Verizon Wireless South Carmel Polygon

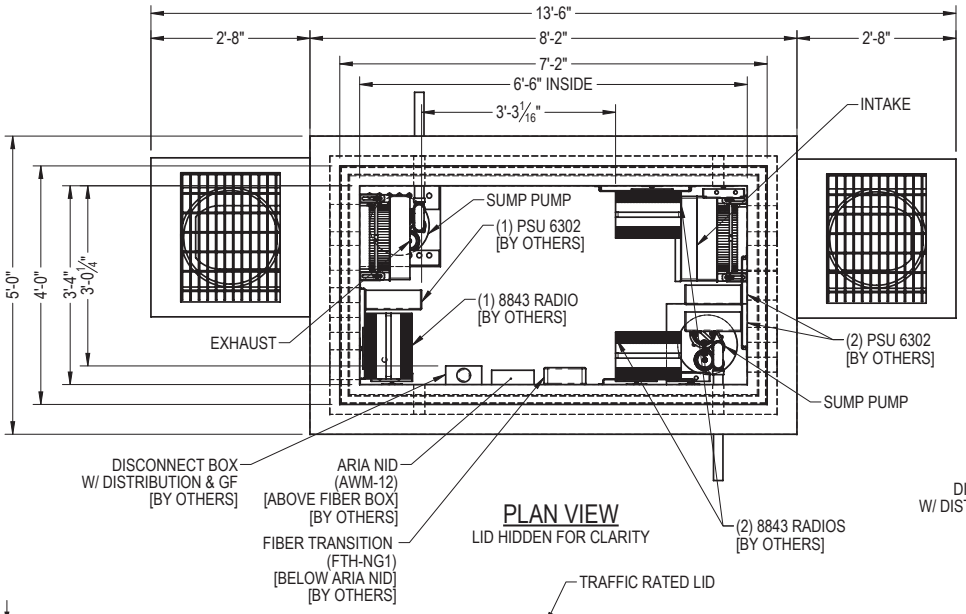
Exhibit E: Vaulting Feasibility Analysis

The equipment proposed to be used by Verizon Wireless for the five projects in Carmel-by-the-Sea is designed to be placed above ground and in an open-air environment. By design the equipment disperses heat into the open air and does not require auxiliary equipment in the form of fans or cooling equipment that emits noise to operate. The equipment is designed to be mounted to utility poles or other structures where the required maintenance space for the equipment is not enclosed greatly reducing the visual mass and space required if the equipment was enclosed. The shroud over the equipment proposed for use is perforated, allows for open air ventilation, and does not increase the size of the space needed.

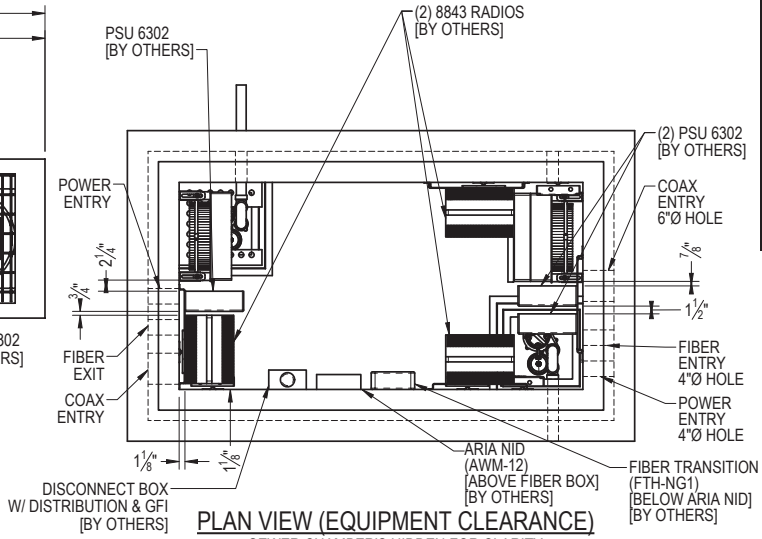
Enclosing the equipment inside a closed cabinet or enclosed subterranean space such as a vault requires that the maintenance clearance space be maintained clear and accessible. Additional equipment is also required to cool the equipment and help prevent condensation and moisture buildup that affects the function of the equipment. This results in a much larger space being needed for the equipment. When a vault is used this equipment includes ventilation equipment including fans ducting, drywells, sump pumps, and electrical distribution equipment. The minimum size of the vault required is five feet wide, eight feet two inches long, and five feet seven inches deep (5'-0" W, 8'-2"L, 5'-7"D). Due to the spacing requirements of the equipment associated with the vault the excavation required to install the equipment is eighteen feet long, ten feet wide, and eight feet one inch (18'-0" L, 10'-0"W, 8'-1"D). This excavation may need to be deeper and wider depending on site specific soils conditions at a site.

The excavation, and thus the vault, cannot be located immediately adjacent to a pole as the excavation could undermine the utility pole. To allow for installation of a vault, to avoid the pole from applying lateral pressure on the vault and components, to allow space for conduit installation and connections from the vault to the utility pole, and to prevent the excavation from undermining the utility pole a the nearest component of the vault must be located a minimum of eight to ten feet (10') from the utility pole.

Example Vault used in analysis discussion.



PLAN VIEW
LID HIDDEN FOR CLARITY



PLAN VIEW (EQUIPMENT CLEARANCE)
SEWER CHAMBER'S HIDDEN FOR CLARITY

ENTRY HOLES TO HAVE PVC PIPE W/ WATER PROOF TERM-A-DUCT

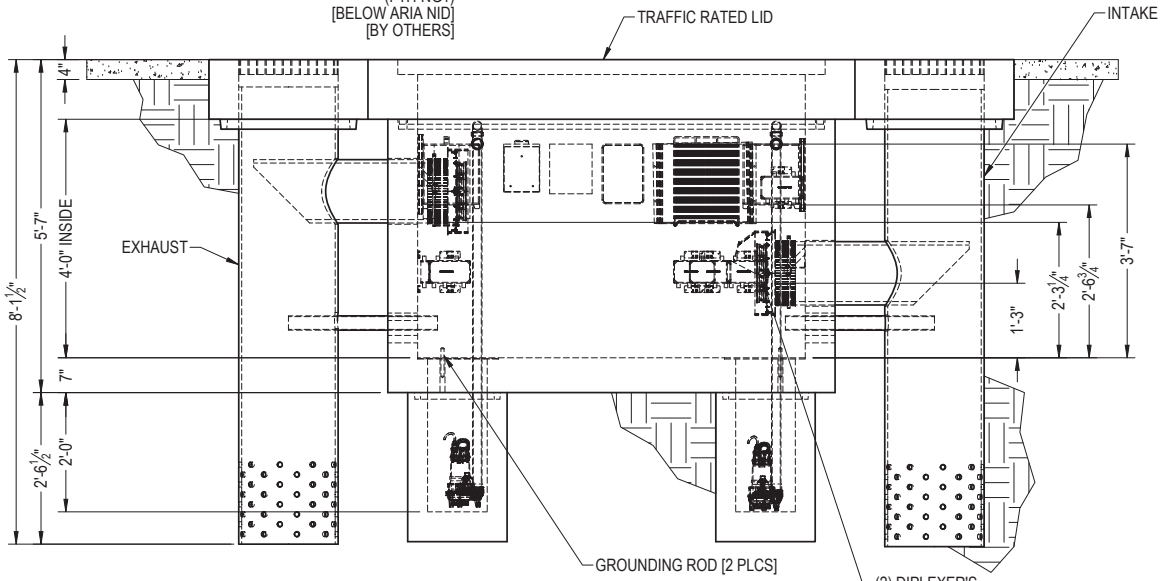
WESTERN UTILITY / TELECOM, INC.
5032 Salem Dallas Hwy NW
Salem, OR 97304
Ph: (503) 587-0101; Fx: (503) 316-1864

DRAWING SUBMITTAL REVIEW

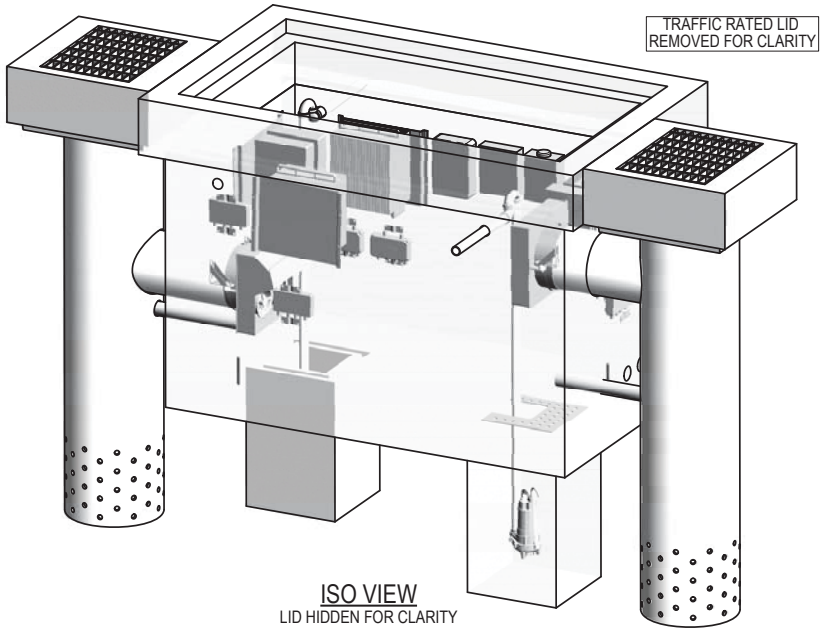
- ☐ Approved w/ No Exceptions
- ☐ Approved w/ Exceptions Noted
- ☐ Revise and Resubmit
- ☐ Rejected. See Remarks

Corrections or comments made on the shop drawings during this review do not relieve the contractor from compliance with the requirements of the plans and specifications. Reivew of a specific item shall not include review of an assembly of which the item is a component. The contractor is responsible for: Dimensions to be confirmed and correlated at the job site; Information that pertains solely to the fabrication processes or to the means, methods, techniques, sequences, and procedures of contruction; coordination of the work with that of all other trades and performing all work in a safe and satisfactory manner.

