

## 5.19 Utilities

*This section discusses existing utilities located within the study area and explains why they are important to the project. The impacts of the project alternatives on utilities also are evaluated, and proposed mitigation measures are discussed to offset any potential adverse effects.*

Since the Supplemental Draft EIS was published in August 2014, additional analyses and content review have been performed for many of the resources discussed in this document. These updates, along with changes resulting from the comments received on the Supplemental Draft EIS, have been incorporated into this Final EIS. In this section, the updates include the following items:

- Additional utility information was obtained, which allowed for further refinement of numbers and extent of overall utility impacts for each alternative.
- Refinement in the size and material of existing utilities being impacted was made.
- Additional detail on type of overhead electrical lines impacted by the project was obtained.
- Additional explanation of existing storm sewer deficiencies was added.

### 5.19.1 What are utilities and why are they important to this project?

For purposes of this analysis, a utility is a privately, publicly, or cooperatively owned line, facility, or system that produces, transmits, or distributes various commodities that directly or indirectly serve the public (23 CFR §645.10).

Various utilities are located within the study area, including electric, water, sanitary and storm sewer, communications, natural gas, and petroleum. The natural gas, electric, communications, and petroleum utilities are privately owned and/or corporately operated to service local communities. Water and sewer facilities typically are provided by local governments to residents and businesses within their jurisdictional boundaries.

Commodities include communications, cable television, power, electricity, lights, heat, gas, oil, crude products, water, steam, waste, stormwater not connected with highway drainage, or any other similar commodity, including any fire or police signal system or street lighting system.

#### **Are railroads a utility?**

The definition of utility also includes railroads. Because of their transportation function, however, railroads are addressed in Chapter 4, Transportation Impacts and Mitigation Measures.

Utilities carry commodities people use in their everyday lives for survival and convenience. They also carry wastewater away to maintain safe, sanitary, and aesthetically pleasing conditions. Disruptions to utilities during project construction can have negative economic, safety, and other effects, further signifying their importance.

### 5.19.2 What study area and evaluation process were used to analyze utility impacts?

Utility impacts occur as a result of construction. Thus, the project alternatives' construction limits were used to identify the type and location of existing utilities and potential impacts from the alternatives. **Exhibit 5.19-1** shows the utilities study area, which is a composite of the construction limits from all of the alternatives.

**Exhibit 5.19-1 Study Area for Utilities Analysis**



To prepare the utilities inventory and analyze potential conflicts, design drawings, spatial data, mapping, and other information available from the respective utility owners were used. Data to support the analysis varied in quality, but there were enough good data values for planning purposes. Utilities were field located and surveyed to prepare utility mapping that was used to identify potential conflicts and required relocations.

Utility conflicts were identified by comparing the proposed construction limits of each alternative with the location of existing utilities. Potential mitigations were identified where the proposed alternative conflicts with a utility. Evaluation of utility mitigations used the following definitions and assumptions:

- Relocation—A utility will be moved horizontally and/or vertically to provide adequate clearance and avoid conflict.
- Adjustment—A utility will be affected by the proposed improvement, but will not require relocation. For example, adjustments to utilities might include extending pipes or culverts, extending or adding protective casings, moving inlets and associated pipes, and modifying the elevation of manholes or valves.
- A utility that crosses a roadway or ramp, where that roadway or ramp is not in excavation, likely will result in an adjustment of the utility, at a minimum.
- All utilities attached to the existing viaduct will be relocated, as the existing viaduct is to be removed and replaced with one of the discussed alternatives.
- A utility attached to a bridge support will result in either an adjustment or relocation. This will be determined in a future phase when more detailed designs for the structures are prepared. For this analysis, it is assumed that the utility will be relocated.
- A utility crossing I-70 in the Partial Cover Lowered Alternative (from Brighton Boulevard to Colorado Boulevard) most likely will need to be relocated. A utility crossing I-70 in the No-Action or Revised Viaduct Alternatives likely will require adjustment or potential relocation. A utility crossing I-70 in an at-grade situation for any alternative likely will require adjustment or possible relocation. For this analysis, it is assumed that the utility will be adjusted.
- A utility running parallel to I-70 likely will require adjustment or relocation due to shifting and/or widening of the highway. For this analysis, it is assumed that the utility will be relocated.

### 5.19.3 What are the existing conditions for utilities in the study area?

This section describes the existing conditions of the utilities, including the approximate location, type, and description.

#### *Water*

Water lines provide filtered potable water to homes and businesses. Most of these lines cross I-70 at right or skewed angles, with some lines running parallel to I-70 or 46th Avenue, within the existing right of way.

