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DESERT RESEARCH INSTITUTE
CULTURAL RESOURCES REPORT LR052020-1
PROJECT NO. 208623

Finding of Adverse Effect and Mitigation Documentation for the Power and Communications System in Mercury, Area 23, Nevada National Security Site, Nye County, Nevada

Prepared by

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November 2020

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A forest of power poles in the center of the Mercury Historic District (Remote Sensing Laboratory, Nellis Air Force Base 2013: Photo D13_08030).

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November 2020

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INTRODUCTION

The U.S. Department of Energy, National Nuclear Security Administration Nevada Field Office (NNSA/NFO) proposes to make multiple upgrades and additions to the power and communications (P&C) system related to modernization activities in the town of Mercury at the Nevada National Security Site (NNSS) in Nye County, Nevada.

The purpose of this letter report is to submit documentation related to the finding of effect and mitigation for the undertaking of modifications to and mitigation of the P&C system in Mercury. This submission is intended to comply with the stipulations in the *Programmatic Agreement between the National Nuclear Security Administration Nevada Field Office and the Nevada State Historic Preservation Officer Regarding Modernization and Operational Maintenance of the Nevada National Security Site, at Mercury in Nye County, Nevada*, hereafter referred to as the Mercury PA.

The town of Mercury and the immediate surrounding area have been designated the Mercury Historic District (MHD; SHPO Resource #D230), which is a property eligible to the National Register of Historic Places under Criteria A and C for its importance in supporting nuclear testing and scientific research from 1951 through 1992. During the initial architectural survey (Reno et al. 2018), the P&C system was identified as contributing to the eligibility of the district.

PROJECT DESCRIPTION

The NNSA/NFO proposes to consolidate and upgrade existing segments of the P&C system (SHPO Resource S1707) within the Mercury modernization construction zone. This undertaking is meant to eliminate age-related deficiencies that pose safety, security, and operational risks to current mission activities. The activities will include rerouting and consolidating lines, installing new poles, installing equipment boxes and pole-mounted fixtures, installing new communications cabinets, and restringing utility lines. Existing poles and cables that are bypassed or no longer active will be removed.

Pole replacement activities involve digging holes 6 ft deep to install new poles. The new poles will have sufficient height to hold both P&C lines and will carry typical crossarms and insulators to support conductor wires. Equipment used to install the poles and rehang wires will remain on paved or graveled roads, or otherwise previously disturbed ground surfaces. The pad-mounted communications boxes are stainless steel and measure approximately 4 ft tall by 3 ft wide and 1.5 ft deep. They will be similar to other communications boxes in Mercury.

The area of potential effect (APE) is the modernization construction zone and based on the proposed P&C upgrade (Figure 1). It consists of five adjacent street blocks of differing sizes in the center of Mercury. The APE encompasses 32 acres that are bound on the west by Mercury Highway and on the north by Ranger Avenue. The furthest extent of the APE is Jangle Street to the east and Trinity Avenue to the south. Per the Mercury PA, the APE for cumulative and visual effects is the boundary of the MHD. Importantly, this project and mitigation documentation does not involve the 138-kV transmission line (SHPO Resource S1725) that supplies power from the Mercury Switching Station to Mercury and throughout the NNSS.

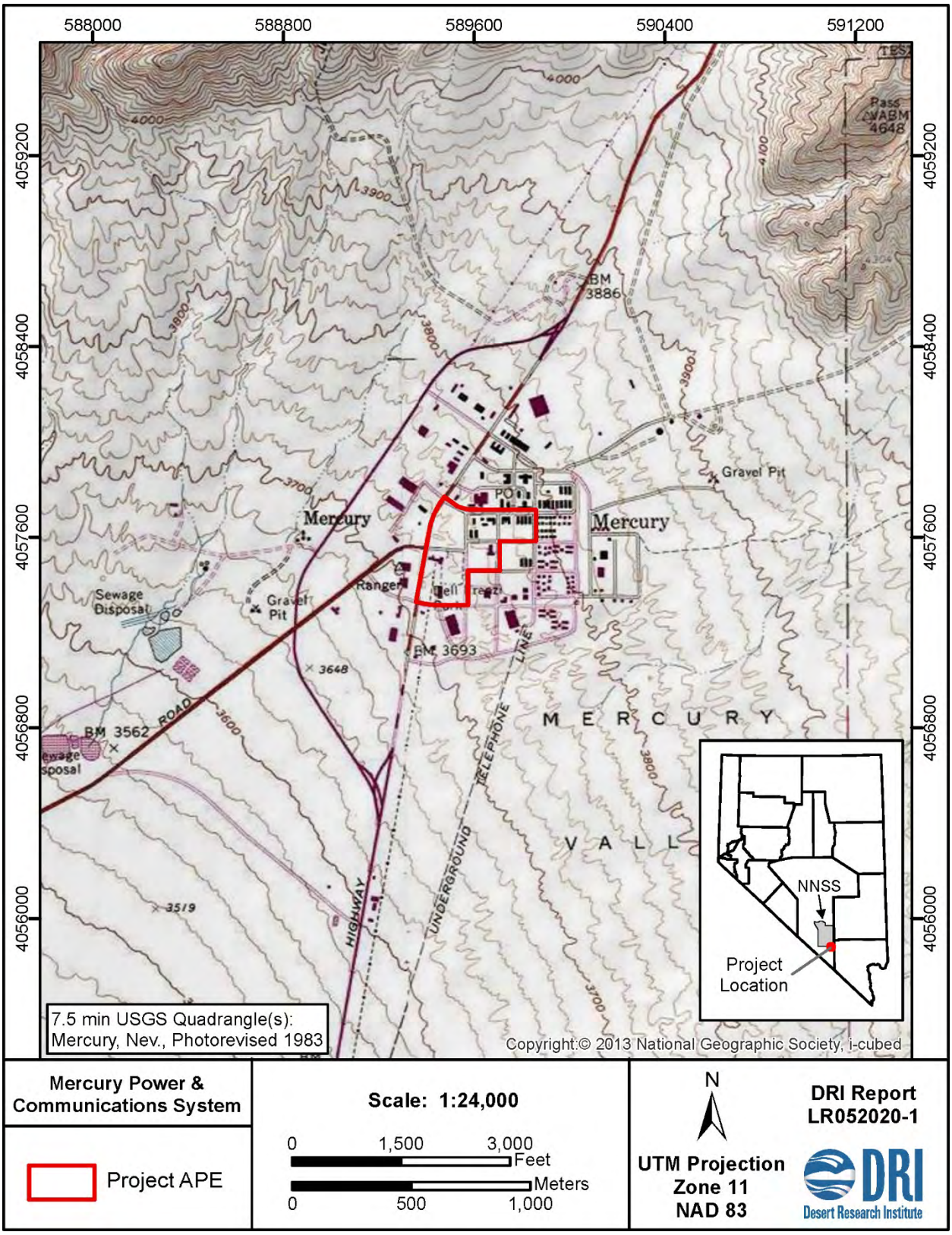

Figure 1. The area of potential effect for the Mercury P&C system.

FINDING OF EFFECT

The P&C system is a contributing element to the MHD. Taken out of the context of Mercury, the P&C system is not exemplary. It is utilitarian in design and was constructed to meet the needs of the Mercury townsite. Individually, it is not strongly associated with significant events in the broad patterns of national, state, or local history; it is not associated with the lives of significant persons; the line lacks distinctive elements of design and method of construction; and does not have the potential to yield information important to history. Therefore, in and of itself, the P&C system is not eligible under the significance criteria of 36 CFR Part 60.4 (Collins and King 2017) and it is only significant as a contributing element to the MHD.

After informal consultation with the DRI subject matter expert and applying the criteria of adverse effect, the NNSA/NFO Cultural Resource Manager (NFO CRM) has determined the planned activities will alter the characteristics that qualify the MHD for inclusion in the National Register. Therefore, the proposed modifications to the P&C system will have an **Adverse Effect** to a historic property.

ELEMENT CATEGORY IDENTIFICATION

In consultation with the State Historic Preservation Office (SHPO), the P&C system was identified as a Category II property or element (Mercury PA, Table C-1) for its potential National Register contribution to the MHD based on the Secretary of the Interior's Significance Criteria. Per Stipulation IV.B.2, Category II properties may include elements for which there are several representatives within the district. The P&C system is a repetitive resource because there are multiple iterations of lines, poles, cables, transformers, and other components spread throughout the district. If a line segment and the attached components are considered an individual representative of the whole property, then the entire system throughout the MHD is considered the element with numerous representatives.

Standard Mitigation for Category II Elements

Pursuant to Stipulation VIII.C of the Mercury PA, the following steps were taken to comply with standard mitigation requirements for a Category II property or element.

- Additional high-quality digital images were taken that are consistent with the plan for photography found in Appendix D of the Mercury PA (VIII.C.1.b) and the digital images were keyed to a plan map to show their locations (VIII.C.1.c) (Appendix A).
- The Architectural Resource Assessment (ARA) form for S1707 was updated (VIII.C.1.a) and includes a site plan map and a drawing series of the Mercury utilities power distribution (VIII.C.1.c) (Appendix B).
- A description of the element class and its historic significance in the context of the MHD was prepared (VIII.C.1.d).

Because the system is composed of hundreds of separate poles with miles of wires and cables, a sampling of various representatives was photographed. There was also an effort to include any unusual components found attached to the poles, although not many of these were encountered while examining the system. DRI archaeologist JD Lancaster took the most recent photographs of the system in May 2020.

HISTORIC SIGNIFICANCE IN THE CONTEXT OF THE MHD

The following narrative is a historical context about the P&C system in Mercury to comply with standard mitigation requirements for a Category II element (VIII.C.1.d).

Introduction

The town of Mercury, Nevada, was established in 1951 at the very southern extent of the Nevada National Security Site (NNSS) and served as the principle entrance to the United States' continental nuclear weapons testing facility. Mercury has always provided a wide range of support services for nuclear weapons testing. It consists of a distinct town center and, like many other government installations, it resembles a typical company town. It was built to be self-contained and established to provide facilities, services, and amenities for personnel working on the NNSS. Architecturally, there are elements similar to other small towns in the United States: administrative buildings, infrastructure—including P&C system utilities—residential buildings, community support, and transportation corridors. Unlike any other small American town, however, the origin and history of Mercury are intricately linked to developments during the Cold War and the United States' nuclear testing program from 1951 to 1992. Several other communities scattered around the country provided support for the development and production of these weapons, but Mercury was the only location where a long series of nuclear explosive tests were undertaken. Between 1951, when it was first built, and the end of the Cold War in 1992, during which period the NNSS was known as the Nevada Test Site (NTS), the town expanded and diversified to accommodate a growing workforce and a year-round testing schedule.

The Early Power System: 1951–1962

The first electricity in Mercury was supplied by a power plant (Building No. 23-116; SHPO Resource No. B15230) located on the south side of Tumbler Avenue, just east of Mercury Highway (Figure 2). This large steel-framed building was equipped with "three diesel electric generating sets" used to produce power (REECo 1955). As of 1955, the buildings in Mercury that required electricity included two administration buildings, a services building (housing office, post office, etc.), a fire station, a cafeteria and detached food warehouse, a recreation building, a steam plant, a power plant, four buildings for contractor use, an assembly building (theater), an air weather station, a vehicle maintenance shop, several warehouses, and numerous dormitories (REECo 1955).

Figure 2. Mercury power plant in 1955, Building 23-116, facing south-southwest (REECo 1955).

The design of the original electrical distribution system remains unknown. By 1956, the Southern Nevada Power Company had completed a 64-mile-long 138 kV transmission line from Las Vegas to Mercury, which supplied regular and reliable power to Mercury (Johnson 2006). Its design was meant to handle future load increase and transformer capacity. However, the power plant remained in operation as a supplementary power source and served as a support facility throughout much of the Cold War.

The current configuration of Mercury's power system was originally designed and installed during the early 1960s. The 1962 Arthur Benedict and Associates (ABA 1962) *Master Plan Mercury* describes the electrical system in Mercury at that time in some detail. The main electrical hub in Mercury was a substation with two transformer banks: one for the forward test areas and one for Mercury. There were two underground feeders from the Mercury transformer, protected by oil circuit breakers, which were routed through a generator switchboard at the power plant. One feeder supported higher amperage wiring for equipment that required more electricity to operate, which were likely located in the steam plant and other shops and warehouses, and the other feeder presumably supported offices, dormitories, and other similar buildings. The outdoor distribution center contained seven circuit breakers, one of which provided service to the station at the power plant. The remaining circuit breakers were attached to the overhead power line distribution system. At the time, the electrical system in Mercury was highly reliable and very few power outages occurred.

According to the *Master Plan Mercury* (ABA 1962):

> Mercury obtains its electrical energy from the Nevada Power Company [formerly Southern Nevada Power Company] substation located in Mercury, Nevada. This substation is supplied by a 138 kilovolt transmission line… The substation consists of two 3750 KVA transformer banks. One transformer bank serves power to the forward test areas at 34.5 kilovolts and the other serves Mercury, Nevada, at the primary distribution voltage of 4160 volts.

In terms of electrical power systems, a distribution substation lowers the transmission voltage so it can be used by end users (Meyer 2014). The Mercury distribution substation lowers the 138 kV transmission voltage to under 69 kV. Many of the lines in the central portion of the town had a capacity of only 2.4 kV.

The distribution station consisted of seven feeder circuits protected by oil circuit breakers, six of which were used in a radial-type overhead distribution system. The radial distribution system is the most common and used to serve light-density load areas and areas where the circuits are usually carried overhead on poles (Csanyi 2019). Commenting on the growth of the power grid in the 1950s, ABA (1962) captures the essential development of the early system: "Due to continual growth of the facilities in small increments and the uncertainty of future expansion, the overhead distribution circuits have had to be installed piecemeal."

The Master Plan Mercury Upgrade: 1963–1964

Although atmospheric testing had ended with the Limited Test Ban in 1962, underground testing activities at the site steadily expanded and took place year-round. This required additional construction to meet the demands for a wide range of facilities in Mercury. To that end, the *Master Plan Mercury* (ABA 1962) proposed an expansion of all facilities for a permanent town, including electrical infrastructure.

It appears that at this time the first comprehensive technical information regarding the power system and other utilities was produced. For instance, in 1963 the engineering and architectural firm Koebig and Koebig, Inc., published *Report on Utilities for Mercury, Nevada*, and the single-line electrical utility diagrams discussed in that report (Plates No. 4 and 5) were used in a 1965 As-Built drawing produced by Holmes and Narver. The Koebig and Koebig (1963:10–19) utilities report included a section on the aerial

electrical distribution system and much of what is provided below is based on that section. (Because the Koebig and Koebig 1963 report is difficult to locate and access, the relevant pages from the report are reproduced as Appendix C.)

Proposed changes to the line in Mercury in 1963 included adding new poles, changing the direction of one alignment using different pole types, modifying equipment on several poles to accommodate the electrical needs of new buildings, relocating and removing some poles, and removing two existing lines. Provisions were made to ensure the system could also be readily expanded (Koebig & Koebig, Inc. 1963).

Power to Mercury continued to be provided by Nevada Power Company from an overhead 138 kV transmission line to a distribution substation (SHPO #C315) (Figure 3). The original seven circuits were double-ended breakers (often referred to as "feeders") and these were rearranged during the upgrade to provide 14 single breakers (Koebig and Koebig 1963:13). Originally, six of the double-ended breakers were used for Mercury. After the upgrade, 10 of the single breakers were used to provide power to a new cafeteria, a new east leg loop, a new center loop, a new west leg loop, Camp Desert Rock, and the air strip.

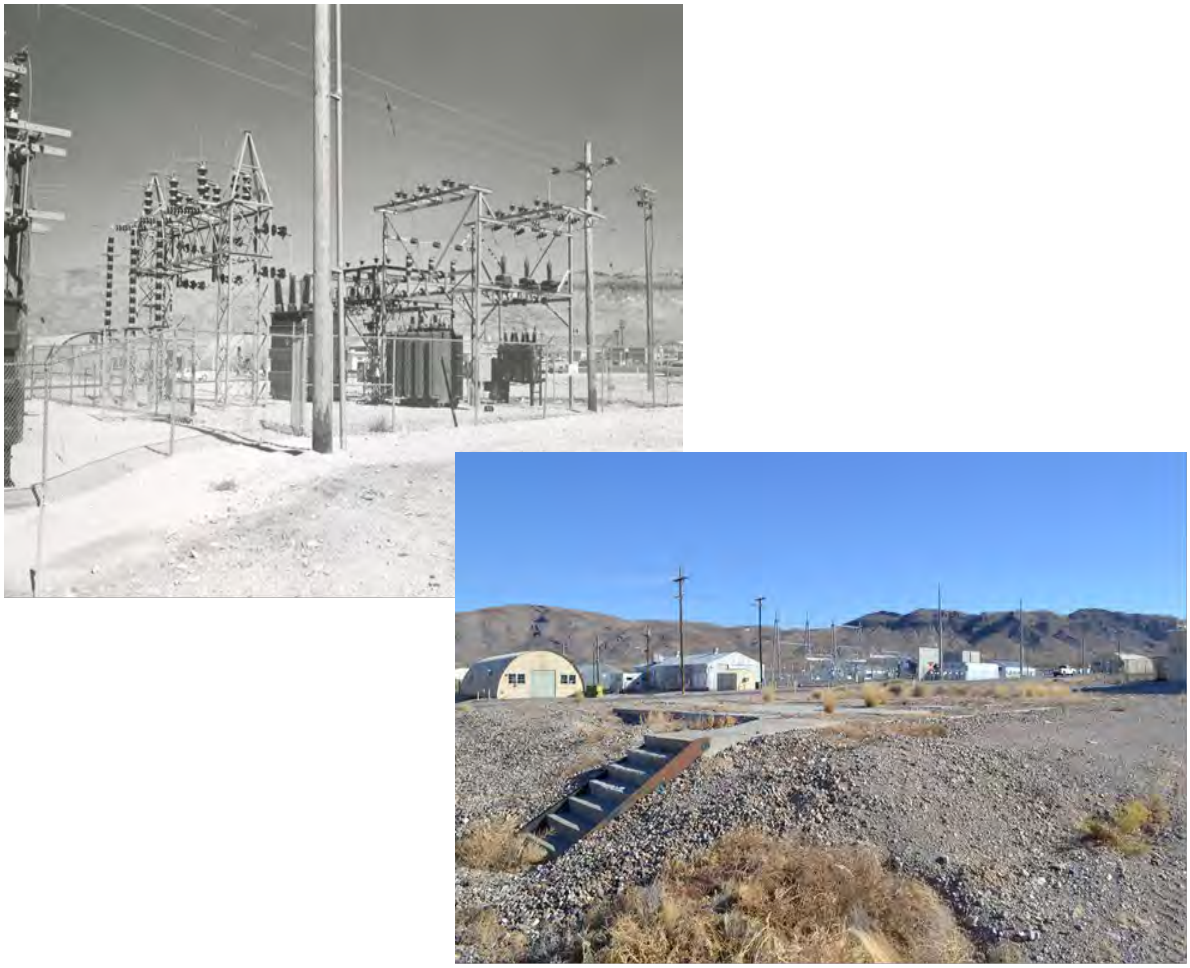

Figure 3. The original substation in 1962 (upper left, facing northwest, REECo 1982) and the remaining foundation in 2017 (SHPO #C315) (lower right, facing north, DRI 2017).

To accommodate this configuration, some of the new circuits ran through underground ducts to manholes and then aerially onto poles, whereas others ran aerially from the substation directly onto poles. Each of the original circuits had been designated numerically, 1–7, and the additional single-line circuits were given alpha-numeric designations, 1A–7A. The conductor sizes and types for each circuit varied, as did the circuit load, depending on what was being supplied with power. These alpha-numeric designations were also used to designate related stretches of the distribution line and the associated power poles across the town.

The archival review found little detailed information about the power distribution system for Mercury after the 1960s upgrade. What was found consists of a limited number of engineering drawings that date from 1972 up to 1993. The lack of information post-dating the mid-1960s suggests that although maintenance and repairs were regularly performed, no substantial upgrades or wholesale changes to the Mercury electrical system occurred up to the end of the Cold War and the last nuclear test in 1992.

