ATKINS

Twin Tunnels Environmental Assessment

Engineering Existing Conditions Summary

December 22, 2011

Plan Design Enable

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1. Introduction

The Colorado Department of Transportation (CDOT) is conducting an environmental assessment (EA) to study transportation improvements on Interstate 70 (I-70) in the Twin Tunnels area. CDOT has identified these improvements as a high priority to address immediate safety and congestion issues. The EA and supporting documentation will comply with the National Environmental Policy Act (NEPA) of 1969.

1.1. Study corridor overview

The I-70 Twin Tunnels study area includes eastbound I-70 between East Idaho Springs (exit 241) and U.S. Highway 6 (US 6)/Floyd Hill (exit 244), as shown in Figure 1.

I-70 is a major east-west travel corridor through the state of Colorado that includes large volumes of commercial and recreational traffic. Recreational traffic is highest on weekends, and the eastbound summer Sunday afternoon trip has the highest traffic volumes of the year. Volumes on weekend afternoons throughout the year are regularly well over capacity, causing severe congestion throughout the corridor from the Eisenhower-Johnson Memorial Tunnel and the Twin Tunnels. The Twin Tunnels are suspected to be one of the primary causes of congestion due to the perceived narrow tunnels and 50-mile per hour (mph) curves east of the tunnels. These slowing vehicles create a queue that can be several miles long during peak travel times.

1.2. Purpose of this report

This report provides a description of the existing engineering design elements (geometric design, structures, water resources, utilities, and bicycle and pedestrian access) within the study limits. This review was prepared to identify the current conditions of the roadway and help identify deficiencies. The deficiencies were identified by comparing the existing conditions to the current applicable design standards for each of the facility's design elements.

The following resources were used to describe existing conditions and to identify planned facilities and design guidelines:

- Site visits (multiple visits during 2011)
- As-built plans
- Staff discussions with CDOT
- I-70 Mountain Corridor Programmatic Environmental Impact Statement (J.F. Sato & Associates, 2004; revised 2010)
- CDOT Structure Inspection and Inventory reports (December 2009 and August 2011)
- I-70 Mountain Corridor Water Resources Technical Report (2010; corrections 2011)
- The Greenway Plan (Clear Creek County, 2005)

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Figure 1. Study area

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2. Existing geometric conditions

This chapter documents the existing geometric conditions of the eastbound I-70 roadway within the project limits. The existing geometric conditions have been obtained from corridor as-built plans, existing topography survey, and from information recorded at several site visits over the past year (fall, winter, spring, summer). The existing conditions and critical issues are presented in the following existing geometric conditions categories.

2.1. Existing design speed

The existing design speed along the project corridor varies due to several reconstruction projects that have occurred since the construction of the initial I-70 corridor. Atkins compiled the corridor as-built plans and reviewed the design speed listed in the most recent as-built plans to document the existing design speed within the project corridor. The existing design speed, based on design criteria at the date of corridor as-built plans, varies between 50 mph and 70 mph, as summarized by curve number in Table 1. Curve numbers are identified on Figure 2.

2.2. Existing horizontal alignment

The location of the horizontal alignment differs slightly between the existing corridor as-built plans and the proposed project control line. The horizontal alignment identified in the corridor as-built plans was generally located within the existing median between the eastbound and westbound lanes. The project control line created by Atkins is located along the eastbound inside shoulder stripe.

The curve radius recorded from the corridor as-built plans and the radius listed from the project control line will differ slightly due to the location difference. The results have been summarized in Table 1.

Table 1. Existing curve radius and design speed summary

Curve Number	Corridor As-built Curve Radius (ft)	EB I-70 Project Control Line Curve Radius (ft)	Curve Design Speed listed in Corridor As-built Plans (mph)
1	1,206	1,215	60
2	1,432	1,450	60
3	1,146	1,200	50
4	716	750	50
5	716	960	50
6	1,910	2,000	70
7	716	1,130	50
8	716	700	50
9	716	725	50
10	716	600	50

It is important to note that the existing design speed listed in Table 1 was recorded directly from the corridor as-built plans. The existing posted speed limit for eastbound I-70 throughout the project corridor is 55 mph. The intent of the proposed action for this project is to widen the roadway to the outside only, therefore matching the existing roadway geometry.

Figure 2. Curve numbers in the study area

2.3. Existing vertical alignment

A vertical alignment was created along the project control line using the existing topography survey. The intent of the vertical alignment was to match the existing vertical conditions as close as possible to document the existing vertical alignment. The maximum vertical grade recorded was approximately 3.5%. All vertical curves meet current American Association of State Highway and Transportation Officials (AASHTO) criteria for a minimum 50-mph design speed, with one exception: a sag vertical curve located at the eastern end of the project approaching the existing Floyd Hill bridge.

The sag vertical curve is approximately 400 feet in length with an approximate K-value of 70 (40-mph design speed). The project scope does not include reconstruction or replacement of the Floyd Hill bridge therefore limiting options to upgrade this sag vertical curve to a 50-mph design speed. Accident history does not indicate that this sag vertical curve is a safety hazard, which reduces the need to upgrade the vertical curve.

2.4. Existing superelevation

The existing maximum superelevation rate for each existing horizontal curve was recorded using cross sections from the existing topography survey. These recorded superelevations rates where then compared to the design superelevation rates listed in the corridor as-built plans. The comparison indicates that the design superelevation rates have been maintained over the years. The results have been summarized in Table 2.

Improvements and/or modifications to the existing superelevation rates have not been identified at this time. The superelevation rates will be evaluated during preliminary and final design to address the maximum rate for each curve.

Table 2. Superelevation rates of existing horizontal curves

Horizontal Curve Number	Corridor As-built Radius (ft)	Maximum Recorded Superelevation
1	1,206	8.4%
2	1,432	7.8%
3	1,146	4.8%
4	716	9.0%
5	716	8.3%
6	1,910	8.0%
7	716	5.1%
8	716	9.4%
9	716	9.2%
10	716	9.2%

2.5. Existing horizontal stopping sight distance

The existing horizontal stopping sight distance for each existing horizontal curve was recorded using the existing topography survey. The results have been summarized in Table 3. The American Association of State Highway and Transportation Officials (AASHTO) recommends a minimum stopping sight distance on level roadways of 425-ft for a design speed of 50-mph. Stopping sight distance along the horizontal curves will be limited to the values obtained utilizing the proposed action shoulder widths. A median wall is proposed along Curve 4 in order to increase stopping sight distance. The intent of the proposed action for this project is to widen the roadway to the outside only, therefore limiting opportunities to increase the stopping sight distance within the study area.

