REPORT FOR SUBSURFACE UTILITY ENGINEERING

FM & Caballero SUE

JN: 190495

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Prepared by:

Clark Land Surveying, Inc.
177 S. Tiffany Drive, Unit 1
Pueblo West, CO 81007
719-582-1270
www.clarkls.com

Prepared in accordance with Colorado Revised Statutes 9-1.5-101 through 9-1.5-108 and with American Society of Civil Engineers (ASCE) Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data (ASCE 38-02).

Introduction

Following is a summary of the results of subsurface utility engineering (SUE) utility designating services performed for design project:

FM & Caballero SUE
Fountain Mesa Rd. & Caballero Ave.
Fountain, Colorado

This report was prepared exclusively for:

HR Green, Inc.
Attn: Michael Connor
7887 E. Belleview Ave., Ste. 1100
Englewood, CO 111
303.228.1660
mconnor@hrgreen

This work was performed under a contract agreement between Michael Connor, (a.k.a. "Client") and Clark Land Surveying Inc., (a.k.a. "Clark") to support the design prime contract between the Client and the El Paso County, (a.k.a. "Owner"). The purpose of this investigation was to interpret the presence of utilities within the specified project limits identified by the Client/Owner as described within this report.

Professional judgment has been exercised to reasonably investigate, develop and present findings in a pragmatic manner for the ensuing project design and bid document preparation. The users of this data are reminded that this information is for design purposes only, and not intended to be used in-lieu of the 811-utility locating process. The contractor is legally required to call 811, 3 days prior to excavation. The data presented here is time sensitive and represents the results of the utility designating efforts at the time of the field investigation June 16, 2020

The results of the subject SUE designating investigation are presented in digital and hardcopy deliverables including this report. To assure meaningful and proper usage, and to minimize risk of misinterpretation, this data must be kept, regarded, and interpreted in a collective, integral manner and in accordance and with understanding of CI/ASCE 38-02 standard guidelines.

This report documents the SUE field investigation and data interpretation. Particular attention has been given to special conditions including questionable interpretations, unusual installations or contradictory information obtained from record data and field findings. The information included herein enables: 1) systematic determination of conflicts between existing utilities and proposed design and construction; and 2) proactive activities between the project development team and utility owners to value engineer resolutions.

To best utilize all project information and data, refer to Appendix A which provides an overview of the SUE investigation process.

Data Limitations

Clark consistently performs professional Subsurface Utility Engineering services in accordance with Colorado Revised Statutes 9-1.5-101 through 9-1.5-108 and ASCE 38-02 guidelines and generally accepted engineering principles and practices at this time. However, a possibility exists that abandoned, forgotten, non-detectable, undocumented or newly installed utilities may not get mapped using standard records research and geophysical survey procedures. Utilities possessing characteristics mentioned below can be missed while following standard utility designating and locating procedures:

1. Utilities without apparent records available and without apparent surface features.
2. Utilities with record information, which is illegible, misleading, or incomplete.
3. Utilities which are inaccurately reported or inaccurately represented by the utility owner as lying a significant distance from the true position.
4. Abandoned utilities.
5. Excessively deep utilities, beyond detection limits of standard designating equipment.
6. Non-conductive utilities buried in clay soil without any apparent surface features.
7. Facilities installed subsequent to the SUE field investigation effort.

A common problem occurs when the project involves facility owners and operators with insufficient records and non-conductive buried facilities, a situation often encountered with public works installations, infrastructure for oil and natural gas wells installed prior to 1960, and irrigation systems that have non-conductive water mains. Though Clark will attempt to achieve Quality Level B for all utilities, facilities mapped under these circumstances may be depicted as Quality Level D during the utility designating field effort. As the design project progresses some depicted facilities may have to be upgraded to a higher quality level through more advanced geophysical prospecting and utility locating methods to properly identify and assess utility conflicts for design and construction. Designers, utility coordinators, and contractors must realize the ASCE 38-02 utility mapping effort is an iterative acquisition and interpretation process; unless subsequent endeavors are made to upgrade designated quality levels, facilities depicted at lower quality levels, such as Quality Level D, may be completely in error.

