



Utilities Technical Report

*For the C-470 Corridor
Revised Environmental Assessment*

May 2015

Submitted to:
CDOT Region 1
2000 S. Holly Street
Denver, CO 80222



COLORADO
Department of
Transportation

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1.0 INTRODUCTION

This Utilities Technical Report examines potential impacts to utilities as the result of proposed improvements to Colorado State Highway 470 (C-470) in the southwestern part of the Denver metropolitan area. Relocation of utility lines can add time and expense to highway construction projects, and so is avoided where possible, but relocation of small and medium sized utility lines is a normal component of highway construction activity. In cases involving certain critical (e.g., very large water supply or sewer) lines, it may be more cost-effective to modify the roadway design than to relocate the utilities. The current conceptual design C-470 Proposed Action has been developed to avoid major utility impacts.

As the C-470 project is about 13.75 miles long, nearly 400 utility lines closely parallel or cross the highway. Of these, 34 lines that cross C-470 are considered critical based on the criteria identified in this report.

C-470 is located about 13 miles south of downtown Denver. It passes through Arapahoe, Douglas, and Jefferson counties, as shown in Figure 1. In 2013, the Federal Highway Administration (FHWA) and Colorado Department of Transportation (CDOT) initiated a Revised Environmental Assessment (EA) for the 13.75-mile portion of C-470 between Kipling Parkway and Interstate 25 (I-25) to address congestion and delay, and to improve travel time reliability for C-470 users. The Proposed Action in the Revised EA differs slightly from the Express Lanes alternative identified in the previous EA that was approved by CDOT and FHWA in 2006.

Figure 1. C-470 Corridor and its Surrounding Vicinity



1.1 No-Action Alternative

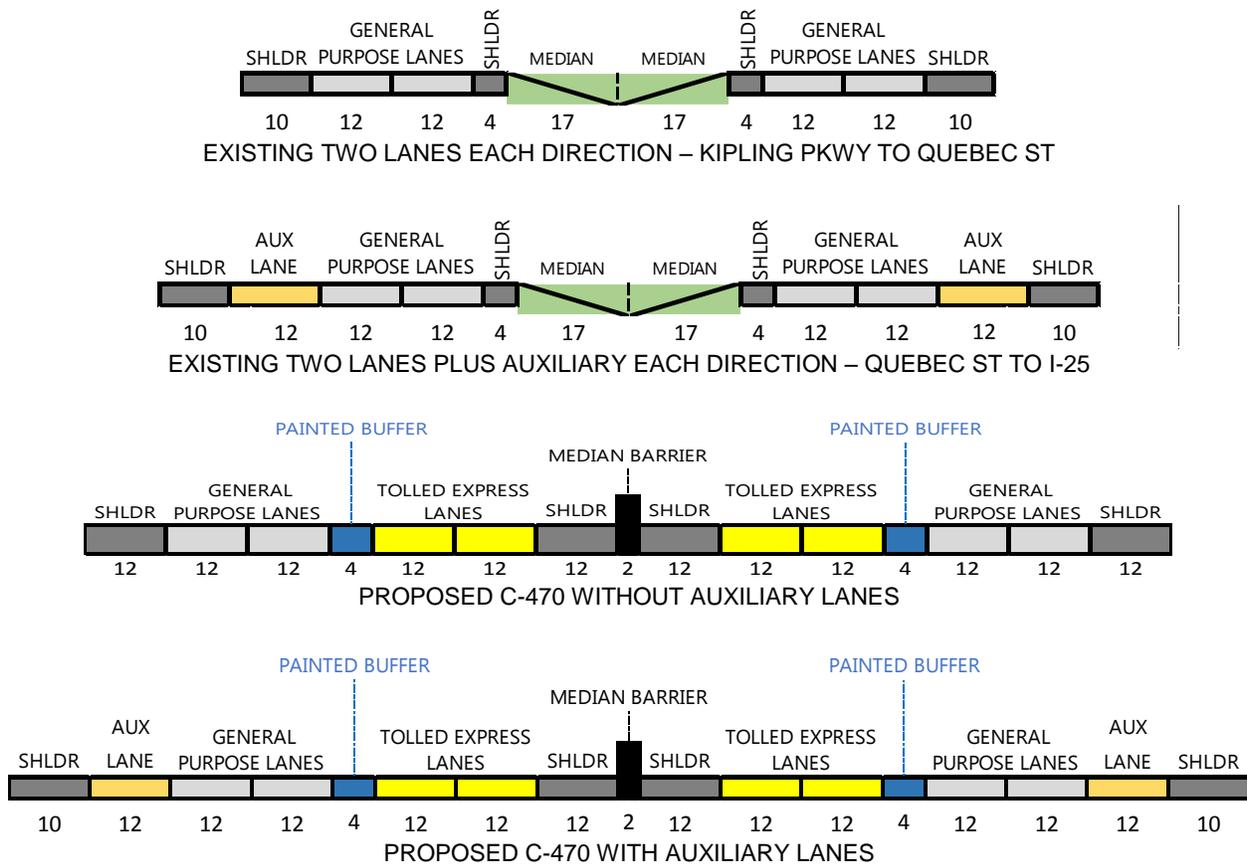
The existing C-470 freeway includes two general purpose lanes in each direction with a depressed median, resulting in a typical cross section approximately 110 feet wide. This width expands near grade-separated interchanges to include off-ramps, on-ramps, and in some cases, auxiliary lanes. In the No-Action Alternative, this configuration would

