

Memo

Date: Wednesday, December 02, 2020

Project: US14A/US85 Deadwood Box Corridor Study

To: Study Advisory Team

From: HDR

Subject: Initial Concept Analysis – Preliminary Utility Coordination

Introduction

This memo was prepared to document existing utilities within the project area. The City of Deadwood's water and wastewater utilities were reviewed with the City to determine relative impacts of current roadway concepts and to identify any planned future improvements. Several private utilities (power, communication, and natural gas) are also located in the project area. The objective is to identify utilities within the project area, identify relevant facilities that are critical to daily utility operations and identify impacts to critical utilities associated with the current project concepts.

A meeting with the City of Deadwood's Public Works Director took place on November 18, 2020. Preliminary corridor concepts were presented and the corresponding impacts to the City's utilities were identified. A summary of the existing conditions and the impacts of each concept are provided. An existing box structure (Structure Number 41-161-156) is located under the current roadway for approximately 1,768 feet. The structure conveys Whitewood Creek through the project area and reconstruction concepts have varying degrees of impacts on existing utilities. The drainage structure varies in width from 36 to 43 feet and is 13.5 feet deep. Due to its size and proximity to existing utilities, concepts that involve relocation of the drainage structure have the largest impact on utility lines.

Existing Conditions

Subsurface utilities have been mapped with owner identification information. A utility map is provided in Appendix A.

Water Distribution System

The City's water distribution system crosses the existing US14A and drainage structure at three locations. Each crossing is accomplished by penetrating the box structure walls and crossing through the upper portion of the drainage channel. Two crossings, one at Pine Street and the other at Deadwood Street, are part of the City's high pressure distribution zone. The City indicated that one of these two high pressure mains is required to be in operation in order to convey water across the project area to existing customers located west of the project area. A third main crossing is located at Lee Street. The Lee Street crossing is a low pressure zone water main that is looped in this area. The Lee Street crossing can be temporarily taken out of service without significant impact to the water system. The City's preference is for the water

utility crossings to be reconstructed as they currently exist, which is to penetrate and pass through the box, rather than to be relocated around or under the structure.

Wastewater Collection System

The wastewater collection system parallels the existing highway in multiple locations. There is one crossing in the project area located at the northern end of the project near Railroad Ave. The collection system crossing conveys wastewater by gravity through the drainage structure. Continuous wastewater conveyance is required to prevent backups or disruption of service. Interruptions of sanitary sewer service will require bypass pumping or other means to continuously convey wastewater during construction related impacts to the existing system. The City's preference is for the wastewater utility crossing to be reconstructed as it currently exists, which is to penetrate and pass through the box.

Water and Wastewater Utility Maintenance History

The existing water and sanitary sewer lines that cross through the box structure have been in operation for many years without significant issues. The City indicated that cold weather does not impact the utility lines and high flows in the box structure have not impacted the pipelines.

Service Lines

Service lines are located throughout the project area to serve adjacent water and sanitary sewer customers. Service lines will need to be reconnected after any utility line replacement or relocation. Impacts to individual service lines is anticipated to be addressed in greater detail as concepts are refined.

A single water service line crosses the box structure to serve the property at 1 Railroad Street. No other service lines are known to cross through the box structure.

Private Utilities

The project corridor adjacent to the existing roadway and drainage structure is congested with several private utility lines. Buried and overhead lines exist adjacent to and crossing US14A. Private utility coordination meetings have not yet occurred and are anticipated to take place as concepts are narrowed down and refined. Private utility relocation is anticipated to be required prior to or during roadway reconstruction.

Future Improvements

Water Distribution System

A high pressure zone main dead-ends at the intersection of Sherman Street and US14A. To improve system efficiency, the high pressure main is planned to be extended north along the project corridor past the Deadwood Box outlet. From there the main would cross Whitewood Creek and connect to an existing high pressure water main located in Main Street.

The timing of the planned improvement was not identified. A water main corridor would need to be identified and reserved for the City.

Wastewater Collection System

No improvements are planned for the City's wastewater collection system.

Concept #1A

Concept #1A reconstructs the box structure and roadway in a similar location as existing. Impacts to existing utilities include addressing the three water main and one sewer main crossing. Utilities located adjacent and parallel to the box structure are assumed to remain in place as they would be outside of the excavation area required to reconstruct the box structure.