At least 20 major water lines, defined as lines greater than or equal to 12 inches in diameter, were identified within the study area:

- 24-inch pipe running north-south along Race Street from 49th Avenue to Brighton Boulevard
- 12-inch pipe running north-south near Brighton Boulevard and Race Court
- 12-inch pipe running north-south along 44th Street in front of the Coliseum
- 20-inch pipe running north-south along 44th Street in front of the Coliseum
- 24-inch pipe running north-south along Brighton Boulevard
- 12-inch main running north-south along York Street
- 36-inch conduit running north-south along Columbine Street
- 42-inch recycled line running north-south along Fillmore Street
- 12-inch main running north-south along Milwaukee Street
- 12-inch main running east-west along 46th Avenue from Milwaukee Street to Jackson Street
- 16-inch main running north-south east of Colorado Boulevard
- 12-inch main running north-south along Dahlia Street
- 12-inch main running east-west along Stapleton Drive North and Stapleton Drive South from Glencoe Street to Oneida Street

- 12-inch main running north-south along Holly Street
- 12-inch main running north-south along Monaco Street
- 24-inch main running north-south along Monaco Street
- 16-inch main running north-south along Havana Street
- 24-inch pipe running north-south along Peoria Street
- 36-inch pipe running north-south across I-70 within the vicinity of Salem Street and Crown Boulevard
- 12-inch pipe running north-south across I-70 extending north of Sable Boulevard
- 16-inch pipe running north-south across I-70 near the Chambers Boulevard westbound off ramp

### *Sanitary sewer*

Sanitary sewers carry sewage from homes and businesses to wastewater treatment plants through a system of underground pipes. Several sanitary sewer lines cross or run parallel to I-70 or 46th Avenue.

At least 13 major sewer lines, defined as greater than or equal to 15 inches in diameter, were identified within the study area:

- 15-inch clay pipe running north-south along Brighton Boulevard near Race Court
- 48-inch reinforced concrete pipe running west from Brighton Boulevard adjacent to Riverside Cemetery
- 77-inch brick pipe running north-south in Globeville Landing Park
- 78-inch reinforced concrete pipe running north-south in Globeville Landing Park
- 48-inch brick pipe running north-south along York Street
- 21-inch reinforced concrete pipe east of Colorado Boulevard running north-south
- 21-inch reinforced concrete pipe east of Colorado Boulevard running east-west along Stapleton Drive North to Dahlia Street
- 18-inch reinforced concrete pipe running north-south along Dahlia Street

- 21-inch PVC pipe running east-west along Stapleton Drive South from Monaco Street to Oneida Street
- 18-inch PVC pipe running north at Oneida Street through the DRIR yard
- 24-inch reinforced concrete pipe and 39-inch (unknown) pipe running north-south along Sand Creek under I-70
- 15-inch PVC pipe running north-south along Sable Boulevard
- 27-inch reinforced concrete pipe running north-south parallel to the west side of Airport Boulevard

### **Storm sewer**

A storm sewer system can consist of curbs, gutters, drains, inlets, pipes, and open ditches that convey rainfall and other drainage (other than sewage) to streams, lakes, or other surface water bodies.

At least nine major sewer lines, defined as greater than or equal to 36 inches in diameter, were identified within the study area:

- 36-inch pipe running north-south along Race Street
- 72-inch pipe running north-south along York Street
- 42-inch pipe running north-south along Colorado Boulevard
- 48-inch pipe running north-south east of Colorado Boulevard
- 120-inch pipe running north-south along Forest Street
- 60-inch sewer pipe running north-south east of Grape Street
- 48-inch pipe running north-south along Airlawn Road
- 48-inch pipe running northeast crossing Quebec Street
- 42-inch pipe running east-west between I-225 and Chambers Road

Storm sewer deficiencies are known to exist within the Montclair and Park Hill Drainage Basins in the study area. Inadequate facilities result in surface flooding generally in a southeasterly to northwesterly direction from Brighton Boulevard to Dahlia Street and below the existing viaduct.

#### **Storm sewer deficiencies**

Descriptions of the Montclair and Park Hill Drainage Basins can be found in Sections 2.1 and 2.2 of the Summary of Existing Studies and Flows, Attachment M, *Hydrology and Hydraulics Technical Report*, Appendix B.

Criteria for the 100-year event (a flood of such a magnitude that it has a 1-percent chance of happening in any given year) are being used for the design to intercept all offsite flows that would potentially reach the Partial Cover Lowered section. Applying these criteria ensures protection from large-event drainage flows entering the lowered roadway section of the Partial Cover Lowered Alternative. Also, drainage facilities on the existing viaduct were not originally designed to adequately handle larger storms. Stormwater drainage for the alternatives is addressed in Section 5.14, Floodplains and Drainage/Hydrology.

### *Communications/fiber optics*

Fiber optic lines are used as a medium for telecommunications and computer networking using pulses of light to carry data along strands of glass or plastic. Fiber optic lines operate at higher bandwidths and frequencies than traditional copper wire carrying electrical signals, so they have higher throughput, or capacity. Fiber optic lines generally have replaced copper wire used traditionally for trunk lines in communications systems. For the majority of installations, fiber lines are placed in conduits referred to as ducts. Fiber ducts can either be single conduits or multi-conduit groupings known as duct banks or large ducts.

