# Downtown Precise Plan

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<u>Section 1: Background Info</u>

This study analyses the current SVP distribution capacity in the downtown precise area plan and provides a summary of the results.

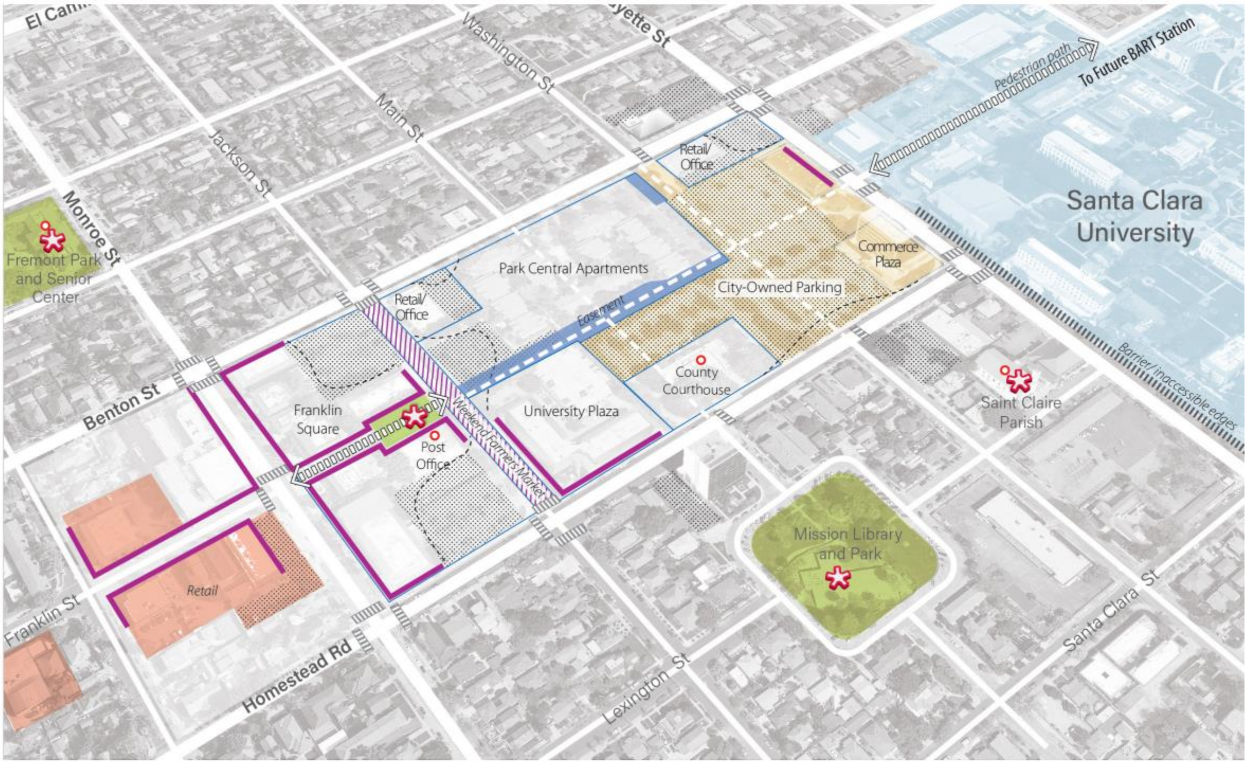



Figure 1-4

**DOWNTOWN SANTA CLARA**
**OPPORTUNITIES AND CONSTRAINTS**

The planning area covers what would be ten standard blocks between Lafayette Street, Madison Street, Benton Street, and Homestead Road.

Figure 1: Downtown specific area plan between Lafayette Street, Madison Street, Benton Street, and Homestead Road.

| Overall Development Capacity | | | | |
|---|---|---|---|---|
| | | **Value** | **SVP Demand Factor** | **Total KVA** |
| ***Housing*** | Base Units | 882 | 3/Unit | 2646 |
| | Bonus Units | 692 | 3/Unit | 2076 |
| | Total Units | 1574 | 3/Unit | 4722 |
| ***Level 2 EV Ready*** | Base Units | 236 | 14.4KVA/Stall* | 329.7 |
| ***Low Power Level 2 EV Ready*** | Base Units | 647 | 7.2KVA/Stall* | 905.1 |
| ***Level 2 EV Ready*** | Bonus Units | 188 | 14.4KVA/Stall* | 263.2 |
| ***Low Power Level 2 EV Ready*** | Bonus Units | 504 | 7.2KVA/Stall* | 705.6 |
| | | | | |
| ***Office/Hotel*** | Base Area (s.f.) | 497,500 | 7 VA/s.f. | 3482.5 |
| | Bonus Area (s.f.) | 172,600 | 7 VA/s.f. | 1208.2 |
| | Total Area (s.f.) | 670,100 | 7 VA/s.f. | 4690.7 |
| ***EVSC**** | Base Area (s.f.) | 522 | 10.8 KVA/Stall** | 2,539 |
| ***EV Capable**** | Base Area (s.f.) | 522 | 4.2 KVA/Stall** | 1,097 |
| EVSC*** | Bonus Area (s.f.) | 181 | 10.8 KVA/Stall** | 881 |
| EV Capable*** | Bonus Area (s.f.) | 181 | 4.2 KVA/Stall** | 381 |
| | | | | |
| ***Retail*** | Area (s.f.) | 197,300 | 12 VA/s.f. | 2367.6 |
| | | | | |
| ***Public Spaces*** | Area (s.f.) | 44,300 | 5 VA/s.f. | 221.5 |

