3.23 CONSTRUCTION

This section identifies the impacts that are expected during the construction phase of the No-Action Alternative or either build package and mitigation measures to address impacts. Construction activities and associated impacts would be similar for both build packages, although in different locations. Therefore, impacts are discussed generally and not by package, except where there are notable differences (e.g., commuter rail for Package A).

What's in Section 3.23?

While other sections of this document address permanent impacts that the packages could have on the environment, this section deals with the potential temporary impacts of construction. Specific construction methods would be addressed during the development of the final construction plans for the Preferred Alternative. In general, highway, rail, and supporting facilities construction includes mobilization, utility relocation and adjustments, demolition and site preparation, and lane or track construction (earth work and paving). Construction sequencing strategies are required for a project of this size and would take into account minimization of related impacts.

Concerns expressed through the public involvement process regarding construction impacts focused on noise, visual, and traffic impacts. These concerns are summarized in **Chapter 8** *Comments and Coordination*.

3.23.1 Construction Schedule

This section identifies and describes various construction impacts associated with the alternatives as well as construction scheduling and phasing. Package A would include highway widening and also double-tracked commuter rail construction mostly along the existing BNSF right-of-way using the existing BNSF railroad track plus one new track from Fort Collins to downtown Longmont, construction of a new double-tracked extension from Longmont to the proposed FasTracks North Metro end-of-line station in Thornton, and construction of associated commuter rail stations and a maintenance facility. Also, highway interchange improvements, commuter bus stations and parking and carpool lots would be constructed as part of Package A. Package B would include construction of bus rapid transit (BRT) stations along I-25, a transit maintenance facility, highway widening including the addition of tolled express lanes (TEL), interchange improvements and parking and carpool lots.

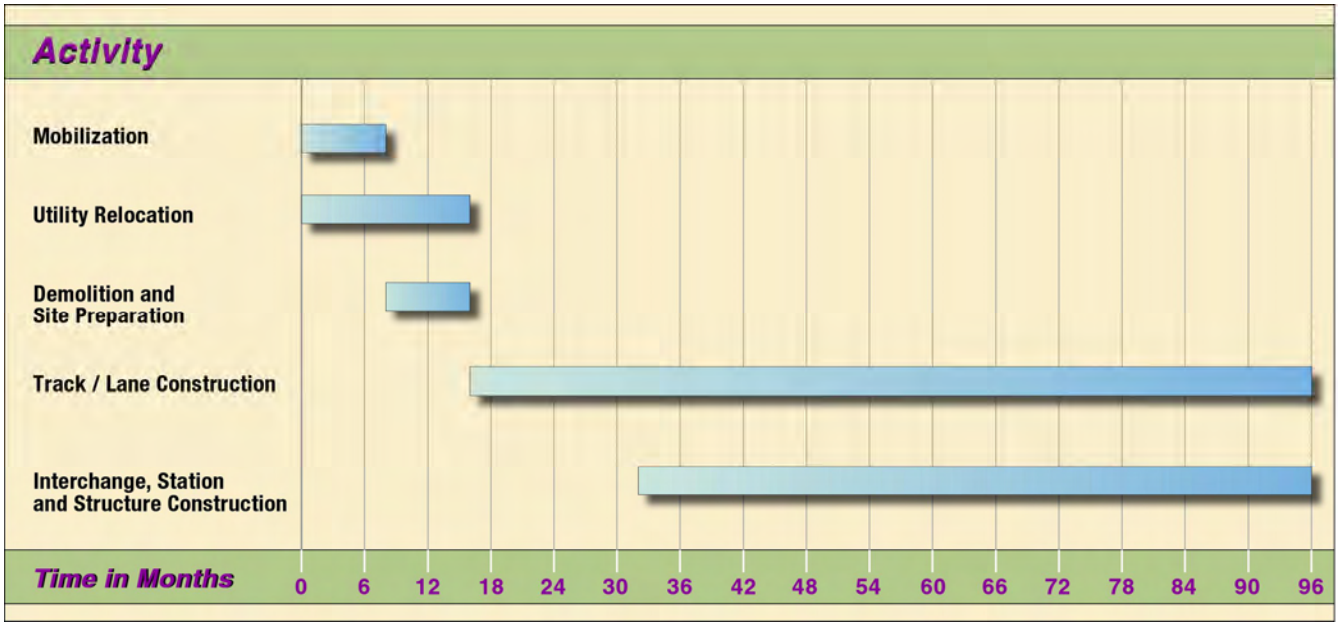
The approximate construction schedule for the project under ideal conditions and the possibility of project phasing are described in this section.

