



Agenda Report

24-1614

Agenda Date: 3/19/2024

REPORT TO COUNCIL

SUBJECT

Informational Report Regarding Route Analysis for 115kV Transmission Line from Northern Receiving Station to Kifer Receiving Station

EXECUTIVE SUMMARY

To meet the increasing demand and electric service growth within the City of Santa Clara (City), Silicon Valley Power (SVP) has determined the need for a near term project for a 115 kilovolt (kV) transmission line to connect the Northern Receiving Station (NRS) and Kifer Receiving Station (KRS). By connecting these two receiving stations, SVP will be able to transfer additional power and balance the electric load throughout the three receiving stations within the City.

SVP conducted a draft analysis of three potential transmission routes, assessing their impact on existing transportation routes, conflict with utilities, land use and easement requirements, constructability, cost, schedule, and environmental considerations. Following a comprehensive comparison and evaluation, the route connecting NRS and KRS through Lafayette Street, Bassett Street, and Duane Avenue was recommended. The proposed route underwent further assessment to determine whether portions could be installed overhead or underground. After considering various factors, including potholing and ground-penetrating radar surveys, load growth, system planning, required easements, permits, and engineering judgment, SVP has concluded that the recommended route should be installed overhead for the entire alignment for various reasons, such as reduced transmission capacity, reliance on external agencies, increased costs, and other factors, that are outlined later in this report.

This is an informational report only and no decisions are being requested at this time. SVP anticipates returning to City Council in Fall 2024 for the consideration of the final recommended project route and CEQA determination.

BACKGROUND

SVP has provided electric service for over 127 years and is experiencing significant continued growth. In 2021, SVP recorded a peak load of nearly 600 Megawatt (MW) and delivered approximately 4,100 Gigawatt-hours (GWh) to customers. In 2022, SVP's recorded peak load increased to 702 MW, and energy delivery rose to 4,550 GWh. This represents an approximate 10% increase in energy delivery and represents the largest year-over-year growth in the last 30 years.

On September 28, 2021, City Council accepted SVP's Three-Year System Growth Strategy Plan (RTC # 21-871). The Three-Year System Growth Strategy Plan identified \$300 million in proposed projects for both near-term and long-term capital improvement projects needed to support anticipated system growth and to replace end-of life equipment to ensure system reliability. One of the necessary near-term projects is the construction of a new 115kV transmission line between NRS and

KRS (New 115 kV Transmission Line). Constructing the New 115 kV Transmission Line will allow energy to be balanced and redistributed within SVP's transmission receiving stations and allow SVP to serve new load growth projected based on the SVP Resource Load Forecast.

At its November 15, 2022, meeting, City Council accepted the report of the SVP System Expansion Plan for the California Independent System Operator's (CAISO) Transmission Planning Process FY2023/24 (RTC # 22-1172).

In March 2023, the CAISO selected LS Power as the developer, owner, and operator of two new 500 MW transmission lines to the South Bay with an estimated cost of over \$1.0 billion. vSVP has been focusing on one of the 500 MW transmission lines that will link Pacific Gas and Electric's (PG&E) existing Newark Substation in Fremont to NRS.

The three receiving stations [NRS, Scott Receiving Station (SRS), and KRS] within the City are all interconnected. The NRS and SRS sites are currently directly connected via two 115kV lines, which are owned by PG&E. The NRS site is connected to PG&E's system via three 115kV transmission lines and one 230kV transmission line. The KRS site has two 115kV transmission lines connected with PG&E. A second 230kV transmission line is being designed to connect to NRS which will be owned and operated by LS Power and rated for 500MW. To transfer this additional power and balance loads between the receiving stations, a new 115kV line between NRS and KRS is required.

SVP's Three-Year Growth Plan Strategy report indicated that the existing PG&E 115kV transmission lines are not sufficient to adequately meet forecasted peak load and ensure reliability, and it recommended the New 115 kV Transmission Line between NRS and SRS. The New 115kV Transmission Line addresses the need for capacity and reliability upgrades and will ensure that SVP's electrical system is able to withstand an unexpected failure of the existing PG&E transmission lines.

The SVP evaluation team identified and evaluated three routes for the New 115kV Transmission Line prior to selection of the final route. These routes are shown in Attachment 1 and described below.

- **Route A** begins at NRS exiting northeast toward Lafayette Street continuing southeast within the median of Lafayette Street to Agnew Road where it transitions to the east side of Lafayette Street until Montague Expressway, where Route A enters Bassett Street. Route A proceeds southeast down Bassett Street to Bayshore Freeway, where the route crosses Bayshore Freeway and continues south along Duane Avenue interconnecting to KRS from the north.
- **Route B** begins at NRS and parallels Route A within the median of Lafayette Street, proceeding southeast, crossing Bassett Street near the intersection with Montague Expressway, continuing southeast to the intersection of George Street. Route B continues southeast within Bassett Street until the intersection of George Street where it crosses the Union Pacific Railroad (UPRR) southeast, entering Lafayette Street and entering an existing utility corridor along the UPRR. The route proceeds southeast, crossing Bayshore Freeway and continues along the railroad before turning west onto private commercial properties and parking lots before exiting onto Comstock Street. The route proceeds west on Comstock Street before crossing Lafayette Street and entering KRS.
- **Route C** begins at NRS traveling west toward San Tomas Aquino Creek. The route turns south and follows the Creek for just over 1.5 miles. Route C then turns east and travels along Central

Expressway before continuing along Comstock Avenue. The route follows Comstock Avenue and turns north into KRS.

After completing a draft alternative route analysis report, the SVP evaluation team assessed the three routes, considering their impact on existing transportation routes, conflict with utilities, land use and easement requirements, constructability, cost, schedule, and environmental considerations. Following a comprehensive comparison and evaluation, Route A emerged as the recommended route.

Route B, while similar to Route A, has additional constructability and easement acquisition concerns and enters the UPRR right-of-way. At this location, the UPRR right-of way is narrow and would not allow for an overhead transmission line to be located at a safe distance from the track. For these reasons, Route B was excluded.

