Report On The Archeological Survey For The City Of Coleman's Proposed New Waterline, Coleman County, Texas

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REPORT ON THE ARCHEOLOGICAL SURVEY FOR THE CITY OF COLEMAN’S PROPOSED NEW WATERLINE, COLEMAN COUNTY, TEXAS

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Written by:
Will Pratt and Josh Haefner

Submitted to:
The City of Coleman
and
Howco Services Inc.

Antiquities Permit #7704
Hicks & Company Archeology Series #281

July 2016
Abstract

ABSTRACT

In July of 2016, Hicks & Company completed an archeological areal survey for the city of Coleman’s Proposed New Waterline Project located in Coleman County, Texas. The survey was completed for the city of Coleman under Texas Antiquities Permit #7704 with investigators surveying a total of 31 acres. The project will be funded through a Community Block Grant Program, as managed by the Texas Department of Agriculture, a political entity of the state of Texas, and is therefore subject to the Antiquities Code of Texas (ACT). The archeological investigations consisted of pedestrian survey supplemented by shovel testing \( n = 6 \) along with backhoe trenching \( n = 12 \). No cultural materials were encountered and no archeological sites were recorded during the course of the survey. Based on the results of the survey, regulatory clearance for the project is recommended to proceed with no further cultural resource coordination necessary. This report is offered in partial fulfillment of the requirements for ACT Permit #7704. All project-related materials will be curated at the Center for Archaeological Studies (CAS) in San Marcos, Texas.
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PROJECT DESCRIPTION AND MANAGEMENT SUMMARY

On July 12, 2016, Hicks & Company conducted an archeological survey of the city of Coleman’s (the City’s) proposed New Waterline Project to be located in Coleman County, Texas (see Figure 1). The proposed project is to include the installation of 9,000 linear feet of eight-inch new water line, boring hydrants, service reconnections and associated appurtenances. Directional boring will be utilized in crossing Hords Creek and an unnamed tributary located to the south of Hords Creek. Anticipated depths of impacts are approximately four feet below the surface through the majority of the project area, though directional boring will extend 15 to 30 feet in depth (see Appendix A: Design Plans). As the City will receive funding through the Texas Department of Agriculture, an entity of the state of Texas, Hicks & Company was contracted to conduct Antiquities Code of Texas Coordination (ACT) with the Texas Historical Commission (THC). Additionally, the project involves a United States Army Corps of Engineers under the jurisdiction of Section 404 of the Clean Water Act, requiring coordination under Section 106 of the National Historic Preservation Act of 1966, as amended. All work was coordinated with the THC and performed under Texas Antiquities Permit #7704.

This project was initially reviewed by the Texas Historical Commission (THC) in 2016. Following there review, the THC noted that archeological survey was warranted within 100 meters of streams and tributaries located within the APE, an area equating to approximately 31 acres in size, supplemented by shovel testing and backhoe trenching where deeply buried cultural resources may be located.

Josh Haefner, the Principal Investigator for the project, conducted the survey with Will Pratt, the Project Archeologist. Greg Cestaro served as crew chief. Will Pratt and Josh Haefner authored the report. A total of 36 field hours were spent on the archeological investigations. Jerod McClelland conducted Geographic Information Systems (GIS) processing and map production, and Anna Holley aided in report formatting and production. As no artifacts were collected during survey, all project-related documents, forms, and photographs will be permanently curated at the Center for Archeological Studies (CAS) in San Marcos, Texas. This report serves as partial fulfillment of the requirements of Antiquities Permit #7704.
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Figure 1
Project Location
City of Coleman
Archeological Survey

USGS 7.5-minute Topographic Quadrangle: Coleman (USGS# 31099-G4), TX
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ENVIRONMENTAL SETTING

PHYSIOGRAPHY

According to the Bureau of Economic Geology (1996), the project area is located within the North-Central Plains physiographic province of Texas. The North-Central Plains is an Upper Paleozoic erosional surface with rivers that meander through local prairies where shale bedrock prevails. Hills and rolling plains characterize the landscape in places where hard bedrock is dominant. Limestone and sandstone is found capping the steep, severely dissected slopes near rivers. The live oaks and ashe junipers transition into mesquite lotebush brush from east to west.

GEOLOGY AND SOILS

According to the Geologic Atlas of Texas (2016) the underlying geology of the proposed project area consists of Admiral Formation Restricted (Pad), Alluvium (Qal), and Fluviatile Terrace Deposits (Qt) (Figure 2). The Admiral Formation Restricted is a Permian-age formation consisting of limestone, shale, and sandstone. Alluvium in this area is a 35-foot-thick, relatively recent Holocene-age floodplain deposits found in low terraces. Fluviatile terrace deposits are Pleistocene-age gravel, sand, silt, and clay terraces.

Soils mapped for the project area include: Frio clay loam; Nuvalde clay loam, 1 to 3 percent slopes; Sagerton clay loam, 1 to 3 percent slopes; Rowena clay loam, 0 to 1 percent slopes; and Rowena clay loam, 1 to 3 percent slopes (Figure 2). Frio series soils are very deep, well drained, moderately permeable soils that formed in loamy, calcareous alluvial sediments located on nearly level to gently sloping flood plain. Nuvalde series soils, located on gently sloping stream terraces and alluvial fans, are very deep, well drained, moderately permeable soils that form in limy alluvium. Found on treads of terraces on dissected alluvial plains, Sagerton series soils are nearly sloping to gently sloping, very deep, well drained, moderately slowly permeable soils. Rowena series soils are very deep, well drained, moderately slowly permeable soils formed from calcareous loamy and clayey alluvium. This soil series is located on nearly level to gently sloping dissected plains (USDA NRCS 2015). The Frio series is noted as having a very high chance of containing intact cultural deposits at depths both above and below one meter from the ground surface (Abbott 2013).
Figure 2
Project Area Geology & Soils
City of Coleman
Archeological Survey

Project Area Soils
- Fo - Frio clay loam
- NuB - Nuvia clay loam, 1 to 3 percent slopes
- OcB - Sagerton clay loam, 1 to 3 percent slopes
- RwA - Rowena clay loam, 0 to 1 percent slopes
- RwB - Rowena clay loam, 1 to 3 percent slopes

Key to Features
- Geologic Formations
- Project Area
- Soil Type Boundaries
- Backhoe Trench Areas
- Survey Areas
- Streams / Creeks

One inch equals 250 m
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CULTURAL BACKGROUND

ARCHEOLOGICAL BACKGROUND

The project area is located within the Central Texas Archeological Region. Most of the recent chronologies for Central Texas are based on six distinct time periods, roughly representing a 12,000-year sequence of occupation. A synthesis of the culture-historical sequences provided by Collins (2004) and Johnson (1995) is as follows: Paleoindian (prior to 8800 BP), Early Archaic (8800–5800 BP), Middle Archaic (5800–4000 BP), Late Archaic (4000–1400 BP), Post-Archaic or Late Prehistoric (AD 600–1600), and Historic (AD 1600 to present). Although these divisions represent convenient temporal categories, they are also based in large part on perceived adaptations in subsistence and are reflected in changes in lithic and other technologies.