Communications Cabling

Very little information is available about communications infrastructure for Mercury and no detailed information specific to the communications lines was encountered during the archival review. A telephone communications system had been constructed in Mercury by 1958 that used both aboveground cables attached to poles and underground cabling (Holmes & Narver 1958). The bulk of the system ran east-west between Sandstone and Ranger Avenues, with extensions south of Camp Desert Rock and north to Warehouse Road. The abovementioned Koebig and Koebig utility report (1963) also refers to a 2.4 kV electrical line supporting a telephone booster.

Current field observations show communications cabling or lines are strung throughout the town and attached to power poles below the existing electrical lines. Some of these poles now only have fiber-optic cable attached to them. These lines are all-dielectric self-supporting (ADSS) fiber-optic cable. A 1955 photograph shows a thick cable attached midway up a wooden power pole below the electrical lines and this may be part of the town's earliest telephone system (Figure 4).

Figure 4. Communications cabling midway up power pole in front of the Recreation Building in 1955 (REECo 1955).

DESCRIPTION OF THE MERCURY P&C SYSTEM

The Mercury P&C system is identified in the 2018 Mercury PA as a Category II element of the historic district. Discussed below are the different sub-elements or components to the overall P&C system element.

In simple terms, an electrical power system consists of three complex and interrelated components: the generating system, the transmission system, and the distribution system (Meyer 2014). Mercury's power system relates only to the third component, the distribution system. At Mercury, transmission lines that carry high-voltage current connect to a distribution substation that houses transformers and other equipment, which reduces the voltage to appropriate levels for the system's end users. Mercury's electrical distribution grid is what is called a "radial system," which means that there is only a single path or direction over which electrical current may flow—from the distribution substation to the distribution transformers, and ultimately to the end users (Csanyi 2019). Figures 5 and 6 show maps of the Mercury P&C system based on engineering drawings.

Distribution Substation

Distribution substations are where high-voltage current is reduced through transformers and other equipment to an appropriate voltage for the system's end users. These substations contain a number of different elements: the supply line, transformers, bus bars, switchgears, switching apparatus, outgoing feeders, and grounding, among other things. Because it is the last in a series of substations that manipulate current in some way and the one that delivers power to users, it typically operates at 2.4 to 34.5 kV levels (Csanyi 2016).

Mercury has a major switching station and three distribution substations (see Figure 5). The Mercury Substation (SHPO Resource #C315) was closely associated with the adjacent power plant. It was dismantled sometime after 1992. The Tap and Meter Substation (SHPO Resource #S1794) for the 138 kV transmission line was constructed in 1963 and was likely removed sometime in the early 1970s. The Switching Station (23-1010) at Gate 100 has been modernized and continues to operate. The present Mercury Substation postdates the Cold War era. In addition, small substations are associated with most of the buildings in Mercury.

The original distribution substation for Mercury was located on Tumbler Avenue, just east of Mercury Highway, behind what is now the cafeteria (see above, Figure 3). Although the earliest information shows that it was in place by 1959, it may well have been built in conjunction with the establishment of the 138 kV transmission line in 1956 (Johnson 2006). Following the end of the Cold War and nuclear testing in 1992, the facility was dismantled (Raytheon 1992). What exists today are a series of concrete foundations or platforms that once held the substation equipment (Mercury Resource M14; SHPO Resource #C315).

Distribution Transformers

Distribution transformers are used for the distribution of electrical energy at low voltage, generally less than 33 kV for industrial purposes and 440 V–220 V for commercial or residential purposes. These kinds of transformers typically operate at less than full loads most of the time and because of periodic drops in voltage, it is usually not possible to deliver power over long distances. In an aerial system, these transformers are mounted onto power poles (pole mounted). When power lines are at ground level or buried underground, these transformers are placed in steel boxes on cement pads (pad mounted). Most distribution lines contain three wires, which require a three-phase transformer, but there are also one-phase (or single-phase) transformers. See Parmar (2011) for general information about distribution transformers.

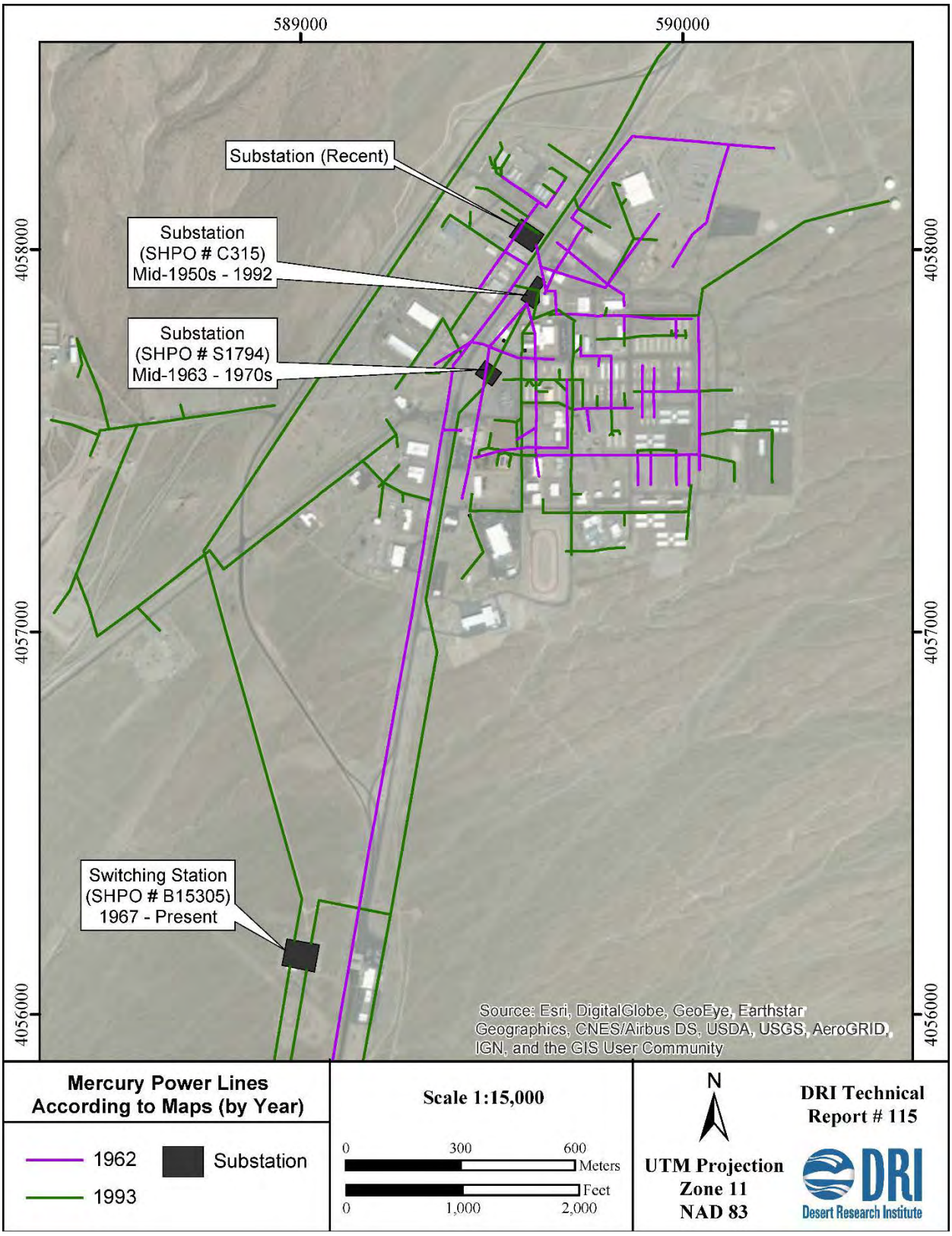

Figure 5. Plan of aboveground power lines (S1707), sources ABA (1962) and REECo (1993).

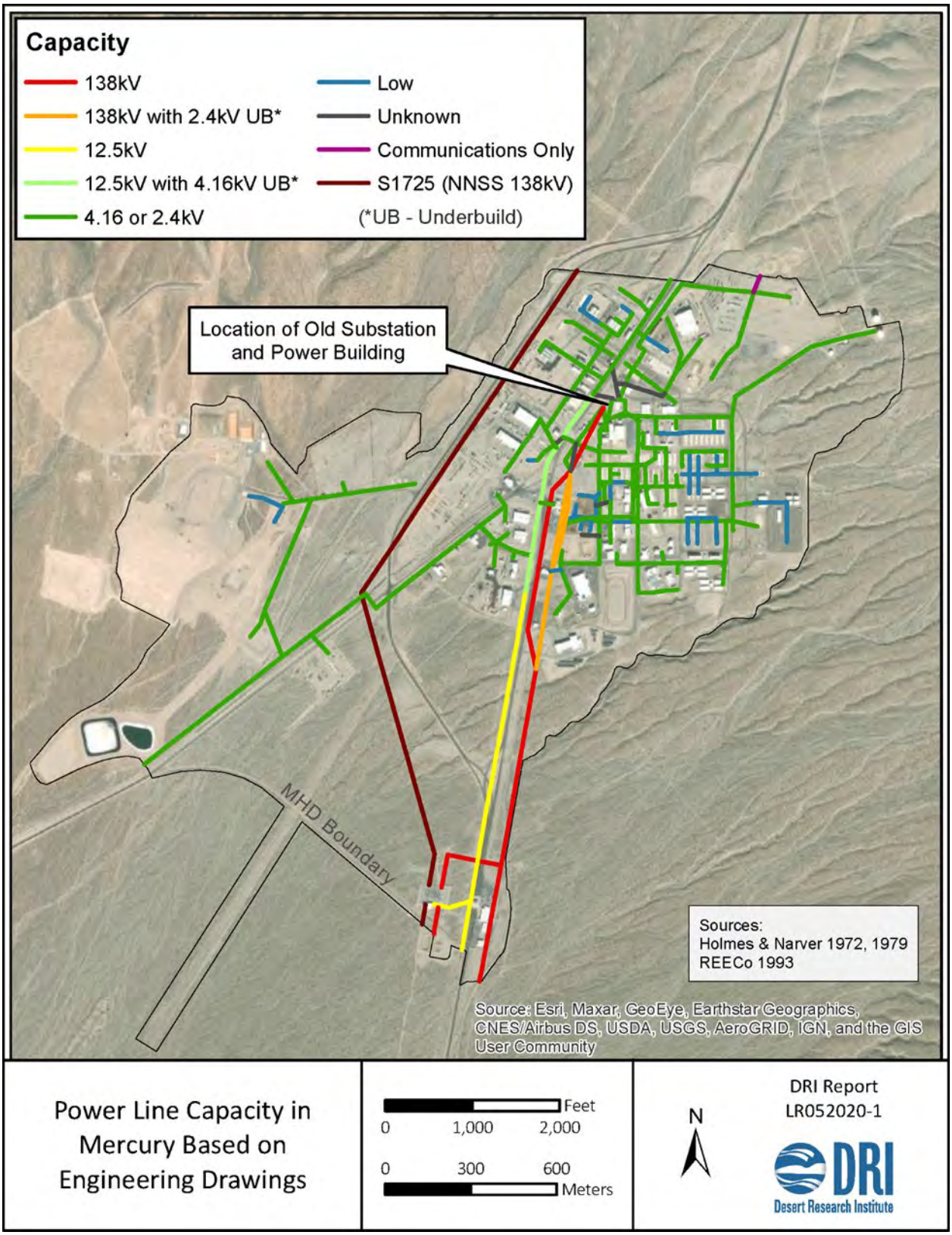

Figure 6. Plan of Mercury power distribution line power capacity.

Distribution transformers are readily apparent on power poles across Mercury, as are rectangular metal boxes that may be related to communication infrastructure. Likewise, locked steel boxes on cement pads are common and may contain pad-mounted transformers for the underground portion of the power grid (Figure 7). There may well be one- and three-phase distribution transformers in Mercury because of changes made incrementally over a 60-plus-year period. For example, a power pole next to the old power plant on Tumbler Avenue that has three pole-mounted single-phase transformers, one to serve each circuit or line.

Figure 7. Example of pole-mounted transformer (left) and pad-mounted transformer (right) (DRI 2020).

Distribution Lines and Poles

There are primarily two types of electrical power lines: transmission lines and distribution lines. Transmission lines transport high voltage energy long distances from the power source to substations, where the voltage is reduced to more usable levels. Distribution lines are low voltage (generally below 69 kV), cover very short distances, and bring power to end users. Importantly, the electricity in distribution lines only flow in one direction, from the distribution substation to the end user. For general information about distribution lines see: www.callmepower/faq/energy-markets/difference-between-transmission-distribution.

As discussed above, Mercury has both underground and aerial distribution lines. The underground segments are used for some of the electrical circuits and transport power from the distribution substation a portion of the way through town and then onto the aerial grid. According to the 1965 As-Built drawing (Holmes and Narver 1965), these underground lines can be accessed by manholes. Although the As-Built figure depicts the configuration, construction details about the underground power grid are not readily available.

It is difficult not to notice the aerial power grid across Mercury. Power poles are everywhere throughout the town and this is likely a result of 60-plus years of incremental growth and serendipitous electrical demands (Figure 8). Many of these poles are flattop structures that have a single crossarm at the top of the pole with all the lines and insulators on top of the crossarm (Meyer 2014). These are single-circuit structures. Then there are single poles that have two crossbeams and each crossbeam carries a different circuit or voltage, one on the upper crossbeam and one on the lower crossbeam (Meyer 2014). For

instance, there is a line along Mercury Highway that has a 12 kV line on the upper crossbeam and a 4.16 kV line on the lower crossbeam (Figure 9). There are also poles that contain two pairs of double crossbeams and these double crossbeams are perpendicular to each other. These kinds of power poles or structures allow the electricity needs to turn at a 90° angle (Meyer 2014). Finally, there are poles that have no crossbeam but the wires are attached in some fashion around them, which are often referred to as spacer poles. For the power poles or structures with crossbeams, pin- or post-style insulators are present and placed above the circuit lines (Meyer 2014).

Figure 8. Mercury Historic District showing extensive grid of power poles, facing northwest (Remote Sensing Laboratory, Nellis Air Force Base 2013, Photo D13_08030).

Figure 9. A 12 kV power line with a 4.16 kV underbuild, facing south-southwest (DRI 2020).

A segment of wooden pole structures along Jangle Street and Ranger Avenue was documented as a result of a Section 106 undertaking in 2017 (Collins and King 2017). These recorded poles provide a small sample of sizes and other attributes of poles found in Mercury (Table 1). Two of these poles are marked with installation dates: one was installed in 1969 and the other in 2001. Another pole has a marking that indicates a telecommunications functionality test was conducted in 1977, thereby securing its installation prior to that year. The poles range in circumference from 26 to 43 in and in height from 27 to 39 ft. In addition to their variability in widths and heights, other varying attributes include step rungs, transformers, power boxes, junction boxes, lights, additional metal poles attached to the main pole, paint around the base, and an assortment of marking tag types.

Table 1. Markings and Attributes from a Sample of Existing Poles.

Tag Information	Other Markings	Circ (in)	Height (ft)	Type	Other
MD-10-019	TED BUTCHER INC. / 1969 / 3 45 / W.C.P. / ARLINGTON WASH.	42	39.0	Elec	Two lights and transformer; power box
552617 H		26	32.9	FO	
572967 H		39	32.9	FO	
None	BUTT TEST 2-77	33	27.3	FO	
None	24	42	35.2	Elec/FO	Base painted yellow; ~15 step rungs; one light
MD-10-023		40	31.7	Elec/FO	One light; ~10 step rungs
MD-10-024		43	35.2	Elec/FO	
MD-10-025	McFARLAND CASCADE / 2001 / 1 40 / DF-PA / EUGENE, OR	42	30.6	Elec/FO	Power box reads 151-1275 T9. Junction box reads BX-109; metal pole
MD-10-001	NWP/ 1-99 / DF PA 45 / 2-45	42	39.0	Elec/FO	Metal pole

Summary

The Mercury P&C system (S1707), as a Category II element in the Mercury PA, is composed of power poles, utility lines, communications cabling, transformers, and other associated fixtures. These are part of the Mercury electrical distribution system, which included a power plant (B152230) and two historic substations (C315 and S1794). Electrical power was supplied to the town via a 138 kV transmission line from the switching station (B15305) at Gate 100. Although the power plant, historic substations, the 138 kV power line, and the switch station are parts of the overall NNSS electrical system, the proposed undertaking only includes the P&C system as described above.

ADEQUACY OF STANDARD MITIGATION FOR CATEGORY II ELEMENTS

Only a few segments of the P&C system (SHPO Resource #1707) are within the APE but collected information about the P&C system includes documentation and photography covering the entire MHD. Pursuant to the Mercury PA Stipulation VIII.E.1.a, the NNSA/NFO is submitting its determination that this mitigation documentation for the P&C system is adequate as a representative sample for all members of the element class and no other documentation will be required for future adverse effects to this element.

REFERENCES

Arthur Benedict Associates (ABA)

1962 *Master Plan Mercury, Nevada*. Prepared for the U.S. Atomic Energy Commission. Arthur Benedict Associates, Los Angeles.

Collins, Cheryl M. and Maureen L. King

2017 *A Cultural Resources Survey for the Proposed Mercury Power and Communications Upgrade, Nevada National Security Site, Nye County, Nevada*. Desert Research Institute Cultural Resources Report SR052417-1. Desert Research Institute, Las Vegas.

Csanyi, Edvard

2016 What is a Distribution Substation and Its Main Components? Electronic document: https://electrical-engineering-portal.com/distribution-substation, accessed September 17, 2020

2019 The Essentials of Radial Distribution System and Its Subtransmission Circuits. Electronic document: https://electrical-engineering-portal.com/radial-distribution-systems-subtransmission-circuits, accessed September 16, 2020.

Holmes and Narver, Inc.

1958 Facilities Brochure of the Nevada Test Site. Prepared for the U.S. Atomic Energy Commission, Las Vegas Branch Office.

1965 Mercury, Nevada Utilities Electrical Single Line Diagram. Drawing No. NV-71-03-05-1, Sheet 133 of 162. As Built version of a 1963 Koebig and Koebig diagram. U.S. Atomic Energy Commission, Nevada Operations Office, Las Vegas.

Hooper, Donald

2015 Donald "Don" Hooper: An interview conducted by Alexander B. Magoun. IEE History Center, 26 August 2015 & 14 September 2015. Electronic document, https://ethw.org/Oral-History:Don_Hooper, accessed March 31, 2020.

Johnson, Erika

2006 *Along the Smooth and Slender Wires: A Historical Context for Overhead Communication and Electrical Lines in Nevada*. Summit Project/Report No. 0694-035. Summit EnviroSolutions, Inc., Carson City, Nevada.

Koebig and Koebig, Inc.

1963 *Report on Utilities for Mercury, Nevada*. U.S. Atomic Energy Commission, Nevada Operations Office, Las Vegas.

Meyer, Lisa M.

2014 *Western Area Power Administration: Desert Southwest Region's Facilities Historic Context*. Western Area Power Administration HAER No. NV-27-0-2.

PCC Worldwide

2020 All dielectric self-supporting aerial cable. Electronic document, https://www.ppc-online.com/all-dielectric-self-supporting-aerial-cable, accessed March 31,2020.

Parmar, Jignesh

2011 Difference between Power Transformer and Distribution Transformers. https://electrical-engineering-portal.com/difference-between-power-transformer-and-distribution-transformer, accessed September 17, 2020.

Raytheon Services Nevada
1992 Area 23 Mercury-Facilities Map. Drawing No. JS-023-002-C2.

Reno, Ron, Cheryl M. Collins, and Maureen King
2018 *The Architecture of Mercury – Nevada's Atomic Boom Town, An Architectural Survey of Mercury, Area 23, Nevada National Security Site, Nye County, Nevada*. DOE/NV/0003 590-09, Desert Research Institute Cultural Resources Report TR115 Rev 1. Desert Research Institute, Las Vegas.

Reynolds Electrical and Engineering Co. Inc. (REECo)
1955 *Report on Existing Facilities at the Nevada Test Site for the United States Atomic Energy Commission*. Reynolds Electrical and Engineering Co., Inc., Las Vegas.