*Automatic Load Management System (ALMS) limiting chargers to 1.4KW

**Applied 45% demand factor due to 30 or more chargers

*** Assumed 3 spots per 1,000 s.f.

| | |
|---|---|
| Minimum KVA - EV Loads | 4,871 |
| Maximum KVA - EV Loads | 7,101 |
| | |
| Minimum KVA Total (includes EV) | 13,588 |
| Maximum KVA Total (includes EV) | 19,102 |

Table 1: Downtown precise plan minimum/maximum electrical demand required

EV Calculations – Supporting Information

## City of Santa Clara EV Reach Code Adoption

| Phrase | Paraphrased Definition | KVA/Parking Spot |
|---|---|---|
| **EV Capable** | Parking connected to electrical panel with capacity to provide 120V and 20Amps. (Only need to be linked in areas that will be inaccessible in the future, panel needs to be labeled for EV capable circuits) | 4.2 |
| **Low Power Level 2 EV Ready Space** | Parking space served with 208/240V & 20Amp minimum branch circuit capacity including electrical panel capacity. If served with EVSE (Electric vehicle supply equipment) a minimum output of 15 amps needed) | 7.2 |
| **Level 2 EV Ready Space** | Parking space with electric circuit with 208/240V and 40amps capacity including electrical panel capacity. | 14.4 |
| **Electric Vehicle Charging Station (EVCS)** | Parking space that includes installation of electric vehicle supply equipment (EVSE) with 30 amps capacity connected to a circuit serving a level 2 EV Ready Space. | 10.8 |

| Code Element | Proposed EV Charging (New Construction) |
|---|---|
| **Multifamily (20 Dwelling or Less) *** | 1 Level 2 EV Ready per Dwelling |
| **Multifamily (20 Dwelling or More) *** | 1 Level 2 EV Ready per Dwelling for first 20 Dwelling Units<br><br>25% of remaining units with assigned spaces Level 2 EV Ready<br><br>75% of remaining units with assigned spaces Low Power Level 2 EV Ready |
| **Office & Other Non-Residential**** | 35% Level 2 Electric Vehicle Charging Station (EVCS)<br>35% EV Capable |
| **Hotels & Motels** | 10% Level 2 Electric Vehicle Charging Station (EVCS)<br>50% shall be EV Capable Spaces |

* ALMS can be used to limit chargers to 1.4KW each for EV Capable, EV Ready or EVCS spaces
** ALMS cannot be used to decrease minimum amperage or voltage

Figure 2: Information extracted/interpreted from 2022 City of Santa Clara Reach Code

**Table 6-1 Diversity Factor for Multiple Charging Stations**

| Number of Chargers | Diversity Factor | Number of Chargers | Diversity Factor |
|---|---|---|---|
| 2 | 0.78 | 17 | 0.47 |
| 3 | 0.68 | 18 | 0.47 |
| 4 | 0.63 | 19 | 0.47 |
| 5 | 0.59 | 20 | 0.47 |
| 6 | 0.56 | 21 | 0.46 |
| 7 | 0.55 | 22 | 0.46 |
| 8 | 0.54 | 23 | 0.46 |
| 9 | 0.52 | 24 | 0.46 |
| 10 | 0.52 | 25 | 0.46 |
| 11 | 0.50 | 26 | 0.46 |
| 12 | 0.50 | 27 | 0.46 |
| 13 | 0.49 | 28 | 0.45 |
| 14 | 0.48 | 29 | 0.45 |
| 15 | 0.48 | 30 | 0.45 |
| 16 | 0.48 | | |

Table 2: Demand Information from PG&E Electric Design Manual

# Section 2: Distribution Quadrant

Downtown specific area plan is within Brokaw Substations distribution quadrant.