Approximate Best-Case Construction Schedule

Either build package could be built in phases if warranted and if funding for the entire project is not available. The construction schedule is expected to be somewhat similar between packages. The only difference would be the development of rail lines to support the transit component in Package A. It is estimated that construction for the entire project

would require up to 96 months in a fully funded scenario, if the project could be funded as one project. The schedule would take into account various construction activities grouped into the categories of: mobilization, utility relocation, demolition and site preparation, lane construction, and interchange and structure construction. The time required to complete activities for each of these categories as well as the relative timing of the activities during the course of the project has been estimated (see **Figure 3.23-1**).

Figure 3.23-1 Approximate Best-Case Construction Schedule for Both Build Packages



Construction Phasing

The phases would be determined once a package is selected and analyzed, along with a funding strategy, in the Final EIS.

3.23.2 Environmental Consequences

3.23.2.1 No-Action Alternative

The No-Action Alternative would involve very little additional construction over what is currently programmed, approved, and funded to support the growing population of the regional study area. Therefore, the No-Action Alternative would result in no construction or utility impacts aside from those associated with the programmed projects (see **Chapter 2** *Alternatives*).

3.23.2.2 Build Packages

Construction of either build package would create various temporary impacts within the project area. Some of these impacts would be common to both build packages while some are specific to particular components of a package, such as the incorporation of a double-track commuter rail line in Package A.

Transportation

Construction detours can create short-term impacts on local traffic circulation and congestion and inter- and intra-state travelers using the I-25 and US 85 corridors for commuting. These impacts may include delays or the need for alternative travel routes to reach residences and community facilities. Emergency service response may be negatively impacted as a result of construction, as well. In the more populated areas, such as the Denver Metro Area, these impacts could cause greater congestion. 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 through construction traffic planning during final design, and by monitoring and adjusting these plans throughout the construction phase.

Construction activities associated with the additional double-track along the BNSF/North Longmont Metro Connection corridors would impact roadway traffic at rail crossings and possibly train traffic along the existing railway. These impacts, though unavoidable, could be minimized through a variety of techniques.

Overall construction impacts to roadway crossings are expected to be minor with employment of mitigation measures listed in **Section 3.23.3**.

Pedestrian and bicycle mobility is important within each of the package corridors. Construction activities could temporarily affect local residents who use these facilities and those who use these corridors for commuting and recreation.

Land Use

Construction of either build package would temporarily affect access to the different land uses within the project area throughout the duration of the project. These impacts would mostly be limited to areas that are in close proximity to large-scale construction activities, generally not greater than 300 feet outside of the work areas.

Economic Conditions

By implementing either of the build packages, the economic benefit of additional employment within the project area due to construction would be evident. This additional employment includes construction-related jobs that are directly and indirectly related to the project. Jobs created that are directly related would include jobs that pertain to the actual construction activities of the project. Jobs that are indirectly related would include positions that would help support the construction efforts by supplying goods and services to construction workers.

Restricted access to businesses located adjacent to the rights-of-way during construction could have the potential of negatively impacting the performance of some of the businesses. These impacts may see a partial offset by increased retail sales due to the presence of construction workers.

Right-of-Way

Some additional land would be required in areas adjacent to the existing rights-of-way for construction staging purposes. These staging areas would be used to store equipment and materials and would also be used to provide parking for construction workers. These necessary areas would be purchased or leased, usually as temporary construction easements, before the start of construction.

Air Quality

Without mitigation, excavation, grading, and fill activities associated with construction activity could increase local fugitive dust emissions. Fugitive dust is airborne particulate matter, generally of a relatively large size (greater than 100 microns in diameter). Because of their large size, these soil particles typically settle within 30 feet of their source. Smaller particles could travel as much as hundreds of feet, depending on winds.