APPENDIX A

Photographic Documentation
(Stipulation VIII.C.1.b, c)

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INDEX TO PHOTOGRAPHS

Power and Communications System
Mercury Historic District
Mercury
Nye County
Nevada

Update to SHPO Resource
#S1707

INDEX TO HIGH-QUALITY DIGITAL IMAGES

JD Lancaster (Desert Research Institute), Photographer, May 2020

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2. VIEW OF THE 12 KV LINE LOOKING BACK TOWARD THE MAIN GATE FACING THE SOUTH-SOUTHWEST.
3. VIEW OF A 4.16 OR 2.4 KV POWER LINE AND COMMUNICATION SYSTEM AT THE INTERSECTION OF TRINITY AVENUE AND BUSTER STREET FACING THE NORTHEAST.
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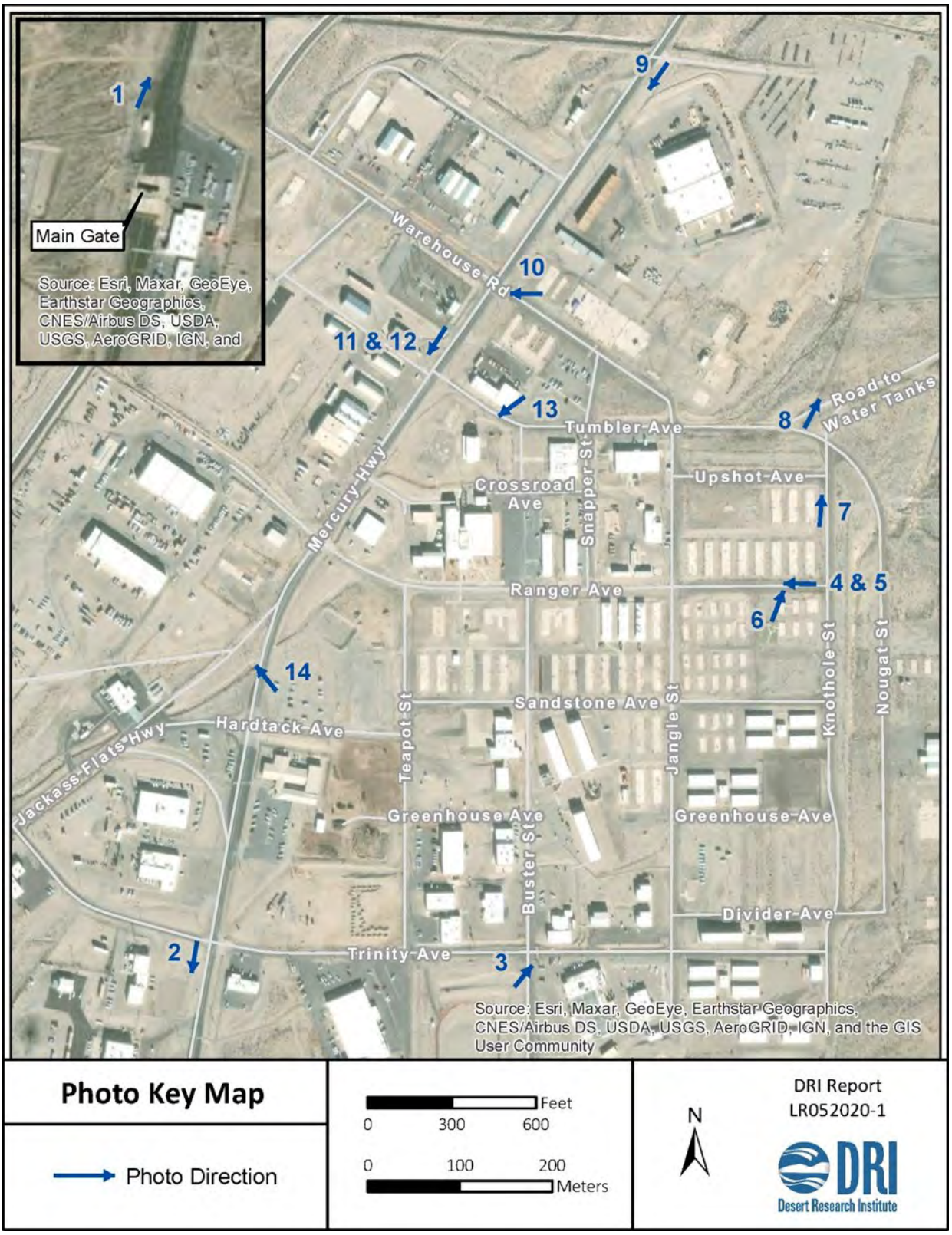
14. DETAIL OF THE 12 KV LINE WITH THE 4.16 KV UNDERBUILD ALONG MERCURY HIGHWAY.



Map key for photography.

PHOTOGRAPH 1. VIEW OF THE 12 KV LINE NEAR THE MAIN GATE
FACING THE NORTH-NORTHEAST (DRI_5290).

PHOTOGRAPH 2. VIEW OF THE 12 KV LINE LOOKING BACK TOWARD THE MAIN GATE FACING THE SOUTH-SOUTHWEST (DRI_5265).

PHOTOGRAPH 3. VIEW OF A 4.16 OR 2.4 KV POWER LINE AND COMMUNICATION SYSTEM AT THE INTERSECTION OF TRINITY AVENUE AND BUSTER STREET FACING THE NORTHEAST (DRI_5275).

PHOTOGRAPH 4. VIEW OF THE 4.16 OR 2.4 KV POWER LINE AND COMMUNICATION SYSTEM LOOKING DOWN RANGER AVENUE FACING THE WEST (DRI_5277).

PHOTOGRAPH 5. DETAIL OF A COBRA LIGHT FIXTURE ON RANGER AVENUE (DRI_5278).

PHOTOGRAPH 6. OVERVIEW OF THE 4.16 OR 2.4 KV SYSTEM NEAR THE INTERSECTION OF KNOTHOLE STREET AND RANGER AVENUE FACING THE NORTH-NORTHEAST (DRI_5282).

PHOTOGRAPH 7. VIEW OF THE 4.16 OR 2.4 KV POWER LINES NEAR THE INTERSECTION OF UPSHOT AVENUE AND KNOTHOLE STREET FACING THE NORTH (DRI_5254).

PHOTOGRAPH 8. VIEW OF THE COMMUNICATIONS LINE EXTENDING TO THE FORWARD AREAS FACING THE NORTH-NORTHEAST (DRI_5258).

PHOTOGRAPH 9. VIEW OF THE 4.16 OR 2.4 KV POWER LINES ALONG MERCURY HIGHWAY FACING THE SOUTH (DRI_5230).

PHOTOGRAPH 10. OVERVIEW OF THE MODERN MERCURY SUBSTATION ON WAREHOUSE AVENUE FACING THE WEST (DRI_5284).

PHOTOGRAPH 11. VIEW OF THE 12.5 KV POWER LINE WITH A 4.16 KV UNDERBUILD ALONG THE WEST SIDE OF MERCURY HIGHWAY FACING THE SOUTH (DRI_5231).

PHOTOGRAPH 12. DETAIL OF THE POWER LINE IN FRONT OF BUILDING 23-W7 (DRI_5233).

PHOTOGRAPH 13. VIEW OF POWER AND COMMUNICATIONS POLES NEAR THE OLD POWER PLANT FACING THE SOUTHWEST (DRI_5238).

PHOTOGRAPH 14. DETAIL OF THE 12 KV LINE WITH THE 4.16 KV UNDERBUILD (DRI_5262).

APPENDIX B

Architectural Resource Assessment Form
SHPO Resource No. S1707
(Stipulation VIII.C.1.a, c)

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NEVADA STATE HISTORIC PRESERVATION OFFICE

Architectural Resource Assessment (ARA) Form

For SHPO Use Only	SHPO Concurrence?: Y / N		Date:		
Survey Date	May 20, 2020	Recorded By	Desert Research Institute	Agency Report #	LR052020-1

The purpose of this update is to record additional information about the Mercury power and communications (P&C) system impacted by the ongoing modifications occurring as a result of the Mercury Modernization Project. The P&C system (State Historic Preservation Office [SHPO] Resource No. S1707) contributes to the significance of the Mercury Historic District (MHD) (SHPO Resource No. D230). Some power poles, many of which also support communications cabling, will be affected by changes to the overall town layout and landscaping in the center of Mercury. The Mercury Modernization Project will be implemented in accordance with the stipulations of the 2018 *Programmatic Agreement between the National Nuclear Security Administration Nevada Field Office (NNSA/NFO) and the Nevada State Historic Preservation Officer Regarding Modernization and Operational Maintenance of the Nevada National Security Site, at Mercury in Nye County, Nevada* (Mercury PA). Pursuant to the Mercury PA, the NNSA/NFO, in consultation with the SHPO, determined that new construction within the district may result in visual or other indirect effects to the overall historic character of the MHD (Stipulation II.D). This ARA form is being updated to mitigate the effects to the P&C system resulting from the new construction. In addition to the photographs in the ARA form, high-resolution digital images are provided in Attachment A.

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5. Narrative Eligibility Justification (Update)
Provide a detailed explanation of the resource's eligibility for the National Register, including supporting historic information, methods for evaluation under the four criteria, discussion of the seven aspects of integrity, and conclusions about eligibility.

There are no changes to the eligibility discussion for S1707. The structure itself remains not eligible as an individual system, but contributes to the eligibility of the MHD as a whole under Criteria A and C.

6. Narrative Architectural Description (Update)
Provide a detailed description of the resource, including all character defining features, potential construction methods, potential alterations (both historic and non-historic), and any accessory resources.

The last update to the ARA form for the P&C system (S1707) included a very brief summary of the description and recommendations for the electrical system in Mercury from the Master Plan (ABA 1962) and the Koebig and Koebig utilities report (1963). The maps included with this update show additional information that has been learned from engineering drawings during research for mitigation activities. Most notably, more information has been found about the capacities of the lines. The map on page 4 was created using drawings from 1972, 1979, and 1993. The capacity shown for each line is the highest observed on any of the three maps. Prior to the construction boom in Mercury during the mid-1960s, many of the lines in central Mercury had a capacity of only 2.4kV. During construction activities, most of the lines off the main distribution wires were upgraded to a 4.16kV capacity. The map on page 5 shows the first year a line appears on a drawing. Unfortunately, no drawings from before 1962 were available.

The 138kV line that supports operations in other areas of the NNSS runs through the MHD. It is described in the ARA form for SHPO Resource No. S1725.

The Koebig and Koebig utilities report contains a detailed description of the power system in the early 1960s and plans for its expansion. Note that some of the recommended changes may not have been implemented. The single line diagrams discussed in that report (Plates No. 4 and 5) were not attached to it; however, there is a 1965 As-Built version of a diagram produced by Holmes and Narver on a previous Koebig and Koebig diagram dated 1963 (possibly one of those from the utilities report), which is reproduced on page 12. An engineering drawing series that was drafted in 1993 is also included.

Very little information is available about the communications cabling installation and use in Mercury. A communications line on poles extends from the northeastern portion of Mercury to the forward areas. Many communications lines strung throughout Mercury are attached to poles below existing power lines, but there are some poles with only fiber optic cable attached.

Based on cable fragments found in the area (see upper left photo, p. 11) and the placement of the cable on the utility poles, it appears that aerial all-dielectric self-supporting (ADSS) fiber optic cable was used. ADSS cable was considered beneficial because it didn't contain metal and, therefore, could be installed safely by workers who did not have advanced electrical training (Hooper 2015). It is also light weight, and its dielectric properties make it possible to install the cable on the same utility pole below electrical distribution lines. ADSS cable can be installed quickly on an as-needed basis, which reduces the costs of planning and executing complex communications cabling projects (PCC Worldwide 2020).

The U.S. Government and the military were among the first to use fiber optic cable once it became commercially available. More than half of the lines installed between 1975 and 1978 served federal agencies (Gantz 1979). No information specific to the communications lines was encountered during the archival review.

7. References

List references used to research and evaluate the individual property.

The photo credited to RSL on page 10 is the property of the Remote Sensing Laboratory, Nellis Air Force Base.

These references are for both the text above and the material on the following pages.

Arthur Benedict Associates (ABA)
1962 *Master Plan Mercury, Nevada*. Prepared for the U.S. Atomic Energy Commission. Arthur Benedict Associates, Los Angeles.

Gantz, John
1979 The Secret and Promise of Fiber Optics. *Computerworld* 13(41);1-10 ("In Depth" section).

Holmes and Narver, Inc.
1965 Mercury, Nevada Utilities Electrical Single Line Diagram. Drawing No. NV-71-03-05.1, Sheet 133 of 162. As Built version of a 1963 Koebig and Koebig diagram. U.S. Atomic Energy Commission, Nevada Operations Office, Las Vegas.

1972 Nevada Test Site – Area 23 Utilities Power Distribution System. Drawing Nos. JS 023 080 E01.2 through E13.2. U.S. Atomic Energy Commission, Nevada Operations Office, Las Vegas.

1979 Area 23 Mercury Utilities Power, Drawing No. 8P_R_15279. Holmes and Narver On-Continent Test Division, Las Vegas.

Hooper, Donald
2015 Donald "Don" Hooper: An interview conducted by Alexander B. Magoun, IEEE History Center, 26 August 2015 & 14 September 2015. Electronic document, https://ethw.org/Oral-History:Don_Hooper, accessed March 31, 2020.

Koebig and Koebig, Inc.
1963 *Report on Utilities for Mercury, Nevada*. Atomic Energy Commission, Nevada Operations Office, Las Vegas.

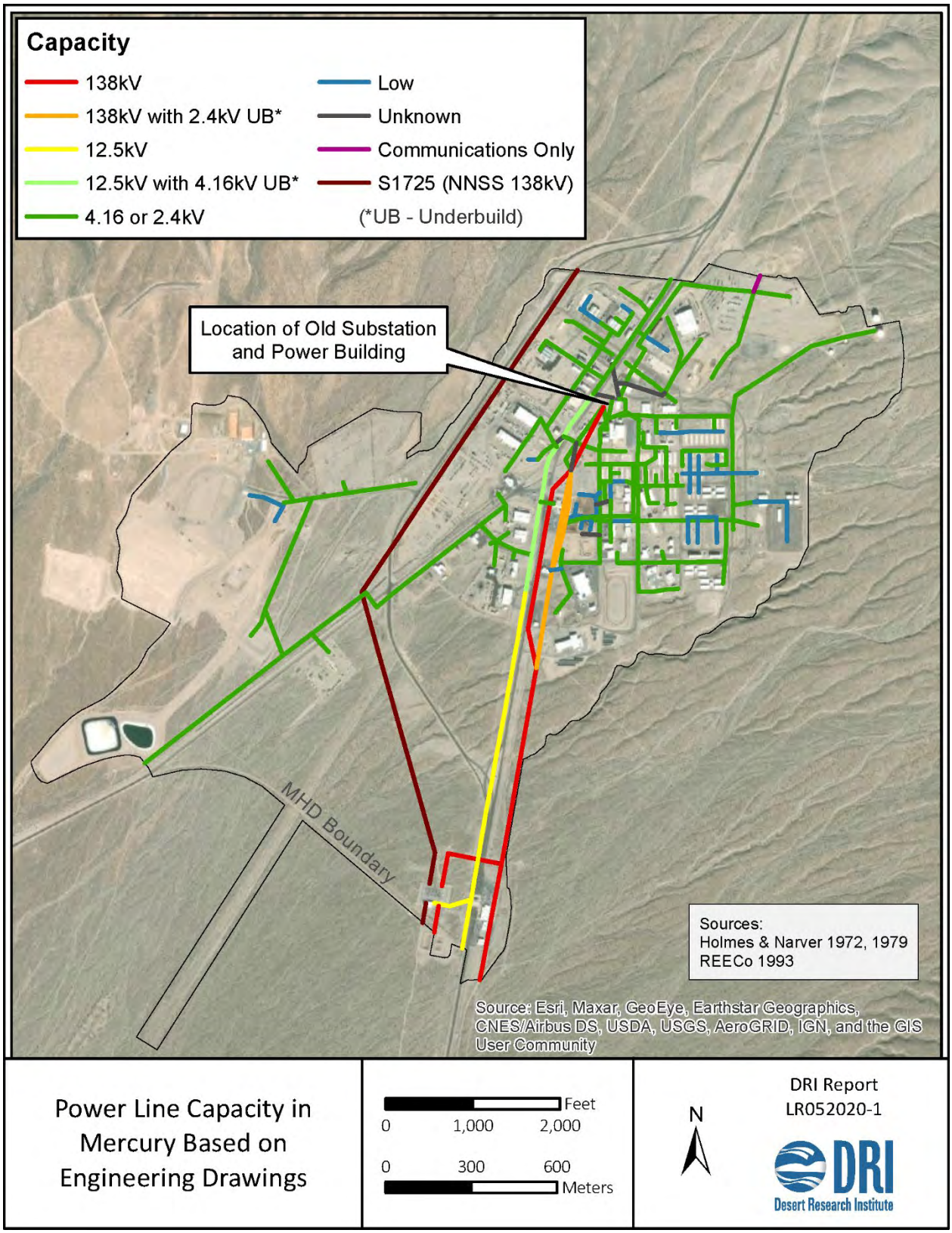
McAvinew, Thomas, and Raymond Mulley
2004 *Control System Documentation : Applying Symbols and Identification*. 2nd ed. Instrumentation, Systems, and Automation Society, Triangle Park, North Carolina.

PCC Worldwide
2020 All dielectric self-supporting aerial cable. Electronic document, https://www.ppc-online.com/all-dielectric-self-supporting-aerial-cable, accessed March 31, 2020.

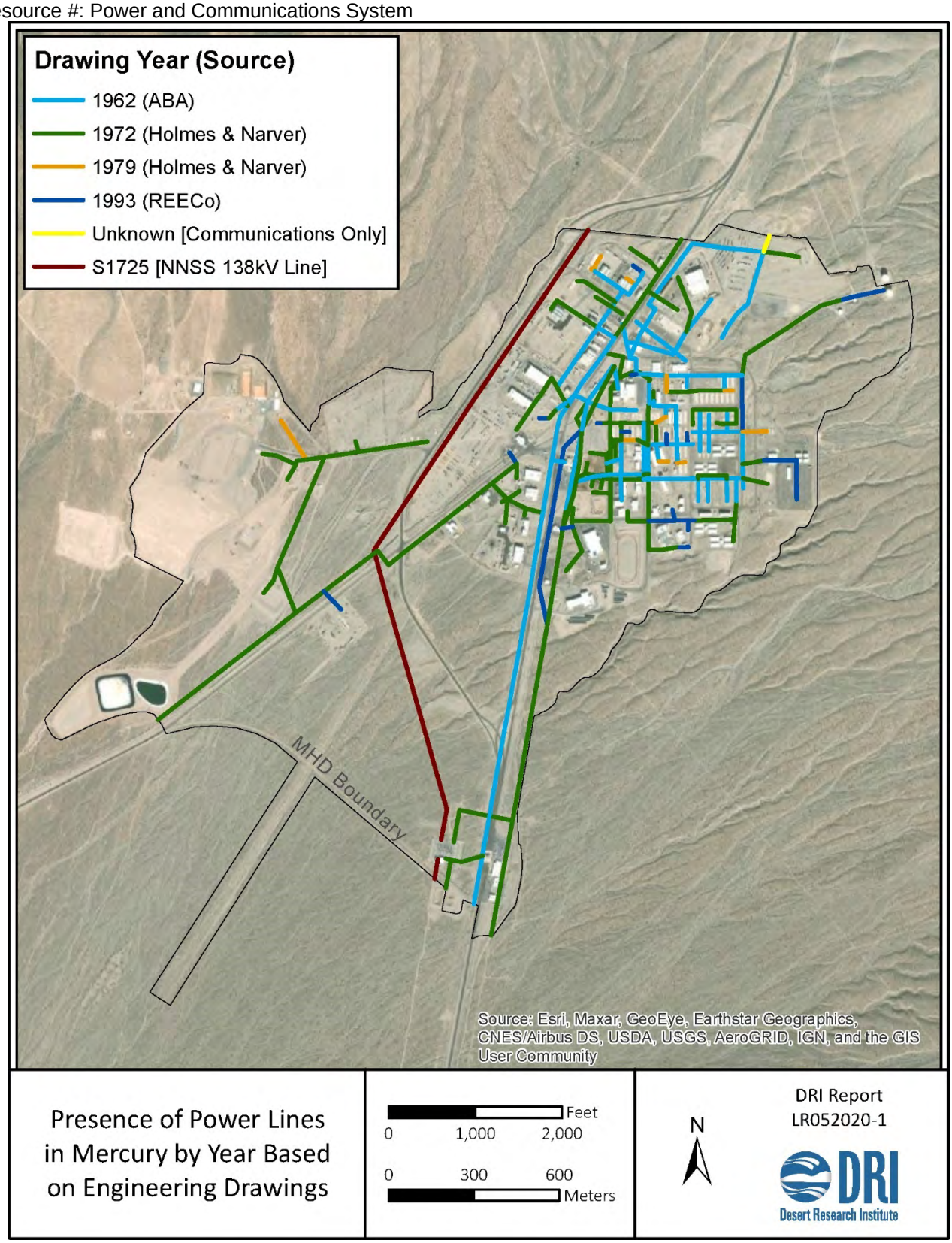
Reynolds Electrical and Engineering Co. Inc. (REECo)
1955 *Report on Existing Facilities at the Nevada Test Site for the United States Atomic Energy Commission*. Reynolds Electrical & Engineering Co., Inc., Las Vegas.