The main challenges with Route C include: (1) easement acquisition along most of the alignment, (2) permitting requirements of Santa Clara Valley Water District on the San Tomas Aquino Creek levee, and (3) the presence of existing transmission lines which would need to be rebuilt and incorporated into the proposed transmission line. These issues would significantly impact the project schedule; therefore, Route C was not preferred.

DISCUSSION

Route A spans 2.24 miles from NRS to KRS. Due to the proximity to residential areas along the northern segment (between NRS and Agnew) of Route A, the SVP team examined underground and overhead alternatives for the northern segment. The northern segment starts from NRS to the intersection of Lafayette Street with Agnew Road and covers approximately 0.74 miles. South of Agnew the team only explored overhead options.

To assess feasibility of either Route A options, the team conducted preliminary utility potholing and ground-penetrating radar surveys to investigate potential conflicts with underground utilities. The SVP evaluation team compared overhead and underground alternatives between NRS and Agnew Road, considering near-term construction and access constraints, long-term operational factors, power delivery and line rating, and aesthetic benefits. See Attachment 2 for the options analyzed within Route A, which is described below. The alignment outside of the northern segment (south of Agnew) is summarized further below and will not change based on the selection of Option 1 or 2.

Northern Segment (NRS to Agnew)

Option 1 - Overhead

Under Option 1, Route A would be entirely overhead and generally consists of nine (9) new poles with foundations spaced approximately every 350 feet (on average) and located within the right-of-way (median or sidewalks) or easements obtained by SVP. Any installed overhead poles are anticipated to be 90 to 125 feet tall. The poles range in height as the overhead wires cross over other existing transmission lines. The current conceptual cost estimate for this overhead segment is \$9.5M which includes City utility relocation but does not include any potential PG&E relocation costs due to pole locations.

Option 2 - Underground

Option 2 includes both overhead and underground transmission lines within the alignment of Route

A. The underground option will include nine 6-inch conduits for electrical and four 2-inch conduits for communications. The underground alignment would also require a portion to be installed overhead between NRS and the Lafayette median as well as two large overhead riser structure poles and two large below grade transmission vaults spaced approximately 100 feet apart near Hope Drive. The current conceptual cost estimate for this underground segment is \$19M which includes City utility relocation but does not include PG&E relocation costs.

The evaluation summary for the variance between Option 1 and 2 along the northern segment of Route A is provided below. Additional details including constructability considerations, existing utilities, power delivery and line rating considerations, potential growth, aesthetics, tree removals, maintenance, cost, and schedule are provided in Attachment 3.

Option 1 Overhead Alternative Discussion

Option 1 includes nine (9) poles installed within the median. This option has moderate traffic control issues and potential for lane closures associated with utility relocations. Currently, the potential relocation of existing utilities occurs at three pole locations which could change as design work progresses. Option 1 has several advantages.

- The construction schedule is under City control, shorter and is scheduled to meet the anticipated energization date of 2028.
- An overhead transmission line can deliver more power and accommodate future growth with the option for a future underbuilt 60kV or 115kV transmission line.
- The alignment will be built for 230kV but energized for 115kV.
- Currently, there are no overhead transmission lines in this segment, but the poles would be located in the median and placed to limit tree removals.
- Maintenance on an overhead transmission line and outage time is relatively less than an underground line.
- The overall cost of Option 1 is 50% less than Option 2.

Option 2 Underground Alternative Discussion

The most significant concerns regarding Option 2 are the conflicts with existing utilities and schedule. There are total of 25 utilities in the corridor including gas, sewer, storm, water, and electric lines. There are some significant issues including:

- The relocation of approximately 300 feet of two existing transmission natural gas lines (12" SVP and 6" PG&E) to facilitate the installation of two large underground vaults (12' x 25').
- The underground duct bank, which will cross the majority of existing utilities within Lafayette Street just south of Agnew Road, may not meet the minimum required vertical pipe clearances. If vertical clearances cannot be met, the duct bank would dive below the existing sanitary sewer line, which is ~12' deep creating a significant excavation and major disturbance in Lafayette. Likely the transmission line would need to be approximately 20' deep.
- The relocation of the high-pressure gas line of the Donald Von Raesfeld Power Plant (DVR) would cause significant schedule constraints. It would require a full shutdown of DVR which can only occur during very limited periods.
- The relocation of a PG&E gas transmission line would also have undetermined, but likely

significant, impact on project delivery. Likely, the New 115kV Transmission Line will not meet the anticipated energization date in the first quarter of 2028.

- Option 2 will only deliver up to 83% of the power of Option 1 at 115kV due to heat dissipation requirements. The power delivery amount further declines at the 230kV level to 79.9%. This will limit future load growth.
- Option 2 does not allow for additional transmission lines within the duct bank. If, after the construction of the New 115kV Transmission Line, additional capacity is required, a new trench or overhead alignment would need to be constructed.
- This option would involve more lengthy traffic control and lane closures and could involve the complete shutdown of portions of Lafayette Street.
- Includes two (2) riser poles where the conductor transitions from overhead to underground. These riser poles typically have a larger visual impact than a typical overhead transmission pole (see Attachment 4 for typical pole types).

South of Agnew Segment

In the Route A alignment south of Agnew Road segment, there are existing 60kV transmission lines present on both the east side of Lafayette Street and the west side of Bassett Street. The alignment south of Agnew Road will be an overhead alignment. From Agnew Road to Montague Expressway, the alignment would shift from the median to the east side of Lafayette Street replacing one of the existing 60kV transmission lines to accommodate the new 115kV transmission line. Just north of Montague Expressway, the alignment would transition into Bassett Street. This portion would replace the existing 60kV transmission line on Bassett Street to facilitate the construction of the New 115kV Transmission Line. Between Norman Avenue and Bayshore Freeway, there are currently no transmission lines for approximately half a mile. At this portion all new overhead transmission lines will be installed. For the final 980 feet from just north of Bayshore to KRS, an existing 60kV transmission line will be replaced to facilitate the construction of the New 115kV Transmission Line. At locations where transmission lines are being rebuilt, a future underbuilt alignment is not feasible; however, the 115kV conductor will be constructed to facilitate future use at 230kV. A new alignment would need to be evaluated at a later date for future growth on the 60kV system. The current conceptual cost estimate for this overhead segment is \$26.5M.