remain unchanged, but would receive maintenance as needed to ensure the safety and functionality of the existing four-lane freeway.

1.2 Proposed Action

The Proposed Action would add two tolled Express Lanes in each direction, expanding the four-lane freeway to an eight-lane freeway. To aid motorists in merging onto or off of the highway, auxiliary lanes will be provided between closely spaced interchanges (e.g., one mile apart). The typical cross section will vary from 154 feet without auxiliary lanes to 174 feet in areas with auxiliary lanes. The Proposed Action does not include any new interchanges or any major interchange modifications. However, at the eastern end of the project area, the Proposed Action also includes direct-connect ramps accommodating movements between I-25 and the C-470 Express Lanes. The existing and proposed typical cross sections are shown below in Figure 2.

**Figure 2
Existing and Proposed C-470 Typical Cross Sections**



2.0 AFFECTED ENVIRONMENT

A complete utility inventory has been prepared for the C-470 corridor and will be included as Table A in at the end of this report. This review identified 184 potential utility resource conflicts used by 18 owner/operators. Many of these utility lines cross C-470, either aerial or underground. A few cross over C-470 along bridges.

Based on discussions with CDOT personnel at the Utility Scoping Meeting held in 2003, only major utilities have been considered for this Environmental Assessment report. Major utilities are defined as follows, per CDOT: water mains and large sanitary sewer lines greater than or equaling 60" in diameter; electrical transmission lines; and fiber optic lines considered critical to national security. Based on these criteria, 34 of the 150 utility lines that cross C-470 are considered critical. These consist of 10 gas lines, 6 water lines, and 18 fiber optic lines.

Table 1 summarizes the potential utility conflicts identified within the Proposed Action.

Table 1
Major Utility Resources Potentially Affected by Proposed Action

Operator	Potential Utility Conflicts		Major	Resource Type
Xcel Energy – Electric	28	15%	3	Electric
CDOT ITS	25	14%	4	Fiber
Denver Water	21	11%	4	Raw and Potable Water
Xcel Energy – Gas	15	8%	7	Gas
Comcast	12	7%	9	Fiber/Cable
Century Link	8	4%	3	Fiber Optic
Zayo	5	3%	3	Fiber Optic
Lockheed Martin	5	3%	5	Fiber Optic
MCI	4	2%	1	Fiber Optic
Irrigation Ditches	4	2%	4	Irrigation
BNSF and UPRR Railroads	2	1%	2	Railroads
Others	55	30%	0	Various
TOTALS	184	(100%)	45	All Types

Figures 3, 4, and 5 depict the locations of the Major utility resources.

Table 2 presents the name and telephone number of for each operator of a utility resource that parallels or crosses C-470. Each person listed was contacted for this project. Many of the fiber optic companies have changed ownership or have changed contacts. The list in Table 2 is current as of 2014.

Table 2
Utility Contact Information

Utility Owner	Contact	Phone
Army Corps of Engineers	Tim Rose	303-979-4120 303-979-0602
AT&T	Guido Aguillard	303-566-6045
CDOT Fiber	Jill Scott	303-512-5805
Centennial WSD	Ryan Edwards	303-791-0430
CenturyLink	Andy Devine	303-792-6298
City of Englewood	Bill McCormick	303-762-2528
City of Littleton	Roger Peterson	303-795-3919
City of Lone Tree	Michael Demmon	303-662-8112
Colorado State Parks - Chatfield	Ryan Eggelton	303-791-7275 303-791-1231
Comcast (South Side)	Patrick Peck	303-603-5441 720-636-3922(cell)
Denver Water	Ray Batts	303-628-6682
Douglas County Governement	Brad Federle	720-346-5783
East Cherry Creek Valley WSD	Glen Bedell	303-693-3800 ext 234
Highlands Ranch Metro District	Forrest Dykstra	303-791-2185 ext 3545
Inverness WSD		303-649-9857
Ken Caryl Ranch WSD	Joe Gallegos	303-979-7424
Level3	Guido Aguillard	303-566-6045
Lockheed Martin Astronautics	Barb Carlsen	303-971-8867 303-971-1259
MCI	David McAllister	800-289-3427
Meadowbrook	Steven Homer	303-913-6514
New Century Energy	Willie Walter	-
Northern Douglas County WSD	Sarah Parsley	303-985-3636
Platte Canyon WSD	Scott Morse	303-979-2333
Roxborough WSD	Mike Marcum	303-979-7286
Southgate WSD	Tammi Lantz	303-779-0261
Southwest Metropolitan WSD	Scott Hand	720-726-5025 303-921-1426(cell)
Willows WSD	Joshua Baile	303-770-8625 303-598-9571(cell)
Xcel Energy - Electric Distribution	Karolyn Langley	303-716-2034 303-716-2056
Xcel Energy - Gas	Scott Gomer	303-716-2003
XO Communications	Steve Valdez	801-364-1063
Zayo Group	Richard Benge	303-381-4683