1993 Utilities Power Distribution Mercury, Area 23. Drawing No. 23-PS-556-E7, E9-19. U.S. Department of Energy, Nevada Field Office, Las Vegas.

10. Site Plan Map



NOTE: SHPO Resource No. S1725 has a separate ARA form.



Presence of Power Lines in Mercury by Year Based on Engineering Drawings

0 1,000 2,000 Feet
0 300 600 Meters

N

DRI Report
LR052020-1

DRI Desert Research Institute

NOTE: The 138-kV transmission line depicted above is shown on Koebig and Koebig 1963.

11. Photographs

Include as many photographs as needed to accurately depict the resource.

A power pole on the southeast side of the Recreation Building 23-113 from a 1955 facilities report (REECo 1955).

A sleeve covers a cable on the side of a pole used to provide electricity to a trailer park at the corner of Knothole Street and Greenhouse Avenue that was in use from 1961 into the 1980s (DRI 2019).

This pole near the parking lot entrance to Building 23-111 appears on the 1993 engineering drawing as part of the 138kV line on the east side of Mercury Highway. Photo faces southwest (DRI 2020).

The power line along the east side of Jangle Street between Ranger Avenue and Sandstone Avenue, facing southwest. One of the older poles was cut short but left in place to support the communications line (DRI 2020).

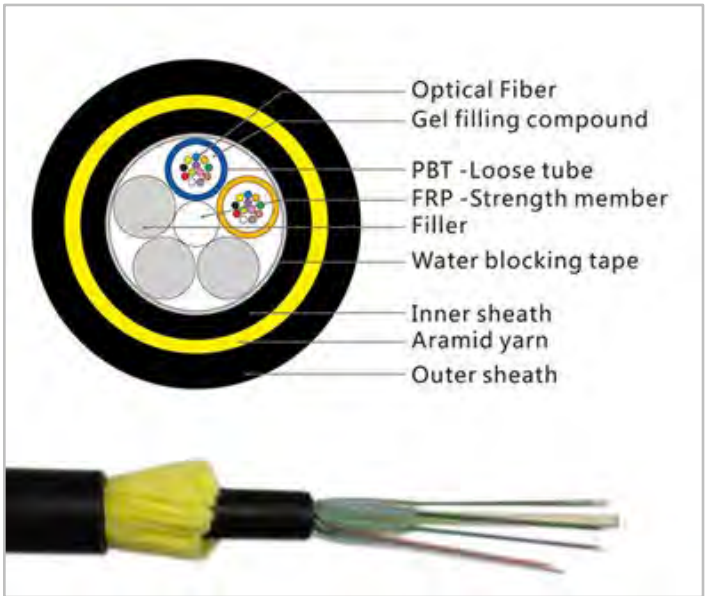
Detail of a typical electrical box on a power pole in Mercury (DRI 2020)

View of central Mercury, facing northwest (REECo 1982 [Photo 3025-10], 5/3/1965). Most of these power poles are still present in the 2013 photo below. The colored circles indicate matching pole locations.

Although this aerial photo was taken in 2013 (RSL), it represents the condition of the power and communications system in central Mercury in 1992 at the end of the period of significance for the district. With very few exceptions, only maintenance and repairs occurred between 1992 and 2013.

Closeup of a discarded piece of ADSS cable found on the ground in Mercury (DRI 2019).

The communications cables are the lower and thicker ones attached to this utility pole in Mercury (DRI 2017).



Schematic of a modern ADSS cable.
Source: https://www.gl-fiberoptic.com/product/24coreaerialadss/.

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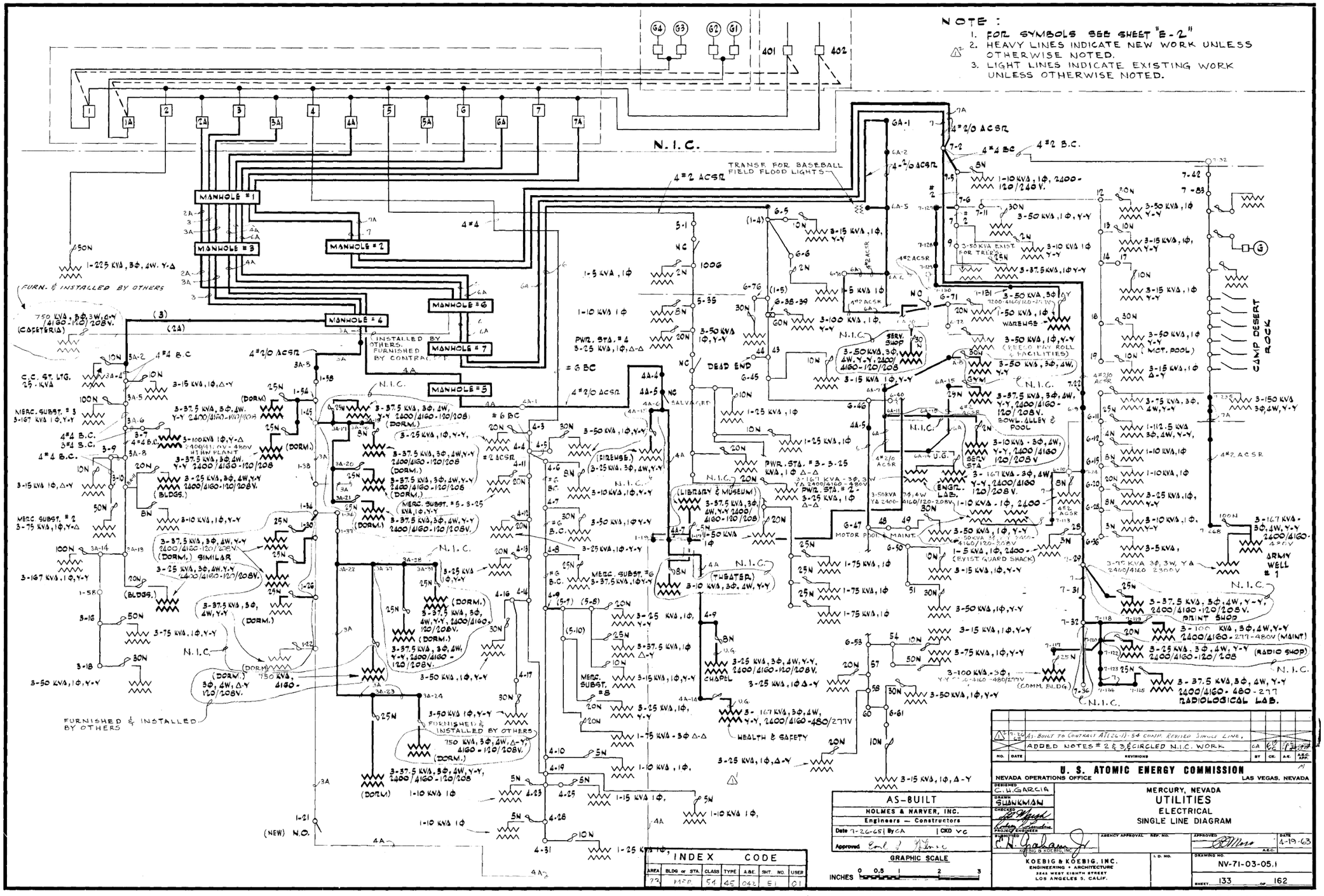

Holmes and Narver 1965

This type of diagram shows a simplified view of a three-phase power distribution system. The flow of electrical power is shown from the top down, representing the path from the source to the user with heavy solid lines (McAvinew and Mulley 2004).

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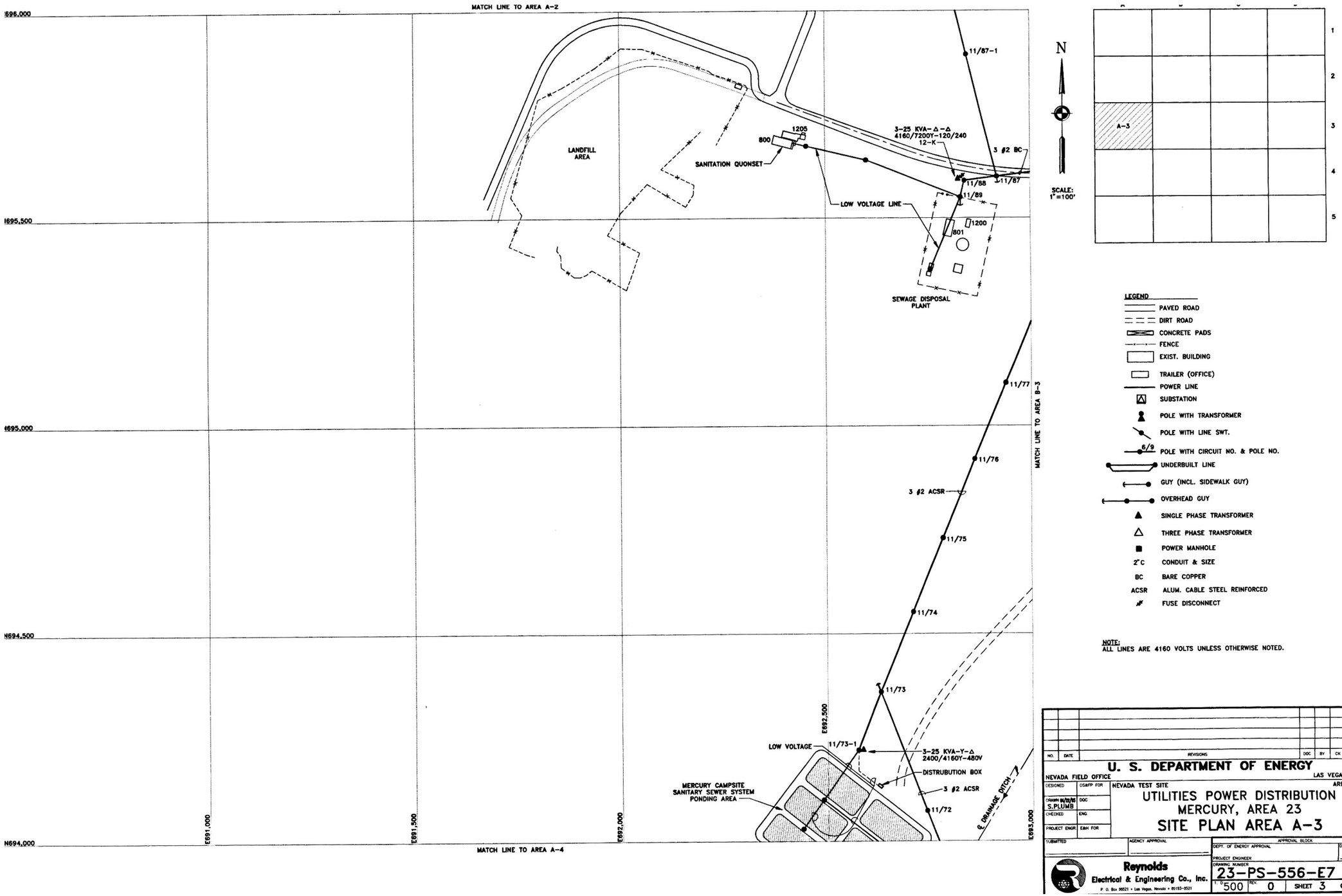
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LANDFILL AREA
SANITATION QUONSET
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1205
3-25 KVA-Δ-Δ
4160/7200Y-120/240
12-K
3 #2 BC
11/87-1
11/88
11/87
11/89
LOW VOLTAGE LINE
1200
801
SEWAGE DISPOSAL PLANT
11/77
11/76
3 #2 ACSR
11/75
11/74
11/73
LOW VOLTAGE
11/73-1
3-25 KVA-Y-Δ
2400/4160Y-480V
DISTRUBUTION BOX
3 #2 ACSR
11/72
MERCURY CAMPSITE SANITARY SEWER SYSTEM PONDING AREA
℄ DRAINAGE DITCH
N
SCALE: 1"=100'
A-3
1
2
3
4
5
LEGEND
PAVED ROAD
DIRT ROAD
CONCRETE PADS
FENCE
EXIST. BUILDING
TRAILER (OFFICE)
POWER LINE
SUBSTATION
POLE WITH TRANSFORMER
POLE WITH LINE SWT.
6/9 POLE WITH CIRCUIT NO. & POLE NO.
UNDERBUILT LINE
GUY (INCL. SIDEWALK GUY)
OVERHEAD GUY
SINGLE PHASE TRANSFORMER
THREE PHASE TRANSFORMER
POWER MANHOLE
2"C CONDUIT & SIZE
BC BARE COPPER
ACSR ALUM. CABLE STEEL REINFORCED
FUSE DISCONNECT
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ALL LINES ARE 4160 VOLTS UNLESS OTHERWISE NOTED.
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NEVADA FIELD OFFICE
LAS VEGAS, NEVA
NEVADA TEST SITE
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UTILITIES POWER DISTRIBUTION
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SITE PLAN AREA A-3
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APPROVAL BLOCK
DEPT. OF ENERGY APPROVAL
DATE
PROJECT ENGINEER
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Reynolds
Electrical & Engineering Co., Inc.
P. O. Box 98521 • Las Vegas, Nevada • 89193-8521
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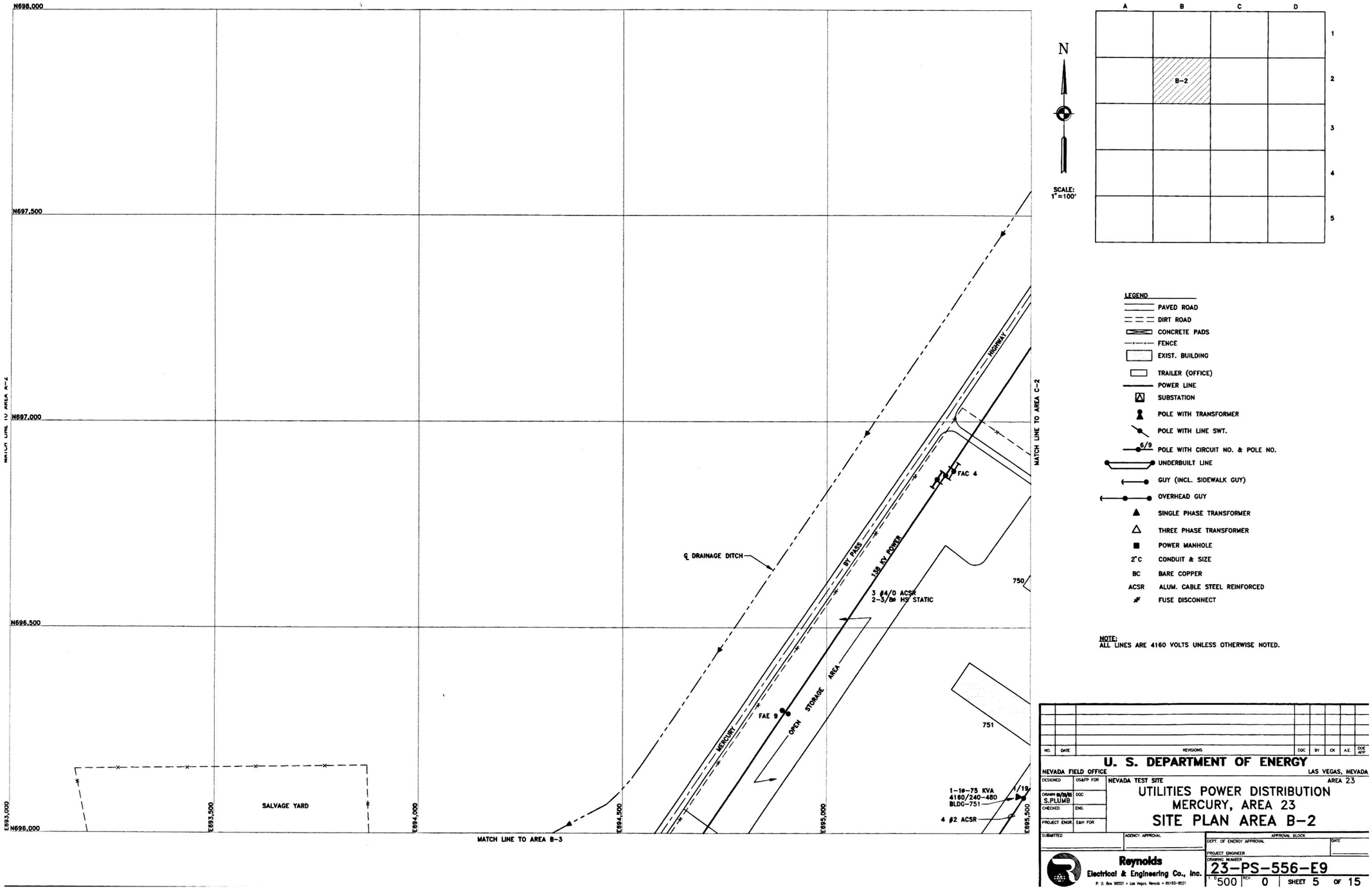
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MATCH LINE TO AREA C-2
MATCH LINE TO AREA B-3
SALVAGE YARD
℄ DRAINAGE DITCH
MERCURY
OPEN STORAGE AREA
BY PASS
138 KV POWER
3 #4/0 ACSR
2-3/8ø HS STATIC
FAE 9
FAC 4
HIGHWAY
750
751
1-10-75 KVA
4160/240-480
BLDG-751
1/19
4 #2 ACSR
N
SCALE:
1"=100'
A
B
C
D
1
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B-2
LEGEND
PAVED ROAD
DIRT ROAD
CONCRETE PADS
FENCE
EXIST. BUILDING
TRAILER (OFFICE)
POWER LINE
SUBSTATION
POLE WITH TRANSFORMER
POLE WITH LINE SWT.
6/9
POLE WITH CIRCUIT NO. & POLE NO.
UNDERBUILT LINE
GUY (INCL. SIDEWALK GUY)
OVERHEAD GUY
SINGLE PHASE TRANSFORMER
THREE PHASE TRANSFORMER
POWER MANHOLE
2"C
CONDUIT & SIZE
BC
BARE COPPER
ACSR
ALUM. CABLE STEEL REINFORCED
FUSE DISCONNECT
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LAS VEGAS, NEVADA
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NEVADA TEST SITE
AREA 23
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S.PLUMB
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PROJECT ENGR.
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UTILITIES POWER DISTRIBUTION
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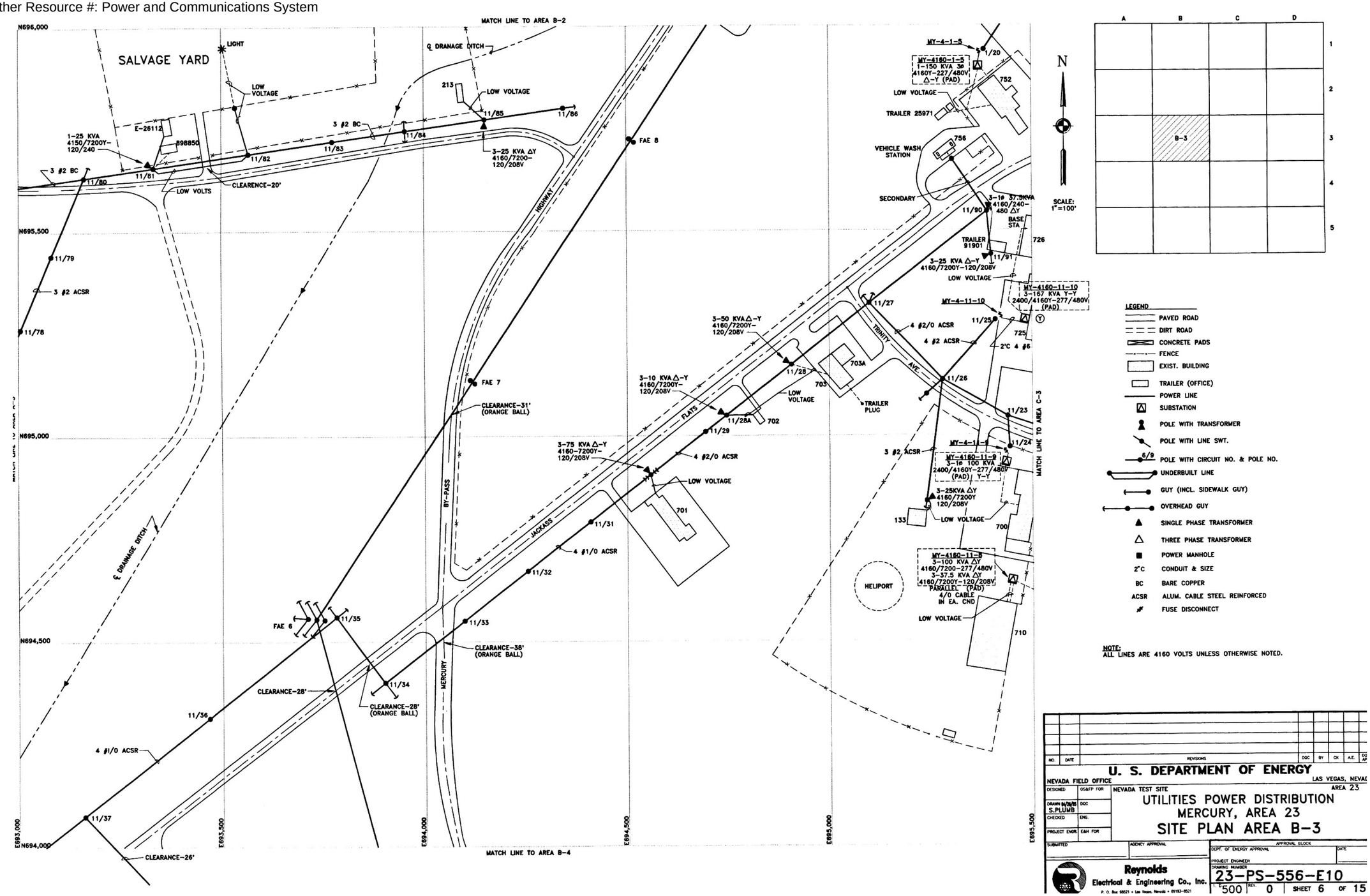