Construction activity would increase emissions from additional traffic and detouring. Also, construction would require the disturbance of soil, which would produce fugitive dust or particulate pollution. Construction-related activities that may cause soil material to become airborne include the following:

- Digging and dumping of soil and discarded construction materials (asphalt, concrete, etc.)
- Material hauling
- Wind erosion over exposed construction sites
- Re-entrainment of construction dirt deposited on local streets by vehicular traffic on the streets

The amount of airborne dust generated and the airborne concentration of particulate matter that human receptors would be exposed to would depend on a variety of factors and would vary from day-to-day, depending on site and climate conditions. Factors influencing fugitive dust emissions include:

- Soil type
- Area of exposed soil
- Location of construction activities relative to potential receptors
- Volume of dirt/material to be moved
- Wind speed and direction
- Soil moisture
- Time of day
- Season of the year

The length of time that any particular receptor would be exposed to construction-related dust would be relatively short, lasting only during construction activities. Construction would likely proceed in a linear fashion with site excavation, bed preparation, and track installation beginning at one or more locations and working along the alignment.

Construction vehicles and equipment would generate the same exhaust emissions as motor vehicles on area roadways. The emissions contribution of these vehicles would be short-term and minor when compared to usual emission levels from day-to-day traffic in the study area. Additionally, construction equipment would generally be diesel-powered, emitting relatively low levels of carbon monoxide.

Exhaust emissions could temporarily impact sensitive receptors located adjacent to the areas of construction.

Noise and Vibration

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

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 and could have both noise and vibration impacts. Alternative construction methods, such as the use of caissons or pre-drilling for piling, 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. Increased noise impacts are expected to occur only in areas near residential developments that are in the vicinity of interchanges requiring demolition and replacement or major renovation. These impacts would occur primarily in the Windsor area and the north Fort Collins area along I-25.

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 of the activity. Vibration from compaction equipment is less severe because it does not propagate through the lower soil layers like pile driving does. Construction activities in close proximity to buildings (i.e., within 50 feet) must be sensitive to vibration damage potential. Extra care would be necessary when in close proximity to buildings. Details would be developed during subsequent design efforts.

Table 3.23-1 shows typical noise emission levels of construction equipment that could be used for either build package at 50 feet. The impact levels from construction noise would depend on the sensitivity of the noise receptor, the magnitude of noise during each construction phase, the duration of the noise, the time of day the noise occurs, and the distance from the construction activities.

A detailed description of noise level measurements (dBA) can be found in **Section 3.6** *Noise and Vibration*.

Table 3.23-1 Typical Construction Equipment Noise Emission Levels at 50 Feet

Equipment Type	Typical Noise Levels at 50 feet (dBA) from Source	Equipment Type	Typical Noise Levels at 50 feet (dBA) from Source
Pile drivers (impacts)	101	Loader	85
Rail saw	90	Tie insert	85
Scraper	89	Pneumatic tool	85
Paver	89	Impact wrench	85
Truck	88	Bulldozer	85
Jackhammer	88	Concrete mixer	85
Mobile crane	88	Concrete pump	82
Pavement breaker	88	Compactor	82
Truck	88	Compressor	81
Grader	85	Backhoe	80
Dozer	85		

Source: FTA 1995.
dBA = A-weighted decibel

The potential for construction noise impacts would vary by location and land use. It is likely that noise impacts would occur in residential areas within 50 feet of the railroad alignment as a result of construction of the double-track commuter system. These impacts would be intermittent and temporary. Potential noise impacts to commercial or industrial areas could occur within 50 feet of the rail alignment from construction activities in areas where pile-driving activity would take place. **Table 3.23-2** identifies acceptable noise levels from construction activities for associated land uses and time of day as provided in the FTA *Noise and Vibration Impact Assessment Guidance Manual* (FTA, 1995).

Table 3.23-2 Acceptable Construction Noise Levels

Land Use	Noise Limit, 8-hour L_{eq} (dBA)	
	Day	Night
Residential	80	70
Commercial	85	85
Industrial	90	90

Source: FTA 1995.
dBA = A-weighted decibel
Leq = sound pressure level

Construction vibration impacts would result from the use of construction equipment such as a pile driver, a bulldozer, or a jack hammer. The vibration would be generally intermittent and temporary, and therefore, would not result in an appreciable impact to receivers along the alignment with the exception of properties in close proximity to construction activities. **Table 3.23-3** identifies vibration source levels for construction equipment at 25 feet.