In addition, depicted facilities and corresponding data are pertinent at the time in which field investigation operations are completed, and are subject to change. Final utility plans and data are for design purposes only and reflect utility conditions at the time surveyed. Unless authorized to maintain and keep data sets current, Clark cannot be held responsible for changing utility scenarios after completion of field operations.

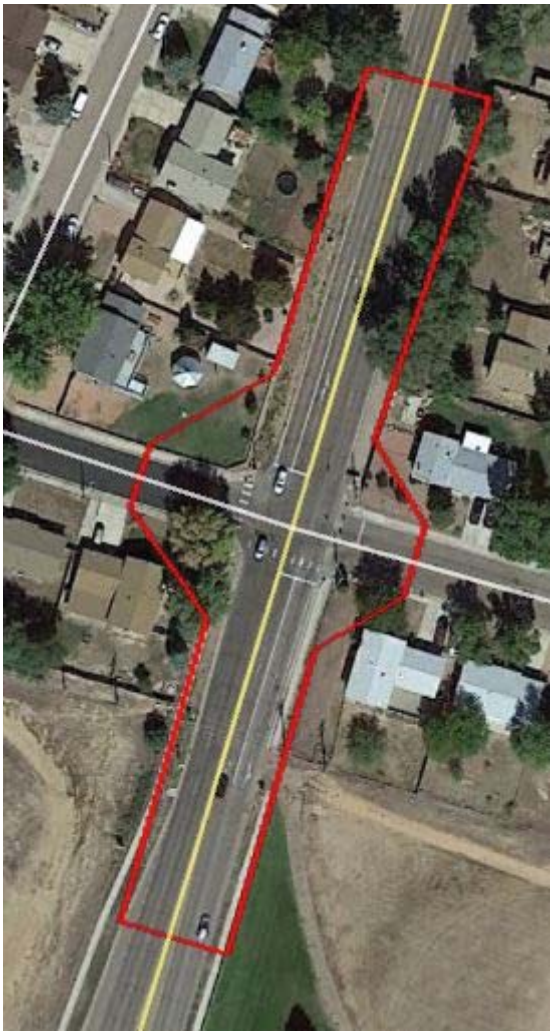
Users of this data set must understand and adhere to the limitations associated with the designated quality levels assigned to the depicted facilities. Quality Levels C and D depictions are based on interpolations, extrapolations, and available record data; this data can be erroneous and should not be used alone for design development and bidding purposes. Additional utility designating and locating field efforts to upgrade data to Quality Levels B and A are strongly recommended for areas where accurate final design and construction planning and bidding is required.

Clark strongly recommends users of this data become orientated with the ASCE 38-02 standard guidelines and the corresponding data limitations inferred by the designated quality levels prior to employing the data set for design purposes. In addition, this report must always accompany the existing SUE Plan to ensure proper interpretation and usage of the data set.

Site Limits

Specified project boundaries for the utility designating effort were identified in the original scope of work dated June 7, 2020 and are shown in Figure 1. Coverage of some facilities may extend outside these project limits as practical to capture surface features necessary to complete the utility alignments.

Figure 1. Site Limits



The project site limits contain an area of approximately 1.36. The site limits are described as follows:

The site limits contain a 85 foot wide strip of land, approximately 600 feet long, along Fountain Mesa Road.

Project Specific Scope of Work

The project scope included designating as practical in an attempt to achieve Quality Level B, or Quality Level A if the facility was exposed and accessible, all identified underground utilities; however, facilities that could not be detected using standard electromagnetic inductive tools were mapped to Quality Levels C and D during this utility field investigation effort. In some situations, Quality Level objectives could not be met due to geophysical limitations such as excessive depth of facility, lack of tracer wire, non-conductive nature of pipe material, lack of surface features, and/or insufficient records. Exceptions to Table 1 are noted.