By: _____ Date: _____



ELEVATION VIEW



ISO VIEW
LID HIDDEN FOR CLARITY

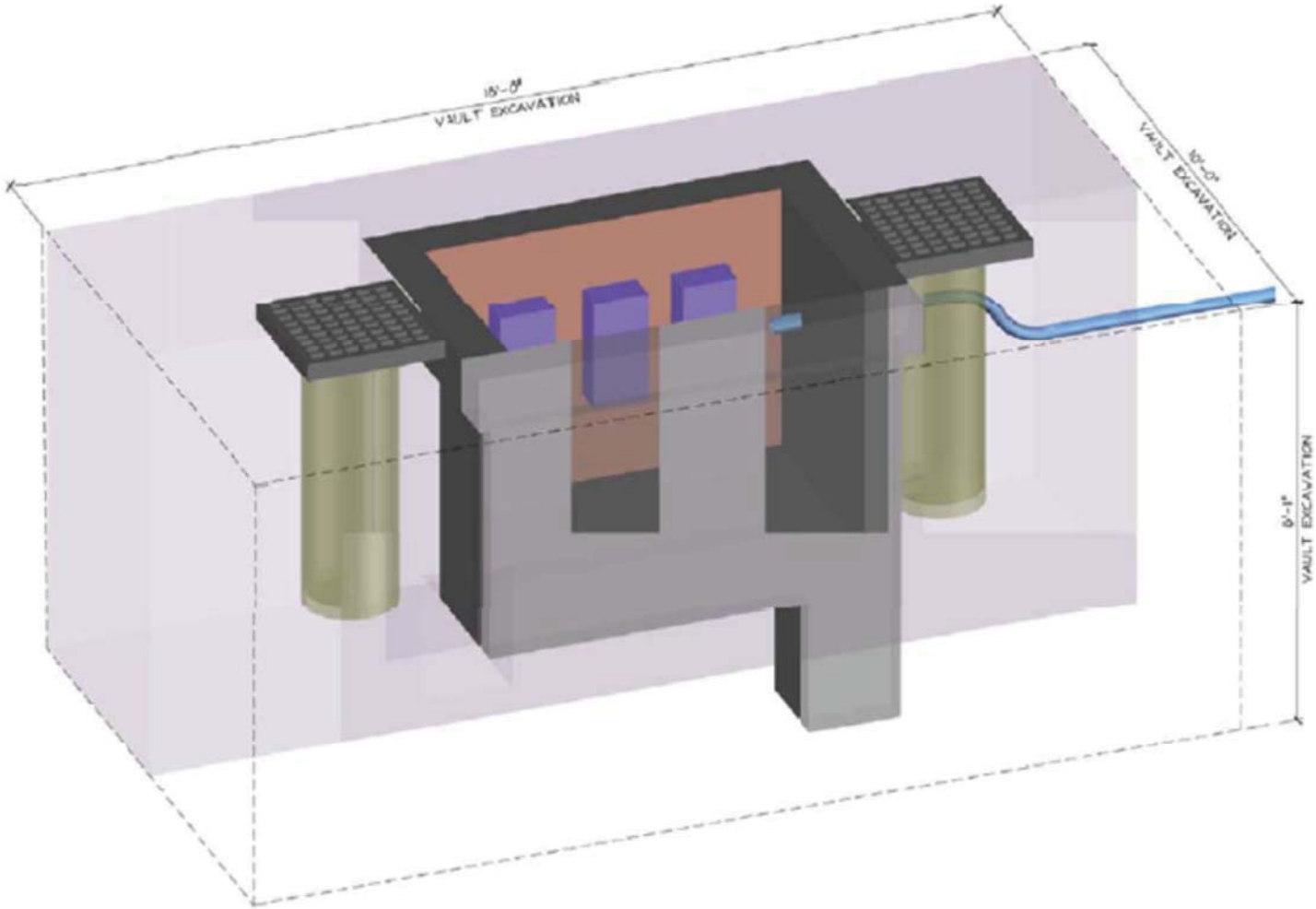
TITLE
GROUND VAULT RADIO ENCLOSURE
CONCEPT DESIGN
WUT PROJ. #18-0017

WESTERN UTILITY / TELECOM, INC.
5032 SALEM DALLAS HWY Phone: (503) 587-0101
Salem OR, 97304 westernutilitytelecom.com

CHG	CHK	REVISION RECORD	DATE	REV
DV	SG	CHANGED RADOIS ORIENTATION	15OCT18	E
DV	SG	ADDED DIPLEXERS AND INFORMATION	04OCT18	D
DV	SG	REARANGED EQUIPMENT LOCATIONS	27AUG18	C
DV	SG	ADDED BRACKET DETAIL	1MAR18	B
BS	AM	NEW PART	22JAN18	-

SCALE: NONE
PAGE: 1 OF 1
DRAWING NO.: 18017-INST

Depiction of required minimum vault excavation.



To meet technical requirements the relatively low wattage remote radio units ("RRUs") must be located in close proximity to the antenna on the utility pole to avoid excessive loss of signal strength due to long cable runs. The maximum distance between the antennas and RRUs is 100 feet. Subtracting the typical pole height, required undergrounding depth, conduit radiuses, and slack required within the vault results in a maximum search radius of thirty feet (30') for the vault from the utility pole the antenna is attached to.

Cable distance in excess of 100 feet require oversized cables over twice as thick as standard cables used for small cells (increases the diameter from ½ inch to 1-5/8 inches). The proposed designs for the five projects in Carmel-by-the-Sea include a single four-inch (4") diameter conduit dedicated for use for coax cables from the RRUs to the antenna. Exceeding a cable length of 100 feet thus requiring the larger cables would require two (2) six inch (6") conduits from the vault to the antenna effectively occupying an entire quadrant on the pole or requiring standoffs for the entire length of the pole creating an unnecessary massing and significant visual impact that could be avoided if the RRUs were just placed within close proximity to the antenna.

In summary a vault must be located between fifteen feet (15') and thirty feet (30') from the utility pole the antenna is attached to.

Relocating the equipment off of a pole also does not remove the need to locate equipment above ground or on the pole. GO 95 and PG&E requirements prohibit the placement of an electrical service meter on a utility pole unless the equipment it is serving is located on the pole (See PG&E document #027911 INSTALLATION DETAILS FOR SERVICE TO POLE-MOUNTED COMMUNICATION EQUIPMENT Rev .#11 dated 11/01/18 General Information Notes 6 and 7). In addition to this requirement the additional electrical capacity of the service needed to support the additional equipment prevents the use of a smart meter and a traditional metered service must be used resulting in the need for a 200 Amp meter pedestal to serve the facility. These pedestals are typically four feet tall, sixteen inches deep, and twenty inches wide 4'T, 1'4"D, 1'-8"W). This meter pedestal needs to be protected from traffic per PG&E standards. In the circumstance of all the proposed projects there are no curbs and gutters to create space to protect meter pedestals the space must be created. And would require the installation of a minimum of two (2) bollards and level maintenance space approximately three feet (3') wide by eight feet (8') long.

GO 95 requirements and PG&E standards also require installation of a disconnect switch (See PG&E document #027911 INSTALLATION DETAILS FOR SERVICE TO POLE-MOUNTED COMMUNICATION EQUIPMENT Rev.#11 dated 11/01/18 General Information Notes 11, 12, 14.B.(7)(a)…) that "is readily accessible to PG&E. PG&E interprets "readily accessible" as being located on the pole below all equipment except an electrical service meter. In the event of ground or vault

mounted RRUs the disconnect would be located on the pole at a height of eight feet (8') above grade and connected to the equipment on the ground or in the vault with two (2) conduits that are otherwise unnecessary.

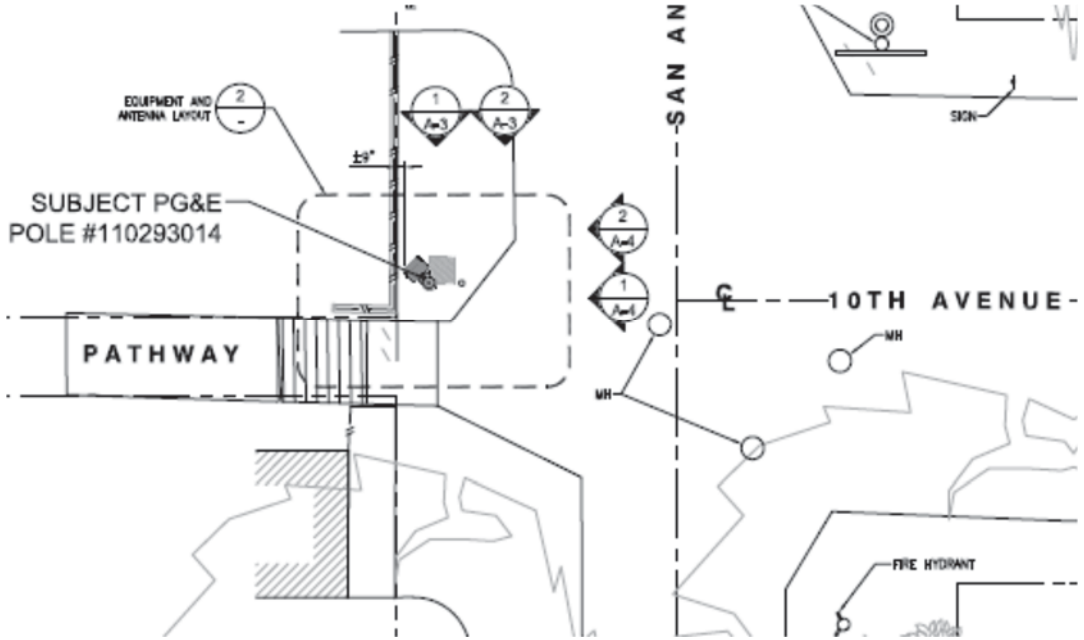
Equipment vault sump pumps also require a water discharge pipe. Typically, this pipe is routed from the sump pump through the curb and into the gutter where water can flow to the local storm drain system. Since no curb or gutter exists at or near any of the proposed projects a location where water could be discharged and flow away from the opening would need to be constructed. Vaults also must be set level for the pump systems to function properly and elevated to route surface flow around the vault and vents. This would require the installation of level space approximately fourteen feet by six feet (14'x6'). Parking would also be prohibited above this space. Prohibiting parking would require the installation of bollards and or curbs. This would conflict with the goals and requirements of the Carmel-by-the-Sea Right-of-Way Vision Statement.