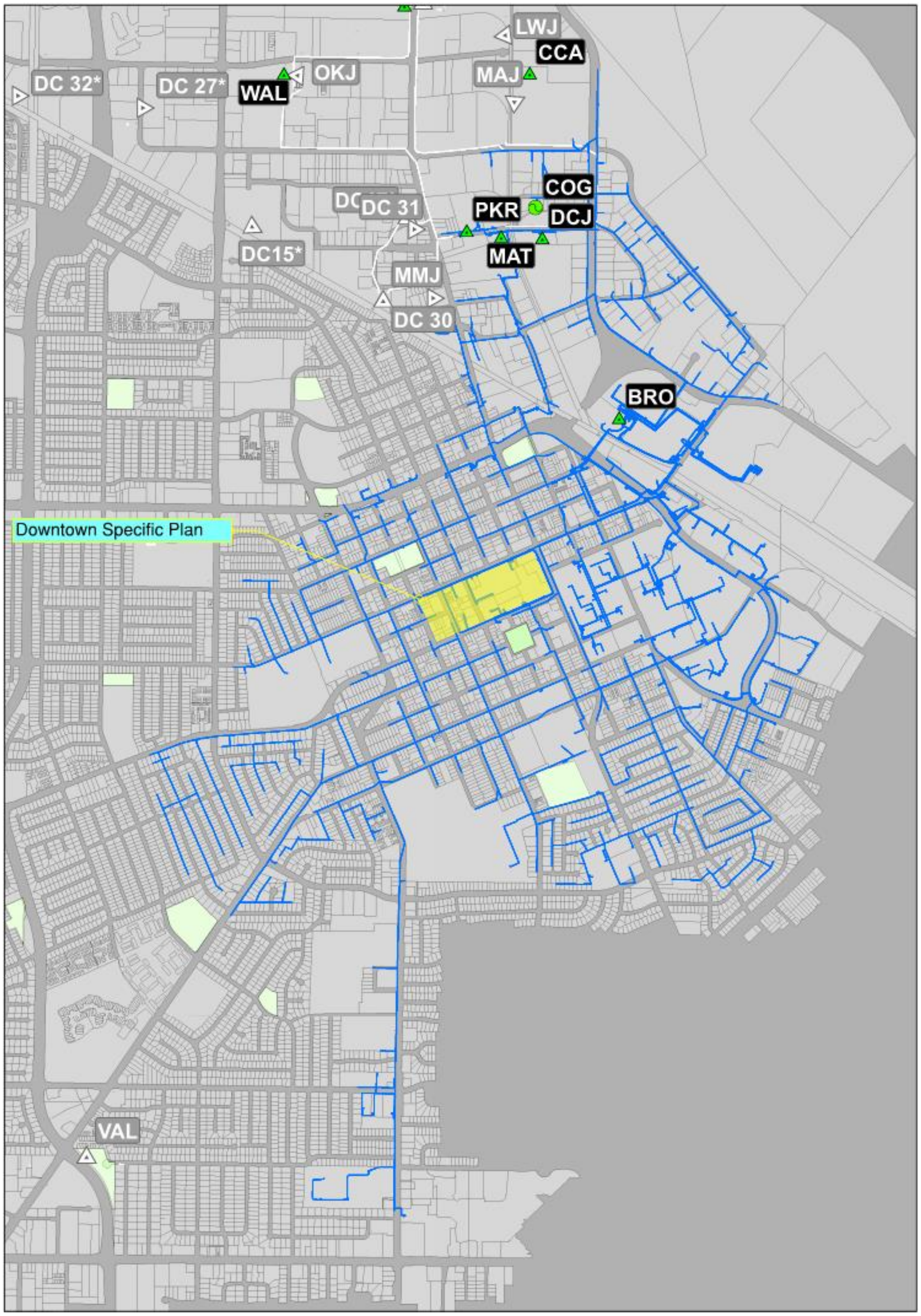



Figure 3: Brokaw substation service area shown in blue, comprised of overhead and underground construction.

## Section 3: Existing Substations Capacity (Present Day)

For SVP Substation Transformers at Brokaw Substation the following data below represents the remaining capacity presently without factoring in new additional loads, Distributed Energy Resource (DER), under-utilized 12KV services, etc.

| | **Txfr** | **MVA Max @ 65°C** | **MVA Max @ 55°C** | **MVA Design Max** | **Max Recorded Loads*** | **Remaining Capacity** |
|---|---|---|---|---|---|---|
| BRO | T1 | 37.3 | 32 | 18.7 | 16.0 | 2.7 |
| | T2 | 37.3 | 32 | 18.7 | 17.0 | 1.7 |
| | | | Design Capacity | 37.3 | | |

*Max Recorded Loads from 2018-2022. Spikes due to switching or abnormal system conditions have been omitted

Table 3: Snapshot of Substation Transformers

Design Philosophy & Assumptions:

1) MVA Design limits for two bank substations are 50% of the max ratings for each transformer at a 65°C Rise.
2) In the event of a N-1 condition, transformer banks may operate at the 65°C ratings to pick up the loads from the transformer that is out of service.