Table 3. Existing horizontal stopping sight distance

Horizontal Curve Number	EB I-70 Project Control Line Radius	Minimum Recorded Stopping Sight Distance (ft)	Direction of Horizontal Curve
1	1,215	590	Right
2	1,450	400	Left
3	1,200	380	Right
4	750	250	Left
5	960	270	Right
6	2,000	650	Right
7	1,130	395	Left
8	700	285	Right
9	725	525	Left
10	600	315	Right

2.6. Existing interchanges

There are three interchanges within or adjacent to the project corridor. The three interchanges consist of the East Idaho Springs Interchange, Hidden Valley Interchange, and the US 6 Interchange. The project scope of work does not include improvements to the existing interchanges with the exception of minor improvements to the eastbound Hidden Valley exit ramp and eastbound US 6 exit ramp. Existing geometric conditions were not evaluated at the three interchanges.

2.7. Existing road conditions

The existing roadway surface appears to be in good condition as a result of recent improvement projects. The most recent construction project was an asphalt overlay that was completed in the summer of 2011. A geological investigation will be conducted in the future to further document the existing road conditions.

2.8. Existing guardrail

A guardrail inventory to document the existing condition has not been completed at this time. It is assumed that the existing guardrail located along the existing outside edge of pavement will be removed in order to construct the improvements. The guardrail will be replaced with new Type 3 guardrail where appropriate or a Type 7 or Type 10 will be constructed integral with the proposed retaining walls. The existing median Type 3 guardrail will may be replaced with new Type 3 guardrail that meets requirements of the CSS guidelines. Headlight glare will be evaluated in the future and may change the type of guardrail used adjacent or within the existing median. A retaining wall is currently proposed for both options within curve 4. The intent of this retaining wall is to increase eastbound sight distance around the existing horizontal curve.

2.9. Tunnel Conditions

The existing conditions of the tunnel will be conducted at a later date and will be documented in a separate report. A brief summary of the tunnel conditions is included in this report and is as follows.

The existing roadway width at the I-70 Twin Tunnels (milepost [MP] 242.2) is approximately 29 feet with a tunnel span of 32 feet, including the shoulder barriers. Refer to Figure 3 for a typical section from the original tunnel construction plans. The following critical issues are present at the tunnel:

- The tunnel portals are boxy and imposing to drivers and tend to cause drivers to perceive them as potential obstacles and thus slow down to improve perceived safety. In addition, the tunnel bores themselves appear dark and produce a “black hole effect,” adding to the perceived safety concern, compounding the drivers’ tendency to slow down, causing reduced traffic flow and queuing.

- Lighting at the tunnel has been upgraded and more improvements are not likely to help the constraints of the tunnel width.
- The tunnel is a two-lane facility and will need to be widened to three lanes.
- The existing effective pillar between the tunnels is approximately 25 to 26 feet wide, and requires more geologic investigation to determine stability needs for larger or additional tunnel bores.
- The tunnels will have to be widened to the south side so as to not reduce the pillar width.
- The tunnel does not provide for hazardous materials spill containment.
- The tunnel does supply a means for emergency egress.
- The west portal has a rock fall hazard potential that needs to be addressed in any new design.

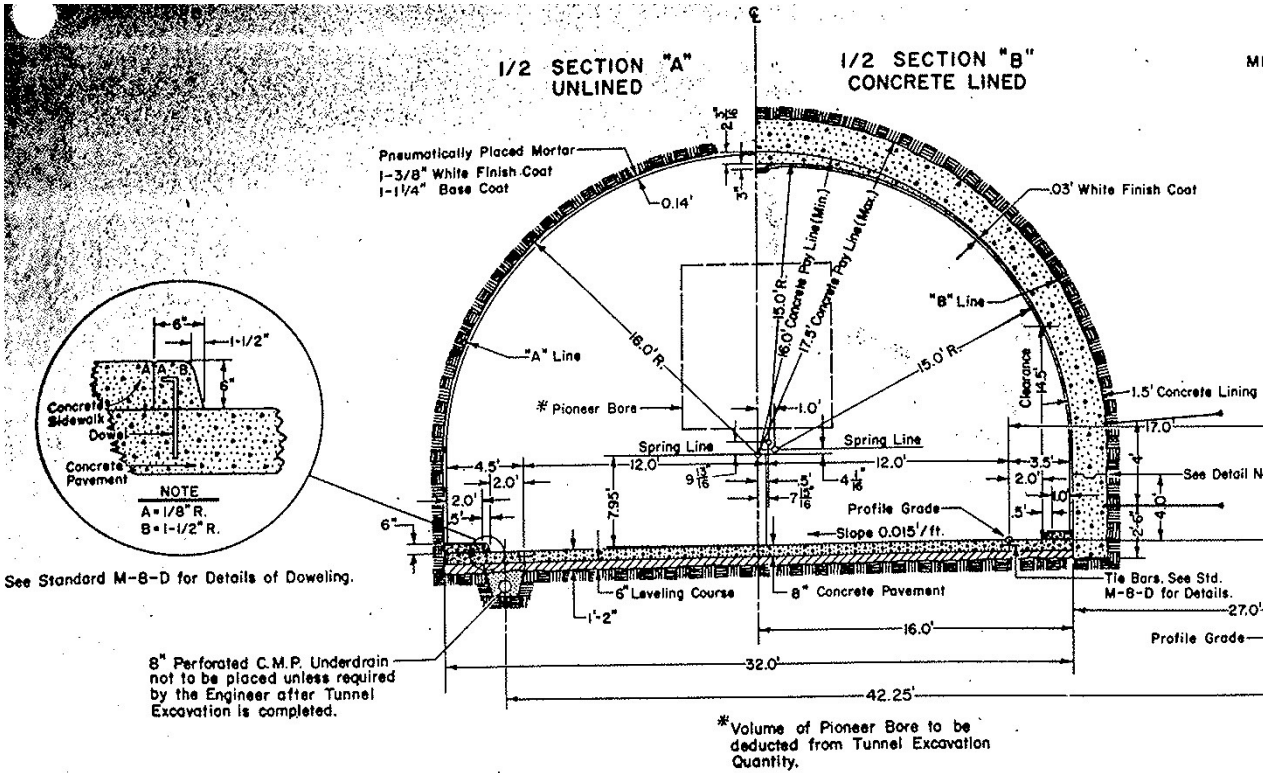

Figure 3. Tunnel typical section from original design plans

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3. Existing structural conditions

On September 20, 2011, Atkins visited the I-70 Twin Tunnels study area to assess the condition of the existing major structures. The following six major structures were identified on I-70 between I-70 exit 241A and exit 244, with the corresponding structure number shown in parenthesis:

1. I-70 over Clear Creek near I-70 eastbound exit 241A (F-15-BV)
2. I-70 over Clear Creek near I-70 eastbound exit 243 (F-15-BH)
3. I-70 over Central City Parkway (F-15-CR)
4. I-70 over Clear Creek near I-70 westbound exit 243 (F-15-BX)
5. I-70 eastbound over Clear Creek and Scott Lancaster Memorial Trail near exit 244 (F-15-CM)
6. I-70 westbound over Clear Creek, Scott Lancaster Memorial Trail and US 6 near exit 244 (F-15-BL)

Figure 4 shows the locations of the six structures and Table 4 provides the location by MP and the corresponding sufficiency rating. Each of the structures is discussed in more detail in the following sections.