Summary

The SVP evaluation team consisted of SVP staff, engineering consultants for the design and environmental work, and program management staff for the System Expansion Program. The SVP evaluation team conducted a comprehensive analysis and evaluation, employing various methodologies such as potholing and GPR surveys. This in-depth assessment took into consideration SVP's load growth and system planning projections, schedule, cost estimation, required easements and permits, and engineering judgment. The goal was to determine feasible route alignments, identify a preferred route, and explore potential overhead and underground options within the preferred route.

The findings favored Option 1 (the overhead option) for the following reasons:

- Ability to meet schedule.
- Flexibility in power delivery.
- Ability to accommodate future growth.

- Ease of maintaining the system.
- Reduces construction disruption to the public.
- Total cost (including southern segment): \$36M.

In contrast, Option 2 (the underground option), while it could be technically feasible, presents challenges such as:

- Relying on external agencies for utility relocation and faces an undetermined and extended timeline for DVR high-pressure gas line and PG&E transmission gas line relocation.
- Reduced transmission capacity (compared to Option 1).
- Lack of provisions for future growth.
- Extended construction timelines with extended lane closures and traffic control.
- Inability to meet the anticipated energization date for the New 115 kV Transmission Line.
- Total cost (including southern segment): \$45.5M.

Recognizing the urgency to support SVP's load growth and forecast, the New 115 kV Transmission Line is crucial, aiming for operational readiness by early 2028 to align with LS Power's transmission line interconnection. Based on the analysis and evaluation completed to date, staff will be recommending Option 1 for a complete overhead alignment along Route A. However, Council will make the final determination when staff returns for consideration in Fall 2024.

ENVIRONMENTAL REVIEW

This item does not constitute a "project" within the meaning of the California Environmental Quality Act ("CEQA") pursuant to CEQA Guidelines section 15060(c)(1) as it does not involve the exercise of discretionary powers by the City Council.

A CEQA determination will be made later (likely, fall 2024) when the City Council makes a final determination regarding the route and options.

FISCAL IMPACT

There is no fiscal impact associated with this item other than administrative staff time.

COORDINATION

This report has been coordinated with the City Manager's Office and City Attorney's Office.

PUBLIC CONTACT

Public contact was made by posting the Council agenda on the City's official-notice bulletin board outside City Hall Council Chambers. A complete agenda packet is available on the City's website and in the City Clerk's Office at least 72 hours prior to a Regular Meeting and 24 hours prior to a Special Meeting. A hard copy of any agenda report may be requested by contacting the City Clerk's Office at (408) 615-2220, email clerk@santaclaraca.gov <<mailto:clerk@santaclaraca.gov>>.

RECOMMENDATION

Note and file the informational report on the route analysis for the New 115kV Transmission Line from Northern Receiving Station to Kifer Receiving Station.