FIGURE 3 – Major Utilities in C-470 Segment between Kipling Parkway and Santa Fe Drive

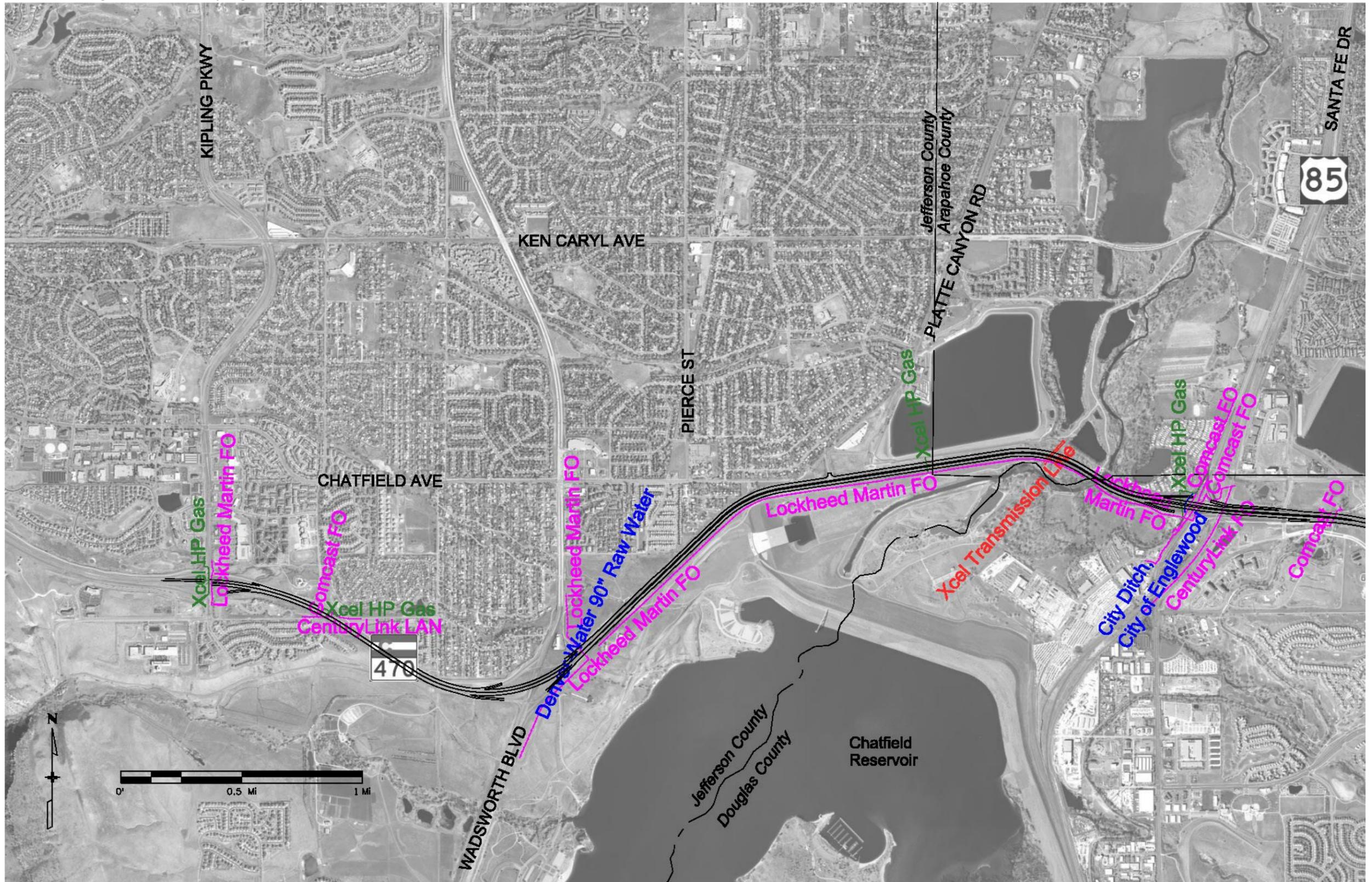


FIGURE 4 – Major Utilities in C-470 Segment between Santa Fe Drive and Colorado Boulevard