Table 1. SUE Utility Designating Results

Utility	Mains (& primary laterals)	Services (& secondary laterals)
Sanitary Sewer	SS-1, QLD, along Caballero Ave. SS-2, QLC, along Caballero Ave SS-3, QLC, along Fountain Mesa Rd. SS-4, QLD, east of Fountain Mesa Rd.	City of Fountain
Storm Drain	ST-1, QLB, across Caballero Ave. and Fountain Mesa Rd. Intersection ST-2, QLD, across Caballero Ave. and Fountain Mesa Rd. Intersection ST-3, QLB, across Caballero Ave. and Fountain Mesa Rd. Intersection ST-4, QLB, along Caballero Ave. ST-5, QLB, along Fountain Mesa Rd.	City of Fountain
Water	WL-1, QLD, along Caballero Ave. WL-2, QLD, along Caballero Ave. WL-3, QLD, across Fountain Mesa Rd. WL-4, QLD, south of Caballero Ave. WL-5, QLD, across Caballero Ave. WL-6, QLD, along Caballero Ave. WL-7, QLD, along Fountain Mesa Rd. WL-8, QLD, along Fountain Mesa Rd. WL-9, QLD, south of Caballero Ave. WL-10, QLD, north of Caballero Ave. WL-11, QLD, south of Caballero Ave. WL-12, QLD, north of Caballero Ave. WL-13, QLD, across Fountain Mesa Rd. WL-14, QLD, across Fountain Mesa Rd. WL-15, QLD, across Fountain Mesa Rd. WL-16, QLD, across Fountain Mesa Rd.	Unable to determine owners
Gas Line	UL-1, QLB, along Caballero Ave. UL-2, QLB, along Fountain Mesa Rd.	Unable to determine owners
Electric	EL-1, QLB, along Fountain Mesa Rd. EL-2, QLB, along Fountain Mesa Rd. EL-3, QLB, along Fountain Mesa Rd.	City of Fountain
Telecommunications	TL-1, QLB, along Fountain Mesa Rd. TL-2, QLD, along Fountain Mesa Rd. TL-3, QLB, along Fountain Mesa Rd. TL-4, QLB, along Fountain Mesa Rd. TL-5, QLB, across Fountain Mesa Rd. TL-6, QLB, across Fountain Mesa Rd. TL-7, QLB, along Fountain Mesa Rd. TL-8, QLB, along Fountain Mesa Rd.	TL-3 is owned by Qwest TL-4 is owned by Century Link All other owners are unable to be determined
Fiber optic	FL-1, QLD, along Fountain Mesa Rd. FL-2, QLD, across Fountain Mesa Rd. FL-3, QLD, along Fountain Mesa Rd.	Unable to be determine owners
Unknown	UL-1, QLB, along Fountain Mesa Rd.	Unable to be determine owners

SUE Services Performed

Protocols for SUE as established by ASCE and the State of Colorado were followed for this project. Field operations proceeded on a segment-by-segment basis, and entailed reconnaissance, field designating, drainage work/manhole logging, and engineering survey campaigns.

Utility Designating

Planning and preliminary discussions were had with Michael Connor to discuss the project and the SUE effort. Once approved to proceed, Clark contacted the Utility Notification Center of Colorado (UNCC) to notify them of the SUE project. The field operations began after UNCC's 10-day response window. Utility designating work involved field meets and reconnaissance, collating information from records obtained from the utility owners, relating records with observable surface features, and geophysical surveys. The work performed was a retracing of distinct, known, detectable utility alignments within the project area to achieve Table 1 Quality Level designating objectives wherever possible.

Concurrently conducted drainage work involved investigation and surveying of drainage structures such as inlets, culverts/pipe ends, and storm drain manholes. Acoustic methods were used in some cases to find the destination and connectivity between storm pipe structures. Storm drainage structure data was entered into a relational database, for managing hydraulic/manhole information, survey data, and digital photographs.