Reviewed by: Manuel Pineda, Chief Electric Utility Officer

Approved by: Jovan D. Grogan, City Manager

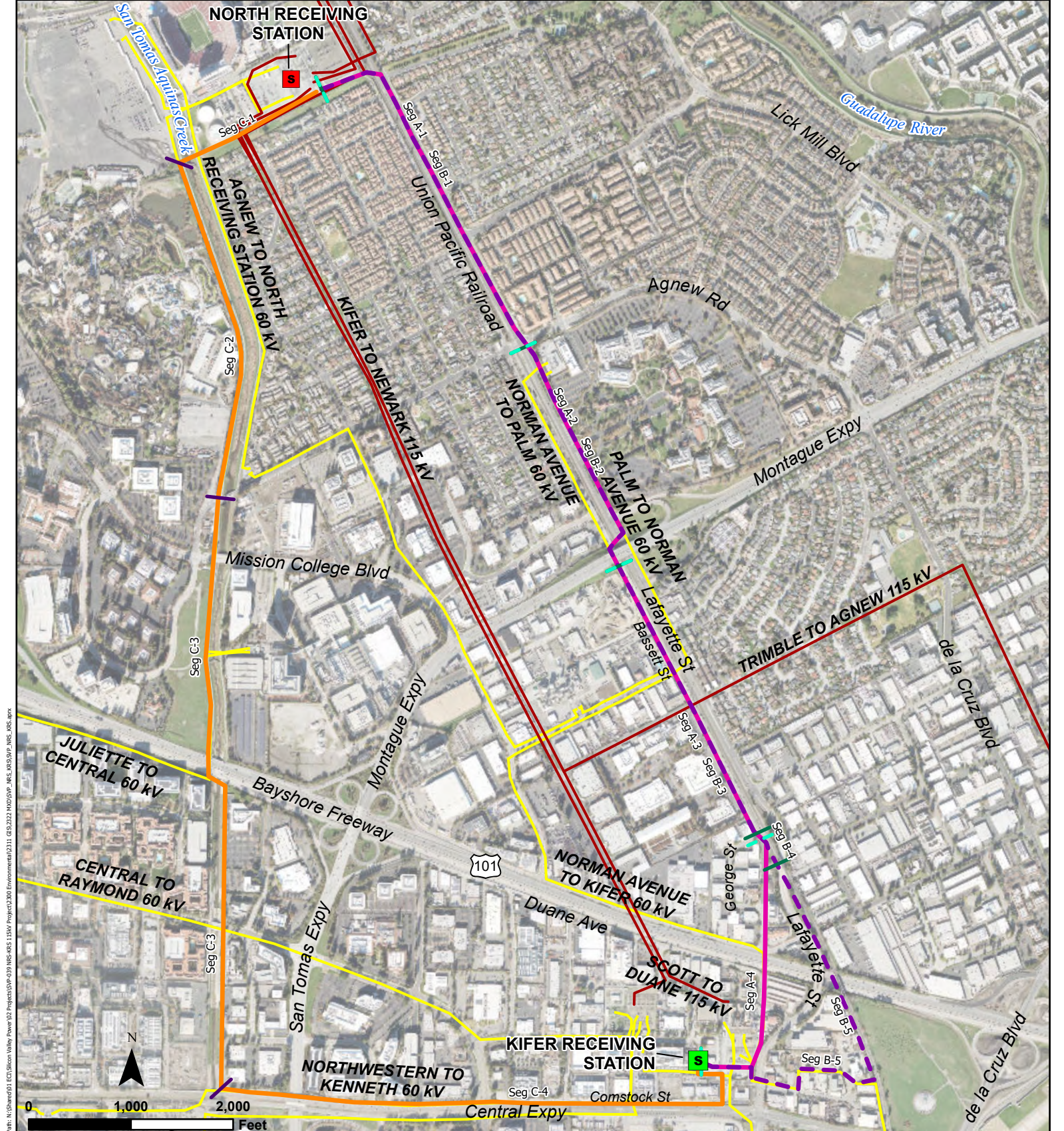
ATTACHMENTS

1. Attachment 1 - Routes Overview
2. Attachment 2 - Route A Map Options 1 and 2
3. Attachment 3 - Option 1 and 2 Route Details
4. Attachment 4 - Typical Pole Types - Transmission and Riser
5. Attachment 5 - List of Potential Utility Conflicts - Underground Alignment

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ATTACHMENT 1

ROUTES OVERVIEW



Path: N:\Shared\01 ECL\Silicon Valley Power\02 Projects\SVPP-039 NRS-485 115kV Project\2300 Environmental\2311 GIS\2322 NVD\SVPP_NRS_485_115kV.mxd

Source: ECL, SVP, USGS, NHD, HIFLD, US Census Bureau, USDOT, CADPR, CA, GIS; Aerial Source: Sanborn Map Company, Maxar



Existing Substation	Route A Segment Division
New Substation	Route B Segment Division
Route A	Route C Segment Division
Route B	
Route C	

Existing Transmission Line

60 kV
115 kV

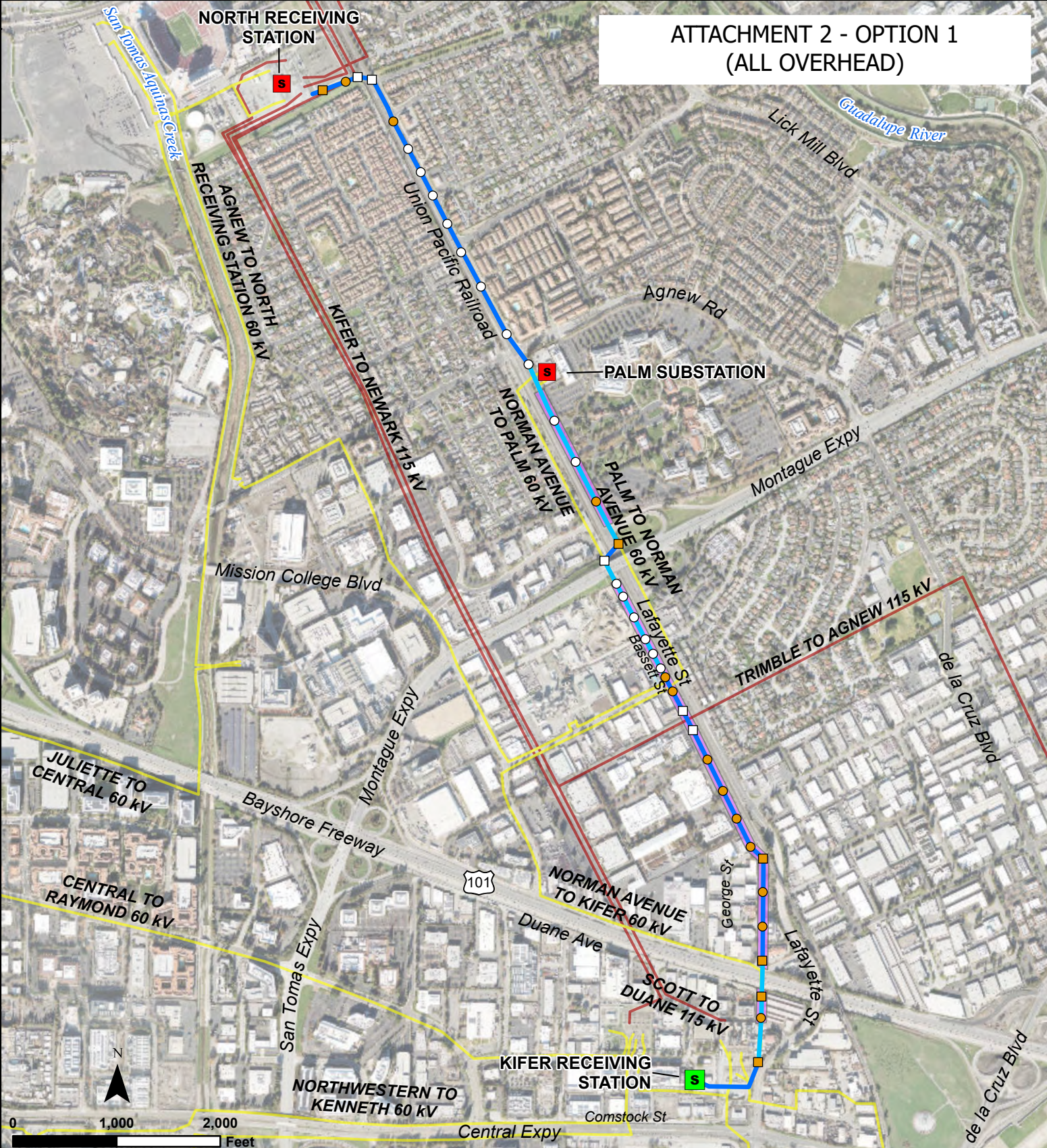
Silicon Valley Power
NRS to KRS
115 kV Transmission Line
City of Santa Clara
Santa Clara County, CA
Overview

RTC # 24-1614

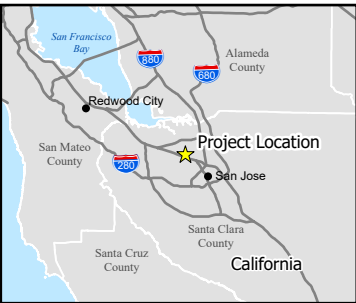
ATTACHMENT 2

ROUTE A OPTION 1 & 2

ATTACHMENT 2 - OPTION 1
(ALL OVERHEAD)



