Control Number: 51023

Item Number: 564

Addendum StartPage: 0

SOAH DOCKET NO. 473-21-0247
PUC DOCKET NO. 51023

APPLICATION OF THE CITY OF SAN ANTONIO TO AMEND ITS CERTIFICATE OF CONVENIENCE AND NECESSITY FOR THE SCENIC LOOP 138-KV TRANSMISSION LINE IN BEXAR COUNTY	§	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

DIRECT TESTIMONY

OF

MARK D. ANDERSON

ON BEHALF OF

ANAQUA SPRINGS HOMEOWNERS' ASSOCIATION, BRAD JAUER AND BVJ PROPERTIES, L.L.C

February 22, 2021

564

TABLE OF CONTENTS

DIRECT TESTIMONY OF MARK D. ANDERSON

ANAQUA SPRINGS HOMEOWNERS' ASSOCIATION, BRAD JAUER AND BVJ PROPERTIES, L.L.C

LIST OF TABLES

LIST OF EXHIBITS

EXHIBIT MDA-1	Mark D. Anderson Resume
EXHIBIT MDA-2	"Scenic Loop Substation Analysis Report" (Application, Attachment 13)
EXHIBIT MDA-3	"CPS Energy Electric Transmission Line Routing/Substation Siting General Process Manual" (CPS Energy's Response to Anaqua Springs RFI 2-28, pages 73 – 97)
EXHIBIT MDA-4	Map Screenshots Depicting Route R1 and Route R1 Modified (including Modifications to Segment 38 and Segment 43)
EXHIBIT MDA-5	CPS Amended Application, Attachment 5 (which is Attachment 6 to the original Application), Sheet 11 of 17.
EXHIBIT MDA-6	Aerial Image of New House That Caused Movement of Segment 26, and Save Huntress Lane Area Association ("SHLLA") Response to Anaqua Springs RFI 1-1 and 1-7 through 1-10
EXHIBIT MDA-7	Figure 6-21, "Modification of Segment 26 Following the CCN Filing" (Application Amendment, Attachment 2)
EXHIBIT MDA-8	CPS Energy's Response to Jauer RFI 2-17
EXHIBIT MDA-9	Habitable Structures Within 300 Feet of the Centerline Sorted by Habitable Structure Number
EXHIBIT MDA-10	Habitable Structures Within 300 Feet of the Centerline Sorted by Segment
EXHIBIT MDA-11	CPS Energy's Response to Anaqua Springs RFI 2-9
EXHIBIT MDA-12	EA Table 2, entitled "Transmission and Substation Facilities Total Estimated Costs (Sorted Least to Most Expensive)" (Application Amendment, Attachment 3)
EXHIBIT MDA–13	Table 4-1 Amended, entitled "Amended Environmental and Land Use Data For Route Evaluation" (Application Amendment, Attachment 2)
EXHIBIT MDA–14	Table 2-1 Amended, entitled "Amended Alternative Substation and Route Composition and Length Amendment" (Application Amendment, Attachment 2)
EXHIBIT MDA–15	CPS Energy's Response to Anaqua Springs RFI 2-7
EXHIBIT MDA-16	CPS Energy's Response to Anaqua Springs RFI 2-5
EXHIBIT MDA-17	CONFIDENTIAL, CPS Spreadsheet from CPS ShareFile at Application Amendment Documents/Native Documents/Cost Documents
EXHIBIT MDA-18	Plat for West Brook Two Subdivision (*i.e.*, the location Substation 7)

EXHIBIT MDA-19	Enlargement of Plat for West Brook Two Subdivision; and Figure 6-3, (Application, Environmental Assessment, Page 6-13) with highlighting added to show the extent of the property's floodplain
EXHIBIT MDA-20	CPS Energy's Response to Anaqua Springs RFI 2-16
EXHIBIT MDA-21	CPS Energy's drawing for the Scenic Loop Typical 3-Unit Substation Layout (Environmental Assessment)
EXHIBIT MDA-22	CPS Energy's Response to Brad Jauer and BVJ Properties RFIs 2-10 and 2-13
EXHIBIT MDA-23	CPS Energy's minimum sized substation derived from Exhibit MDA-3 super-imposed on Substation Site 7
EXHIBIT MDA-24	CPS Energy's Response to Cleveland RFI No. 1-10
EXHIBIT MDA-25	CPS Energy's Response to Jauer RFIs 2-8 and 2-16
EXHIBIT MDA-26	CPS Energy's Response to Commission Staff's First RFI No. 1-2

I. POSITION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Mark D. Anderson. My business address is 14995 Boulder Pointe Road, Eden Prairie, Minnesota, 55347.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am currently self-employed.

Q. WHAT IS YOUR PROFESSIONAL AND EDUCATIONAL BACKGROUND AND EXPERIENCE?

A. I have a B.S. in Industrial Technology from Moorhead State University, Moorhead, Minnesota. I have 46 years of experience in the energy sector, including transmission and generation development. The Project Management Institute certified me as Project Management Professional ("PMP"). This is commonly recognized in the project management profession as recognition that the practitioner has passed a rigorous qualification and examination process. A copy of my resume is included as Exhibit MDA-1, which is attached to my testimony.

Q. WHAT EXPERIENCE DO YOU HAVE WITH TRANSMISSION SITING AND CONSTRUCTION?

A. I was employed by Xcel Energy Services Inc, ("XES"), the service company for the Xcel Energy Inc, holding company system. I was Project Manager for Transmission in the Project Management Department. Starting with my tenure at XES, I have been responsible for the construction of approximately 1,000 miles of 115 kV and 345 kV transmission lines and over 40 substation projects valued at about $1.5 billion dollars. I have been employed by transmission owners and contractors and consulted to both. On my largest project, CapX2020 Brookings County to Hampton, which went from central Minnesota to eastern

South Dakota, I had overall responsibility for siting, right of way acquisition, procurement, construction, and energization. This project was designated as a Multi Value Project by the Midcontinent Independent System Operator and was authorized for construction with a budget of $738.4 million. This project included 250 miles of transmission lines and eleven new or expanded substations, and spanned an area from near White, South Dakota to near Hampton, Minnesota. The budget, after energization, was $662.1 million. I managed a multi-disciplinary team through many cost benefit decisions in order to derive a savings of some $76.3 million.

Q. PLEASE DESCRIBE YOUR EXPERIENCE WITH EVALUATING ROUTING FOR TRANSMISSION LINES.

A. In addition to my experience with transmission line siting and construction discussed above, I have been involved in hundreds of miles of transmission line projects where I had direct or supervisory responsibility over routing, developing alternative routes for regulatory approval, and the justification of those routes. My teams were responsible for finding the route that, among other things, best addressed community values, especially including landowner and homeowner inputs on structure location, as well as proximity to habitable structures, while still considering the importance of cost.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE ANY REGULATORY COMMISSIONS?

A. Yes. I provided testimony before this Commission in Docket Nos. 49523, 43878, 50812, and before the Minnesota Public Utilities Commission in Docket No. E-002/TL-07-1233.

Q. ON WHOSE BEHALF ARE YOU SUBMITTING THIS TESTIMONY?

A. Anaqua Springs Homeowners' Association, Brad Jauer and BVJ Properties, L.L.C.

Q. WAS THIS TESTIMONY PREPARED BY YOU OR UNDER YOUR DIRECT SUPERVISION AND CONTROL?

A. Yes.

Q. DO YOU SPONSOR ANY EXHIBITS WITH YOUR TESTIMONY?

A. Yes. I am sponsoring Exhibits MDA-1 through MDA-26. Unless the exhibit is identified as material obtained from other parties to this proceeding as part of their pleadings or through discovery, each of these exhibits was prepared by me or under my supervision and is true and correct to the best of my knowledge and belief.

II. PURPOSE OF DIRECT TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY IN THIS PROCEEDING?

A. The purpose of my direct testimony is to provide and discuss my expert opinion of the route that best meets the applicable regulatory standards after considering the segments and routes proposed by the City of San Antonio, acting by and through the City Public Service Board ("CPS") to construct the Scenic Loop 138-kV transmission line in Bexar County, Texas. Based on my analysis, I have concluded that route similar to Route R1, with a modification to avoid three habitable structures (referenced hereafter as "R1 Modified"), best meets the applicable evaluation criteria. Because those habitable structures can be avoided at a lower cost, and without impacting additional landowners, if R1 Modified is not considered, then I have concluded that Route W best meets the applicable evaluation criteria. I will discuss this in detail later in my testimony.

I further conclude that Route Z1, (CPS's best meets route) should not be approved because, relative to other routes, it is contrary to community values and impacts a large number of habitable structures (often in close proximity) and an elementary school (most

notably its outdoor recreational facilities), along a highly congested roadway that already hosts within its right of way natural gas and water pipelines and electric distribution lines, a recently added microwave transmission corridor, as well as the Alamo Area Regional Radio System ("AARRS") that is part of the local public safety communications system.

Q. WHAT PRELIMINARY ORDER ISSUES ARE YOU ADDRESSING IN YOUR TESTIMONY?

A. I am addressing the issues related to the routing of the transmission line. Specifically, I am addressing Preliminary Order Issues 4 and 5 which ask which proposed transmission line route is the best alternative weighing the factors set forth in PURA § 37.056(c) and 16 TAC § 25.101(b)(3)(B) and whether there are alternative routes or facilities configurations that would have a less negative impact on individual landowners as well as the community at large, respectively.

Q. ARE YOU ADDRESSING THE NEED FOR THE TRANSMISSION LINE?

A. No. I take no position on whether the transmission line is needed.

Q. WHAT DOCUMENTS AND DATA DID YOU REVIEW IN ARRIVING AT THE CONCLUSIONS AND RECOMMENDATIONS CONTAINED IN YOUR TESTIMONY?

A. I began my analysis with an examination of the Application and all of its attachments, including Attachment 13 to the Application, which is CPS's "Scenic Loop Substation Analysis Report" and is attached as Exhibit MDA-2 to my testimony. I have also reviewed applicable statutes and regulations and all of the filings that have been made in this proceeding to date, including:

- The amendments of the Application;
- The Parties' discovery responses, including those of CPS;

- The Parties' requests for a route adequacy hearing, and the responses to those requests;
- CPS's direct case evidence for the route adequacy hearing;
- The Parties' statements of position for the route adequacy hearing and the responses to those statements of position;
- Statements of position filed on the PUC Interchange by individuals; and
- CPS Energy Electric Transmission Line Routing/Substation Siting General Process Manual, pages 73 – 97, which was produced by CPS in its Response to Anaqua Springs RFI 2-28 and is attached as Exhibit MDA-3 to my testimony.

Q. HAVE YOU HAD A CHANCE TO VISIT THE STUDY AREA?

A. Only virtually. My home is in Minnesota and visiting the study area would have required travel during the COVID-19 pandemic. I have followed the guidelines about not traveling since I drove home from Florida last March, as we are snowbirds. Thanks to the readily available aerial maps and street view maps on sites such as Google Earth, as well as reviewing recent photographs and video recordings of the routes, I have been able to visit the study area virtually. CPS also provided maps in its Application as amended.

III. ANALYSIS OF BEST MEETS ROUTE

Q. ARE YOU FAMILIAR WITH TRANSMISSION LINE ROUTING CRITERIA IN TEXAS?

A. Yes. As indicated earlier, I have provided testimony before the PUC in Docket Nos. 43878, 49523, and 50812, and I have reviewed and applied Section 37.056 of the Public Utility Regulatory Act ("PURA") and 16 Texas Administrative Code ("TAC") § 25.101 quite extensively, as a result.

Q. HAVE YOU REVIEWED THE SEGMENTS, ROUTES AND SUBSTATION SITES PROPOSED BY CPS IN THIS PROCEEDING?

A. Yes, I have reviewed the alternative segments, routes and substation sites described in CPS's application (including amendments) and the direct testimonies supporting the Application. I have also reviewed CPS's cost estimates, including right of way estimates, as stated in the application's Environmental Assessment (including amendments).

Q. BASED ON YOUR REVIEW, WHAT DID YOU FIND TO BE THE BEST MEETS ROUTE?

A. My opinion is that the best meets route is Route R1 Modified, which is depicted on the lower map on Exhibit MDA-4. Exhibit MDA-4 contains two versions of the same screenshot of the map included in CPS's Amended Application as "Figure 2-4 Amended,"[1] focusing on those segments that make up Route R1 -- Segments 50, 15, 26a, 38 and 43. The first version (i.e., the upper one) is Route R1 as proposed by CPS, and the second version (i.e., the lower one) contains the modifications recommended in "R1 Modified." Route R1 Modified consists of a slightly shorter Segment 26a, and modifications to Segments 38 and 43 to avoid 3 habitable structures.

As seen the map attached as Exhibit MDA-5,[2] which includes property tract numbers, the modifications in Route R1 Modified shorten the northwest end of Segment 26a, and reroute the eastern half of Segment 38 to make it parallel to the property line of

[1] *See* Figure 2-4 Amended, entitled "Amended Primary Alternative Routing Segments with Environmental and Land Use Constraints (Topographic Base Map with Constraints) (Appendix D)," in CPS Energy's Application Amendment (Dec. 20, 2020), Attachment 2.

[2] Exhibit MDA-5 is an amended map attached as Sheet 11 of 17 as part of CPS Energy's Application Amendment (Dec. 20, 2020), Attachment 5. *See also* CPS's Application, Attachment 8, "Landowner Notice List" for ownership of each Tract Nos. referenced in Exhibit MDA-5.

Tract No. F-021 along the full length of its southern border with Tract No. F-014, then extending the western half of Segment 38 in a southwesterly direction across Tract No. F-020 until it reaches the western boundary of Tract No. F-006 (i.e., Bexar Ranch). I refer to this modification of Segment 38 as Segment "38a". The eastern endpoint of Segment 43 is then moved south to avoid the 3 habitable structures impacted by its current location and connects with the western terminus of Segment 38a, and from that point of connection, Segment 43 progresses westwardly on the south side of a hill, rather than the north side. I refer to this modification of Segment 43 as Segment "43a". In addition to avoiding the 3 impacted habitable structures, these modifications will have the positive impact of lessening the cost due to its shorter, more direct route.

Q. WHY DO YOU RECOMMEND MOVING SEGMENT 43 TO THE SOUTH OF THE HILL?

A. Moving the eastern portion of Segment 43 to the south of the hill eliminates impacted habitable structures, thereby reducing the total habitable structure count on R1 from 8 to 5 on R1 Modified. In addition, moving the route as described above has the added benefit of shortening the route by 0.284 miles and reducing the cost by $1.78 million.

Q. HOW DID YOU DETERMINE ROUTE R1 MODIFIED IS SHORTER THAN ROUTE R1?

A. I measured the length of the new Segments 38a and 43a and the corresponding lengths of 38 and 43. I used a full-size print of Figure 2-4 Amended when doing this. It has a scale of 1" = 1,000 feet. When I compared the two sets of measurements, I determined that the proposed modification decreased the length of Route R1 by .284 miles. Route R1 is 4.76 miles long, so Route R1 Modified would be 4.476 miles long.

Q. WHAT IS THE COST IMPACT OF THIS?

A. Route R1 has an estimated total cost of $29,759,151 and a length of 4.76 miles,[3] which is $6.25 million per mile. Multiplying the shorter length of R1 Modified by that cost per mile ($6.25 million), I get $1.78 million in savings resulting from the modifications effected by Segments 38a and 43a incorporated into Route R1 Modified.

Q. ISN'T IT TRUE THAT MOVING THE LINE TO THE SOUTH OF THE HILL ON SEGMENT 43 MOVES IT FARTHER FROM THE HOME OF THE PRESIDENT OF THE ANAQUA SPRINGS HOMEOWNER'S ASSOCIATION?

A. Yes, that is true. It also moves it farther away from two (2) *other* habitable structures currently within 300 feet of the centerline and moves it farther away from all the other homes in the lower part of the Anaqua Springs subdivision, thereby reducing the habitable structure count and moderating the impact on the affected community, while moving it into an area in The Canyons development with little existing development where there appear to be no homes.

Q IS THE CANYONS OF SCENIC LOOP ("THE CANYONS") SUBDIVISION FULLY DEVELOPED IN THIS AREA?

A. No, not at all. There currently are very few homes built in this area, and the few that have been built are in the eastern portion of the area near The Canyons' boundary with Clearwater Ranch. In fact, the portion of the original location of Segment 26 where it ran north was located along a string of undeveloped properties within The Canyons just inside its eastern boundary with Clearwater Ranch. This was the location of Segment 38 when

[3] Table 3, entitled "Transmission Facilities Total Estimated Costs," in CPS Energy's Application Amendment (Dec. 20, 2020), Attachment 3.

the routes were presented to the community at CPS's Open House on October 3, 2019,[4] and it was the location of Segment 26 when the Application was filed.[5] However, despite being on notice of a segment in this location as of the date of the Open House and certainly as of the date the Application was filed, The Canyons proceeded with its development into the Segment 26 area of its property, including constructing paved roads, at least one house built directly within Segment 26's right of way, and up to 8 others potentially within 300 feet of Segment 26's centerline.[6] In fact, after the route adequacy hearing, CPS amended its Application to move the north-south portion of Segment 26 to the east into the Clearwater Ranch development due to the home built in The Canyons directly within Segment 26's right of way after CPS's Open House and the filing of the Application.[7] CPS's map reflecting: i) the original location of Segment 26; ii) the house built directly within its right of way (Habitable Structure No. 198); and iii) the resulting movement of the segment onto pre-existing homeowners' properties in the adjacent Clearwater Ranch subdivision (Segment 26a) is included as Exhibit MDA-7,[8] which is attached to my testimony.

---

[4] *See* CPS Energy's Application, Attachment 1, "Scenic Loop 138 kV Transmission Line and Substation Project Environmental Assessment and Alternative Route Analysis - July 2020," Section 2.7, Pages 2-6 to 2-7 & Figure 2-2 (Bates Stamp Nos. 000087-90).

[5] *See* CPS Energy's Application, Attachment 1, Figure 4-1 ("Habitable Structures and Other Land Use Features in the Vicinity of the Primary Alternative Routes").

[6] Exhibit MDA-6, Save Huntress Lane Area Association ("SHLAA") Response to Anaqua Springs RFI 1-1 and 1-7 through 1-10.

[7] *See* Amendment to CPS Energy's Application, Section III(A)(2) ("Segment 26") and Section III(B) ("Newly Identified Habitable Structures"), Pages 4 to 6 (Bates Stamp Nos. 00004-06). *See also* Exhibit MDA-6, Save Huntress Lane Area Association ("SHLAA") Response to Anaqua Springs RFI 1-7 and 1-8 (re: homes constructed after CPS's Open House).

[8] Exhibit MDA-7 is Figure 6-21, entitled "Modification of Segment 26 Following the CCN Filing," in CPS Energy's Application Amendment (Dec. 20, 2020), Attachment 2.

Q. DO YOU HAVE AN OPINION ABOUT THE EXTENSION OF A DEVELOPMENT, SUCH AS THE CANYONS, INTO OR ADJACENT TO THE RIGHT OF WAY OF A PROPOSED TRANSMISSION LINE SEGMENT?

A. Yes. Development that is constructed with knowledge of a proposed transmission line – and most certainly development constructed *directly within the right of way* of a proposed transmission line – should not be given greater weight or consideration than existing subdivisions and established homes built before the transmission line was proposed. Development that is planned but not yet constructed is not a factor in the Commission's routing criteria. As a matter of fact, transmission corridors can be designed into a new community, and they are ideal for accommodating green space for bicycle paths and pedestrian walkways.

IV. COMPARISON OF ROUTE R1 MODIFIED TO OTHER ROUTES

Q. CAN YOU COMPARE ROUTE R1 MODIFIED TO CPS'S BEST MEETS ROUTE, ROUTE Z1?

A. Yes. The most striking difference is the habitable structure count. Route R1 Modified has the lowest habitable structure count of *all* routes, and Route Z1 impacts *more than 6 times more*. The table below outlines some of the basic differences between Routes R1 Modified and Route Z1.

Table MDA-1

Route	Habitable Structures <300'	Length (miles)	Transmission & Substation cost (MM)
Z1	31[9]	4.53	$38.47
R1 Modified	5	4.476	$41.75

As you can see from this table, Route R1 Modified impacts only 5 habitable structures, while Route Z1 impacts 31 – more than a 6 times difference. Notably, ***two*** of the five habitable structures impacted by Route R1 Modified are homes built in The Canyons *after* CPS's Open House and the filing of the Application:

1. *Habitable Structure No. 198* – the house built in The Canyons directly within the right of way of the north-south portion of Segment 26 that prompted the mid-case modification that moved the segment (now Segment 26a) onto *pre-existing* home and property owners in the adjacent Clearwater Ranch subdivision;[10] and
2. *Habitable Structure No. 199* – a "newly constructed" home in The Canyons "located south of Segment 26 and within 300 feet thereof".[11]

The map included as Exhibit MDA-7 identifies both of these post-notice habitable structures, as well as the movement of Segment 26a onto pre-existing home and property owners in the adjacent subdivision.

[9] This number accounts for a previously not counted habitable structure. *See*, Exhibit MDA-8, CPS Energy's Response to BVJ RFI 2-17.

[10] *See* Amendment to CPS Energy's Application, Section III(A)(2) ("Segment 26") and Section III(B) ("Newly Identified Habitable Structures"), Pages 4 to 6 (Bates Stamp Nos. 00004-06). *See also* Exhibit MDA-6, Save Huntress Lane Area Association ("SHLAA") Response to Anaqua Springs RFI 1-7 and 1-8 (re: homes constructed *after* CPS's Open House).

[11] Save Huntress Lane Area Association ("SHLAA") Response to Anaqua Springs RFI 1-8 (included as part of Exhibit MDA-6). *See also* Amendment to CPS Energy's Application, Section III(A)(2) ("Segment 26") and Section III(B) ("Newly Identified Habitable Structures"), Pages 4 to 6 (Bates Stamp Nos. 00004-06).

Relative to length and cost, Route R1 Modified is shorter than Route Z1, but more expensive. However, as reflected in Table MDA-2, R1 Modified is still among the least expensive routes -- the 5th least expensive out of all 31 routes under consideration.[12] Paying a reasonable amount more to avoid impacting over 6 times more habitable structures is appropriate in this case, especially since most of the homes impacted by Route Z1 (many less than 125 feet from the center line)[13] are pre-existing in established neighborhoods and were not "built into" a previously noticed segment of the transmission line under consideration. A table itemizing the habitable structures within 300 feet of the centerline of their nearest segment is attached to my testimony as Exhibit MDA-9. Additionally, and as discussed further in my testimony, CPS's cost estimates for Route Z1 are incomplete.

Q. WHY IS THE NUMBER OF IMPACTED HABITABLE STRUCTURES IMPORTANT?

A. The habitable structure count is relevant to the Commission's policy on prudent avoidance. That policy requires the limiting of exposures to electric and magnetic fields that can be avoided with reasonable investments of money and effort. Additionally, based on the 186 questionnaires completed by members of the community during and shortly after the Open House, the community ranked "impact to residences" as the most important factor, followed by "visibility of structures", and then "proximity to schools, places of worship

[12] *See e g* , Table 2, entitled "Transmission and Substation Facilities Total Estimated Costs (Sorted Least to Most Expensive," in CPS Energy's Application Amendment (Dec. 20, 2020), Attachment 3.

[13] Exhibit MDA-10 - Habitable Structures Within 300 Feet of the Centerline Sorted by Segment.

and cemeteries".[14] These additional community values reinforce my recommendation for Route R1 Modified.

Based on my extensive experience, the Commission's prudent avoidance policy, the expressed community values, and the significant number of impacted habitable structures along Toutant Beauregard among other issues discussed later in my testimony), it is my opinion that neither Route Z1 nor any other route along Toutant Beauregard should be approved. Route R1 Modified is clearly a superior route because it impacts only 5 habitable structures -- the lowest number of any route, and it is the 5th least expensive.

Q. HAVE YOU DONE ANY ADDITIONAL ANALYSIS ON HABITABLE STRUCTURES WITHIN 300 FEET OF THE CENTERLINE?

A. Yes. Exhibits MDA–9 and MDA-10 were prepared under my supervision and will be referred to in the remaining part of my testimony. Exhibit MDA-9 groups habitable structures within 300 feet of the centerline sorted by habitable structure number, and Exhibit MDA–10 groups habitable structures within 300 feet of the centerline sorted by segment. Both of these exhibits are based on information extracted from the "Amended Habitable Structures and Other Land Use Features in the Vicinity of the Primary Alternative Routes" tables attached to CPS's Application Amendment,[15] which only list habitable structures relative to their *closest* segment. As a result, some of these tabulations *under* represent the total number of habitable structures within 300 feet of some segments,

[14] *See* Application, Attachment 1, "Scenic Loop 138 kV Transmission Line and Substation Project Environmental Assessment and Alternative Route Analysis - July 2020," Section 6.0 & Table 6-1, Pages 6-2 to 6-3 (Bates Stamp Nos. 000189-90).

[15] Tables 4-6 to 4-36 in Attachment 2 of CPS Energy's Application Amendment (Dec. 20, 2020) (Bates Stamp Nos. 000085-134).

because some habitable structures are within 300 feet of multiple segments, particularly along Toutant Beauregard.

When reviewing these exhibits, keep in mind that homes within 100 feet of the centerline are subject to a risk that is referred to as the "theoretical fall radius." (*See e.g.*, Exhibit MDA-11, which is CPS's response to Anaqua Springs RFI 2-9). Given that structures with a height of approximately 100 feet are planned[16], any habitable structures within 100' of the centerline could be subject to being struck by a structure that fails in a storm.

Q. ARE THERE OTHER LESS EXPENSIVE ROUTES THAT IMPACT FEWER HABITABLE STRUCTURES THAN ROUTE R1 MODIFIED?

A. No. There are no routes that impact fewer habitable structures than Route R1 Modified – period, whether less expensive or otherwise. As a matter of fact, as evidenced by the table below, each of the four (4) routes that are less expensive than Route R1 Modified impact *significantly more* habitable structures – *more than 6 times more*, in fact.

[16] According to the Application, page 5 (Bates 000005), the heights of typical structures proposed for the project range from 70 to 130 feet above ground.