## Section 3.1: Existing Substations (Present Day) with new third bank

| | **Txfr** | **MVA Max @ 65°C** | **MVA Max @ 55°C** | **MVA Design Max** | **Max Recorded Loads*** | **Remaining Capacity** |
|---|---|---|---|---|---|---|
| BRO | T1 | 37.3 | 32 | 24.9 | 16.0 | 8.9 |
| | T2 | 37.3 | 32 | 24.9 | 17.0 | 7.9 |
| | T3 | 37.3 | 32 | 24.9 | 0.0 | 24.9 |
| | | Design Capacity | | 74.6 | | |
| | | New Capacity | | 37.3 | | |

*Max Recorded Loads from 2018-2022. Spikes due to switching or abnormal system conditions have been omitted

Table 4: Operating Philosophy of SVP Transformers in an N-1 Scenario

An N-1 Scenario is the unplanned outage of a transformer at a substation. In this scenario the load served by the transformer would need to be picked up by other sources.

Design Philosophy & Assumptions:

1) MVA Design limits for two bank substations are 66.6% of the max ratings for each transformer at a 65°C Rise.
2) In the event of a N-1 condition, transformer banks may operate at the 65°C ratings to pick up the loads from the transformer that is out of service.

## Section 4: Santa Clara University DER

| Adjusting with Loss of DER | | |
|---|---|---|
| | | **Value (KW)** |
| ***Bro BK-1 (102B)*** | Existing Solar | 300.0 |
| | New Proposed Solar | 507.1 |
| | **Total Reserves** | **807.1** |
| | | |
| ***Bro BK-2 (205B)*** | Existing Solar | 500.0 |
| | New Proposed Solar | 1,296.9 |
| | Bloom Fuel Cells | 1,530.0 |
| | **Total Reserves** | **3,326.9** |

Table 5: DER reserves for Santa Clara University on Brokaw BK1 &2

## Section 5: New Projected Loads & Remaining Bank Capacity

The major existing DER interconnection is shown, and the distribution capacity is analyzed with the loss of these generations. New Project Loads in the Brokaw distribution area are shown in Table 6 below (see Appendix B for El Camino Real Specific Plan):

| | | | YEARS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **PROJECTS** | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| **SUBSTATIONS** | BRO | Gateway Crossing Ph 1 (5 MW) | | | | 2 | 2 | 1 | | | | |
| | | Gateway Crossing Ph 2 (5 MW) | | | | | | 2 | 2 | 1 | | |
| | | 312 Brokaw Hotel | | | | | 0.5 | 0.5 | | | | |
| | | Agrihood | | | 0.5 | 0.5 | 0.5 | | | | | |
| | | Serra Sub Load Adjustment (BK-1) | | -4 | | | | | | | | |
| | | 500 Benton | | | | | 0.5 | 0.5 | 0.5 | | | |
| | | El Camino Real Specific Plan (14.65MW) | | | | | | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| | | Area Plan (Up to Scott Blvd) | | | | | | | | | | |
| | | Coleman Highline (Commercial) | | -1 | | | | | | | | |
| | | PV, Battery &/or Fuel Cell Reserves * | 4.133 | | | | | | | | | |

Table 6: Load Forecasts for New Projects in the Brokaw Substation Service Area

Remaining capacity for each substation banks is shown below in Table 7.

New loads still in the design phase have been evenly distributed over the substation transformers. (For example: a new project in the Brokaw substation area, the projected loads for that project would be evenly distributed over the 2 transformer banks at Brokaw substation)

| | | | YEARS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Substation Transformers** | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| **SUBSTATIONS** | BRO | Bank 1 Remaining Load | 1.84 | 5.84 | 5.59 | 4.34 | 2.593 | 0.343 | -1.16 | -1.91 | -2.16 | -2.41 |
| | | Bank 2 Remaining Load | -1.68 | -0.68 | -0.93 | -2.18 | -3.93 | -6.18 | -7.68 | -8.43 | -8.68 | -8.93 |

Table 7: Remaining Design Load at each Substation Bank

From the information in Table 7, Brokaw substation a two Bank substation has a remaining 4.4 MW of capacity available that will run out by the year 2025. This available capacity will run out solely on the existing projects identified and shown in Table 6.