Source: ECI, SVP, USGS, NHD, HIFLD, US Census Bureau, USDOT, CADPR, CA, GIS, CA Energy Commission; Aerial Source: Sanborn Map Company, Maxar



- S** Existing Substation
- S** New Substation
- Deadend Pole <120 ft
- Tangent Pole <120 ft
- Deadend Pole 120+ ft
- Tangent Pole 120+ ft

Proposed Transmission Line

- New Transmission Line
- Double Circuit existing 60kV w/ New 115kV (same poles)

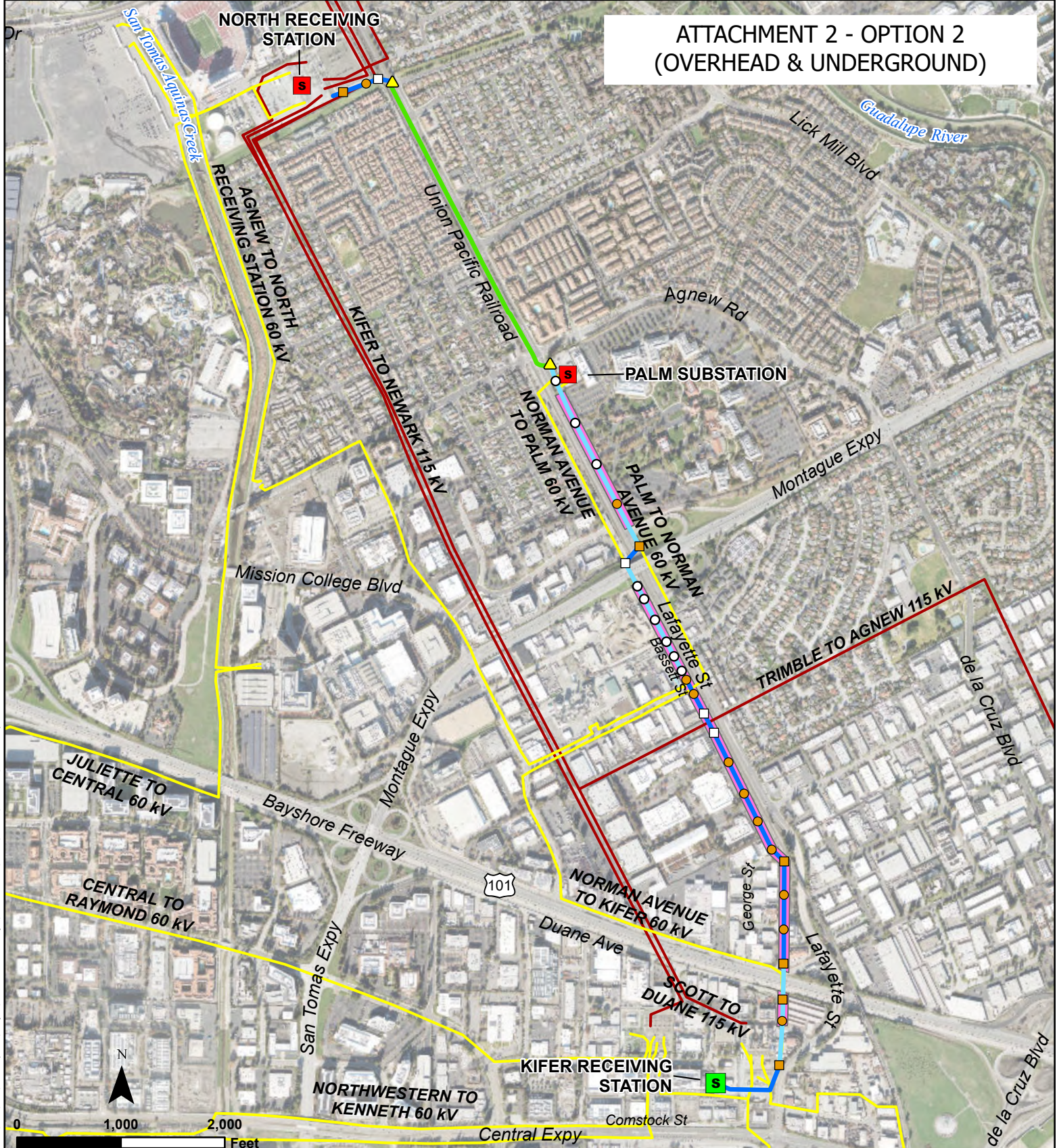
Existing Transmission Line

- 60 kV
- 115 kV
- Easement Needed

Silicon Valley Power
NRS to KRS
115 kV Transmission Line
City of Santa Clara
Santa Clara County, CA
**Preferred Route
Option 1**



ATTACHMENT 2 - OPTION 2 (OVERHEAD & UNDERGROUND)



Source: ECI, SVP, USGS, NHD, HIFLD, US Census Bureau, USDOT, CADPR, CA, GIS, CA Energy Commission; Aerial Source: Sanborn Map Company, Maxar



- S Existing Substation
- S New Substation
- Deadend Pole <120 ft
- Tangent Pole <120 ft
- Deadend Pole 120+ ft
- Tangent Pole 120+ ft
- ▲ Riser Pole <120 ft

Proposed Transmission Line

- Overhead Transmission Line
- Double Circuit existing 60kV w/ New 115kV (same poles)
- Underground Transmission Line

Existing Transmission Line

- 60 kV
- 115 kV
- Easement Needed

Silicon Valley Power
NRS to KRS
115 kV Transmission Line
City of Santa Clara
Santa Clara County, CA
**Preferred Route
Option 2**



RTC # 24-1614

ATTACHMENT 3

OPTION 1 & 2 ROUTE DETAILS

Attachment 3

The following lists summarize the key items associated with the overhead and underground options (Option 1 and 2, respectively) for the northern Lafayette Street segment from NRS to Agnew Road.