Paleoindian (prior to 8800 BP)

The Early Paleoindian culture in South and Central Texas is believed to be related to the well-known big game hunting tradition of the Great Plains (Hester 1980). Most of the well-documented Early Paleoindian sites in Texas that are associated with extinct megafauna are located north and west of Central Texas on the Llano Estacado and adjacent areas of the Southern High Plains. In general, Early Paleoindian sites are scarce in Central Texas, or at least less visible than later sites. Conversely, later Paleoindian sites are much more numerous in South and Central Texas, although both are usually identified from only surface-collected artifacts (Black and McGraw 1985). Subsistence data from several Late Paleoindian sites does suggest, however, that small game was exploited in addition to extinct megafauna. This data supports the idea that a hunting and gathering lifestyle may have already been adopted across much of Central Texas prior to the Early Archaic period.

Paleoindian occupations in Central Texas have typically been associated with lanceolate projectile points such as Clovis, Folsom, Plainview, Golondrina, and Meserve and stemmed points such as Scottsbluff (Turner and Hester 1993). Recent investigations at the Wilson Leonard Site (41WM235) (Collins 2004) equate three styles of projectiles, Golondrina/Barber, St. Mary’s Hall and Wilson, to the Late Paleoindian period. The Wilson component is dated at 10,000 to 9650 BP and is associated with features, artifacts, and a burial that are more Archaic-like in nature than Paleoindian (Collins 2004). The data from this site further suggests that the Archaic nature of the adaptation continues during the ensuing Golondrina/Barber and St. Mary’s Hall components. These are dated between 9500 and 8800 BP and may represent a transitional period between the Paleoindian and the Archaic.
Early Archaic (ca. 8800–5800 BP)

The Early Archaic period is subdivided into three projectile point style intervals: Angostura, Early Split Stem and Martindale/Uvalde, from 8800–6000 BP (Collins 2004). Generally, the shift from Paleoindian to Archaic subsistence strategies is measured by a change in technology focused on the use of burned rocks to process geophyte plant foods. This shift is traced back as early as 8800 BP at the Wilson-Leonard Site and at roughly comparable ages at several other Central Texas sites (Decker et al. 1999; Thoms et al. 1996). At these sites, evidence for the use of earth ovens and burned rock technologies for processing plant foods is associated with lanceolate Angostura projectile points. Hence, the use of Angostura and Late Paleoindian lithic technologies may have continued into the Early Archaic period for a time but was gradually replaced by the bifurcate base split-stem and Martindale/Uvalde styles.

The Early Archaic period marks a shift to the use of burned limestone and other rocks in the form of scatters, hearths, middens and other features for the heated processing of plant foods. This represents the start of a long-lived Archaic cooking tradition, lasting from roughly 8800 to 1400 BP. This tradition was characterized by the repeated utilization of earth ovens and the resulting creation of burned rock middens at strategic places on the landscape. These new subsistence practices began with a distinctive cooking technology using layered arrangements of heated rocks in earth ovens, allowing for exploitation of a broad range of geophytes. These included upland xerophytic plants like sotol (Dasylirion wheeleri) and other species such as Lily family (Liliaceae) onion bulbs, which grow in wetter environments (Decker et al. 1999).

Some of the most recent climatic reconstructions for the period posit a moist and cool Late Pleistocene environment with early to mid-Holocene shifts to drier conditions that became most pronounced during the mid-Holocene (ca. 5000–7000 BP, Ricklis and Collins 1994). In contrast, Johnson (1995) suggests that the relatively mesic conditions of the eastern Edwards Plateau during the Pleistocene and early Holocene/Paleoindian period underwent a brief dry interval during Late Paleoindian times, later returning to more mesic conditions during the ensuing Early Archaic period (roughly 8000–5800 BP). Whether the Early Archaic climate reflects a gradual drying period (Ricklis and Collins 1994) or a more mesic interval within an overall, long-lived trend toward aridity along the eastern Edwards Plateau, it appears that the use of burned rock midden technologies for plant food and other types of subsistence related processing began during this period and continued for many thousands of years.

Overall, the bulk of the Central Texas archeological literature suggests that the Early Archaic occupations were generally small, widely distributed, and non-specialized (Black and McGraw 1985). Explanations for these characteristics support a generalized hunting-gathering strategy involving relatively high group mobility, poorly defined territories, and short-term occupations. Broad spectrum, well-adapted, highly mobile subsistence strategies are theorized.
**Middle Archaic (ca. 5800–4000 BP)**

The Middle Archaic marks an intensification of the use of burned rock technologies to process plants and other types of foods within an increasingly arid environment. Ricklis and Collins (1994) recognize a pronounced mid-Holocene drying event from 7000–5000 BP, though it may have lasted longer. Johnson (1995) posits the occurrence of a dry Edwards Interval along the eastern Edwards Plateau from roughly 5500–1400 BP. Evidence for this is seen in the cessation of significant overbank sediment aggradation at a number of Central Texas sites. Instead of deposition, arid conditions catalyzed extensive downcutting and erosion along many Central Texas streams. Hypothetically, dry conditions would have promoted the spread of desert succulent xerophytic plants and fostered the increased use of burned rock middens. Drier conditions may also have engendered the return of the American bison (*Bison bison*) to the plateau during the Middle and Late Archaic periods. Furthermore, the proliferation of Bell/Andice/Calf Creek projectile point styles at the beginning of the Middle Archaic may have coincided with the return of bison to the Edwards Plateau and the adjacent Blackland Prairie; these broad bladed points have been associated with the exploitation of bison within archaeological literature. Additional Middle Archaic projectile point styles include Early Triangular, La Jita, Nolan, and Travis.

**Late Archaic (ca. 4000–1400 BP)**

Recent refinements in the Central Texas chronology divide the Late Archaic interval into two different subperiods (Johnson 1995). Late Archaic Subperiod I is marked by the appearance of Bulverde projectile points, which along with later forms (Pedernales, Castroville, Marshall and Montell) were used to hunt bison and other large game. Burned rock middens continued to proliferate during the Late Archaic I interval. The resources processed via burned rock technology may have included species of yucca (*Yucca* spp.), sotol, and perhaps *Agave lechuguilla*. Other middens may simply be dumps for kitchen-type debris, which contain sizeable quantities of animal bones, broken stone tools, and flint-knapping detritus (Johnson 1995). Pedernales peoples in particular may have been adept at both hunting and the processing of large volumes of plant food materials.