Utility Ownership

Table 2 specifies utility ownership and representative contact information for utilities identified within the subject SUE investigation project limits. Information is current as of the date of submittal.

Table 2. Utility Ownership and Contacts

Utility Provider	Utility Type	Contact	Phone / Email
BHEG04	Electric	Black Hills Energy	888.890.5554
CMSEP00	Telecom	Comcast-El Paso County	800.934.6489
FNTN01	Water & Electric	City of Fountain	719.322.2010
PAETEC	Telecom	Windstream/Paetec	800.347.1991
PCI01	Internet	PCI Broadband	719.264.1111
QLNCC00	Telecom	Century Link	800.261.1691
SECOM2	Telecom	Secom	800.657.7149
WDHH20	Water & Sewer	Widefield Water & Sanitation	719.390.7111
ZAYLHS	Telecom	Zaya Bandwidth	866.364.6033

Supplemental Comments Regarding Existing Facilities

Users of this information are reminded that results presented with this submittal are representative as of completion of field investigation and are a pragmatic interpretation based on the systematic designating effort executed. Limitations may still exist as previously discussed in this report.

Utility Descriptions

The following utility specific sections are general, non-inclusive overviews of utilities encountered within the project limits. Special mention is made to many, but not all, locations of potential utility conflicts. In all cases, please refer to the SUE Plan for utility details, location specific quality level attributes, and identified discrepancies.

SUE designating investigations have produced considerable data and digital information which is presented via the SUE Plan. The objective is to depict and provide representative information for subsurface utilities present within the specified project limits. The following provides a descriptive summary of the depicted utilities and discusses the quality level of that information.

Summary

The project limits included those areas depicted in Figure 1. For this investigation, Quality Level A data is tied via an engineering survey to project survey control 3D coordinates; Quality Level B data is tied to project horizontal coordinates, but elevations are at the ground surface. Quality Level C alignments are straight lined between visible surface features, consequently they will not reflect ground surface undulations. Quality Level D alignments are approximate only and will not reflect ground surface undulations. Explanation of areas where geophysical detection was poor or non-existent, degrading the quality of designation, will be provided in the following utility specific descriptions.

Natural Gas

Natural gas facilities were present within the limits of the project area; these gas mains were generally mapped to Quality Level B on the SUE Plan.

Sanitary Sewer

Sanitary sewer facilities were present within the limits of the project area, and along the following street alignments:

- Caballero Avenue
- Fountain Mesa Road

At each accessible manhole, the inverts were measured, and the pipe size and material were recorded. The connections between each structure were designated Quality Level C based on record prints and the apparent alignments indicated by the pipe direction at each manhole.

Telecommunications

Telecommunications facilities and buried telephone cable were present within the limits of the project area, these facilities were generally designated Quality Level B on the SUE Plan.

Electric, Traffic Signals and Street Lighting

Numerous buried facilities were present within the limits of the project area. These facilities are primarily for streetlight and traffic signal service. This includes both buried and aerial facilities. The buried power installations were generally mapped Quality Level B during this field investigation.

Cable Television
Cable Television facilities were not present within the limits of the project area; these facilities were generally mapped to Quality Level B on the SUE Plan. Aerial facilities were also present.

Water
Water installations were present within the limits of the project area. These facilities were generally designated Quality Level B on the SUE Plan. Some of the water mains and the services could not consistently be detected with sufficient confidence using EM inductive methods due apparently to excessive depth and non-conductive piping or joints. The Quality Levels C and D alignments depicted on the utility reference file reflect Clark's best estimate based on visible surface features and record information. Further analysis of these utilities may be warranted.

