TITLE: Site Delineation and Mark and Locate Surface Marking

Purpose

This guideline establishes uniform procedures for providing temporary surface markings of both planned Pacific Gas and Electric Company (Company) excavations and of substructures in potential conflict with planned Company excavations.

This guideline supports UO Standard S4412, "Protection of Underground Infrastructure." This revision supersedes UO Guideline G14412, effective 11-00.

Implementation Responsibilities

The directors of Gas Distribution and Technical Services (GD&TS) and Gas System Maintenance and Technical Support (GSM&TS) are responsible for approving, reviewing, and distributing this guideline.

General Information

Nothing in this guideline shall obligate a department to create and maintain Company records electronically. (See Page 4 for detailed procedures.)

Definition of Terms

Acoustic Locating
A method of locating underground facilities in which an audible signal is applied to a pipeline through the use of an acoustic transmitter.

Approximate Location of Subsurface Installations
A strip of land not more than 24 inches on either side of the exterior surface of the UG infrastructure. "Approximate location" does not include depth measurements.

Computerized Facility Records
Records created and maintained electronically on a suitable storage medium.

Conductive Locating
A method of locating underground facilities in which an active signal is directly applied to the pipe or cable by way of a transmitter connected directly to that facility.

Curb Markers
Semi-permanent markers that are made of composite materials and designed to be attached with adhesives in paved areas (asphalt or concrete).

Delineation
The identification of a Company or external entity's work area by premarking the area of proposed excavation with surface markings or by other means.[1]

Electronic Marker System (EMS Markers)
A utility-specific device that is installed over buried facilities to enable accurate future locating and identification of those facilities. Specific locating instruments are required to identify these markers. Refer to Gas Design Standard M-62, "Approved Specialty Locating Instruments," for the approved locator and markers.

Inductive Locating
A method of locating underground facilities in which a signal is indirectly applied to a pipe or cable by creating a magnetic field.

Locator
An employee of the Company assigned the duties of marking and locating Company UG infrastructure.

Passive Locating
A method of locating underground facilities in which naturally present signals are detected through the use of a passive receiver.

Surface Indications
A technique to detect the presence and location of UG infrastructure from pavement cuts and other physical features (bell-holes, trench lines, valve frames and covers, box lids, etc.) or service locations.

Underground Service Alert (USA)
Regional one-call notification centers for the Company service territory. There are two centers serving the Company: Underground Service Alert of Northern California and Underground Service Alert of Southern California.

Whiskers
Nylon markers that can be placed in paved or nonpaved areas using a drivable anchor to mark a buried facility or delineate an area for marking.

[1] Delineation is not used in this guideline to mean providing facility records to external agencies.

Date Issued/Updated

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Review Date: January 2005

Signed,

[redacted]
Director
Gas Distribution and Technical Services

Signed,

[redacted]
Director
Gas System Maintenance and Technical Support

Reference Documents

Code of Safe Practices

California Government Code, Section 4216

Gas Information Bulletin 151, "Preventing Mechanical Damage to Gas Transmission Lines"

Gas Information Bulletin 155, "Preventing Mechanical Damage to Gas Distribution Facilities"

Gas Standards and Specifications, Gas Standard A-90, "Plastic Main and Service Installation"

Gas Standards and Specifications, Gas Standard M-60, "Approved Mark and Locate Instruments, Equipment, and Accessories"

Gas Standards and Specifications, Gas Standard M-60.3, "Approved Marking Products"

Gas Standards and Specifications, Gas Standard M-61, "Approved Maintenance, Operations, and Engineering Locating Instruments"

Gas Standards and Specifications, Gas Standard M-62, "Approved Specialty Locating Instruments"

USA North California Marking Guidelines, Dated 9/26/00

UO Standard S4412, "Protection of Underground Infrastructure"

Detailed Procedures

Safety Note: Follow all applicable safety rules as listed in the *Code of Safe Practices*. Additionally, use flag persons and/or vehicle-mounted electronic "arrow boards" for traffic control where warranted.