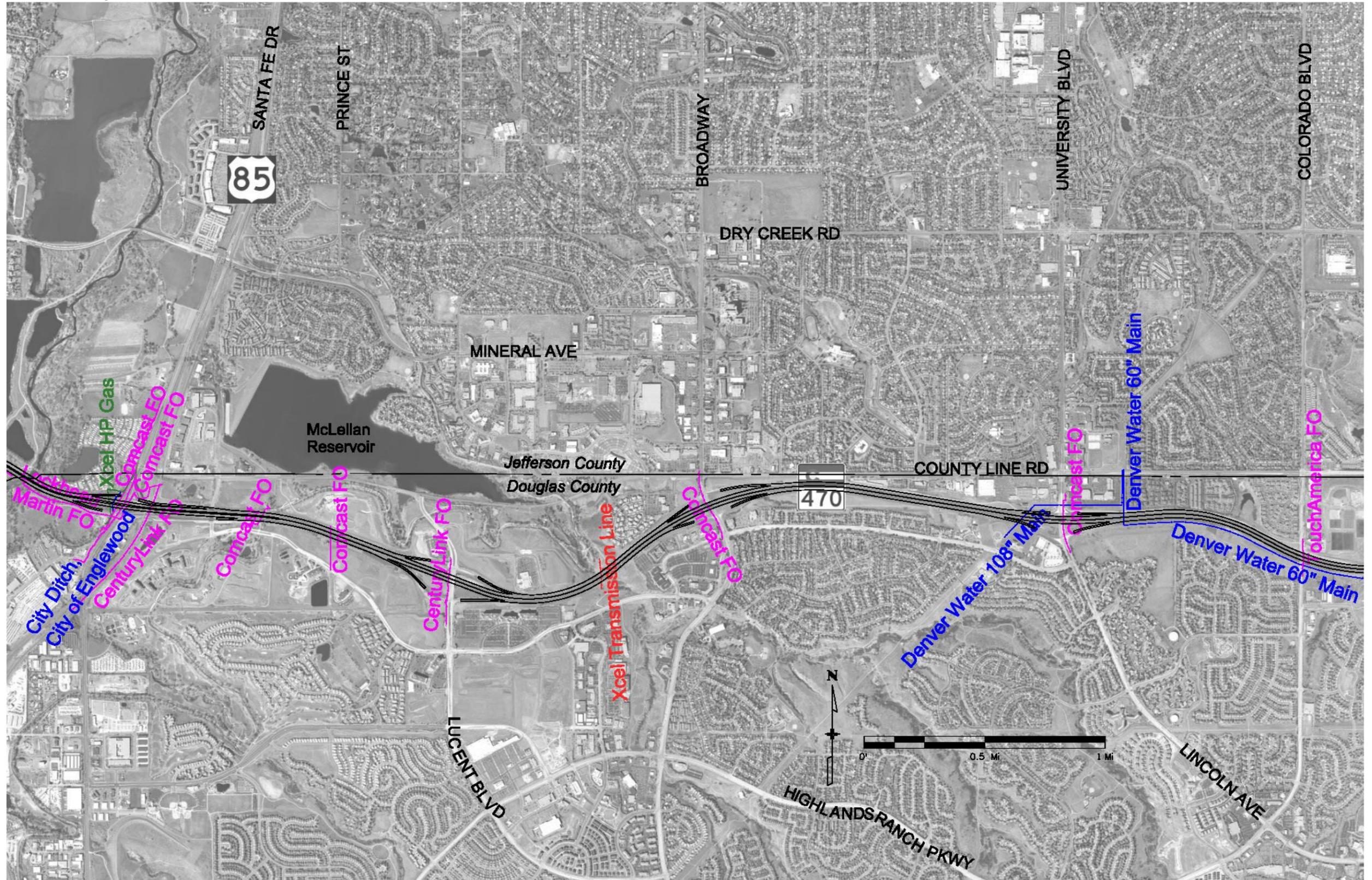
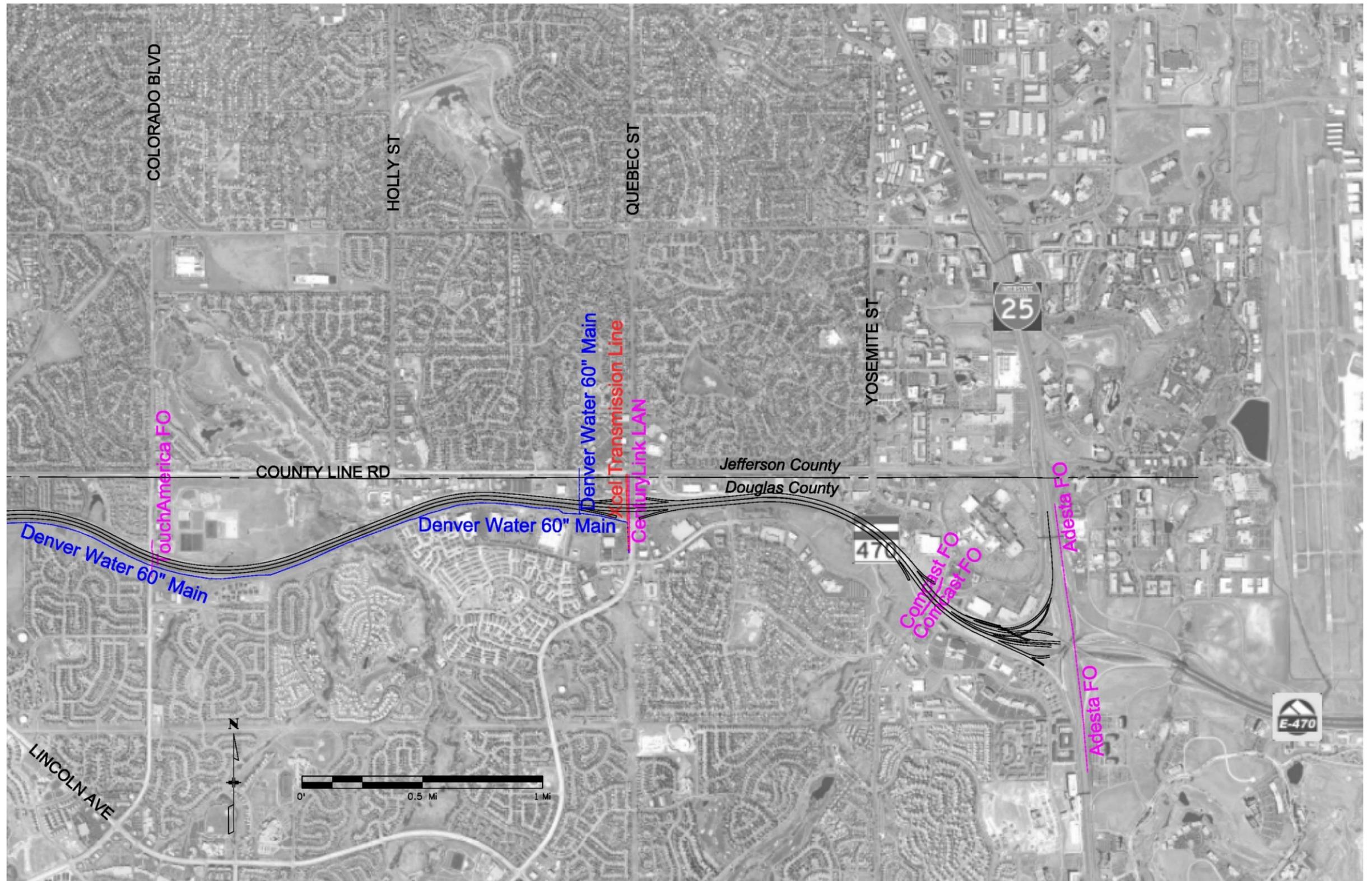