Vaults located in the middle of the street or in areas without traffic protection in areas where parking is prohibited require street closures for maintenance. Maintenance visits would be required approximately once per month. Underground utilities such as water mains, storm drains, and gas lines, etc., collectively referred to as substructure, also prohibit the installation of vaults in many instances. Visual inspection of the area surrounding each proposed project identified evidence of substructure in close proximity or in possible vault locations in the form of trenching repairs and old Underground Service Alert markings. Due to the narrow nature of the lots surrounding each proposed project underground laterals (connections from main lines to each residence) would be frequent and prohibit vault installation without additional work to relocate these underground utility connections.

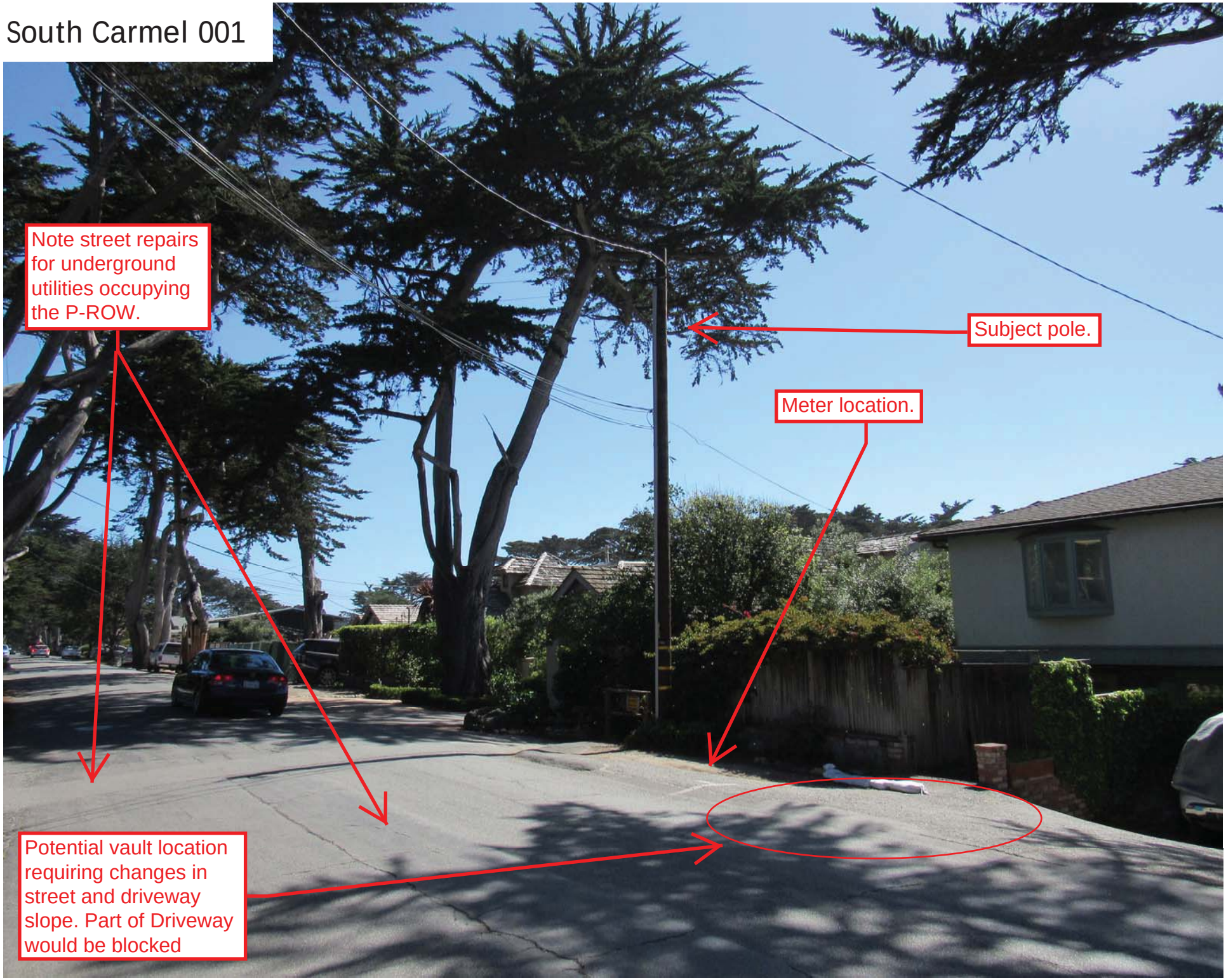
The following discussions addresses the specifics of each proposed project location.

South Carmel 001

Pole is located on the west side of San Antonio Avenue at 10th Avenue. The P-ROW is relatively flat at this location and drops off in grade immediately to the west outside the P-ROW into a residential front yard. There are storm drains that cross San Antonio Avenue diagonally then turning west just south of the subject pole. There is also evidence of utilities in the middle of the P-ROW of San Antonio evidenced by trenching repairs in the street. The P-ROW here drains to the site apparently down a paved foot path between the two lots adjacent to the pole. The lot immediately west and north west of the pole had sandbags to protect water flow onto the lot from the street and a raised bump to prevent the draining of the P-ROW down the driveway. A vault in close enough proximity to the pole to function would need to be place in the path of the front walk to a residence and would require changing the grade and existing flow pattern of the street in the area to prevent water flow into the vault and vents. The location appears to currently be used for parking which would be prohibited by a vault. Locations of utility laterals serving the residence are unconfirmed. Locating the vault south or north of the location immediately adjacent to the subject pole would place it in residential driveways impacting the grade of the driveways and/or immediately adjacent to large trees. Vaulting here is not feasible without substantial reconstruction of the street and changing its character.