Detailed information on vibration measurements (vdB) can be found in **Section 3.6** *Noise and Vibration.*

Table 3.23-3 Vibration Source Levels For Construction (From Measured Data)

Equipment	PPV at 25 Feet (in/sec)	Approximate VdB at 25 Feet
Pile driver (impact)	1.518	112
Large bulldozer	0.089	87
Caisson drilling	0.089	87
Loaded trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

Source: FTA 1995.
PPV = Peak Particle Velocity VdB = vibration decibels

Ecosystems

Wildlife habitats adjacent to the railway or roadway improvements would be impacted during construction. Some wildlife would be driven away during construction activities due to the increased noise and activity. These impacts would be primarily limited to the undeveloped areas of the project area.

Farmlands

Farmlands adjacent to the alignments would be impacted if construction activities are required to extend beyond the right-of-way or if access must be modified. Also, dust generated from construction activities could settle on agricultural lands, possibly temporarily altering soil composition. The impacted farmland areas are scattered throughout the project area where land is undeveloped or primarily rural.

Cultural Resources

Construction could damage or remove archaeological or paleontological resources that have become buried beneath the soil surface, as discussed in **Section 3.15** *Historic Preservation* and **Section 3.16** *Paleontological Resources*. The amount of damage would vary, depending upon soil strata, type, and condition, materials, and type of structure. Construction could have both short- and long-term impacts on cultural landscapes by introducing intrusive elements into the landscape, or by removing character-defining elements of that landscape, such as large trees, irrigation features, or open spaces.

Parks and Recreational Resources

Parks located adjacent to construction activity could experience temporary impacts during construction. Detailed information on each of the parks and recreation areas can be found in **Section 3.18**, *Parks and Recreation*. Impacts to these areas could include construction noise, dust, visual degradation, and increased traffic congestion inhibiting access to the park and recreation areas.

Visual Setting

Short-term construction-related visual impacts would likely occur as a result of the proposed build packages. These impacts would include the presence of construction equipment and material storage, temporary barriers, guardrail, detour pavement and signs, temporary shoring and retaining walls, lighting for night construction, and removal of existing

vegetative cover in the construction zone. Residential areas near construction activities could experience visual impacts resulting from construction activities.

It is assumed that the construction of either package would be conducted in phases so the entire corridor would not be undergoing construction at one time. The greatest visual impacts during construction would be associated with construction lay-down yards (staging areas), construction traffic/equipment along I-25 and the rail line, clearing/demolition of the bridge structures, safety barriers, and signage and flag-persons. The impacts would be visible both to residents along the I-25 corridor and the rail line as well as travelers on the roadway network within the project area.

Floodplains and Water Resources

During construction, stormwater runoff could present the potential for violations of water quality standards if discharge occurs without the application of best management practices. Without mitigation measures, stormwater runoff could cause erosion and sedimentation and transport spilled fuels or other hazardous materials off the construction site. Both packages cross several drainage basins. Groundwater could be encountered during relocation of deep utilities, excavation, and construction of tunnels and below-grade roadways. Dewatering and treatment could be required where groundwater is present.

Both build packages would cause an increased risk to surface water quality due to proximity of construction to tributaries of the South Platte River. These tributaries include the Cache la Poudre River, Big Thompson River, Little Thompson River, and St. Vrain Creek. Final design would include runoff prevention measures to minimize the amount of sediment reaching surface water bodies as a result of rail or road construction.

Wetlands and Waters of the U.S.—Section 404

Temporary impacts to wetlands could occur within the drainages of St. Vrain Creek, Little Thompson River, Big Thompson River, and Cache la Poudre River. These impacts would primarily be from construction equipment adjacent to wetland areas. Wetlands would be restored to the extent possible if damage from the equipment occurs (see **Section 3.8** *Wetlands*).

Hazardous Materials

Hazardous materials could be encountered during construction in several ways. The movement of earth, particularly excavation, could uncover sites with hazardous chemicals or petroleum products. Former or current gas stations can frequently contain petroleum contamination that could be encountered during construction.

During construction, it is expected that there would be excavation and drilling for caissons to support underpasses, overpasses, and bridge development. Any of these activities could cause an impact to soils or groundwater containing hazardous waste and, possibly, a potential impact to human health and safety.