## Section 6: Brokaw Feeder Loading

Based on the 5 feeders per bank loaded up to the design limits for a 37.3MVA transformer the loading is 215 Amps/feeder. If we were to replace the existing substation transformers with 50MVA transformers the loading per feeder would go up to 336 Amps. This is about 82% of the circuit capability which is ~30% higher than our normal practice.

Due to this switching and offloading procedures will become increasingly difficult with less spare capacity per feeder.

| Brokaw Max Feeder Ampacity | Circuit Capability | Design Capability | 50MVA Transformer Normal Feeder Loading (A) | 37.3MVA Transformer Normal Feeder Loading (A) |
|---|---|---|---|---|
| ***101B*** | 412 | 206.0 | 336 | 215.04 |
| ***102B*** | 412 | 206.0 | 336 | 215.04 |
| ***103B*** | 412 | 206.0 | 336 | 215.04 |
| ***104B*** | 481 | 208.4 | 336 | 215.04 |
| ***105B*** | 412 | 206.0 | 336 | 215.04 |
| | | | | |
| ***201B*** | 412 | 206.0 | 336 | 215.04 |
| ***202B*** | 412 | 206.0 | 336 | 215.04 |
| ***203B*** | 412 | 206.0 | 336 | 215.04 |
| ***204B*** | 394 | 197.0 | 336 | 215.04 |
| ***205B*** | 475 | 208.4 | 336 | 215.04 |

Table 8: Brokaw Feeder Loading with 50MVA and 37.3MVA transformers

Based on Table 8 it is recommended to install a third bank (additional 37.3MVA transformer) for additional capacity rather than upgrading the size of the existing two transformers.

## Section 7: Conclusion

From the findings in this report, Brokaw substation a 2 Bank substation has a remaining 4.4 MW of capacity available that will run out by the year 2025. This capacity will be utilized solely by the existing and proposed projects identified and shown in Table 6. The interim services from SVP's existing system (up to 3.5 MW) shall be available to the Downtown Precise Plan Projects until 2027. Beyond 2027, the offsite improvements as detailed in Section 8 will need to be funded and constructed.  Please note, this interim service availability may also be impacted on the future El Camino Real Specific Plan project projects ramp up. Section 9 describes the Downtown Precise Plan's onsite load development fees from the City's municipal fee schedule.

Accounting for the additional load for the Downtown Precise Plan & the El Camino Real Specific Plan SVP will require offsite capacity improvements needed to upgrade and plan for additional load growth in this area.

## Section 8: List of SVP Improvements Needed to support the Downtown Precise Plan (Offsite Work)

| | | | **Option 1** | **Option 2** |
|---|---|---|---|---|
| Item | Description | Quantity (unit) | Cost | Cost |
| 1 | New substation bank at Brokaw substation (Prorated Amount for Specific Area Plan) | 1 | $3,072,708 | $3,072,708 |
| 2A | New underground substructure - open trenching in Roadway (See Appendix C) | 3300 Feet | $2,529,408 | |
| 2B | New underground substructure - open trenching in Roadway (See Appendix C) | 2050 Feet | | $1,760,693 |
| 2C | New underground substructure - Directional Bore – Under Railway | 250 Feet | $2,000,000 | $2,000,000 |
| 2D | Manholes, Vaults, Capacitor Pads. Tie ins to existing infrastructure | ~14 Manholes/Vaults | $3,000,000 | $3,000,000 |
| 3 | Procurement of SVP Equipment (Switch Vaults/Capacitor Banks) | 3 Switch's & 2 capacitors | $250,000 | $250,000 |
| 4 | AMI Infrastructure for the area? | | $250,000 | $250,000 |
| 5 | Development of site specific standards for indoor transformer rooms | | $50,000 | $50,000 |
| | | | | |
| | Estimated Total Costs | | $11,152,115 | $10,383,400 |
| | Contingency (25%) + Inflation* (9%) | | $14,943,835 | $13,913,757 |

*Construction assumed in 2025 so inflation data is projected for that year. Beyond 2025 this value would be expected to increase.