Fiber lines within or crossing the I-70 highway corridor also are used for ITS and traffic signal operations.

At least 37 fiber optic lines cross or run parallel to the project alternatives in the study area. The following list of existing fiber optic lines is based on preliminary utility data collected:

- Four regular ducts running north-south along Brighton Boulevard, near Race Court
- One duct running north-south along 44th Street in front of the Coliseum
- Two regular ducts running north-south along Brighton Boulevard at I-70
- One large duct and two regular ducts running north-south along the Union Pacific Railroad corridor
- One large duct and one line running along the southern edge of the existing I-70 right of way for almost the entire length of the project
- Two large ducts and one regular duct running north-south along York Street

- One large duct running north-south along Josephine Street
- One large duct running north-south along Steele Street/Vasquez Boulevard
- One duct running north-south along the BNSF Market Lead Railroad
- One large duct west and two large ducts east running north-south near Colorado Boulevard
- One large duct and two regular ducts running north-south along Dahlia Street
- One duct running north-south along Holly Street
- One duct running east-west along Stapleton Drive North from Holly Street to the DRIR yard
- One large duct running north-south along Monaco Street
- One large duct running north-south along Quebec Street
- Two regular ducts running north-south along Havana Street
- Two regular ducts running north-south along Peoria Street
- One large duct and one regular duct running north-south across I-70 near Crown Boulevard
- One duct running north-south along Chambers Road
- One duct running north-south west of Airport Boulevard
- One duct running north-south along Tower Road

In addition to the fiber optic lines within the project, there are many above- and below-ground telephone and cable lines that cross and run parallel to the highway, arterial roads, collector roads, and local streets.

### ***Electric***

Electric power facilities are used to provide power to commercial, industrial, public, and residential users. Electric lines can either be buried underground or installed on overhead structures.



Electric lines typically fit into one of four categories:

1. Distribution Lines—overhead lines that provide power service to individual users; usually 4 to 13 kilovolts (kv)
2. Transmission Lines—overhead lines that transport power from one place to another; usually 69 to 500 kv
3. Underground Distribution Lines—underground lines that provide power service to individual users; usually 4 to 13 kv
4. Underground Transmission Lines—underground lines that transport power from one place to another; usually 69 to 138 kv

While relocating distribution lines is less problematic and a common occurrence on roadway projects, relocating transmission lines, whether underground or overhead, is significantly more disruptive, particularly when power must be shut down.

At least seven overhead transmission lines that cross I-70 were identified within the study area:

- A transmission line running north-south along Race Street
- A transmission line running north-south along York Street
- A transmission line running north-south along Steele Street/Vasquez Boulevard
- A transmission line running north-south along Jackson Street
- A combination line running north-south along Dahlia Street
- A transmission line running north-south west of Quebec Street along the DRIR corridor
- A transmission line running north-south west of Chambers Road

Four overhead distribution lines that cross I-70 also were identified within the study area:

- A distribution line running north-south along the alley between Josephine Street and Columbine Street
- A distribution line running north-south along Glencoe Street

- A distribution line running north-south west of Quebec Street near the DRIR corridor
- A distribution line running north-south along Havana Street

Many other overhead distribution lines parallel the highway or cross arterials, collector roads, and local streets. In addition to overhead lines, there are a myriad of underground lines that cross and run parallel to the highway, arterials, collector roads, and local streets. At this stage, none of the underground lines have been identified as transmission lines.

### ***Natural gas, petroleum, and jet fuel***

Natural gas and petroleum pipelines are used to bring energy to commercial, industrial, public, and residential users.

At least 22 major gas, petroleum, or jet fuel lines, defined as greater than or equal to 6 inches in diameter, were identified within the study area:

- 12-inch gas pipe running north-south into a natural gas collector facility on the northwest corner of the Brighton Boulevard interchange
- 20-inch gas pipe running north-south along Brighton Boulevard
- 6-inch gas pipe running north-south along York Street
- 16-inch gas pipe running north-south along York Street
- 20-inch gas pipe running north-south along Steele Street/Vasquez Boulevard
- 10-inch gas pipe running north-south along Steele Street/Vasquez Boulevard
- 6-inch gas pipe running east-west along 46th Avenue from Madison Street to Garfield Street
- Two 6-inch gas pipes running north-south along Dahlia Street
- 6-inch gas pipe running north-south along Holly Street
- 6-inch petroleum pipe running east-west along the DRIR west of Quebec Street

- 10-inch petroleum pipe running east-west along the DRIR west of Quebec Street
- 8-inch petroleum pipe running north-south along Central Park Boulevard
- Two 6-inch petroleum pipes running north-south along Central Park Boulevard
- 10-inch petroleum pipe running east-west south of I-70 from west of Central Park Boulevard to Havana Street
- 16-inch gas pipe running north-south along Peoria Street
- 6-inch gas pipe running east-west south of I-70 from I-225 to Chambers Road
- 20-inch gas pipe running north-south west of Chambers Road
- 6-inch gas pipe running north-south west of Chambers Road
- 6-inch petroleum pipe running north-south west of Airport Boulevard
- 10-inch jet fuel pipe running north-south west of Airport Boulevard
- 22-inch petroleum pipe running north-south west of Airport Boulevard

In addition to the major pipelines, there are many smaller lines that cross and run parallel to the highway, arterials, collector roads, and local streets. All major and minor pipelines are underground.