Table MDA-2

Route	Cost ($MM)	Habitable Structures within 300'	Includes Toutant Beauregard (e g , Segment 54)
AA1	$38.29	31	**Yes**
Z1	$38.47	31	**Yes**
DD	$39.00	33	**Yes**
EE	$39.76	32	**Yes**
R1 Modified	$41.75	***5***	*No*
Y	$42.72	40	**Yes**
BB	$42.74	25	**Yes**
I1	$42.88	44	**Yes**
P	$43.41	13	*No*
R1	$43.52	8	*No*

All of the seven (7) least expensive routes that run along Toutant Beauregard impact *5 to nearly 9 times more* habitable structures than Route R1 Modified, because Toutant Beauregard, and especially Segment 54, has long been lined with homes and other habitable structures, unlike the area utilized by Route R1 Modified. Irrespective of this very important factor, however, two-thirds ***(2/3)*** of all the routes proposed by CPS use Segment 54, and Segment 54 is included in *all but one* of the *northern* routes. In my opinion, the number of route offerings is so heavily weighted to Segment 54 that it suggests a strong preference for utilizing Toutant Beauregard, despite the heavy impact on habitable structures and negative implications for the community and its values and the Commission's prudent avoidance policy.

Relative to negative impacts on habitable structures and community values, it is worth noting that, in addition to Segment 54, the other two segments impacting the most

habitable structures of all segments are also part of the northern group of Toutant Beauregard routes – Segment 17 and Segment 32.[17]

Segment 32 impacts twenty-four (24) habitable structures[18] -- *the most habitable structures of any segment*, and it runs along the length of Mr. Brad Jauer's eastern border. Segment 32 is a high impact rating segment and therefore should not be used.

Q. HOW WAS TABLE MDA–2 PREPARED?

A. I constructed it using the information from Exhibits MDA–12, MDA–13, and MDA–14.[19]

V. CONCERNS WITH USING TOUTANT BEAUREGARD

Q. WHY DOES THE FACT THAT THE LOWEST COST ROUTES UTILIZE TOUTANT BEAUREGARD CONCERN YOU?

A. In my opinion, the Toutant Beauregard routes are unacceptable transmission corridors for the following reasons. First and foremost: the high number of impacted habitable structures and the impact on the elementary school -- particularly when there is an inexpensive, viable alternative that bypasses the school altogether and impacts only 5 habitable structures.

---

[17] *See* Table 4-2, entitled "Amended Land Use and Environmental Data for Segment Evaluation," in CPS Energy's Application Amendment (Dec. 20, 2020).

[18] *Id*

[19] Exhibit MDA-12 is Table 2, entitled "Transmission and Substation Facilities Total Estimated Costs (Sorted Least to Most Expensive)," in CPS Energy's Application Amendment (Dec. 20, 2020), Attachment 3 (Bates Stamp Nos. 00137).
Exhibit MDA–13 is Table 4-1 Amended, entitled "Amended Environmental and Land Use Data For Route Evaluation," in CPS Energy's Application Amendment (Dec. 20, 2020), Attachment 2 (Bates Stamp Nos. 000045-46 & 000055-56).
Exhibit MDA–14 is Table 2-1 Amended, entitled "Amended Alternative Substation and Route Composition and Length Amendment," in CPS Energy's Application Amendment (Dec. 20, 2020), Attachment 2 (Bates Stamp No. 000043).

Segment 54 also is built along a narrow, constrained transportation and utility corridor with a relatively sharp curve, requiring shorter span lengths and more transmission structures than other segments, as evidenced in the following table taken from CPS's Response to Anaqua Springs RFI 2-7, which is attached to my testimony as Exhibit MDA-15:

Table MDA-3

Segment	Number of Structures	Estimated Average Span Length
14	4	550 feet
54	9	465 feet
36	6	500 feet
20	6	630 feet

Each of these elements makes Segment 54 more dangerous to the community due to an increased risk of collisions with the transmission line structures themselves. In addition, the roadway which Segment 54 follows is likely to be subject to lane additions, which would create a relocation risk for the transmission line structures as the community continues to expand down Toutant Beauregard to the west.

Segment 54 is proposed to be built very close to homes. This is particularly true on its eastern portion along the north side of Toutant Beauregard. For example, Habitable Structure No. 81 along this portion is only *82 feet* from the centerline (See, Exhibit MDA-9) with no room to provide more clearance. By my calculations, using measurements on Google Earth and referring to Exhibit MDA-10, Segment 54's centerline appears to be about 6 feet away from the road right-of-way inside landowner property -- so the road right-of-way is obviously being shared or co-located due to the highly constraining proximity of Toutant Beauregard.

Although CPS repeatedly claims in its responses to Requests for Information "[i]t is currently anticipated that the proposed transmission line facilities will be constructed

utilizing a right-of-way of approximately 100 feet,"[20] CPS priced its right-of-way acquisition for Segment 54 and other segments along Toutant Beauregard, including Segment 36 that crosses Brad Jauer's property, based on a right-of-way width of 75 feet,[21] further confirming the crowded nature of Segment 54 and Toutant Beauregard, through which CPS has routed two-thirds (2/3) of its routes. Narrower rights-of-way require closer structure spacing further congesting this narrow, developed corridor.

Due to the extremely close proximity of the transmission line to homes, grounding to protect these homes from induced currents or other protective measures may be required on Segment 54, increasing the per mile cost and potential risk to the community for this segment relative to other segments.

Q. WAS THERE AN OPEN HOUSE THAT REVEALED THE OVERWHELMING RELIANCE ON THE USE OF SEGMENT 54 & TOUTANT BEAUREGARD AND A NEW SUBSTATION (SITE 7) TO THE COMMUNITY?

A. No. Segment 54 was one of two northern routing corridors presented at CPS's open house held in October 2019. Notwithstanding CPS's own "Siting and Routing Manual" (Exhibit MDA-3) providing for the convening a second public meeting, if necessary, no such meeting was held, in part, due to Covid, as explained in the cover letter that distributed the landowner packet dated July 22, 2020. In my opinion, the additions of 2 substation sites (especially Substation 7 in the middle of a subdivision) and the fact that 2/3 of the routes were now focused on Toutant Beauregard's Segment 54 and not any farther north, at a minimum, should have been highlighted in the packet. Moreover, CPS could also have

[20] *See e.g.*, Exhibit MDA-15 is CPS's Response to Anaqua Springs RFI 2-7, and Exhibit MDA-16 is CPS's Response to Anaqua Springs RFI 2-5.

[21] *See* Exhibit MDA-17(CONF).

held a virtual meeting, as we did the Route Adequacy hearing in this proceeding. I am aware of a virtual open house held in one other CCN case, Docket 51015, where it was noted that this was a practice accepted by the Commission.

Q. WHAT DOES CPS'S USE OF SEGMENT 54 IN ITS BEST MEETS ROUTE SIGNIFY TO YOU?

A. Since Toutant Beauregard, including Segment 54, is used in all but one of the northern routes, including CPS's best meets route, it appears that CPS has weighed cost heavily (refer to Table MDA-2) compared to community values. CPS should also place a high priority on what the community has stated its concerns and values are, which, as previously indicated, are – first and foremost – impact to residences (i.e., habitable structures). In fact, CPS's own policy directives require it. The *first* policy directive set forth in CPS's Routing/Siting Process Manual (Exhibit MDA-3), as it pertains to the development of "preliminary alternative transmission line routes," stipulates as follows: "Existing residential areas and subdivisions will be avoided when possible. Habitable structures will be avoided where feasible."[22]

VI. SUBSTATION SITE 7

Q. CPS' LOWEST COST ROUTES ALSO ALL USE SUBSTATION SITE 7. DOES THAT SERVE TO LOWER THE COST?

A. Yes. Because Substation Site 7 is on Toutant Beauregard, it necessarily shortens the length of the route compared to using any of the other five northern substation sites which are all further east, with correspondingly higher costs.

---

[22] *See* Exhibit MDA-3, CPS Energy's Electric Transmission Line Routing/Substation Siting General Process Manual, p.4, which was produced as part of CPS Energy's Response to Anaqua Springs 2nd RFIs, Attachment AS 2-28 – Scope of Work, Bastes Stamp No. 075.

Q. DO YOU HAVE ANY CONCERNS WITH THE USE OF SUBSTATION SITE 7?

A. Yes. I have several. Substation Site 7 is nestled among mature homes in a deep, relatively narrow, pie shaped lot of about 7.2 acres. The lot slopes down to the west to Leon Creek, where the associated flood plain will decrease the constructable portion accordingly, as well as risking contamination due to runoff. Its location in such close proximity to the surrounding homes is also concerning. CPS's failure to hold a second open house prevented the community from becoming aware of and providing input on that location. Steve Cichowski, the president of the Anaqua Springs Homeowners' Association, testifies regarding the community values related to Substation Site 7.

Q. CAN YOU BE MORE SPECIFIC WITH YOUR CONCERNS?

A. Yes, there are many. I will begin with CPS's Routing Siting Process Manual. I will state the CPS requirements in the order as shown in the Manual, and then explain my concern specific to that requirement.

c. Size – The minimum fenced dimensions for a four-unit substation is 420' x 420' (approximately 4 acres). I obtained a copy of the plat for West Brook Two subdivision, and it is attached to my testimony as Exhibit MDA-18. It shows property on which Substation Site 7 is located as Lot 19, along with its 100-year flood line of 1250. I made an enlargement of Lot 19, which is attached to my testimony as Exhibit MDA-19, along with Figure 6-3, from the Environmental Assessment, entitled "Addition of Substation 7; Relable (sic) of Southern Portion of 14 as 54 Following the Open House Meeting" from CPS's Application, Environmental Assessment, Page 6-13, with highlighting added to show the extent of the property's floodplain. Exhibit MDA-19 clearly shows dimensions, lines, grades, and the flood plain. I then located the drawing for the Scenic Loop Typical

3-Unit Substation Layout (Exhibit MDA-21). Given the narrow entrance to the lot and the slope to Leon Creek in the back of the lot, my opinion is that CPS's standard substation layout, as proposed, will not fit in this location. In response to RFI AS 2-16, CPS confirmed that Exhibit MDA-21 is the general proposed substation layout. Given that 420 feet is the minimum dimension, I scaled the longer dimension to be about 520 feet.

d. (1) Location – The substation site will not be located in existing defined flood hazard areas and will be located sufficiently above existing flood levels so that future development will not cause the flood plain to encroach upon the substation. As clearly shown on Exhibit MDA-19, the site slopes down to Leon Creek and its associated flood plain, which appears to be slightly above elevation 1250. With the continuing development that is causing the Scenic Loop Project, this is a concern and limits the usability of this lot, and risks contaminating the creek with any runoff that is not contained. The cited requirement to consider the impact of future development causing encroachment above elevation 1250 further limits the full site potential. Primary, secondary, and even tertiary spill containment facilities will necessarily need to be robust in order to protect the Leon Creek watershed.

d.(2) Terrain – The substation site should be relatively flat, but be adequately sloped to allow for drainage of precipitation and evacuation of spill containment facilities. Transformers are filled with oil, and in the event of a transformer failure, it is necessary to contain the spill. This requires a relatively flat site. None of the substations I have worked on have sloped over 25 feet from end to end. None of the pictures of typical CPS substations depicted in CPS' Open House materials (Application Environmental Assessment, Bates pages 000320 and 000321) are steeply sloped, and no nearby creeks are evident. Further,

the storm water runoff discharge facilities depicted would not be robust enough for Substation Site 7 given its proximity to Leon Creek. My experience leads me to believe that a large amount of fill will be required to obtain a relatively level surface, and the slope that then drains towards Leon Creek and its demarcated flood plain makes the drainage highly problematic from a contamination standpoint. I would expect that the necessary primary and secondary (even tertiary) spill containment facilities, which appear to be very low berms constructed within the security fence, to collect runoff and avoid contaminating surrounding areas, would be further congesting the usable area. If a secondary or tertiary spill containment ditch or basin is required, this will further limit useability and increase contamination risk from heavy rains.

g. Environmental Issues-The substation site will be free from contaminants, will not contain any known historic or prehistoric features, will not be habitat to any endangered species, will not have any evidence of aquifer recharge features and should have minimal vegetation that requires removal. Substation Site 7 is heavily wooded with what appear to be mature trees, based on my Google Earth virtual tour of this property. Given the size limitations as previously described, I believe the clear cutting the majority of the central area of the lot will be required, while leaving the slope to Leon Creek undisturbed within the flood plain and potential flood plain, and possibly leaving a few trees towards the front of the lot (reference Exhibit MDA 23). This Exhibit shows the Site 7 lot, the elevation 1250 100-year floodplain line, as well as a yellow square scaled to represent a 420'x420' minimum sized substation, with dashed lines indicating encroachment of the adjacent lot lines. CPS' response to Brad Jauer & BVJ Properties LLC's RFI 2-10 states that "it is anticipated that the substation facilities will be constructed in the center area of the

property', and that "No "clear cutting" is anticipated. It appears to me that clear cutting may well be required pending final design.

h. Neighborhood impact – The substation site will be located to minimize impact on churches, schools, parks, residences, etc. CPS provided the following data in response to RFI AS 2-17 (Exhibit MDA-8). The following table clearly shows just how close this substation will be to nearby homes. Keep in mind that this site was not included in the open house presentation materials. These neighbors may be exposed to an 8-foot-high fence that surrounds the substation and possibly an additional "lower barbed wire property line fence." (per CPS' response to Brad Jauer's and BVJ Properties, LLC's RFI 2- 10). Substations have security lights from dawn to dusk. These lights will be 10-20' above ground and typically 120 watts. I believe these lights do not belong in the heart of a mature residential area given the nearby houses.

Table MDA-4

Habitable Structure No.	Approximate Distance (feet) to Substation
77	274
78	197
79	196
80	212
178	279
Additional House 1[23]	86
Additional House 2	179

n. Potential noise will be considered when the location of substation is being determined. Substations do not make good neighbors because, in addition to the unattractive features I

[23] CPS has designated Additional Houses 1 and 2 as such in the response to AS RFI 2-17.

have just described above, they make noise. Breakers hiss and crackle as they arc-flash upon opening and closing. Transformers emit a deep humming sound. The wind whistles in the wires, and, while the neighboring lots may have trees that block the wind, this lot may be largely clear cut.

Q. WHAT ARE YOUR CONCLUSIONS ABOUT SUBSTATION SITE 7?

A. Substations are not good neighbors. It would be better to place a substation farther away from homes than the location of Substation Site 7. Because of the issues related to the flood plain, there may be additional costs for building the substation that are not captured in the Application, making it riskier for contamination of Leon Creek and more expensive to build than other substation sites.

VII. SARA MCANDREW ELEMENTARY SCHOOL

Q. IN ADDITION TO THE HOMES ALONG TOUTANT, ARE ANY SCHOOLS IMPACTED?

A. Yes. Northside Independent School District's Sara McAndrew Elementary School is in the study area, and there are four segments that run close to the school. Segment 35 runs within 214 feet of the elementary school.[24] Segments 34 and 41 cross school district property to the north of the elementary school through the future site of an adjacent middle school. And, most notably, Segment 42a runs within "approximately 280 feet" of the elementary school's sports and recreation areas (See Exhibit MDA-24).[25]

---

[24] *See,* Exhibit MDA-26, CPS Energy's Response to Commission Staff's First RFI No. 1-2.

[25] Exhibit MDA-24 is CPS's response to Patrick Cleveland RFI Question No. 1-10 relative to Segment 42 before it was modified into Segment 42a. CPS's Application Amendment later described Segment 42a's modification as follows: "*The northern portion of Segment 42 was modified by shifting it to the north...* " Amendment of the Environmental Assessment, Segment 2.1, entitled "Segment Modifications," in CPS Energy's Application Amendment (Dec. 20, 2020), Attachment 2, Page 2 (Bates Stamp No. 000028).

CPS's transmission line siting criteria set forth in Table 4-1 Amended and Table 4-2 Amended, along with Question No. 26 of the CCN application, entitled "Parks and Recreation Areas," specify that CPS will consider as part of its environmental and land use criteria:

> *Parks and Recreation Areas*: For each route, list *all parks and recreational areas* owned by a governmental body or an organized group, club or church and located *within 1,000' of the center line of the route*. Provide a general description of each area and its distance from the center line. Identify the owner of the park or recreational area (public agency church, club, etc.). List the sources used to identify the park or recreational areas. Locate the listed sites on a routing map. (emphasis added)

In addition, "recreational and park areas" are among the few factors expressly listed in PURA § 37.056(c).

In my opinion, the Sara McAndrew Elementary School and its recreational facilities should have been carefully considered and given great weight in the siting of any segments – or perhaps more appropriately, a decision *not to site*. Children will be playing on these recreational facilities every day of the school year, weather permitting, and there are other routes that do not impact this recreational environment whatsoever.

I have reviewed the statements of position filed in this proceeding and have seen concerns from the community about transmission lines running close to the school. Fortunately, the interests of the community relative to habitable structures and the school are aligned because all of the segments that are close to the school also run along heavily populated Toutant Beauregard for some portion of their length. Thus, this is yet another expression of community values that weighs in favor of Route R1 Modified, or any other route that does not utilize Toutant Beauregard.

Q. WHAT CONSIDERATION DID CPS GIVE TO THIS SCHOOL IN ITS ROUTING CRITERIA?

A. From what I can see in the record, very little. There are 15 routes (about half of all routes considered) that incorporate at least one of the 4 segments that is in close proximity to the school (*i.e.*, Routes B1, C1, D1, E, G1, I1, J1, M1, T1, X1, Y, Z1, AA1, DD and EE).[26]

Q. DOES CPS'S BEST MEETS ROUTE Z1 INCLUDE A SEGMENT THAT IS IN CLOSE PROXIMITY TO THE SCHOOL?

A. Yes. Segment 42a is a part of Route Z1, and it is at least within approximately 280 feet of the elementary school recreational areas (unless its movement north moved it even closer).[27] I think it is telling that CPS accommodated a landowner request to modify this segment in return for savings to the project in the form of donated right of way. These savings contribute to lowering the cost of Route Z1 and appear to be an incentive to use Segment 42a at the expense of community values relating to avoiding schools and outdoor recreational facilities, especially those for elementary age children. The community does not value Route Z1 as highly as CPS does based on the statements of position recently filed that clearly spell out numerous concerns.

---

[26] *See* Figure 4-1 Amended, entitled "Habitable Structures and Other Land Use Features in the Vicinity of the Primary Alternative Routes," in CPS Energy's Application Amendment (Dec. 20, 2020), Appendix E.

[27] Exhibit MDA-24 is CPS's response to Patrick Cleveland RFI Question No. 1-10 relative to Segment 42 before it was modified into Segment 42a. CPS's Application Amendment later described Segment 42a's modification as follows: "*The northern portion of Segment 42 was modified by shifting it to the north...* " Amendment of the Environmental Assessment, Segment 2.1, entitled "Segment Modifications," in CPS Energy's Application Amendment (Dec. 20, 2020), Attachment 2, Page 2 (Bates Stamp No. 000028).

VIII. PIPELINES

Q. DO ANY OF THE SEGMENTS PARALLEL OR CROSS A PIPELINE?

A. Yes, as Brad Jauer indicates in his testimony, there is a steel natural gas pipeline on the north side of Toutant Beauregard Road where CPS has located Segment 20. The riser for the pipeline is clearly shown on the photographs included in Jauer Exhibit BJ-1, and the fact that it is owned and/or operated by "CPS Energy," itself, is evidenced by the signage shown in those photographs.

Q. HAS CPS MADE ANY REFERENCE TO THIS PIPELINE IN THE APPLICATION OR OTHERWISE?

A. No, it has not. In fact, in response to Brad Jauer & BVJ Properties RFI 2-8, CPS states declaratively, "CPS Energy is not aware of any steel natural gas or water pipelines within the study area." Then, responding with even more specificity to Brad Jauer & BVJ Properties RFI 2- 16, CPS states, "CPS Energy does not have any information regarding any pipelines in proximity to Segment 20, including owner, size, composition, or material, and type."[28] Both of these discovery responses from CPS Energy are attached to my testimony as Exhibit MDA-25 (CPS Response to Jauer 2-8 and 2-16).

In addition, CPS's tables summarizing the results of its evaluations of "Environmental and Land Use Data" (i.e., Table 4-1 Amended and Table 4-2 Amended) similarly fail to identify any segment or route that parallels or crosses a pipeline.

[28] Exhibit MDA-25, CPS Response to Jauer RFIs 2-8 and 2-16.

Q. WHAT CONCLUSIONS DO YOU DRAW BASED ON THESE IMPORTANT OMISSIONS?

A. First, I conclude that the EA and its due diligence was not very thorough. Second, I conclude that there are an increasing number of utilities and facilities that require due consideration for evaluation that further reinforce my opinion that the Toutant Beauregard corridor is too highly congested with so many issues that have the potential to increase the cost of the routes using Toutant Beauregard, that its cost estimate is not accurate and cannot be quantified with the information provided.

IX. CEMETERIES AND HISTORIC DISTRICTS

Q. DOES CPS' BEST MEETS ROUTE (ROUTE Z1) INCLUDE ANY CEMETERIES, HISTORIC DISTRICTS OR OTHER FEATURES THAT SHOULD BE AVOIDED?

A. Yes, as to both. Route Z1 (specifically Segment 36) passes within very close proximity (specifically 98 feet) to the Heidemann Ranch Historic District,[29] which is on the National Register of Historic Places,[30] and also has a cemetery on its premises.[31] A screenshot of CPS's map of "Habitable Structures and Other Land Use Features in the Vicinity of the Primary Alternative Routes" (Figure 4-1 Amended)[32] is attached to my testimony as Exhibit MDA-13. The Heidemann Ranch Historic District is delineated by the blue hash-

[29] *See* "Map Number" 901 on CPS Energy's Application Amendment (Dec. 20, 2020), Attachment 2, Table 4-31 Amended, "Habitable Structures and Other Land Use Features in the Vicinity of the Primary Alternative Route Z1" (Bates Stamp No. 000128).

[30] *See* CPS Energy's Application Amendment (Dec. 20, 2020), Attachment 2, Pages 4-29 to 4-30 and Table 4-5 Amended, "NRHP-Listed Resources recorded Within 1,000 Feet of the Alternative Route Centerlines" (Bates Stamp No. 000081-82).

[31] See CPS Energy's Application Amendment (Dec. 20, 2020), Attachment 2, Page 4-30 (Bates Stamp No. 000082).

[32] *See* National Register of Historic Place No. 901 on CPS Energy's Application Amendment (Dec. 20, 2020), Appendix E, Figure 4-1 Amended, "Habitable Structures and Other Land Use Features in the Vicinity of the Primary Alternative Routes."

marked area, the blue and yellow "901" indicating (as per the base map's legend) it is on the National Register of Historic Places, and the white cross in the red box indicating its cemetery.[33] This historic place is the type of cultural resource upon which the community places a high value, and it is located just over 30 yards from Route Z1 and the other routes that utilize this portion of Toutant Beauregard. There is simply no reason for such an encroachment on a national treasure on the National Register of Historic Places when a much less burdensome and affordable option exists in Route R1 Modified.

X. MODIFICATION FLOW-THROUGH

Q. IF THE COMMISSION ULTIMATELY APPROVES A ROUTE OTHER THAN R1 MODIFIED THAT USES SEGMENTS 26A, 38, 39, OR 43, SUCH AS ROUTE P, DO YOU STILL RECOMMEND THE MODIFICATION APPLIED TO ROUTE R1 MODIFIED?

A. Yes.

Q. CAN YOU EXPLAIN WHY?

A. For the same reasons that I recommended modifications to Segments 38 and 43 in the first place, including avoiding three habitable structures and significantly lowering cost.

XI. MODIFICATIONS TO Z1

Q. NOTWITHSTANDING THE RECOMMENDATIONS YOU HAVE MADE, IF THE COMMISSION APPROVES ROUTE Z1 ARE THERE CHANGES THAT YOU WOULD RECOMMEND TO IT?

A. Yes.

---

[33] *Id*

Q. WHAT ARE THEY?

A. I would recommend that Segment 36 remain on the same side of the road as Segment 20. Segment 36 impacts at least one habitable structure, and based on my review of the maps, if it remained on the same side of Toutant Beauregard as Segment 20, it would not impact any habitable structures on the other side of the road. I reviewed CPS cost data and estimated that this could save up to $300,000 if the line were to remain on that side of Toutant Beauregard.

Q. BUT ISN'T THERE A HISTORICAL SITE ON THE OPPOSITE SIDE OF TOUTANT FROM SEGMENT 36?

A. Yes. That is yet another reason not to route the line along Toutant Beauregard. However, if Route Z1 is approved, this property could be spanned, meaning there would not be a structure placed on it. I would also note that Segment 31 appears to abut the historical site and Segments 42a and 35 are in close proximity to it. However, if spanning the historical site were a concern, Segment 36 could remain on the same side of Toutant Beauregard as Segment 20 for some portion of its length and then cross at the corner of the historical site. That would avoid both the habitable structure and the historical site as much as practicable.

XII. ALTERNATE RECOMMENDATIONS

Q. IF THE MODIFICATION IS NOT DONE TO ROUTE R1, WHAT ROUTE WOULD YOU RECOMMEND?

A. Route W.

Q. CAN YOU EXPLAIN WHY?

A. For reasons previously stated, I consider all of the 20 northern routes that use Toutant Beauregard, Segment 54, and Substation Site 7 to be unsuitable for inclusion in a best meets route. Of the central routes that run between Anaqua Springs and the Canyons,

without further modifications, I do not consider any of these routes acceptable because they unnecessarily increase the habitable structure count. For the remaining southern routes that interconnect with Ranchtown to Menger Creek at either Segment 45 or Segment 44, please refer to Table MDA-5.

Table MDA-5

Route	Length (miles)	Transmission & Substation cost ($MM)	Ranchtown Interconnecting Segment	Substation Site	Habitable Structures <300'
W	6.25	52.87	44	6	25
V	6.6	54.17	44	6	25
S	6.73	55.33	45	6	25
O	6.83	56.19	44	5	29

The routes shown above include no further modifications. As shown in the preceding Table, Segment W is the clear choice due to its shorter length, which corresponds to less impact to the community, is the least cost option, and impacts the same or fewer habitable structures than the other segments. Due to its length, it is not one of the lower cost routes; however, CPS proposed 7 other routes that are more expensive.

Compared to Z1's 30 habitable structures within 300 feet, Route W has 5 fewer. Route W does not cross or parallel any natural gas pipelines, compared to Route Z1's confirmed presence of at least 1 pipeline. Route W does not cross within 1,000' of any parks/recreational areas, compared to Z1's passing the recreational facilities as previously described above. Route W is tied with O for the best score when considering crossing high quality golden-cheeked warbler habitat at 2.95 compared to Z1's 11.12, nearly a four-fold higher impact. Route W's paralleling other linear features is better at 3.63 miles compared to Z1's 3.09. Route W does not pass any cemeteries within 1,000', compared to Z1's 1

cemetery. Route W's crossing areas of high archeological site potential is 2.75 compared to Z1's 3.01. For these reasons, Route W is the clear choice of the unmodified routes.

