bridges for the railroad and the parallel LRT line and retaining walls. These structures would be designated to accommodate the city's plans for future roadway widening of Alameda Avenue and for bicycle/pedestrian facilities. Detouring of Alameda Avenue traffic to Broadway or US 6 would be desirable.

4.18.1.4 UTILITY IMPACTS

The Valley Highway corridor right-of-way is crossed by various utilities, some of which would be relocated during construction. Impacts to existing utilities located within the proposed right-of-way were evaluated based on preliminary utility mapping developed from aerial surveys, base maps collected from individual utility companies, and field reconnaissance. Utilities in the project corridor to be considered during the design process are described below.

Electrical and Cable TV

Approximately 60 electrical and cable lines cross and/or are parallel to the Valley Highway. The majority of these lines would be removed or relocated. System Alternatives 2 and 3 would have the largest impacts to utilities because of the grade separations which would take roadways underground; System Alternative 1 and the Preferred Alternative would have the least amount of impacts.

Communication Cables

Communication cables cross and/or parallel the highway. Many of these communication cables would have to be relocated. Communication cables are often found in the same cluster of conduits as fiber optic lines, which are described later in this section.

Natural Gas

Approximately 20 natural gas pipelines, all owned and operated by Xcel Energy, cross and/or parallel the right-of-way. These pipelines vary from 2 inches to 10 inches in diameter. It is anticipated that many of these pipes would need to be relocated since they are not at ample depth to avoid excavation impacts.

Sanitary Sewer

Sanitary sewer services along the right-of-way are provided by the Metro Wastewater Reclamation District, various special districts, and the City and County of Denver. Approximately 30 crossings have been identified, with pipelines ranging from 8 to 72 inches in diameter. It is anticipated that the majority of these pipes are deep enough to avoid excavation impacts.

Storm Sewer

The project corridor contains several storm sewer drainage systems all generally destined for the South Platte River. Major highway and local street drainage systems collect surface drainage and currently discharge directly into the South Platte River. The I-25 underpass at Alameda Avenue has historically flooded. The system includes inlets, pipes, a sheet pile cofferdam that restricts ground water from inundating the highway, and a pump system that lifts the water from the highway and discharges it to the South Platte River. A study of the drainage systems has been conducted through this EIS; results of this study are summarized in the *Water Resources Report* (FHU and Muller Engineering, 2005g) prepared as part of the EIS process. Further discussion of the disposition of the storm sewer system is provided in **Section 4.9** *Water Resources*.

Water Lines

Approximately 20 water lines cross the right-of-way. Relocation would be required for a majority of these pipelines.

Fiber Optic Lines

Approximately 10 fiber optic lines cross and/or parallel the right-of-way. A majority of these lines would need to be relocated. Many of the fiber optic lines cross the highway through the overpass and underpass bridge crossings of I-25 and US 6. They would be accommodated with replacement bridges.

Utility impacts would generally occur within the construction time frame for the project.

4.18.2 Mitigation Measures

4.18.2.1 CONSTRUCTION MITIGATION

The Construction Citizen Working Group met twice during the EIS process to discuss construction-related impacts, identify those parties most likely to be impacted, and to identify possible mitigation measures. A summary of the Citizen Working Group activities is included in **Chapter 6** *Public Involvement.* **Table 4.18-1** provides a summary of their recommendations

regarding mitigation strategies. Appropriate application of these mitigation strategies will be defined during the final engineering phase of this project. Additional mitigation measures may be developed during final design, as appropriate. Additional discussion on sustainable construction and designs is provided in **Section 4.17** *Irreversible and Irretrievable Commitments of Resources.*

4.18.2.2 UTILITY MITIGATION

Mitigation of utility impacts would begin with a confirmation of the location of the utility through further records research, meetings with the specific utility, and field investigations. Relocations, adjustments, or modifications to utilities would be integrated into schedules and budgets as appropriate to avoid disruption of customer service and to ensure that construction can proceed with limited interruption.

Table 4.18-1 Summary of Citizen Working Group Recommendations for Construction-Related Mitigation Strategies

Impact	Most Likely Impacted	Recommended Mitigation Strategies
Noise	• Local residents and businesses	• Implement construction best management practices • Use temporary noise walls / screens • Make available hotel vouchers • Schedule construction during less noise-sensitive times • Create a Noise Hotline manned by an actual troubleshooter • Send information to affected public before construction • Note that there are seasonal differences relative to noise • Email/voice mail affected public before construction activities • Use noise blankets on equipment and quiet-use generators • Combine noisy operations to occur in the same time period • Use alternative construction methods such as sonic or vibratory pile-driving in sensitive areas, when possible
Access	• Local residents and businesses • Traveling public	• Use enhanced signing • Use alternate access enhancements • Use advertising / public relations • Do not close multiple interchanges concurrently
Traffic • Detours • Lane closures • Congestion • Parking impacts • Construction vehicles on local streets • Safety of lane shifts	• Local residents and businesses • Traveling public	• Limit detours • Place detours on major arterial streets and ensure no local street detours are implemented • Schedule construction during periods of least traffic • Use geometric enhancements including wider lanes and better visibility • Limit construction vehicles to major arterials • Enforce speed restrictions; provide adequate space for enforcement on I-25; make prime contractor accountable • Use Courtesy Patrol • Use enhanced signing • Phase construction to limit traffic in neighborhoods

Table 4.18-1 Summary of Citizen Working Group Recommendations for Construction-Related Mitigation Strategies (continued)

Impact	Most Likely Impacted	Recommended Mitigation Strategies
Traffic (Continued)		• Comply with American Association of State Highway and Transportation Officials guidance and *Manual on Uniform Traffic Control Devices* • Coordinate work activities to ensure they do not coincide with sporting or entertainment events • Implement advanced traffic diversion (470 Beltway, Colfax as an alternate to 6th Avenue) • Use intelligent management systems and variable message signs to advise / redirect traffic • Work with Regional Transportation District to offer enhanced operations during peak construction • Develop traffic management plans • Maintain access to local businesses / residents • Coordinate with emergency service providers to minimize delay and ensure access to properties
Modified Pedestrian / Bike Mobility	• Local residents • Commuters	• Provide well defined detours for pedestrians/bicyclists • Enhance safety through the use of adequate signing, fencing, and lighting • Implement a public relations program • Comply with American Disability Act requirements • Construct Bayaud Avenue bike / pedestrian overpass as a detour before Alameda Avenue construction
Environmental Impacts • Dust / Air quality • Hazardous waste • Water quality • Resource use/ Recycling material	• Construction workers • Downstream water users • Local residents and businesses	• Use wetting / chemical inhibitors for dust control • Provide early investigation of subsurface conditions • Prepare a well-defined materials handling plan • Employ educated contractor with trained personnel • Require prompt and safe disposal of waste products • Implement water quality best management practices • Prepare well-defined stormwater management plan • Conduct monitoring • Institute resource reuse and allocation • Ensure regulatory compliance • Cover trucks hauling soil and other materials • Stabilize and cover stockpile areas • Minimize off-site tracking of mud and debris by washing construction equipment in contained areas and via temporary access stabilization • Avoid impacts to wetlands or other areas of important habitat value in addition to those impacted by the project itself • 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 • Store equipment and materials in designated areas only • Promptly remove any unused detour pavement or signs • Follow Sections 107.25 and 208 of *CDOT Standard Specifications for Road and Bridge Construction* (CDOT, 1999)

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