#### 5.19.4 How do the project alternatives potentially affect utilities?

Based on the definitions and assumptions described previously, each potential utility conflict was evaluated to determine if the effect on the utility will require an adjustment or a relocation. If the conflict was determined to require an adjustment, it was considered a minor impact. If the conflict was determined to require a relocation to a major utility, as defined in the above section, then it was considered a major impact. A qualitative comparison between the alternatives analyzes major impacts only (as detailed in the above section).

Within the Brighton Boulevard to Colorado Boulevard section, the No-Action Alternative and Revised Viaduct Alternative are anticipated to have fewer utility relocations (and more utility adjustments) as compared to the Partial Cover Lowered Alternative. Since the Partial Cover Lowered Alternative will require extensive excavation from Brighton Boulevard to Colorado Boulevard, all the existing utilities crossing I-70 within this section will need to be relocated. Because utility relocations tend to cost significantly more than utility adjustments, the Partial Cover Lowered Alternative will have substantially higher utility-related costs than the Revised Viaduct Alternative and the No-Action Alternative. From Colorado Boulevard to Tower Road, the utility conflicts are the same for the Revised Viaduct Alternative and the Partial Cover Lowered Alternative. However, from Quebec Street to Tower Road, the Managed Lanes Option increases utility impacts in locations with managed lanes direct connections.

The alternatives are broken out into the following subsections: No-Action Alternative, Revised Viaduct Alternative, Partial Cover Lowered Alternative, Colorado Boulevard to Tower Road, and Managed Lanes Option. The No-Action Alternative, Revised Viaduct Alternative, and Partial Cover Lowered Alternative only document major impacts from Brighton Boulevard to Colorado Boulevard. As the name implies, the Colorado Boulevard to Tower Road section discusses all major impacts within that segment. The Managed Lanes Option subsection discusses the additional major impacts associated with the construction of the managed lanes direct connections.

### ***No-Action Alternative***

The No-Action Alternative has the fewest utility impacts of all the Build Alternatives. The minimal utility impacts are due to 46th Avenue remaining at existing grade and the viaduct being replaced from Brighton Boulevard to Colorado Boulevard. Most utilities cross under the viaduct and will need to be adjusted to match the new ramp and side street locations. There also will need to be relocations for any utilities that cross the north drainage outfall system. Additional utility relocations will be required for any utility within the footprint of a proposed viaduct pier.

The number and types of conflicts between the No-Action Alternative, North Option and No-Action Alternative, South Option are similar. The exact location of each conflict may vary, but the relative effect will be similar for both options.

The following subsections explain the No-Action Alternative's potential impacts to the major utilities in the study area.

### Water

- 12-inch and 20-inch pipes, respectively, running north-south along 44th Street in front of the Coliseum will require relocation because they cross the proposed outfall system
- 24-inch pipe running north-south along Brighton Boulevard will need to be relocated to avoid the proposed east bridge abutment for the I-70 structure over Brighton Boulevard
- 12-inch pipe running east-west along 46th Avenue from Milwaukee Street to Jackson Street will need to be relocated to avoid the proposed bridge piers

There are other major and minor pipelines that cross and run parallel to the highway, arterials, collector roads, and local streets. These lines will be disrupted and adjusted, but the majority of pipelines should not need to be relocated.

### Sanitary sewer

There are major and minor pipelines that cross and run parallel to the highway, arterials, collector roads, and local streets. These lines will be adjusted where there are conflicts with bridge abutments or piers, but the majority of sewer lines should not need to be relocated.

### Storm sewer

The No-Action Alternative will disrupt all the storm sewer systems within the study area. All the inlets and pipes along 46th Avenue will need to be reconstructed to match the new 46th Avenue location and grades. The existing drainage system for the viaduct will be removed during demolition of the existing viaduct and will need to be completely replaced for the new viaduct.

It should be noted that all proposed drainage systems will convey only drainage for the new infrastructure and will not offer relief from the existing offsite surface flooding and drainage issues in the study area. The No-Action Alternative includes a new drainage outfall for the improved bridge structure drainage conveyance.

### Communications/fiber optics

- All the above-ground telephone and cable lines that cross I-70 will need to be relocated to accommodate the new viaduct structure, underground line relocation is anticipated to be minor
- One duct running east-west under 46th Avenue will need to be relocated to avoid the proposed series of bridge piers for the I-70 structure

Other existing fiber lines that cross and run parallel to the highway, arterials, collector roads, and local streets should not require major relocation due to the minimal excavation required.