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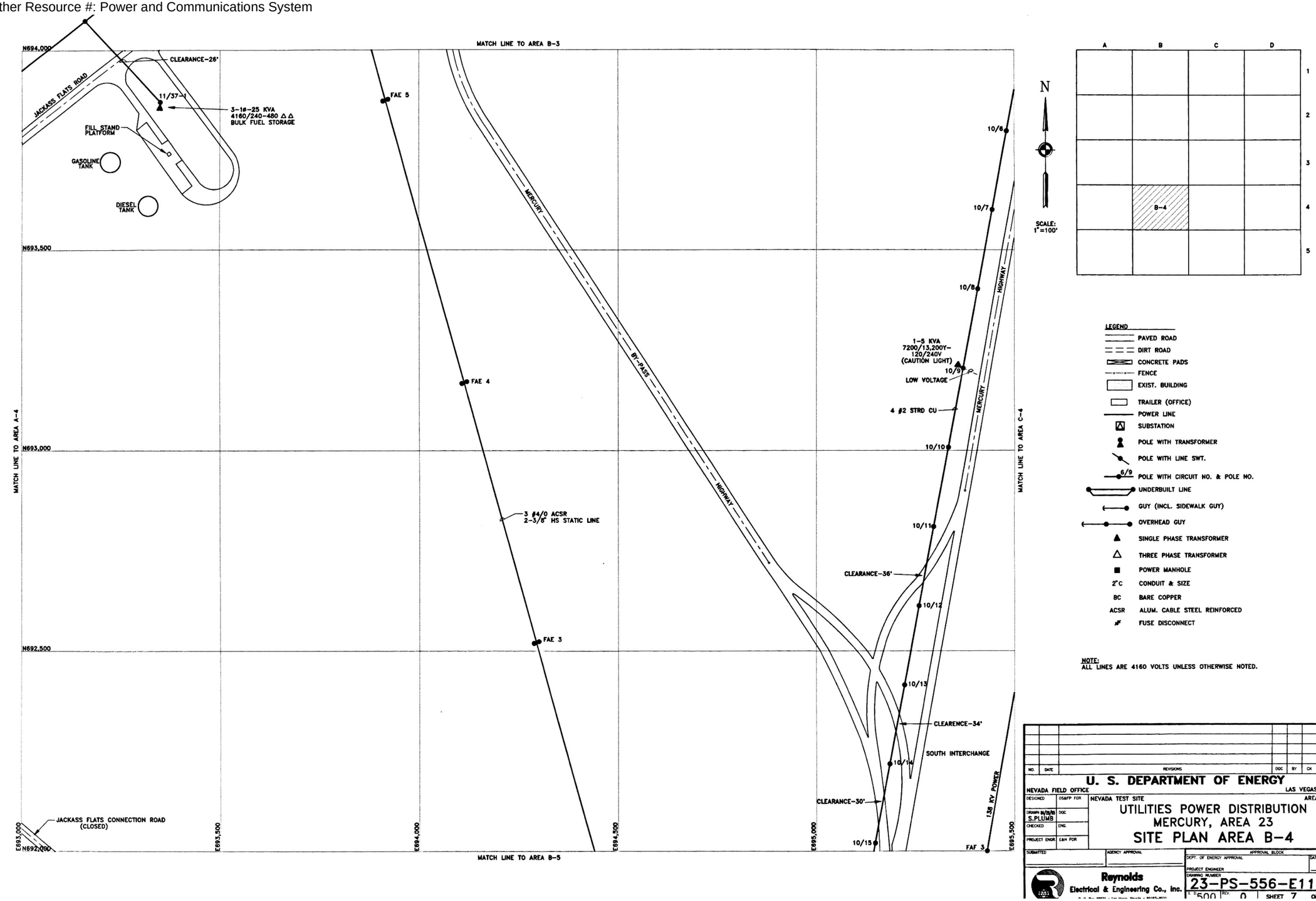
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JACKASS FLATS ROAD
CLEARANCE-26'
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BULK FUEL STORAGE
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DIESEL TANK
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FAE 4
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3 #4/0 ACSR
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MERCURY
BY-PASS
HIGHWAY
10/6
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7200/13,200Y-
120/240V
(CAUTION LIGHT)
10/9
LOW VOLTAGE
4 #2 STRD CU
10/10
10/11
CLEARANCE-36'
10/12
10/13
CLEARENCE-34'
SOUTH INTERCHANGE
10/14
CLEARANCE-30'
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138 KV POWER
FAE 3
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(CLOSED)
N
SCALE:
1"=100'
A
B
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B-4
LEGEND
PAVED ROAD
DIRT ROAD
CONCRETE PADS
FENCE
EXIST. BUILDING
TRAILER (OFFICE)
POWER LINE
SUBSTATION
POLE WITH TRANSFORMER
POLE WITH LINE SWT.
6/9 POLE WITH CIRCUIT NO. & POLE NO.
UNDERBUILT LINE
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2"C CONDUIT & SIZE
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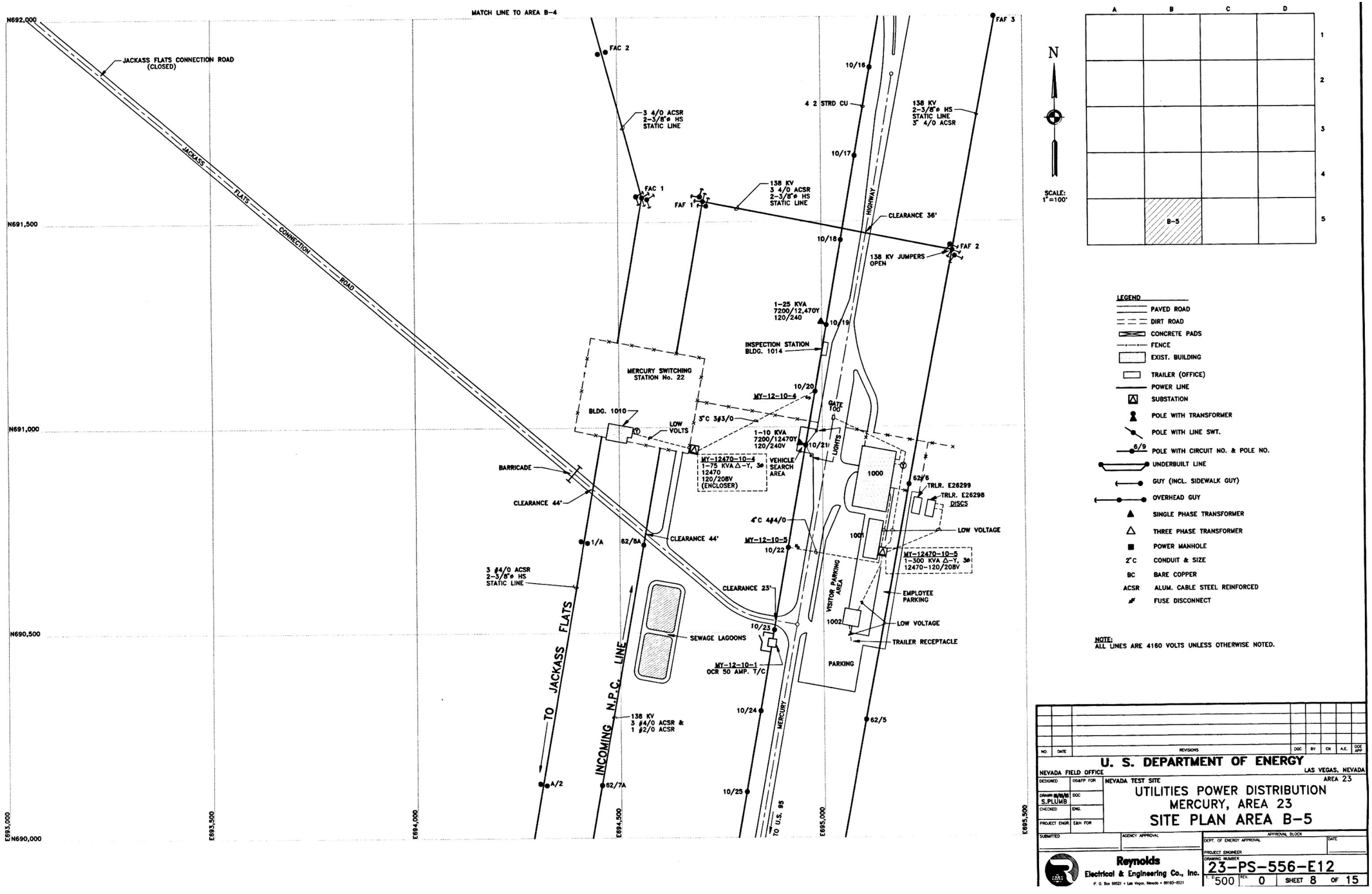
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JACKASS FLATS CONNECTION ROAD (CLOSED)
JACKASS FLATS CONNECTION ROAD
FAC 2
FAC 1
FAF 1
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3 4/0 ACSR 2-3/8"ø HS STATIC LINE
138 KV 3 4/0 ACSR 2-3/8"ø HS STATIC LINE
4 2 STRD CU
138 KV 2-3/8"ø HS STATIC LINE 3 4/0 ACSR
HIGHWAY
CLEARANCE 36'
138 KV JUMPERS OPEN
1-25 KVA 7200/12,470Y 120/240
INSPECTION STATION BLDG. 1014
MERCURY SWITCHING STATION No. 22
BLDG. 1010
LOW VOLTS
MY-12-10-4
3"C 3#3/0
GATE 100'
1-10 KVA 7200/12470Y 120/240V
LIGHTS
MY-12470-10-4 1-75 KVA Δ-Y, 3ø 12470 120/208V (ENCLOSER)
VEHICLE SEARCH AREA
BARRICADE
CLEARANCE 44'
1000
TRLR. E26299
TRLR. E26298
DISCS
LOW VOLTAGE
4"C 4#4/0
MY-12-10-5
MY-12470-10-5 1-300 KVA Δ-Y, 3ø 12470-120/208V
3 #4/0 ACSR 2-3/8"ø HS STATIC LINE
CLEARANCE 23'
VISITOR PARKING AREA
EMPLOYEE PARKING
1002
TRAILER RECEPTACLE
SEWAGE LAGOONS
MY-12-10-1 OCR 50 AMP. T/C
PARKING
TO JACKASS FLATS
INCOMING N.P.C. LINE
138 KV 3 #4/0 ACSR & 1 #2/0 ACSR
MERCURY
TO U.S. 95
N
SCALE: 1"=100'
A
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B-5
LEGEND
PAVED ROAD
DIRT ROAD
CONCRETE PADS
FENCE
EXIST. BUILDING
TRAILER (OFFICE)
POWER LINE
SUBSTATION
POLE WITH TRANSFORMER
POLE WITH LINE SWT.
POLE WITH CIRCUIT NO. & POLE NO.
UNDERBUILT LINE
GUY (INCL. SIDEWALK GUY)
OVERHEAD GUY
SINGLE PHASE TRANSFORMER
THREE PHASE TRANSFORMER
POWER MANHOLE
CONDUIT & SIZE
BC BARE COPPER
ACSR ALUM. CABLE STEEL REINFORCED
FUSE DISCONNECT
NOTE:
ALL LINES ARE 4160 VOLTS UNLESS OTHERWISE NOTED.
NO. DATE REVISIONS DOC BY CK A.E. DOE APP
U. S. DEPARTMENT OF ENERGY
NEVADA FIELD OFFICE
LAS VEGAS, NEVADA
AREA 23
NEVADA TEST SITE
DESIGNED
OS&FP FOR
DRAWN 00/00/00 S.PLUMB
DOC
CHECKED
ENG.
PROJECT ENGR.
E&H FOR
UTILITIES POWER DISTRIBUTION
MERCURY, AREA 23
SITE PLAN AREA B-5
SUBMITTED
AGENCY APPROVAL
APPROVAL BLOCK
DEPT. OF ENERGY APPROVAL
DATE
PROJECT ENGINEER
Reynolds
Electrical & Engineering Co., Inc.
P. O. Box 98521 • Las Vegas, Nevada • 89193-8521
DRAWING NUMBER
23-PS-556-E12
1" = 500
REV. 0
SHEET 8 OF 15

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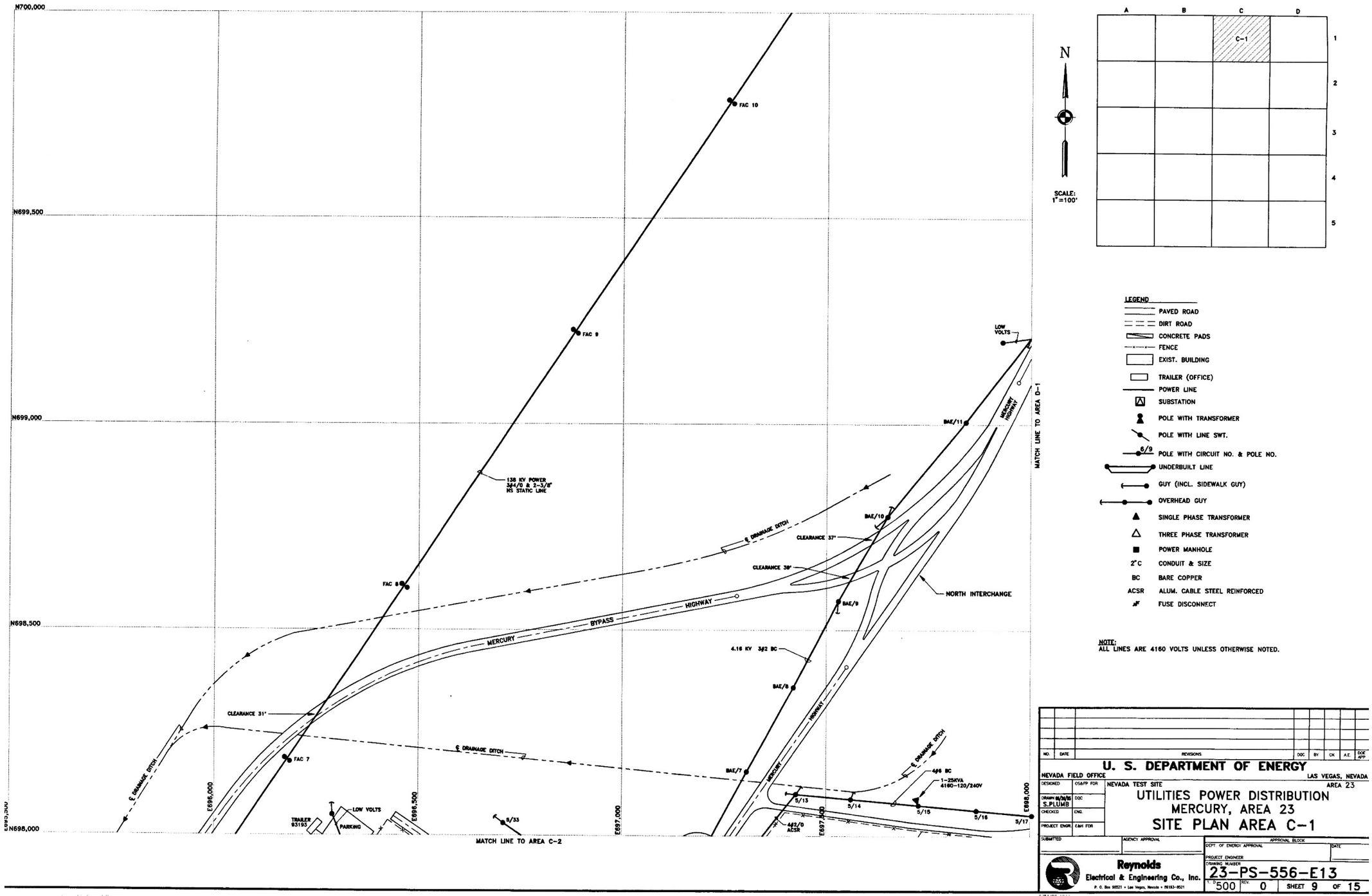
N700,000
N699,500
N699,000
N698,500
N698,000
E696,000
E696,500
E697,000
E697,500
E698,000
FAC 10
FAC 9
FAC 8
FAC 7
138 KV POWER
3#4/0 & 2-3/8"
HS STATIC LINE
℄ DRAINAGE DITCH
CLEARANCE 37'
CLEARANCE 38'
CLEARANCE 31'
MERCURY BYPASS HIGHWAY
NORTH INTERCHANGE
4.16 KV 3#2 BC
BAE/11
BAE/10
BAE/9
BAE/8
BAE/7
MERCURY HIGHWAY
LOW VOLTS
TRAILER 93193
PARKING
5/33
5/13
5/14
5/15
5/16
5/17
4#6 BC
1-25KVA
4160-120/240V
4#2/0 ACSR
MATCH LINE TO AREA C-2
MATCH LINE TO AREA D-1
N
SCALE:
1"=100'
A
B
C
D
1
2
3
4
5
C-1
LEGEND
PAVED ROAD
DIRT ROAD
CONCRETE PADS
FENCE
EXIST. BUILDING
TRAILER (OFFICE)
POWER LINE
SUBSTATION
POLE WITH TRANSFORMER
POLE WITH LINE SWT.
6/9
POLE WITH CIRCUIT NO. & POLE NO.
UNDERBUILT LINE
GUY (INCL. SIDEWALK GUY)
OVERHEAD GUY
SINGLE PHASE TRANSFORMER
THREE PHASE TRANSFORMER
POWER MANHOLE
2"C
CONDUIT & SIZE
BC
BARE COPPER
ACSR
ALUM. CABLE STEEL REINFORCED
FUSE DISCONNECT
NOTE:
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NO.
DATE
REVISIONS
DOC
BY
CK
A.E.
DOE APP.
U. S. DEPARTMENT OF ENERGY
NEVADA FIELD OFFICE
LAS VEGAS, NEVADA
DESIGNED
OS&FP FOR
NEVADA TEST SITE
AREA 23
DRAWN 05/30/85
S.PLUMB
DOC
CHECKED
ENG.
PROJECT ENGR.
E&H FOR
UTILITIES POWER DISTRIBUTION
MERCURY, AREA 23
SITE PLAN AREA C-1
SUBMITTED
AGENCY APPROVAL
APPROVAL BLOCK
DEPT. OF ENERGY APPROVAL
DATE
PROJECT ENGINEER
Reynolds
Electrical & Engineering Co., Inc.
P. O. Box 80521 • Las Vegas, Nevada • 89183-0521
DRAWING NUMBER
23-PS-556-E13
1" = 500'
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SHEET 9 OF 15