Table 9: List of SVP Improvements required with preliminary cost estimates

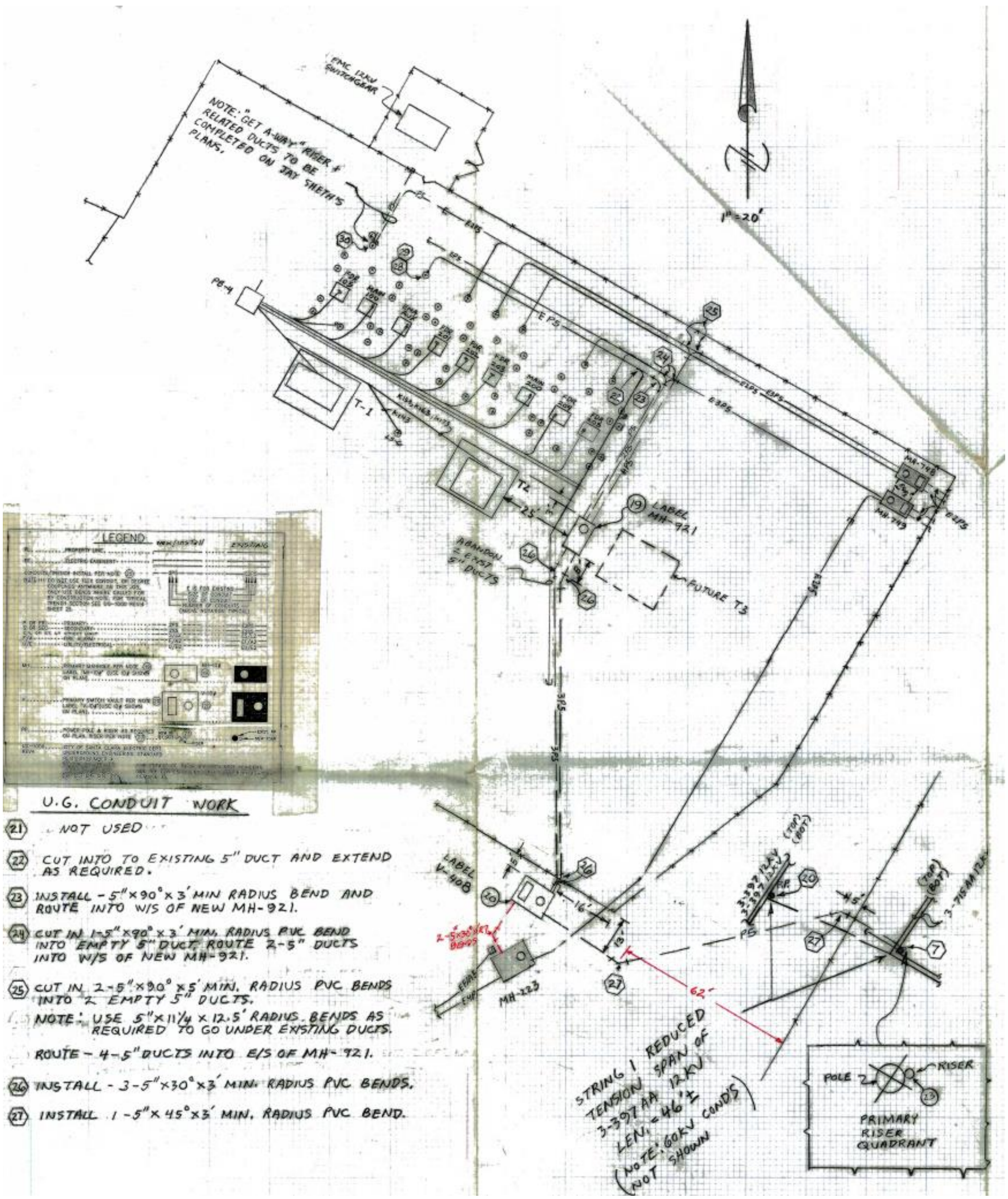
## Section 9: List of SVP Improvements Needed within the Downtown Precise Plan (Onsite Work)

| Item | Description | Quantity (unit) | Minimum Cost* | Maximum Cost* |
|---|---|---|---|---|
| 1 | Frontage Improvements for each individual parcel (developer provided) | | n/a | n/a |
| 2 | $/ Residential Unit | 882 Min<br>1574 Max | $1,826,480.9 | $3,259,502.2 |
| 3 | Load Development Fee's | 10,942 KVA Min<br>14,380 KVA Max | $2,665,799.5 | $3,503,399.4 |
| 4 | SVP Equipment (Transformers/Vaults/Cable) | | To be covered by Fee's in Line 2/3 | To be covered by Fee's in Line 2/3 |
| | | | | |
| | Estimated Total Fee Costs Recovered | | $4,492,280 | $6,762,902 |

*Muni Fee Schedule from FY2022/2023 was used in the calculation of these fees. Fees are expected to increase over the coming years and the rate applied would be based on the year of individual projects building permit submittal.