XIII. SUMMARY AND CONCLUSION

Q. PLEASE SUMMARIZE YOUR EXPERT OPINIONS BASED ON YOUR EXPERIENCE AND ANALYSIS.

A In my expert opinion, Segment 54 should not be used because it is a highly constrained and congested utility and transportation corridor located in the center of a rapidly growing community. Furthermore, no routes that run close to the elementary school should be approved. Similarly, Substation Site 7 should not be used because of its highly constrained size, noise and lighting issues, and proximity to nearby homes and the Leon Creek watershed.

Using Route R1 Modified aligns with the Commission's policy of prudent avoidance by impacting only 5 habitable structures (the fewest of any route), avoiding proximity to any school, avoiding a district on the National Register of Historic Places, aligning with community values, and accomplishing all this while being the 5th lowest cost route. As-filed R1 needlessly impacts additional habitable structures at an increased cost, making it an unattractive option without my modification.

Q. WHAT ROUTE DO YOU RECOMMEND AS THE "BEST MEETS" ROUTE?

A. I recommend approving R1 Modified. Modifying the route as I have suggested reduces Route R1's habitable structure count by three, reduces its cost by approximately $1.78 million, and results in a habitable structure count that is *6 times less* than CPS's best meets route. It moves the line farther away from existing homes in established subdivisions, conforms to the area's community values of keeping the line away from homes and schools,

and avoids unknown cost increases along Z1. If R1 Modified is not approved, I recommend Route W be approved.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

Mark D Anderson PMP
14995 Boulder Pointe Road
EDEN PRAIRIE, MN 55347
Tel. (612) 345-1456
mda5551@hotmail.com

Mark D Anderson, PMP

Portfolio/Program/Project/Construction Manager, Expert Witness

SUMMARY

Senior level executive with extensive project/program management experience in the power sector. Persuasive negotiator with proven project management, problem-solving, decision-making, team building and leadership skills. Demonstrated ability to identify and mitigate risk, negotiate win/win outcomes while maintaining positive relationships, meet scheduled deadlines and manage costs within budgets while enhancing the bottom line. Analytical process oriented perspective used to establish, measure and monitor processes, and provide feedback for continuous process improvement. As an Expert Witness in three appearances at PUC's in two jurisdictions, my testimony and recommendations were incorporated into the final orders.

EXPERIENCE

MARK ANDERSON MANAGEMENT ASSOCIATES llc **10/2019 to 2/2020**
Managing Director
Provided route analysis and expert witness testimony for a client in Docket 49523 at the Public Utilities Commission of Texas, where my proposed routing recommendations were adopted. Currently providing route analysis and expert witness testimony in PUCT Dockets 50812 and 51023.

STANLEY CONSULTANTS, INC. **11/2017 to 6/2018**
Construction Manager
Provided Construction Management services to Lansing Board of Water and Light's West Side Reinforcement Project.

ALDRIDGE ELECTRIC **5/2016 to 10/2016**
Project Sponsor
Provided Business Development and Project Management services to Transmission Partners, a joint venture between Aldridge, Kiewit and Henkels and McCoy.

WESTWOOD PROFESSIONAL SERVICES **12/2014 to 5/2016**
Project Director
Developing marketing strategies designed to cater to the transmission sector, as well as mentoring project managers on transmission projects.

- Provided expert witness testimony for transmission line siting and routing in Docket 43878 at the Texas PUC. The PUC adopted my proposed route modifications.
- Developed fast track survey process to accelerate design and ROW acquisition.
- Developed access planning tools based on geo-referenced technology.

GREAT RIVER ENERGY – CapX2020 Brookings to Hampton Project
Project Manager **12/2011 to 8/2014**
Overall responsibility for pre-construction planning through energization. Project was initially approved for $738.5 million, now estimated at $670.7 million. Developed design and schedule optimization processes and implemented unique contracting and risk sharing strategies that resulted in the cost under-run.

MYR TRANSMISSION SERVICES, INC. **8/2010 to 12/2011**
Sr Project Manager
Managed the KETA project in central Kansas, significantly increased the profit margin from the initial bid and delivered the project on time. Managed multiple subcontractors for foundations, access, and vegetation management.

MARK ANDERSON MANAGEMENT ASSOCIATES llc **8/2009 to 8/2010**
Managing Director

Consultant on transmission business development opportunities for a major Midwest privately held construction company, a Denver based design engineering firm, and a national publicly traded electrical construction company.

KENNY CONSTRUCTION COMPANY **8/2008 to 8/2009**

Program Manager

P&L responsibility for a Program Management Office with a mid-west Transmission Utility for a portfolio of high voltage (345kV) transmission line and substation construction projects with an annual capital budget of +$150 million.

- Establish enhanced processes and controls that provided cash flows to +/- 5% of the monthly projection, while eliminating cost overruns.
- Implemented OSHA 30 hour training for all supervisory and field personnel.
- Optimized the constructability review process to consistently lower estimates by 5-10%.

XCEL ENERGY, INC. **2005 to 2008**

Senior Project Manager

Responsible for large Greenfield HV Transmission Projects

- Managed the SWTU EHV EPC project, about $150 million value, 150 miles of 345kV and 115kV, plus 3 new substations and modifications to 2 others.
- Negotiated a contract scope reduction to self perform the civil work scope that resulted in $15 million in savings compared to unit prices in the initial contract.
- Met scheduled ISD's and avoided $540 million in penalties notwithstanding a 9 month delay in obtaining a key permit.
- Developed a fast track project execution process that shortened permit to construction durations by 1 year.
- Provided expert witness testimony and routing recommendations to the Minnesota Public Utilities Commission, which were adopted by the Commission.

Manager, Transmission Project Management Office

Established the framework for a Project Management Office to standardize project management practices and better manage and track a capital budget that was doubling in size every year, better define roles and responsibilities within the Business Unit, select and roll out the primavera scheduling tool, and implement constructability review processes.

Sourcing Specialist

Hired to develop a fixed price lump sum EPC contract template for the transmission business unit.

- Managed the RFP process such that there was less than 1% difference in pricing between the two lowest bidders on a $150 million work scope after implementing a best and final series of bid clarifications that resulted in $8 million of price reductions.
- Developed metrics for unknown soils conditions that allowed competitive foundation bids as the geotech report was not yet completed.

MARK ANDERSON MANAGEMENT ASSOCIATES **2004 to 2005**

Managing Director

Managed consulting practice dedicated to risk mitigation for independent power producers.

NRG ENERGY, INC **1985 to 2004**

A multinational power and energy company that owns and operates a variety of energy-related operations worldwide.

Director, Contracts **2001 to 2004**

Senior commercial negotiator for large construction contracts, and program manager for lender's collateral while in bankruptcy.

- Negotiated the restructuring of a $600 million EPC contract for a greenfield one thousand megawatt project in Illinois when the prime contractor's parent became insolvent, maintaining original schedule.
- Developed and implemented a storage and preservation program for over $1 billion worth of combustion turbines and related equipment from terminated construction projects, saving over $10 Million

compared to original maintenance recommendations while maintaining resale value and Lender relationships.

- Closed a stagnant negotiation with project lenders on a greenfield 1,000MW project within a six week period, successfully avoiding project bankruptcy and/or lender foreclosure. Resulted in $1.8M fee for NRG and waiver of defaults to the credit facility. Managed subsequent completion of construction.

Executive Director, Commercial Portfolio Management, Europe	**1999 - 2001**
Executive Director, Asset Management, North America	**1998 – 1999**
Director, Contract Performance	**1995 – 1998**
Director, Business Development	**1992 – 1994**
Project Manager	**1990 - 1992**
Project Engineer	**1985 - 1990**

EDUCATION

Moorhead State University
BS Industrial Technology

CERTIFICATIONS

PMI Certified Project Management Professional (Lapsed)
OSHA 30 Certified

Attachment 13

BURNS McDONNELL

Scenic Loop Substation Analysis Report

CPS ENERGY

CPS Energy

7/14/2020

Scenic Loop Substation Analysis Report

prepared for

CPS Energy
San Antonio, TX

Project No. 123099

Final
7/14/2020

prepared by

Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri

BURNS McDONNELL

Contents

List of Tables

List of Figures

BURNS McDONNELL

BURNS McDONNELL

1. Executive Summary

CPS Energy is experiencing significant load growth in the northwest region of Bexar County, in some areas as high as 4-7 percent annually. Limitations on the existing electrical infrastructure in that area will be challenged by increasing load along the IH-10 corridor north of Loop 1604, including La Cantera, Camp Bullis, and the Rim multiuse shopping development area. Future load from the University of Texas at San Antonio (UTSA) associated with its Main Campus Master Plan (presented in February 2020) will essentially double the current UTSA load. In addition, the UTSA Area is targeted as a regional development center in the City of San Antonio's (City) SA Tomorrow Comprehensive Plan (Comprehensive Plan) and is one of the fastest growing areas of the City.

In conjunction with the significant load growth CPS Energy is experiencing in the northwest Bexar County area, the existing distribution circuits within La Sierra Substation and some of the circuits originating at the Fair Oaks Ranch Substation are very long (up to nearly seven times longer than the average distribution circuit within CPS Energy's system) and serve thousands of customers. These long, heavily loaded circuits have resulted in significant reliability concerns for the area.

Even with planned improvements to the existing distribution system, without a new substation in northwest Bexar County, the existing distribution system will reach its reliability limit within five years.

A new proposed Scenic Loop Substation will provide CPS Energy with the infrastructure that it needs to reliably serve the northwest area of Bexar County for many years to come. The new substation will offload existing circuits, thereby enhancing reliability to customers, and enabling additional load growth capability within the region.

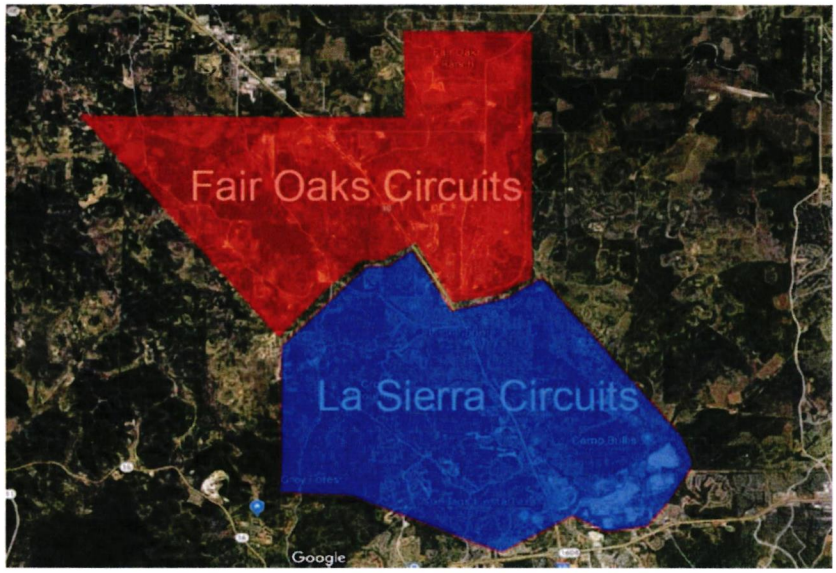
BURNS McDONNELL

2. Existing System Assessment

2.1 Background of System

The load in the northwest region of Bexar County is currently served by long circuits from the La Sierra and Fair Oaks Ranch substations. The long circuits serving a large number of customers have created significant impacts on power reliability in the area. The reliability concerns will increase as load continues to grow in the area.

Figure 1: Geographic area served by Fair Oaks Ranch and La Sierra 35-kV stations



The La Sierra Substation has a total transformer capacity of 200 MVA that includes two 100 MVA transformers. There are three other substations in the vicinity (Hill Country Substation to the East, DeZavala Substation to the South, and Ranchtown Substation to the West) that can help with serving load in the event of the loss of one of the 100 MVA transformers. According to CPS Energy's established planning practice, the total planning capacity of the La Sierra Substation is 75 percent of the nameplate capacity (i.e., 150 MVA). This planning capacity is based on the ability of CPS Energy to shift load to other substations in the event of the loss of one of the two La Sierra transformers.

The Fair Oaks Ranch Substation has a total transformer capacity of 100 MVA that includes two 50 MVA transformers. Fair Oaks Ranch has less support from other nearby stations because of the terrain in the area and the CPS Energy service territory boundary. Thus, it is only capable of being supported after a loss of one of the existing transformers from two circuits of the La Sierra Substation. As a result, the total planning capacity of the Fair Oaks Ranch Substation is 60 percent of the nameplate capacity (i.e., 60 MVA).

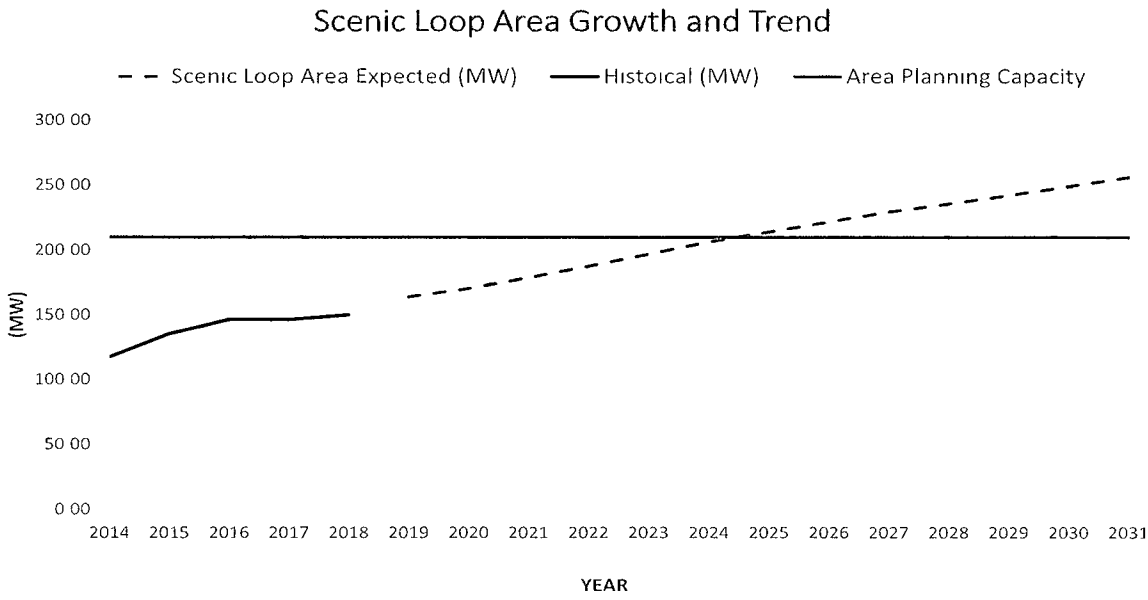
Thus, the total planning capacity for the area served by the La Sierra and Fair Oaks Ranch substations is 60 percent of 100 MVA from Fair Oaks Ranch and 75 percent of 200 MVA from La Sierra for a total of 210 MVA for the overall area.

The area served by the La Sierra and Fair Oaks Ranch substations has seen significant load growth over the last ten years, which is anticipated to be sustained in the foreseeable future. The following plot describes expected load growth within the region along with the planning capacity based on the current ability of distribution circuits to support load. The demand on the current system is expected to exceed

BURNS McDONNELL

capacity within the next few years. The area needs an additional substation by 2024 to serve the area demand in a reliable manner.

Figure 2: Historical Load growth and expected load growth for next 10 years[1].



Evidence supporting CPS Energy's projected future load growth for the area is contained in the City's SA Tomorrow Comprehensive Plan. As set forth in the plan, the UTSA Area is one of the fastest growing areas of the City. Appendix A of this document describes the 2010-2040 Forecast for Residential Dwelling Units and Jobs and shows the plan's 30-year forecasts for housing unit and employment growth under two scenarios, (1) the Alamo Area Metropolitan Planning Organization (AAMPO) Baseline, and (2) the Targeted Growth Scenario that assumes investment and market shift that results in denser development patterns supported by high-frequency transit.

The tables in Appendix A describe future land use (acreage) including a forecast of dwelling units, jobs, and commercial/industrial square footage. The data in the Comprehensive Plan compiles information from several different economic and planning system models showing the number of acres designated to each land use category in the adopted UTSA Area Regional Center Plan. The land use map included in Appendix A describes the overall UTSA Area land capacity estimates for residential and commercial/industrial uses (by land use category, and based upon several assumptions and factors that are shown in the table) and the 2040 forecasts for net new (from 2018/2019 levels) residential dwelling units, commercial/industrial jobs, and commercial/industrial building square footage.

[1] The CPS Energy DP Design Manual 2019 (section 3.3 process 8-11) describes the steps followed in the demand forecast. The process includes load normalization to reduce annual variation. Actual recorded demands are statistically adjusted by temperature index relative to 5 year average to find an equivalent base each year. Forecasting individual substation growth is based on information known about the area (Large loads, data centers and other customer load growth) and apply to the base demand calculated for each circuit.
Average temperature and not forecast future weather are used for the base demand a single expected average is displayed. Variations in the expected demand for Individual substation growth is based on information known about the area (Large loads, data centers and other customer load growth) that is applied to the base demand.
Erratic growth rates in some years reflect load switching between stations that are outside the study with temporary excess capacity while investments from contractors is expected to fund local distribution system expansion.

BURNS McDONNELL

The Comprehensive Plan designated the UTSA Area as one of the fastest growing areas of the City. The amount of forecasted economic activity, jobs, residential/commercial and industrial development equates to a significant increase in load demand on the CPS Energy distribution system and supports and validates the assumptions of load growth included in this study for the circuits originating from the La Sierra and Fair Oaks Ranch substations.

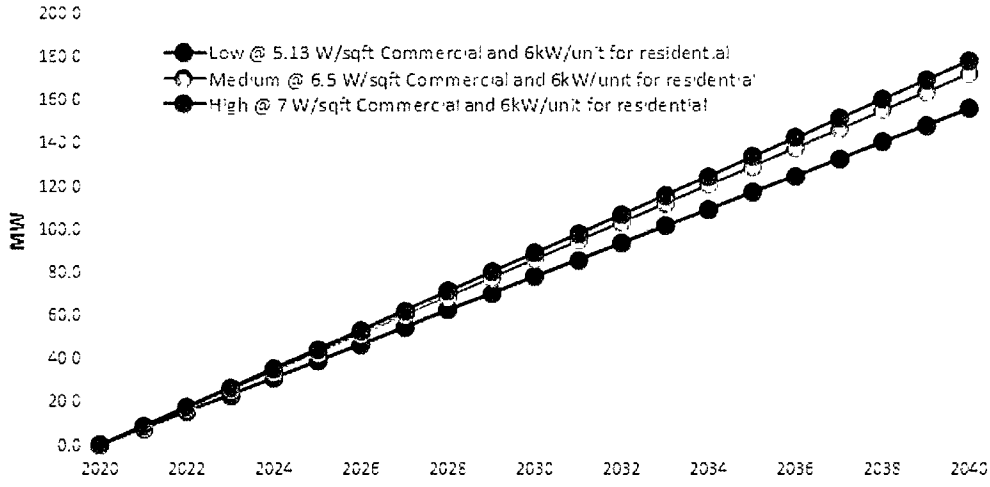
Based on the growth experienced by CPS Energy in the area over the last 10 years and information on the total anticipated residential dwelling units and the amount of square footage of commercial/industrial development from the Comprehensive Plan report, the total additional electrical load reasonably projects to approximately 8-9 MW/year of load growth in the region. Considering the targeted growth scenario, by 2040 this additional load equates to approximately 160-180 MW using the Baseline forecast scenario and could be as high as approximately 300 MW using the Targeted forecast scenario.

- The CPS Energy Distribution Planning Manual describes the electrical load of residential dwelling units at 6 kW for each new dwelling unit. The Comprehensive Plan indicates 15,900 new dwelling units (~95 MW) in this region under the Baseline scenario and 37,500 new residential units (~225 MW) under the Targeted scenario by the year 2040. This additional load growth could very easily be higher considering all the essential service loads that would be necessary to support that level of new residential development in the region. The additional load on the system cannot be accommodated reliably from the existing circuits originating from the La Sierra and Fair Oaks Ranch substations.
- According to the Department of Energy (DOE)[2], the average number of kilowatt hours per square foot for a commercial building is approximately 22.5 kWh. Some types of commercial loads, such as food service facilities, consume approximately 56 kWh/ft^2. Retail malls consume approximately 23 kWh/ft^2 on average. Other loads such as a public assembly buildings and warehouses consume approximately 15 kWh/ft^2 and 9kWh/ft^2, respectively. Assuming an average energy use of 22.5 kWh/ft^2 and a load factor of 0.5, this amounts to approximately 5.13 Watts/ft^2 for load calculations. A Review of CPS Energy's commercial/industrial load statistics indicates an average of approximately 6.5 Watts/ft^2.

The following Figure 3 describes the anticipated load growth using the Baseline (minimum) scenario projections in the UTSA Area described in the Comprehensive Plan report. The high, medium, and low growth scenarios are based on assumed load per square foot values described above.

[2] https://www.energy.gov/eere/analysis/energy-intensity-indicators
https://www.eia.gov/totalenergy/data/annual/

Figure 3: Load Growth based on SA Tomorrow's forecasted customers – Baseline forecast only.



2.2 Planning Criteria

Distribution planning analysis was conducted on various system conditions to determine the reliability need for the area and to find a robust and cost-effective solution from both near-term and long-term perspectives. The study criteria, assumptions, methodology, and findings from the analysis are presented in this section and are consistent with the CPS Energy Distribution Planning Manual.

According to CPS Energy's long-standing Distribution Planning Manual, the electric distribution supply to the CPS Energy service territory is deemed adequate when the following criteria are met:

- No substation transformer is loaded above 80% of its Normal Rating during expected peak energy usage conditions.
- No backbone distribution feeder is loaded above 80% of its Normal Rating during expected peak energy usage conditions. A backbone distribution feeder is one within the three phase primary distribution system characterized by having large conductor and most direct path(s) to adjacent substations.
- For the extended outage of any substation transformer, no facility will be loaded in excess of its Emergency Rating.
- Voltages are within the ANSI 84.1 voltage range A limits for normal conditions and range B for emergency conditions on primary distribution lines.
- Power Factors, or the ratio of the real power absorbed by the load to the apparent power flowing in the circuit, are greater than 97% at the secondary breakers on each substation transformer under normal conditions.

In addition to the provisions established in the CPS energy planning manual, and in accordance prudent utility practice, the total transformer capacity of an individual substation is limited by the ability of CPS Energy to sustain the loss of one substation transformer by shifting load to other transformers in that or nearby substations.

BURNS McDONNELL

2.3 Existing Distribution Circuit Performance

The existing distribution system served out of the La Sierra and Fair Oaks Ranch substations served a peak summer load of approximately 165 MW in 2019. The La Sierra substation has two 100 MVA transformers and currently serves approximately 110 MW (peak summer load in 2019) via seven circuits. The transformers at the substation were peak loaded to 71% and 42% of their capacity rating in 2019. The peak load on one of the transformers was more than 80% in 2018 and near 80% in the other recent years. Thus, the loss of one of the transformers within the station will load the other transformer to near 120% of its emergency rating. The Fair Oaks Ranch Substation has two 50 MVA transformers and serves load connected to four circuits split between the two transformers, with a total peak load of approximately 50 MW served in 2019.

The La Sierra and Fair Oaks Ranch substations have no spare transformers and the circuits served from these stations have only a limited ability to support load growth as the limit is defined by circuit capacity and on how one of the substation transformers gets loaded if the other one is lost as a part of an outage.

The following
Table 2 and

Table 3 show the loading on the circuits and the length of the circuits originating from the La Sierra and Fair Oaks Ranch substations. As can be seen in the tables, the loadings on the circuit R034 from Fair Oaks Ranch and U114 from La Sierra exceeded CPS Energy's Distribution Planning Criteria in 2019. The projected 2020 summer peak loads on circuits U112 and U114 will exceed CPS Energy's Distribution Planning Criteria of 80% loading on the U114 circuit (98%) and U112 circuit (80%) this summer.

Of importance to note for this study, CPS Energy reconfigured the circuits out of Fair Oaks Ranch with two on each 35-kV switchgear within the substation in the summer of 2020. As a result of the reconfiguration, the load and circuit R011 moved to the other switchgear and is named circuit R033. A portion of the U114 and R034 circuits shifted to a new circuit R014. Table 1: Scenic Loop Area 34.5kV Distribution Circuits describes the details of the existing circuit lengths connected to La Sierra and Fair Oaks Ranch along with a scenario following the energization of circuit R014. This table also provides details on the final circuit lengths after inclusion of the Scenic Loop Substation (estimated for 2024). As can also be seen in Tables 2 and 3, some of the La Sierra and Fair Oaks Ranch circuits are very long compared to an average CPS Energy distribution circuit (which is approximately 12.8 miles long). The length and loading on these circuits equate to lower reliability to the customers served by these feeders, as will be seen in the reliability metrics presented in the following discussion.

BURNS McDONNELL

Table 1: Scenic Loop Area 34.5kV Distribution Circuits

Circuit Lengths in Miles				
Circuit Number		Existing Configuration	Existing Configuration +R014 (2020)	Existing Configuration +R014 + Scenic Loop (2024)
La Sierra	U111	2.66	2.66	2.66
	U112	46.37	46.37	46.37
	U113	1.51	1.51	1.51
	U114	85	32.95	8.07
	U132	45.43	45.43	4.58
	U134	34.81	34.81	34.81
Fair Oaks Ranch	R014	-	97.13	31.31
	R034	73.27	28.19	28.19
Scenic Loop Rd	V611	-	-	41.58
	V612	-	-	24.28
	V613	-	-	34.84
	V614	-	-	30.66
TOTAL		**289.06**	**289.06**	**288.87**

Table 2: Fair Oaks Ranch Substation Circuits

Xfrmr #1	Length	Customers	2019 Loads		2020 Loads	
50MVA	(miles)		Load (kW)	% of Nominal	Load (kW)	% of Nominal
R011	27.3	-	9639	36	Not Utilized	-
R012	-	2	Not Utilized	-	Not Utilized	-
R013	25.9	1660	12933	49	11900	45
R014	54.8	3021	New	-	9461	41
Xfrmr #3	**Length**	**Customers**	**2019 Loads**		**2020 Loads**	
50MVA	**(miles)**		**Load (kVA)**	**% of Nominal**	**Load (kVA)**	**% of Nominal**
R031	-	-	Not Utilized	-	Not Utilized	-
R032	-	-	Not Utilized	-	Not Utilized	-
R033	27.3	1256	New	-	9736	44
R034	13.3	3140	22812	105	16807	77

Table 3: La Sierra Substation Circuits

Xfrmr #1	Length	Customers	2019 Loads		2020 Loads	
100MVA	(miles)		load (kW)	% of Nominal	load (kW)	% of Nominal
U111	2.7	1659	18774	60	20488	66
U112	46.4	3222	24250	78	24736	80
U113	1.5	88	8374	28	830	3
U114	85.0*	4095	28514	91	30577	98
Xfrmr #3	**Length**	**Customers**	**2019 Loads**		**2020 Loads**	
100MVA	**(miles)**		**load (kW)**	**% of Nominal**	**load (kW)**	**% of Nominal**
U131	-	-	Not Utilized	-	Not Utilized	-
U132	45.5	2617	13531	39	14644	42
U133	2.0	553	6409	21	14770	48
U134	34.7	3288	15647	50	15990	51

* Circuit will be reduced by approximately 50 miles after the load is being picked up by R014.