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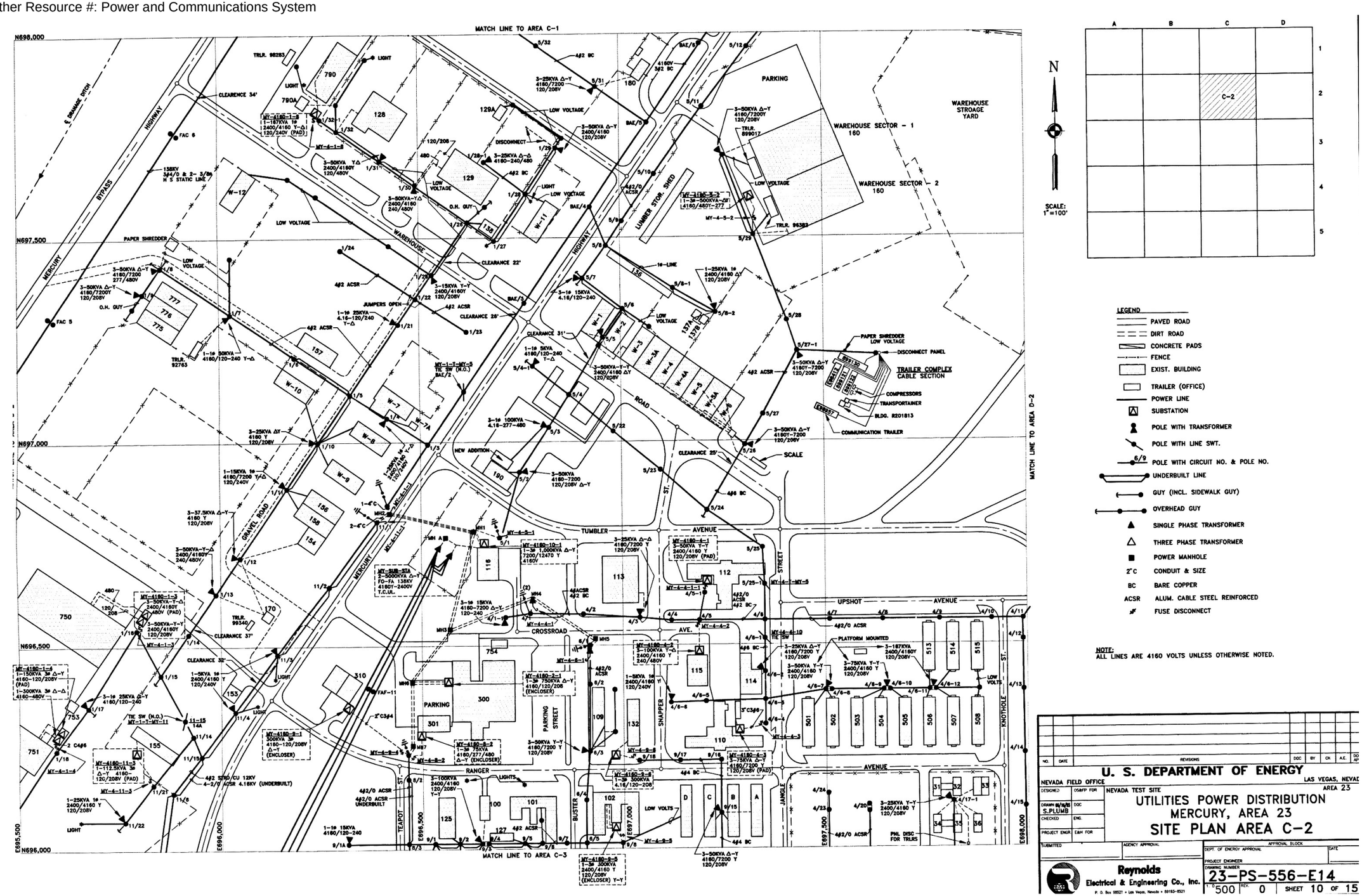
MATCH LINE TO AREA C-1
MATCH LINE TO AREA D-2
MATCH LINE TO AREA C-3
N
SCALE: 1"=100'
C-2
LEGEND
PAVED ROAD
DIRT ROAD
CONCRETE PADS
FENCE
EXIST. BUILDING
TRAILER (OFFICE)
POWER LINE
SUBSTATION
POLE WITH TRANSFORMER
POLE WITH LINE SWT.
POLE WITH CIRCUIT NO. & POLE NO.
UNDERBUILT LINE
GUY (INCL. SIDEWALK GUY)
OVERHEAD GUY
SINGLE PHASE TRANSFORMER
THREE PHASE TRANSFORMER
POWER MANHOLE
CONDUIT & SIZE
BC BARE COPPER
ACSR ALUM. CABLE STEEL REINFORCED
FUSE DISCONNECT
NOTE:
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U. S. DEPARTMENT OF ENERGY
NEVADA FIELD OFFICE
LAS VEGAS, NEVADA
NEVADA TEST SITE
AREA 23
UTILITIES POWER DISTRIBUTION
MERCURY, AREA 23
SITE PLAN AREA C-2
Reynolds
Electrical & Engineering Co., Inc.
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SHEET 10 OF 15

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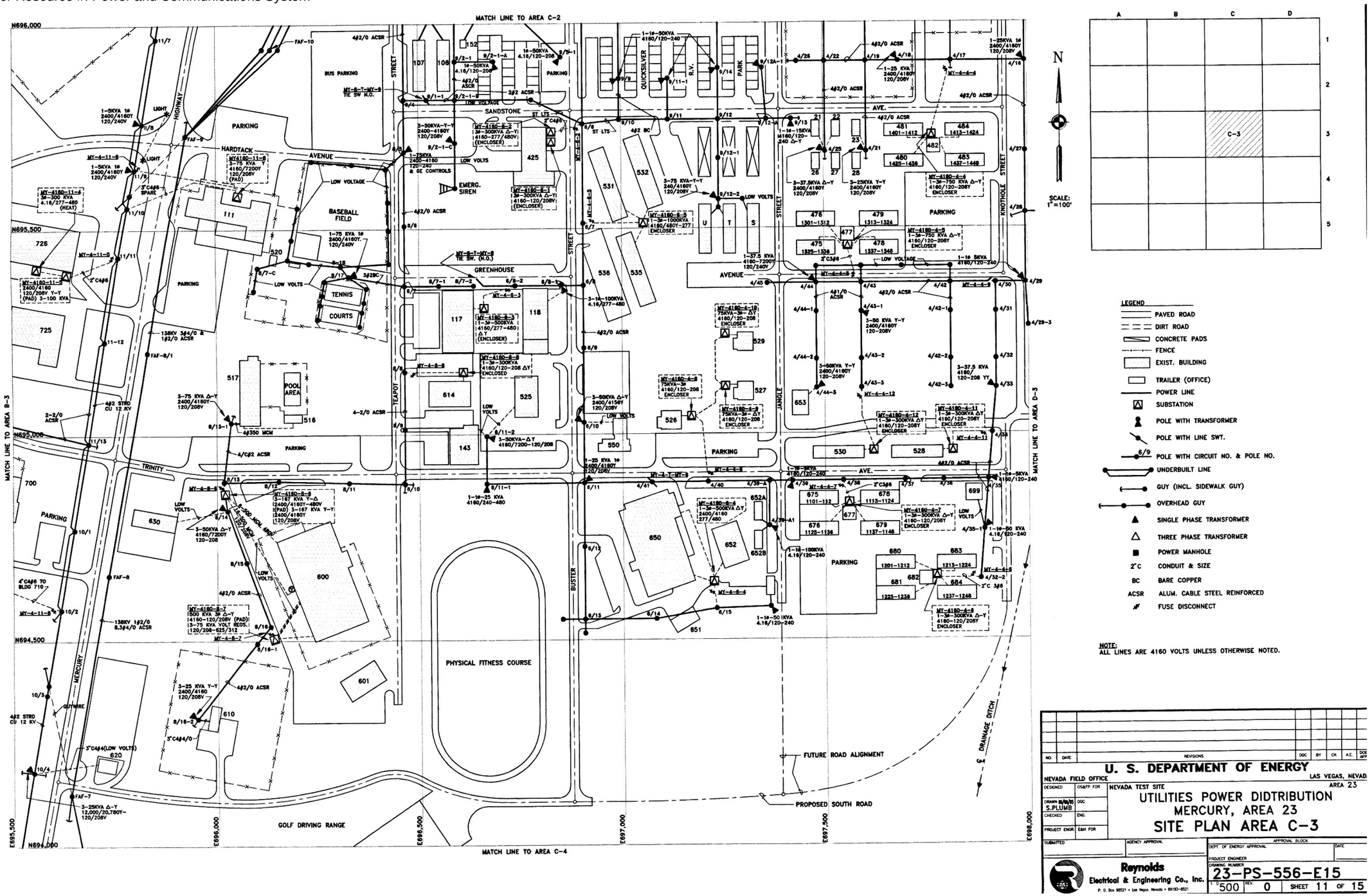
MATCH LINE TO AREA C-2
MATCH LINE TO AREA B-3
MATCH LINE TO AREA D-3
MATCH LINE TO AREA C-4
N696,000
N695,500
N695,000
N694,500
N694,000
E695,500
E696,000
E696,500
E697,000
E697,500
E698,000
HIGHWAY
HARDTACK
AVENUE
SANDSTONE
STREET
QUICKSILVER
R.V.
PARK
KNOTHOLE
TEAPOT
JANGLE
TRINITY
MERCURY
BUSTER
PARKING
BUS PARKING
BASEBALL FIELD
TENNIS COURTS
POOL AREA
GREENHOUSE
EMERG. SIREN
PHYSICAL FITNESS COURSE
GOLF DRIVING RANGE
DRAINAGE DITCH
FUTURE ROAD ALIGNMENT
PROPOSED SOUTH ROAD
N
SCALE: 1"=100'
C-3
LEGEND
PAVED ROAD
DIRT ROAD
CONCRETE PADS
FENCE
EXIST. BUILDING
TRAILER (OFFICE)
POWER LINE
SUBSTATION
POLE WITH TRANSFORMER
POLE WITH LINE SWT.
POLE WITH CIRCUIT NO. & POLE NO.
UNDERBUILT LINE
GUY (INCL. SIDEWALK GUY)
OVERHEAD GUY
SINGLE PHASE TRANSFORMER
THREE PHASE TRANSFORMER
POWER MANHOLE
CONDUIT & SIZE
BARE COPPER
ALUM. CABLE STEEL REINFORCED
FUSE DISCONNECT
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U. S. DEPARTMENT OF ENERGY
NEVADA FIELD OFFICE
LAS VEGAS, NEVADA
NEVADA TEST SITE
AREA 23
UTILITIES POWER DIDTRIBUTION
MERCURY, AREA 23
SITE PLAN AREA C-3
Reynolds
Electrical & Engineering Co., Inc.
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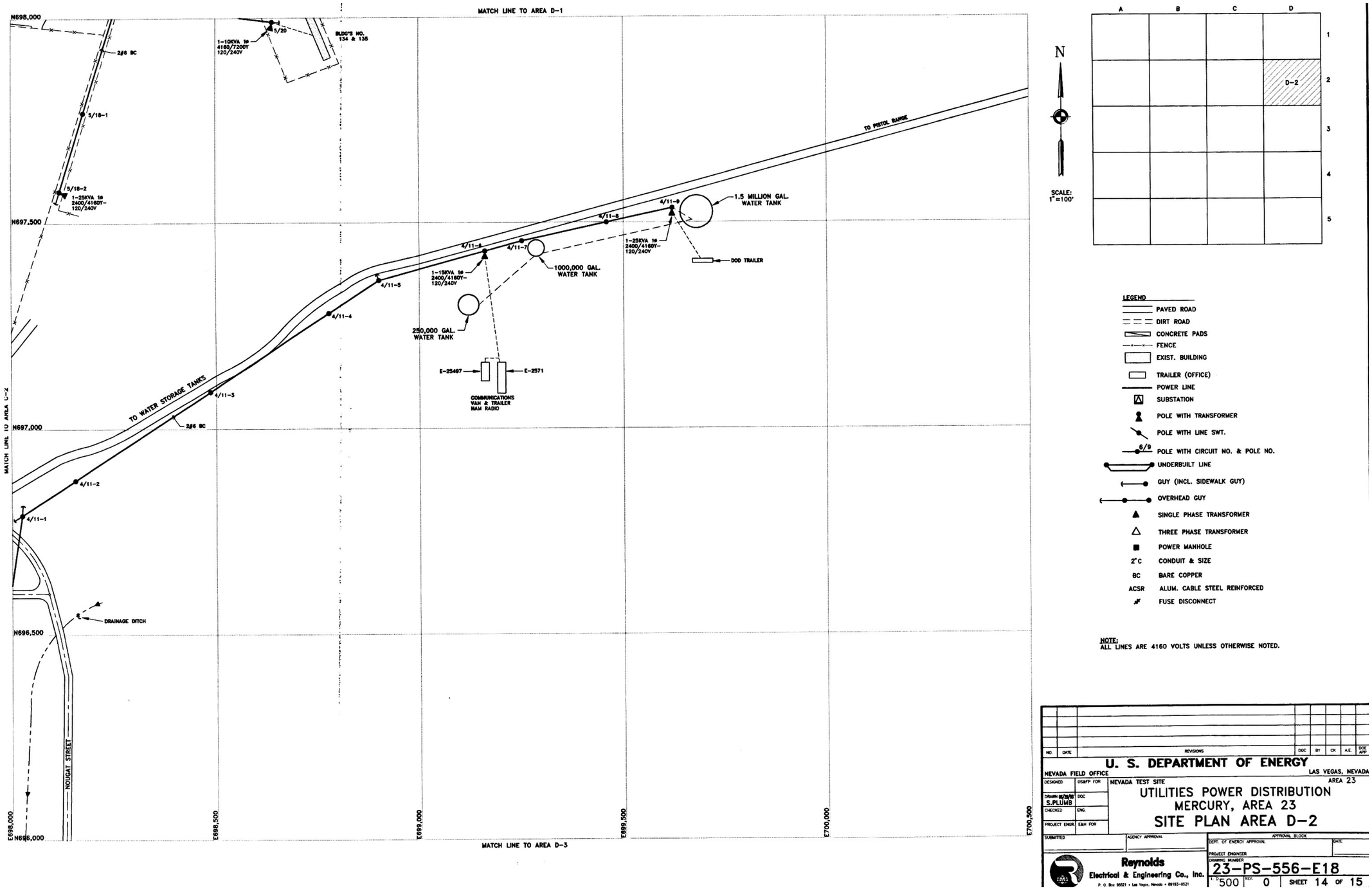
MATCH LINE TO AREA D-1
N698,000
N697,500
N697,000
N696,500
N696,000
E698,000
E698,500
E699,000
E699,500
E700,000
E700,500
MATCH LINE TO AREA C-2
MATCH LINE TO AREA D-3
2/6 BC
5/18-1
5/18-2
1-25KVA to 2400/4160Y-120/240V
1-10KVA to 4160/7200Y 120/240V
5/20
BLDG'S NO. 134 & 135
TO PISTOL RANGE
4/11-9
4/11-8
4/11-7
4/11-6
4/11-5
4/11-4
4/11-3
4/11-2
4/11-1
1.5 MILLION GAL. WATER TANK
1-25KVA to 2400/4160Y-120/240V
DOD TRAILER
1000,000 GAL. WATER TANK
1-15KVA to 2400/4160Y-120/240V
250,000 GAL. WATER TANK
E-25497
E-2571
COMMUNICATIONS VAN & TRAILER HAM RADIO
TO WATER STORAGE TANKS
2/6 BC
DRAINAGE DITCH
NOUGAT STREET
N
SCALE: 1"=100'
A
B
C
D
1
2
3
4
5
D-2
LEGEND
PAVED ROAD
DIRT ROAD
CONCRETE PADS
FENCE
EXIST. BUILDING
TRAILER (OFFICE)
POWER LINE
SUBSTATION
POLE WITH TRANSFORMER
POLE WITH LINE SWT.
6/9 POLE WITH CIRCUIT NO. & POLE NO.
UNDERBUILT LINE
GUY (INCL. SIDEWALK GUY)
OVERHEAD GUY
SINGLE PHASE TRANSFORMER
THREE PHASE TRANSFORMER
POWER MANHOLE
2"C CONDUIT & SIZE
BC BARE COPPER
ACSR ALUM. CABLE STEEL REINFORCED
FUSE DISCONNECT
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NO. DATE REVISIONS DOC BY CK A.E. DOC APP
U. S. DEPARTMENT OF ENERGY
NEVADA FIELD OFFICE
LAS VEGAS, NEVADA
NEVADA TEST SITE
AREA 23
DESIGNED OSAFP FOR
DRAWN 8/20/85 S.PLUMB DOC
CHECKED ENG.
PROJECT ENGR. E&H FOR
UTILITIES POWER DISTRIBUTION
MERCURY, AREA 23
SITE PLAN AREA D-2
SUBMITTED
AGENCY APPROVAL
APPROVAL BLOCK
DEPT. OF ENERGY APPROVAL
DATE
PROJECT ENGINEER
DRAWING NUMBER
23-PS-556-E18
Reynolds
Electrical & Engineering Co., Inc.
P. O. Box 98521 • Las Vegas, Nevada • 89193-8521
1"=500'
REV. 0
SHEET 14 OF 15