FIGURE 5 – Major Utilities in C-470 Segment between Colorado Boulevard and Interstate 25



For the purpose of this report, utilities have been separated into five subgroups. These subgroups are telephone and communications, electrical and gas, water and sanitary, ditches, and railroads. The major infrastructures are owned mainly by the telephone and communication, electrical and gas, and water and sanitary subgroups. The subgroups describe the type of utility rather than the company that owns the specific facility; for example, the Lockheed Martin fiber optic communication lines in the project corridor are included in the telephone and communications subgroup.

Potential utility impacts were evaluated in segments along the C-470 corridor as follows:

- Between Kipling Parkway and Santa Fe Drive;
- Santa Fe interchange vicinity;
- Between Santa Fe Drive and University Boulevard;
- Between University Boulevard and Interstate 25.

Table 1, presented earlier, indicated that the 34 critical utility resources that cross C-470 consist of 18 fiber optic lines, 10 gas lines, and 6 water resources (notably including the High Line Canal, City Ditch, and a 108-inch diameter water line). Each of these critical lines is described in more detail below. The discussion is organized by project segment and utility type.

2.1 Between Kipling Parkway and Santa Fe Drive

Telephone and Communications: Comcast owns a fiber optic line that crosses C-470 from north to south at Garrison Street, east of Kipling Parkway. This an aerial line using Xcel-owned poles on either side of the C-470 right-of-way. This fiber line provides cable television and internet services and is considered by Comcast to be a trunk line.