Storm Drains and Culverts
Storm drainage system were present within the limits of the project area. This system consists primarily of a series of inlets/vaults which are connected with various sizes of RCP. Culverts were not present within the limits of the project area. At each accessible manhole, inlet and culvert, the inverts were measured, and the pipe size and material were recorded. The connections between each structure were designated Quality Level C based on record prints and the apparent alignments indicated by the pipe direction at each manhole or drop inlet. For those alignments where the connectivity was not readily apparent, a Quality Level D designation was assigned to the connection.

Utility Discrepancies, Issues and Notes

The following summaries are provided to draw particular attention to special conditions such as discrepancies between utility records and field findings, unusual utilities, and utilities found to have incomplete or conflicting information. These issues may warrant further investigation.

1. There is a 6" PVC Sewer line running southeast along Caballero Avenue, with an endpoint that could not be determined.

2. There is an underground storm structure that was located using a sond. The exact location, size, and shape could not be determined.

3. There is a gas line flag on the west side of Fountain Mesa Road that was unable to be designated. Test holes may provide a solution to further confirming the location of the line.

Test Hole Discrepancies, Issues and Notes

The following summaries are provided to draw particular attention to special conditions such as discrepancies between field findings, unusual utilities, and utilities found to have incomplete or conflicting information found will completing the quality level “a” investigation.

1. No utilities were found at a depth of 10’ for test hole 1.
2. No utilities were found at a depth of 10’ for test hole 2.
3. No utilities were found at a depth of 10’ for test hole 11.
4. No utilities were found at a depth of 6.6’ for test hole 12. The ground at the depth of 6.6’ was impenetrable.
5. No utilities were found at a depth of 10’ for test hole 14.
6. No utilities were found at a depth of 10’ for test hole 15.

Recommendations

Clark recommends vacuum excavations (test holes) or advanced geophysical methods be used to further investigate utilities identified to be in potential conflict with the proposed designs to better define positional and facility characteristics and explore conflict mitigation alternatives. Further exploration is also recommended on Quality Levels C and D depicted utilities where more accurate positioning is necessary to assess conflicts and clarify or resolve discrepancies between field observations and record data.

Clark should be kept advised throughout the design process to 1) evaluate designer usage of the SUE utility data; and 2) provide recommendations for further utility investigations as deemed prudent based on previous SUE investigation results.

Appendix A

SUE PROCESS

The project SUE investigation was performed in a systematic and practical manner, complying Colorado Revised Statutes 9-1.5-101 through 9-1.5-108 and adhering to established standard guidelines published by the American Society of Civil Engineers (ASCE 38-02) as described below.

ASCE Standard Guidelines for Utility Data Acquisition

Data collection activities follow ASCE Standard Guidelines for the Collection and Depiction of Existing Subsurface Utility Data (Standard CI/ASCE 38-02, American Society of Civil Engineers, Reston, VA, 2002, 20 p). A significant contribution of the ASCE standard is development of a formalized procedure for qualifying and designating the general quality of the depicted individual facilities. Table 4 summarizes the four quality levels (QL) definitions included in the ASCE standard. Included with the definitions are comments on the relative positional accuracy for the corresponding quality levels.

Adherence to ASCE depiction standards along with the use of records research, geophysical methods, vacuum excavation, and engineering survey, and quality assurance measures, combined in a phased approach and guided by professional judgment, is often simply regarded as subsurface utility engineering or SUE. However, in proper context, SUE is a rather complex and important series of engineering tasks and associated responsibilities; the utility mapping and designation of quality levels, in fact, provides the data set with which the SUE process begins. In a broader sense, SUE involves utilizing the qualified utility data sets to conduct the following engineering activities:

- systematically identify, itemize, and define apparent conflicts between proposed designs and existing utilities;
- optimize design development to curtail utility conflicts and risks;
- identify and accommodate other infrastructure planned betterments and new installations;
- conduct effective utility coordination in which resolutions to conflicts are derived that serve the best interests of the public and all stakeholders involved;
- develop construction plans and bid documents that concisely identify and detail outstanding conflicts for construction planning, bidding, and execution; and
- encourage value engineering and mitigation of cost implications to all infrastructure systems, which provide service to commerce, government, and the general public.