South Carmel 001



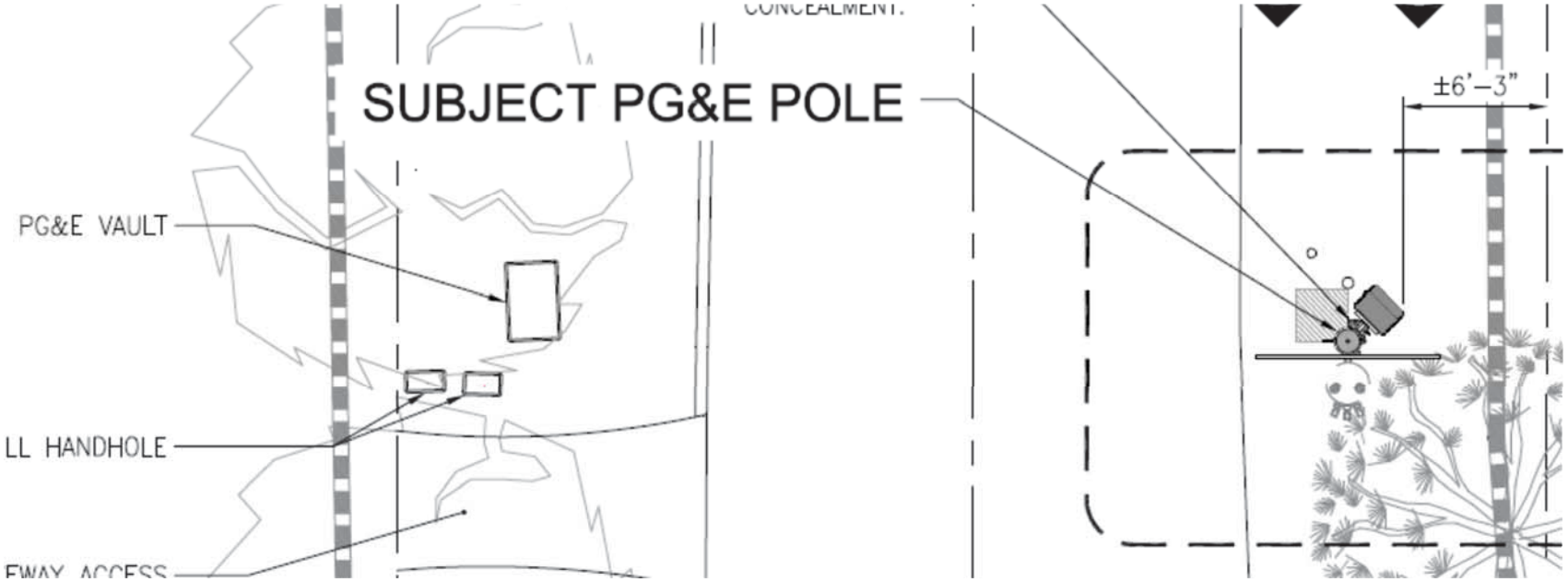
South Carmel 001

South Carmel 001

South Carmel 001

South Carmel 002

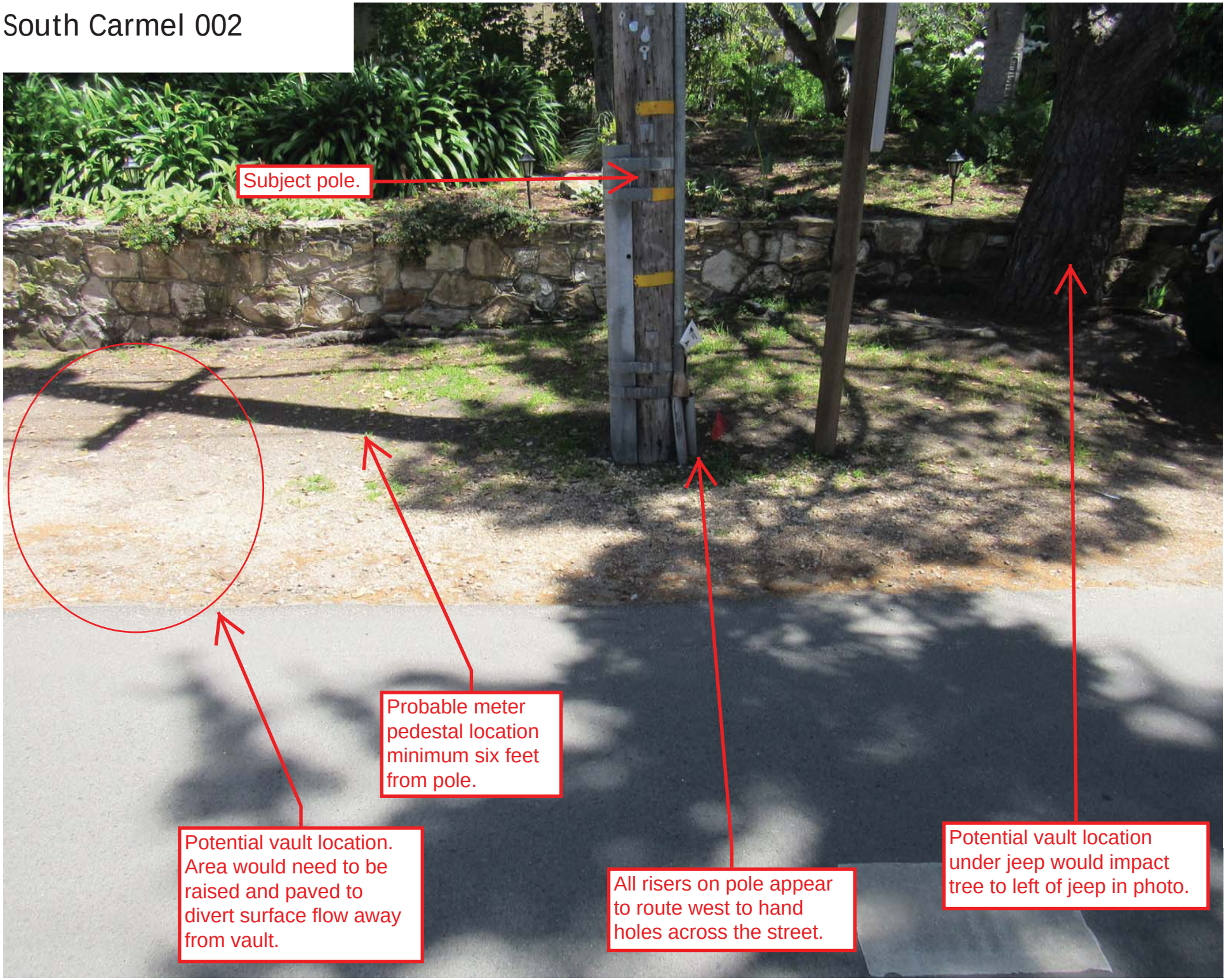
Pole is located on the east side of San Antonio Avenue south of 13th Avenue. The P-ROW is relatively flat at this location. There are no curbs or gutters. The unpaved P-ROW here is flat, dirt, slightly lower in grade than the adjacent paving, and used for parking. Parking is marked “Reserved Parking Guests Only” and would be prohibited by a vault. Utilities from the pole are routed west to vaults across the street. Locating a vault south of the pole would be immediately adjacent to a large tree. Locating a vault north of the pole off pavement would require the area to be raised and paved to have water flow away from the vault. The existing flow pattern of the street would be altered by the vault blocking flow as surface flow currently flows off pavement. A minimum of four additional bollards would be required to prevent parking over the vault. Impacts of vault installation are far greater than mounting the equipment on the pole.