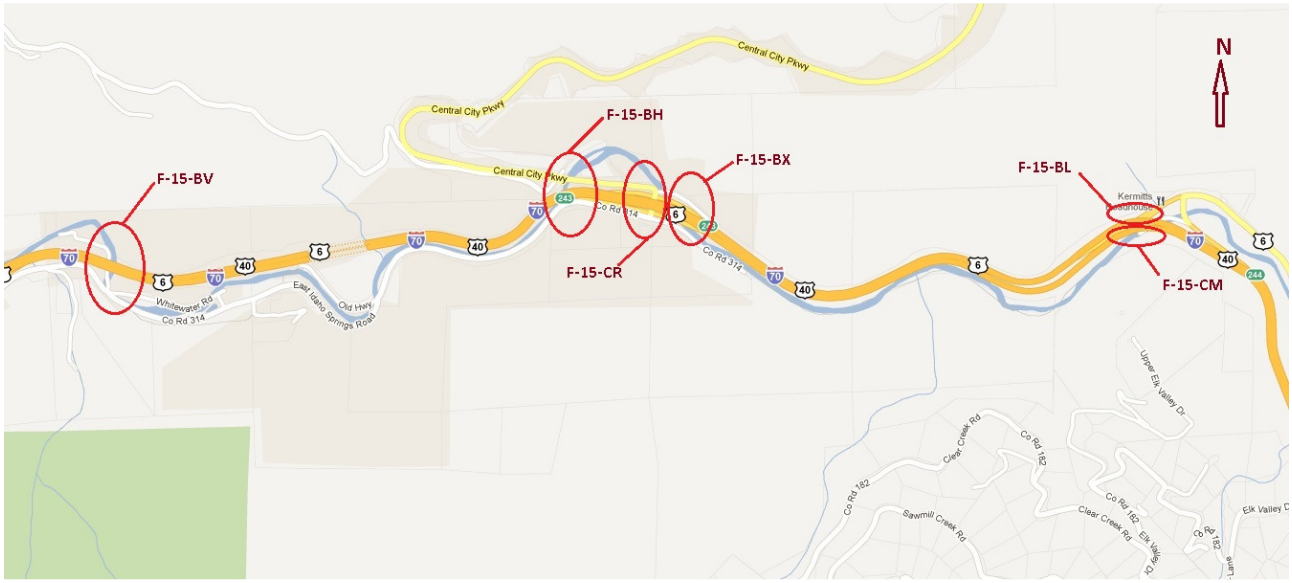

Figure 4. Location map of structures

Table 4. Summary of structures

Description	Location (MP)	Structure number	Sufficiency rating (date)
Three-span, steel plate girder bridge over Clear Creek	241.640	F-15-BV	96.0 (August 29, 2011)
Four-span, steel plate girder bridge over Clear Creek	242.786	F-15-BH	93.1 (December 14, 2009)
Single-span, bulb-tee, pre-stressed girder bridge over Central City Parkway	242.980	F-15-CR	96.0 (December 14, 2009)
Three-span bridge at a skew	243.040	F-15-BX	96.0 (December 14, 2009)
Three-span, steel plate girder bridge	244.260	F-15-CM	95.0 (December 15, 2009)
Six-span bridge with steel plate girder superstructure over multi-column bents	244.261	F-15-BL	43.6 (December 12, 2009)

3.1. Structure F-15-BV

This bridge was built in 1989 and is a three-span, steel plate girder bridge over Clear Creek supported by multi-column bents and seat type abutments. This bridge also spans over an unpaved road that provides access to a private property, as shown in Figure 5. The bridge was constructed without a skew and with minimal vertical slope; however, steep slopes were seen near abutments. Girders and channel cross bracings are painted, as shown in Figure 6. The bridge has a sufficiency rating of 96.0 according to the CDOT Structure Inspection and Inventory Report, dated August 29, 2011. Because the sufficiency rating is higher than 80.0, the bridge is not eligible for federal aid for rehabilitation.

Figure 5. Access road below the bridge

Figure 6. Girders and cross bracing

3.1.1. Existing conditions

Overall, this bridge is in very good condition with efflorescence seen in very few places. The concrete finish is smooth and the galvanized type 10M barriers are in good condition.

3.2. Structure F-15-BH

This bridge was built in 1961 and is a four-span, steel plate girder bridge over Clear Creek supported over multi-column bents and seat type abutments on a horizontal curve, as shown in Figure 7. Two pier caps, one for each direction of traffic, are connected by a pier wall. The bridge is in a skew with short wing walls on all four corners. Type 3 galvanized steel barriers with a concrete median barrier in the middle accommodate two lanes of traffic in each direction. The bridge has a sufficiency rating of 93.1 according to the CDOT Structure Inspection and Inventory Report, dated December 14, 2009. Because the sufficiency rating is higher than 80.0, the bridge is not eligible for federal aid for rehabilitation.

3.2.1. Existing conditions

Vertical exposed reinforcement and efflorescence were seen near a pier cap/pier column junction, as shown in Figure 8.

Figure 7. Bridge looking west

Figure 8. Exposed rebar in pier cap

There is paper felt containing asbestos between beam elements at sliding guardrail joint connections, as shown in Figure 9; however, the paper felt is not in the fixed joint connections.

Figure 9. Bridge rail expansion joint

The exterior steel girder on the south side has rust in most places, requiring maintenance. Other galvanized girders are in good condition. The deck shows cracks in many places and concrete spalls with exposed reinforcement at some places. These conditions are shown in Figure 10 and Figure 11.