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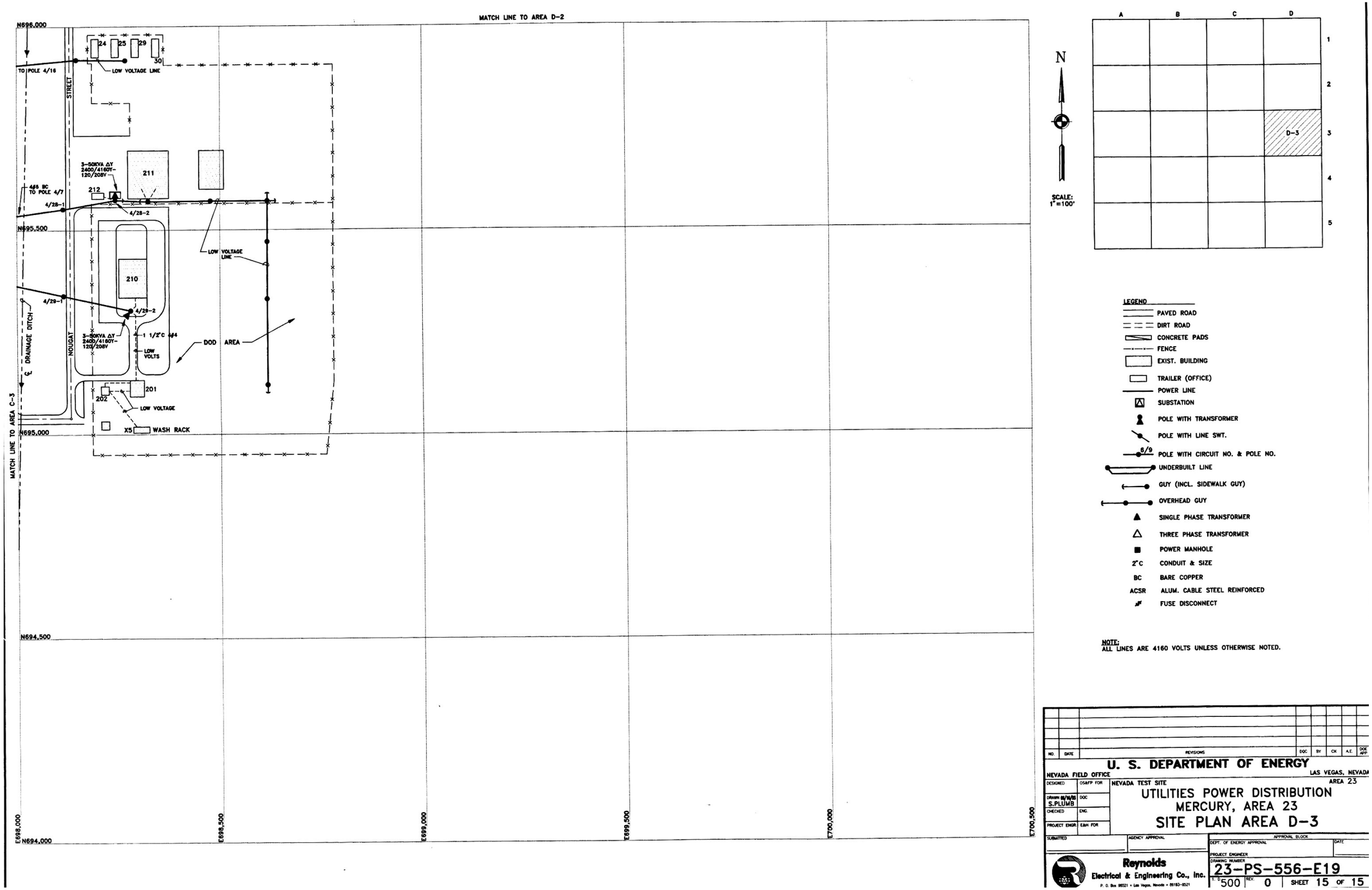
MATCH LINE TO AREA D-2
MATCH LINE TO AREA C-3
N696,000
N695,500
N695,000
N694,500
N694,000
E698,000
E698,500
E699,000
E699,500
E700,000
E700,500
TO POLE 4/16
LOW VOLTAGE LINE
STREET
NOUGAT
DRAINAGE DITCH
24
25
29
30
211
212
210
201
202
X5
WASH RACK
3-50KVA ΔY 2400/4160Y-120/208V
4/0 BC TO POLE 4/7
4/28-1
4/28-2
4/29-1
4/29-2
1 1/2"C #4
LOW VOLTS
DOD AREA
LOW VOLTAGE
N
SCALE: 1"=100'
A
B
C
D
1
2
3
4
5
D-3
LEGEND
PAVED ROAD
DIRT ROAD
CONCRETE PADS
FENCE
EXIST. BUILDING
TRAILER (OFFICE)
POWER LINE
SUBSTATION
POLE WITH TRANSFORMER
POLE WITH LINE SWT.
6/9 POLE WITH CIRCUIT NO. & POLE NO.
UNDERBUILT LINE
GUY (INCL. SIDEWALK GUY)
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POWER MANHOLE
2"C CONDUIT & SIZE
BC BARE COPPER
ACSR ALUM. CABLE STEEL REINFORCED
FUSE DISCONNECT
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NO.
DATE
REVISIONS
DGC
BY
CK
A.E.
DGC APP.
U. S. DEPARTMENT OF ENERGY
NEVADA FIELD OFFICE
LAS VEGAS, NEVADA
DESIGNED
OS&FP FOR
NEVADA TEST SITE
AREA 23
DRAWN 6/9/93 S.PLUMB
DGC
CHECKED
ENG.
PROJECT ENGR
E&H FOR
UTILITIES POWER DISTRIBUTION
MERCURY, AREA 23
SITE PLAN AREA D-3
SUBMITTED
AGENCY APPROVAL
APPROVAL BLOCK
DEPT. OF ENERGY APPROVAL
DATE
PROJECT ENGINEER
DRAWING NUMBER
23-PS-556-E19
Reynolds
Electrical & Engineering Co., Inc.
P. O. Box 95521 • Las Vegas, Nevada • 89193-8521
T. D. 500
REV. 0
SHEET 15 OF 15

(REECo 1993).

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Selection of additional drawings related to the Mercury Power Distribution System available from the Nuclear Testing Archive, Las Vegas.

Name	Description/Title	Issue Date
ATS J 3005_R_33106	POWER LAYOUT	12/29/1951
M 0110 E2.1_R_33122	POWER LAYOUT	09/04/1957
NV 30 01 01 E9.1_R_195290	LIGHTING & POWER PLAN	04/19/1965
NV 30 01 02 E10.1_R_195291	LIGHTING & POWER PLAN	04/19/1965
NV 71 03 05 E021.1_R_69278	POWER DISTRIBUTION SUBSTATION POLE MOUNTING	07/27/1965
NV 71 03 05 E022.1_R_69279	POWER DISTRIBUTION SUBSTATION PAD MOUNTING	07/27/1965
21307 E33.4_R_99356	12,470-120/208V STATION POWER INSTALLATION	12/02/1966
JS 023 080 E01.2 R_57463 thru E13.2	POWER DISTRIBUTION SYSTEM	11/01/1972
PV 404 MN_R_69123	6'X8'X7' POWER VAULT	11/26/1976
JS 023 080 E01.2_R_82790 thru E13.3	POWER DISTRIBUTION SYSTEM	06/01/1979
PAGE 8P_R_152179	MERCURY UTILITIES POWER	04/01/1979
JS 023 080 E01.3_R_140643 thru E09.5	POWER DISTRIBUTION SYSTEM	05/26/1981
23 PD E3_R_91993	POWER DISTRIBUTION SYSTEM PLAN	07/08/1982
NO NUMBER_R_159254	AREA 23 POWER MAP (MERCURY)	09/06/1985
JS 023 080 E09.5_R_208827	POWER DISTRIBUTION SYSTEM	10/01/1991

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SHPO Resource #: S1707 Rev. 2017
Other Resource #:

NEVADA STATE HISTORIC PRESERVATION OFFICE

Architectural Resource Assessment (ARA) Form

For SHPO Use Only	SHPO Concurrence?: Y / N		Date:		
Survey Date	5-24-2017	Recorded By	T. Menocal, L. Keach	Agency Report #	SR052417-1

1. Property Type

Building ☐	Structure ☒	Object ☐	Landscape (non-archaeological site) ☐

2. Property Overview and Location

Street Address	Ranger Ave. and Jangle St.				
City, Zip	Mercury, NV 89023				
County	Nye				
Assessor's Parcel #	N/A		Subdivision Name	N/A	
UTM Location (NAD 83, UTM Zone 11 North)	Easting: 589854		Northing: 4057713		
USGS Info	Township: 15S	Range: 53E	Section:	USGS 7.5' Quad & Date: Mercury, Nev. 1961, Photorevised 1983	
Ownership	Private ☐	Public-Local ☐	Public-State ☐	Public-Federal ☒	Multiple ☐
Should the property's location be kept confidential?	Yes ☐		No ☒		

3. Architectural Information

(Insert primary photograph below.)

Construction Date	1951 - 2001	
Architectural Style		
Architectural Type	Power & Communications Infrastructure	
Roof Form		
Roof Materials		
Exterior Wall Materials		
Foundation Materials		
Window Materials		
Window Type		
Accessory Resources?	Yes ☐	No ☒
	Number:	

Condition of Resource(s)?		
Good ☒	Fair ☐	Poor ☐
Explanation: Within the segment recorded, poles installed as far back as 1969 are still usable.		

4. Existing Listing & Potential District

Is the property listed in the National Register?	Yes ☐	No ☒	If yes, provide:	Date Listed:	
				NRIS #:	
Contributing to a	Yes	No ☒	If yes,	Name:	NRIS #:

listed historic district?	☐		provide:	Date listed:		
If no, is there a potential district?	Yes ☒	No ☐	If so, is this resource contributing?		Yes ☒	No ☐
District Name: Mercury Historic District					SHPO #: Recording in Progress	

5. NRHP Evaluation

If not already listed, complete the information below: ***Note: The current form is reporting a segment of the Mercury power and communications above-ground infrastructure. An evaluation of the Mercury Historic District is in progress. This form will be updated as part of that project to cover the entire power and communications system in Mercury. S1707 is not considered individually eligible to the NRHP, but is a contributing component to the potentially eligible Mercury Historic District.***

Eligible Under:	Criterion A ☐	Criterion B ☐	Criterion C ☐	Criterion D ☐		
	Not Eligible ☐	Unevaluated ☐				
Area(s) of Significance	Cold War, nuclear testing					
Period(s) of Significance	1951-1992					
Integrity – Does the resource possess integrity in all or some of the 7 aspects?						
Location ☐	Design ☐	Materials ☐	Workmanship ☐	Setting ☐	Feeling ☐	Association ☐
General Integrity:	Intact ☐	Altered ☒	Moved ☐	Date(s): 1950s-Present		
Threats to Resource:						
Historic Name						
Current/Common Name						
Historic/Original Owner	Atomic Energy Commission					
Current Owner	Department of Energy					
Current Owner Address						
Historic Building Use						
Current Building Use						
Architect/Engineer/Designer						
Builder/Contractor						

6. Narrative Eligibility Justification

Provide a detailed explanation of the resource's eligibility for the National Register, including supporting historic information, methods for evaluation under the four criteria, discussion of the seven aspects of integrity, and conclusions about eligibility.

The power and communications (P&C) line (SHPO Resource Number S1707) is a contributing eligible component of the unrecorded Mercury Historic District. Evaluation of the district is in progress, and it is assumed to be an NRHP-eligible resource under Criterion A, as an important part of the Cold War and nuclear testing in the U.S., and Criterion C, due to the unique needs and circumstances of its construction (Tlachac 1991). Mercury may be eligible under Criterion D due to its research potential regarding company and governmental town development. It may be eligible under Criterion B as well, pending further research.

Eighteen buildings within Mercury that were constructed from 1951 through 1963 were previously recorded as potentially eligible properties for the National Register of Historic Places (Beck et al. 1996). The bowling alley has since been further recorded and is considered an eligible contributing component to the Mercury Historic District (Reno and King 2016).

The P&C line (SHPO Resource Number S1707) is a contributing component of the unrecorded Mercury Historic District. However, taken out of the context of Mercury, the P&C line is not exemplary. Individually, it is not strongly associated with significant events in the broad patterns of national, state, or local history; it is not associated with the lives of significant persons; the line lacks distinctive elements of design and method of construction; and does not have the potential to yield information important to history. Therefore, in and of itself, the P&C line is not eligible under the significance criteria of 36 CFR Part 60.4.

However, the P&C line, including the section of the line recorded during this survey, is an integral part of the Mercury Historic District and is eligible as a contributing component of the district. The power supply to Mercury was necessary to support nuclear testing and was included in the AEC's earliest plans to build support facilities. During the testing period of 1951 to 1992, and continuing into the present, maintenance, expansion, and upgrades to the line have been a regular consideration to sustain mission activities at the NNSS. Such maintenance activities do not diminish the integrity of design, materials, and workmanship of the P&C system.

Evaluation of the district is in progress, and it is assumed to be an NRHP-eligible resource under Criterion A, as an important part of the Cold War and nuclear testing in the U.S., and Criterion C, due to the unique needs and circumstances of its construction. Mercury may be eligible under Criterion D due to its research potential regarding company and governmental town development. It may be eligible under Criterion B as well pending further research.

In order to contribute to the Mercury Historic District, S1707 must retain aspects of integrity. With regard to the material, design, and workmanship of the P&C line, most of the existing infrastructure (poles, wiring, and attached equipment) was installed during the period of significance (1951 – 1992) and still functions to provide power and communications capabilities to Mercury. The structure does retain these aspects of integrity.

S1707 retains integrity of location and setting when it is considered within the context of the district. Mercury could not have functioned without infrastructure; thus, the location and setting of the P&C line was vital to the Cold War efforts and the nuclear testing program. The electrical transformer in Mercury provided electricity to the town and to the forward areas during testing activities. The location of Mercury was selected due to its spatial relationship to Las Vegas and the testing areas, and the remote desert setting of the entire project was considered important in order to protect the public from fallout as much as possible and make it easier to provide a high level of perimeter security.

The aspects of feeling and association are also present for the structure. Regarding the physical structure itself, the line retains the feeling of an ever-changing infrastructure designed to keep up with the evolving technology and research needs of the testing program over its 41 year period of significance. The P&C line also retains sufficient historic character to maintain its association with the unrecorded Mercury Historic District. The crisscrossing pole lines are highly visible due to the sparse layout of the town and the prevalence of one-story buildings. Because of the importance of electricity and communications in moving the nuclear program forward, the structure contributes to the sense that Mercury was part of the critical nuclear testing effort during the Cold War.

7. Narrative Architectural Description

Provide a detailed description of the resource, including all character defining features, potential construction methods, potential alterations (both historic and non-historic), and any accessory resources.

This form is documenting a segment of the above-ground power and communications structure in Mercury, which has the SHPO Resource Number S1707. Nine existing poles within the segment were recorded as elements of the structure in May 2017. The southeast end of the segment begins at the pole on the northwest corner of Sandstone Ave. and Jangle St., heading north. It turns to the west at the corner of Ranger Ave and Jangle St., running along the north side of Ranger. The segment ends at the pole on the northeast corner of Ranger Ave. and Teapot St.

The earliest date found on a pole was 1969, marking its installation by Ted Butcher Inc. of Arlington, Washington. The most recent pole was installed in 2001 by McFarland Cascade of Eugene, Oregon. The only other confirmed date identified was from a marker indicating a telecommunications test was carried out at a pole in 1977. A fourth pole was marked with information including "1-99," which could indicate its installation date, but this is not certain. The remaining five poles did not have tags.

The poles range in circumference from 26 to 43 in and from 27 to 39 ft in height. Further contributing to the variability in height, the surface elevations of the poles are also different. The recorded poles along Jangle St. are placed on built up surfaces of compacted gravel used in the 1950s to support Quonset hut foundations. This adds up to 3.5 ft in additional height to these poles compared to the elevation of Jangle St.

The recorded poles provide a small sample of the sizes and other attributes of poles found in Mercury. In addition to the wide range of widths and heights, other varying items include step rungs, transformers, power boxes, junction boxes, lights, additional metal poles attached to the main pole, paint around the base, the number of crossarms and insulators, as well as a variety of marking tag types.

8. References

List references used to research and evaluate the individual property.

Beck, Colleen M., Nancy Goldenberg, William Gray Johnson, and Clayton Sellers
1996 *Nevada Test Site Historic Structures Survey*. Technical Report No. 87. Desert Research Institute, Las Vegas.

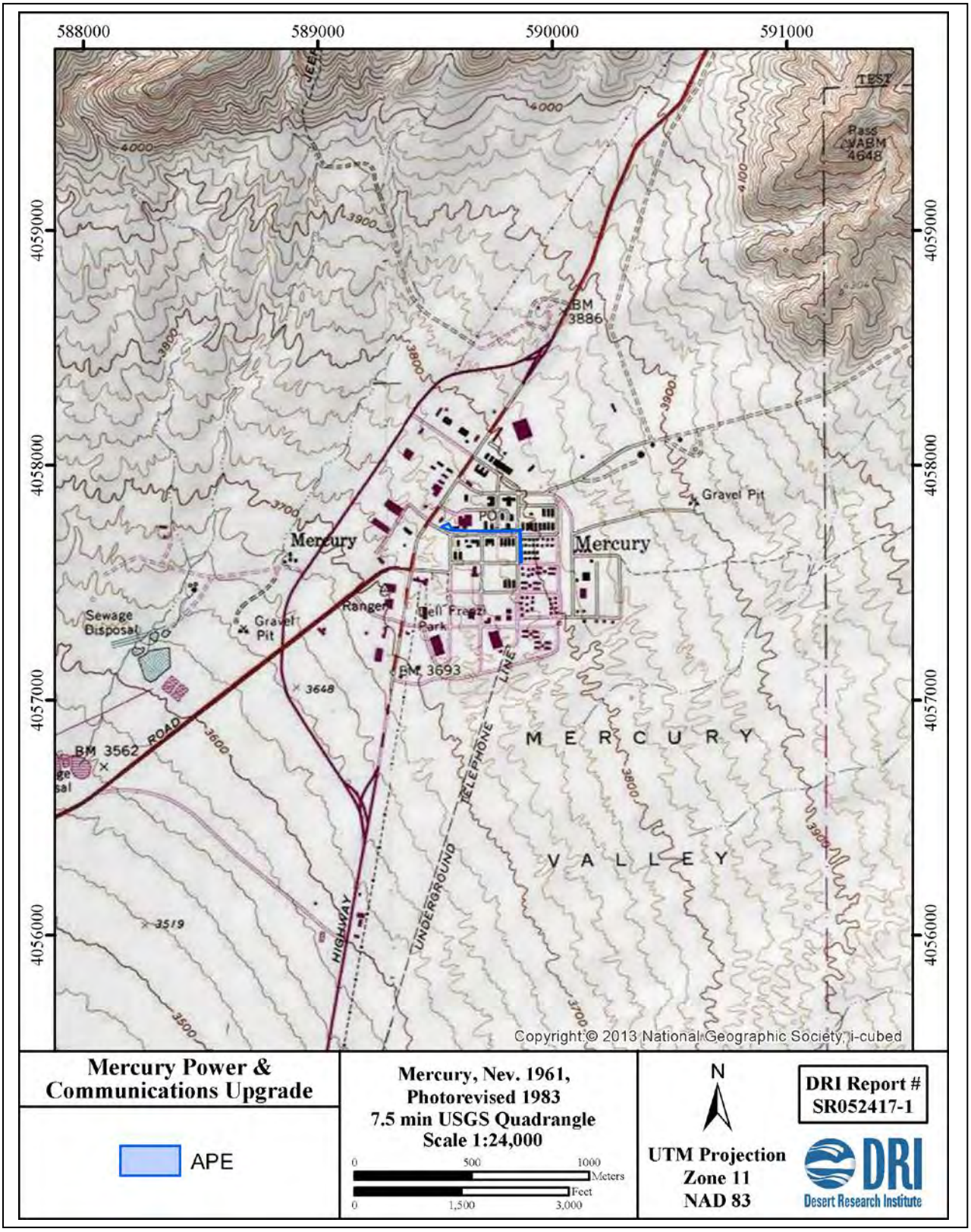
Tlachac, Eve M.
1991 Operating Plan, Nuclear Testing. In *Nevada Comprehensive Preservation Plan*, edited by W.G. White, R.M. James, and R. Bernstein, pp. 25/13-24/24. Nevada State Historic Preservation Office, Carson City.

Reno, Ron, and Maureen King
2016 A Section 106 Evaluation of the Mercury Bowling Alley, Area 23, Nevada National Security Site, Nye County, Nevada. Cultural Resources Inventory Report SR041316-1. Desert Research Institute, Las Vegas.

U.S. Atomic Energy Commission
1951 Alternate Test Site -- Mercury. U.S. Atomic Energy Commission, Santa Fe Operations Office, Albuquerque.