### Electric

All overhead electric lines that cross I-70 will need to be relocated to accommodate the new viaduct structure. Although there may be sufficient vertical clearance, relocation of towers that are close to or within the footprint of the highway may be required. Underground line relocation is anticipated to be minor.

### Natural gas, petroleum, and jet fuel

- 20-inch gas pipe running north-south along Brighton Boulevard will need to be relocated to avoid the proposed east bridge abutment for the I-70 structure over Brighton Boulevard

There are other major and minor pipelines that cross and run parallel to the highway, arterials, collector roads, and local streets. These lines will be disrupted and adjusted, but the majority of pipelines should not need to be relocated.

### ***Revised Viaduct Alternative***

The Revised Viaduct Alternative impacts are estimated to be more than the No-Action Alternative impacts because the proposed highway typical section increases from six lanes to 10 lanes. Unlike the No-Action Alternative, the Revised Viaduct Alternative project limits do not end prior to Colorado Boulevard.

Similar to the No-Action Alternative, the Revised Viaduct Alternative impacts are likely to result in adjustments rather than relocations. There will be increased minor relocations for the Revised Viaduct Alternative due to the increased footprint and associated impacts to local streets, either south or north of the current I-70 highway. Only additional impacts beyond the No-Action Alternative are listed below. It is assumed that all of the impacts from the No-Action Alternative apply to the Revised Viaduct Alternative.

The number and types of conflicts between the Revised Viaduct Alternative, North Option and Revised Viaduct Alternative, South Option are similar. The exact location of each conflict may vary, but the relative effect will be similar for both options. The following subsections explain the Revised Viaduct Alternative's potential impacts to the major utilities in the study area.

#### **Water**

Major impacts generally match the No-Action Alternative impacts.

#### **Sanitary sewer**

Major impacts generally match the No-Action Alternative impacts.

#### **Storm sewer**

Major impacts generally match the No-Action Alternative impacts. Similar to the No-Action Alternative, the proposed drainage systems will only convey drainage for the new infrastructure and will not offer relief from the existing offsite surface flooding and drainage issues in the study area. The Revised Viaduct Alternative also includes a new drainage outfall for the improved bridge structure drainage conveyance.

#### **Communications/fiber optics**

Major impacts generally match the No-Action Alternative impacts.

## Electric

Major impacts generally match the No-Action Alternative impacts.

## Natural gas, petroleum, and jet fuel

Major impacts generally match the No-Action Alternative impacts.

### ***Partial Cover Lowered Alternative***

The Partial Cover Lowered Alternative has substantially greater impacts as compared to both the No-Action Alternative and the Revised Viaduct Alternative. The increased impacts are caused by the extensive excavation required for the lowered section. In addition to the excavation required, a storm outfall conveying offsite drainage is required from I-70 going west through the Coliseum property to the South Platte River. This outfall system adds more impacts relative to the other alternatives.

All of the utilities that cross the lowered section of I-70 require relocation. Utilities need to be moved to cross the proposed lowered section at proposed structure locations: either bridges, the highway cover, or on their own separate structure. Similar relocation considerations are necessary for utilities that run parallel to the highway within the construction limits.

The number and types of conflicts between the Partial Cover Lowered Alternative, Basic Option and the Partial Cover Lowered Alternative, Modified Option are similar. The exact location of each conflict may vary, but the relative effect will be similar for both options. The following subsections explain the Partial Cover Lowered Alternative's potential impacts to the major utilities in the study area.

## Water

- 24-inch pipe running north-south along Race Street from 49th Avenue to Brighton Boulevard will need to be relocated for construction of the onsite drainage outfall system
- 12-inch and 20-inch pipes, respectively, running north-south along 44th Street in front of the Coliseum will need to be relocated at their crossing with the offsite drainage outfall system



- 24-inch pipe running north-south along Brighton Boulevard will need to be relocated to avoid the proposed east I-70 bridge abutment as well as the crossing of the offsite drainage outfall system
- 12-inch main running north-south along York Street will need to be relocated within or along the York Street bridge structure to cross the lowered section
- 36-inch conduit running north-south along Columbine Street will need to be relocated within the proposed Columbine Street bridge or separate structure to cross the lowered section
- 42-inch recycled line running north-south along Fillmore Street will need to be relocated to the proposed Fillmore Street bridge or separate structure to cross the lowered section
- 12-inch main running north-south along Milwaukee Street will need to be relocated to either the proposed Fillmore Street or Steele Street/Vasquez Boulevard bridge structure to cross the lowered section
- 12-inch main running east-west along 46th Avenue from Milwaukee Street to Jackson Street will need to be relocated outside the lowered section
- 16-inch pipe running north-south east of Colorado Boulevard may need to be relocated within the proposed Colorado Boulevard bridge structure or lowered in place

There are many other minor pipelines that cross and/or parallel the highway. All lines that intersect with the proposed lowered section will need to be relocated and most other lines will need to be adjusted or relocated to better match the new side street and ramp locations.