BURNS McDONNELL

Reliability of a distribution system can be evaluated by considering SAIDI (system average interruption duration index), SAIFI (system average interruption frequency index), and CMI (customer minutes of interruption). The Customers Affected (CA) include the number of customers whose outages are included in the calculation of the reliability indices presented in this report. The reliability metrics for the La Sierra and Fair Oaks Ranch substation circuits for the past seven years indicate a much lower reliability as compared to the averages of the CPS Energy system. The La Sierra and Fair Oaks Ranch circuits have 4-6 times higher SAIDI and SAIFI values in comparison to the system average interruption indices for CPS Energy as a whole.

The reliability statistics on the La Sierra and Fair Oaks Ranch circuits indicate that the CMI from these circuits have accounted on average for approximately 11.2 percent of CPS Energy's total minutes of interruptions (as high as 20% in 2017), even though these circuits serve only approximately 3% of CPS Energy's entire load. This indicates a much lower reliability for the loads served by these substations.

Notably, from 2013 to 2019 the SAIDI and SAIFI indices have steadily risen (indicating declining reliability). This increase in the frequency and duration of interruptions experienced by customers clearly evidences a steady decline in the reliability and power quality in the area. Table 4: CPS Energy System-wide Average Reliability Indices presents the CPS Energy-wide SAIDI, SAIFI, and CMI in addition to number of customers affected.

Table 4: CPS Energy System-wide Average Reliability Indices

YEAR	CMI	SAIDI	SAIFI	CA
2013	37,465,050	51.39	0.79	575,726
2014	35,449,090	47.55	0.73	547,023
2015	41,562,265	54.62	0.76	580,576
2016	44,120,730	57.4	0.8	616,000
2017	42,443,090	53.97	0.83	654,000
2018	44,311,290	54.49	0.84	686,000
2019	42,464,750	61	0.86	603,000
Total	**287,816,265**			**4,262,325**

Table 5 presents the reliability indices for the circuits served from the La Sierra and Fair Oaks Ranch substations. The data clearly show a high CMI. As stated above, in 2017 the interruptions on these circuits contributed nearly 20% of the total CMI for the entire CPS Energy system. Based on the outage data presented below, the customers served from the La Sierra and Fair Oaks Ranch circuits have experienced approximately 8-10 times more outages compared to the entire CPS Energy system average.

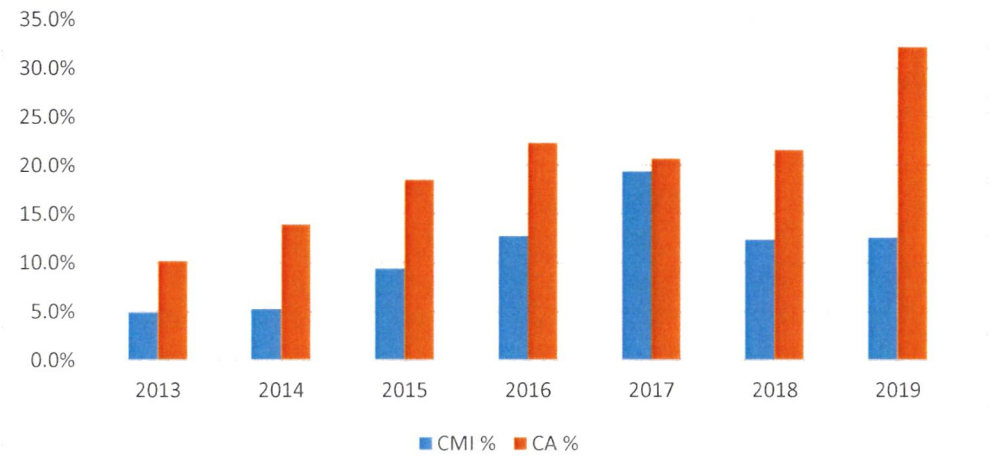
Table 5: La Sierra and Fair Oaks Ranch Circuits Reliability Indices

YEAR	CMI	CMI %	SAIDI	SAIFI	CA
2013	1,842,904	4.90%	83.77	2.67	58,633
2014	1,868,883	5.30%	83.06	3.39	76,259
2015	3,900,198	9.40%	169.57	4.67	107,463
2016	5,614,911	12.70%	238.93	5.85	137,513
2017	8,219,320	19.40%	342.47	5.65	135,583
2018	5,483,364	12.40%	223.81	6.05	148,185
2019	5,345,088	12.60%	215.53	7.82	194,027

Total	**32,274,667**	**11.20%**			**857,663**

Figure 4 shows the degree to which the low reliability on the La Sierra and Fair Oaks Ranch circuits (comprising approximately 3% of the CPS Energy overall load) contribute to the CPS Energy metrics for reliability in terms of CMI and customers affected (CA). The number of CA for the year 2019 on the loads served on La Sierra and Fair Oaks Ranch circuits is more than 30% of the CA for the whole CPS Energy system.

Figure 4: Fair Oaks Ranch and La Sierra Load Contribution to CPS Reliability Metrics from 2013-2019



The reliability issue with the La Sierra and Fair Oaks Ranch circuits is self-evident. Between 2010 and 2018, some of the La Sierra and Fair Oaks Ranch circuits have made CPS Energy's poor performing circuits (PPC) list for five different years (based on standards established by the Public Utility Commission of Texas), and a total of 6 of the 11 circuits have been on the list since 2010. Additionally, five circuits from La Sierra and Fair Oaks Ranch were on the PPC list in 2018, the most of any year within the past 10 years. This increase in the number of PPC is shown in Table 6**Error! Reference source not found.**.

Table 6: La Sierra and Fair Oaks Ranch Poor-Performing Circuits

Station	Circuit	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Fair Oaks	R011										
Fair Oaks	R012			PPC						PPC	
Fair Oaks	R013	PPC								PPC	
Fair Oaks	R034			PPC						PPC	
La Sierra	U111									PPC	
La Sierra	U112										
La Sierra	U113										
La Sierra	U114			PPC	PPC				PPC		
La Sierra	U133										
La Sierra	U134										
La Sierra	U132									PPC	PPC

Table 7 and Table 8 demonstrate the severe reliability issues that are occurring on circuits served from the La Sierra and Fair Oaks Ranch substations. As can be seen in the information presented in the tables, in the past year, La Sierra circuit U134 has the most affected customers experiencing momentary operations,[3] high frequency interruptions at 593% of system SAIFI, and is ranked one of the PPCs in 2019. Fair Oaks Ranch circuit R012 has high SAIDI and SAIFI values at 240.59 (which exceeds the 300% threshold) and 2.76, respectively. These statistics reveal the urgent need to remediate the reliability issues across La Sierra and Fair Oaks Ranch circuits. In addition to the objective declining reliability metrics presented above, CPS Energy has experienced subjective reliability complaints from customers in the Scenic Loop area. On two occasions in 2019 alone, CPS Energy representatives met with groups of customers in the area to address the frequent and sustained outages.

Table 7: La Sierra and Fair Oaks Frequent Device Operations Sustained & Momentary
(Apr 1, 2019 to Mar 31, 2020)

Circuit	Device	# of Sustained Operations	# of Momentary Operations	Customers Affected	CMI
U114	R3696	6	-	1027	96,502.88
R013	S5106	4	-	150	18,537.30
U132	CBU132	-	7	19344	8930.5
U134	CBU134	-	6	28316	7939.32
U114	CBU114	-	4	21176	30901.67

Table 8: SAIFI Poorest Performing Circuits

Circuit Number	Customers Served as of Last Outage	Last Outage Month	SAIDI	SAIFI	Compared to System SAIFI	Also Exceeds SAIDI 300% Threshold
U134	3288	1-Mar-20	18.33	1	593.37%	NO
R012	1085	1-Jun-19	240.59	2.76	460.03%	YES

One root cause for increased number of outages and duration of the outages on the La Sierra and Fair Oaks Ranch circuits are due to the length of the circuits. As shown above, some of the circuits from these substations are approximately 6-8 times longer than an average circuit length within CPS Energy's service territory. The length and poor reliability of these circuits today, coupled with the additional load growth these circuits will experience in the next several years, will continue to further erode the reliability on these circuits through an increase in the number and duration of outages along with the number of customers experiencing these outages. Installation and maintenance of adequate numbers of reclosers to detect and interrupt momentary faults will help with reliability but cannot fully address the reliability issues associated with the length and loading of the circuits. Specifically, the La Sierra and Fair Oaks Ranch circuits have adequate automation and sectionalization, but due to the nature of the circuit topology related to the terrain, length, and number of customers, reliability is still an underlying issue to be resolved.

Circuit	# of Reclosers
R014	5
R034	3
U111	1
U114	4
U132	1
U134	5

[3] A momentary operation is a brief loss of power delivery (less than 5 minutes) caused by the opening and closing operation of an interrupting device (e.g., a circuit breaker or recloser). These momentary operations and the number of customers impacted typically increase with line length, number of customers served.

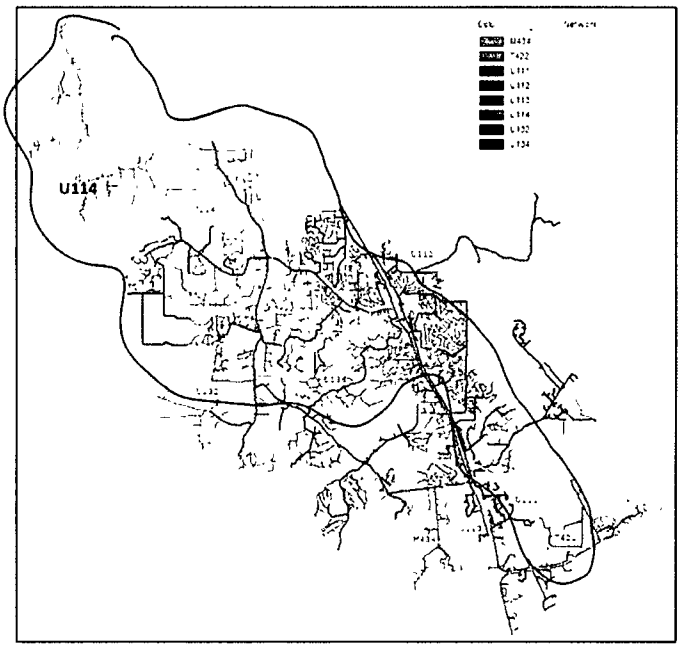
BURNS McDONNELL

For example, the longest circuit in the region is La Sierra circuit U114 that serves approximately 30 MW of load and over 4,000 customers. The circuit has four reclosers to help improve reliability, but it traverses heavily wooded areas and a canyon, which greatly impacts reliability. The circuit was flagged as a worst performing circuit more than three times in the last 10 years based on a large number of customer minutes of interruption.

As discussed previously, CPS Energy is not waiting until the construction of a new substation to improve reliability to the region. In order to increase capacity in the region and improve the reliability of circuit U114, during the early summer of 2020 CPS Energy moved a portion of the downstream load of U114 (approximately 6 MW) so it is picked up by another circuit (Fair Oaks Ranch R014). This reduces the length of the U114 circuit and provides some capacity for load growth on it. However, following the transfer, the R014 circuit increased from 52.05 miles to approximately 97 miles in length (which will likely result in decreased reliability on that circuit for those customers). Furthermore, shifting approximately 6 MW from U114 to R014 is only a temporary fix to create a small increase in capacity on the La Sierra circuits to help facilitate load interconnections and load growth around the IH-10 corridor. Capacity on the La Sierra circuits is very much needed to serve load growth around the UTSA area, La Cantera, and loads around IH-10, but the circuits also need to also be able to shift loads between the Hill Country and DeZavala substations. The Hill Country Substation has a single 50 MVA transformer that is expected to have a loading of 50% in 2020. The DeZavala Substation has three 100 MVA transformers and the peak loading on those transformers is expected to be 42%, 61% and 83% in the summer of 2020. Load increases and outages at these stations will need additional capacity from La Sierra to pick up load and to restore service in certain outage conditions.

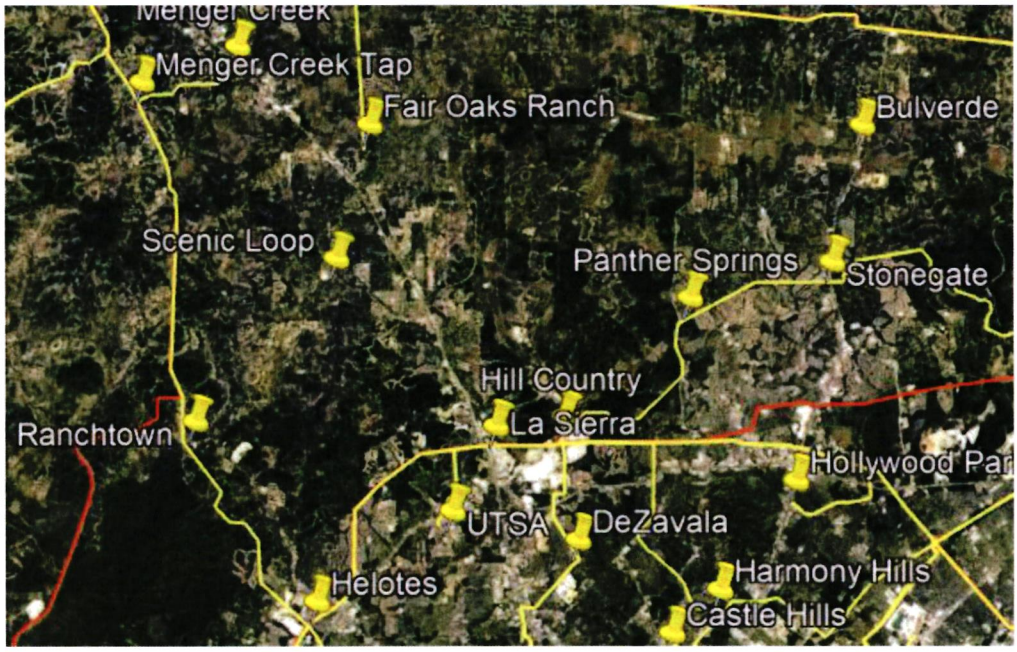
Finally, shifting load to R014 will only reduce the circuit length of U114 by 25 miles. After the transfer, U114 will still be around 60 miles in length, which is still almost 5 times longer than the system average circuit length (resulting in continued reliability challenges for that circuit).

Figure 5: Existing System Configuration of Circuits Served from La Sierra Substation, (U114 is the Longest Circuit)



The aerial image in Figure 6 shows the locations of the distribution substations owned and operated by CPS Energy in this area. The La Sierra, Hill Country, De Zavala, and UTSA substations are all within three miles of each other. Similarly, the Stonegate, Panther Springs, and Bulverde substations are within three to six miles of each other and the circuits between these stations are not very long. In contrast, the La Sierra and Fair Oaks Ranch substations are approximately 11 miles apart and some of the circuits served by these substations are extremely long. Because of the distances, the loads at the downstream portions of the La Sierra and Fair Oaks Ranch circuits (such as U114) cannot be served by any other substations without building significant additional infrastructure from more than 10 miles away through hilly and wooded terrain, which further increases the length of the lines, resulting in a continued possibility of lower reliability to the downstream loads.

Figure 6: CPS Energy Substations in Northwest Region of Bexar County



2.3.1 La Sierra Distribution Circuits Current Configuration – Power Flow Analysis

To evaluate the capacity and reliability of the current system in northwestern Bexar County, a power flow analysis was performed. This initial analysis did not include the load shift from circuit U114 to circuit R014. That configuration is shown in the second modelling provided below. The current CPS Energy distribution system shows loading on the U114 and U112 circuits was higher than CPS Energy planning criteria of 80% of their nominal rating in 2019. The 100 MVA transformers at the La Sierra Substation were loaded beyond 70% and 40% of their nominal rating in 2019. At this loading level, the loss of one of the transformers would result in a shortage of capacity to serve all the feeders out of the substation. In 2019, heavy loading on distribution circuits U114, results in voltage problems on downstream circuits and loads.

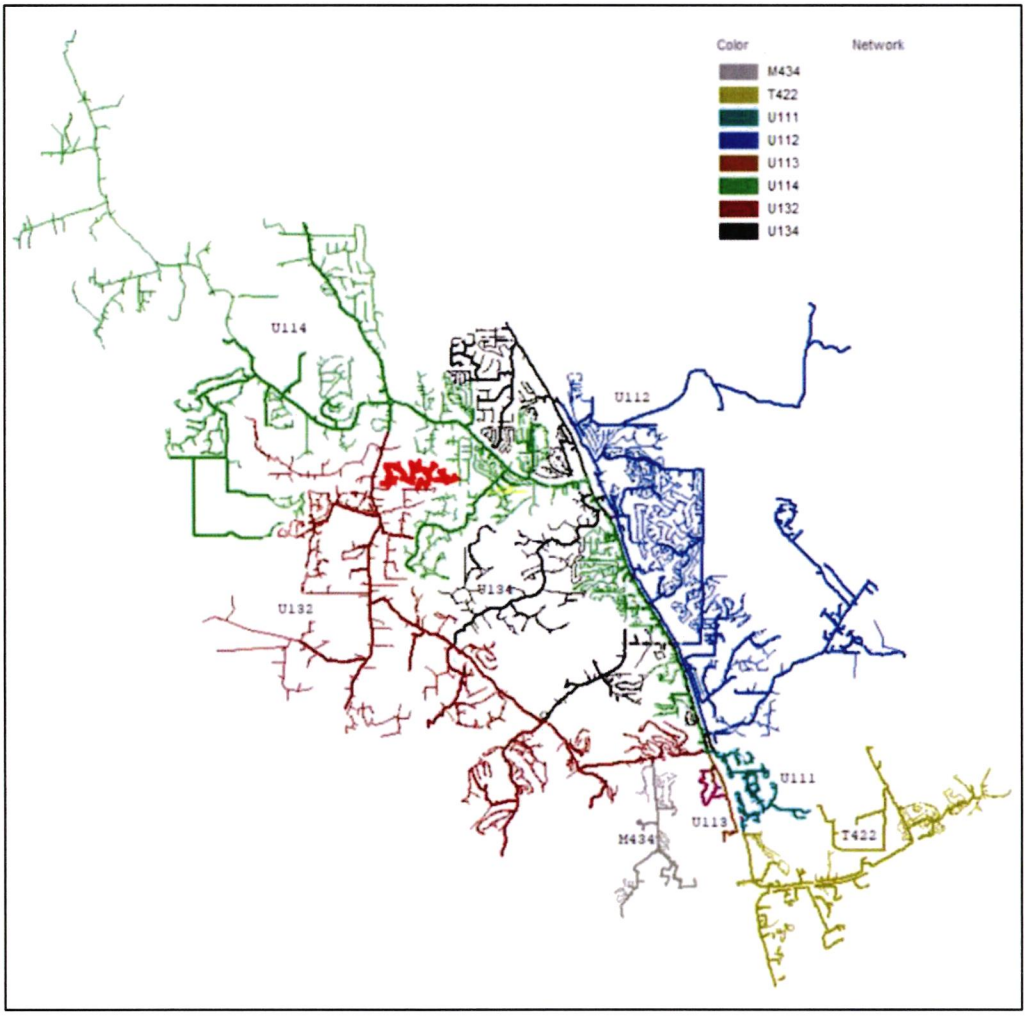
Figure 7 shows the La Sierra circuits with overloads and low voltages on a few portions of the U114 circuit.

Table 9: La Sierra Distribution Circuit Loadings

La Sierra Distribution Circuits	Loading	Total Load		
	%	kW	kVAr	kVA
U111	59.06	18331.07	6702.41	19517.95
U112	79.83*	24682.79	4667.76	25120.27
U113	31.78	8792.21	5324.65	10278.85
U114	87.91*	27428.49	4684.55	27825.65
Total		**79234.55**	**21379.36**	**82068.21**
La Sierra Distribution Circuits	**Loading**	**Total Load**		
	%	**kW**	**kVAr**	**kVA**
U132	37.79	13178.12	1317.49	13243.81
U134	50.75	15911.63	1727.68	16005.15
Total		**29089.75**	**3045.17**	**29248.7**

* CPS Distribution Planning Criteria violations

Figure 7: N-0 Model of La Sierra Circuits with Peak Loading (Actual FY 2019) Included in the Model



As discussed above, this part of the CPS Energy system has been experiencing above average (4-7%) load growth for the last five years. A model has been simulated to include additional loads to represent the year 2025 assuming a conservative load growth of 4% each year.

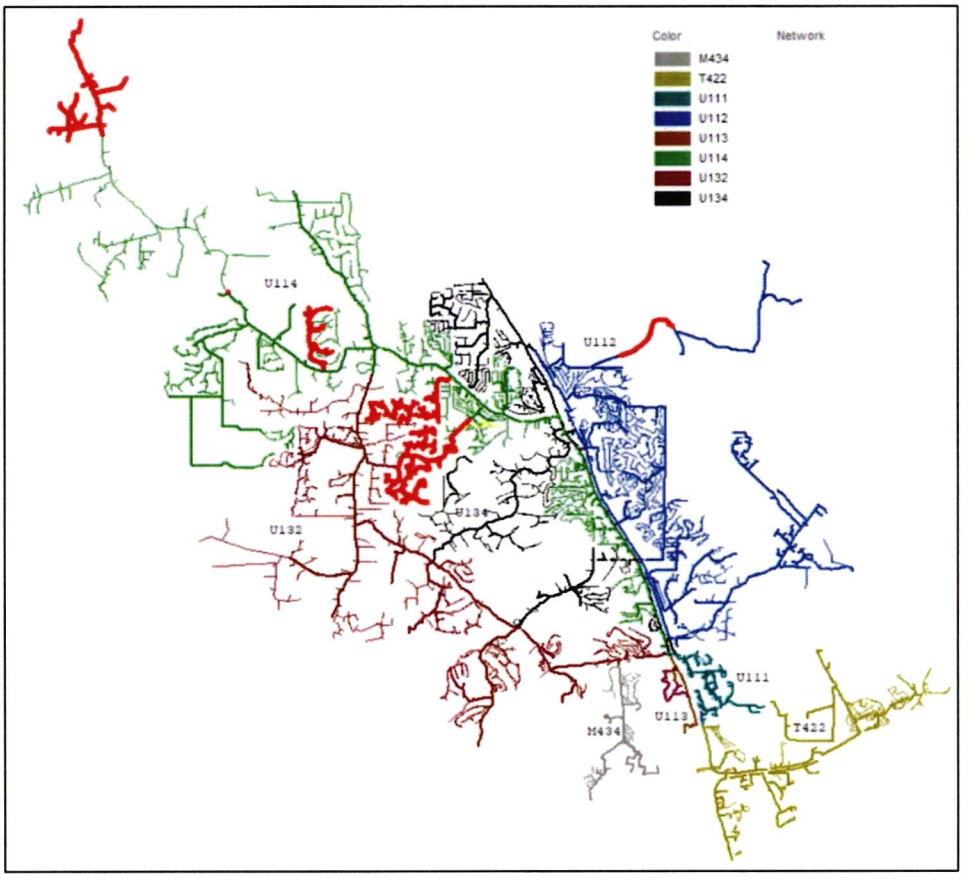
Table 10: La Sierra Distribution Circuit Loadings (FY 2025)

La Sierra Distribution Circuits	Loading	Total Load		
	%	kW	kVAr	kVA
U111	77.34	24007.96	10423.74	26173.2
U112	101.28*	31315.61	8081.35	32341.55
U113	43.54	12047.04	7445.16	14161.97
U114	112.23*	35015.09	8658.51	36069.74
Total		**102385.7**	**34608.76**	**108076.81**
La Sierra Distribution Circuits	**Loading**	**Total Load**		
	%	**kW**	**kVAr**	**kVA**
U132	49.82	17371.29	3324.67	17686.58
U134	64.37	20180.17	4073.32	20587.16
Total		**37551.46**	**7397.99**	**38273.25**

* CPS Distribution Planning Criteria violations

The modelling results indicate that the system problems in the area are exacerbated and voltage issues can be seen on multiple circuits in the region by 2024. Specifically, circuit U114 does not have adequate capacity to support the load and results in thermal and voltage violations as depicted in Figure 8.

Figure 8: N-0 Model of La Sierra Circuits with Peak Loading (Forecast FY 2025 with 4% Growth)



As discussed above, circuit U114 is currently greater than 85 miles long, which decreases reliability. As a result, CPS Energy has planned to shift a portion of the downstream network and load from circuit U114 to circuit R014 that is served from the Fair Oaks Ranch Substation.

2.3.2 La Sierra Distribution Circuits with R014 Energized – Power Flow Analysis

The forecasted peak load on circuit R014 in 2020 is estimated to be approximately 9.46 MW (41% loading of nominal rating). This circuit is served off the Fair Oaks Ranch Substation and serves load on the west side of IH-10. As discussed above, CPS Energy shifted approximately 6 MW of load from circuit U114 to circuit R014 in June of 2020 to reduce the length and loading on circuit U114. The following Table 11 provides the loads on the circuits in the area under this modelling scenario.