Figure 10. Cracks in deck near east abutment

Figure 11. Rust in steel girders

Rocker bearings are rusted and dirty and show significant rotation, as shown in Figure 12. The deck is drained by pipes installed at a 45-degree angle through an overhang, as shown in Figure 7. There is a corrugated metal pipe (CMP) drain pipe on the west abutment, as shown in Figure 13. There are steep slopes near both abutments. Overall, the bridge is in good condition.

Figure 12. Bearings in pier

Figure 13. Drain pipe near west abutment

3.3. Structure F-15-CR

This bridge was built in 1999 and is a single-span, bulb-tee, pre-stressed girder bridge on I-70 over Central City Parkway near exit 243. This bridge is located only a few hundred feet west of structure F-15-BX. Bridge rails are type 10M galvanized and are in good condition. Both the abutments are wrapped by mechanically stabilized earth (MSE) walls with concrete block facing. The MSE walls are tiered on the north side, as shown in Figure 14. The west abutment MSE walls are more than 240 feet long on each side, as shown in Figure 15. This bridge has a sufficiency rating of 96.0 according to the CDOT Structure Inspection and Inventory Report, dated December 14, 2009. Because the sufficiency rating is higher than 80.0, the bridge is not eligible for federal aid for rehabilitation.

Figure 14. Tiered MSE wall on northeast corner

Figure 15. MSE wall on northwest corner

3.3.1. Existing conditions

Slight efflorescence is near the bottom flange of girders, as shown in Figure 16. There is also some erosion in the southwest embankment due to a riprap rundown, as shown in Figure 17.

Figure 16. Some efflorescence in west abutment

Figure 17. Southwest riprap rundown

3.4. Structure F-15-BX

This bridge was built in 1999 and is a three-span bridge located at exit 243 on I-70 at a considerable skew. The bulb-tee girders are supported on integral abutments and multi-column bents. Even though one structure number was identified, eastbound and westbound bridges are separated, as shown in Figure 18. The eastbound bridge and westbound bridge abutments have an offset, as shown in Figure 19. This bridge has a sufficiency rating of 96.0 according to the CDOT Structure Inspection and Inventory Report, dated December 14, 2009. Because the sufficiency rating is higher than 80.0, the bridge is not eligible for federal aid for rehabilitation.

Figure 18. Pier bent looking east

Figure 19. Offset in west abutment

The bridge has Type 10M galvanized barriers on a concrete deck. The eastbound and westbound ramp bridges are located close to this bridge. The east abutment of the eastbound ramp bridge is integrally connected to the east abutment of this bridge, as shown in Figure 20. The eastbound ramp bridge has bulb-tee girders with integral abutments and multi-column bents similar to this pier. The westbound ramp bridge is a single-span, steel plate girder bridge with less free board above Clear Creek than the other bridges, as shown in Figure 21.

Figure 20. I-70 and eastbound ramp bridges

Figure 21. Westbound ramp bridge

A cast-in-place (CIP) retaining wall runs for more than 400 feet along Clear Creek on the southeast corner of the eastbound ramp bridge, as shown in Figure 22. Light poles are attached and a small box culvert and a couple of reinforced concrete pipes (RCP) cross through this wall, as shown in Figure 23.

Figure 22. Retaining wall with box culvert

Figure 23. Light pole blister and RCP

3.4.1. Existing conditions

This bridge is in good condition and there is no reinforcement or concrete spalls exposure on this structure. The retaining wall is in good condition and was built with crack control and expansion joints. The stay-in-place forms and galvanized steel diaphragms are in good condition. There is some efflorescence below the pier caps, as shown in the Figure 24, as well as in the abutments, as shown in Figure 25.

Figure 24. Efflorescence in pier cap

Figure 25. Efflorescence in abutment

3.5. Structure F-15-CM

The eastbound I-70 bridge was built in 1974 and is a steel plate girder, three-span bridge supported by multi-column bents. The superstructure has a crash-tested concrete barrier, and deck and girders are in good condition. This bridge has lower pier heights than the structure F-15-BL piers. This bridge is in a horizontal curve with superelevation and has a large skew. The north abutment and the adjacent pier are connected by a counter-fort retaining wall on the south side along the creek. This bridge has a sufficiency rating of 95.0 according to the CDOT Structure Inspection and Inventory Report, dated December 15, 2009. Because the sufficiency rating is higher than 80.0, the bridge is not eligible for federal aid for rehabilitation.

3.5.1. Existing conditions

3.5.1.1. Abutment and pier north of creek

The wall between the north abutment and the adjacent pier shows deterioration on top of the wall. Reinforcement is exposed showing corrosion, as shown in Figure 26. The retaining wall has rotated approximately 1 inch at the top of the wall away from the abutment wall, as shown in Figure 27. Some efflorescence is at the bottom of the deck due to cracks, as shown in Figure 28. Leaking water caused concrete spalls and efflorescence around the expansion joint. Rebar is exposed and corroded, and horizontal cracks are seen below the bearing seat. Figure 29 shows an example of the corrosion around expansion joints.

Figure 26. Top of pier wall

Figure 27. North abutment wing-wall

Figure 28. Efflorescence at deck bottom

Figure 29. Corrosion around expansion joint

3.5.1.2. Pier south of creek

There are vertical cracks in the pier column, as shown in Figure 30. There are also spalls in concrete in the west end of the pier cap with rebar exposed. Rusting, minor cracks, and efflorescence are seen at the bottom of the pier cap, as shown in Figure 31.

Figure 30. Pier column

Figure 31. Bottom of pier cap

3.6. Structure F-15-BL

This bridge was built in 1959 and is a six-span bridge with a steel plate girder superstructure over multi-column bents. The end span on the north side is a short span with no girders, as shown in Figure 32. The bridge is in a horizontal curve with superelevation and piers have large skews. A CIP retaining wall of approximately 30 feet in length retains I-70 westbound located a few hundred feet past the north abutment, as shown in Figure 33. This bridge has a sufficiency rating of 43.6 according to the CDOT Structure Inspection and Inventory Report, dated December 12, 2009. Because the sufficiency rating is less than 50.0, the bridge is eligible for federal aid for replacement.

Figure 32. North abutment

Figure 33. Retaining wall

3.6.1. Existing conditions

Slope paving, as shown in as-built plans, is not seen at the abutments. Piers show minor cracks and spalling of the concrete. Reinforcement is exposed and there is rust in many places, especially in the deck overhangs and pier caps, as shown in Figure 34 and Figure 35. Pier caps are strengthened and patched by fiber reinforced polymer. Efflorescence is in many places throughout the bottom of the bridge deck due to longitudinal cracks in the deck, as shown in Figure 36, and also in piers below expansion joints, as shown in Figure 37.