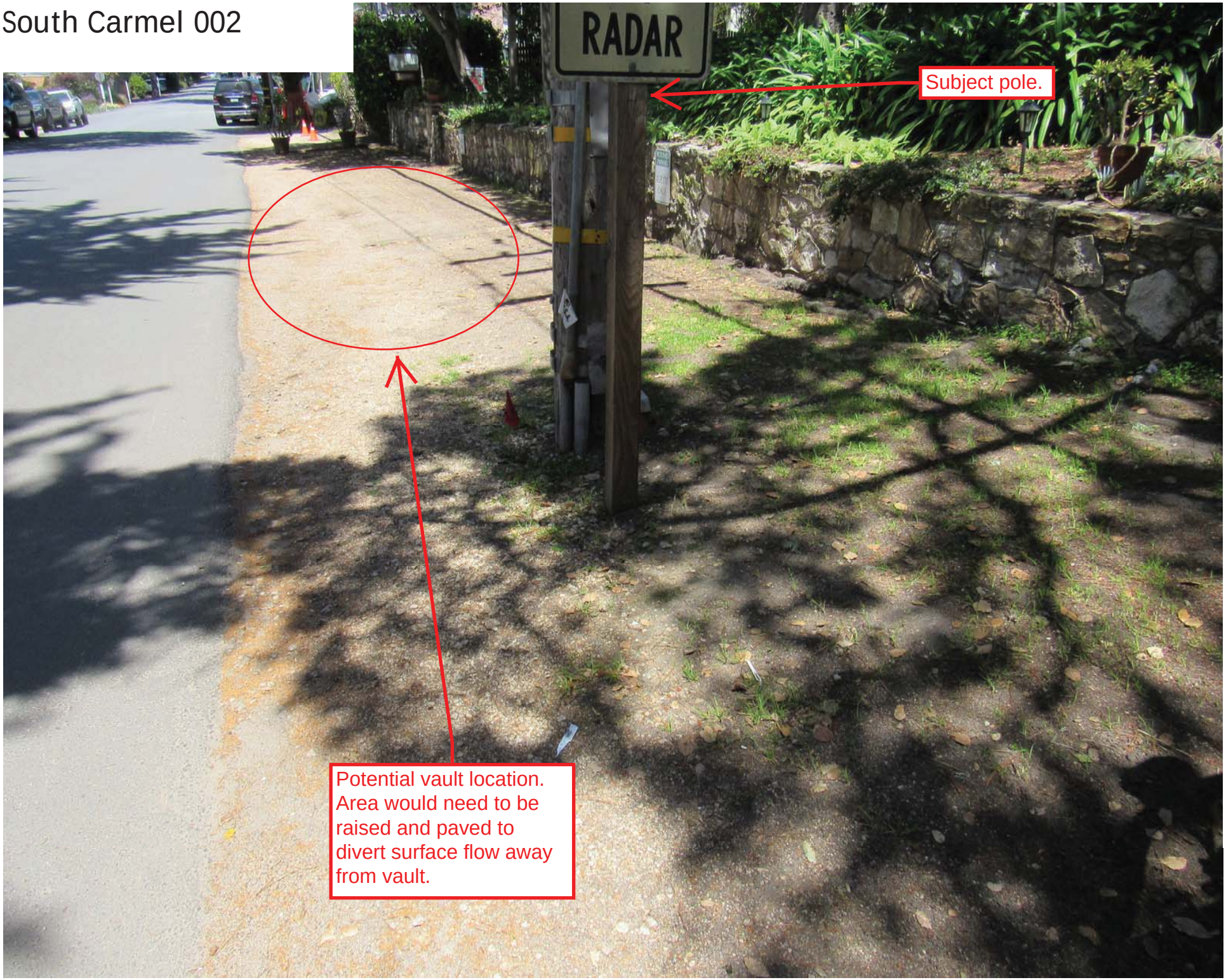
South Carmel 002

South Carmel 002

South Carmel 002

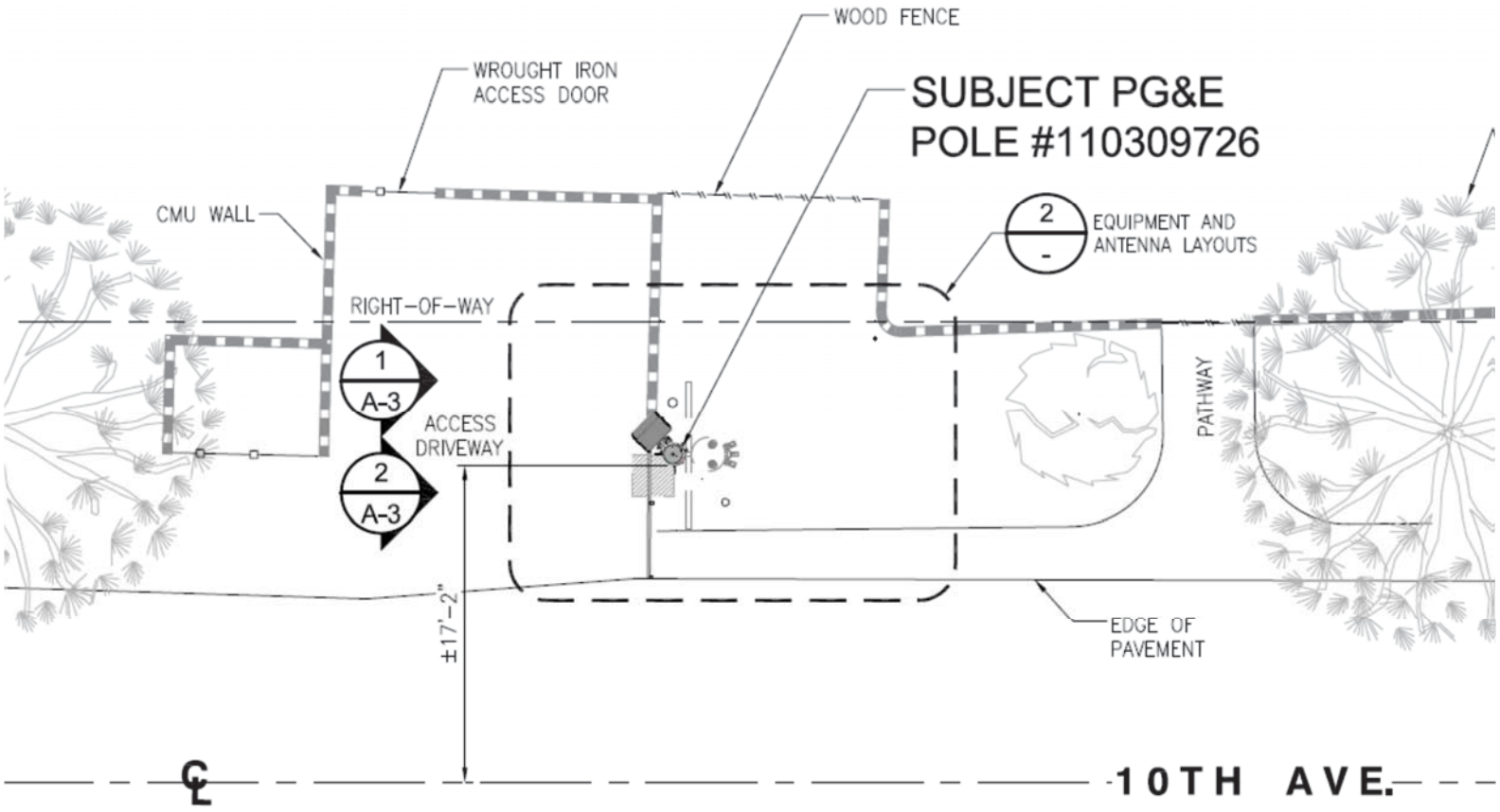


South Carmel 002

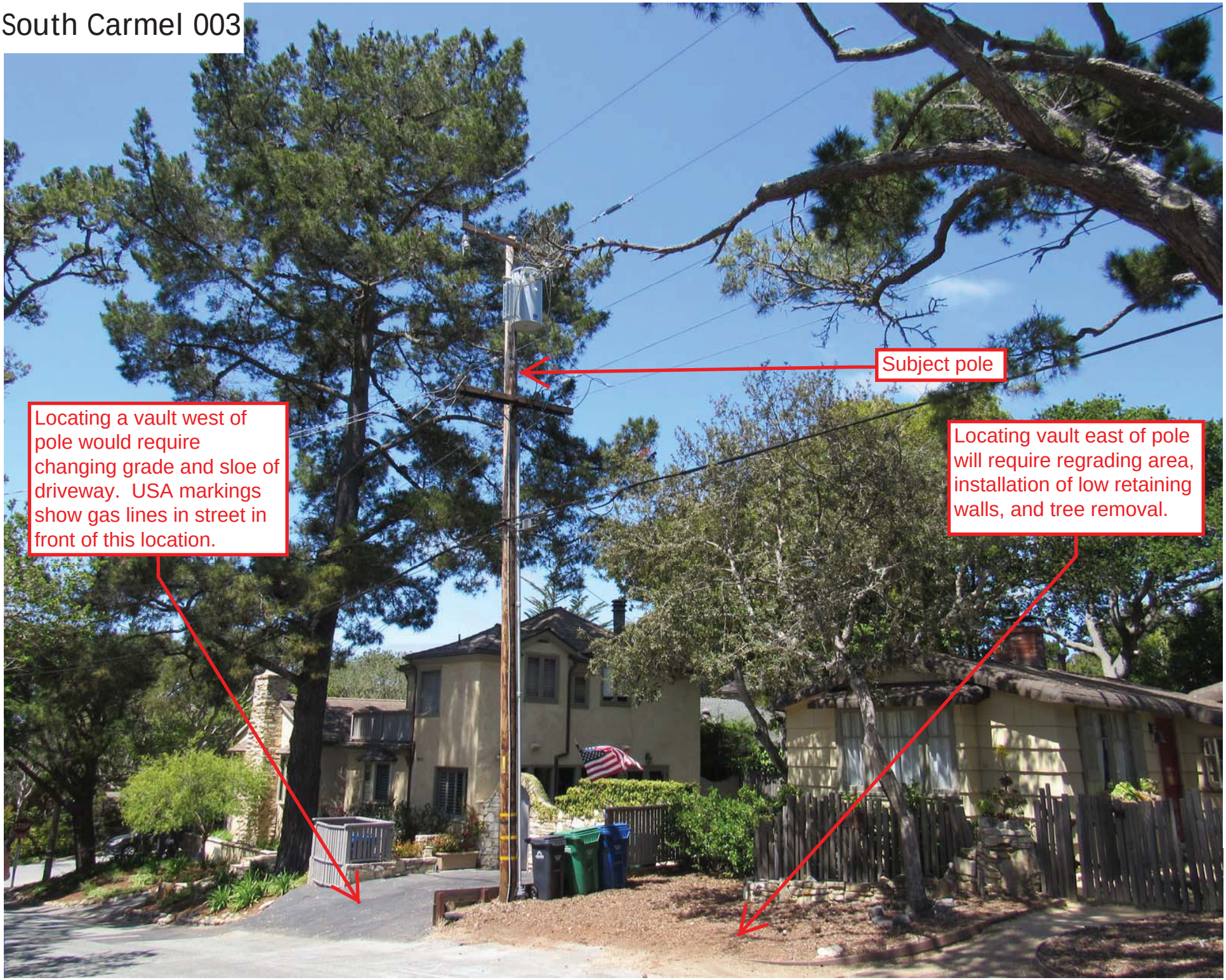


South Carmel 003

Pole is located on the north side of 10th Avenue between Lincoln and Dolores Streets. 10th Avenue slopes down to the west at this location and the street, adjacent driveway to the west, and the landscaping to the east of the pole are all sloped. Placing a vault west of the pole would require changing the grade of the of the driveway rendering it unusable. Placing a vault east of the pole would require removal of a tree, regrading the landscaped are in front of the residence, and installation of low retaining walls and bollards. USA marking and trench repairs in the P-ROW immediately south of the pole are evidence of underground utilities that would most likely need to be relocated for a vault. Vaulting here is not feasible without substantial reconstruction of the street and changing its character.