1. General

A. Records used for mark and locate purposes shall be provided to locators in the following order of preference:

1. Computerized facility records accessed directly by the locator from an online application or disk.
2. Reduced-size gas plat sheets or aperture card products*.
3. Reduced-size electric plat sheets or aperture card products*. Contact GD&TS for assistance in determining the suitability of reduced-size electric plat sheets.

   *Use durable, high-quality, pre-punched paper when preparing reduced-size plat sheet books for locators. 80-pound paper is recommended for this application.
4. Full-sized gas plat sheet copies. Distribute these only for large, ongoing projects where multiple USA tickets may be issued.
5. Full-sized electric plat sheet copies.
6. Copies of abandoned facility records, if they are available.
7. "As-built" drawings for unmapped facilities, where required.
8. If required, gas service records for unmapped facilities where the service locations are not readily identifiable by surface indications.
9. Where required, electric duct maps for congested areas.
10. Microfiche.

Note: Maps scaled larger than 1" = 100' shall not be reproduced for locator books. In areas where the distribution map is larger than 1" = 100', provide a full-size map copy to the locator.

B. Reduced-size plat sheets, aperture card products, and computerized facility records shall be reviewed by the locator or the mapping group at least monthly to ensure that they are serviceable and current. Update these items at least annually. Factors to consider in determining when to make new reduced copies of maps are the serviceability of the map, the frequency of USA requests, and amount of new posting (pencil posting, premapping, job posting) on a particular map. It is suggested to update the books for mark and locate when other map books, such as the leak survey and patrols map books, are updated.

C. White markings are used for excavation delineation. Substructure markings are of specific colors as listed in Section 6, "Color Code Identifiers," of this guideline.

D. Full facility operator and excavator responsibilities are detailed in Section 3 of the *Protection of Underground Infrastructure* manual, Article 2 of California Government Code Section 4216 through 4216.9, and UO Standard S4412, "Protection of Underground Infrastructure."

E. Markings should be easy to see, functional, and considerate of surface aesthetics and the local community. When marking on private property, use chalk-based paint, whiskers, or flags.

F. When marking in paved areas, avoid excessive or oversized marking, especially if marking outside the excavation area. If conditions permit, use spray chalk paints, water-based paints, or an equivalent less-permanent type marking. Limit the length, height, and interval of marks to those recommended in this guideline. Letters and numbers should not exceed 6 inches in height.

G. When marking in nonpaved areas, use appropriately colored stakes, lath, whiskers, flags, or chalk-based paint. Select marker types that are most compatible to the purpose and marking surface. To avoid losing surface markings in nonpaved areas, use offset markings where feasible.

H. Offset markings shall clearly indicate the direction, path, and distance to the facility or excavation.

I. When a locator is unable to provide surface markings per this guideline, this fact and any omitted surface marking information shall be communicated directly to the excavator. Direct communication includes phone conversations, field meets, voice mail, and faxed messages. Document all actions taken on the USA ticket and in the USA software.

J. When providing initial surface markings for gas facilities, conductive locating is preferred. Use the following alternate methods **only** if field conditions preclude conductive techniques:

- Inductive.
- Passive power (50/60 hertz [Hz]) or radio (14 - 22 kilohertz [kHz]).
- Acoustic (Contact GD&TS).
- E-Line™ (Contact GD&TS).
- Maps.
- Surface indications.

Conductive techniques cannot be used in the following situations:

- Broken, damaged, or missing locating wire.
- Contacts with subsurface installations.
- Excessive distance from an electrolysis test station (ETS) to the area to be located.

Note: Gas transmission lines must be located conductively, if possible. When a transmission line cannot be located conductively, the locator must complete the checklist on the USA ticket, documenting that all possible efforts to connect to the pipe have been made. If the pipe must be inductively located, the locator shall carefully probe and/or hand dig to verify the transmission line location. If probing or hand digging is not possible at the time

because of hard surface and the pipe is inductively located to within 5 feet of the planned excavation, the exact pipeline location must be confirmed during excavation while the standby person is present.