The Late Archaic II interval (ca. 600 BC-AD 600) may have been a time of increasingly mesic conditions for all but the western and southwestern portions of the Edwards Plateau (Johnson 1995). The onset of more mesic conditions may have resulted in decreased numbers of upland xerophytic plants and perhaps bison (Johnson 1995), which may have forced adjustments in prehistoric subsistence strategies. There appears to be a decrease in the number of burned rock middens that can be directly attributable to the Late Archaic II interval. The projectile points used at this time are smaller and are characterized by such styles as Ensor, Fairland, Frio and Darl. Evidence suggests the large projectiles well-adapted to bison hunting may have been
gradually replaced. Also, it has been posited that the spread of Eastern Woodland religious cults may have had an influence on the Late Archaic II peoples of Central Texas (Johnson 1995).

**Late Prehistoric (ca. AD 600–1600)**

The Late Prehistoric or Post-Archaic (ca. AD 600–1600) (Johnson 1995) in Central Texas is initially marked by the replacement of the dart and atlatl with the bow and arrow, as reflected in the shift from dart points to smaller, thinner and lighter arrow points (Ricklis and Collins 1994). Despite the shift to the bow and arrow, there is strong indication that the broad based hunting-gathering economy of the Late Archaic persisted into and throughout most of the Late Prehistoric period in Central Texas. The latter part of this period is marked by the appearance of pottery and a distinctive complex of tools composed of contracting-stem Perdiz arrow points, an abundance of unifacial end scrapers, thin, alternately beveled bifacial knives, and drills or perforators made of flakes and blades. The Post-Archaic era again turned dry and somewhat arid toward the middle of the Late Prehistoric, during which a dramatic increase in bison exploitation suggests it became an increasingly important economic activity during the later part of this period.

**Historic Period (AD 1528–Present)**

The most radical changes in the Native American history of Central Texas came during the historic era (Black 1989). The historic period in Texas begins with the arrival of Alvar Nunez Cabeza de Vaca and other survivors of the Navarez expedition on the Texas coast in 1528. The influences of European colonization were not felt strongly in Texas until several centuries later. By the middle of the eighteenth century, though, the Spanish had established missions in East Texas and settlements in South Texas. This resulted in massive depopulation and cultural disintegration among Native American groups.

The horse was introduced into North America by Spanish settlers in the sixteenth century; nomadic groups, initially the Apaches and later the Comanches adopted the horse and rapidly altered the aboriginal situation of Central Texas. These nomadic groups entered Central Texas from the plains and mountains to the north and west and within 150 years had forced most of the native peoples to flee. Most groups were destroyed by the combined effects of the nomadic raiders and the foreign diseases introduced by Europeans. Others moved south, entering Spanish missions and settlements, or eastward to join various agricultural groups such as the Wichita (Black 1989).

The city of Coleman traces its history to 1876 when R.J. Clow donated 160 acres along Hords Creek for the creation of a new county seat. The town was named after Coleman County which was named for Robert M. Coleman, Sam Houston’s aide during the Texas Revolution (Hunt 2010). The site of the city of Coleman was chosen in a location which showed no evidence of previous human habitation (City of Coleman 2016). The city became a popular location for cattlemen and trail drivers. In 1886, a spurline of the Santa Fe railroad was built to connect the
town to the main line. By 1900, cotton farming had become the dominant trade in the city. The city eventually became a meat and wool processing center as well as a manufacturing center for the production of clay and brick tiles, clothing, and leather (Hunt 2010).
PREVIOUS INVESTIGATIONS

According to the THC’s Online Site Atlas (the Atlas), accessed on July 17, 2016, one previously conducted archaeological survey is recorded within one kilometer of the proposed project area (Figure 3). This survey was conducted by the State Department of Highways and Public Transportation (now the Texas Department of Transportation) in 1987 (THC 2016). No archeological sites or cemeteries are documented as being located within one kilometer of the project area.
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Key to Features
- Archeological Surveys (linear)
- Streams / Creeks (NHD)
- Project Area
- Backhoe Trench Areas
- Survey Areas
- Archeological Surveys (poly)

Figure 3
Cultural Resources and Previous Investigations
City of Coleman Archeological Survey

One inch equals 500 m
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METHODOLOGY

Hicks & Company archeologists conducted the archeological survey of a 31-acre tract for the proposed City of Coleman’s New Waterline exceeding the minimum standards established by the THC for areal projects measuring 11 to 100 acres in size (at a rate of one sub-surface tests per two acres), excavating a total of six shovel tests and twelve backhoe trenches. The majority of the shovel tests were excavated to approximately 40 centimeters below existing ground surface terminating at thick Bt horizons (cmbs). Backhoe trenches were excavated to a depth of approximately two meters below the existing ground surface, 80 centimeters below the typical anticipated depth of impacts of 120 centimeters for most of the proposed improvements. All sediment removed from shovel tests was screened through quarter-inch hardware mesh or hand-sorted when dry clay content prevented efficient screening. Backhoe trenching and backdirt was monitored during the course of excavations. All relevant shovel test and backhoe trench information was recorded on standardized forms. Locations were recorded with GPS technology. Photographs were taken to document the project area conditions and to aid in reporting.
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RESULTS OF FIELD INVESTIGATIONS

Hicks & Company archeologists surveyed the entirety of the 31 acre high potential segments of the project. Survey and testing was concentrated along the eastern portion as the City informed survey crews that they intended to install the waterline along the eastern boundary of the project area. During survey it was noted that the project area is bounded on the west by a tributary of Hords Creek. The project area overlies Hords Creek and three associated tributaries. Topography within the project area is generally flat, with slopes ranging from steep to moderately sloping along Hords Creek and its associated tributaries.

During survey, ground visibility was noted as variable, ranging from 5-70 percent. All shovel tests and backhoe trenches conducted during the investigation were negative for cultural materials. A total of six shovel tests were excavated within the project area in a location mapped as overlying Frio series soils which the backhoe was unable to access due to fencing constraints. Generally, shovel tests contained sandy clays and terminated at depths from 40-85 cmbs within dense clays. Observed Munsell values were generally consistent with the Frio soil series mapped for this area (USDA NRCS 2016b). Small-sized limestone gravel inclusions were noted within four of the shovel tests (see Appendix B for Shovel Test and Backhoe Trench Locations and Appendix C for Shovel Test Data).

BACKHOE TRENCH EXCAVATIONS

Twelve backhoe trenches were excavated in various locations throughout areas mapped as overlying and adjacent to Frio series soils (see Appendix B: Shovel Test and Backhoe Trench Locations). Trench 1, 2, and 4 through 12 were oriented east to west and Trench 3 was oriented north to south. No cultural materials were encountered during the course of the backhoe trench excavations.