South Carmel 003



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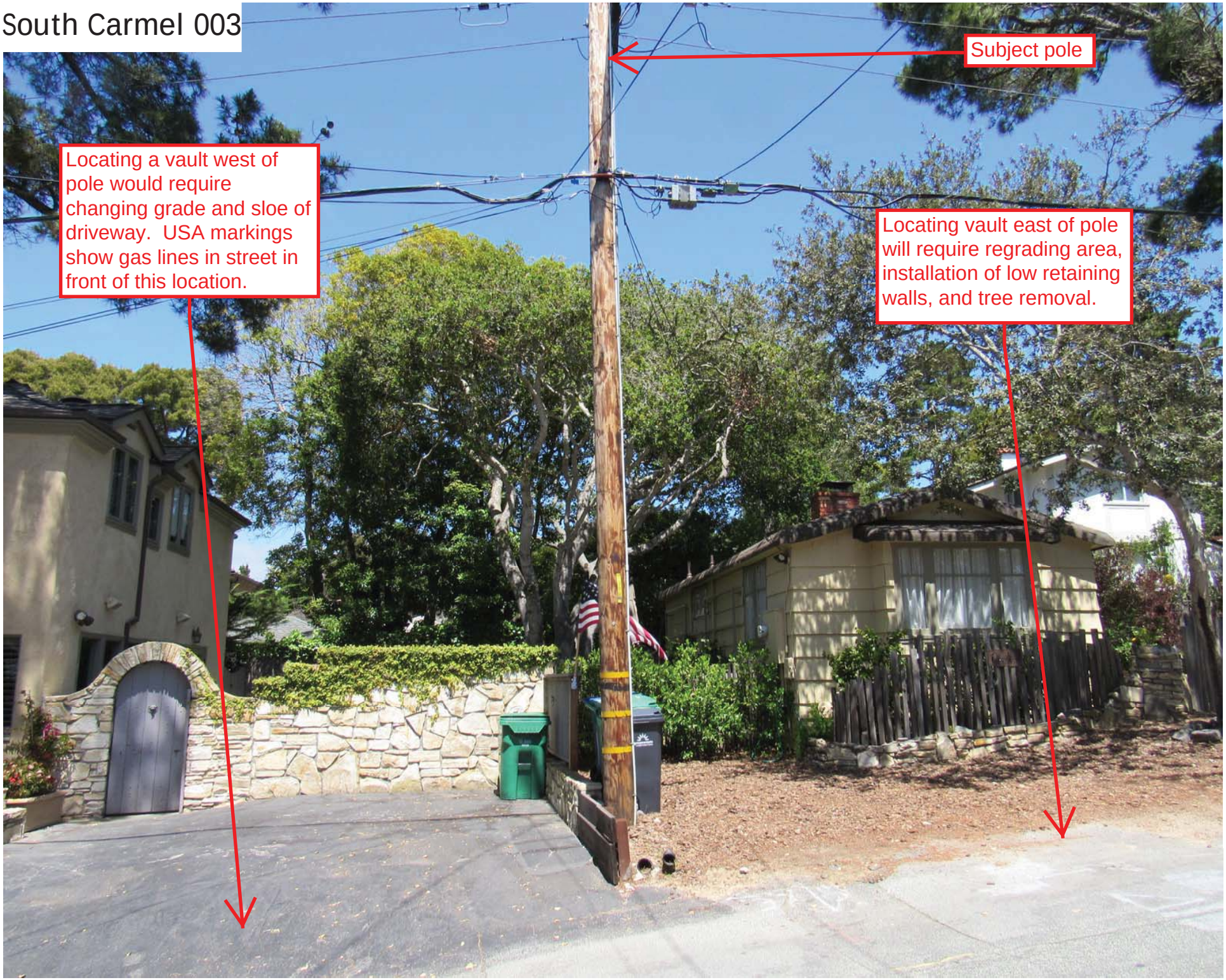
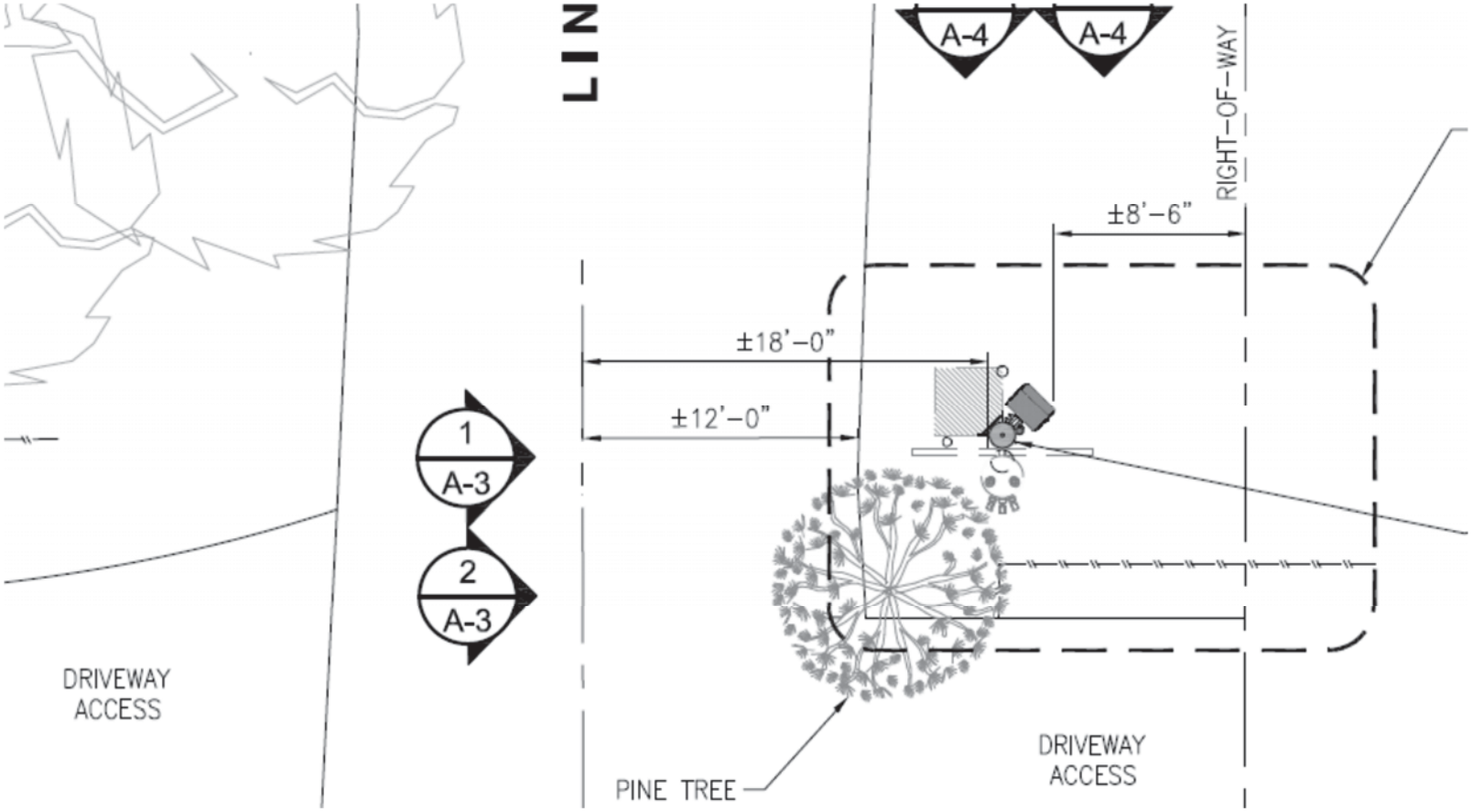