Prior to construction and right-of-way acquisition, soil sampling would be performed to determine the nature and extent of contamination at sites with recognized environmental conditions. The results of this sampling would be incorporated into a health and safety plan that would be implemented during construction to minimize the potential exposure of workers to contaminants and hazards. Soil and water management plans would be

developed to minimize runoff and impacts to uncontaminated soils. Contaminated materials would be disposed according to Colorado Department of Public Health and Environment (CDPHE) requirements.

Utilities

Construction associated with either build package would require excavation, grading, boring and other activities that would have short-term effects on utilities. This would include crossing existing lines, relocation, modification, and usage of temporary easements. The process of relocating these utilities could cause temporary planned or accidental disruptions in service to local residents in the project area.

CDOT would be responsible for utility relocations and replacements required by the build packages. Mitigation would include meeting and consulting with the municipalities and utility representatives during the final design and construction phases to coordinate planning and construction activities. CDOT's goal is to minimize and, to the extent possible, avoid interruptions in service to corridor residents and businesses.

Energy

Either build package would require a substantial one-time energy expenditure related to the manufacture of construction materials, transporting of materials to the site, and construction of new facilities. Construction energy consumption is based on the number of lane-miles and track-miles proposed for each construction type; at-grade and on elevated structure. The build packages require energy to construct additional lanes, double-track commuter rail, stations, and maintenance facilities. The energy consumption estimated for construction of Package A is approximately 2,112,000 British thermal units (BTUs), while the estimated energy consumption for Package B is approximately 2,300,000 BTUs (see **Table 3.23-4**).

Table 3.23-4 Energy Consumption for Construction

Alternative	Type of Construction	Lane Miles/ Track Miles	BTUs per Lane Mile (in millions)	BTUs Consumed
Package A	Surface Road/Railway	122.9	13,885	1,706,467
	Elevated Road/Railway	3.1	130,739	405,291
	Total Construction	126.0	N/A	2,111,758
Package B	Surface Roadway	128.0	13,885	1,777,280
	Elevated Roadway	4.0	130,739	522,956
	Total Construction	132.0	N/A	2,300,236

Source: FTA, 2006.

3.23.3 Mitigation Measures

CDOT's *Standard Specifications for Road and Bridge Construction* (2005) and CDOT's *Construction Manual* (2002a) outline basic mitigation measures that contractors are required to take on any construction project. Appropriate application of these mitigation strategies would be defined during the final engineering phase of this project. See **Table 3.23-5** for a summary of construction-related mitigation strategies.

Table 3.23-5 Summary of Construction-Related Mitigation Strategies

Impact	Most Likely Impacted	Recommended Mitigation Strategies
Noise	Local residents Local businesses	▪ Implement construction best management practices. ▪ 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. ▪ In residential areas, construction activities will be minimized during the evening, nighttime, weekends, and holidays when receptors are usually in these areas. ▪ Nighttime construction will be desirable (e.g., commercial areas where businesses may be disrupted during daytime hours) or necessary to avoid major traffic disruption. ▪ The major noise source on construction sites is typically diesel motors; therefore, all engines will use commercially available effective mufflers and enclosures, as possible. ▪ 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 creates less operational noise than older equipment. All construction equipment will be inspected at periodic intervals to ensure proper maintenance and presence of noise-control devices (e.g., mufflers and shrouding). ▪ 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. ▪ 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. ▪ Plans will be made to conduct truck loading, unloading, and hauling operations so that noise will be kept to a minimum. This will be achieved by carefully selecting routes to avoid going through residential neighborhoods to the greatest possible extent.

Table 3.23-5 Summary of Construction-Related Mitigation Strategies (Cont'd)