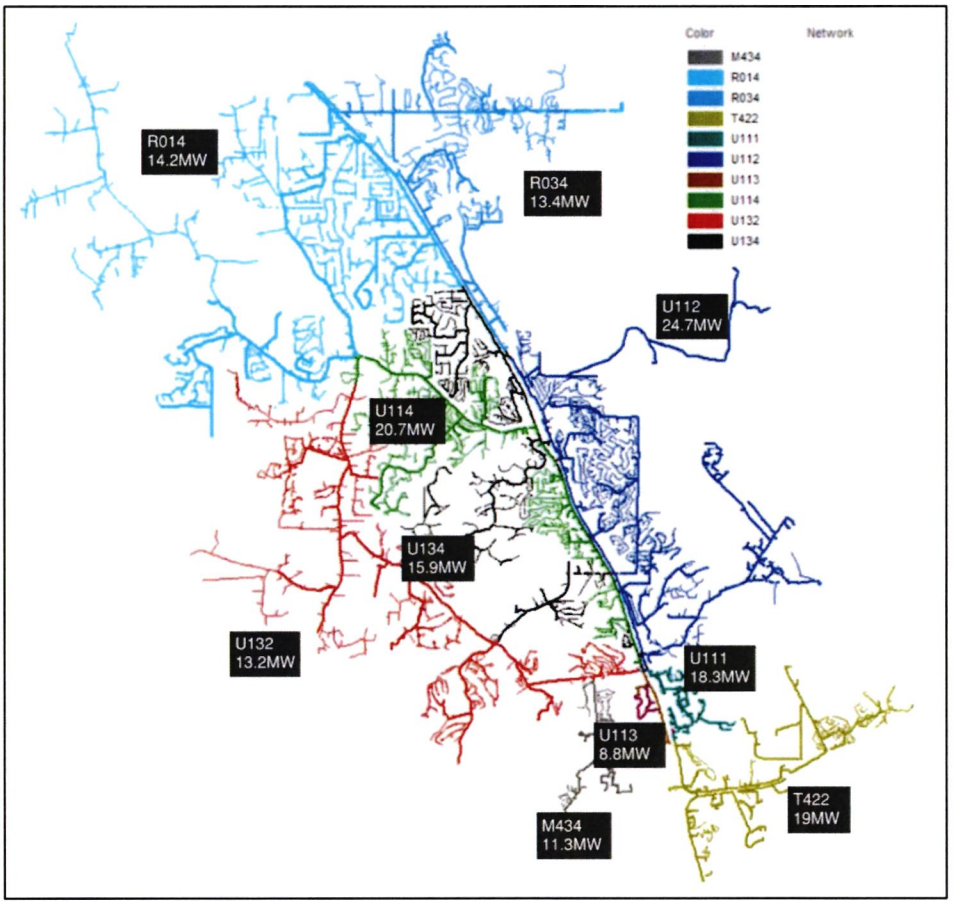
Figure 9 describes the R014 circuit along with other circuits in the region.

Table 11: La Sierra Distribution Circuit Loadings with R014

La Sierra Distribution Circuits	Loading	Total Load		
	%	kW	kVAr	kVA
U111	59.06	18331.07	6702.41	19517.95
U112	79.83*	24682.79	4667.76	25120.27
U113	31.78	8792.21	5324.65	10278.85
U114	66.35	20701.81	3878.69	21062.03
Total		**72507.86**	**20573.49**	**75370.15**
La Sierra Distribution Circuits	**Loading**	**Total Load**		
	%	**kW**	**kVAr**	**kVA**
U132	37.79	13178.12	1317.49	13243.81
U134	50.75	15911.63	1727.68	16005.15
Total		**29089.75**	**3045.17**	**29248.7**
Fair Oaks Ranch Distribution Circuits	**Loading**	**Total Load**		
Network ID	**%**	**kW**	**kVAr**	**kVA**
R014	61.67	14234.66	1791.57	14346.96

* Nearing CPS Distribution Planning Criteria violations

Figure 9: N-0 Model of La Sierra Circuits + Fair Oaks Circuit R014 with Peak Loads (Forecast FY 2020) Included in the Model



As can be seen in the modelling results, shifting a portion of the load from circuit U114 to circuit R014 improves the power flow in the area. Due to the significant lengths of several of the circuits (including reconfigured circuits R014 and U114, the loads will still be subject to reliability concerns resulting from the circuit lengths. After the load shift to R014, an outage of the main feeder of U114 is simulated with the entire load being picked up by R014. Under that scenario, the loading on R014 will violate its ratings in 2020, which will result in an infeasible solution considering future load growth through 2024 and beyond.

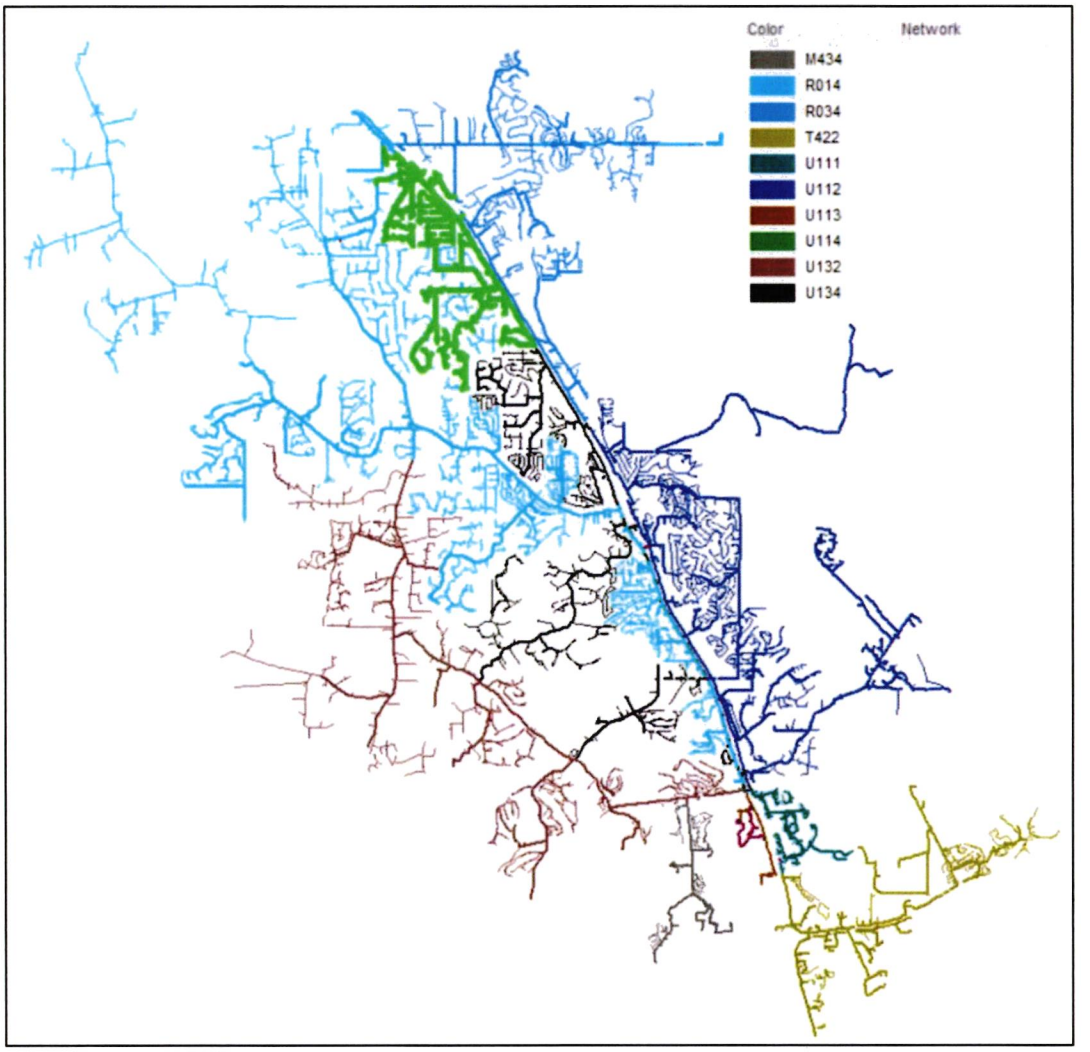
Table 12: La Sierra Distribution Circuit Loadings with R014 (FY 2020 & N-1)

La Sierra	Loading	Total Load		
Distribution Circuits	%	kW	kVAr	kVA
U111	59.06	18331.07	6702.41	19517.95
U112	79.82	24682.79	4667.76	25120.27
U113	31.78	8792.21	5324.65	10278.85
U114	0.037	11.59	-9.94	15.27
Total		**51817.65**	**16684.87**	**54437.61**
La Sierra	**Loading**	**Total Load**		
Distribution Circuits	**%**	**kW**	**kVAr**	**kVA**
U132	37.79	13178.12	1317.49	13243.81
U134	50.75	15911.63	1727.68	16005.15

Total		29089.75	3045.17	29248.7
Fair Oaks Ranch Distribution Circuits	Loading	Total Load		
Network ID	%	kW	kVAr	kVA
R014	155.34*	35861.26	8834.26	36933.37

* CPS Distribution Planning Criteria Violation

Figure 10: Outage of Circuit U114, R014 Included in the Model with Peak Loads (FY 2020)



The reconfigured circuit case (without any outages) was also run to include additional loads to represent the year 2025 (assuming a reasonable average load growth of 4% each year). The following are the modelled loadings on the circuits.

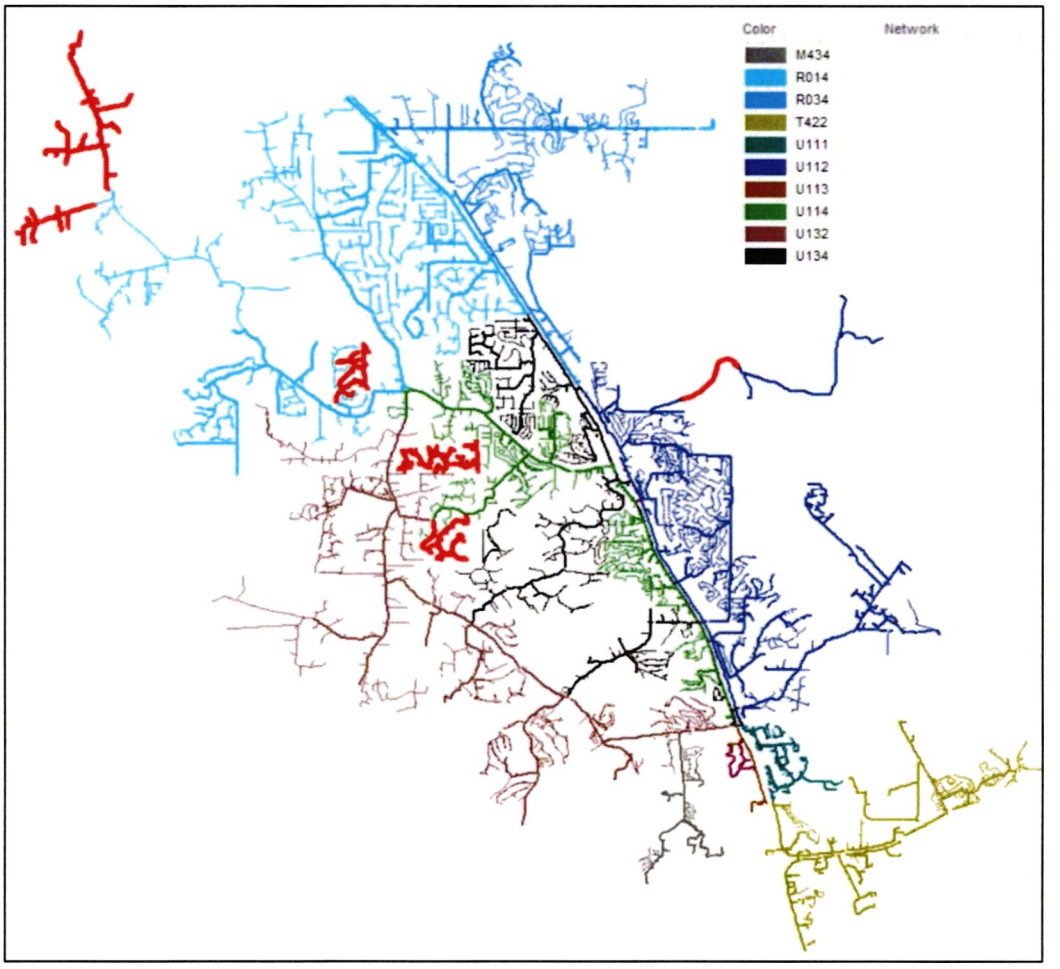
Table 13: La Sierra Distribution Circuit Loadings with R014 (FY 2025)

Substation U1-1	Loading	Total Load		
Network ID	%	kW	kVAr	kVA
U111	77.35	24007.96	10423.74	26173.2
U112	101.28*	31315.61	8081.35	32341.55

U113	43.54	12047.04	7445.16	14161.97
U114	84.41*	26336.08	6519.35	27131
Total		**93706.69**	**32469.6**	**99172.67**
Substation U1-3	**Loading**	**Total Load**		
Network ID	**%**	**kW**	**kVAr**	**kVA**
U132	49.832	17371.29	3324.67	17686.58
U134	64.37	20180.17	4073.32	20587.16
Total		**37551.46**	**7397.99**	**38273.25**
Substation R0-1	**Loading**	**Total Load**		
Network ID	**%**	**kW**	**kVAr**	**kVA**
R014	102.03*	23547.91	7689.13	24771.49

* CPS Distribution Planning Criteria violations

Figure 11: N-0 Model of La Sierra Circuits + Fair Oaks Circuit R014 with Peak Loads (Forecast FY 2025 with 4% Growth) Included in the Model.



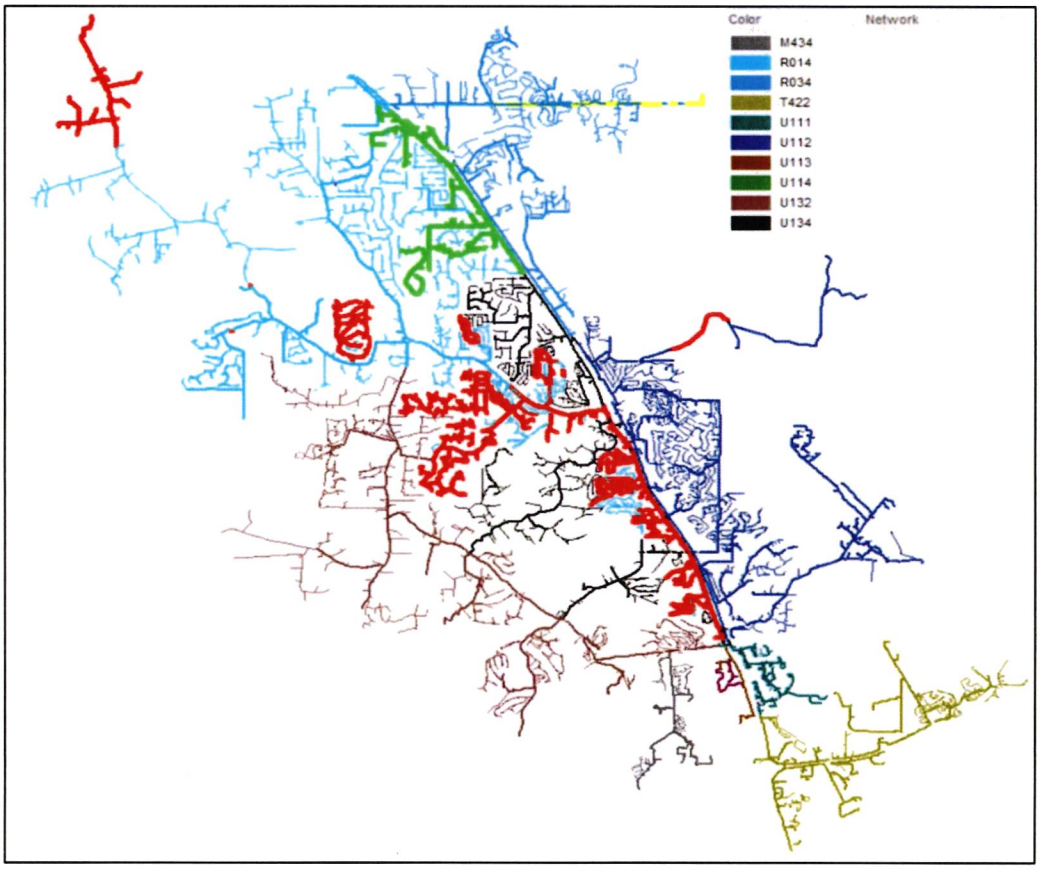
Next, the reconfigured circuit case was modelled with a loading scenario for year 2025 with the outage of circuit U114 where all its load is picked up by circuit R014. There is not adequate capacity available on other La Serra circuits and R014 to be able to pick up this load from U114.

Table 14: La Sierra Distribution Circuit Loadings with R014 (FY 2025 & N-1)

La Sierra Distribution Circuits	Loading	Total Load		
	%	kW	kVAr	kVA
U111	77.35	24007.96	10423.74	26173.2
U112	101.28*	31315.61	8081.35	32341.55
U113	43.54	12047.04	7445.16	14161.97
U114	0.047	14.67	-8.99	17.2
Total		**67385.28**	**25941.26**	**72206.12**
La Sierra Distribution Circuits	**Loading**	**Total Load**		
	%	**kW**	**kVAr**	**kVA**
U132	49.82	17371.29	3324.67	17686.58
U134	64.37	20180.17	4073.32	20587.16
Total		**37551.46**	**7397.99**	**38273.25**
Substation R0-1	**Loading**	**Total Load**		
Network ID	**%**	**kW**	**kVAr**	**kVA**
R014	224.87*	51900.61	21679.47	56246.54

* CPS Distribution Planning Criteria violations

Figure 12: Outage of Circuit U114 with 4% Load Growth to Simulate a 2025 Case with Circuit R014 Energized



BURNS McDONNELL

Based on the reasonable growth and expected development described above, the current La Sierra and Fair Oaks substations will exceed capacity and cannot adequately serve the area by 2024.

The modelling reveals low voltages on portions of the system served by circuit U114. These low voltages are within the Scenic Loop Road area. In addition, a loss of circuit U114 results in a voltage collapse in the Scenic Loop Road area (and beyond) as there is not adequate capacity on adjacent feeders to pick the load from circuit U114. Under that circumstance, voltages at the loads drop to a point lower than what a regulator or a capacitor bank can do to push the voltage to a normal operating range. Shifting loads to adjacent circuits only provides additional operation flexibility or near term planning flexibility and would not improve system reliability or overall system capability to support additional load growth within this region.

Importantly, CPS Energy's Distribution Planning Criteria includes limiting the loading on a distribution circuit to 80% of its capacity in order to ensure safe and reliable operation of the circuit and maintain quality service to customers. Circuit U114 recorded a peak loading of approximately 30 MW in 2019, which is approximately 98% of its rating. Circuit R014, which will be energized in summer 2020 will offload circuit U114 to under 70% of the rated capacity for a short time. However, the historical load growth in the region, and especially on circuit U114, is reasonably forecasted to remain at 4% (or higher). Thus, the loading on circuit U114 will again reach its reliable loading limit of 80% within four years. In addition, the load growth on the other circuits (within the entire northwestern region of Bexar County) will reasonably experience similar load growth and will not have adequate capacity on existing circuits by 2024.

BURNS McDONNELL

3. System Assessment with Scenic Loop Substation

As a result of the limitations on the existing system to reliably serve current and future load, CPS Energy considered reasonable alternatives, including the construction of a new substation near the intersection of Scenic Loop Road and Toutant Beauregard Road. A new Scenic Loop substation within the area will significantly improve reliability for the northwest region of Bexar County by reducing circuit length and loading on each circuit, which will reduce exposure for outages as well as the number of customers affected during an outage. The new circuits out of the proposed Scenic Loop Substation will also create strong backbones and sufficient field ties to adjacent substation circuits (La Sierra and Fair Oaks Ranch) that will prevent major loss of customer load in emergency conditions. The new substation will not create additional circuits initially, but rather will allow for portions of existing circuits in the area to terminate at the new station, essentially shortening circuits and providing a new source to meet load demand. The proposed configuration of the Scenic Loop Substation would connect portions of circuits U114, U132, and R014 to Scenic Loop, thereby creating circuits V611, V612, V613 and V614 as shown in Figure 13 and Figure 14 below.

The new substation will support the development and requirements of existing and future critical load customers. Initially, an estimated 20-25 MW of load will be served by this new substation. If the project is not completed, the distribution system capacity in the Scenic Loop area will be exceeded by 2024 and the La Sierra and Fair Oaks Ranch substations will have increased reliability concerns. Also, some contingency conditions may lead to customer load being at risk of lengthy outages due to exceeding emergency capacity limits.

CPS Energy has designed new substations to help loads on circuits showing poor reliability very similar to the loads served from circuits connected to the La Sierra and Fair Oaks Ranch substations. As an example, H341 is a circuit in the nearby Helotes Substation that was serving approximately 4,000 customers and experienced poor reliability. In 2016 it was split into three circuits (K021, K022, K023) with 1,600 customers served off a new transformer in the Ranchtown Substation. When the load was moved onto the new circuits, the remaining customers served from the H341 circuit connected to the Helotes Substation experienced improved reliability and a reduction of CMI by 95% and CA by 97%. The SAIDI and SAIFI values on the circuit H341 shown in Table 15 indicate significant improvement in reliability achieved by splitting a portion of the load from H341 onto three shorter circuits beyond 2016.

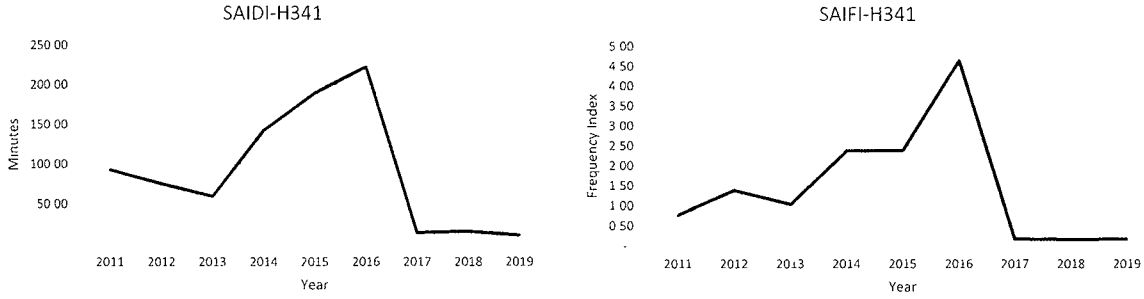
The circuit H341 is a good example of the reliability benefits that can be achieved with the Scenic Loop Substation project. H341 is located nearby the Scenic Loop Substation study area and traverses similar terrain. Prior to the reconfiguration that significantly shortened the circuit, for years customers served by H341 experienced outages and poor reliability similar to the circuits served off the La Sierra and Fair Oaks Ranch substations.

Table 15: Helotes H341 Substation Circuit

Year	Customers	CMI	SAIDI	SAIFI	CA
2011	3562	**329,619.53**	92.55	0.76	**2,708**
2012	3818	**286,261.77**	74.98	1.38	**5,279**
2013	4016	**237,979.13**	59.25	1.03	**4,136**
2014	3638	**517,724.22**	142.32	2.37	**8,631**
2015	3620	**683,906.21**	188.95	2.38	**8,611**
2016	2011	**447,157.68**	222.37	4.64	**9,335**
2017	1706	**23,537.00**	13.80	0.17	**298**
2018	1704	**26,470.12**	15.53	0.15	**262**
2019	1707	**18,032.17**	10.57	0.17	**290**

BURNS McDONNELL

The following plots describe the SAIDI and SAIFI reliaiblity indices on the circuit H341 and it can be cleary seen that after the significant load shift to other circuits described above, there has been a dramatic improvement in reliability to the loads remaining connected to that circuit.



Following the reconfiguration of circuit H341, the reliability on the three new circuits K021, K022, K023 generally experienced reliability similar to the CPS system wide averages with a few exceptions due to extended outages during construction and other planned upgrades on these circuits. Table 16 lists the reliability values on these circuits for the past few years.

Table 16: Reliability values for circuits K021, K022 and K023 after shifting loads from H341

YEAR	K021		K022		K023	
	SAIDI	SAIFI	SAIDI	SAIFI	SAIDI	SAIFI
2016	22.06	2.22	-	-	-	-
2017	1.37	0.01	26.15	0.52	5.3	0.07
2018	490.46	2.34	83.29	2.41	29.88	0.23
2019	128.15	1.82	154.15	1.43	72.23	0.33

A planning analysis was conducted to identify system reliability based on assumed load forecast under no outage and selected outage conditions after inclusion of the Scenic Loop Substation. The analysis shows that a new substation in the Scenic Loop area will improve reliability within the northwestern region of Bexar County and will provide additional capacity for the significant forecasted load growth for the area. The proposed project configuration does not add additional circuits initially, but rather terminates existing circuits at the new substation, thereby directly contributing to improvement of reliability to the loads connected to the new substation as well as the shorter and less loaded circuits that remain connected to the La Sierra and Fair Oaks Ranch substations.

It is anticipated that by shifting portions of circuits U114, U132, and R014 to the Scenic Loop Substation (thereby creating four circuits V611, V612, V613 and V614), would provide an improvement on the reliability to the loads on the underlying circuits and would improve the overall reliability within this region.

The following circuit loadings described in the Table 17 represent a scenario that models the year 2024 in the region with Scenic Loop substation and inclusion of V611, V612, V613, and V614 circuits.

Table 17: Loading on Circuits in the Area after Including the New Scenic Loop Substation.