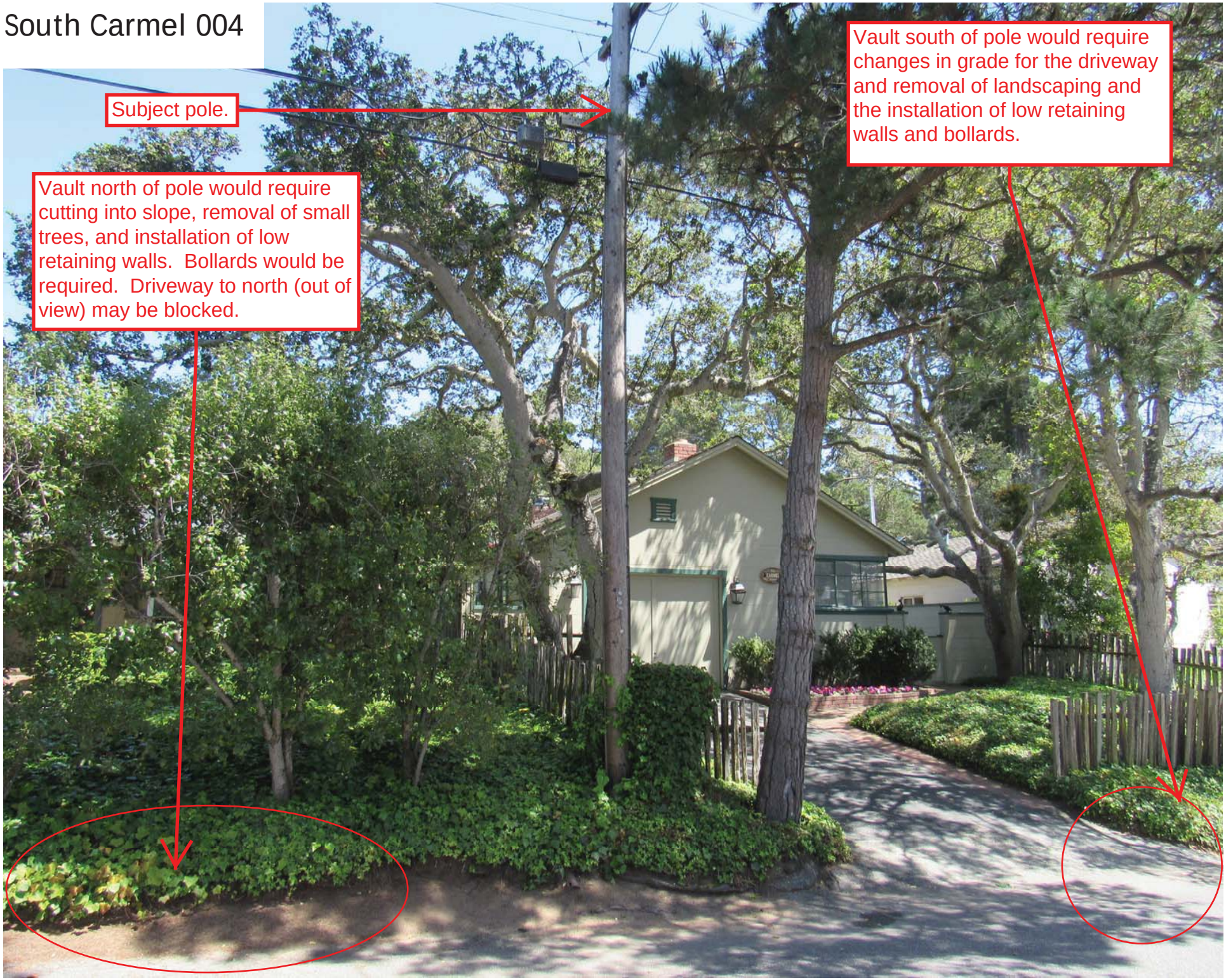
South Carmel 003

South Carmel 004

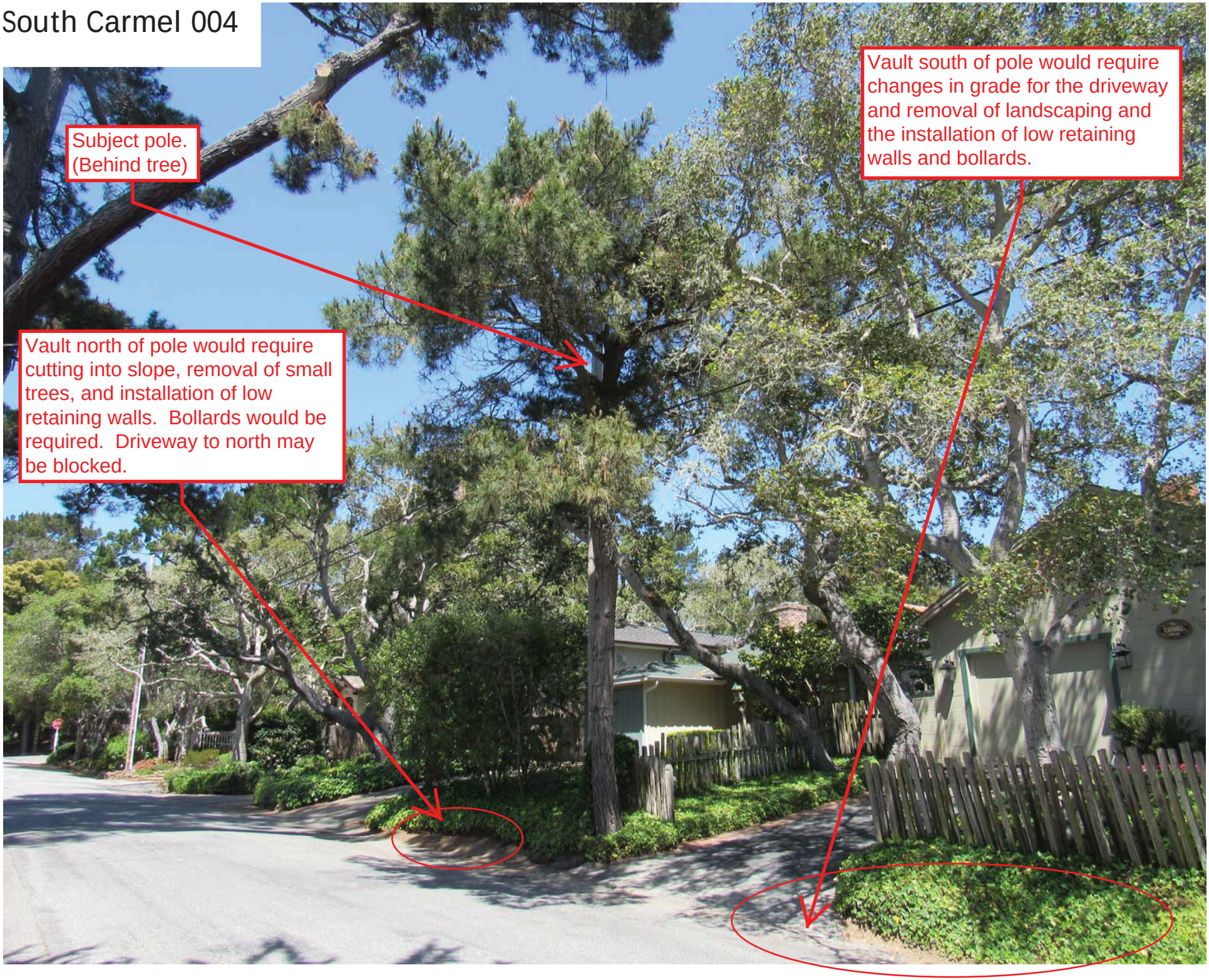
Pole is located on the east side of Lincoln Street between 11th and 12th Avenues. The location slopes down to the street pavement towards the west. The location is heavily landscaped and occupied by a sloped driveway to the south. A vault north of the pole will require cutting into the slope, removal of small trees and landscaping and the installation of retaining walls. A vault south of the pole would require removal of a tree and changing the grade of a driveway and its relationship to the street and or removal of substantial landscaping. If the vault was placed in the paved portion of the street surface flow patterns would need to change to allow for flow around the vault. Vaulting here is not feasible without substantial reconstruction of the street and changing its character.