Option 1 - Overhead Alternative along Northern Lafayette Street Segment

- Constructability considerations:
 - Segment includes 9 poles installed in the median.
 - Consistent with typical City residential design standards and installations.
 - Moderate traffic control and potential lane closures for required utility relocations outside of the median.
 - Isolated excavation and pole installation within the median.
- Existing utilities:
 - Depending on the exact location of the poles in this segment, we anticipate the need for minimal existing underground utility relocations at three locations. Utility relocation work would need to be completed prior to the anticipated construction start in Q4 2026. With Lafayette Street currently under a pavement moratorium through December 2025, the Project would have approximately 9 months to complete this work.
 - Potential Relocations of Existing Utilities:
 - PG&E-owned natural gas transmission lines – One Location
 - Sanitary Sewer – One Location
 - Water line – Two Locations
- Power delivery and line rating considerations:
 - The overhead transmission line option can deliver more power due to better heat dissipation than the underground alternative. Overhead systems can be designed to satisfy any current rating requirements by changing variables such as conductor type, structure/pole height, etc.
- Potential growth:
 - New pole locations will be able to accommodate a future underbuilt 60kV transmission line.
 - Poles will be designed to accommodate voltages of 230kV but energized for 115kV.
 - Future upgrades in voltage would allow for more power transfer through this section of the Lafayette corridor without major additional capital investment or disruptions.
- Aesthetic considerations:
 - No overhead transmission lines currently exist along this segment.
 - New overhead transmission line installed in the median of Lafayette Street (representative of typical steel poles in SVP's system, Attachment 4).
- Tree removals:
 - None are anticipated at this time however as design progresses, there may be a need for tree removal. If that is considered, trees will be replaced at a 2:1 ratio. Location and species will be determined with the City arborist.

- Additional Maintenance considerations:
 - Restoration time for an overhead transmission line is shorter and requires less resources than an underground line.
 - With poles being placed in the median, the risk for car strikes to poles is present.
 - If significant damage occurs to an overhead pole, SVP can perform emergency work to restore service in a matter of hours.
- Estimated construction cost:
 - \$36M
 - North of Agnew Road: \$9.5M (overhead)
 - Includes potential City utility relocation: \$0.25M
 - South of Agnew Road: \$26.5M (overhead – consistent with Option 2, includes easement costs)
 - Does not include PG&E costs.
- Estimated duration/schedule:
 - Anticipated Energization Q1 2028 (dependent on completion of utility relocation work).

Option 2 - Underground Alternative along Northern Lafayette Street Segment

- Constructability considerations:
 - Relocation of ~300 feet of two existing transmission natural gas lines (owned by SVP and PG&E) would be necessary to facilitate the installation of two underground vaults, each measuring 12' by 25', which are required to facilitate pulling and splicing of the underground conductor near Hope Drive. These vaults would require the relocation of:
 - SVP natural gas line that supplies Donald Von Raesfeld (DVR) Power Plant. This work would have to be coordinated to occur during off-peak times of the year, November through March.
 - PG&E natural gas line is a transmission line. It is unknown the timing that PG&E could take on the relocation of this alignment including design and construction. The impacts to the overall schedule are unknown.
 - Potential violations of the minimum vertical pipe clearances between utilities are anticipated at the duct bank crossing Lafayette south of Agnew Road. This involves traversing the majority of existing utilities within Lafayette. This utility crossing will need to be reviewed in more detail. If the minimum clearances are not met, an alternative option involves installing the duct bank below the existing sanitary sewer pipe which is ~12 feet below grade. This excavation could be up to 20 feet deep and duct bank installation would be a major disturbance to traffic with prolonged construction time frames.
 - Extended traffic control on the southbound lanes along the entire alignment on Lafayette Street which could involve completely shutting down portions of Lafayette Street.
 - Prolonged excavation and shoring along entire alignment.

- Existing utilities:
 - Multiple utility relocation and crossing will be required. Utility relocation work would need to be completed prior to the anticipated construction start in Q4 2026. With Lafayette Street currently under a pavement moratorium through December 2025, the Project would have approximately 9 months to complete all of the necessary utility relocations.
 - The Project would have an even shorter window of 3 months from January 2026 to March 2026 to complete the work for the 300' high pressured gas line relocation for DVR due to operational constraints which the Project team believes to be an infeasible schedule.
 - Required Crossings of Existing Utilities
 - Communication line – Three Locations
 - Electric line – Five Locations
 - PG&E-owned natural gas line – Four Locations, including PG&E gas transmission lines
 - SVP-owned natural gas line – Two Locations
 - Sanitary Sewer – Four Locations
 - Storm Drain – One Location
 - Water line – Three Locations
 - Required Relocations of Existing Utilities
 - PG&E-owned natural gas line – One Location (~300 feet)
 - SVP-owned natural gas line – One Location (~300 feet)
 - Attachment 5 provides a table of the potential underground utility crossings and relocations associated with the alternative underground route.
- Power delivery and line rating considerations:
 - The underground transmission line option is anticipated to be able to deliver only about 83% of the power that the overhead option would be able to provide at 115kV. This value drops to 79.9% at 230kV.
 - The cable and configuration proposed is at the maximum size for solid dielectric cable in the industry. If any additional capacity is required, a gas insulated transmission line would be required which adds significant complexity and costs to the Project.
- Potential growth:
 - The underground option will be designed to accommodate voltages of 230kV but energized for 115kV.
 - Future upgrades in voltage would allow for more power transfer through this section of the Lafayette corridor without major additional capital investment or disruptions at 79.9% of the capacity as the overhead alternative.
 - Any future 60kV lines in this corridor would necessitate a new alignment and trench, leading to additional disturbances and costs at a later date. A new alignment with separation from the existing trench would be required to accommodate the necessary heat dissipation emitted from the multiple sets of cable at the different voltage levels and may not be feasible due to the number of existing utilities and minimum vertical and horizontal clearances required.