Figure 1 Concept #1A

Summary of significant impacts (with approximate length of impacts):

- Replace three water main crossings (150 feet)
- Replace one gravity sanitary sewer crossing (50 feet)
- Potential impacts to utilities located adjacent to the box structure (1,500 feet)

Impact to existing utilities relative to other concepts: Low

Concept #1B

Concept #1B reconstructs the roadway in a similar location as existing. The box would be reconstructed in its existing location on the southern end of the project and would be reconstructed in a new alignment on the northern end of the project. Realigning the box structure in this concept would impact existing utilities located adjacent to the east side of the existing structure (approximately 700 feet). Utility relocation would be required to clear the corridor required for the revised box structure alignment. Where the box structure is being realigned, the abandoned box structure area would be filled and could be utilized as a corridor for utility relocation.



Figure 2 Concept #1B

Summary of significant impacts (with approximate length of impacts):

- All underground utilities located north of Sherman Street and east of the existing box structure are impacted by the new box structure alignment (700 feet)
 - Impacts to water, sanitary sewer, power, and communication in this area.
- Replace three water main crossings (150 feet)
- Replace one gravity sanitary sewer crossing (50 feet)
- Potential impacts to utilities located adjacent and west of the box structure (800 feet)

Impact to existing utilities relative to other concepts: Medium

Concept #1C

Concept #1C reconstructs the box structure in its existing location. The roadway would be reconstructed in its current location on the south end of the project and would be realigned toward the east on the north end of the project. Moving the roadway would impact underground utilities but less extensively than concept #1B, where excavation for the box structure would require relocation. In concept #1C, the existing utilities may be able to remain in their existing location with some modifications to account for the new roadway alignment. Modifications would include adjustment of sanitary manholes and water system valves and hydrants.



Figure 3 Concept #1C

Summary of significant impacts (with approximate length of impacts):

- Replace three water main crossings (150 feet)
- Replace one gravity sanitary sewer crossing (50 feet)
- Likely modifications to existing utilities located in revised roadway alignment (700 feet)
 - Existing utilities include water, sanitary sewer, power, and communication
- Potential impacts to utilities located adjacent to the box structure (1,500 feet)

Impact to existing utilities relative to other concepts: Low

Concept #1D

Concept #1D is a hybrid of concepts #1B and #1C. Concept #1D would reconstruct the roadway and box structure in their existing locations at the southern end of the project area. Both the roadway and box structure would be realigned at the northern end of the project. The utility impacts are similar to concept #1B, the existing utilities located in the conceptual box structure corridor would require relocation.



Figure 4 Concept #1D

Summary of significant impacts (with approximate length of impacts):

- All underground utilities located north of Sherman Street and east of the existing box structure are impacted by the new box structure alignment (700 feet)
 - Impacts to water, sanitary sewer, power, and communication in this area.
- Replace three water main crossings (150 feet)
- Replace one gravity sanitary sewer crossing (50 feet)
- Potential impacts to utilities located adjacent and west of the existing box structure (800 feet)

Impact to existing utilities relative to other concepts: Medium

Concept #2A

Concept #2A would reconstruct the box structure in its existing location. The roadway would be realigned to make US 85 (Sherman Street) the through movement. Consistent with Concept #1 variations, Concept #2A has the least utility impacts due to the box structure being reconstructed in its current alignment. Some additional impacts are anticipated to the new through movement corridor but those would likely be limited to surface features such as fire hydrants, valve boxes, and manhole castings.



Figure 5 Concept #2A

Summary of significant impacts (with approximate length of impacts):

- Replace three water main crossings (150 feet)
- Replace one gravity sanitary sewer crossing (50 feet)
- Potential impacts to utilities located adjacent to the box structure (1,500 feet)
- Likely impacts to surface features along Sherman Street and Pine Street (1,400 feet)

Impact to existing utilities relative to other concepts: Low

Concept #2B

Concept #2B is similar to Concept #2A except the roadway would be realigned to the east of its existing alignment. The realignment would allow parking to be located on the west, adjacent to points of destination. The box structure would be reconstructed in its existing location. Concept #2B has similar utility impacts as other concepts that replace the box structure in its current location. Some additional impacts are anticipated to the new through movement corridor but those would likely be limited to surface features such as fire hydrants, valve boxes, and manhole castings.



Figure 6 Concept #2B

Summary of significant impacts (with approximate length of impacts):

- Replace three water main crossings (150 feet)
- Replace one gravity sanitary sewer crossing (50 feet)
- Potential impacts to utilities located adjacent to the box structure (1,500 feet)
- Likely impacts to surface features along Sherman Street, Pine Street, and existing US14A (2,300 feet)

Impact to existing utilities relative to other concepts: Medium Low

Concept #2C

Concept #2C would realign the roadway to make US 85 the through movement. Rather than reconstructing the box structure in its current location, it would be partially reconstructed on a new alignment. Similar to Concepts #1B and #1D the box structure would deviate from its current alignment at the northern end of the project, past the existing Sherman Street intersection.