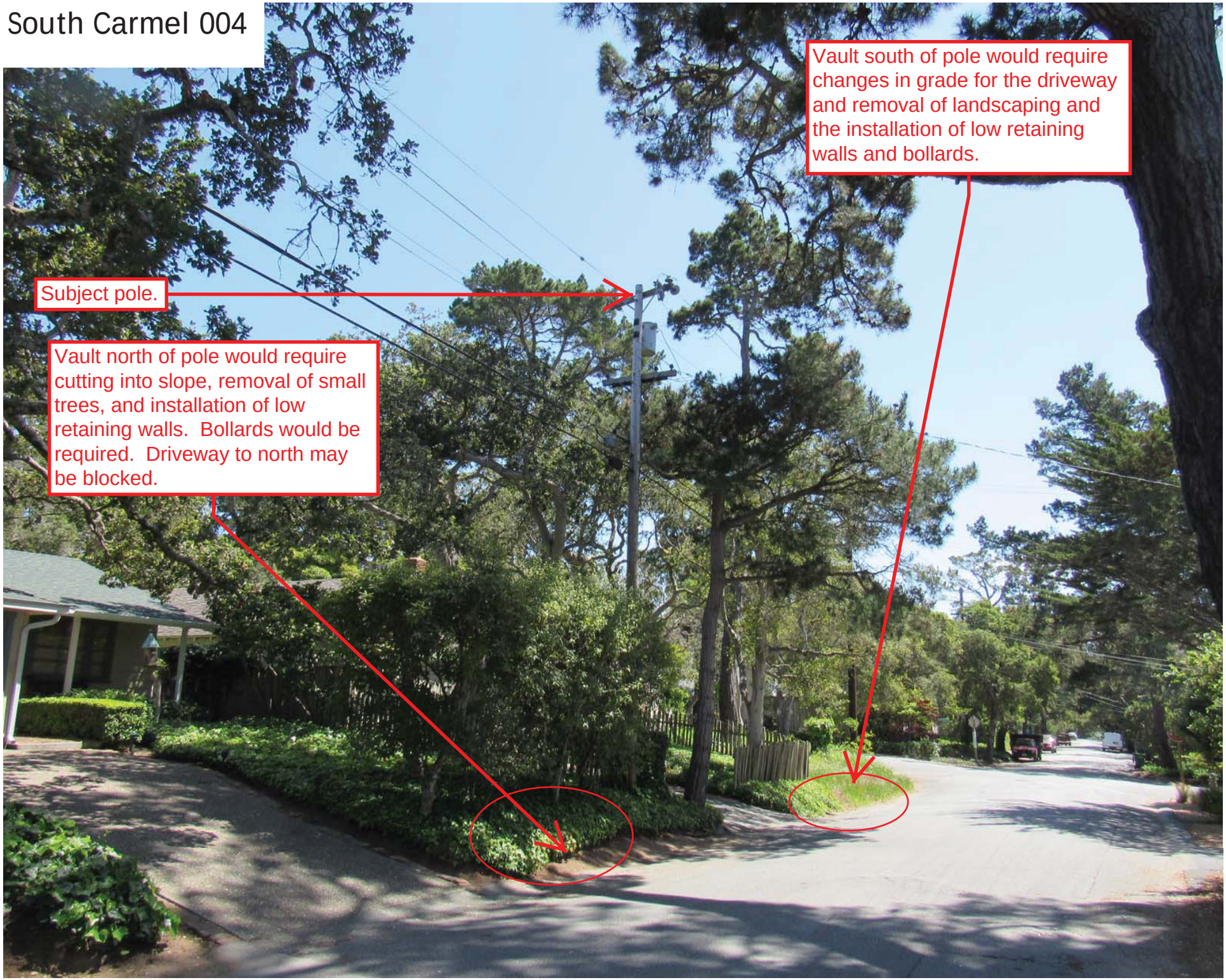
South Carmel 004



South Carmel 004

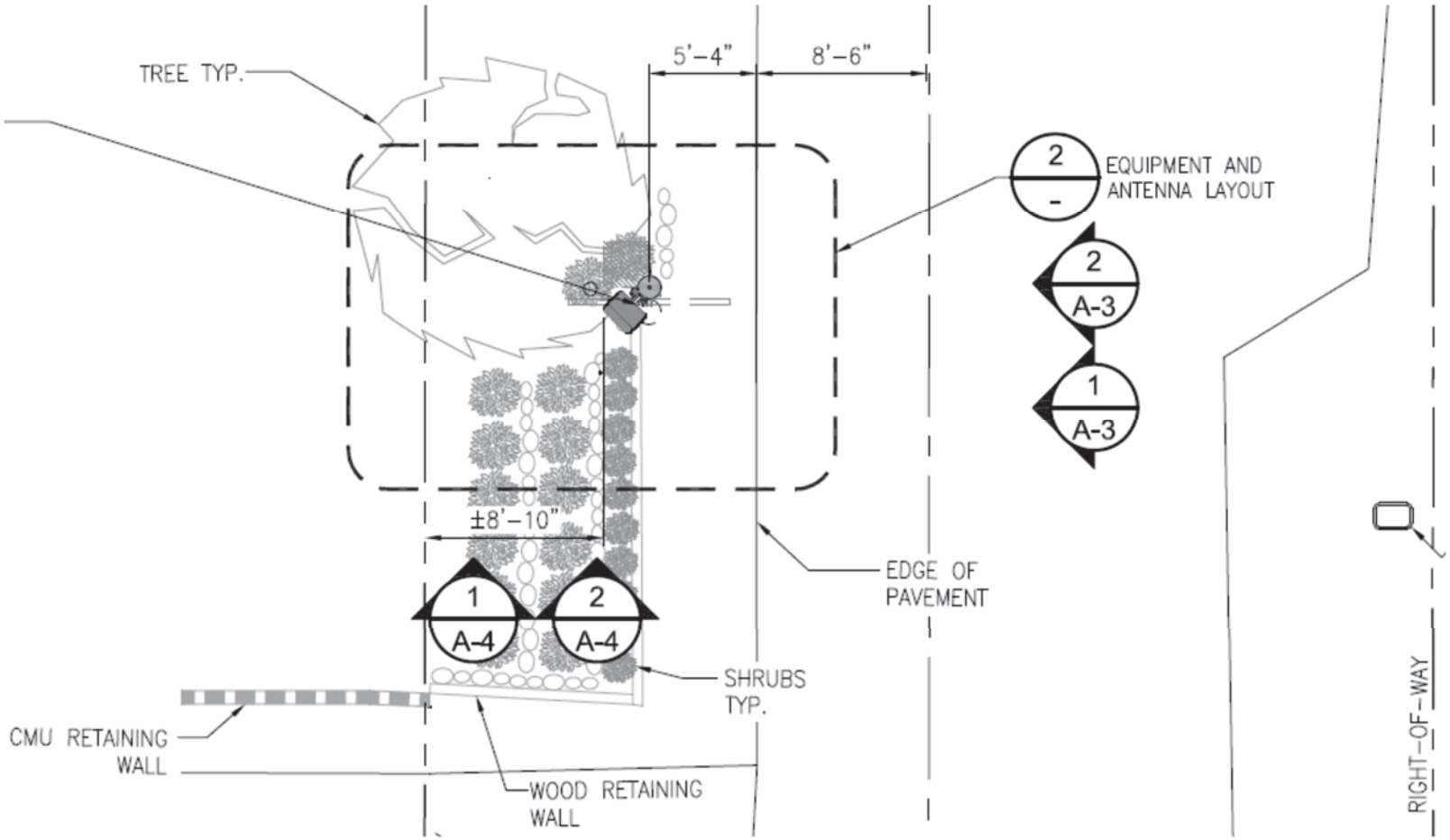


South Carmel 004

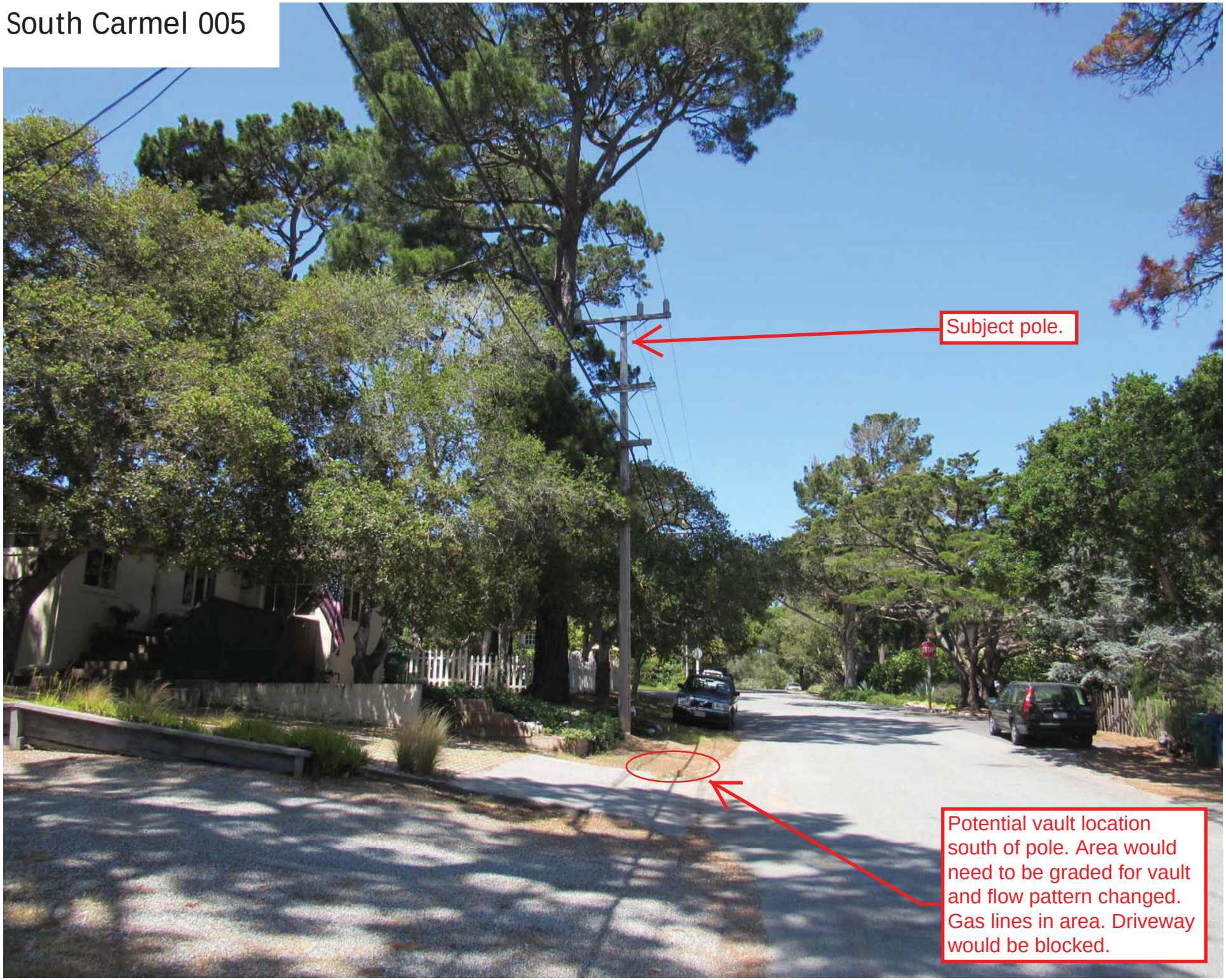


South Carmel 005

Pole is located on the west side of Mission Street between 12th and 13th Avenues. Mission Street slopes down towards the south here and the slots slope down towards the street to the east. Any vault placed north of the pole would be under the canopy of a large oak tree and require removal of a street parking space. Any vault placed south of the pole would require regrading of the location, changing the surface flow pattern of the street, and elimination of street parking and blocking of the driveway. Existing USA markings show the existence of gas lines that would be impacted by any vault installation. Impacts of vault installation are far greater than mounting the equipment on the pole.

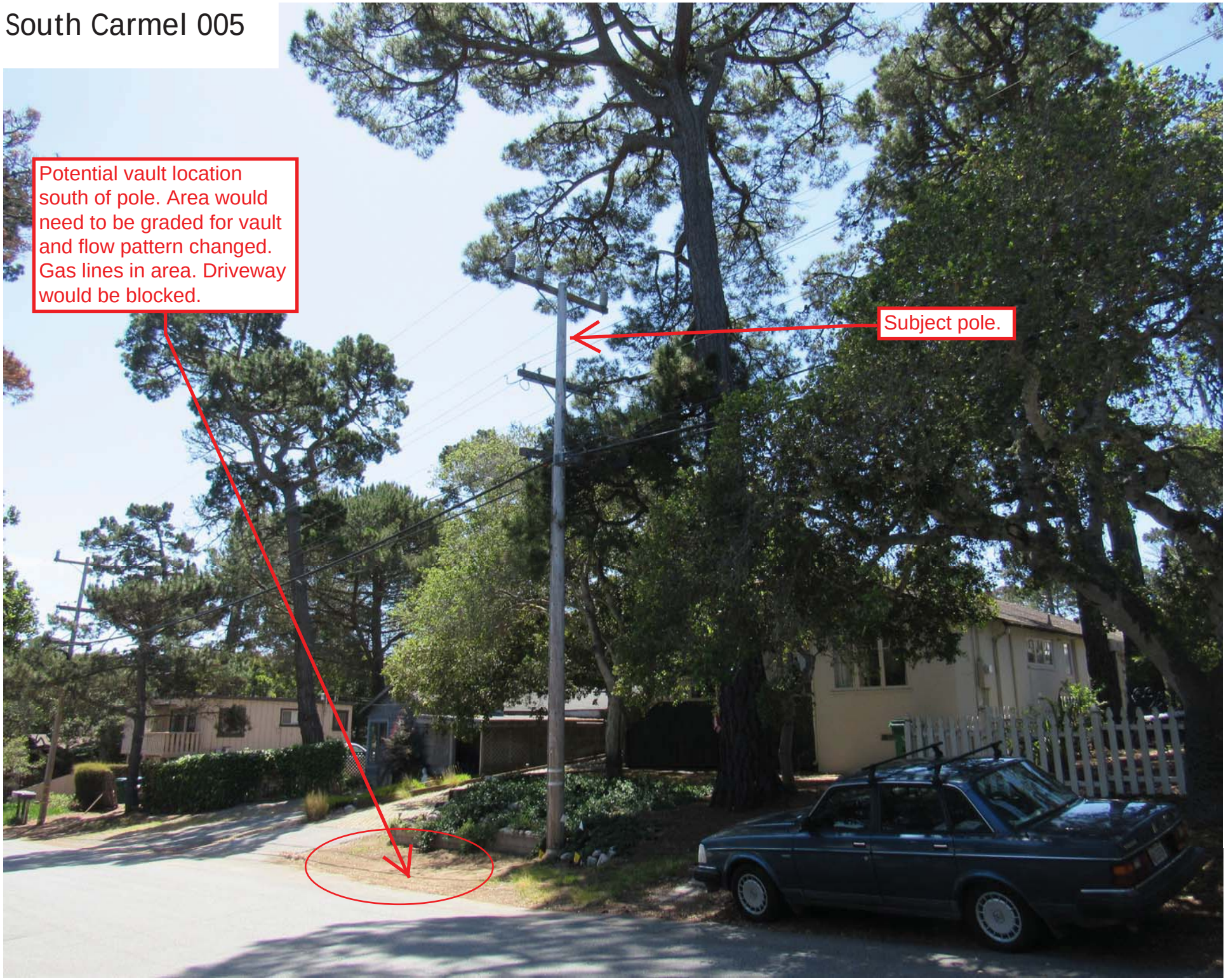


South Carmel 005



South Carmel 005

South Carmel 005



South Carmel 005