Backhoe Trench 1

Backhoe Trench 1 (BHT01) was excavated on the north bank of Hords Creek near the eastern extent of the project area to a depth of 163 centimeters below the surface (cmbs). Three distinct strata were documented within this trench. Stratum 1 extended to a depth of 43 cmbs and was noted as a dark red (2.5YR3/6) silty sand which terminated in a wavy but distinct boundary. Stratum 2 was composed of red (2.5YR4/8) clay and terminated at a depth of approximately 113 cmbs in a wavy and diffuse boundary. Stratum 3 was characterized by a pink (2.5YR8/4) clay mottled with pink (10R8/4) clay with caliche inclusions.
Backhoe Trench 2

Backhoe Trench 2 (BHT02) was oriented east to west and excavated to a depth of 153 cmbs on the north bank of Hords Creek approximately 25 meters west of BHT01. Three distinct strata were recorded within BHT2. Stratum 1 within this trench was documented as a weak red (10YR4/3) silty sand which terminated in a wavy but distinct boundary at 33 cmbs. Stratum 2 noted to be a yellowish red (5YR4/6) sandy clay which terminated in a wavy and diffuse boundary at 120 cmbs. Stratum 3 was a strong brown (7.5YR4/6) clay.

Backhoe Trench 3

Backhoe Trench 3 (BHT03) was excavated 30 meters west of BHT02 to a depth of 193 cmbs and oriented north to south. Three distinct strata were identified within BHT03. Stratum 1 within this trench was documented as a weak red (10YR4/3) silty sand which terminated in a wavy but distinct boundary at approximately 30 cmbs. Stratum 2 was noted to be a yellowish red (5YR4/6) sandy clay which terminated in a wavy and diffuse boundary at approximately 120 cmbs. Stratum 3 was recorded as a strong brown (7.5YR4/6) clay.

Backhoe Trench 4

Backhoe Trench 4 (BHT04), oriented east to west, was excavated near the northern limits of the project area to a depth of 183 cmbs. Two distinct strata were documented within BHT 4 (Figure 4). Stratum 1 was noted to be a very dark gray (7.5YR3/1) clay loam which terminated in a slightly wavy and distinct boundary at 88 cmbs. Stratum 2 was noted to be reddish yellow sandy clay with limestone gravel inclusions.

Figure 4: BHT04 south wall profile.
Backhoe Trench 5

Backhoe Trench 5 (BHT05) was excavated approximately 50 meters south of BHT04 and oriented east to west. This trench, containing two distinct strata, was excavated to a depth of 210 cmbs. Stratum 1 was recorded as a very dark gray (7.5YR3/1) clay loam which terminated in a slightly wavy and distinct boundary at approximately 80 cmbs. Stratum 2 was noted to be a reddish yellow sandy clay with very few limestone gravel inclusions.

Backhoe Trench 6

Located approximately 75 meters south of Hords Creek near the eastern limits of the project area, Backhoe Trench 6 (BHT06) was oriented east to west and excavated to a depth of 182 cmbs. Within this trench, three distinct strata were identified. Stratum 1 was noted to be a dark brown (7.5YR3/2) sandy loam with a diffuse boundary which transitioned gradually into Stratum 2 at approximately 47 cmbs. Stratum 2 was a brown (7.5YR4/3) sandy loam with few limestone pebble inclusions. This stratum transitioned gradually into Stratum 3 at approximately 145 cmbs. Stratum 3 was documented as a brown (10YR4/3) sandy loam with sparse limestone gravel inclusions.

Backhoe Trench 7

Backhoe Trench 7 (BHT07), located north of a tributary of Hords Creek, was oriented east to west and excavated to a depth of 195 cmbs. Only a single stratum was documented within this trench. Stratum 1 was documented as a yellowish brown (10YR5/4) silty sand with tiny specs of silty white marl inclusions which increased in density with depth.

Backhoe Trench 8

Backhoe Trench 8 (BHT08) was excavated across the tributary 90 meters south of BHT07. This trench was oriented east to west and excavated to a depth of 210 cmbs. Three distinct strata were documented within this trench (Figure 5). Stratum 1 was noted to be a yellowish brown (10YR5/4) silty sand with very sparse, white marl inclusions which terminated in a distinct linear boundary at 145 cmbs. Stratum 2 was a thin band of light yellowish brown (10YR6/4) clayey sand with dense limestone gravel inclusions which terminated in a distinct linear boundary at 160 cmbs. Stratum 3 was documented as being similar in texture and color to Stratum 1.
Backhoe Trench 9

Backhoe Trench 9 (BHT09) was excavated to a depth of 215 cmbs approximately 75 meters southwest of BHT08 in an east to west orientation. Three distinct strata similar to those observed in BHT08 were documented within this trench. Stratum 1 was identified as a yellowish brown (10YR5/4) silty sand with very sparse, white marl inclusions which terminated in a distinct linear boundary at 195 cmbs. Stratum 2 was a thin band of light yellowish brown (10YR6/4) clayey sand with dense limestone gravel and cobble inclusions which terminated in a distinct linear boundary at 210 cmbs. Stratum 3 was noted to be a yellowish brown (10YR5/4) silty sand with very sparse, white marl inclusions similar to Stratum 1.

Backhoe Trench 10

Located on the north bank of the southernmost tributary within the project area, Backhoe Trench 10 (BHT10) was oriented east to west and excavated to a depth of 230 cmbs. Two distinct strata were documented within this trench. Stratum 1 was noted to be a dark brown (7.5YR3/2) silty sand which terminated in an indistinct, wavy boundary at 43 cmbs. Stratum 2 was documented as a dark yellowish brown (10YR4.5/4) sandy clay with clay content increasing in density with depth.
Backhoe Trench 11

Backhoe Trench 11 (BHT11), located near the southeastern boundary of the project area, was oriented east to west and excavated to a depth of 210 cmbs. Two distinct strata were identified within this trench. Stratum 1 was a yellowish brown (10YR5/4) silty sand with clay inclusions which increased in density with depth. This stratum terminated in a distinct, wavy boundary at 176 cmbs. Stratum 2 was noted to be a light yellowish brown (10YR6/4) sand with a bit of clay and limestone cobble inclusions.