Scenic Loop Substation Circuits	Loading	Total Load		
	%	kW	kVAr	kVA
V611	30.80%	10925.01	-112.47	10925.59
V612	41.30%	12956.41	1945.47	13101.66
V613	19.62%	6516.88	1735.68	6744.06
V614	19.13%	6229.53	2104.14	6575.29
Total		**36627.83**	**5672.82**	**37064.53**
La Sierra Substation Circuits	**Loading**	**Total Load**		
	%	**kW**	**kVAr**	**kVA**
U111	74.10%	23076.39	9806.55	25073.66
U112	97.1%*	30089.77	7438.95	30995.68
U113	41.80%	11581.9	7140.82	13606.31
U114	38.70%	11844.05	3255.19	12283.23
Total		**76592.11**	**27641.52**	**81427.3**
La Sierra Substation Circuits	**Loading**	**Total Load**		
	%	**kW**	**kVAr**	**kVA**
U132	17.40%	5942.39	1697.92	6180.2
U134	61.70%	19393.11	3634.74	19730.79
Total		**25335.5**	**5332.65**	**25890.63**
Fair Oaks Ranch Substation Circuits	**Loading**	**Total Load**		
Network ID	**%**	**kW**	**kVAr**	**kVA**
R014	39.44	9572.99	2324.3	9851.12

* loads on this circuit can be easily switched on to other circuits on La Sierra and this is not considered a violation for this planning analysis

Figure 13: Ariel Imagery of Scenic Loop Region Indicating Boundaries of Circuits Serving Loads

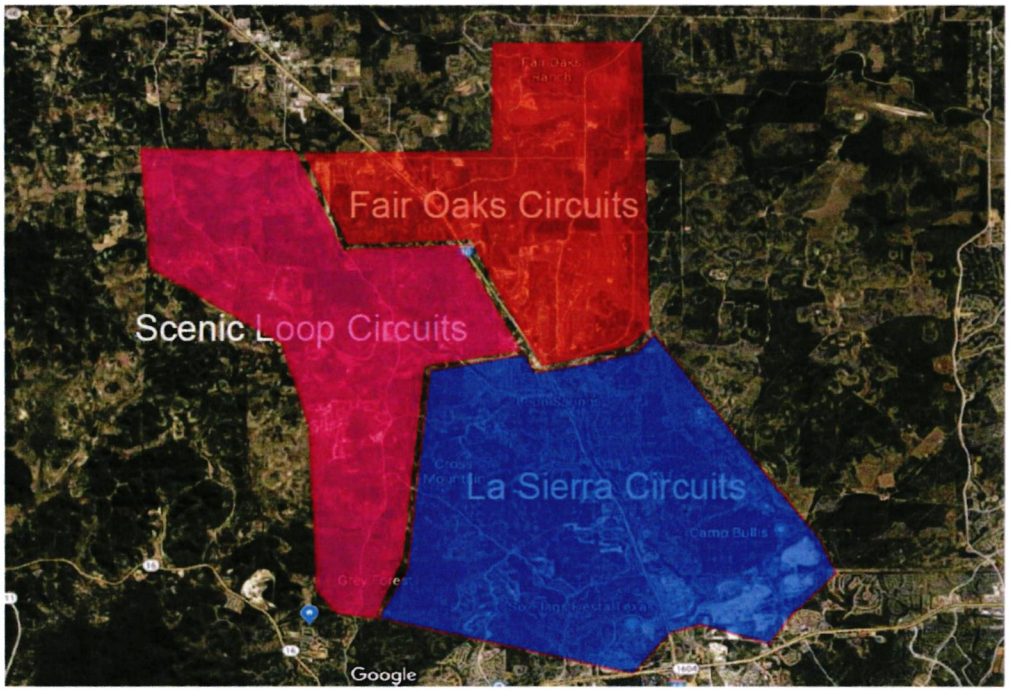
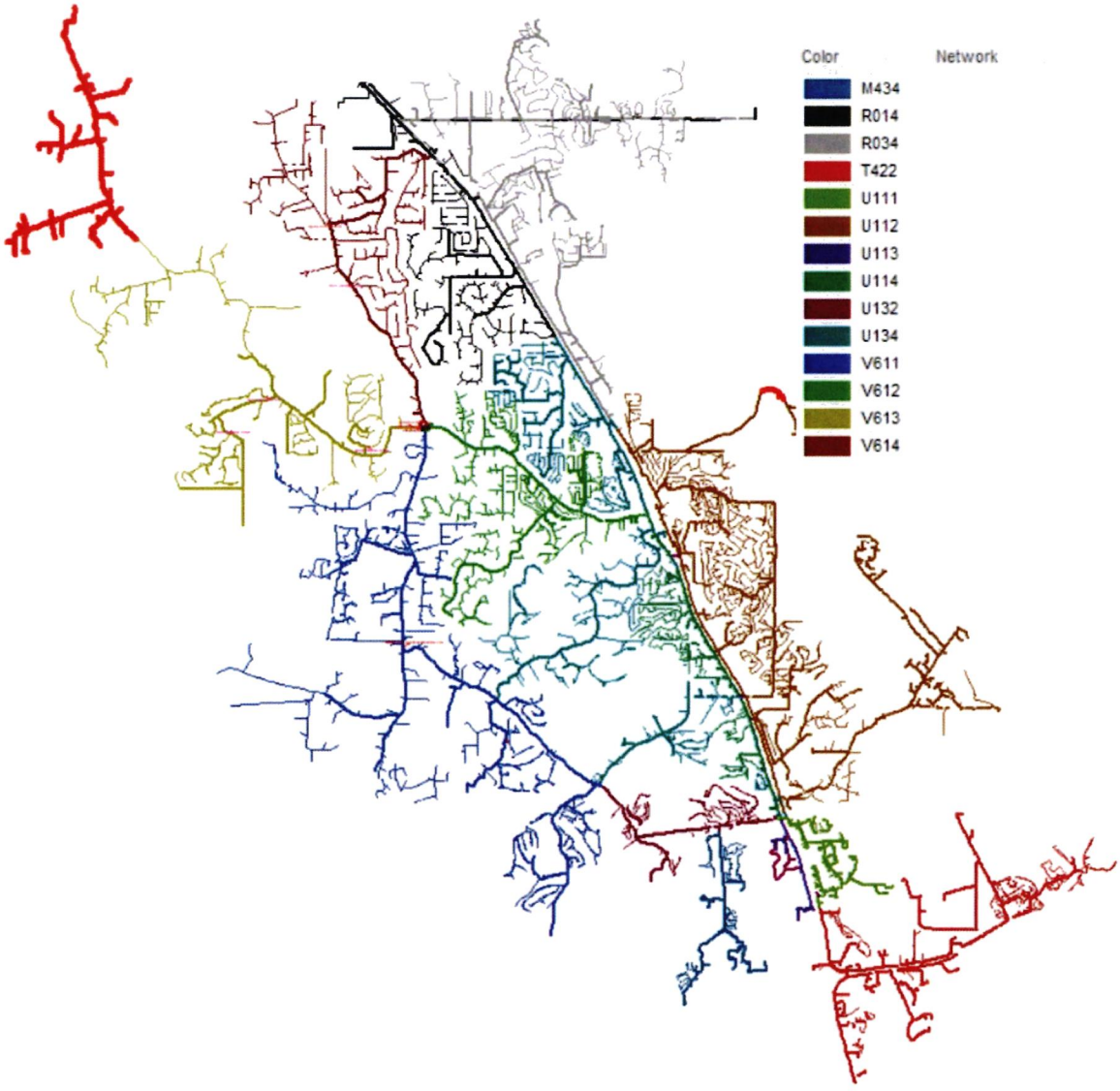


Figure 14 : Performance Under Peak Load (Forecast Summer 2024 Peak Loads with 4% Growth) – No Outage Conditions



Additional analysis was conducted on the case with the Scenic Loop Substation in service under a severe outage that results in a loss of the main feed to circuit U114. The modelling tested the ability of Scenic Loop to pick up the service to loads connected to U114. The results indicate a feasible solution with acceptable thermal and voltage performance.

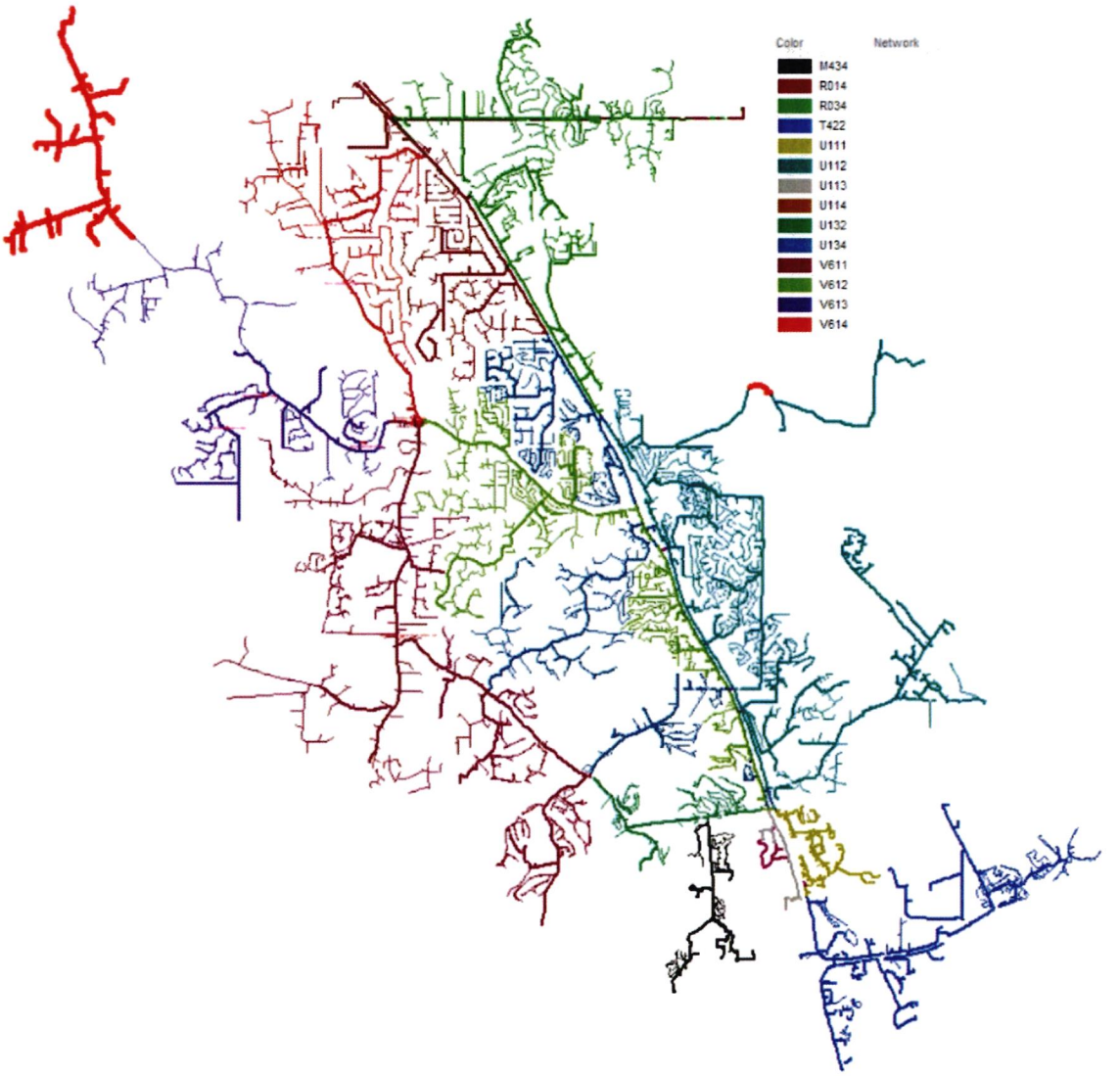
BURNS McDONNELL

Table 18: Outage of Circuit U114 and Loads Getting Picked Up by Circuit V612

Scenic Loop Substation Circuits	Loading	Total Load		
	%	kW	kVAr	kVA
V611	30.86%	10925.01	-112.47	10925.59
V612	80.08%	24953.43	5839.71	25627.64
V613	19.66%	6516.88	1735.68	6744.06
V614	19.16%	6229.53	2104.14	6575.29
Total		48624.86	9567.06	49557.09
La Sierra Substation Circuits	**Loading**	**Total Load**		
	%	**kW**	**kVAr**	**kVA**
U111	74.10%	23076.39	9806.55	25073.66
U112	97.1%*	30089.77	7438.95	30995.68
U113	41.80%	11581.90	7140.82	13606.31
U114	-	14.10	-9.16	16.82
Total		64762.16	24377.16	69198.15
La Sierra Substation Circuits	**Loading**	**Total Load**		
	%	**kW**	**kVAr**	**kVA**
U132	17.40%	5942.39	1697.92	6180.2
U134	61.70%	19393.11	3634.74	19730.79
Total		**25335.5**	**5332.65**	**25890.63**
Fair Oaks Ranch Substation Circuits	**Loading**	**Total Load**		
Network ID	**%**	**kW**	**kVAr**	**kVA**
R014	9.44	9572.99	2324.3	9851.12

* loads on this circuit can be easily switched on to other circuits on La Sierra and this is not considered a violation for this planning analysis

Figure 15: Circuit Loadings on a Case that Models Outage of Circuit U114 in Forecast Summer 2024 with 4% Growth and Scenic Loop Substation in Service



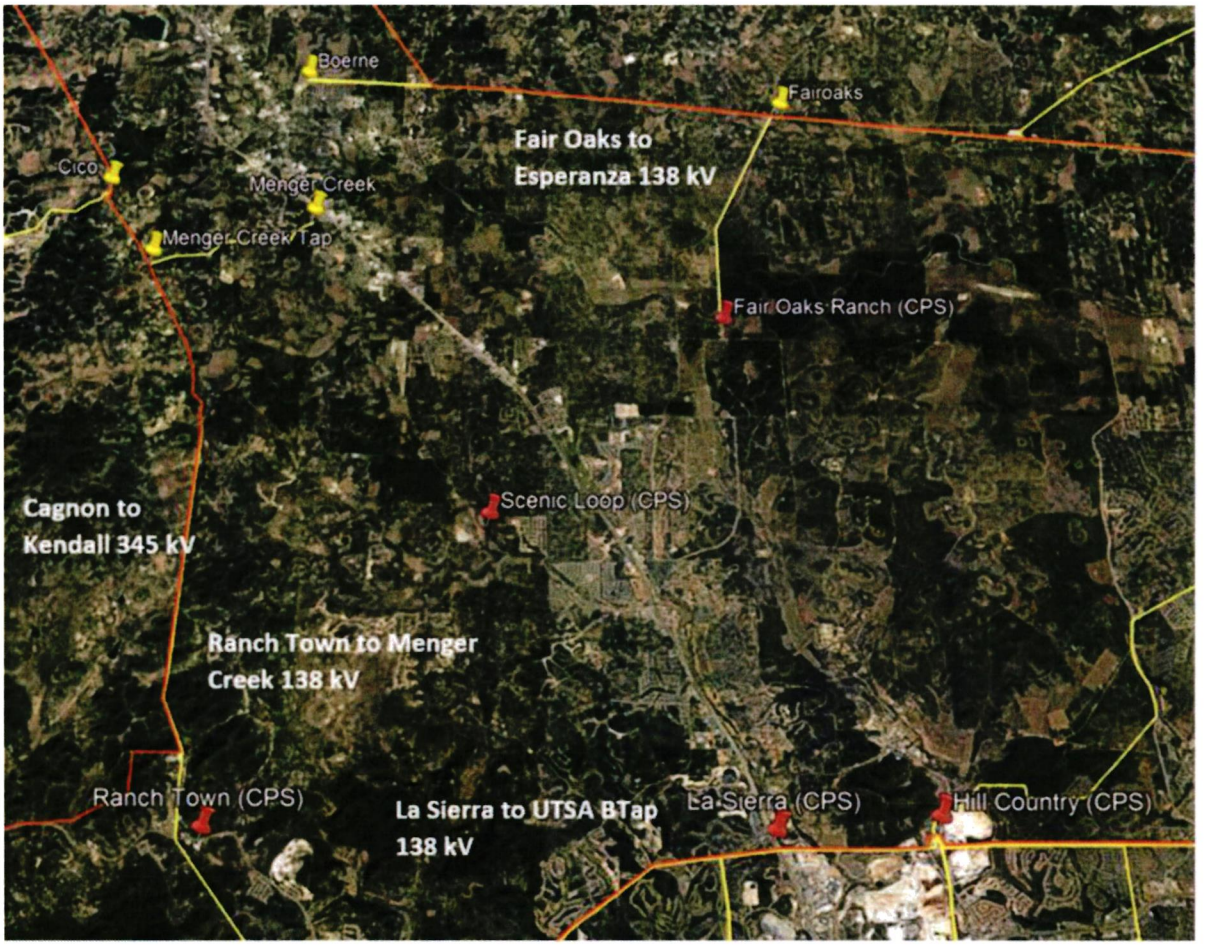
The distribution planning cases, and analysis indicate that the existing and planned system can be further optimized and circuit loadings can be well balanced by shifting loads onto other circuits such that the existing infrastructure will be well utilized under such outage conditions.

BURNS McDONNELL

4. Transmission Interconnection

CPS Energy evaluated potential transmission options that are best capable to serve the proposed Scenic Loop Substation. CPS Energy's standard practice is to loop in 138-kV transmission lines for CPS Energy owned load serving stations and has arrived at three potential transmission options that connect the proposed Scenic Loop Substation to the existing interconnected transmission grid. Although there are 345-kV transmission lines in the vicinity of the proposed Scenic Loop Substation, because CPS Energy does not serve the distribution system load from 345 kV system, interconnection with such lines was not considered a viable alternative option. Figure 16 Transmission lines in the area surrounding the proposed Scenic Loop Substation provides an overview of the available transmission lines in the area, including substations within the region.

Figure 16 Transmission lines in the area surrounding the proposed Scenic Loop Substation



To determine the best option to serve and connect to the proposed Scenic Loop Substation, additional power flow analysis was conducted. This analysis coupled with the cost estimates to construct a looped 138-kV transmission circuit on mono pole structures determined the preferred transmission option. Figure 17 shows the three options considered and their possible connection to the area proposed for the Scenic Loop Substation. Table 19 provides the high level cost estimate considered in the analysis. To estimate the length of ROW, a straight line length with a 30% adder was used. For purposes of this

analysis, CPS Energy's estimated cost per mile for double circuit 138-kV structure for the study area of $ 6.9 million/mile was assumed for this analysis.

The following are the three options considered for the analysis:

- Option 1: Looping the Ranchtown to Menger Creek 138-kV transmission line into the Scenic Loop Substation.
- Option 2: Looping the La Sierra to UTSA BTap 138-kV transmission line into Scenic Loop Substation.
- Option 3: Looping Fair Oaks to Esperanza 138-kV transmission line into Scenic Loop Substation.

Figure 17 Transmission Options considered for analysis.

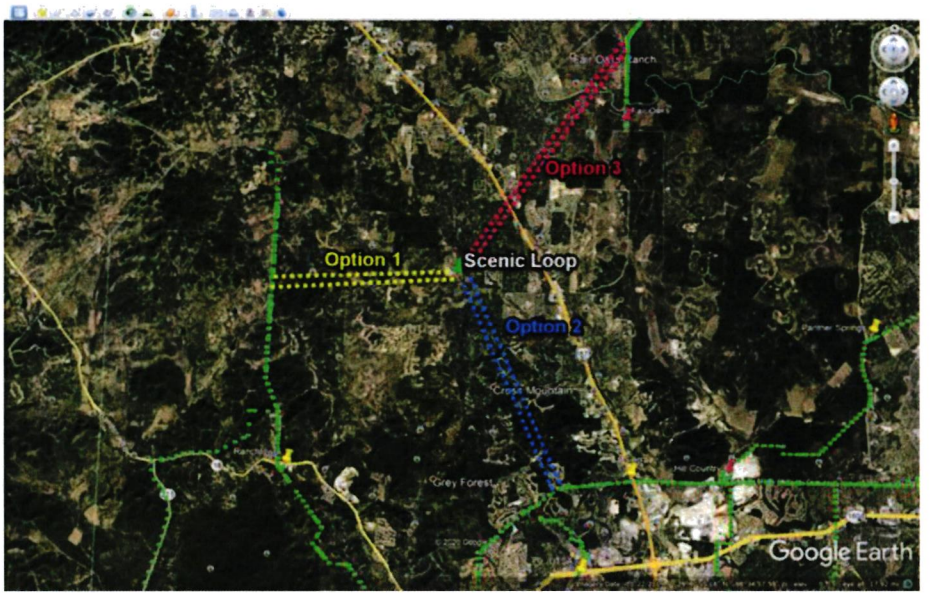


Table 19: Transmission options cost estimates

Study Options	Description	Conductor Type Modeled	Mileage (miles)	Substation ($M)	Transmission ($M)	Total ($M)
Option 1	Looping Ranchtown to Menger Creek transmission line into Scenic Loop	795 Drake ACSR (2-Bundled)	4.27 Straight line length+ 30% adder= 5.55	$ 8.0	$ 38.3	**$ 46.3**
Option 2	Looping La Sierra to UTSA B Tap transmission line into Scenic Loop	1272 Narcissus AAC (2-Bundled)	5.28 Straight line length+ 30% adder= 6.86	$ 8.0	$ 47.3	**$ 55.3**
Option 3	Looping Fair Oaks to Esperanza transmission line into Scenic Loop	795 Drake ACSR (Single)	6.65 Straight line length+ 30% adder= 8.65	$ 8.0	$ 59.7	**$ 67.7**

BURNS McDONNELL

Power Flow Analysis:

To evaluate the performance of the considered transmission options, power flow analysis was conducted on a 2024 summer peak case published by ERCOT in March 2020. For this power flow case, the new Scenic Loop Substation was added along with the relevant transmission connections described above.

The following figures describe the power flows on the system based on the transmission options proposed.

Figure 18 Option 1: Looping Ranchtown to Menger Creek transmission line into Scenic Loop

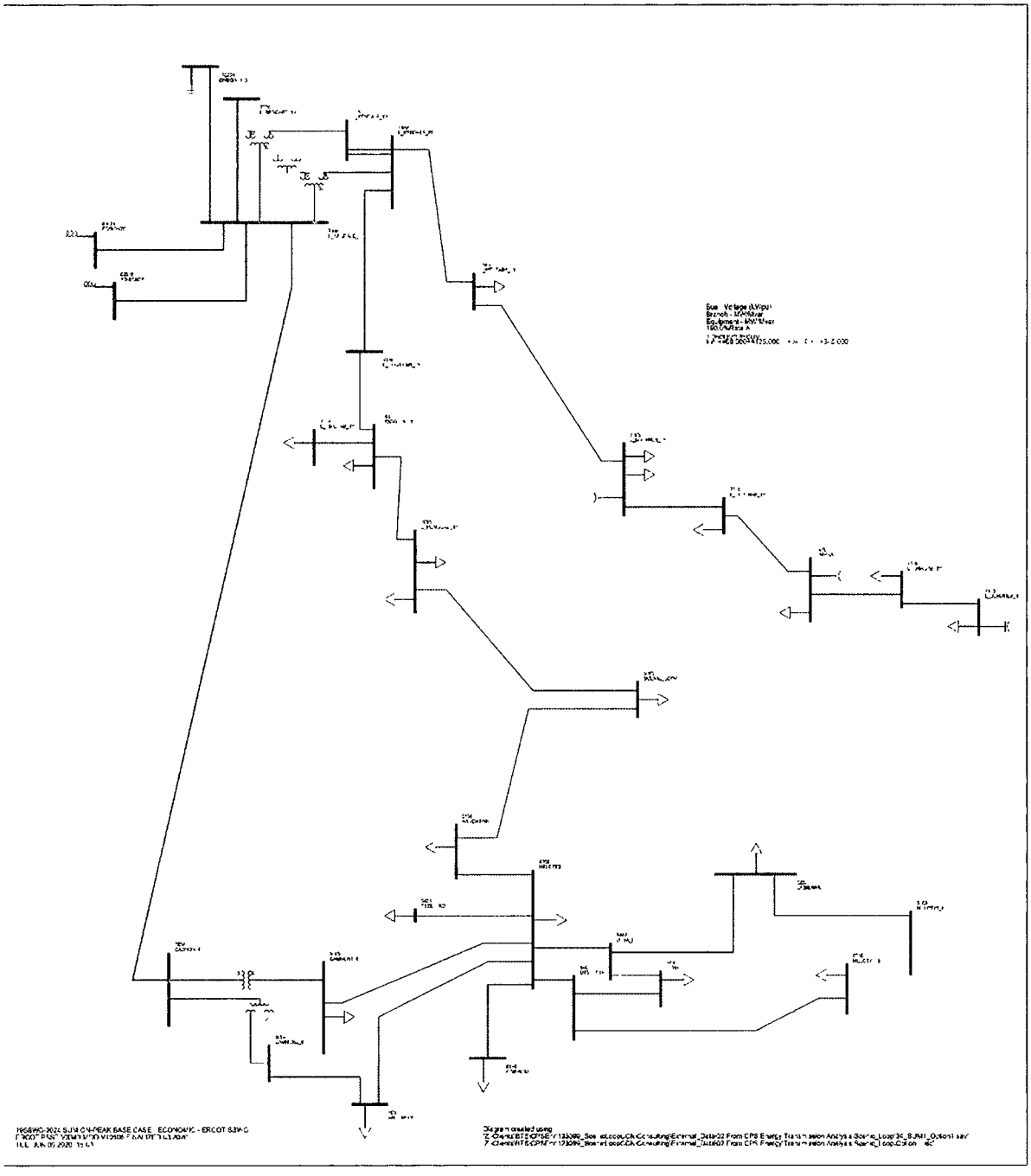


Figure 19 Option 2: Looping La Sierra to UTSA B Tap transmission line into Scenic Loop