K. When providing initial surface markings for electric facilities, conductive locating is preferred. Common connection points are the exteriors (case) of pad-mounted equipment and meter panels. Using an inductive clamp is preferred when locating electric facilities in areas where pad-mounted equipment is not readily accessible. Use the following alternate methods **only** if field conditions preclude the aforementioned techniques:

- Inductive locating without using the clamp.
- Passive power (50/60 Hz) or radio (14 - 22 kHz).
- Maps.
- Surface indications.

L. For facilities that cannot be readily located by using instruments, install approved permanent markers whenever the facility is exposed or otherwise accurately located. Use markers that most suit the location, either EMS or curb markers. Follow the provisions of Gas Design Standard M-62 to install and map EMS markers. Supplemental information may be found in Gas Design Standard A-90, "Plastic Main and Service Installation". Send the EMS installation information to the appropriate mapping group. Refer to Section 5, "Mark and Locate Surface Markings," Item A in this guideline for EMS marker spacing requirements.

M. When providing initial surface markings for steel gas facilities that cannot be readily located by using instruments, an ETS shall be installed after consulting the area corrosion mechanic whenever practicable. Send the ETS installation information to the appropriate mapping group.

N. When locating with questionable signal strength, or when the facilities have no locating wire, conduct a field meet with the excavator to convey marking information. Consider using acoustic or E-Line™ equipment to investigate facilities identified as unlocateable. Refer to Gas Design Standard M-62 for approved acoustic and E-Line equipment. Maps and other methods may be used if conditions do not permit the timely use of the equipment.

O. Facility maps shall be reviewed for accuracy and corrected as needed. The mark and locate (M&L) supervisor or locator shall notify mapping departments of any discrepancies. Locators should provide any additional clarification or assistance as needed.

P. EMS markers or curb markers may be used to identify buried facilities that present the following problems:

- Facilities have limited access points.
- Facilities are located in roadways that are subject to heavy traffic.
- Facilities are otherwise not conducive to locating.

Q. New technology applications shall only be used with approval from GD&TS or GSM&TS as applicable.

2. Surface Markings for Excavation Delineation

A. California Government Code, Section 4216, requires delineating excavation sites.

B. Delineate excavation sites before calling USA. Identify delineated areas using white markings with the Company's name within the premarked zones.

C. When it is not practical to delineate the excavation site, the person conducting the excavation shall contact USA to advise the owners/operators that the excavator shall identify the excavation site in another manner sufficient to enable the owners/operators to field mark the excavation. The person conducting the excavation should request a field meet with the owners/operators listed on the ticket.