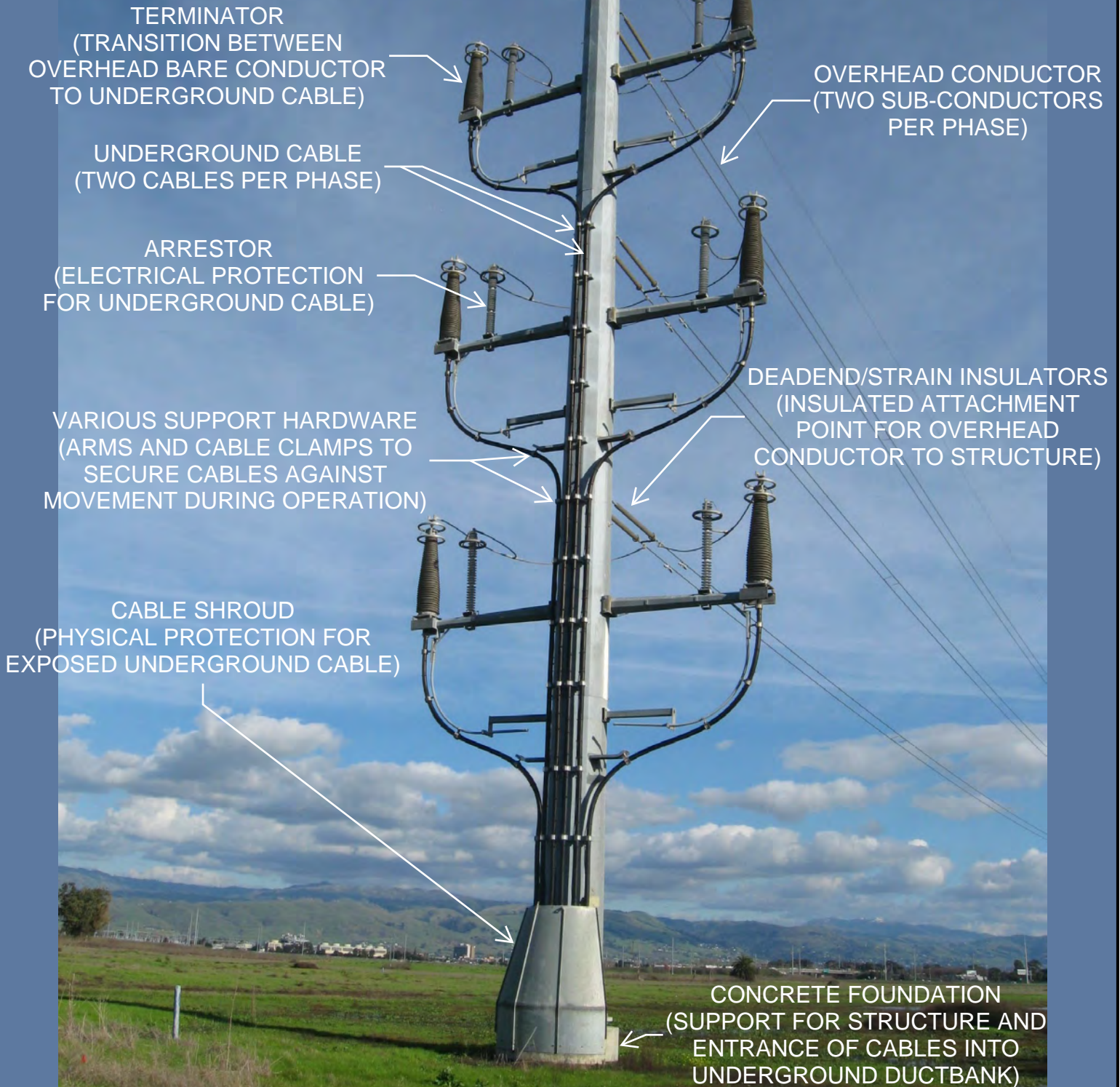
- Aesthetic considerations:
 - A portion of this alignment will still be overhead from inside NRS to the median of Lafayette.
 - Two overhead transmission riser poles on either end of the underground segment are required to transition from overhead to underground. These riser poles typically have a larger visual impact than a typical overhead transmission pole as the conductor material transitions from bare overhead conductor to an insulated underground cable including additional hardware required for a riser pole that are not found on typical overhead poles (terminators, arrestors, and conductor shrouds). This hardware would also require additional structural appurtenances (see Attachment 4 for representation of a typical riser pole).
- Tree removals:
 - None are anticipated at this time however as design progresses, there may be a need for tree removal. If that is considered, trees will be replaced at a 2:1 ratio. Location and species will be determined with the City arborist.
- Additional Maintenance considerations:
 - Restoration time for an underground transmission line will be significantly longer and require more resources than for a comparable overhead transmission line.
 - If significant damage occurs to an underground riser pole, the work required to splice new cable and bring the line back into service could take days to complete.
 - Future access to the underground vaults for cable pulling would require a lane closure.
- Estimated construction cost:
 - \$45.5M
 - North of Agnew Road: \$19M (underground)
 - Includes potential City utility relocation: \$0.5M
 - South of Agnew Road: \$26.5M (overhead – consistent with Option 1, includes easement costs)
 - Does not include PG&E costs.
- Estimated duration/schedule:
 - Unknown.
 - This option requires extensive relocation of a PG&E gas transmission line which will not meet the Q1 2028 time frame.
 - The relocation of the DVR gas line is also limited to a 3 month schedule which the Project team believes to be infeasible.
 - The Project is required to be complete in early 2028 to support the interconnection with LS Powers transmission line.