Figure 7 Concept #2C

Summary of significant impacts (with approximate length of impacts):

- All underground utilities located north of Sherman Street and east of the existing box structure are impacted by the new box structure alignment (700 feet)
- Replace three water main crossings (150 feet)
- Replace one gravity sanitary sewer crossing (50 feet)
- Likely impacts to surface features along Sherman Street, Pine Street, and existing US14A (2,300 feet)
- Potential impacts to utilities located adjacent and west of the existing box structure (800 feet)

Impact to existing utilities relative to other concepts: Medium High

Concept #2D

Concept #2D would, similar to all Concept #2 iterations, realign the roadway to make US 85 the through movement. This concept realigns US 85 to the east and avoids utilizing Sherman Street as the through corridor. The box structure would be reconstructed in its current location, utility impacts along the box structure are similar to other concepts that utilize the existing box structure alignment. Realigning US 85 to the south would impact the Miller Street parking area and continue south until the highway rejoins its current alignment. Subsurface utility location was not completed for the southern portion of this concept and potential impacts were not discussed in detail. If Concept #2D moves forward, additional utility location and conflict identification are anticipated to occur.



Figure 8 Concept #2D

Summary of significant impacts (with approximate length of impacts):

- Replace three water main crossings (150 feet)
- Replace one gravity sanitary sewer crossing (50 feet)
- Impacts to utilities along Sherman Street, Pine Street, and existing US14A (2,300 feet)
- Potential impacts to utilities located adjacent and west of the existing box structure (800 feet)
- Unidentified impacts beyond the current extend of utility mapping.

Impact to existing utilities relative to other concepts: Medium High

Concept #3A

Concept #3A would elevate the roadway and revise impacted local streets. The box structure would be reconstructed in its current alignment. Utility impacts associated with the box structure would be consistent with other concepts that retain the box structure alignment. Additional impacts are anticipated due to grade changes and potential impacts with the elevated roadway foundations.



Figure 9 Concept #3A

Summary of significant impacts (with approximate length of impacts):

- Replace three water main crossings (150 feet)
- Replace one gravity sanitary sewer crossing (50 feet)
- Potential impacts to utilities located adjacent to the box structure (1,500 feet)
- Likely impacts at Sherman Street, Deadwood Street, and at the new overpass (1,400 feet)
- Likely impacts to utilities where grade changes and elevated roadway foundations would be required (currently unidentified)

Impact to existing utilities relative to other concepts: Medium High

Concept #4A

Concept #4A involves two tunnels through the hillsides and elimination of the current US14A between Upper Main Street to Sherman Street intersection. The box structure would be revised to a paved open channel structure where the roadway is removed. To the north, parking is proposed in place of the old roadway. In this area the box structure would be reconstructed in its current alignment.



Figure 10 Concept #4A

Summary of significant impacts (with approximate length of impacts):

- Replace three water main crossings, new crossings would be exposed or relocated under the new open channel (150 feet)
- Replace one gravity sanitary sewer crossing (50 feet)
- Potential impacts to utilities located adjacent to the box structure (1,500 feet)
- Likely impacts at the intersection with US 85, additional investigation required if the concept moves forward

Impact to existing utilities relative to other concepts: Medium

Concept #5A

Concept #5A would relocate US14A onto an existing local street corridor. The existing box structure would be replaced with an open channel south of Deadwood Street to the termination point of the existing box structure. This concept has the most impacts to utilities and was only reviewed briefly due its conceptual nature. If Concept #5A moves forward, additional utility mapping and conflict identification is required.



Figure 11 Concept #5A

Due to the large extent of the conceptual impacts, individual utility impacts were not identified.

Impact to existing utilities relative to other concepts: High

Private Utility Impacts

In addition to the City of Deadwood’s publicly owned utilities, there are several privately owned utility lines in the project area. Other known utility owners in the project area include:

- Lead-Deadwood Sanitary District
- CenturyLink
- SDN
- Vast
- Midco
- Montana Dakota Utilities (MDU)
- Black Hills Energy

Individual meetings with private utility owners are anticipated to occur as concepts are refined. A cursory review of the private utility locations indicates that there are varying impacts to each of the utilities.

Summary of Relative Impacts

Each of the concepts was given a relative rating of impacts to existing utilities using a range of Low-Medium-High. A summary is provided in Table 1.



Table 1 Relative Impact to Existing Utilities by Concept

Concept Name	Relative Impact to Existing Utilities
1A	Low
1B	Medium
1C	Low
1D	Medium
2A	Low
2B	Medium Low
2C	Medium High
2D	Medium High
3A	Medium High
4A	Medium
5A	High



Appendix A – Existing Utility Map