D. Delineation must not be misleading, duplicative, or misinterpreted as traffic or pedestrian control.

3. Single Point Excavation Examples

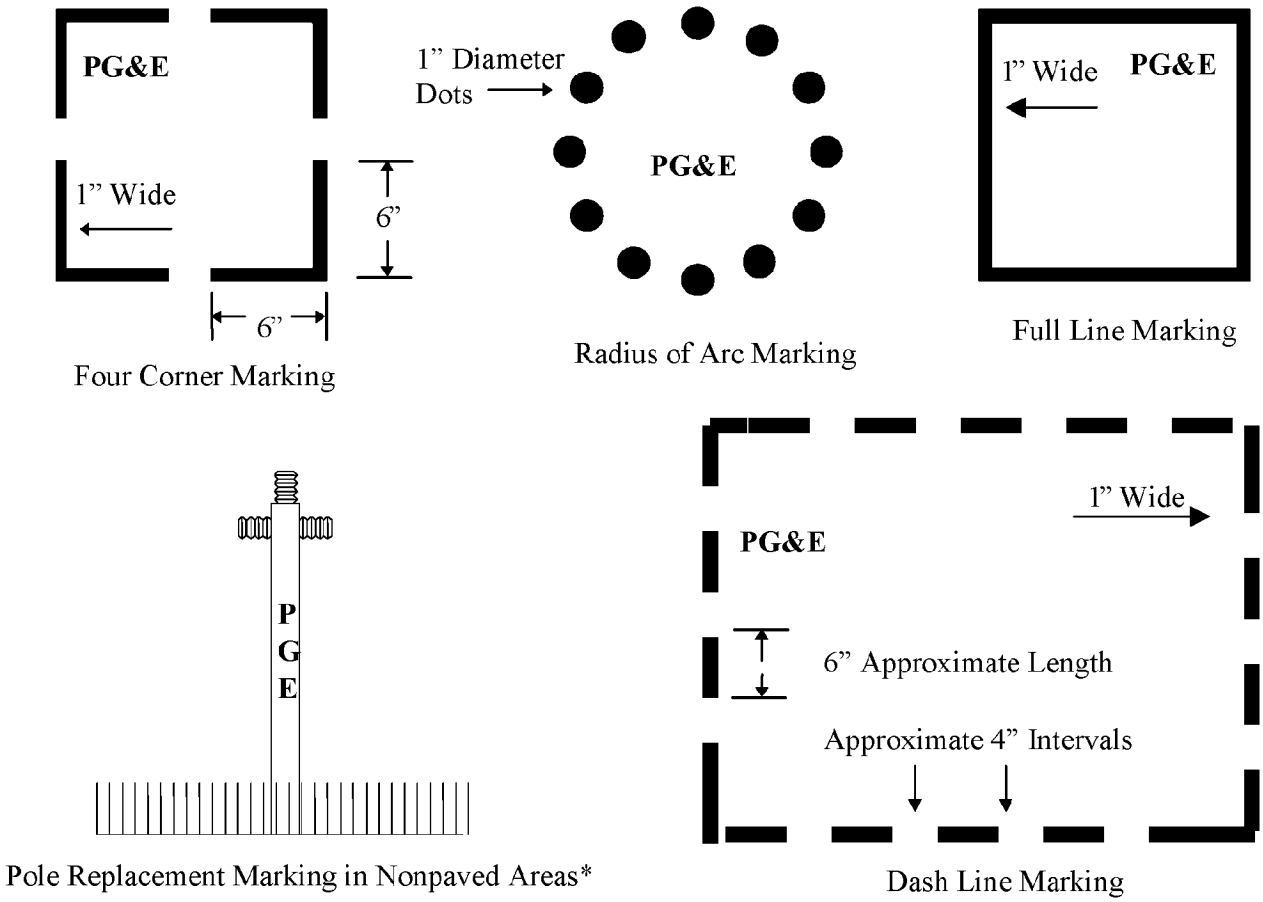

Figure 1 – Single Point Excavation Markings

* **Note:** If placing a new pole in a new hole or placing a new anchor, stake the location of the proposed pole or anchor in addition to marking on the existing pole.

4. Trenching, Boring, or Other Continuous Type Excavations

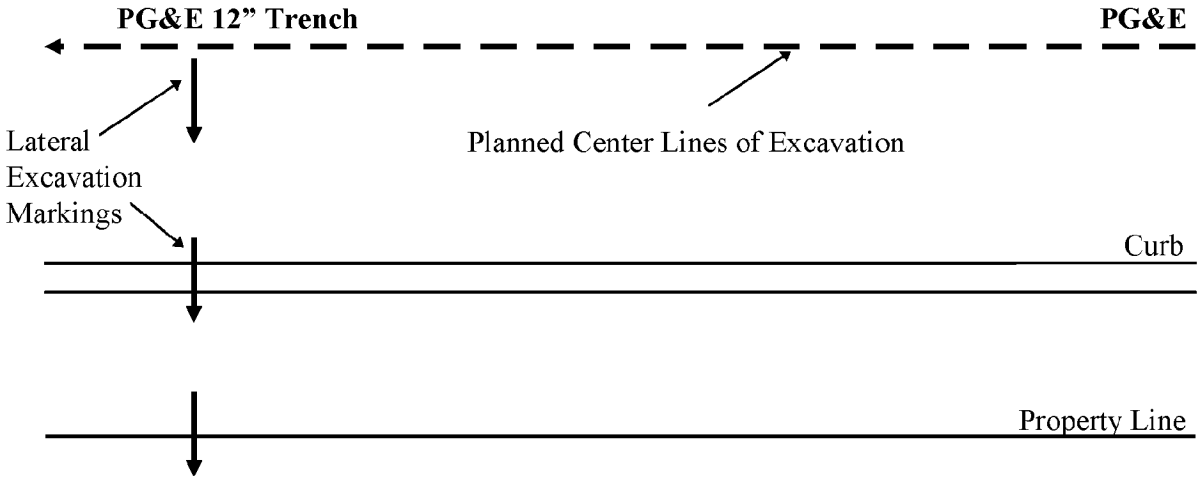

Figure 2 - Continuous Excavation Marking

Use the illustration above and the following information as a guide for marking continuous excavations:

- Mark the centerline of the planned excavation with 6-inch long by 1-inch wide arrows (approximately 4 feet apart) to show the direction of the excavation.
- For boring or continuous operations where marked paving is not to be removed, mark at critical points with a maximum mark separation of approximately 50 feet.
- Mark lateral excavations with arrows showing the excavation direction from the center line with marks at the curb or the property line, if crossed.
- Intermittently indicate the excavation width on either side of the centerline in 3-inch to 6-inch high figures.
- Use dots for curves and closer interval marking.

5. Mark and Locate Surface Markings

A. Marks in the appropriate color should be approximately 12 inches long and spaced no more than 50 feet apart on straight-line installations. Directional changes, "off-sets," and taps must be marked as frequently as needed to adequately define their location.

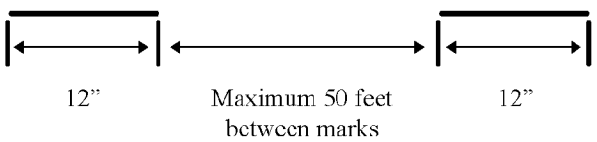

Figure 3 – Spacing for Surface Markings

The marks should be placed over the approximate center of the facility.

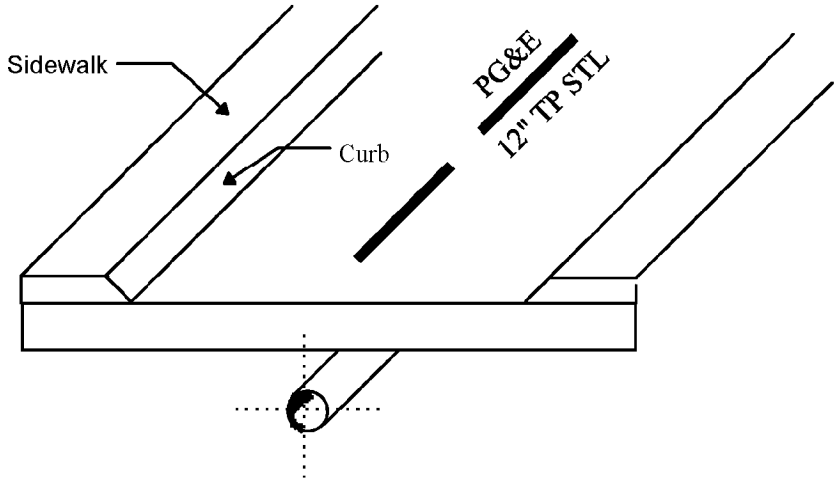

Figure 4 – Centering Surface Markings

B. Identification

1. The Company's initials shall be placed near the marks at least one time per excavation site and more often if there could be confusion as to who owns the facility. An example would be where another utility is operating a gas or electric line near the Company's gas or electric facilities.
2. For gas facility locations, line pressure indicators shall be included. These marks indicate the type of line located to the excavator and all Company employees. Consult the appropriate facility records for line pressure. Field marking pressure indicators are:
   a) TP = Transmission Pressure
   b) DP = Distribution Pressure

C. The size, pressure, and composition of the facility shall be marked if known. Examples shown are the number of ducts in a multi-duct structure, the diameter and pressure of a pipeline, and whether it is steel, plastic, etc.

PG&E	PG&E	PG&E	PG&E
4" DP PL	2 - 4" Ducts	24" TP STL	1/2" DP PL

Figure 5 – Surface Marking to Indicate Size, Pressure, and Composition

Additionally, the following supplemental marks may be made when the above referenced marks have been adequately made:

Figure 6 – Supplemental Markings

D. Facilities installed in casings shall be identified as such. Examples shown are 2-inch DP plastic gas pipes installed in 4-inch cast iron casing, ½-inch DP plastic gas service installed in ¾-inch steel casing, and a ½-inch DP plastic gas service inside 1-inch copper pipe installed in 2-inch steel casing ("triple insert").