Backhoe Trench 12

Backhoe Trench 12 was excavated to a depth of 200 cmbs near the southwestern limits of the project area in an east to west orientation. A single stratum was documented within this backhoe trench. Stratum 1 was noted to be a strong brown (7.5YR5/6) silty sand with a bit of clay and numerous gravel-sized chalk inclusions.
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CONCLUSIONS AND RECOMMENDATIONS

On July 12, 2016, Hicks & Company archeologists conducted an intensive pedestrian survey of a 31-acre project area to be utilized for construction of the New Waterline Project by the city of Coleman. A total of six shovel tests were conducted within the project area, all of which were negative for cultural material. Twelve backhoe trenches which were excavated within the project area all of which were negative for cultural material. No artifacts or archeological sites were recorded during the course of the survey. Therefore, the project is recommended to proceed to construction with no further coordination required for compliance with the ACT. In the unlikely event that archeological resources are identified during the course of construction, all work in the immediate vicinity should cease until the THC is notified and appropriate actions are determined. Hicks & Company offers this report in partial fulfillment of Antiquities Permit #7704. All project-related materials will be permanently curated at CAS in San Marcos, Texas.
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Turner, E.S. and T.R. Hester


U.S. Department of Agriculture (USDA) National Resource Conservation Service (NRCS)

APPENDIX A

DESIGN PLANS
CONSTRUCTION PLANS FOR
CITY OF COLEMAN, TEXAS
GRAY STREET WATER LINE REPLACEMENT
JUNE, 2016

PROPOSED WATER LINE REPLACEMENT

CITY COUNCIL
NICK POLDRACK
GARY PAYNE
SHERMAN SMITH
CAROLYN MERRIMAN
PAUL CATOE
CRESTON OLINGER
TOBY TERRY
KAREN LANGLEY

MAYOR
MAYOR PRO TEM
DANNY JAMESON
CITY MANAGER
WATER DISTRIBUTION MANAGER
WATER PRODUCTION MANAGER
CITY SECRETARY

PROJECT LOCATION MAP
SCALE 1" = 200'
EXISTING FENCE

PROPOSED 10" DR 25 C=900 PVC ML

W OVERALL ST

EXISTING SEWER MANHOLE

10" OV

10""X6" TEE

6" C=900 (20')

8' MIN SEPARATION

EXITING 10" CI ML

EXISTING 10" CI ML

EXISTING COUPLING

EXISTING 18" OR 18" STEEL CASING

REMOVE EXISTING 10" ML AND INSTALL NEW 10" DR 25 C=900 PVC ML.

NOTE: MATERIAL SUPPLIER SHALL FURNISH 18"-POLY SPACERS AND 2-END SEALS.

EXISTING CASING

10"X6" TEE

6" C=900 (80')

CENTER 20' JOINT WL OVER SEWER LINE CROSSING

8" COUPLING

6" PVC ML

PROPOSED 10" DR 25 C=900 PVC ML

GRAY ST

GRAY ST STREET WATER LINE REPLACEMENT CONSTRUCTION DRAWINGS

PLAN VIEW

MABON

CITY OF COLEMAN

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SCALE 1"=20' 1/2"=7'-0"

DRAWN: 10/01/07

CHECKED: 10/01/07

SEAL: 10/01/07

SHEET 3 OF 20

TO THE BEST OF THE KNOWLEDGE OF THE PREPARER THESE DRAWINGS ARE CORRECT AND ACCURATE

REFERENCES:

1. CITY OF COLEMAN WATER/WASTE water/waste lines plans.

2. CITY OF COLEMAN WATER/WASTE water/waste lines drawings.

3. CITY OF COLEMAN WATER/WASTE water/waste lines specifications.

4. CITY OF COLEMAN WATER/WASTE water/waste lines bid documents.
10" CI ML TO BE ABANDONED

PROPOSED 8" DR 25 C-900 PVC ML

EXISTING UNPAVED ROAD

8" HOPE FLANGE DI FT x NW ADAPTOR & MEASALUS

EXISTING UNPAVED ROAD

HORDS CREEK TRIBUTARY

ABANDON 10" CI ML

8" DR 25 C-900 PVC ML

EXISTING UNPAVED ROAD

100 LF SUEX BORE

PROPOSED 200 LF 8" SDR 11 HOPE DFS ML

8" OV

8" Service Reconnect

6x2 TS
2" OD RIBB & ELLS
See Misc Details

PROPOSED 8" DR 25 C-900 PVC ML

EXISTING UNPAVED ROAD

8" HOPE DFS ML

(Not part of Grant)
TRENCH SAFETY NOTE:
EXCAVATIONS DEEPER THAN 5.0' SHALL
MEET OSHA TRENCH SAFETY STANDARDS
PER REQUIREMENTS OF PART 1926,
SUBPART P, SECTIONS 1926.550
THROUGH 1926.553 INCLUSIVE
( "EXCAVATION, TRENCHING & SHORING")
OF THE OSHA STANDARDS.

NOTE: The Material supplier shall furnish and deliver all incidental material, gasket sets, bolts, nuts, rings, pipe dope, etc. as required
for complete product whether or not called out on the plans. The Material supplier shall also furnish and deliver all material required
for the installation of the project as shown on the plans and as noted below.

1. All fittings 4" and larger shall be compact ductile iron with megalug joint restraints. All fittings 3" and smaller shall be Harco
ductile iron with knuckle joint restraints.
2. For branch connections to 6" PVC lines, a sleeve with megalugs shall be used instead of a coupling. For 6" cast iron or asbestos
connect branch lines, a 6" x 12" Smith Blair Quantum coupling shall be used.
3. For 2" branch line connections, a 2" x 6" Smith Blair 411 coupling shall be used for steel pipe. 2" Harco sleeve with restraints
for 2" PVC branch line, and all fittings smaller than 4" shall be Harco ductile iron with knuckle joint restraints instead of MJ cast
iron with megalug.
4. For the connection of HDPE with 0-900 PVC, supplier shall furnish fusible HDPE Flanges and Flange a MJ adapters with megalugs
for each end. The HDPE pipe shall be IPS or Iron Pipe Size.
5. Brass material shall be as manufactured by Ford. The meter stop for service meters shall be straight and it shall have a 360
derogreek lockable operator.
6. The service saddles shall be epoxy coated stainless steel Smith Blair 315.

NOTE: ONLY DOMESTIC FITTINGS SHALL BE USED.

NOTES:
BLOCKING REQ'D. ON ALL BENDS > 2" LARGER. ALL REQU.
BENDS & FITTINGS ARE NOT LABELED ON THE PLANS. PIPE MAY
BE CURVED UP TO 75% OF MFL. RECOMMENDED MAX. CURVATURE
WITHOUT A BEND AS APPROVED BY OWNER & ENGINEER.

BORE & ENGAGEMENT LENGTH SPECIFIED ON PLANS SHALL NOT BE
INCREASED W/O PRIOR PERMISSION FROM ENGINEER.

ALL IRON FITTINGS & VALVES SHALL BE EMBRACED
IN 8 MIL POLYETHYLENE PER SPEC.

CONTRACTOR SHALL USE MEGALUG RESTRAINTS FOR ALL FITTINGS
AND VALVES.

USE FOSTER ADAPTORS BETWEEN VALVES AND FITTINGS WHEN THEY
ARE ADJACENT.

3" AND SMALLER FITTINGS SHALL BE HARCO DUCTILE W/KNUCKLE
RESTRANTS.