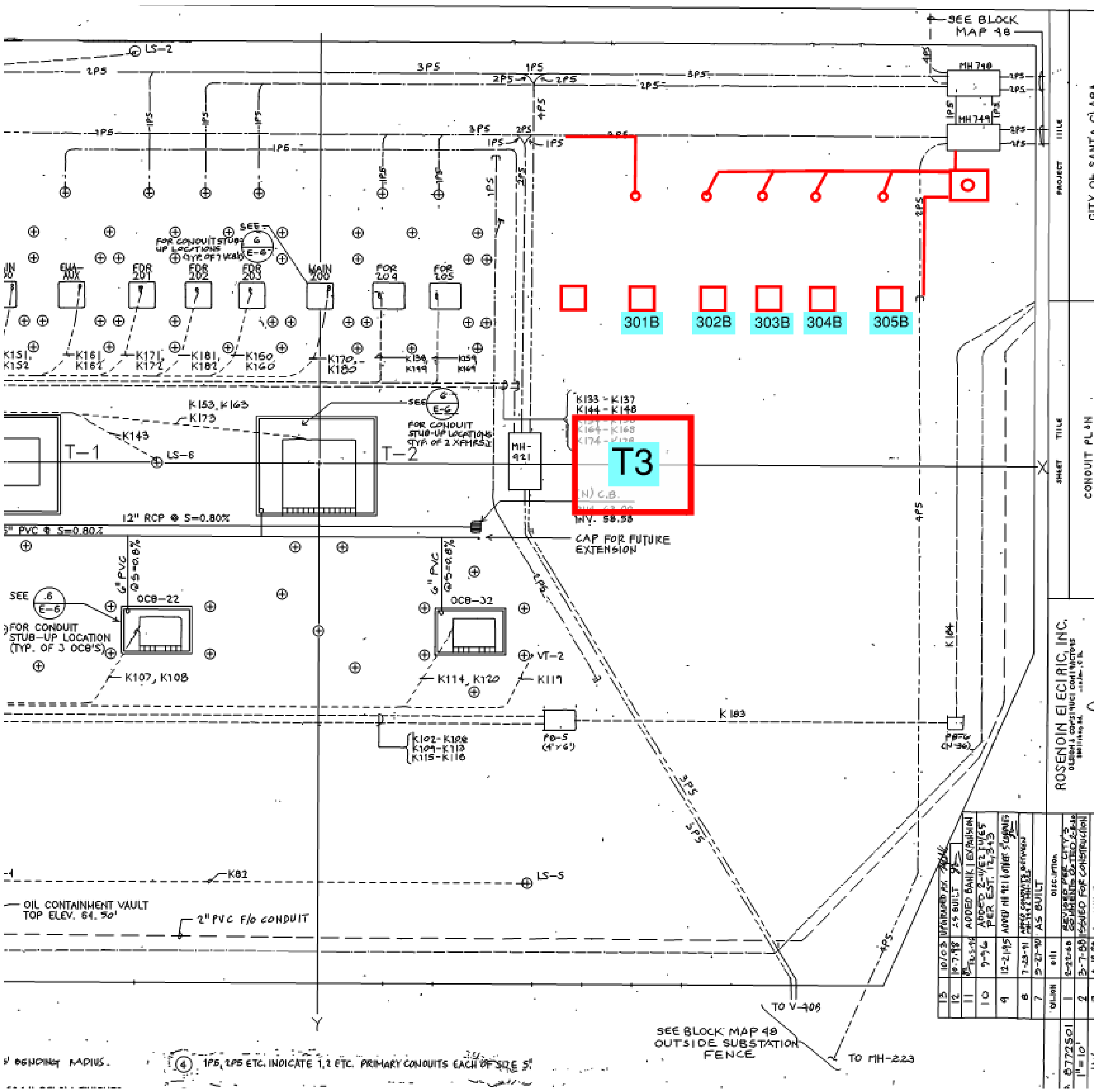
Table 10: List of SVP Fee’s and Improvements needed within the Downtown Precise Plan