Figure 34. Cracks in pier cap and column

Figure 35. Exposed rebar below pier cap

Figure 36. Bottom of bridge deck

Figure 37. Pier below expansion device

The original bridge rails and light posts are removed, and the bolts on the sides of the bridge deck show rust, as shown in Figure 38. The original bridge rail was replaced by CDOT with crash-tested concrete barrier. Steel plate girders and intermediate truss type diaphragms show rusting in many places. Abutment 1 has short wing walls and is surrounded by steep embankment with slopes closer to a 1:1 ratio. The bearings are dirty and show signs of corrosion, as shown in Figure 39. Large cracks are on the top portion of the abutment seat, as shown in Figure 40. Abutment 2 is a short seat abutment resting directly on hard bedrock.

Figure 38. North side bridge rail and deck

Figure 39. South abutment bearing

Figure 40. Cracks in south abutment

3.6.2. Other information

The bridge crosses the US 6 ramp as shown in Figure 41. Access to construction is on both sides of the structure's deck. The distance between eastbound and westbound bridge abutments is approximately 24 feet on the south side with a steep embankment slope. A utility pipe approximately 6 inches in diameter runs along the north side deck overhang.

Figure 41.US 6 ramp below I-70

4. Existing water resources, floodplains, and water quality conditions

An analysis of water resources, floodplains, and water quality issues was conducted as part of this existing conditions assessment in support of the I-70 Twin Tunnels EA. This chapter provides basic information for water resources, floodplain, and water quality within the study area. The information was derived from site visits, published reports, and discussions with CDOT staff. Additional information is in the I-70 Mountain Corridor Water Resources Technical Report, dated August 2010 with corrections in March 2011.

4.1. Current watershed conditions

The study area is located in the Clear Creek watershed with a drainage area of approximately 267 square miles (mi^2) upstream of the project area. The project is approximately 30 acres (0.05 mi^2), which represents approximately 0.018 percent of the watershed.

Clear Creek originates at the continental divide, west of the study area, near Loveland Pass and flows approximately 30 miles to the east and confluences with the South Platte River. This watershed, upstream of the project site, includes Clear Creek County and the communities of Idaho Springs and Georgetown. The Mount Evans Wilderness and the Roosevelt National Forest are also located within the watershed, upstream of the project site.

Land uses in the watershed consist mostly of forest with some small communities and existing and historical mining operations. The I-70 corridor follows the main stem of Clear Creek upstream of the study area and includes transportation facilities and adjacent development.

4.2. Clear Creek and floodplain

Clear Creek is a perennial stream that flows along and crosses I-70 through the study area. Portions of Clear Creek were channelized with the construction of I-70 in the 1950s. Clear Creek is a typical mountain stream with large cobbles and boulders and steep channel banks. It has a low stream sinuosity (ratio of the stream length to the valley length), slight meandering, and limited riparian (streamside) vegetation.

This reach of Clear Creek is shown on Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) panels 0226D and 0227D for Clear Creek County. The 100-year flood zone is shown as Zone A and calculated base flood elevations have not been determined. The delineated floodplain is relatively uniform width and represents the floodplain contained within the main channel of Clear Creek. The effective FEMA floodplain delineations are based on mapping efforts conducted during the 1970s and do not follow more accurate topographic information for this reach of Clear Creek. The FEMA 100-year floodplain delineations are shown in Figure 42.

FEMA prepared a detailed hydraulic study of Clear Creek upstream of this project area. The downstream limit of the detailed study ends approximately 1,500 feet upstream of the western limit of this project area. FEMA calculated 100-year peak discharge for Clear Creek, upstream of this project area, is 3,670 cubic feet per second (cfs).

Additional hydraulic analysis was prepared for the Twin Tunnels EA to more accurately delineate 100-year floodplains. The FEMA 100-year discharge from the upstream reach of Clear Creek detailed study was applied to the reach of Clear Creek through the Twin Tunnels project. A Hydrologic Engineering Center River Analysis System hydraulic model was developed with cross sections spaced approximately every 500 feet. The preliminary hydraulic analysis calculated the 100-year water surface elevations and those calculated elevations were delineated to map the existing 100-year floodplain. The preliminary hydraulic analysis and floodplain delineation created a significantly narrower floodplain than the FEMA Zone A delineation.

A Letter of Map Revision may be required to change the FEMA Zone A delineation and remove the floodplain from I-70. If proposed improvements encroach into the Clear Creek floodplain, Clear Creek County and Idaho Springs (the local floodplain administrators for this area) will require the project to not cause an increase in water surface elevation on adjacent properties.

4.3. Clear Creek water quality

Historic activities in the Clear Creek watershed, including mining, industry, and transportation have impacted the water quality of Clear Creek. This reach of Clear Creek, within the project area, is included in segment COSPCL11 (Clear Creek, Argo Tunnel to Farmers Highline Canal) on the Colorado Department of Public Health and Environment Water Quality Control Commission Regulation No. 93 for the year 2010. This is also known as the Section 303(d) list of impaired waters and monitoring and evaluation list. This segment is listed as high priority with an impairment of cadmium (Cd). The Clear Creek watershed is shown in Figure 43.

Due to the recreational uses and environmental sensitivity of this reach of Clear Creek, CDOT has identified additional water quality requirements to be met with proposed projects in this study area to control and mitigate the impacts of sand and de-icer application along the highway. The Stream and Wetland Ecological Enhancement Program Memorandum of Understanding was signed January 4, 2011, and provides direction for future projects through the I-70 Mountain Corridor.

The major existing water quality concern for this study area is disturbance of existing contamination, including heavy metals found in mine tailings and the application of sand and de-icing agents on I-70. Currently, there are no water quality treatment facilities along this section of I-70.