#### Sanitary sewer

- 77-inch brick and 78-inch reinforced concrete pipe, respectively, running north-south in the Globeville Landing Park; these pipes should not need to be relocated, but the proposed drainage outfall will cross over them; They will need to be protected to prevent damage
- 48-inch brick pipe running north-south along York Street will need to be relocated to cross the lowered section

There are many other minor pipelines that cross and/or parallel the highway. All lines that intersect with the proposed lowered section will need to be relocated. Most other lines will need to be either adjusted or relocated to better match the new 46th Avenue, side streets, and ramp locations.

### Storm sewer

The Partial Cover Lowered Alternative will disrupt all the storm sewer systems within the study area. All the inlets and pipes along 46th Avenue will need to be relocated to match the new 46th Avenue location and grades. The existing drainage system for the viaduct will be removed during demolition of the existing viaduct and a new system within the lowered section needs to be constructed. Two major existing system impacts are of concern and are listed below:

- 72-inch pipe running north-south along York Street will need to be relocated along the York Street bridge or on a separate structure to cross the lowered section
- 42-inch pipe running north-south along Colorado Boulevard will need to be reconstructed in conjunction with the storm drain ponds proposed for the two east quadrants of the interchange

The Partial Cover Lowered Alternative includes two drainage outfall systems. A system is proposed on the south side of I-70 to capture existing offsite drainage and convey it to the South Platte River. Another system is proposed on the north side of I-70 to convey onsite drainage from the lowered I-70 highway, running approximately one mile to the South Platte River. Due to its depth, the north outfall will be bored approximately 35-40 feet below current ground level.

### Communications/fiber optics

- Two ducts running north-south along Brighton Boulevard will need to be relocated for the reconstruction of Brighton Boulevard
- Three ducts running north-south along the Union Pacific Railroad corridor will need to be relocated for construction of the Union Pacific Railroad bridge structure, the lowered section of I-70, 46th Avenue, and sidewalks

- Two ducts running along the southern edge of the existing I-70 right of way from Brighton Boulevard to Colorado Boulevard will need to be relocated outside of the lowered section
- Three ducts running north-south along York Street will need to be relocated within or along the York Street bridge structure to cross the lowered section
- One duct running north-south along Josephine Street will need to be relocated at either the Josephine Street or Columbine Street bridge structure to cross the lowered section
- One duct running north-south along Steele Street/Vasquez Boulevard will need to be relocated to the Steele Street/Vasquez Boulevard bridge structure to cross the lowered section
- One duct running north-south along the BNSF Market Lead railroad will need to be relocated to one of the new Market Lead bridge structures to cross the lowered section
- One duct west and two ducts east running north-south near Colorado Boulevard will require relocation to the Colorado Boulevard bridge structure to cross the lowered section

All the above- and below-ground telephone and cable lines that cross I-70 will need to be relocated to accommodate the lowered section.

#### Electric

All overhead and underground electric lines that cross I-70 will need to be relocated to accommodate the lowered section. Although there may be sufficient vertical clearance, relocation of five to seven transmission towers and four to five distribution poles that are close to or within the footprint of the highway may be required.

Many other overhead and underground distribution lines parallel the I-70 highway, arterials, collector roads, and local streets. It is anticipated that most of these lines will require relocation.

#### Natural gas, petroleum, and jet fuel

- 20-inch gas pipe running north-south along Brighton Boulevard will need to be relocated to make room for the east Brighton Boulevard bridge abutment and onsite outfall system

- 6-inch gas pipe running north-south along York Street will need to be relocated within or along the York Street bridge structure to cross the lowered section
- 16-inch gas pipe running north-south along York Street will need to be relocated within or along the York Street bridge structure to cross the lowered section
- 20-inch gas pipe running north-south along Steele Street/Vasquez Boulevard will need to be relocated within the Steele Street/Vasquez Boulevard bridge structure to cross the lowered section
- 10-inch gas pipe running north-south along Steele Street/Vasquez Boulevard will need to be relocated within the Steele Street/Vasquez Boulevard bridge structure to cross the lowered section
- 6-inch gas pipe running east-west along 46th Avenue from Madison Street to Garfield Street will possibly need relocation to accommodate the new 46th Avenue roadway section

There are other minor pipelines that cross and run parallel to the I-70 highway, arterials, collector roads, and local streets. These lines will most likely need to be relocated outside of the lowered section and/or adjusted to better match new side street and ramp locations.

### ***Colorado Boulevard to Tower Road***

From Colorado Boulevard to Tower Road, the impacts for the Revised Viaduct Alternative and Partial Cover Lowered Alternative are the same. This segment does not apply to the No-Action Alternative, as the project limits for the No-Action Alternative end just prior to Colorado Boulevard.