TYPICAL BLOCKING DETAILS

CONCRETE BLOCKING (TYP) W/TOTAL MINIMAL BEARING SURFACE OF 1.5 SQ. FT PER INCH OF PIPE (SEE TABLE)

PROTECT BOLTS FROM CONCRETE

FIRM UNDISTURBED SOIL

CONCRETE BLOCKING (TYP) W/TOTAL MINIMAL BEARING SURFACE OF 1.5 SQ. FT PER INCH OF PIPE (SEE TABLE)

FIRM UNDISTURBED SOIL

PROTECT BOLTS FROM CONCRETE

TYPICAL BLOCKING DETAILS

DUCTILE IRON FITTINGS REQUIRED FOR ALL LINES > 4" LARGER PER PLANS AND SPEC.

Ductile iron fittings shall be from:

- Smith Blair 411 for steel pipe
- 2" Harco sleeve with restraints for 2" PVC branch line
- All fittings smaller than 4" shall be Harco ductile iron with knuckle joint restraints instead of MJ cast iron with megalug.

TYPICAL BLOCKING DIMENSIONS

<table>
<thead>
<tr>
<th>Dim for Concrete Thrust Blocks</th>
<th>Min for Steel (In.)</th>
<th>Min for Cast Iron (In.)</th>
<th>Min for MVSP (In.)</th>
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<tbody>
<tr>
<td>2</td>
<td>2.0</td>
<td>2.5</td>
<td>3.0</td>
</tr>
<tr>
<td>2 1/2</td>
<td>2.5</td>
<td>3.0</td>
<td>4.0</td>
</tr>
<tr>
<td>3</td>
<td>3.0</td>
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<td>4.5</td>
</tr>
<tr>
<td>4</td>
<td>4.0</td>
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</tr>
<tr>
<td>10</td>
<td>10.0</td>
<td>15.0</td>
<td>15.0</td>
</tr>
</tbody>
</table>

* Varies considerably w/distance between pipe and bearing point.
SEED CONTROL FENCE USAGE GUIDELINES

A SEED CONTROL FENCE MAY BE CONSTRUCTED NEAR THE DOWNSTREAM PERIMETER OF A DISTURBED AREA ALONG A 2 YEAR STORM FLOODWAY WHERE THE FENCE MAY BE CONSTRUCTED NEAR THE TO INTERCEPT SEED FROM OVERLAND RUNOFF. A 2 YEAR STORM FLOODWAY MAY BE UTILIZED TO CALCULATE THE FLOW RATE TO BE FILTERED.

SEED CONTROL FENCE SHOULD BE SIZED TO FILTER A MAXIMUM FLOW RATE THROUGH 100 GPM/AC. FOR SEED CONTROL FENCE IS NOT RECOMMENDED TO CONTROL EROSION FROM A DRAINAGE AREA LARGER THAN 2 ACRES.

GENERAL NOTES
1. THE GUIDELINES SHOWN HEREIN ARE SUGGESTIONS ONLY AND MAY BE MODIFIED BY THE ENGINEER.

Baled Hay For Erosion Control

Profile View

Plan View

GENERAL NOTES
1. HAY BALES SHALL BE A MINIMUM OF 24" IN LENGTH AND WIDE A MINIMUM OF 50 LBS.
2. HAY BALES SHALL BE BOUND BY EITHER WIRE OR NYLON OR POLYPROPYLENE STRING. THE BALES SHALL BE COMPRISED ENTIRELY OF VEGETATIVE MATTER.
3. HAY BALES SHALL BE EMBOSSED IN THE SOIL A MINIMUM OF 4" AND WHERE POSSIBLE 3' HIGH.
4. HAY BALES SHALL BE Installer IN A ROW WITH EACH FASTENING THE ADJACENT BALES, THE BALES SHALL BE PLACED WITH Bindings Parallel TO THE GROUND.
5. HAY BALES SHALL BE SECURELY ANCHORED IN PLACE WITH 3/16" DIA. Hemp On 3' X 3' MOOD STAKES BURIED THROUGH THE BALES. THE FIRST STAKES SHOULD BE HANDLED TOWARDS THE PREVIOUSLY LAID BALES TO FORCE THE BALES TOGETHER.
6. THE GUIDELINES SHOWN HEREIN ARE SUGGESTIONS ONLY AND MAY BE MODIFIED BY THE ENGINEER.

SLOPE INSTALLATION

DITCH INSTALLATION

SOIL RETENTION BLANKET EROSION CONTROL

CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLIANCE WITH ALL TOED EROSION CONTROL REQUIREMENTS AT HIS EXPENSE.

GENERAL NOTES
1. USE WIRE STAPLES, 0.1" IN DIAMETER OR GREATER "3/4" SHAPED WITH LESS 6" IN LENGTH AND A 1" CROWN, SIDE AND SHAPE OF STAPLES USED WILL VARY WITH SOIL CONDITIONS. DRIVE STAPLES VERTICALLY INTO THE GROUND. USE FOUR STAPLES ACROSS AT THE START OF EACH ROLL.
2. PREPARE SLOPE INSTALLATION, CONSTRUCT STAPLE ALONG THE LENGTH OF THE ROLL AT 8 FT INTERVALS.
3. FOR DITCH LINER, STAPLE ALONG THE LENGTH OF THE ROLL AT 4 FT INTERVALS.
4. ANOTHER ROW OF STAPLES IN THE CENTER OF EACH BLANKET SHALL BE ALTERNATELY SPACED BETWEEN EACH SIDE FOR EITHER SLOPE OR DITCH.
5. USE A COMMON ROW OF STAPLES ON ADJACENT BLANKETS.
SEPARATION COMPLIANCE NOTES:

The contractor shall fully comply with TCEQ Chapter 290.44 (E) as shown below. No extra payment shall be made to the contractor for this compliance unless large lengths (more than 20 feet each location) of existing wastewater main or laterals have to be replaced. If a leaking wastewater main or lateral is discovered during construction, the contractor shall immediately notify the city and engineer and cease new wastewater line construction until the contractor follows the provisions of this TCEQ rule. Any proposed new wastewater line alignment shown on the plans shall be changed to meet the required separation distances as shown below. The actual required separation distances may be different than those shown on the plans. The contractor shall be responsible for all costs incurred.

1. When new potable water distribution lines are constructed, they shall be installed no closer than nine feet in all directions to wastewater collection facilities. All separation distances shall be measured from the outside surface of each of the respective pieces.

2. Potable water distribution lines and wastewater mains or laterals that form parallel utility lines shall be installed in accordance with the following:

3. No physical connection shall be made between a drinking water supply and a sewer line. Any appurtenance shall be disconnected and backfilled so as to prevent any possibility of sewage entry into a potable water system.