In this corridor segment, Lockheed Martin owns three fiber optic lines that are considered critical to national security, as they provide direct communications from Lockheed Martin's Littleton offices to other Lockheed Martin sites and NASA facilities. These fiber lines are buried and have stringent security requirements associated with any potential construction impacts. Any direct impacts to these fiber lines must be approved by Lockheed Martin prior to start of work, and if any fiber line will be exposed overnight, an armed guard must be hired to protect the line. Lines currently existing on the eastern edge of Kipling and Wadsworth, crossing C-470 and running north/south. The line then runs along the southern edge of C-470 all the way to the eastern edge of Santa Fe Drive where it crosses C-470.

Century Link owns one buried fiber optic line that crosses C-470 from west to east near Ute Avenue and Garrison Street.

CDOT ITS maintains a fiber optic backbone along the northern edge of C-470.

Electrical and Gas: Xcel owns one electric transmission line in this segment. Transmission lines provide high voltage power from power plants to large transformers for distribution to local areas. This particular transmission line crosses C-470, north to south, at the Platte River greenway, just west of Santa Fe with existing poles located

outside of the easement that C-470 exists within. This line is aerial and primarily supported by large, wooden, column-style towers. The remainder of Xcel electric lines in the area are either distribution lines or lines that feed highway lighting.

Xcel also owns several buried high pressure gas transmission lines in this segment. In Kipling, a single line running north/south is an 8 inch HP gas line. East of Kipling, a 16-inch HP gas line crosses C-470. East of Wadsworth a 10-inch HP gas line crosses C-470. The two most critical gas mains in this segment parallel C-470 north of the highway near the Platte Canyon off-ramp and continuing to the east where they cross C-470 to the south near the county line. Just west of Santa Fe, a 3-inch gas line crosses C-470 to serve the Wolhurst Community. High pressure gas transmission lines are similar in function to electrical transmission lines, in that they provide large volumes of gas for distribution to local areas.

Water and Sanitary: Denver Water owns a 90" raw water main that crosses C-470 beneath the east ramps at Wadsworth Boulevard.

Ditches: The Last Chance Ditch crosses in a conduit under C-470 just east of the Platte Canyon off-ramp. The Nevada Ditch crosses C-470 west of the South Platte River.

2.2 Santa Fe Interchange Vicinity

The Santa Fe interchange vicinity has been considered as a separate segment, as it includes many utilities along Santa Fe (US Highway 85), as well as the corridor's only railroad crossing. Impacts will be refined as design progresses. Some of the utilities along Santa Fe have already been relocated as part of the flyover ramp construction project that was completed in December 2011.

Telephone and Communications: Comcast owns two buried fiber optic conduits in this segment that provide cable television and internet services to businesses and residents. These are considered trunk lines. The first Comcast fiber line crosses C-470 beneath the west ramps at Santa Fe, and is outside of the project footprint to the north and south. The second fiber line crosses C-470 attached to the Santa Fe overpass and continues to the north and south in the southbound lanes of Santa Fe.

Lockheed Martin owns one critical fiber optic communication conduit in this segment. It is part of the same network mentioned earlier and the same security measures apply. The fiber line is buried and crosses C-470 attached to the Santa Fe overpass.

MCI owns one fiber optic communication conduit in this segment that is considered a backbone line. It crosses C-470 on the railroad bridge owned by Burlington Northern and Santa Fe Rail Company (BNSF). The BNSF bridge is the eastern-most of two rail overpass bridges just east of Santa Fe. This fiber line is buried to the north and south of this overpass bridge.

Century Link owns one fiber optic communication conduit that is considered a backbone line. This fiber conduit crosses C-470 on the BNSF bridge, and is buried to the north and south of this overpass bridge.

Zayo owns one fiber optic communication conduit in this segment that is considered a backbone line. It crosses C-470 attached to the railroad bridge owned by Union Pacific Railroad Company (UPRR). The UPRR bridge is the western-most of two rail overpass bridges just east of Santa Fe. This fiber line is buried to the north and south of the overpass bridge.

CDOT ITS maintains a fiber optic backbone along the northern edge of C-470. There is also a north/south fiber optic along the western edge of Santa Fe Drive.

Electrical and Gas: Xcel owns one high pressure gas transmission line in this segment. This gas transmission line is buried and crosses C-470 beneath the west ramps at Santa Fe. Based on information gathered to date, there are no electrical transmission lines in this segment that would be affected by proposed C-470 improvements.

Water and Sanitary: Based on information gathered to date, no major water or sanitary sewer mains in this segment would be impacted by the C-470 Proposed Action.

Ditches: The City of Englewood owns the City Ditch that provides water to Englewood from the South Platte River. This portion of the City Ditch is a buried 58"x36" reinforced concrete pipe that crosses C-470 beneath the west ramps of Santa Fe.