Figure 42. FEMA 100-year floodplain delineations

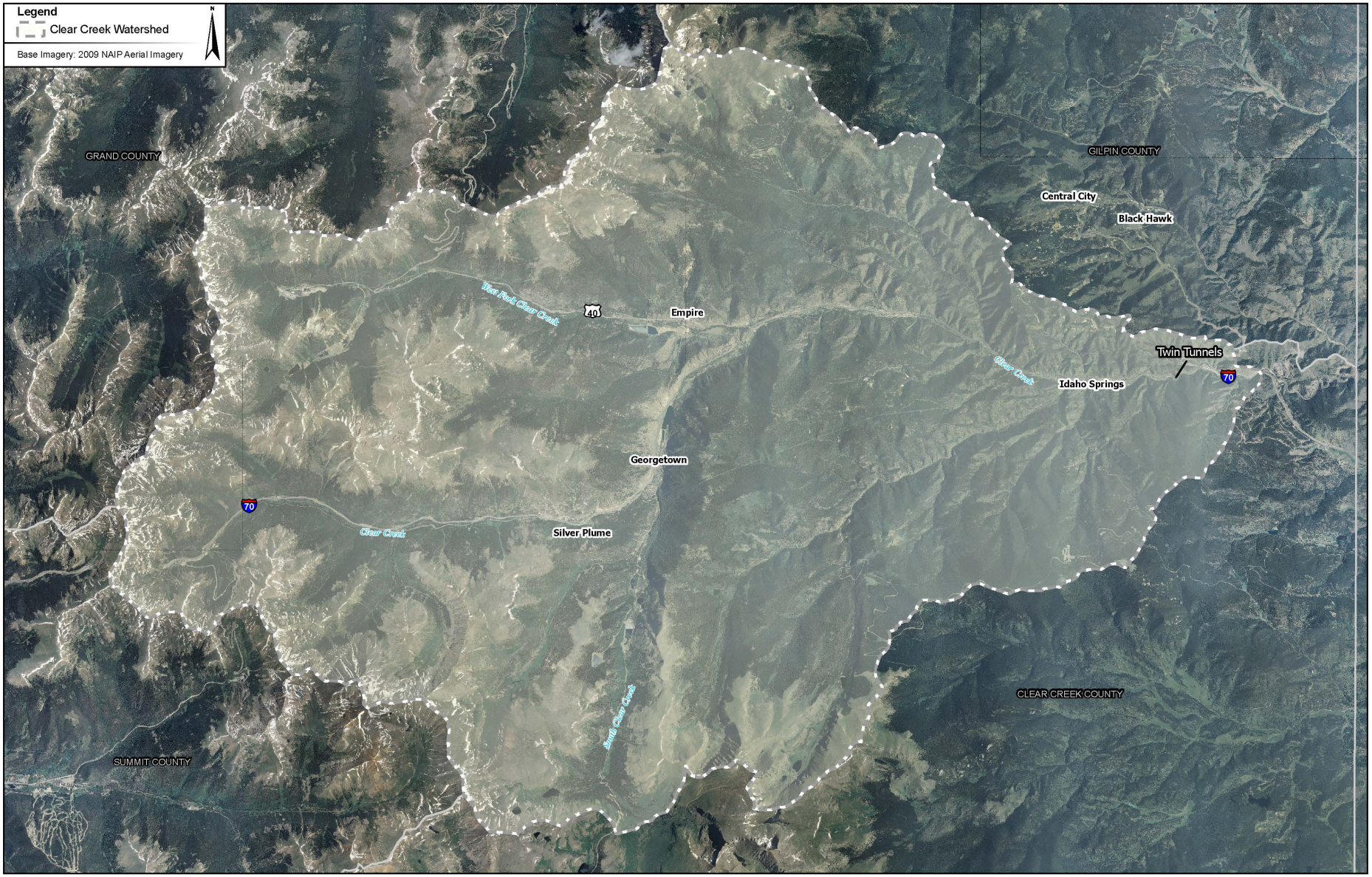

Figure 43. Clear Creek watershed

5. Existing utilities conditions

This chapter discusses the existing utilities within the study area. This information will be used during the preliminary design of the EA alternatives to identify potential conflicts and coordinate future infrastructure needs with the utility companies.

5.1. Methodology

Atkins contacted the Utility Notification Center of Colorado (UNCC) for initial identification of all Tier I and Tier II utilities in the study area. A test ticket was generated by UNCC to identify the existing utilities within the study area. The identified utility companies and agencies were contacted to obtain infrastructure maps or verbal descriptions of their existing infrastructure. Field reconnaissance confirmed the findings and provided additional information. An existing topography survey was completed by a consultant surveyor. The survey included above ground locates of the existing utilities throughout the corridor and this survey was used to help verify the UNCC identified utilities.

5.1.1. Limitations

It should be noted that not all of the utility companies listed as Tier I and Tier II utilities by UNCC responded to requests for additional information. The utility information in this document concerning type and location of the underground and other utilities is not guaranteed to be accurate or all inclusive. This utility inventory should be supplemented by field verification and UNCC coordination before any construction.

5.2. Existing conditions

The major utilities in the study area include overhead electric transmission lines, overhead electric lines, overhead cable lines, buried fiber optic lines, water lines, and sanitary sewer lines. The following subsections provide general information for each known utility. Contact information for the utilities is provided in Table 5 at the end of this section.

CDOT Fiber Optic. A CDOT fiber optic backbone line is located within the study area. The backbone line generally runs adjacent to the westbound I-70 outside shoulder. There are several drop locations to variable message signs and other CDOT ITS infrastructure units located throughout the study area.

CDOT Electric. CDOT electrical infrastructure is located in the study area, as shown in Figure 44. CDOT infrastructure that requires electric service lines include chain station lights, roadway lights, variable message boards, and signing.

Figure 44. CDOT utility infrastructure at eastbound I-70 west tunnel portal

Electric Transmission Lines. An Xcel Energy transmission line traverses through the study area. The transmission line consists of three overhead crossings of I-70 within the study area. Conflicts with the existing transmission line are not anticipated.

Electrical Service Lines. Xcel Energy has several electrical service lines in the study area. The known service lines are above-ground facilities. The majority of the above-ground facilities are not located adjacent to I-70, rather runs along the south side of old Route US 40 and the south side of the Frontage Road. Several overhead and underground electric service drops form the main overhead service line, as shown in Figure 45.

Figure 45. Overhead Xcel Energy electrical service lines with other utilities attached

Telephone Lines. CenturyLink has telephone lines in this area. Contacts to confirm the location have been unsuccessful to date. It is assumed that the telephone lines are located on the Xcel Energy overhead electrical service lines with associated drops at certain locations, as shown in Figure 45.

Cable Television Lines. Comcast has cable television infrastructure in this area. The facilities are located on the Xcel Energy overhead electrical service lines with associated drops at certain locations.

Sanitary Sewer. The City of Idaho Springs has a sewer line in the study area. The sewer line is located north of I-70 between exit 241A and the existing Clear Creek Bridge. The line then crosses underneath I-70 and runs south of Clear Creek to the city's water treatment plant located near the west portal of the Twin Tunnels.

Water Line. The City of Idaho Springs has a water line in the study area. The water line is located north of I-70 between exit 241A and the existing Clear Creek Bridge. The line then crosses underneath I-70 and runs south of Clear Creek to the city's water treatment plant located near the west portal of the Twin Tunnels.