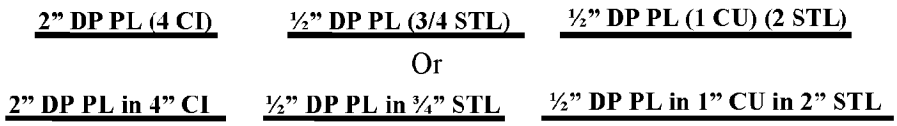

Figure 7 – Markings to Indicate Facilities in Casings

E. Joint trench facilities may not be indicated on the same mark. Each commodity, gas and electric, shall be located and marked separately as shown.

Figure 8 – Joint Trench Markings

F. Clearly indicate changes in direction and lateral connections at the point where the change in direction or connection occurs.

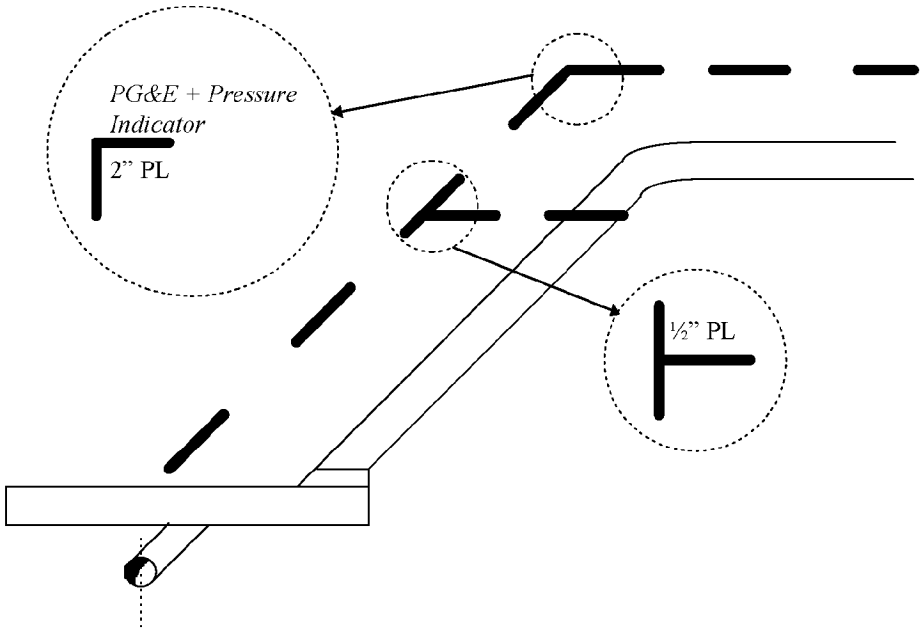

Figure 9 – Marking Direction Changes and Connections

G. When providing offsets, show the direction, distance to, and path of the facility. In the example below, a 12-inch steel gas main is shown in the dirt area, 8 feet to the right of the markings on the sidewalk.