Table 3. Quality level (QL) definitions per ASCE Subsurface Utility Engineering Standards

Quality Level (QL)	Description	Resulting Positional Accuracy and Data Completeness
D	Information derived from existing records or oral recollections.	Data may be completely erroneous. Only the records indicate the utility is present. No direct field evidence is apparent.
C	Information obtained by surveying and plotting visible above ground utility features and by using professional judgment in correlating information to available records and QL D information. QL C is usually used to map non-conductive pipes, deep utilities, or when electromagnetic (EM) signal interference and distortion is too significant.	Positional accuracy of surface features is to within 0.1 feet; however, alignments between surface features are often schematic only, providing general direction of alignment. Typically, according to FHWA studies, 15% to 30% of the utility data may be erroneous or missing.
B	Information obtained through the application of appropriate surface geophysical methods to determine the existence and approximate horizontal position of subsurface utilities. QL B data should be reproducible at any point of their depiction using surface geophysical methods. This information is surveyed to applicable tolerances defined by the project and reduced onto plan documents. Standard geophysical methods map only the point of peak signal associated with a conductive utility. While a QL B point can be reproducible using geophysics, the signal can be distorted due to the superposition of EM fields from adjacent conductors and not lie horizontally above the target. Experienced SUE operators help identify and mitigate these issues. However, QL A data is recommended for design / construction work to be performed in the immediate proximity of QL B depicted utilities to provide definitive positional accuracy.	A positional accuracy statement with confidence level is not feasible unless electromagnetic fields are completely mapped and statistical analysis is used to derive alignments from the linear anomalies; in addition, sufficient ground truth sampling (e.g., test holes) is required. This level of geophysical survey and analysis effort required is often not practical or cost effective. In practice, experienced SUE designators can determine utility alignments reasonably well. Professional judgment is exercised to distinguish incidents of "bleed-over" and when apparent alignments don't make sense. Available utility records are compared with field findings to confirm completeness of the QL B data. QL B rating, as a rule of thumb, is generally estimated to +/- 1 foot horizontally for utilities less than 5 feet deep. Horizontal accuracy degrades with depth. Utilities over 10 feet deep are very difficult to position horizontally using standard inductive equipment. Vertical location cannot be reliably derived using EM inductive methods as computed depths are often inconsistent and can be misleading unless ground truth (i.e. test holes) are available to confirm accuracy.
A	Precise horizontal and vertical location of utilities obtained by the actual exposure (or verification of previously exposed and surveyed utilities) and subsequent measurement of subsurface utilities, usually at a specific point. Minimally intrusive excavation equipment is typically used to minimize the potential for utility damage. With QL A observations, relatively precise horizontal and vertical depictions, as well as other utility attribute data, are shown on plan documents. Accuracy is typically about 0.1 feet vertical, and to applicable horizontal survey and mapping accuracy as defined or expected by the project owner and as limited by the survey equipment and methodology used to perform the measurement.	This is the only QL to which a positional accuracy statement might be made. QL A is as accurate as the reference horizontal and vertical survey control will permit and the methodology used to make the measurement and derive the coordinates. Note that in some cases involving inverts, direct measurements may not be possible; consequently, QL A designation can only indicate that a relatively accurate position has been determined on the subject facility at that discrete location. In some cases, an apparent minimum depth of clearance is provided. This is not QL A data as the utility has not been exposed. The utility apparently lies in line with the test hole but is deeper than can be reached via vacuum excavation based on the detected geophysical signal. However, the minimum depth data is provided for informational purposes for planning consideration.

Certification

I hereby certify that this Subsurface Utility Engineering Report was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Colorado.

Steven Anselmo, P.E. 12/9/2020
Colorado Professional Engineer No. 39279
For and on behalf of Clark Land Surveying, Inc