Table 5. Utilities contact information

Name	Company/Agency	Address	Phone Number	E-mail Address
Dave Ruble, Utility Coordinator	CDOT Region 1 Utilities	18500 E. Colfax Aurora, CO 80111	303-365-7309	Dave.ruble@dot.state.co.us
Matt Rickard	CDOT Region 1, Electric	18500 E. Colfax Aurora, CO 80111	303-365-7313	Matt.rickard@dot.state.co.us
Rick Sembrat	CDOT Region 1, Intelligent Transportation Systems (ITS)	425 C. Corporate Circle Room 109 Golden, CO 80401	303-512-5804	Richard.sembrat@dot.state.co.us
Jonnie Worrell	Xcel Energy	4019 Evergreen Parkway P.O. Box 640 Evergreen, CO 80437	303-445-4504	Jonnie.worrell@xcelenergy.com
Sam Tooley	CenturyLink	591 Center Circle P.O. Box 739 Silverthorne, CO 80498	970-468-6860	Samuel.tooley@qwest.com

5.3. Conclusions

A complete impact evaluation has not been completed for this document. It is anticipated that several utilities will be required to be relocated throughout the project area. Initial relocation considerations should include several overhead electrical service lines, CDOT intelligent transportation system (ITS) infrastructure, and service drops for both electrical and telephone services. All utilities will receive further evaluation throughout the EA. Significant grade change areas and roadway widening areas will be of particular concern. As part of the future impact evaluation, utility conflicts will be identified and relocation recommendations will be made and discussed with CDOT and the affected utility companies.

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6. Existing bicycle and pedestrian facilities

An inventory of existing bicycle and pedestrian facilities was completed in September, 2011. This chapter summarizes the condition of the existing pedestrian and bicycle facilities within the Twin Tunnels study area between Idaho Springs (exit 241) to the west and US 6 exit to the east (exit 244). The inventory focused on the Frontage Road, as I-70 is a grade-separated facility where bicycles and pedestrians are prohibited and therefore not included in the analysis.

Bicycle and pedestrian access within the Twin Tunnels study area is important for recreational purposes. Under 23 United States Code §217(g), transportation plans must consider bicycle and pedestrian accommodations:

1. In General—bicyclists and pedestrians shall be given due consideration in the comprehensive transportation plans developed by each metropolitan planning organization and State in accordance with sections 134 and 135, respectively. Bicycle transportation facilities and pedestrian walkways shall be considered, where appropriate, in conjunction with all new construction and reconstruction of transportation facilities, except where bicycle and pedestrian use are not permitted.
2. Safety considerations—transportation plans and projects shall provide due consideration for safety and contiguous routes for bicyclists and pedestrians. Safety considerations shall include the installation, where appropriate, and maintenance of audible traffic signals and audible signs at street crossings.

Clear Creek County developed a Greenway Plan in November 2005 as a recommendation from the 2030 Clear Creek County Master Plan. The plan identifies features of the Greenway as a major recreational corridor linking communities with recreational opportunities along the creek. The proposed Greenway Plan for this section of Clear Creek County is shown in Figure 46 and Figure 47.

The Colorado Bicycle Map (published by CDOT) identifies I-70 as a limited access highway prohibited for cycling within the study area. The on ramps to I-70 also include bicycles prohibited signs to reinforce this. The Scott Lancaster Trail is in the study area and runs from exit 241 in Idaho Springs to US 6 to the east, as shown in Figure 46 and Figure 47. The Colorado Bicycle Map identifies US 6 as a highway with shoulders of less than 4 feet, indicating it is not a bicycle friendly route, but does not prohibit bicycles. Due to the recreational nature of the Scott Lancaster Trail and the fact that US 6 does not have shoulders wider than 4 feet, the Scott Lancaster Trail is advertised on the Clear Creek County bicycling map as an out and back route from Idaho Springs. The Greenway Plan, however, proposes new trails both east and west of the Scott Lancaster Trail that could increase the use of this trail.

The trail shares the alignment of the Frontage Road for a large portion of the study area, but in other areas is a separated multiuse path. The trail does not have a consistent surface or width throughout this area. The trail is mostly asphalt, with a section shared with the frontage road that has a gravel surface. The trail varies in width from 6 to 8 feet when not sharing the Frontage Road alignment.