The following subsections explain the potential impacts to the major utilities from Colorado Boulevard to Tower Road.

#### **Water**

- 12-inch pipe running north-south along Dahlia Street will need to be adjusted for the reconstruction of Dahlia Street
- 12-inch pipe running east-west along Stapleton Drive North and Stapleton Drive South from Glencoe Street to Oneida Street will need to be at least partially relocated to better match the new Stapleton Drive South alignment and grade

- 12-inch pipe running north-south along Holly Street will need to be relocated for the reconstruction of the roadway and I-70 bridge
- 12-inch and 24-inch pipes running north-south along Monaco Street will need to be adjusted for the reconstruction of Monaco Street
- 16-inch pipe running north-south along Havana Street will require relocation to accommodate the Havana Street reconstruction
- 24-inch pipe running north-south along Peoria Street will need to be adjusted for the reconstruction of Peoria Street
- 36-inch pipe running north-south across I-70 within the vicinity of Salem Street and Crown Boulevard will need to be relocated to avoid retaining walls proposed in this section

There are other minor pipelines that cross and run parallel to the I-70 highway, arterials, collector roads, and local streets. These lines will most likely need to be relocated outside of the proposed highway footprint and/or adjusted to better match new side street and ramp locations.

#### Sanitary sewer

- 21-inch reinforced concrete pipe running north-south to the east of the Colorado Boulevard interchange may need to be adjusted or relocated for the I-70 construction
- 21-inch reinforced concrete pipe east of Colorado Boulevard running east-west along Stapleton Drive North to Dahlia Street will require relocation to move it out of the I-70 footprint
- 21-inch PVC pipe running east-west along Stapleton Drive South from Monaco Street to Oneida Street will require relocation due to conflict with proposed roadway retaining walls
- 18-inch PVC pipe running north at Oneida Street through the DRIR yard will require relocation due to conflicts with proposed bridge structures
- 24-inch reinforced concrete pipe and 39-inch (unknown) pipe running north-south along Sand Creek under I-70 will require relocation to avoid conflict with proposed bridge structures

There are other minor pipelines that cross and run parallel to the I-70 highway, arterials, collector roads, and local streets. These lines will most likely be maintained or adjusted to better match new side street and ramp locations.

#### Storm sewer

- 120-inch pipe running north-south along Forest Street will need to be protected from proposed retaining walls crossing above it in this section
- 60-inch sewer pipe running north-south east of Grape Street will need to be partially relocated or protected to avoid retaining walls proposed in this section
- 48-inch pipe running north-south along Airlawn Road will require relocation to better match the proposed Stapleton Drive North alignment and profile
- 48-inch pipe running northeast crossing Quebec Street will require partial relocation due to Quebec Street reconstruction
- 42-inch pipe running east-west between I-225 and Chambers Road will need to be relocated to match the revised I-70 width

There are other minor pipelines that cross and run parallel to the highway, arterials, collector roads, and local streets. These lines will most likely need to be relocated outside of the proposed highway footprint and/or adjusted to better match new side street and ramp locations.

#### Communications/fiber optics

- Two ducts running east-west along the south side of the existing I-70 will need to be relocated due to the widening in this section
- Two ducts running north-south along Havana Street will require relocation to better fit with the proposed Havana Street alignment and grade
- One duct running north-south west of Airport Boulevard may need to be relocated to avoid retaining walls proposed in this section

Other existing fiber optic lines that cross and run parallel to the I-70 highway, arterials, collector roads, and local streets may need adjustments due to the required improvements.

All the above-ground telephone and cable lines that share poles with electrical distribution lines and cross I-70 will

need to be relocated. Underground line relocation is anticipated to be minor with the exception of two locations:

- Two lines running north-south along Havana Street, one along the east side, the other along the west side will need to be relocated for the reconstruction of Havana Street

### Electric

All overhead electric lines that cross I-70 will need to be relocated to accommodate the wider footprint. Although there may be sufficient vertical clearance, relocation of towers that are close to or within the footprint of the highway will be required. Generally, most underground line relocation is anticipated to be minor, with the exception of the following locations:

- One line running north-south along Havana Street requiring relocation for the reconstruction of Havana Street
- One line running north-south along Peoria Street requiring relocation for the reconstruction of Peoria Street

### Natural gas, petroleum, and jet fuel

- 4-inch and 6-inch petroleum pipes running east-west along the DRIR west of Quebec Street will need to be relocated to avoid the proposed bridge abutments for I-70 and respective ramp structures over the railroad
- 10-inch petroleum pipe running east-west along the DRIR west of Quebec Street will need to be relocated to avoid the proposed bridge abutments for I-70 and respective ramp structures over the railroad
- 6-inch gas pipe running east-west south of I-70 from I-225 to Chambers Road may need to be relocated outside of the proposed I-70 footprint

There are other minor pipelines that cross and/or parallel the highway. These lines will most likely not be in conflict or require adjustment.