Railroads: The Burlington Northern and Santa Fe Railroad (BNSF) Company owns the easternmost of two rail overpass bridges that crosses C-470 on the east side of Santa Fe. The Union Pacific Railroad Company (UPRR) owns the western-most of the two. Rail companies often attach their own utilities to their rail and structures.

2.3 Between Santa Fe Drive and University Boulevard

Telephone and Communications: Comcast owns four buried and one overhead fiber optic cable conduits in this segment that could potentially be impacted by this project. These fiber lines provide cable television and internet services to residents and businesses and are considered trunk lines by Comcast. The first buried fiber line in this segment crosses beneath C-470, north to south, at the High Line Canal crossing between Santa Fe and Lucent. The second buried fiber line crosses C-470, north to south, east of the High Line Canal crossing, west of Lucent. The third buried fiber line crosses C-470 beneath Broadway, and the fourth crosses C-470 beneath University.

Century Link owns one buried fiber optic communication conduit in this segment that could potentially be impacted by this project. This fiber optic line provides long distance services and is considered a backbone line by Qwest. This critical fiber line crosses C-470 on the west side of the Lucent overpass.

CDOT ITS maintains a fiber optic backbone along the northern edge of C-470. There is also a north/south fiber optic line along the western edge of Santa Fe Drive.

Electrical and Gas: Xcel owns one electric transmission line in this segment that could potentially be impacted by this project. Electric transmission lines are considered critical for maintaining power supply to large areas. This line is aerial and supported in this area by the thin steel-style towers. This transmission line crosses C-470 west of Broadway, with existing poles outside of C-470 right-of-way.

Water and Sanitary: Denver Water owns one major water main in this segment. The 108" inner diameter water main is buried and crosses C-470 beneath the west ramps at University Boulevard. The main parallels the northern right-of-way of C-470 to the eastern ramps of University, where it then extends northward.

Ditches: Denver Water owns one ditch in this segment. It is the High Line Canal, which crosses C-470 between Santa Fe and Lucent. The box culvert that carries the canal under C-470 is not affected by the Proposed Action.

2.4 Between University Boulevard and Interstate 25

Telephone and Communications: Comcast owns two buried, fiber optic cable conduits in this segment. These fiber lines provide cable television and internet services to residents and businesses. Comcast considers both of these to be trunk lines. These lines run parallel crossing C-470 beneath Yosemite.

Century Link owns one buried fiber optic communication conduit in this segment. This fiber line provides local telephone service to residents and businesses and Century Link considers it to be a backbone line. It crosses C-470 at Quebec attached to the overpass.

Zayo owns one buried fiber optic communication line in this segment that was formerly owned by Touch America. This fiber line provides telecommunications services and is considered a backbone line to Zayo. It crosses C-470 attached to the Colorado Boulevard overpass bridge.

Zayo (formerly Adesta fiber optic in this location) owns a fiber optic line that runs along the eastern edge of I-25 through the C-470 interchange.

Electrical and Gas: Xcel owns one electric transmission line in this segment. This aerial line is primarily supported by the thin steel towers. The line crosses C-470 at Quebec Street, just west of the overpass bridge.

Based on information gathered to date, no high pressure gas transmission lines were found to be impacted in this segment.

Water and Sanitary: Denver Water owns two major water mains in this segment. Both mains are buried and are 60" inner diameter conduits. The first main crosses C-470

beneath the east ramps of University Boulevard and parallels the south right-of-way of C-470 to Quebec Street. The second main crosses C-470 beneath the west ramps of Quebec Street.

Based on information gathered to date, no major sanitary sewer lines were found to be impacted by any proposed improvement along the C-470 corridor in this segment.

3.0 IMPACTS TO UTILITIES

3.1 Impacts of the No-Action Alternative

The No-Action Alternative would maintain the existing highway in its existing configuration, with no new construction. No impacts to utilities would result.

3.2 Impacts of the Proposed Action

C-470 highway design will avoid critical utility resources to the degree possible and may require extra efforts to accommodate or relocate those which cannot be avoided. Non-critical utility resources that cross or parallel C-470 would be relocated as needed, in accordance with routine practices. Table 3 details what is expected to occur with regard to each of the major utility lines that are potentially affected by C-470. As seen in the table, many of the key utility resources would not be affected by the Proposed Action.