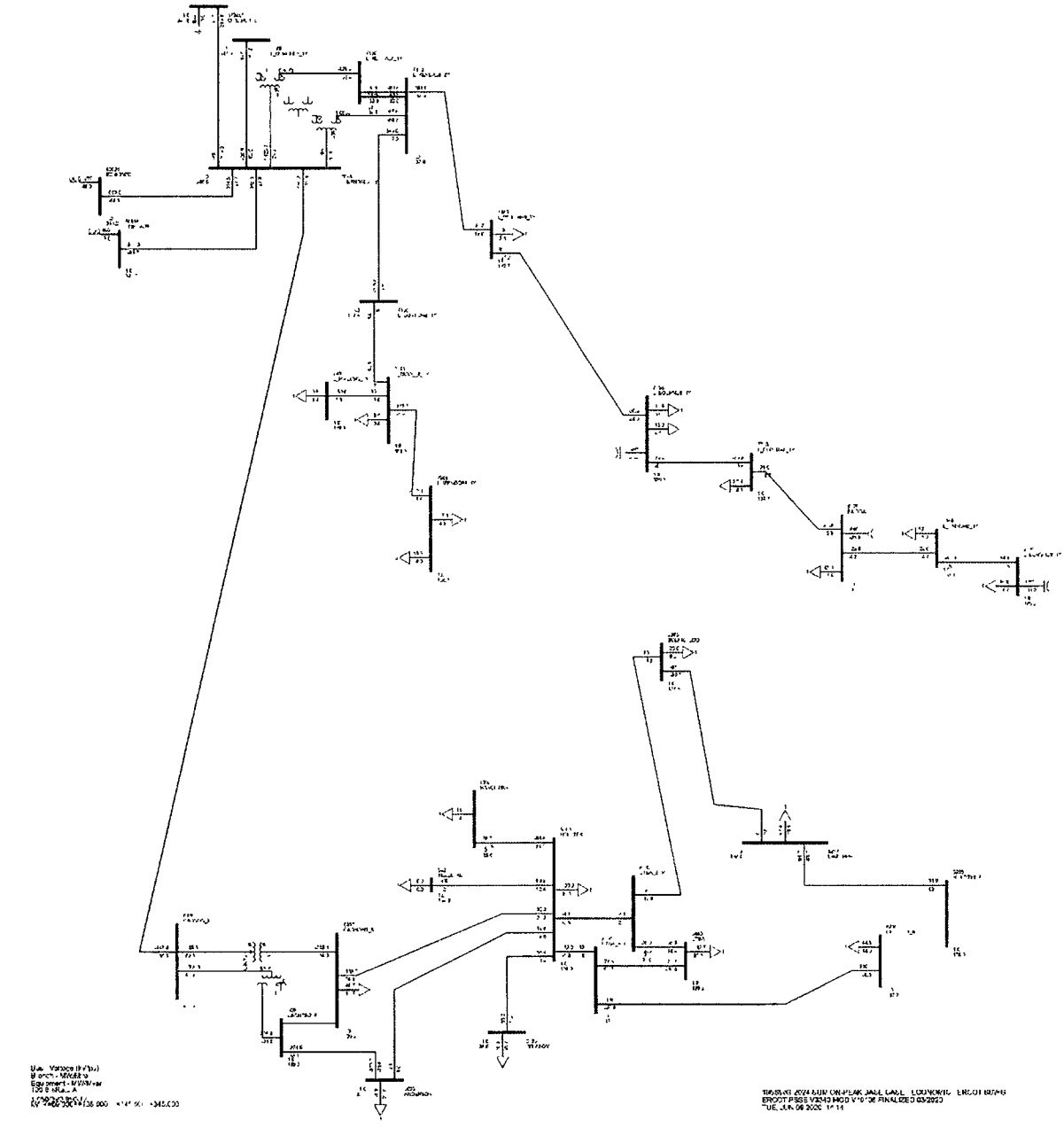
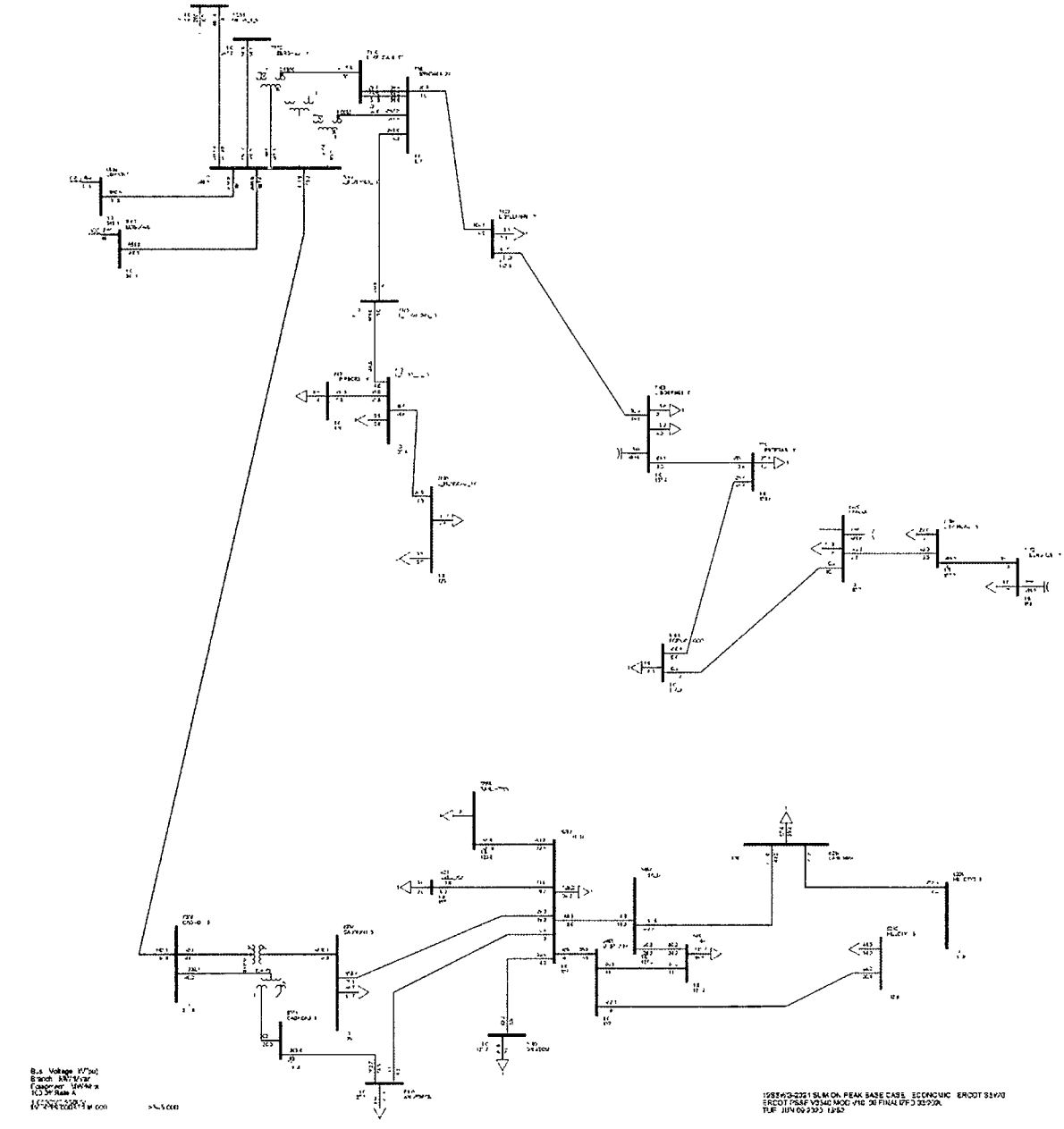


Figure 20 Option 3: Looping Fair Oaks to Esperanza transmission line into Scenic Loop



To evaluate the robustness of the transmission options, power flow contingency analysis was conducted to determine the impact of serving 25 MW from the Scenic Loop Substation. Contingency[4] analysis based on contingencies within Kendall Zone[5] for LCRA Transmission Services Corporation along with CPS Energy contingencies and standard single element outage and double element outages along with ERCOT specific outages were simulated for the analysis and compared against ERCOT planning criteria and CPS planning criteria.

The results from the analysis indicate no thermal overloading problems for all the options analyzed. The screening of the voltages (Table 20) following contingency analysis indicate a few outages where Option 3 does not meet the planning criteria. Over all the analysis indicates that Option 1 is a better performing option.

Table 20: Voltage Performance of the Transmission Options

Contingency Type	Bus Number	Bus Name	KV	1st Con	Option1		Option2		Option3	
					V Init	V Con	V Init	V Con	V Init	V Con
P1	5363	SCENIC_LOOP	138	7169 L_FAIROA8_1Y - 7170 L_BERGHE8_1Y - 1*	0 987	0 986	0 997	0 996	0 993	**0 933**
	5470	FAIRRA	138	7169 L_FAIROA8_1Y - 7170 L_BERGHE8_1Y - 1*	1.001	0 977	1 001	0 978	0 997	**0.931**
P2	5363	SCENIC_LOOP	138	5470 - CAP* 5470 FAIRRA - 7169 L_FAIROA8_1Y - 1	0 987	0 986	0 997	0 996	0 993	**0.919**
	5470	FAIRRA	138	5470 - CAP* 5470 FAIRRA - 7169 L_FAIROA8_1Y - 1	1 001	0 957	1 001	0 957	0 997	**0.912**
ERCOT3	5363	SCENIC_LOOP	138	7770 L_BERGHE5_1Y - 7170 L_BERGHE8_1Y - 7771 L_BERGHE1_1Y – 1 Followed by 7152 L_KENDAL8_2Y - 7153 L_WELFAR8_1Y - 1 7770 L_BERGHE5_1Y - 7046 L_KENDAL5_1Y - 1	0 987	0 989	0.997	0 997	0 993	**0 879**
	5470	FAIRRA	138		1 001	0 935	1 001	0 935	0 997	**0.892**

Based on the cost and power flow analysis described above, connection of the Scenic Loop Substation to the existing interconnected transmission grid is most viable and less impacting to the community from a tie point on the Ranchtown to Menger Creek 138-kV transmission line located approximately five miles west of the area proposed for the Scenic Loop Substation.

[4] NERC TPL-001-4 P1 through P7 type contingencies
[5] submitted by LCRA published on 03/19/2020

BURNS McDONNELL

5. Alternatives Considered

Six options were considered to address the reliability and capacity concerns associated with the CPS Energy distribution system in northwestern Bexar County. Option A involves shifting load from existing circuits identified as overloaded. Option B involves the construction of a new Scenic Loop Substation. Option C involves adding a distributed generation power source as a non-wire solution for the area. Option D describes an alternative with inclusion of a simple cycle gas generating station within the footprint to relieve loadings on the transformers. Option E involves adding new circuits into the Fair Oaks Ranch Substation to pick up additional loads in the Scenic Loop region. Option F describes rebuilding existing low reliable circuits as underground circuits. These six options are described and analyzed below.

- ### Option A

Option A involves designing tie points and shifting load from the La Sierra Substation to surrounding available circuits to create greater capacity on the La Sierra circuits to pick up growing loads in the Scenic Loop area. Because of the geographic relief and the existing CPS Energy service territory boundary, the Fair Oaks Ranch circuits can only shift load with La Sierra circuits, which would not enhance the capacity in the Scenic Loop area. Specifically, as shown in Table 21, Option A would involve shifting approximately 14.24 MW of load from La Sierra circuit U114 and Fair Oaks Ranch circuit R034 onto Fair Oaks Ranch R014 to provide loading relief on those circuits. This would result in 13.22 MW of capacity on circuits U114 and R034. Of this additional capacity that is available, only 2.7 MW can be useful for planning purposes as per the CPS Energy planning criteria to maintain circuit loadings under 80% of their nominal rating. After load shifts, the circuit R014 will have a loading of 62% and can additionally accommodate 4 MW to keep the circuit loading under 80%. Option A would result in approximately 6.7 MW of additional capacity available for future load growth in the Scenic Loop area. Based on CPS Energy's current load forecasts, Option A would provide sufficient capacity for the area until approximately 2021. The cost for Option A is minimal as no additional equipment upgrades are needed but will not provide the desired capacity to meet the load forecast beyond 2021. The R014 circuit has been energized in June of 2020 and the Table 21 describes the loading on circuits and the shift in loads on to R014 circuit.

Although Option A would provide some temporary additional load serving capacity from the La Sierra Substation and possibly some short term reliability improvement, it will not significantly improve the reliability issues experienced in the Scenic Loop area (described in Section 2.3) over the longer planning horizon. Under the Option A scenario, the circuit lengths originating from the La Sierra and Fair Oaks Ranch substations will be the same or in some cases lengthened based on load shifts chosen. Further, Option A would not add additional capacity to the Scenic Loop area and any benefit provided by this is only operational flexibility and has a minor benefit in short term planning.

The La Sierra circuits currently serving the Scenic Loop area loads (current U114 circuit is an example) are already extremely long and heavily loaded. The length and loading configuration of these circuits has resulted in decreasing reliability performance. Although Option A is a low cost alternative, it will only temporarily decrease some of the circuit loading in the area and will not notably reduce circuit line length. Within a short period of time, Option A will exacerbate the poor reliability performance of the CPS Energy distribution system in the Scenic Loop area and will not be able to accommodate load growth beyond the next few years. Regardless of cost, Option A is not a viable alternative to address the significant reliability and capacity problems CPS Energy is experiencing in northwest Bexar County.

Table 21: Load Shift Design.

From				To				Load Shift				
CKT 1	CKT 1-kW	CKT 1-Nominal kW	CKT 1-%	CKT 2	CKT 2-kW	CKT 2-Nominal kW	CKT 2-%	Load Shift-kW	CKT 1 Adjusted-kW	CKT 1 New-%	CKT 2 Adjusted-kW	CKT 2 New-%
U114	28514	30577	93.25	R014	0	22806	0	7812	22765	74	14235	62
R034	22812	21799	110					6423	16389	75		

- Option B

Constructing a new Scenic Loop Substation will result in new transformer capacity (at the substation) directly connected to the existing transmission grid in an area where CPS Energy needs to significantly reduce distribution circuit length for reliability and increase overall system capacity (by more than 50 MW) for load growth. As proposed, locating a new substation geographically between the La Sierra and Fair Oaks Ranch substations significantly reduces the length and loading on many of the existing distribution circuits in the area. As discussed in greater detail above, shorter, less loaded distribution circuits will significantly decrease the exposure of the distribution system to potential outage events, which will directly relate to improved reliability. In contrast to Option A, which shifts some load, but cannot alter the distance of many of the distribution circuits in the area due to the geographic distance between La Sierra and Fair Oaks Ranch substations (approximately 11 miles), Option B places a new substation (with dual feed transmission service) geographically central to the area of increasing load growth (compare Figure 1 to Figure 13). Importantly, given the significant new load growth in the area generally, and specifically associated with the UTSA expansion and growth along the IH-10 corridor north of Loop 1604, a new substation in the in the Scenic Loop area will provide much needed operational flexibility that will allow CPS Energy to reliably serve capacity demands from the La Sierra, Fair Oaks Ranch, and Scenic Loop substations well into the future.

The customers connected downstream of the circuits from La Sierra will especially see a benefit from the new station in terms of improvements in reliability, as the additional station will offload circuits connected to La Sierra and Fair Oaks Ranch. The current estimated cost of the Scenic Loop Substation (including the transmission line project to connect the substation to the existing electric grid) is approximately $46.3M.

- Option C

Option C considers non-wire alternatives to traditional transmission and distribution facility investments. The concept behind Distributed Energy Resources (DER) is that these alternatives will ultimately result in savings for ratepayers as utilities are able to develop DER within communities to offset or relieve local grid needs at a potentially lower cost and lower impact to the community than installation of additional distribution or transmission infrastructure. Thus, for DER to be a viable alternative to the Scenic Loop Substation project, it will need to provide similar system improvements at a reasonably similar cost to ratepayers.

To assess the relative costs of DER as an alternative to the Scenic Loop Substation project, Solar photovoltaic (PV) generation operated in conjunction with battery storage (BESS) was compared to the CPS Energy La Sierra Substation facilities as a potential solution to reduce peak and relieve capacity on circuits.

BURNS & MCDONNELL

Figure 21: Relative Plots of MWh Comparing Energy Supplied by Source

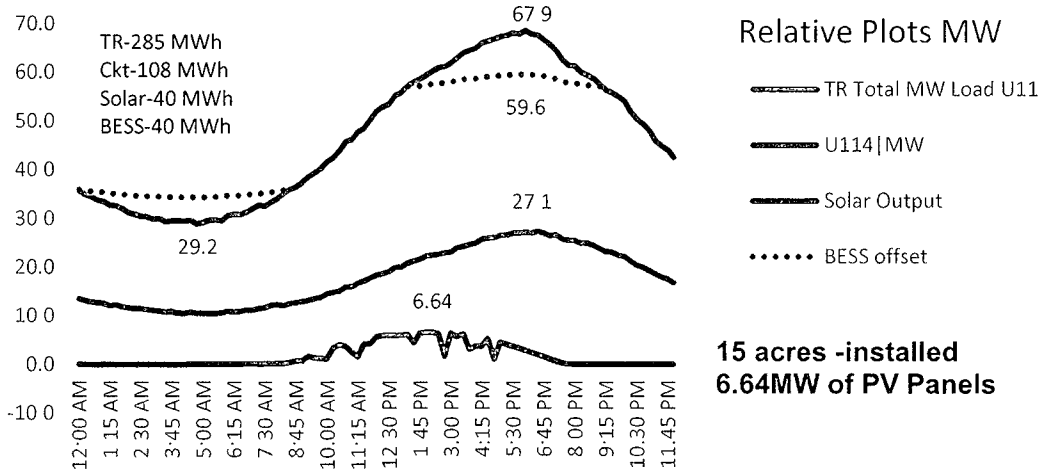


Figure 21 shows August 2019 Peak day demand of a transformer at La Sierra substation and one of the circuits (U114) to study the benefits and costs associated with a reduction of peak that is possible by including Solar PV and BESS as potential means to reduce circuit loadings. The plot shows an output of a 6.64 MW solar site and how including a 40MWh BESS on one of the circuits could perform in reduction of peak load on the transformer and provide adequate demand reduction. In this example, solar provided 40 MWh of energy during the day that is available to reduce the demand on the station. Because the solar PV generates energy in the afternoon rather than at evening peak, energy storage is required to shift the power to the evening when demand is the highest. Storage could perform the demand reduction without solar nearby if the energy is stored using the distribution system available capacity during low demand periods. The NREL study[6] is used to estimate battery capacity, solar power requirements and the costs. BESS offset illustrates a demand reduction of 8.3 MW with 40MWh of storage and the demand peak that may be flattened by applying a BESS.

Based on the example discussed above, the cost of providing a demand reduction of 8.3 MW is $15.2M ($0.38M/MWh (40MWh). The Scenic Loop Substation is anticipated to provide a system capacity benefit of 20-25 MW initially and the cost of BESS to provide a similar benefit would be approximately $45.0M. In addition, the typical functional life-span of BESS is currently limited to approximately 15 years (compared to the estimated 40 year lifespan of the proposed substation facilities). BESS also requires higher operating costs to maintain the BESS resource.

The estimated cost of single axis tracking solar panels with the inverters to produce 40MWh on a sunny day is approximately $7.5M. Replacing the 20-25MW initial capacity of the Scenic Loop Substation would cost approximately three times that amount. In addition, using a conservative estimate of 2.5 acres per MW of solar, such a facility would require approximately 50-60 acres of available property for operation of the solar PV facility. Thus, the total cost of the installation of a 25 MW PV resource would be approximately $25 - $30M and would require at least ten times the acreage of the proposed substation. In addition to the significant total cost of resources nearly $75M ($45M for BESS and $25M for PV), it is also important to note that this solution will require additional station costs to interconnect the DER

[6] https://www nrel gov/docs/fy19osti/71714.pdf

BURNS McDONNELL

resources to the distribution system and will not fully alleviate existing reliability issues that are directly associated with line length and overhead line length through significant terrain and vegetation since the existing distribution circuits would remain unchanged.

- Option D

Another DER option considered was construction and operation of gas-fired generation within the project area to replace the capacity of the proposed Scenic Loop Substation. The nearest available gas pipeline to the Scenic Loop area capable of serving a gas-fired generating station is approximately 5.0 miles away. In addition, any new fossil-fueled generation would require significant water usage and environmental permits.

Based on the review of the load growth in the region, a new substation is needed in the Scenic Loop area by 2025. It is highly unlikely that any new fossil-fueled generation could be permitted and constructed in order to address the need for the area within this time frame.

Also, it should be noted that adding a generation resource to the existing circuits will still require additional switchgear and transformers and the cost would be considerably similar to the cost of developing a new Scenic Loop Substation (in addition to the cost of the generation facility).

The cost to develop a new 50 MW peaking plant (aeroderivative engine) would be approximately $60M without considering the costs to develop a pipeline to the plant and the costs to mitigate other constraints to make this option a viable alternative to the Scenic Loop Substation. In addition to the significant cost of more than $60M (plus the Pipeline costs and interconnection costs), and depending on the location of the generation facility, it is also important to note that this solution may not fully alleviate existing reliability issues that are directly associated with distribution circuit line length and overhead line length through significant terrain and vegetation since the existing distribution circuits would remain unchanged if the new generator is not constructed in the area proposed for the new Scenic Loop Substation.

- Option E

An alternative to construction of the Scenic Loop Substation that was evaluated involves upgrading the existing transformers at the Fair Oaks Ranch Substation for 100 MVA operation and the construction of two new distribution circuits from that substation. The Ranchtown Substation is further west to Scenic Loop area it was determined that building new circuits from that substation was not a reasonable alternative to the project.

The Fair Oaks Ranch Substation is located on the east side of the I-10 with more than a mile of underground conduit to terminate cables into the station. The distribution corridor in the Scenic Loop area is very limited and would require converting the existing single circuit structures to double circuit structures and terminating the new circuits into Fair Oaks Ranch with additional undergrounding and utilizing existing trenching. The length of a new circuit is anticipated to be 30 miles long to pick up portions of the Scenic Loop area load and is anticipated to have a cost of more than $20M. Expansion of the capacity of the Fair Oaks Ranch Substation will provide some additional capacity for the distribution system in the Scenic Loop area. However, as can be seen on Figures 1 and 13, expansion of Fair Oaks Ranch will still leave the Scenic Loop area served by long distribution circuits many miles from the substation transformers at Fair Oaks Ranch and La Sierra. Thus, while there may be some benefit in the short term to some aspects of reliability and capacity expansion, the reliability to the Scenic Loop area will continue to deteriorate due to the distance from a strong substation in the vicinity. Further, at a total estimated cost of $45M (2 circuits with transformer and station upgrades), this option is nearly as costly as the Scenic Loop Substation alterative with significantly less improvement to the reliability and capacity flexibility for the area.

BURNS McDONNELL

- Option F

In order to address reliability of the existing distribution circuits serving the Scenic Loop area, an alternative was evaluated that involved relocation of existing poor performing circuits from overhead to underground. While undergrounding distribution circuits can have a significant improvement on reliability, the cost to underground an entire circuit is typically 8-10 times[7] more expensive than overhead circuits (approximately $40M[8]). At least two of the existing circuits from the La Sierra and Fair Oaks Ranch substations (U114, R034) would need to be relocated underground to achieve the reliability benefits anticipated from construction of the proposed Scenic Loop Substation. An estimated cost of such undergrounding is reasonably estimated at approximately $80M.

In addition, the engineering and maintenance for underground distribution circuits is more complex and expensive and would take many years to complete (resulting in further decreasing reliability in the interim of the conversion). In addition, the expanded capacity on the new underground ground distribution circuits would result in further needed upgrades to equipment at the Fair Oaks Ranch and La Sierra substations, resulting in additional costs for this alternative.

In order to achieve the same reliability and capacity benefits of the Scenic Loop Substation alternative, the undergrounding alternative would cost more than twice the cost of a new substation and will not provide the same operational flexibility as a third substation (Scenic Loop) for the region. This alternative was rejected based on the significant expense of the alternative.

[7] https://emp.lbl.gov/sites/all/files/lbnl-1006394_pre-publication.pdf

[8] https://emp.lbl.gov/sites/all/files/lbnl-1006394_pre-publication.pdf - EEI (2013) reported a minimum overhead-to-underground distribution line conversion cost range of $158,100–$1,000,000/mile and a maximum conversion cost range of $1,960,000–$5,000,000. EEI (2013) also reported that installing new underground distribution lines costs from $297,200-$1,141,300/mile (minimum) to $1,840,000–$4,500,000/mile (maximum).

BURNS McDONNELL

6. Conclusion and Recommendation

As residential, commercial, and industrial development and associated electric demand increases in the northwestern region of Bexar County, CPS Energy has identified reliability violations in the Scenic Loop area today. Although few modifications of the existing distribution circuits will provide additional capacity and some short term improvements in reliability, the existing system will be inadequate to reliably serve the area by 2024 in accordance with CPS Energy's Distribution Planning Criteria. If additional capacity is not added to the system, it will become difficult for CPS Energy to provide reliable service, sufficient voltage support for normal summer load, and capacity for load shifts during maintenance or emergency conditions. By 2024 the distribution system will reach a point at which connection of new customers will lead to unacceptable levels of reliability. The addition of the Scenic Loop Substation will support existing, short-term, and long-term load growth in the region, increase system capacity and infrastructure support circuit ties, improve reliability, and decrease outage durations. The new substation will also reduce transformer loading at adjacent substations, providing for additional load growth in the regional area.

The reliability concerns, driven by continued load growth in the area, demonstrate the need for a new substation. Burns McDonnell conducted analysis that supports CPS Energy's recommendation that a new Scenic Loop Substation (Option B) is the preferred solution to address the short-term and long-term system needs of the northwestern Bexar County region.

The proposed new Scenic Loop Substation will meet the forecasted load growth and improve the reliability of the area with shorter circuits, strong backbones, and sufficient field circuit ties that will prevent major loss of customer load in faulted conditions (e.g. equipment failures, tree contact, lightning strikes, or vehicle incidents). The Scenic Loop Substation will be designed as a three unit site to accommodate two transformers and a spare position. An estimated 20-25 MW of load will be served by the new substation initially. The substation will be looped into the existing Ranchtown to Menger Creek 138 kV transmission line approximately five to seven miles to the west.

In addition to accommodating forecasted load growth, the Scenic Loop Substation will improve reliability in the northwestern region of Bexar County. Adding the proposed substation will reduce the total number of customer interruptions and duration of those interruptions.

BURNS McDONNELL

7. Appendix A: UTSA 2010-2040 Forecast for Residential Dwelling Units and Jobs

SA Tomorrow UTSA Area Regional Center

2010-2040 Forecast for Residential Dwelling Units and Jobs

Forecast, 2010-2040	Baseline Scenario[1]	Targeted Growth Scenario[2]
Dwelling Units		
Forecast Total	15,900	37,500
Forecast Annual	530	1,250
Remaining Capacity[3]	27,544	5,944
Percent of Capacity[3]	37%	86%
Jobs		
Forecast Total	39,700	48,000
Forecast Annual	1,323	1,600
Remaining Capacity[3]	67,690	59,390
Percent of Capacity[3]	37%	45%

Source: Economic & Planning Systems; City of San Antonio Planning Department

[1] Based on Alamo Area Metropolitan Planning Organization (AAMPO) 2040 TAZ forecasts

[2] Estimates for future growth in the centers and corridors assuming that denser development patterns can be attracted and supported by high-frequency transit service. The Targeted-Growth numbers assume a significant market shift towards the Regional Centers based on associated infrastructure such as fixed guideway, frequent transit service that facilitates denser, mixed-use development.