# Appendix A – Brokaw Substation

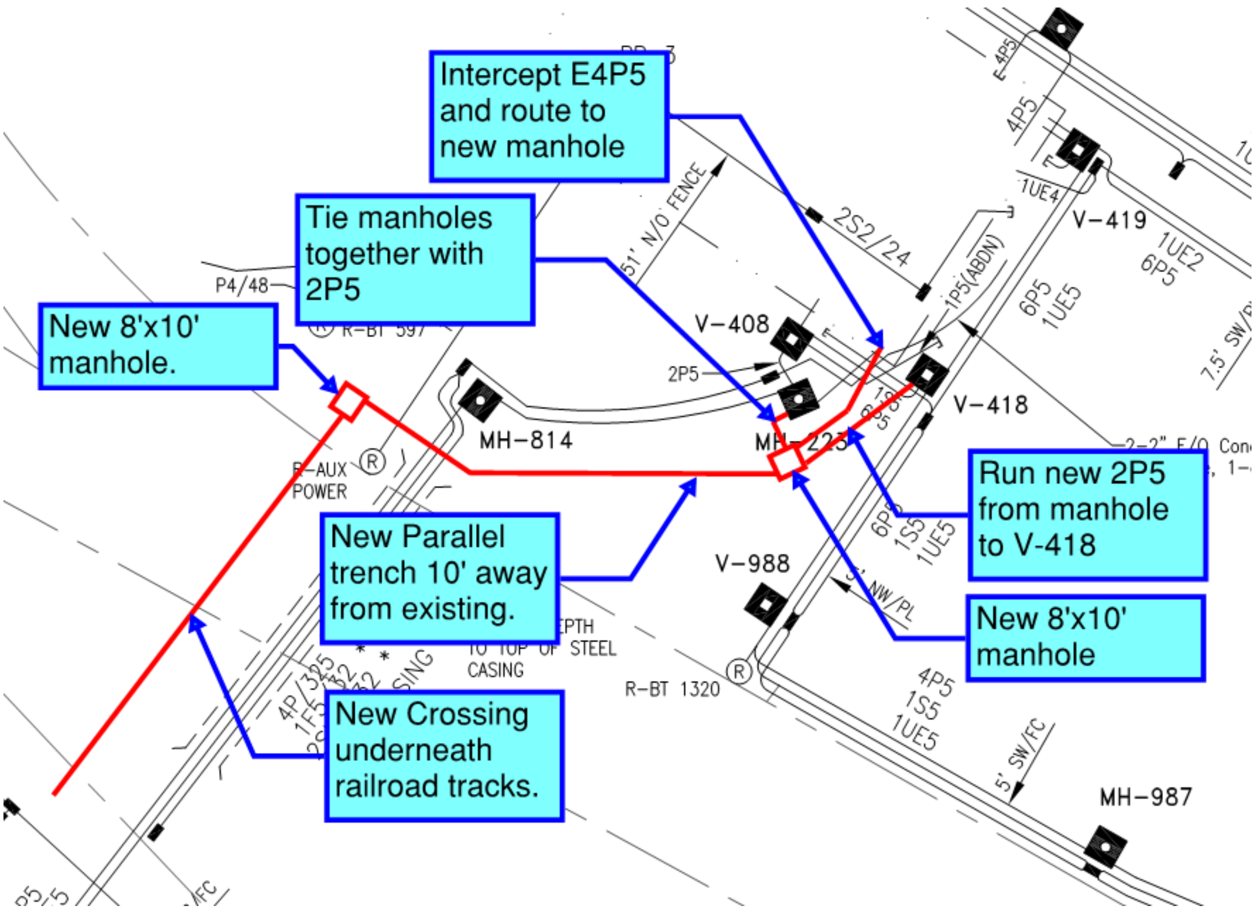


# Appendix A – Brokaw Substation

Proposed Bank 3 and conduit plan for 301B thru 305B



<u>Appendix A – Brokaw Substation</u>



Appendix B – El Camino Specific Plan

# 3.3 Development Potential

Table 3-1 estimates total development potential of reasonable buildout of the Plan Area over the next 20 to 30 years, organized by land use designation. The General Plan currently identifies capacity to build 2,274 units within the El Camino Real Focus Area, of which 1,499 units have been approved and/or built with another 549 units in pending applications. Today the corridor includes approximately 2.2 million square feet of retail space. Table 3-1 provides the net growth in residential and retail development compared to what is on the ground today or has been recently built/entitled. A maximum of 6,200 units would be added through the Land Use Plan. These numbers were used to analyze economics, infrastructure, transportation, and other impacts. Buildout assumptions are based generally on the building envelope allowed in each land use designation to provide a realistic future development scenario. The Plan Area's development potential was determined by assuming buildout of just over half of vacant and underutilized parcels along the corridor.

Since the future is inherently uncertain and the activities of private property owners are not within the City's direct control, these are broad, planning-level estimates for the potential of future development, given the heights, intensities, and land uses specified in the Specific Plan. These numbers are not intended as predictions or quotas on development, and the actual future development mix and amount that occurs over the next 20 to 30 years will vary from these estimates.

**Table 3-1. Development Potential by Land Use**

| Land Use Designation | Net Growth | |
|---|---|---|
| | *Residential* | *Retail* |
| Regional Commercial Mixed Use | 3,650 | -115,000 |
| Corridor Mixed Use | 2,050 | -140,000 |
| Corridor Residential | 500 | -140,000 |
| **Total** | **6,200** | **-395,000** |
| | 18.6 MW (3KVA/Unit) | 3.95 MW (10VA s.f.) |

Total New Load 14.65 MW

## Appendix C – Approximate Offsite Trenching Length