Table 3
Potential Impacts to Major Utility Lines (listed by utility operator)

Owner/Operator	Type	Description/Location	Project Impact	
Between Kipling Parkway and Santa Fe Drive				
Xcel	1	Gas	8 Inch In Kipling	No Impact
Xcel	2	Gas	16 Inch Crossing C-470	Potentially Impacted
Xcel	3	Gas	20-Inch North of C-470 east of Platte Canyon – Buried	Potentially Impacted
Xcel	4	Gas	24-Inch North of C-470 east of Platte Canyon – Buried	Potentially Impacted
Xcel	5	Gas	20-Inch Crosses C-470	Potentially Impacted
Xcel	6	Gas	24-Inch Crosses C-470	Potentially Impacted
Comcast	7	Fiber/ Cable	Crossing C-470 aerial at Garrison	Potentially Impacted
Century Link	8	Fiber Optic	Crossing C-470 UG at Garrison	Potentially Impacted
Lockheed Martin	9	Fiber Optic	In Kipling – Bridge Widening	Potentially Impacted – pothole and avoid
Lockheed Martin	10	Fiber Optic	In Wadsworth – bridge widening	Potentially Impacted – pothole and avoid
Lockheed Martin	11	Fiber Optic	Crossing C-470 east of Wadsworth	Potentially Impacted – pothole and avoid
Lockheed Martin	12	Fiber Optic	South of C-470	No Impact
CDOT ITS	13	Fiber Optic	North of C-470	Impacted – relocated with ITS/Tolling design

Table 3 (continued)
Potential Impacts to Major Utility Lines (listed by utility operator)

Owner/Operator		Type	Description/Location	Project Impact
Between Kipling Parkway and Santa Fe Drive				
Denver Water	14	Raw Water	90-Inch east of Wadsworth	No Impact – pothole and avoid
Xcel	15	Electric Trans.	Aerial west of Platte River	No Impact
Last Chance Ditch	16	Irrig.	UG in conduit east of Platte Canyon	No Impact
Nevada Ditch	17	Irrig.	UG in conduit west of Platte River	Potentially Impacted – pothole
Santa Fe Interchange Area				
Comcast	18	Fiber/Cable	Crosses west ramps	Potentially Impacted – pothole
Lockheed Martin	19	Fiber	In Bridge running north/south	Potentially Impacted – pothole
MCI	20	Fiber	In railroad bridge	No Impact
Century Link	21	Fiber	In railroad bridge	No Impact
Zayo	22	Fiber	In railroad bridge	No Impact
CDOT ITS	23	Fiber	North of C-470	Impacted – relocated with ITS/Tolling design
Xcel	24	Gas.	3-Inch	Potentially Impacted – pothole
Englewood – City Ditch	25	Irrig.	In conduit crossing C-470 west of Santa Fe bridge	Potentially Impacted – pothole
UPRR	26	Railroad	Crosses east of Santa Fe	No impact – railroad C&M process
BNSF	27	Railroad	Crosses east of Santa Fe	No impact – railroad C&M process
Between Santa Fe Drive and University Boulevard				
Comcast	28-32	Fiber/Cable	Aerial and UG in 5 locations	Potentially impacted – pothole
CDOT ITS	33	Fiber	North of C-470	Impacted – relocated with ITS/Tolling design
Xcel	34	Electric Trans.	Aerial crossing C-470	Not impacted
Denver Water	35	Water	108-inch west of University	No impact – avoid
Denver Water	36	Irrig.	Highline Canal – box culvert	No impact
Between University Boulevard and I-25				
Comcast	37-38	Fiber/Cable	UG	Potentially impacted – pothole
Century Link	39	Fiber	Quebec bridge	Potentially impacted – pothole
Zayo	40	Fiber	In Colorado Boulevard bridge	No impact
Zayo	41	Fiber	East of I-25	No impact
Xcel	42	Electric Trans.	West of Quebec – protect poles	No impact
Denver Water	43-44	Water	Two 60-inch water mains	Potentially impacted – pothole
CDOT ITS	45	Fiber	North of C-470	Impacted – relocated with ITS/Tolling design

In some locations, the existence of major utility lines parallel to C-470 creates potential design conflicts that would preclude various other project mitigation features, such as creation of a water detention pond or a noise berm. These issues have been considered in the conceptual design of the Proposed Action to identify solutions that best balance any conflicting needs.

4.0 MITIGATION MEASURES

Common, minor utility impacts are relatively simple to mitigate. In general, when a privately owned utility is located within public right-of-way, the owner company is responsible for relocating the utility to accommodate a public improvement project. This usually applies to telephone and communications and electrical and gas subgroups. When a publicly held utility must be relocated to accommodate a public improvement project, it is generally the project's (CDOT's) responsibility to fund the related construction for relocation. Publicly held utilities generally fall under the water and sanitary subgroup.

5.0 NEXT STEPS

Utility assessment for this Revised EA was prepared based on the generally known locations of utility lines for the purpose of identifying impacts and constraints. In the proposed project design/build process, the next stage of utility coordination is the need to develop more detailed design information. Engineering "locates" (location determinations) should be performed and a field survey of the locates should be completed. Any utility company that will be impacted by construction during this project will be notified. A potholing plan will be devised to determine any subsurface utility conflicts and more precisely locate any utility lines that could potentially be impacted. Any remaining conflicts will be resolved by relocation of that utility or additional roadway design modifications.