4. Where the nine-foot separation distance cannot be achieved, the following criteria shall apply:

   a. New wastewater installation – Parallel Lines:

      i. Where a new potable waterline parallels an existing, non-pressure or pressure rated wastewater main or lateral and the licensed professional engineer licensed in the state of Texas is able to determine that the existing wastewater main or lateral is not leaking, the new potable waterline shall be located at least two feet above the existing wastewater main or lateral, measured vertically, and at least four feet away, measured horizontally, from the existing wastewater main or lateral. Every effort shall be exerted not to disturb the bedding and backfill of the existing wastewater main or lateral.

      ii. Where a new potable waterline parallels an existing pressure rated wastewater main or lateral and if it cannot be determined that the existing wastewater main or lateral is not leaking, the new potable waterline shall be located at least six feet above the existing wastewater main or lateral, measured vertically, and at least four feet away, measured horizontally, from the existing wastewater main or lateral.

   b. New wastewater installation – Cross-Lines:

      i. Where a new potable waterline crosses an existing, non-pressure rated wastewater main or lateral, one segment of the wastewater pipe shall be centered over the wastewater main or lateral such that the joints of the wastewater pipe are equidistant and at least nine feet horizontally from the centerline of the wastewater main or lateral. The potable water main or lateral shall be at least two feet above the wastewater main or lateral, measured vertically, and whenever possible, the crossing shall be centered between the joints of the wastewater main or lateral.

      ii. Where a new potable waterline crosses a new wastewater main or lateral, one segment of the wastewater pipe shall be centered over the wastewater main or lateral such that the joints of the wastewater pipe are equidistant and at least nine feet horizontally from the centerline of the wastewater main or lateral. The potable water main or lateral shall be at least six inches above the wastewater main or lateral, measured vertically, and whenever possible, the crossing shall be centered between the joints of the wastewater main or lateral. If the existing wastewater main or lateral shows signs of leaking, it shall be replaced for at least nine feet in both directions (18 feet total) with at least 150 psi pressure rated pipe.

5. Where a new potable waterline crosses a new, pressure rated wastewater main or lateral and the standard pipe segment length of the wastewater main or lateral is at least 18 feet, one segment of the wastewater pipe shall be centered over the wastewater main or lateral such that the joints of the wastewater pipe are equidistant and at least nine feet horizontally from the centerline of the wastewater main or lateral. The potable water main or lateral shall be at least two feet above the wastewater main or lateral. Whenever possible, the crossing shall be centered between the joints of the wastewater main or lateral. The potable water main or lateral shall have a minimum pipe stiffness of 115 psi at 50% deflection. The wastewater main or lateral shall be embedded in cement stabilized sand (see clause (f) of this subparagraph) for the total length of one pipe segment plus 12 inches beyond the joint on each end.

6. Where a new potable waterline crosses a new, non-pressure rated wastewater main or lateral and a standard length of the wastewater main or lateral is less than 18 feet in length, the wastewater main or lateral shall be centered over the wastewater line. The materials and method of installation shall conform with one of the following options:

   a. Within nine feet horizontally of either side of the wastewater line, the wastewater pipe and joints shall be constructed with pipe material having a minimum pressure rating of at least 150 psi. An absolute minimum vertical separation distance of two feet shall be provided. The wastewater man or lateral shall be located below the waterline.

   b. All sections of wastewater man or lateral within nine feet horizontally of the waterline shall be encased in an 18-foot (or longer) section of pipe. Flexible encasing pipe shall have a minimum pipe stiffness of 115 psi at 50% deflection. The encasing pipe shall be centered on the waterline and shall be at least two nominal pipe diameters larger than the wastewater man or lateral. The space around the carrier pipe shall be supported at five-foot (or less) intervals with spacers or be filled with loose dry material. The end of the casing shall be sealed with wastewater non-shrink cement grout or a manufactured watertight seal. An absolute minimum separation distance of two feet shall be observed. The encasing pipe and the waterline shall be provided. The wastewater line shall be located below the waterline.

   c. When a new wastewater line crosses a new, non-pressure rated wastewater main or lateral, the waterline shall be encased as described for wastewater mains or laterals in subclause (b) of this clause or constructed of ductile iron or steel pipe with mechanical or welded joints as appropriately an absolute minimum vertical separation distance of one foot between the waterline and the wastewater main or lateral shall be provided. Both the waterline and wastewater main or lateral must pass a pressure and leakage test as specified in安娜《C》02《。《C》 standards.

   d. Where a new potable waterline crosses a new, pressure rated wastewater main or lateral, one segment of the waterline pipe shall be centered over the waterline pipe such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the centerline of the wastewater main or lateral. The potable waterline shall be at least six inches above the wastewater main or lateral, measured vertically, and whenever possible, the crossing shall be centered between the joints of the wastewater main or lateral. The waterline shall have a minimum pressure rating at least 150 psi. The wastewater main or lateral shall be embedded in cement stabilized sand (see clause (f) of this subparagraph) for the total length of one pipe segment plus 12 inches beyond the joint on each end.

   e. Where cement stabilized sand bedding is required, the cement stabilized sand shall have a minimum of 10% cement by weight. The cement stabilized sand mixture shall be based on loose dry weight volume (at least 3.2 bags of cement per cubic yard of mixture). The cement stabilized sand bedding shall be a minimum of six inches above and four inches below the wastewater main or lateral. The use of brown coloring in cement stabilized sand for wastewater main or lateral bedding is recommended for the identification of pressure rated wastewater main or lateral. The use of brown coloring in cement stabilized sand for wastewater main or lateral bedding is recommended for the identification of pressure rated wastewater main or lateral.

7. Waterline and wastewater main or lateral manhole or cleanout separation. The separation distance from a potable waterline to a wastewater main or lateral manhole or cleanout shall be a minimum of nine feet. Where the manhole or cleanout distance cannot be achieved, the potable waterline shall be encased in a joint of at least 150 psi pressure class pipe at least 18 feet long and two nominal sizes larger than the new conveyance. The space around the carrier pipe shall be supported at five-foot intervals with spacers or be filled with loose dry material. The end of the casing shall be sealed with wastewater non-shrink cement grout or a manufactured watertight seal.

8. Location of fire hydrants. Fire hydrants shall not be installed within nine feet vertically or horizontally of any wastewater main, wastewater lateral, or wastewater service line regardless of construction.

9. Location of potable or raw water supply or suction lines. Suction mains to pumping equipment shall not cross wastewater mains, wastewater laterals, or wastewater service lines. Raw water supply lines shall not be installed within five feet of any tile on concrete wastewater main, wastewater lateral, or wastewater service line.

10. Proximity of septic tank drainfields. Sewage mains shall not be installed closer than ten feet to septic tank drainfields.
Texas Commission on Environmental Quality
Water Distribution System

GENERAL CONSTRUCTION NOTES

1. This water distribution system must be constructed in accordance with the current Texas Commission on Environmental Quality (TCEQ) Rules and Regulations for Public Water Systems with the exception of any site-specific requirements as specified in the Master Water Work Orders (MWWOs). When Conflict Between Federal and Local Standards, the More Stringent Requirement Shall Be Met. All Construction for Public Water Systems shall be at a minimum, meet TCEQ’s Rules and Regulations for Public Water Systems.