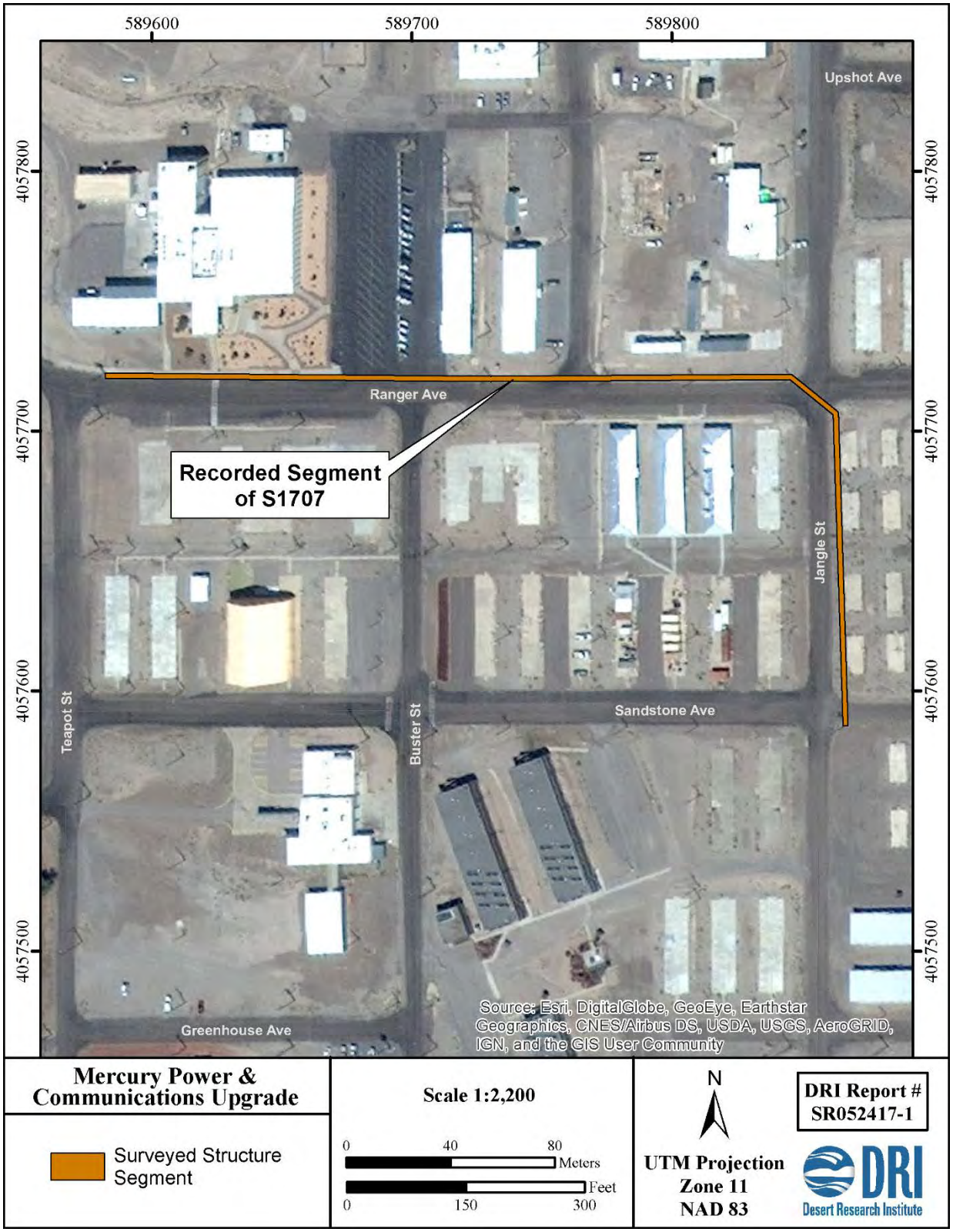
9. Area Location Map

Use a USGS quadrangle map at large extent to show general area of resource.



10. Site Plan Map

Use aerial imagery, drafting software, or a hand-drawn sketch (to scale) showing, at minimum, building/structure footprints and relationship to associated features. Attach extra maps if needed.



11. Photographs

Include as many photographs as needed to accurately depict the resource.

Elevation: South Direction facing: North Photographer: T. Menocal Date: 5/24/17

Elevation: South Direction facing: North Photographer: T. Menocal Date: 5/24/17

Elevation: East Direction facing: West Photographer: T. Menocal Date: 5/24/17

Elevation: West Direction facing: East Photographer: T. Menocal Date: 5/24/17

APPENDIX C

Report on Utilities for Mercury, Nevada
Section III. Electrical Distribution
Koebig and Koebig 1963

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ATOMIC ENERGY COMMISSION

NEVADA OPERATIONS OFFICE

CONTRACT NO. AT(26-1)-25

REPORT

on

UTILITIES

for

MERCURY, NEVADA

January 1963

KOEBIG & KOEBIG INC.

ENGINEERING - ARCHITECTURE

141

COPY NO. 5

SECTION III

ELECTRICAL DISTRIBUTION SYSTEM

A. SCOPE.

The Scope of Work described in this Section of the Report includes the revision of the existing aerial distribution system in order to provide service to proposed new buildings, to clean up areas that are presently crowded and therefore present hazardous conditions, and to adjust the existing circuits in order to provide more efficient load distribution. Improved reliability of electrical service is included in the proposed modifications to the existing distribution system. The work also includes the provisions for power and control circuits to the proposed booster pump station at the existing Army Well No. 1.

B. EXISTING DISTRIBUTION SYSTEM.

1. General.

The Mercury portion of the Nevada Test Site obtains its electrical power from a Nevada Power Company substation located in Mercury, Nevada. The supply voltage of this substation and the overhead transmission line to the substation is 138 KV. According to the Nevada Power Company the 138 KV transmission line has been sized to provide for any contemplated load increase at the Test Site, and increased transformer capacity can be provided as the need arises. Reliability for the source is excellent, having had less than 17 minutes' outage per year for the past 6 years.

The substation has two 3750 KVA transformer banks. According to the utility company, these transformers have been modified with forced air cooling and 65° Centigrade windings, thus increasing their capacity to 5,200 KVA. One of these transformers serves the "forward area" at 34.5 KV and the other serves Mercury proper at 4,160 V, 3 Phase, 4 Wire. The Mercury portion is metered at the 4160 V side of the transformer and has loss compensators so that the transformer losses are not reflected in the meter readings.

Two oil circuit breakers located in the utility company substation protect the two 4160 V underground feeders which are routed through a generator switchboard in the power plant to an outdoor distribution switching station. These feeder conductors are 350 MCM and #4/0

respectively. The 350 MCM feeder called the "Upper Bus," and the #4/0 feeder called the "Lower Bus" each feed one row of seven 5 KV oil circuit breakers located opposite one another. Each breaker is connected to the one directly across from it by means of a cross-over tie, forming a group of seven feeders available for serving Mercury. These feeders tap off from the cross-over ties.

One of these feeders is used for power plant station service, while the remaining six are used for serving the overhead distribution system. The overhead distribution system is of the radial type. Continuous increases in demand and the lack of information on future changes have made most of this aerial installation a "build-as-needed" type. Refer to the single-line diagram shown in Plate No. 4.

2. Analysis of Circuits and Feeders.

a. Switchyard Area. The 34.5 KV feeder originating at the Nevada Power Company substation and serving the "forward area" has its first span supported on an existing steel structure inside the switchyard. This structure also supports feeder #5 which in turn goes to the forward area. It was observed that the separation between conductors is inadequate and therefore warrants correction.

b. 2.4 KV Feeder. This feeder is owned by the Nevada Power Company and originates at the substation. It runs south to the telephone company relay booster station, and is underbuilt on the existing 138 KV structures. The addition of the new 138 KV line to area 12, presently under contract, will interfere with this 2.4 KV line. There will be inadequate vertical clearance and the proposed switchyard will interfere with the path of the existing 2.4 KV feeder. Therefore it is recommended that the AEC initiate the necessary changes to correct this interference.

c. Circuit #1. This relatively new feeder serves three new trailer areas located adjacent to Greenhouse Avenue, the Quonset Building area, and the DOD area. The conductor size is #2/0 ACSR. When new buildings between Buster and Teapot Avenues are built, there will be an interference.

d. Circuit #2. This circuit feeds the power plant, and its capacity is adequate.

e. Circuit #3. This feeder provides power to the buildings included between Knothole Street and Buster Street, north and south of Cross-road Avenue. It also serves the street lighting requirements of Mercury. The conductor size is #4 BC. This feeder at one time was used as the main

feeder to Mercury. Thus it has two, normally open, gang operated switches which could connect this feeder to feeders #6 and #1. However, the switches have never been phased, thus they are inoperable.

f. Circuit #4. At the present time this feeder supplies Building 123 and the warehouse area north of Warehouse Road and east of Mercury Highway with the exception of the small portion that is handled by Circuit #5. The conductor size is #6 BC which, although small, carries a low demand on its connected load.

g. Circuit #5. The primary purpose of this feeder is to provide power to the "forward area". Some of the warehouse buildings inside Mercury are now being served by a leg of this feeder. The 382 KVA load, which is presently connected on this leg, should be provided for in a different manner in order that circuit #5 may solely serve the "forward area".

h. Circuit #6. This circuit is the most overworked feeder at Mercury. It feeds the area between Teapot and Jangle Streets, and between Ranger Avenue and Greenhouse Avenue, in addition to the athletic area, the trailers adjacent to the security area, part of the trailers at Sandstone Avenue, and everything west of Mercury that is not fed by Circuit #7. This feeder has been having additions made to it on an immediate demand basis; therefore its conductors vary in size and material from #4 BC at its start to #6 BC or #2/0 ACSR on its various legs.

i. Circuit #7. This feeder, whose basic conductor size is #2 BC at the substation area, crosses Mercury Highway and feeds all the warehouses and buildings west of Mercury Highway and north of the road to the sewage plant. The size of a portion of this feeder branch is #4 BC. The feeder continues south, parallel to Mercury Highway where it feeds Building 111 and the gatehouse. A continuation of this feeder serves Army Camp Desert Rock, which has been partially abandoned, thus its demand is low. The size of wire on leaving the Mercury area is reduced to #4 BC.

j. Substation Area. This area has quite a number of underground feeders going to various poles where the previous mentioned feeders start their overhead routing. In general, due to the location of the Nevada Power Company substation, the proposed switchyard for the 138 KV line to area 12, and the 2.4 KV line to the telephone booster, the area is quite crowded with poles where transitions from underground to overhead are made. This congestion could be hazardous in the event of a line breakage, and is unsightly.

k. Loads. The transformer connected loads on the 7 circuits are as follows:

CIRCUIT NUMBER	CONDUIT SIZE AND TYPE	CONNECTED LOAD-KVA
1	#2/0 ACSR	3192
2	#4 BC	225
3	#4 BC	1895
4	#6 BC	1122
5 At Mercury	#2 ACSR	388
Outside	#2 ACSR	500
6	#4 BC	2392
7 At Mercury	#2 BC	827
Outside	#4 BC	872

Demand load information was not available except for circuits 4, 5, and 7 which was labeled as low.

C. DESIGN CRITERIA FOR PROPOSED MODIFICATIONS AND ADDITIONS.

1. General.

Due to the amount of work to be done at Mercury to accommodate all the necessary changes, and to guarantee the requirement for uninterrupted power, it is necessary to carefully coordinate the steps necessary to perform the work. In general, the work can be grouped into that to be performed in the substation area, and that to be performed on the overhead distribution system.

2. Substation Area.

a. Available Circuits. The number of existing circuits is not adequate for an efficient distribution system considering the amount of additional load, the location of the new buildings and the reliability of the system as a whole. Based on the present switchgear line up, and taking into consideration studies done by others, the present 7 circuits could be modified to provide 12 circuits, each one protected by a 600 A, 5 KV, oil circuit breaker. New feeders could then be taken from the substation as indicated in the single line diagram shown on Plate No. 5. The rearrangement of the present switch gear containing 7 double ended breakers could provide 14 single breakers. The first two breakers would be used as the breakers for the generators and the remaining twelve could be used for the overhead distribution circuits.

It is assumed that the rearrangement of the present switch gear will not be included in the Utilities Contract, and therefore provisions should be made to coordinate the two items of work.

To simplify the identity of each feeder and breaker the following numbering system is used.

Original Circuit Breaker	New Circuit Breaker	Use
1	1-1A	Generator Tie
2	2	Power Plant
	2A	New Cafeteria
3	3	Existing
	3A	East Leg Loop
4	4	Existing
	4A	Center Leg Loop
5	5	Existing
	5A	Spare
6	6	Existing
	6A	West Leg Loop (Former Circuit 1)
7	7	Existing Mercury
	7A	Desert Rock, Air Strip, Booster Pump Station

The new numbers will be used to identify the circuits described in this Report.

b. Underground Ducts and Manholes. In order to simplify the routing of the additional feeders from the switchgear cable vault, a series of seven manholes as shown on the Title I - Electrical Distribution System Drawing will be required.. The duct banks will be concrete encased, red dyed, Class "C", with fiber ducts, and a ground wire #4/0 SDBC. The underground system will start at Manhole No. 1 with an open connection to the underground vault and consist of two feeder branches. One branch will run in a westerly direction across Mercury Highway to Manhole No. 2 at the base of existing pole 7-2 which will be modified to receive two underground feeders, 7 and 7A. The other branch will run in a southerly direction to Manhole No. 3 just beyond the existing Nevada Power Company Substation fence. Manhole No. 3 will have two branch feeders leaving the manhole. The branch leading in an easterly direction will go to Manhole No. 4 at the base of pole 3-2.. This pole will act as a transition point for feeders 3 and 3A which run overhead. The other branch will run in a southerly direction to Manhole No. 6, from which circuit 2A can provide underground service to the proposed

Cafeteria Building. A feeder duct from Manhole No. 4 will cross Crossroad Avenue and run to Manhole No. 5 carrying circuit 4-A at which point the circuit will go overhead. The duct from Manhole No. 6 continues southerly to Manhole No. 7. At Manhole No. 7, circuits 6 and 6A will rise and go overhead.

c. Overhead Modifications. In order to correct the inadequate separation between conductors in the switchyard area mentioned previously, a pole to support the 34.5 KV line should be located as indicated between the Nevada Power Company substation enclosure and pole #5-1. The line between the new pole and the Nevada Power Company substation structure will be slack span. This modification will diminish the hazard of short-circuit possibilities between phases of the 34.5 KV line and will remove the 34.5 KV from above the 4.1 KV switchgear.

As mentioned previously, changes are necessary to the 2.4 KV feeder in order to correct interferences with the new 138 KV line to area 12, presently under contract. One way in which this might be accomplished would be to change the alignment as indicated on the Title I - Electrical Distribution System Drawing, utilizing double dead end type poles to facilitate the required changes in direction.

3. Overhead Distribution.

a. Circuit No. 3. This circuit will be modified between existing poles 3-2 and 1-58 in order to carry new circuit 3A. Modifications will involve the lowering of the transformers and lighting circuits. The load on this feeder will be increased because of the need to provide power for the addition to the Steam Plant, a larger load center substation, and the proposed relocated buildings.

b. Circuit No. 3A. This new circuit will run on existing modified poles 3-2 to 1-58, and at pole 1-58 will be tied to the existing #2/0 ACSR line which runs from pole 1-58 to pole 1-21. The wire for the new circuit will be #2/0 ACSR. Modifications will include the relocation of the load isolating, gang operated, normally closed, pole switch now located on pole 1-38, to pole 4A-5. This feeder will serve as the east leg of the loop around the main part of Mercury and will require a new, normally open, load isolating, gang operated switch at pole 1-21. Prior to the ultimate dormitory development, this feeder will carry the loads of the DOD area, the extreme southeast area, the new trailer housing area, the Quonset Building area, and two of the new proposed Dormitories. When all proposed buildings are completed, its load would be that of the proposed 16 Dormitories in addition to the DOD area.

c. Circuit No. 4. This circuit will be modified at pole 4-9, where circuit 5 and circuit 4 cross, northerly of Tumbler Avenue between Snapper and Jangle. At pole 4-9, jumpers will be added between existing circuit 4 and circuit 5, and therefore circuit 5 at this point will become circuit 4. The existing line going from pole 4-9 to pole 5-4 will be removed. In this manner circuit 4 will supply the warehouse area east of Mercury Highway.

d. Circuit No. 4A. This new circuit will be #2/0 ACSR, and will be the normal source of supply for the proposed Theater, Service Shop, Library and Museum Chapel, and Health, Medicine & Safety Buildings. The circuit will run on new, existing, and relocated poles on the east side of Buster Avenue. The normally closed, gang operated, load isolating switch, to be relocated from pole 1-38 will be installed on pole 4A-5. At the south side of Greenhouse Avenue, circuit 4A will connect to an existing line which extends west to pole 1-13 where a normally opened isolating switch will be installed, and extends to pole 1-21. This existing line on Greenhouse Avenue is #2/0 ACSR.

e. Circuit No. 5. Poles 5-3 and 5-4 will be removed after the line between poles 5-1, 4-2, 5-3, and 5-4, and 4-9 has been removed. This will clear all the loads in Mercury from circuit #5 with the exception of one existing 5 KVA transformer on pole 1006. The completion of this phase of the work will add approximately 385 KVA of capacity to the "forward area."

f. Circuit No. 5A. This circuit would remain as a spare.

g. Circuit No. 6. At pole 6-9, circuit #6 will be cut and jumpers will be installed to the new circuit #7, thereby transferring the present load on circuit 6 beyond this point to new circuit.

The existing #2 ACSR line going to pole 6-71 will be disconnected at pole 6-70, and transferred to pole 6A-5 where it will be connected to circuit 6A. This will remove the load of the Athletic Field and the Trailers outside of Building 111 from circuit 6.

The line going east from pole 6-46 to pole 6-47 will be supported on a new crossarm placed on pole 4A-5, after which pole 6-46 will be relocated from its present location to a new location at the southwest corner of Sandstone Avenue and Buster Street. Poles 6-64 through 6-70 and the #4 BC line can be removed as the existing trailer areas are abandoned or removed.

The existing #2 ACSR line will be removed from pole 1-17 and relocated to new pole 6A-4. This will remove the outfield lighting of the baseball diamond from circuit 6.

The new Motor Pool Building will be served from pole 6-10.

The main feed of circuit 6 will be provided by tieing a new #2 ACSR line from pole 6A-1 to pole 6-73 where it will be tied to the existing #2 BC.

h. Circuit 6A. New circuit 6A will run from Manhole No. 7 on the east side of Teapot Street to the Laboratory and Engineering Building, and will be the west leg of the Mercury Loop. This circuit size will be #2/0 ACSR, and will be connected with the existing #2/0 ACSR line at pole 1-13 with a normally open isolating switch. On completion of circuit 6A the loads located between Mercury Highway and Teapot Street will be serviced.

NOTE: In the following discussion of circuits 7 and 7A, the new circuit will be designated as circuit 7 and the existing circuit will be designated as circuit 7A.

i. Circuit No. 7. The overhead run of this new circuit will start at pole 7-2. It will be located on the same poles as existing circuit 7A, and will be underbuilt on poles 7-2 to 7-21, and thence through to 7-41. The conductor size will be #2/0 ACSR and will be connected to loads at the following points:

(1) At pole 7-2, for all loads going north to existing #4 BC line.

(2) At pole 6-9, to existing #4 BC line serving the Mousehouse Area.

(3) At pole 7-28, to existing Gatehouse Service.

(4) At pole 7-29, to existing #6 Underground Service to Building 111. In addition this would be the point of service for the future Print Shop.

(5) At pole 7-31, a new one-span #4 BC line will be installed to the west to serve the proposed Communications Building.

(6) At pole 7-32, a new line will be installed to the Jackass Flats Road and thence parallel to the Jackass Flats Road to serve the proposed Maintenance Building, proposed Radio Shop, proposed Radiological Laboratory, and one of the street lighting constant current transformers.

j. Circuit No. 7A. This existing circuit runs parallel to Mercury Highway and feeds the overhead installation at Camp Desert Rock. The conductors on this existing circuit are #2 BC from pole 7-2 to pole 7-99. The conductors are #4 wire between pole 7-99 and a point 9 spans beyond pole 7-111, where it dead ends. A new transformer will be provided at this dead end pole and an underground run will be installed to serve the Air Strip Dispatcher Office and the landing strip lights. In addition, from this dead end pole, a new #4 BC circuit will be provided to serve the proposed Booster Pump Station at the existing Army Well No. 1. This circuit will be mounted on new poles spaced approximately 200 feet apart. This new pole line will also provide for two pairs of control wires. Between the dead end pole and Camp Mercury the two pairs of control wires will be mounted above the existing telephone lines. The two pairs of control wires will be used for telemetry and fire alarm capability between the proposed Booster Pump Station and Camp Mercury.

k. Loads. The loads for the various circuits in the proposed system are as follows:

LOAD CHART

Circuit	Conductor Size and Type	Circuit Load KVA
2	4 BC	225
2A	2/0 BC	900
3	4 BC	2045
3A	2/0 ACSR	1867
4	6 BC	1638
4A	2/0 BC	1042
5 At Mercury	2 BC	5
Outside	4 BC	870
5A		Spare
6	2 ACSR	1505
6A	2/0 ACSR	1592
7 At Mercury	2 ACSR	2278
7A Outside	2 BC	45

4. Service for Programmed Buildings. Provisions have been made in the proposed system to serve all the programmed buildings. In addition the system has the capability of serving those structures that are scheduled in the near future.

5. Street Lighting. Provisions have been made in the system to place, in general, street lights at all new intersections created by the proposed roadway system.

D. SUMMARY AND CONCLUSIONS.

In order to develop a more efficient, balanced, and workable distribution system, to eliminate various potential hazardous areas, and to provide for a distribution system which can be more readily expanded, modifications to the existing system should be made in addition to the development of the new distribution capabilities for the proposed expansion of Mercury.

It should be emphasized that several items of work should be accomplished by others in order to facilitate the proposed work to be performed under the Utilities Contract. The 2.4 KV Nevada Power Company feeder should be modified in conjunction with the proposed 138 KV transmission line contract, presently underway. In addition, modifications to the existing switchgear should be made in accordance with the details provided in the single line diagram shown on Plate No. 5.