Impact	Most Likely Impacted	Recommended Mitigation Strategies
Noise (Cont'd)		▪ Good public relations will be maintained with the community to minimize objections to unavoidable construction noise. Frequent updates of all construction activities will be provided to the public. This program should keep residents informed so they may plan around periods of particularly high noise levels and should provide a conduit for residents to express any concerns or complaints about noise. ▪ A community noise and vibration monitoring plan and a noise and vibration control plan will be prepared to ensure that contractors take all reasonable steps to minimize noise and vibration due to proposed construction activities. The noise and vibration monitoring plan will be prepared before initiating any construction. The monitoring plan will clearly specify monitoring locations, measurement duration, and monitoring procedures. Construction and vibration monitoring will be conducted according to the monitoring plan. The noise and vibration control plan should include construction equipment noise levels and proposed noise and vibration control measures to ensure that the contractor will meet noise and vibration criteria.
Access	Local residents Local businesses Travelers	▪ Use enhanced signing. ▪ Use alternate access enhancements. ▪ Use advertising/public relations. ▪ Do not close multiple interchanges concurrently.
Highway ▪ Traffic detours ▪ Lane closures ▪ Congestion ▪ Construction vehicles on local streets ▪ Safety of lane shifts	Local residents Local businesses Travelers	▪ 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; make prime contractor accountable. ▪ Use courtesy patrol. ▪ Use enhanced signing. ▪ Phase construction to limit traffic in neighborhoods. ▪ Comply with American Association of State Highway and Transportation Officials (AASHTO) guidance and Manual on Uniform Traffic Control Devices. ▪ Coordinate work activities to ensure they do not coincide with sporting, school, or special events.

Table 3.23-5 Summary of Construction-Related Mitigation Strategies (Cont'd)

Impact	Most Likely Impacted	Recommended Mitigation Strategies
Highway (Cont'd)		▪ Implement advanced traffic diversion. ▪ Use intelligent management systems and variable message signs to advise/redirect traffic. ▪ Work with Regional Transportation District (RTD) 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.
Pedestrian/ Bicycle mobility	Local residents Commuters Bicyclists	▪ 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 new bike/pedestrian overpass as a detour before old is demolished.
Environmental Impacts ▪ Dust/air quality ▪ Hazardous waste ▪ Water quality ▪ Resource use/ recycling material	Construction workers Downstream water users Local residents Local 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 offsite tracking of mud, debris, hazardous material, and noxious weeds by washing construction equipment in contained areas. ▪ 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.

Table 3.23-5 Summary of Construction-Related Mitigation Strategies (Cont'd)

Impact	Most Likely Impacted	Recommended Mitigation Strategies
Environmental Impacts (Cont'd.)		▪ Store equipment and materials in designated areas only. ▪ Promptly remove any unused detour pavement or signs. ▪ Follow CDOT *Standard Specifications for Road and Bridge Construction* (2005)**,** including sections regarding water quality control, erosion control, and environmental health and safety. ▪ As soon as practicable after construction activities have been completed in a disturbed area, begin permanent stabilization to limit further erosion of soil. ▪ Remove soil and other materials from paved streets. ▪ Incorporate recommendations as appropriate from the Regional Air Quality Council (RAQC) report, *Reducing Diesel Emissions in the Denver Area* (RAQC, 2002). ▪ Operate equipment mainly during off-peak hours. ▪ Limit equipment idling time. ▪ Use recycled materials for project activities to the extent allowed by good practice and CDOT construction specifications. ▪ Use construction equipment that use ultra-low sulfur fuels to the extent practicable.
Floodplains and Water Resources		▪ To mitigate potential water quality problems from construction, best management practices will be implemented as part of the stormwater management plan to abate and control suspended soil loading from erosion. 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 *Erosion Control and Stormwater Quality Guide* (CDOT, 2002b). This will include such measures as silt fences and detention ponds. Rip-rap slope protection will be utilized where necessary to prevent erosion. Any impacts to surface water quality as a result of construction will be temporary. Mitigation measures for contaminated groundwater potentially encountered during construction are discussed in **Section 3.7** *Water Resources*. Section 107.25 of CDOT's *Standard Specifications for Road and Bridge Construction* (2005) deals with contractor's requirements for water quality control.

Source: CDOT, Construction Manual, 2002; CDOT, Standard Specifications for Road and Bridge Construction, 2005.
Note: Mitigation required by CDOT *Standard Specifications and Construction Manual* (2005) are in **bold.**

3.23.4 Summary

Package A would have the greatest construction impacts (noise, air quality, and transportation) to residential areas since the construction of the double-track commuter rail would extend through residential areas. In contrast, construction of Package B primarily would involve the widening and addition of lanes along a corridor that consists primarily of commercial, industrial, and agricultural development.

Construction of the build packages would cause varying temporary impacts to traffic patterns and congestion, noise and vibration, air quality, and visual presence. These impacts would be short-term and isolated in extent depending upon the types and location of construction. Through the planning and implementation of mitigation measures during final design of the Preferred Alternative, these impacts would be minimized.