2. An approved engineer shall satisfy: (i) all the TCEQ’s Regulatory Office requirements when constructing storm sewer systems. Please bear in mind that prior to completion of the water work project, the engineer or owner shall notify the TCEQ’s Water Quality Division, in writing, as to be completed. The engineer or owner shall obtain written evidence that the work has been completed in accordance with the plans and changes orders on file with the commission as required by TAC Title 25, Chapter 250, Subchapter A.

3. Bylaw on Water Supply and Conservation, the Essential Water Supply Association (AWSA) C4-00 is required by 25 TAC 325.1409. Please ensure that the formula for this calculation is correct and used correctly by the contractor.

4. The hydraulic design services shall be provided by a Certified Water Resources Engineer. All existing work shall be completed in accordance with the plans and specifications. The contractor shall provide all necessary modifications to the design to make the system operational.

5. The system must be designed to maintain a minimum freeboard of 12 inches at all points where water supply or water pressure is expected to be maintained. The system is intended to provide firefighting capability. It must also be designed to maintain a minimum fire flow to meet the needs of the required fire and drinking water flow conditions as required by 25 TAC 325.1409.

6. The contractor shall install appropriate air release devices in the distribution system at all points where groundwater or other features may cause a back siphon. All work performed to the system shall be covered with a 60-inch concrete base, corrosion resistant materials or any acceptable equivalent as required by 25 TAC 325.1409.

7. The contractor must provide a complete package of service connections, main and meter locations shown on the plans.

8. The contractor shall install 30 TAC 325.1409, all service valves and boxes to be installed. The engineering report shall establish criteria for this change.

9. The contractor shall ensure that all work is completed in accordance with the drawings and specifications. The contractor shall provide all necessary modifications to the design to make the system operational.

10. The contractor shall maintain a minimum freeboard at all points between the proposed water main and the water intake structure. The main lines shall be installed in a manner that they do not interfere with the contractor's installation plans. All materials shall be installed in accordance with the plans and specifications. For more information, please see Section 325.1409.

January 20, 2014

Revised: January 2, 2014

2014

2

2014

GRAY STREET WATER LINE REHAB

PROJECT NOTES

Addenda:

20. 2014

1. CONTRACTOR SHALL SUBMIT A DRAWING SHOWING THE LOCATION OF ALL EXISTING WATER MAINS TO THE CITY OF COLEMAN FOR CONSTRUCTION PURPOSES.

2. CONTRACTOR SHALL INSTALL A SHUTOFF VALVE AT THE END OF EACH WATER MAIN TO ALLOW FOR EASY ACCESS TO THE SHUTOFF VALVE.

3. ALL EXISTING WATER MAINS SHALL BE COATED WITH A MINIMUM OF 2 INCHES OF CEMENT TO PROTECT THE METAL FROM CORROSION.

4. CONTRACTOR SHALL INSTALL A LID ON ALL EXISTING WATER MAINS TO PROTECT THEM FROM DAMAGE.

5. CONTRACTOR SHALL INSTALL A LID ON ALL EXISTING WATER MAINS TO PROTECT THEM FROM DAMAGE.

6. CONTRACTOR SHALL INSTALL A LID ON ALL EXISTING WATER MAINS TO PROTECT THEM FROM DAMAGE.

7. CONTRACTOR SHALL INSTALL A LID ON ALL EXISTING WATER MAINS TO PROTECT THEM FROM DAMAGE.

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23. CONTRACTOR SHALL INSTALL A LID ON ALL EXISTING WATER MAINS TO PROTECT THEM FROM DAMAGE.

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25. CONTRACTOR SHALL INSTALL A LID ON ALL EXISTING WATER MAINS TO PROTECT THEM FROM DAMAGE.

26. CONTRACTOR SHALL INSTALL A LID ON ALL EXISTING WATER MAINS TO PROTECT THEM FROM DAMAGE.

27. CONTRACTOR SHALL INSTALL A LID ON ALL EXISTING WATER MAINS TO PROTECT THEM FROM DAMAGE.

28. CONTRACTOR SHALL INSTALL A LID ON ALL EXISTING WATER MAINS TO PROTECT THEM FROM DAMAGE.

29. CONTRACTOR SHALL INSTALL A LID ON ALL EXISTING WATER MAINS TO PROTECT THEM FROM DAMAGE.

30. CONTRACTOR SHALL INSTALL A LID ON ALL EXISTING WATER MAINS TO PROTECT THEM FROM DAMAGE.

31. CONTRACTOR SHALL INSTALL A LID ON ALL EXISTING WATER MAINS TO PROTECT THEM FROM DAMAGE.
APPENDIX B

SHOVEL TEST AND BACKHOE TRENCH LOCATIONS
APPENDIX C

SHOVEL TEST DATA
<table>
<thead>
<tr>
<th>Shovel Test</th>
<th>Material older than 50yrs?</th>
<th>Depth (cmbs)</th>
<th>Location</th>
<th>Ground Surface Visibility</th>
<th>Results</th>
<th>Cultural Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>STGC1</td>
<td>No</td>
<td>43</td>
<td>In area under tree along fence 10m north of BHT06</td>
<td>50%</td>
<td>0-25cmbs 10YR4/1 hard silty clay with limestone fragments &lt;3cm diameter @ 5% 25-43cmbs 10YR4/2 cilty clay with limestone fragment inclusions &lt;3cm diameter @ 5%</td>
<td>None</td>
</tr>
<tr>
<td>STGC2</td>
<td>No</td>
<td>60</td>
<td>60m south of creek, 50m southwest of STJH6</td>
<td>0%</td>
<td>0-60cmbs 10YR4/4 sandy clay</td>
<td>None</td>
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<tr>
<td>STJH1</td>
<td>No</td>
<td>40</td>
<td>South area of the middle of the APE off of two track next to fenceline</td>
<td>55%</td>
<td>0-40cmbs 7.5YR5/4 compact sandy loam</td>
<td>None</td>
</tr>
<tr>
<td>STJH2</td>
<td>No</td>
<td>40</td>
<td>Off of two track</td>
<td>70%</td>
<td>0-40cmbs 7.5YR5/4 compact sandy loam with gravel</td>
<td>None</td>
</tr>
<tr>
<td>STJH3</td>
<td>No</td>
<td>40</td>
<td>South of Hords Creek near the western extent of the project area</td>
<td>25%</td>
<td>0-40cmbs 7.5YR5/4 compact sandy loam with gravel</td>
<td>None</td>
</tr>
<tr>
<td>STJH4</td>
<td>No</td>
<td>85</td>
<td>Near the south bank of Hords Creek</td>
<td>5%</td>
<td>0-60cmbs 10YR4/4 sandy clay 60-85cmbs 2.5YR4/6 clay loam with high clay content</td>
<td>None</td>
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