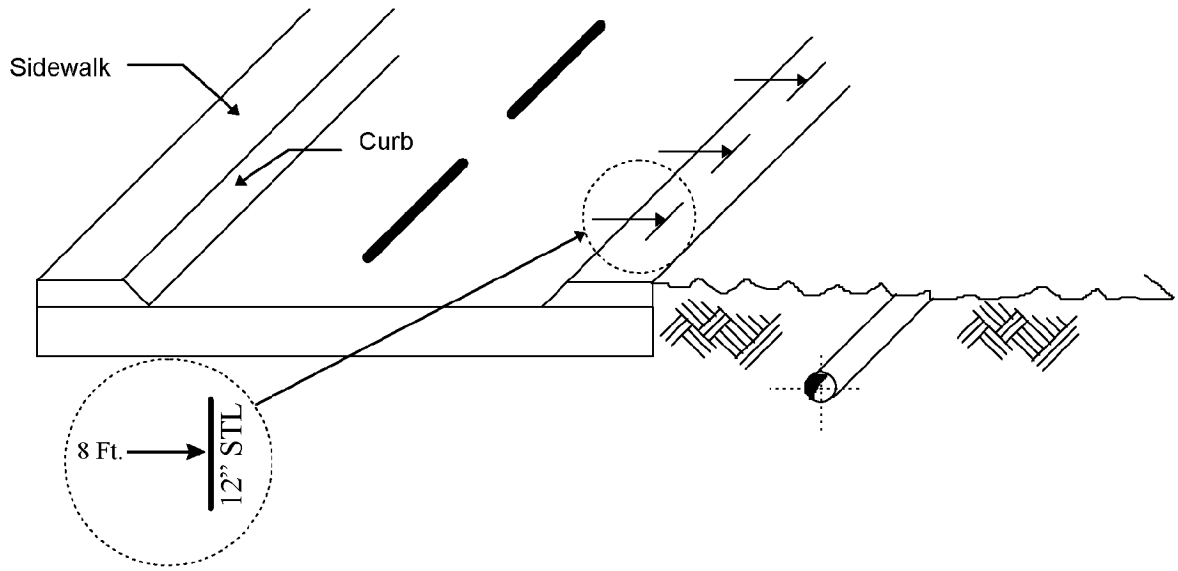

Figure 10 – Offset Markings

H. Structures, such as vaults, that are physically larger than obvious surface indications should be marked so as to generally define the parameters of the structures.

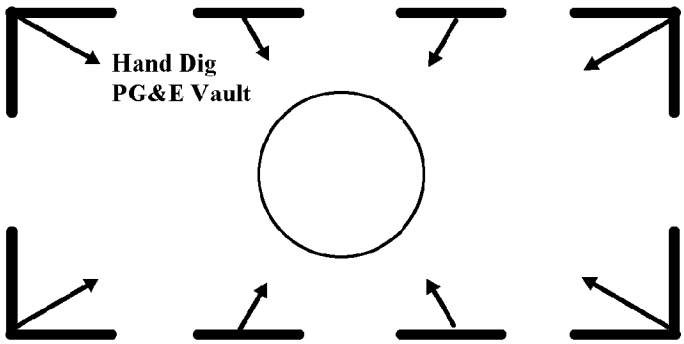

Figure 11 – Marking Structures

I. Termination points or dead ends should be indicated as such.

J.

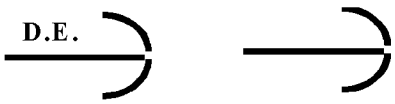

Figure 12 – Marking Termination Points

J. If there is no conflict but the excavator has not been verbally notified as such, mark "NO PG&E (DP or TP) Gas/Elect." within the delineated work area using the appropriate color identifier. The "NO PG&E" mark cannot be used unless the commodity and type of facility (distribution or transmission) is stated. Allow adequate space for facility mark outs by others. "No conflict" marking indicates that there are no Company facilities (gas, electric, etc.) within the delineated area. For areas that cannot be delineated, direct verbal communication shall be made with the excavator. This contact and any relevant items discussed shall be documented.

6. Color Code Identifiers

Note: The American Public Works Association (APWA) color code guide and California Government Code Section 4216 differ on the color code requirements for reclaimed water and slurry pipelines. Reclaimed water and slurry pipelines may be either depicted in blue or purple paint. Consult the facility owner to clarify the type of facility when necessary.

Red	→	Electric
Yellow	→	Gas/Oil/Steam
Orange	→	Telephone/Communications/Cable TV
Blue	→	Water
Green	→	Sewer
Purple	→	Reclaimed Water and Slurry
White	→	USA Delineation Area
Pink	→	Temporary Survey Markings

7. Instruments and Material

Use only Company-approved instruments and marking products. See Gas Design Standards M-60, "Approved Mark and Locate Instruments, Equipment, and Accessories," and M-61, "Approved Maintenance, Operations, and Engineering Locating Instruments," for approved instruments. See Gas Design Standard M-60.3, "Approved Marking Products," for approved marking products.