[3] Based on UTSA Land Capacity Analysis totals in Table: *Future Land Use Acreage and Forecast Dwelling Units, Jobs, and Commercial/Industrial Square Feet*

SA Tomorrow UTSA Area Regional Center

Future Land Use Acreage and Forecast Dwelling Units, Jobs, and Commercial/Industrial Square Feet

		Percent by Use		Acres by Use		Factors			UTSA Land Capacity			Forecast (2040)[4]		
Future Land Use Category	Acres[1]	Residential	Non-Residential	Residential	Non-Residential	FAR	DU/Acre[2]	Sq. Ft. per Job	Residential Dwelling Units	Commercial / Industrial Bldg Area	Commercial / Industrial Jobs	Residential Dwelling Units	Commercial/ Industrial Jobs	Commercial/ Industrial Building Area (SF)
Low Density Residential	57.2	100%	0%	57	0	0	5	0	286	0	0	105	-	-
Urban Low Density Residential	135.3	100%	0%	135	0	0	10	0	1,353	0	0	495	-	-
Medium Density Residential	29.4	100%	0%	29	0	0	20	0	587	0	0	215	-	-
High Density Residential	0.0	100%	0%	0	0	0	35	0	0	0	0	-	-	-
Neighborhood Mixed-Use	16.7	25%	75%	4	13	0.5	20	300	83	272,770	909	31	308	92,315
Urban Mixed-Use	295.6	50%	50%	148	148	0.5	35	300	5,172	3,218,730	10,729	1,893	3,631	1,089,335
Regional Mixed-Use	1,369.6	50%	50%	685	685	0.75	50	300	34,241	22,372,880	74,576	12,532	25,239	7,571,796
Employment/Flex Mixed-Use	245.8	20%	80%	49	197	0.5	35	500	1,721	4,283,222	8,566	630	4,832	1,449,598
Business/Innovation Mixed-Use	0.0	20%	80%	0	0	0.5	35	500	0	0	0	-	-	-
Heavy Industrial	1,276.7	0%	0%	0	0	0.3	0	1,000	0	0	0	-	-	-
Community Commercial	323.2	0%	100%	0	323	0.3	0	400	0	4,224,116	10,560	-	4,765	1,429,595
Regional Commercial	62.7	0%	100%	0	63	0.3	0	400	0	819,535	2,049	-	925	277,360
City/State/Federal Government	692.1	0%	0%	0	0	0.3	0	300	0	0	0	-	-	-
Parks/Open Space	560.7	0%	100%	0	561	0	0	0	0	0	0	-	-	-
Agricultural	0	10%	90%	0	0	0	0	0	0	0	0	-	-	-
Total	**5,065.1**	**22%**	**39%**	**1,108**	**1,988**				**43,444**	**35,191,252**	**107,390**	**15,900**	**39,700**	**11,910,000**

Source: Economic & Planning Systems; City of San Antonio Planning Department

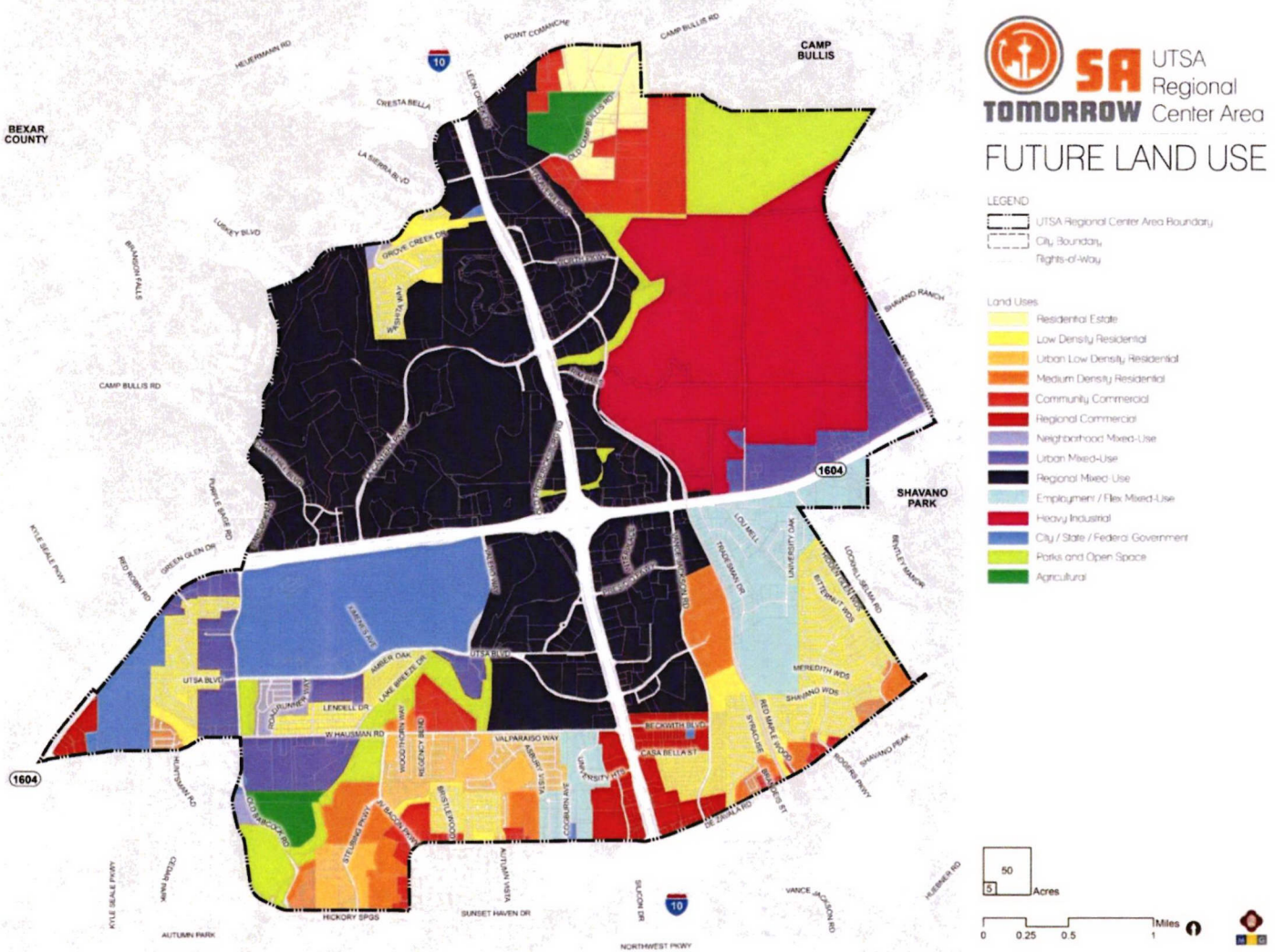
[1] Based on the adopted Future Land Use Map in the UTSA Area Regional Center Plan [https://utsa-area.sacompplan.com/en/plan-framework/land-use/]

[2] Based on the stated range of typical densities for residential land use categories [*SA Tomorrow Land Use Classifications (Adopted October 11, 2018)* document found at https://www.sanantonio.gov/Planning/PlanningUrbanDesign/Future-Land-Use]

[3] The 2040 Forecast numbers should be considered "Net New" dwelling units, jobs, and building square footage beyond current levels

BURNS McDONNELL

UTSA Area Regional Center's adopted Future Land Use Map.



ATTACHMENT A

CPS ENERGY

ELECTRIC TRANSMISSION LINE ROUTING/SUBSTATION SITING GENERAL PROCESS MANUAL

January 2001 (revised 2011)

CPS ENERGY
ELECTRIC TRANSMISSION LINE ROUTING/SUBSTATION SITING
GENERAL PROCESS MANUAL

INTRODUCTION

On December 27, 1999, the City Public Service (CPS) Board of Trustees approved a CPS Facility General Routing/Siting Process for Electric Transmission Lines and Substations, which is presented in Appendix A. The purpose of this manual is to provide annotations for the General Routing/Siting Process which can be utilized by CPS staff for future projects. This manual is intended to be a dynamic document, to allow for new data sources and for changes and revisions necessary to accomplish future projects.

ANNOTATED GENERAL ROUTING/SITING PROCESS

1. **NEED FOR PROJECT** - CPS Planners/Engineers will determine/establish the need for the project. The following needs will be determined:
   A. Transmission line voltage needs
   B. Substation needs

2. **STUDY AREA DELINEATION** - The study area will be delineated based on end points for the proposed transmission line and/or the electrical load area for the substation. The substation vicinity will be selected based on load and system requirements. The study area will be large enough to allow flexibility in transmission line routing/substation siting. The study area will be depicted in a way to show any obvious natural or human- made obstacles.

3. **DATA GATHERING/CONSTRAINTS MAPPING** - Following the delineation of the study area will be the data-gathering phase and the development of land use and environmental constraints maps.
   A. Letters will be sent to federal, state, and local agencies/officials requesting information/ concerns about the study area and the project. An example agency contact list is shown in Appendix B.
   B. Aerial photographs of the study area will be obtained. If recent existing aerial photography is not available (i.e., 1-2 years old), new photography will be ordered. The minimum resolution should be 1" = 1,000' in order to determine locations of habitable structures, vegetation boundaries, and other important land use and environmental features.
   C. Information regarding sensitive/important natural, cultural, and human resources will be obtained and mapped as constraints. Sources of information may include, but not be limited to, the following list.

      1. Natural resources
         a. geological formations - sources include Bureau of Economic Geology-

University of Texas at Austin, Geologic Atlas Sheets ....karst features can be included here and/or with endangered and threatened species and sensitive habitats - sources include Veni and Associates reports (for karst information)

b. topographical formations - sources include U.S. Geological Survey (USGS) quads (7.5 minute series)

c. soil formations - sources include Soil Surveys (U.S.D.A. Natural Resources Conservation Service (NRCS, formerly the Soil Conservation Service)).
   (1) prime farmland soils , defined by the Secretary of Agriculture in 7 CFR 657 (Federal Register, Vol. 43, No. 21) as land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, or oilseed and is also available for these uses (i.e., the land could be used as cropland, pasturelands, rangeland, forestland, but not land that is developed or under water). Source of county information in Texas is Texas Prime and Potential Prime Farmland Soils Inventory (NRCS, 1979).
   (2) hydric soils - one of three criteria (vegetation, soil, hydrology), which the U.S. Army Corps of Engineers (USACE) uses to determine if a site is a jurisdictional wetland. Lists of these soils are available from NRCS local offices.

d. mineral resources - sources include Mineral Resources of Texas (BEG, 1979)

e. energy resources - sources include Energy Resources of Texas (BEG, 1976)

f. surface water - sources for information about the watershed and/or stream segments include the Texas Natural Resource Conservation Commission (TNRCC, 1996, 1997), the Texas Water Commission (TWC, 1992) and the Environmental Protection Agency (EPA) Web Site.

g. ground water formations - sources include Ashworth and Hopkins (1995), the Texas Water Development Board (1995, 2000), and TNRCC (undated).

h. vegetative regions including wetlands and other sensitive habitats - sources of information include the National Wetland Inventory quads (7.5 minute series), and Texas Parks and Wildlife Department's (TPWD) Biological and Conservation Data System (TXBCD) by USGS quad (Austin TPWD office).

i. ecological resources - biotic provinces of Texas including wildlife communities are described by Blair (1950).

j. sensitive and/or endangered and threatened plant and wildlife species and critical habitats (endangered, threatened, species of concern)
   (1).state - TXBCD by USGS 7.5 minute quad and county lists (available at TPWD office, Austin, TX, state-wide list available also on TPWD web site)
   (2) federal - U.S. Fish and Wildlife Service county lists

k. areas with high aesthetic values - determined from miscellaneous published documents and/or general reconnaissance of the study area.

2. Human resources - sources of data for following include the Texas Workforce

Commission (TWC), Texas State Data Center (TSDC), Texas Department of Agriculture, Texas Water Development Board, National Oceanic and Atmospheric Administration (NOAA, 1998, 2000), Federal Aviation Administration (FAA), Texas Department of Transportation, Texas Outdoor Recreation Plan (TORP), Texas Outdoor Recreation Inventory (TORI), various maps, and site reconnaissance.

a. socio-economic
b. population, population trends, and population housing characteristics
c. area income data, labor force, and unemployment
d. economic indicators
e. agriculture -- cropland, livestock, non-agricultural sectors
f. forestry, trade, tourism
g. oil and gas production
h. political subdivisions and transportation network
i. major (public or military) and private airfields and other FAA-controlled facilities
j. microwave and communication towers (AM, FM, cellular, etc.)
k. churches, schools, and cemeteries
l. utility systems
m. parks and recreation facilities

3. Cultural resources - Previously recorded cultural resources sites will be located based upon a review of information from the Texas Archaeological Research Laboratory (TARL) at the University of Texas and the Texas Historical Commission (THC). Other sources of information will vary depending on project location.
   a. Cultural history of the area
   b. cultural resources, backgrounds, previous investigations, and results of investigations

D. Property boundary information obtained (not specific land ownership)
   1. City, county, state, and federal lands
   2. Private lands (boundary information from County Appraisal District office)

4. **DEVELOP PRELIMINARY ALTERNATIVE TRANSMISSION LINE ROUTES/SUBSTATION SITES** - Preliminary alternative transmission line routes/substation sites will be developed, considering:

A. Environmental/land use constraints, avoidance/exclusion areas, and opportunity areas.
   1. Transmission lines
      a. Existing residential areas and subdivisions will be avoided when possible. Habitable structures will be avoided wherever feasible.
      b. Alternative routes will utilize or parallel existing transmission line, distribution line, highway, roadway, or railroad right-of-way, etc., whenever feasible.

c. The delineation of alternative transmission line routes will be done to preserve the natural landscape and minimize conflict with present and known planned uses of the land
d. Routes will avoid heavily wooded areas, steep slopes, and scenic areas, where possible.
e. Known locations of endangered/threatened species, significant cultural resource sites, wetlands, and parks/recreation areas will be avoided whenever possible.
f. Where feasible, the use of natural screens (vegetation and/or terrain) to minimize the view of the transmission facilities from highways and other areas of public view, will be considered.
g. To avoid silhouetting transmission towers against the sky, they will not be constructed on top of hills, along ridgelines, or other high points, if possible. Instead, routes will be placed below the crest of a hill or in a saddle to carry the line over the ridge or hill.
h. When crossing wooded canyons, long-span towers will be considered to keep the conductors above the trees and to minimize the need to clear all vegetation from below the lines. Clearing in the canyon will be limited to that which is necessary to string the conductors.
i. Routing the transmission line across open expanses of water and marshland and particularly those used as flight lanes by migratory waterfowl and other birds will be avoided.
j. The types of vegetation, soil, geological formations, and topography will be considered to minimize the level of disturbance, cost, and/or maintenance. Factors include:
   (1) soil/rock stability which may contribute to erosion problems and/or increased turbidity/silting of streams
   (2) difficulty or expense in ROW creation (need for blasting) or maintenance (difficulty in establishing vegetative cover)
   (3) methods of clearing/grading that will minimize disturbance
      (i) Use of brush blades in place of dirt blades on bulldozers will preserve ground cover and avoid scarring and associated erosion
      (ii) Limit clearing to only those plants and features that pose a hazard to the transmission line (leave ground cover and low vegetation), i.e., clear only when necessary to provide clearance for transmission line reliability or suitable access.
      (iii) Areas that require grading will be contoured so as to minimize erosion. As a general rule, bulldozing will not be done on slopes which exceed 35%.
      (iv) Mechanized clearing and construction activities will not be performed within 100' of a stream bed. All activities will minimize damage to the natural condition of these areas.

(v) Protection of adjacent resources including avoiding fragmentation of larger natural areas that serve as wildlife habitat will be considered.

k. Consideration will be given to multiple uses of ROWs. Possible uses include nurseries/orchards for various economic plants such as Christmas trees, native plants for wildlife forage, wildlife management areas, general agriculture, and hike/bike trails.

2. Substations

a. General Area Selection - The general area for a new substation will be determined by the Planning Division based upon load and system requirements. Within this general area, the Substation Design Section will locate preliminary alternative sites.

b. Accessibility - The substation site requires public roadway access of sufficient quality to allow for normal operation and maintenance vehicle access during bad weather conditions and to allow for large construction vehicles during good weather conditions. A minimum of one access will not cross a floodplain.

c. Size - The minimum fenced dimensions for a four-unit substation is 420' x 420' (approximately 4 acres). Additional areas may be required for substation entrances, landscaping, buffering, etc.

d. Conditions

(1) Location - The substation site will not be located in existing defined flood hazard areas and will be located sufficiently above existing flood levels so that future development will not cause the flood plain to encroach upon the substation.

(2) Terrain - The substation site should be relatively flat, but be adequately sloped to allow for drainage of precipitation and evacuation of spill containment facilities.

(3) Soil - The substation site will be in a natural state, void of fill material unacceptable for construction activities.

e. Transmission Access - Where possible, the substation site will be located and oriented such that transmission line entrances are direct and do not require additional transmission structures to be located near or within the substation.

f. Distribution Access - Most substations are designed to support 16 distribution circuits. It is advantageous to locate the substation near a major intersection to facilitate access to the distribution system.

g. Environmental Issues - The substation site will be free from contaminants, will not contain any known historic or prehistoric features, will not be habitat to any endangered species, will not have any evidence of aquifer recharge features, and should have minimal vegetation that requires removal.

h. Neighborhood Impact - The substation site will be located to minimize impact on churches, schools, parks, residences, etc.

i. Land use - The substation site will be located adjacent to existing transmission

easements, where possible. The site will not overlie any existing non-CPS easements or rights-of-way. The substation site will not infringe on evident future public developments such as roadways, waterways, etc.

j. Land Availability - Acquisition of property from a willing seller is preferred over condemnation.

k. Substations will be located with consideration to both their basic function and the preservation of public views of scenic, historic, natural, and recreation areas, parks, etc. Where possible, they will be located where they can be naturally or artificially screened (vegetation and/or terrain).

l. Where possible, locations near existing or proposed interstate or state primary highways will be avoided, except in commercial/industrial areas.

m. If possible, locations will avoid population areas, particularly scenic areas, wildlife refuges, hilltops, and historic man-made structures.

n. Potential noise will be considered when the location of substations is being determined.

o. The proposed location, layout, and design parameters will be coordinated with appropriate local planning agencies to assure maximum compatibility between the facilities and present and future land use

B. Routing/siting opportunities
   1. The use of existing transmission line, distribution line, highway, roadway, and railroad ROW will be considered whenever possible.
   2. Paralleling existing ROWs will be considered whenever possible.
   3. The placement of routes/sites within commercial/industrial areas will be considered whenever feasible.

C. Engineering/right-of-way concerns
   1. To reduce the number of transmission lines constructed, the joint use of existing electric transmission facilities will be considered when feasible.
   2. Access roads will be located in a manner that will preserve natural beauty and minimize erosion. Existing roads will be used to the maximum extent possible.

D. Evaluation of structure types
   1. When possible, existing lower voltage transmission lines will be upgraded to allow the construction of higher voltage lines on the existing ROW instead of adding or widening the ROW.
   2. The materials used to construct transmission towers will harmonize with the natural surroundings, where possible. Self-protecting bare (rusted) steel may be appropriate in areas. Towers constructed of galvanized steel, concrete, and wood will also be considered.
   3. Choice of conductor material will be carefully considered so as to avoid sheen or too strong a silhouette and to provide the best selection for blending the conductors into any given setting through which the line must pass. Standard aluminum wire will dull with time as it oxidizes in the atmosphere.

4. The use of high strength conductors will be considered, particularly at road, waterway and canyon crossings to pick up the line sag and allow for straighter line profiles.
5. When lines are adjacent to highways, the use of guyed towers will be avoided, where possible.
6. In scenic areas and along roadways, lower structure heights and reduced structure spacing will be considered for aesthetic purposes.
7. In situations where there is a conflict between adherence to safety regulations and any of the above considerations, the safety regulations shall govern.

5. **PUBLIC INVOLVEMENT PROGRAM** - a public involvement program will be implemented for each new project. Landowners and interested parties will be notified by letter and/or newspaper advertisements (legal and metro sections) of the proposed project two (2) times; once two weeks prior to the event and once one week prior to the event. At a minimum, notification shall include landowners whose property is within 300' for a 138kV project and 500' for a 345kV project. A public, open-house meeting(s) will be held to explain the need for the project and to solicit input on preliminary alternative routes/sites.

   A series of information stations/booths will be set up which will include, but not be limited to, the following:

   - Welcome/Sign-in
   - Project Planning, Purpose and Need
   - Environmental/Routing and Siting
   - Transmission Engineering
   - Substation Engineering
   - Right-of-way

   An information handout and questionnaire to solicit public input will be developed for each project. The public open house meeting(s) will be held in the late afternoon/early evening at an appropriate location within or near the study area, and will generally be at least two hours in length.

6. **REFINE ALTERNATIVES** - The preliminary alternative routes/sites will be refined down to the primary alternative routes/sites. The public and agency input will be evaluated and used to modify alternative routes, if appropriate.

7. **ADDITIONAL PUBLIC MEETINGS** - An additional public meeting(s) will be held to

review revised routes with the public, if necessary. Individual meetings may also be held with neighborhood associations, special interest groups and public officials, as appropriate. These meetings may be held in a variety of formats, including open houses, presentation/question and answer, focus groups, and/or workshops. Additional information may be shared and exchanged with the public through newsletters, mailouts, project-based websites, and/or other medias.

8. **EVALUATION OF PRIMARY ALTERNATIVE ROUTES/SITES** - The primary alternative routes/sites will be evaluated/ranked by the consultant using a list of environmental criteria to build a matrix (table) comparing each of the criteria for each alternative route/site. An example list of the 25-35 environmental/land use criteria used to evaluate/compare alternatives is shown in Appendix C.

9. **PREFERRED ROUTE/SITE RECOMMENDED BY CONSULTANT**
   A. Based on environmental/land use factors present, the consultant will evaluate each primary alternative using staff with expertise in several different environmental disciplines (e.g., terrestrial ecology, land use, planning, cultural resources). Each person will independently analyze the routes from the perspective of their discipline. The consultant's environmental/land use project team will then discuss their independent results with one another in a meeting of the whole group. The relationship and relative sensitivity among the major environmental criteria will be determined by the group as a whole. An environmental/land use preferred route, and any ranked alternatives, will be determined by a consensus of the group, which will be presented to CPS in a draft environmental assessment report.

10. **PREPARATION OF ENVIRONMENTAL ASSESSMENT REPORT** - The consultant will prepare the final environmental assessment report, which will include a discussion of:
   A. Purpose and need for project
   B. Description of proposed design and construction
   C. Existing environment
   D. Alternative analysis
   E. Public/agency input
   F. Impacts of each alternative
   G. Local/state/federal permitting requirements
   H. Mitigation (if necessary)
   I Costs for each alternative (as provided by CPS).

   An example Table-of-Contents for an Environmental Assessment/Alternative Route Analysis Report is shown in Appendix D.

11. **CPS SELECTION OF OVERALL PREFERRED ROUTE/SITE** - CPS will select the overall preferred route based on factors including, but not limited to:

A. Public input
B. Engineering criteria
C. Cost
D. Right-of-way considerations
E. Maintenance
F. Environmental impacts
G. Land use impacts

12. **PUBLIC NOTIFICATION OF FINAL ROUTE/SITE SELECTED** - CPS will notify interested persons of the final route/site selected and the date for start of construction. This will be accomplished by individual letter and/or newspaper advertisements.

MODIFIED PROCESS FOR OTHER ELECTRIC FACILITIES

In the course of providing safe and reliable electric service to its customers, CPS must plan for and construct electric transmission and substation facilities other than totally new electric transmission lines and related new substations. These projects include, but are not limited to the following facilities.

- New Substations Not Associated With A New Transmission Line
- Substation Relocations/Expansions
- Use of Existing Right-of-Way/Right-of-Widening for Reconstruction of Electric Transmission Lines
- Re-Conductoring/Adding New Conductors on Existing Transmission Structures
- Minor Line Alterations/Relocations

During the planning process, each of these types of projects will be evaluated by CPS staff on a case by case basis to determine the components of a "Modified Process." The level of detail and components comprising the "Modified Process" for a particular project will be selected based upon the nature, extent, and location of the project; engineering; safety; environmental issues/regulations; project costs; right-of-way; and public/stakeholder/agency input, as necessary. A general discussion of the components of the "Modified Process" for each type of project is presented below.

1. NEW SUBSTATION NOT ASSOCIATED WITH A NEW TRANSMISSION LINE

Depending on the location, a new substation siting project may involve most of the steps presented above in this General Routing/Siting Process Manual. This is especially true if the

new substation is located in a previously developed area. If the new substation is to be located in a more rural/remote area, the modified process may include the following items.

A. Determine General Substation Location Area
B. Alternative Site Selection/Engineering and Environmental Constraint Analysis
C. Records Check/Site Inspection for Threatened and Endangered Species
D. Site Inspection for Wetlands and Karst Features
E. Records Check/Site Survey for Cultural Resources
F. Floodplain Evaluation
G. Land Use/Aesthetics Evaluation
H. Noise Analysis for Nearest Residence (as deemed necessary)
I. Draft Report Documenting the Results up to this point in Process
J. Landowner/Public/Homeowner Associations Input/ Meetings as Necessary
K. Utility selects best site
L. Brief Final Report Documenting the Results of the Process/Results

2. SUBSTATION RELOCATIONS/EXPANSIONS

The relocation of an existing substation will require most of the components discussed above for new substations. The expansion of an existing substation may only require a brief engineering and environmental overview/constraint analysis and landowner input.

3. USE OF EXISTING RIGHT-OF-WAY/RIGHT-OF-WAY WIDENING FOR RECONSTRUCTION OF ELECTRIC TRANSMISSION LINES

The reconstruction of transmission lines within existing right-of-way and widening of existing right-of-way may include the following modified process components.

A. Landowner Contract/Input (Meetings as Necessary)
B. Threatened and Endangered Species Records Check/Site Survey
C. Cultural Resources Records Check/Site Survey
D. Site Survey for Wetlands and Karst Features if Right-of-way Requires Clearing or Widening
E. Aesthetic Analysis for Change of Structure Type
F. Brief Report Documenting the Results

4. RE-CONDUCTORING /ADDING NEW CONDUCTORS ON EXISTING TRANSMISSION STRUCTURES

If existing lines are re-conductored or new conductors are added, no additional investigations beyond engineering analyses and landowner contact should be required.

5. MINOR LINE ALTERATIONS/RELOCATIONS

The relocation or alteration of minor lengths of line (a few spans) should require minimal investigations beyond engineering analyses and right-of-way acquisition. Investigations could include the following components.

A. Landowner/Stakeholder Input
B. Brief Environmental/Land Use Analysis (Habitable Structures, Threatened & Endangered Species, Wetlands/Karst Features, Cultural Resources)
C. Brief Report Documenting the Results of the Analyses