RTC # 24-1614

ATTACHMENT 4

TYPICAL POLE TYPES

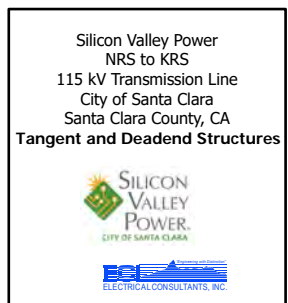
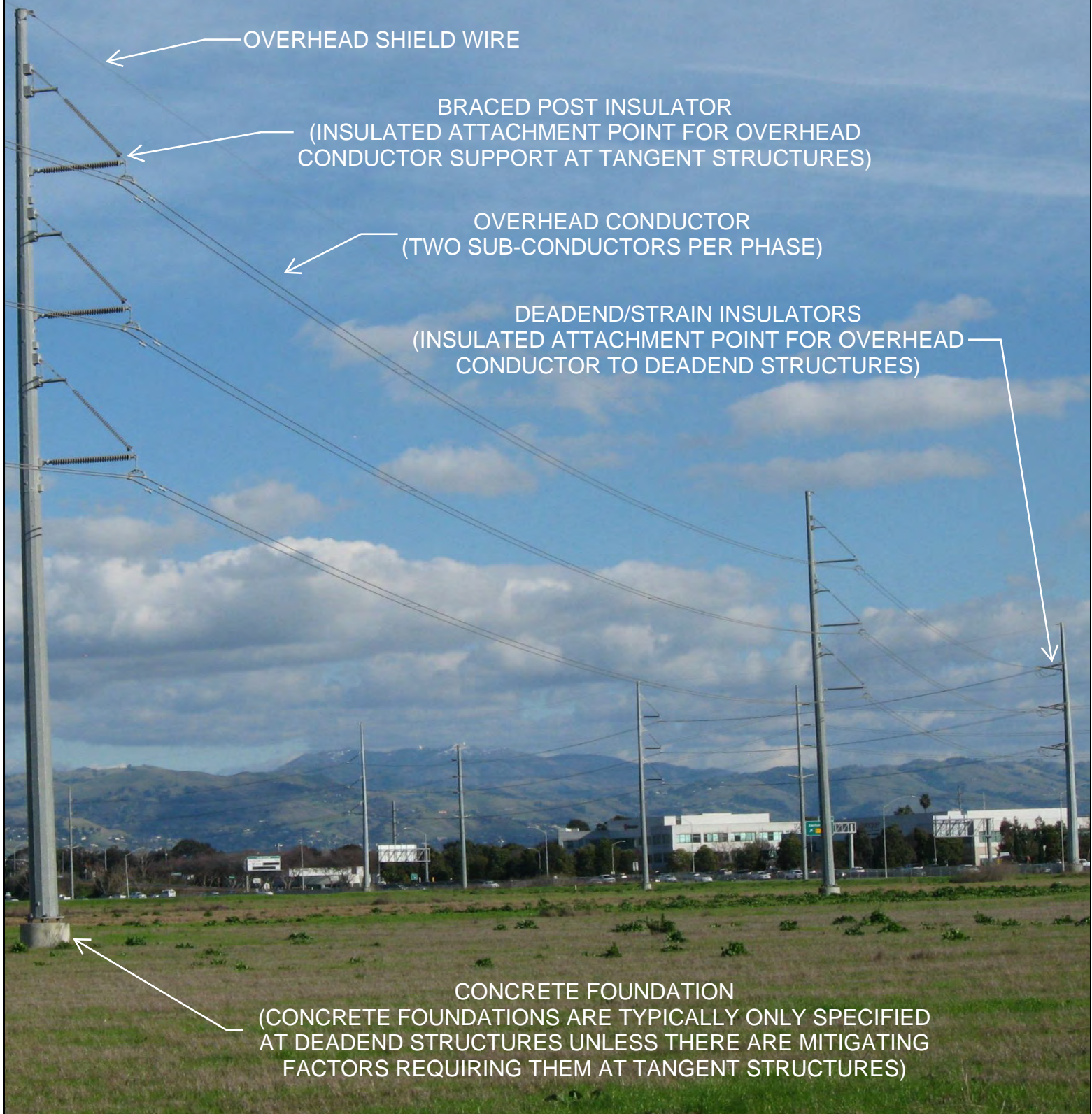
ATTACHMENT 4 - TYPICAL POLE TYPES
230 kV RISER POLE



Silicon Valley Power
NRS to KRS
115 kV Transmission Line
City of Santa Clara
Santa Clara County, CA
Riser Structure



ATTACHMENT 4 - TYPICAL POLE TYPES
230 kV TANGENT AND DEADEND POLES



RTC # 24-1614

ATTACHMENT 5

LIST OF POTENTIAL UTILITY
CONFLICTS

Attachment 5

The table below provides a list of the potential utility crossings and relocations associated with Option 2, the alternative underground route along the Northern Segment.

Utility Conflict #	Existing Utility	Quantity/Size	Approximate Location Along Lafayette ST.
1	Electric	Ductbank with five 5" conduits and one 4" conduit	South of Agnew Rd.
2	Communication	Unknown * typically one or more pipes, each ranging from 1" to 4"	South of Agnew Rd.
3	Communication	Unknown * typically one or more pipes, each ranging from 1" to 4"	South of Agnew Rd.
4	Natural Gas (PG&E)	12"	South of Agnew Rd.
5	Sanitary Sewer	30"	South of Agnew Rd.
6	Natural Gas (PG&E)	6"	South of Agnew Rd.
7	Water	12"	South of Agnew Rd.
8	Natural Gas (SVP)	12"	South of Agnew Rd.
9	Electric	Ductbank with five 5" conduits and one 4" conduit	South of Agnew Rd.
10	Electric	Ductbank with four 5" conduits and one 4" conduit	North of Agnew Rd.
11	Communication	4"	North of Agnew Rd.
12	Natural Gas (PG&E)	6"-24" *	Between Hope Dr. and Agnew Rd.
13	Sanitary Sewer	8"	Between Hope Dr. and Agnew Rd.
14	Storm Drain	15"	South of Hope Dr.
15	Water	12"	Intersection of Hope Dr.
16	Natural Gas (SVP)	12"	Between Eisenhower Dr. and Hope Dr.
17	Natural Gas - Transmission (PG&E)	6"-24" *	Between Eisenhower Dr. and Hope Dr.
18	Electric	1.5" Streetlight conduit *	South of Eisenhower Dr.
19	Electric	1.5" Streetlight conduit *	Intersection of Eisenhower Dr.
20	Sanitary Sewer	21"	North of Eisenhower Dr.
21	Electric	1.5" Streetlight conduit *	North of Hogan Dr.
22	Sanitary Sewer	15"	Between Fairway Glen Dr. and Hogan Dr.
23	Natural Gas (PG&E)	24" *	Between Fairway Glen Dr. and Hogan Dr.
24	Water	8"	Between Fairway Glen Dr. and Hogan Dr.
25	Natural Gas (SVP)	12"	South of Fairway Glen Dr.

* Utility size is estimated, accurate record information is unavailable.