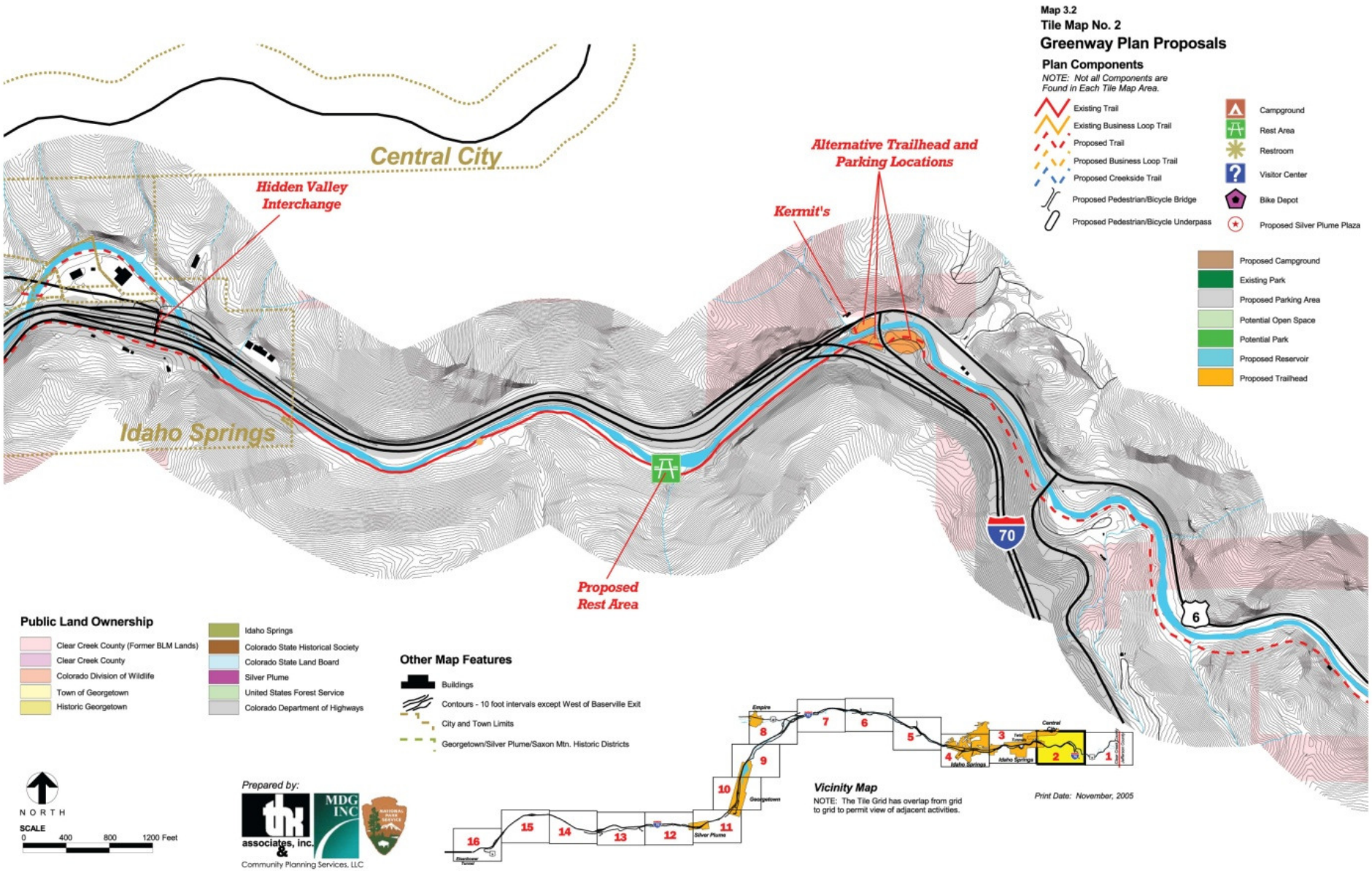

Figure 46. Greenway Plan map

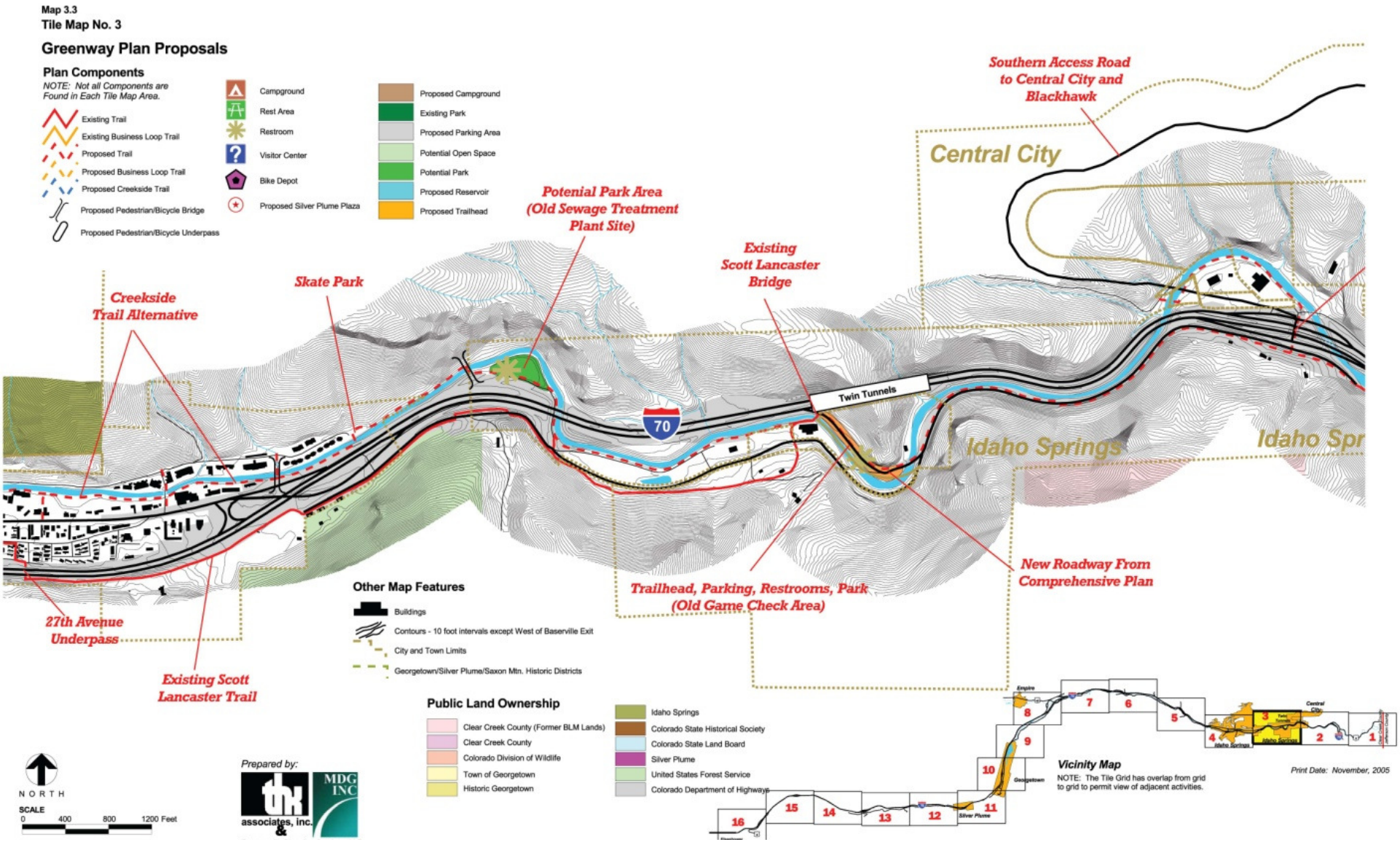

Figure 47. Greenway Plan map

The bikeway has signage alerting riders to the direction of the trail (see Figure 48). There are also pavement markings indicating the location of the bike path in some areas (see Figure 49).

Figure 48. Bikeway signage

Figure 49. Bicycle path pavement markings

The bikeway appears to be in need of maintenance in several locations including areas of overgrown foliage and cracking pavement (see Figure 50 and Figure 51).

Figure 50. Bikeway overgrown foliage

Figure 51. Bikeway cracked pavement

The Greenway Plan identified design criteria for trail facilities according to the *Manual on Uniform Traffic Control Devices* and AASHTO guidelines. These guidelines state that for an on-street bicycle route (share the road condition) the lane width of the road should be 12 feet minimum to accommodate both users. For a multi-use path condition, the trail should be 10 feet minimum with a 4-foot graded area on each side of the path. AASHTO recommends a minimum of eight feet vertical clearance, and 10 vertical feet between the trail surface and the bottom of a structure. If equestrian access is expected, however, 12 vertical feet is recommended, as shown in the Greenway Plan.

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