### *Managed Lanes Option*

The Managed Lanes Option for the Build Alternatives has slightly greater utility impacts than the General-Purpose Lanes Option because it includes direct managed lane connection at the I-270, I-225, and Peña Boulevard interchanges with I-70. All the additional impacts occur east of Quebec Street. Managed lanes direct connections—

consisting of independent ramps, structures, and mainline realignments—result in a larger roadway footprint, so they introduce additional impacts.

The following subsections explain the Managed Lanes Option additional major potential impacts to the utilities in the study area, as compared to the overall Colorado Boulevard to Tower Road segment.

#### Water

The Managed Lanes Option has no additional major impacts.

#### Sanitary sewer

The Managed Lanes Option has no additional major impacts. There is one additional minor adjustment at the I-270 connection.

#### Storm sewer

The Managed Lanes Option has no additional major impacts.

#### Communications/fiber optics

The Managed Lanes Option has one additional major impact to the twin fiber trunk lines running east-west at I-270.

#### Electric

The Managed Lanes Option has no additional major impacts. There are two additional minor relocations of underground electric lines, one at I-225 and the other at Peña Boulevard.

#### Natural gas, petroleum, and jet fuel

The Managed Lanes Option has no additional major impacts.

### 5.19.5 How are the impacts from the project alternatives mitigated for the utilities?

Wherever possible, impacts to utilities will be avoided through close coordination with municipalities and utility companies during design and construction. In all cases, coordination with jurisdictions, utility companies, and other utility owners is an important component of any highway construction project. Proper coordination, planning, and design will reduce delays and improve cost efficiency. Where effects cannot be avoided, this coordination will facilitate mitigation efforts.



In some cases, utilities are an integral part of the design of an alternative. With the Partial Cover Lowered Alternative, for example, it is necessary to relocate many of the utilities within the covered section or within bridge structures.

The following mitigation measures will be used to address impacts:

- Conduct early coordination with utility owners for designs and/or construction that can be advanced to take place prior to design-build construction.
- Schedule service disruptions to coincide with periods of lower demand. This will be especially critical for large water conduit lines.
- Minimize service disruptions by connecting to active utilities wherever possible.
- Encase or provide protective cover over any impacted underground utilities, as necessary. This might include utilities under new or reconstructed roads or where existing cover will be reduced over a utility.
- Coordinate with utility owners and operators to identify construction requirements and financial responsibilities for relocations based upon easements, license agreements, ownership, or other existing agreements covering the use of affected utilities.
- 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.

The effects to utilities during construction for any of the alternatives will be temporary. During construction, the affected utilities will be protected, temporarily interrupted, and/or relocated, as necessary. At completion of construction, all remaining impacted utilities will be returned to an upgraded condition of compliance with current codes and standards with renewed serviceability life. This work will result in an overall improvement to the community's permanent utility infrastructure. **Exhibit 5.19-2** shows a summary of the impacts and mitigations related to utilities.

**Exhibit 5.19-2 Summary of Utilities Impacts and Mitigations**

Alternative/Option	Impacts and/or Benefits	Mitigation Measures Applicable to All Alternatives
No-Action Alternative	<ul style="list-style-type: none"> <li>All utility types will be affected to some extent</li> <li>Construction impacts to utilities, mainly adjustments, will be limited to the section of the existing viaduct, realigned ramps, and drainage outfall</li> </ul>	<ul style="list-style-type: none"> <li>Minimize service disruptions by connecting to active utilities, and scheduling to coincide with periods of lower demand</li> <li>Encase or provide protective cover over any impacted underground utilities</li> </ul>
Revised Viaduct Alternative	<ul style="list-style-type: none"> <li>All utility types will be affected to some extent</li> <li>Construction impacts to utilities are estimated to be greater than the No-Action Alternative due to wider construction impacts and reconfiguration of ramps</li> </ul>	<ul style="list-style-type: none"> <li>Coordinate with utility owners and operators to identify construction requirements and financial responsibilities for relocations</li> </ul>
Partial Cover Lowered Alternative	<ul style="list-style-type: none"> <li>All utility types will be affected to some extent</li> <li>Construction impacts to utilities will be substantial to accommodate the lowered highway and increased width</li> <li>Offsite stormwater drainage system south of I-70 will cause additional impacts to utilities and result in major benefit to address an existing deficiency</li> </ul>	<ul style="list-style-type: none"> <li>Identify and improve any utility concerns that can be addressed as part of project implementation</li> <li>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</li> </ul>
Managed Lanes Option (option to Build Alternatives)	<ul style="list-style-type: none"> <li>Additional temporary impacts to Build Alternatives only at locations of direct connections to I-270, I-225, and Peña Boulevard</li> </ul>	<ul style="list-style-type: none"> <li>Move above-ground utilities underground to the greatest extent practical</li> </ul>