



Gas Pipeline Markers and Indicators

SUMMARY

This utility procedure describes the steps for installing and maintaining pipeline markers and indicators at Pacific Gas and Electric Company (Company or PG&E) gas main and transmission line locations in compliance with federal requirements.

Level of Use: Informational Use

TARGET AUDIENCE

Personnel involved in directing, supervising, or performing pipeline marker and indicator repairs and installations, including: gas general construction personnel and supervisors, gas maintenance and construction (M&C) personnel and supervisors, gas maintenance and operations (M&O) personnel and supervisors, gas transmission (GT) project management personnel and supervisors, estimating personnel and supervisors, pipeline pathway personnel, GT construction management, leak survey personnel, corrosion mechanics, aerial patrol personnel, damage prevention personnel and contractors performing work for the Company.

SAFETY

Hazards impacting this work include, but are not limited to, the following conditions:

- Dangerous animals
- Tripping and slipping
- Traffic conditions
- Vegetation, including poison oak
- Electrical shock

Use standard safe work practices and standard issue personal protective equipment (PPE). In addition, personnel must have the following PPE:

Required to wear:

- Traffic vest
- Proper work footwear (no sneakers allowed)
- Long-sleeved attire

Must be available:

- Hard hat
- Gloves



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- Safety glasses
- Hearing protection
- Disposable vinyl gloves

Recommended:

- Sufficient hydration
- Sufficient protection from the elements
- Co-worker communication plan and means of communication

BEFORE YOU START

Personnel installing markers must hold [operator qualification \(OQ\) 08-03, "Install and Maintain Pipeline Markers,"](#) or be directly supervised by operator-qualified personnel, before the start of work.

Use an approved impact bar probe (see [Gas Design Standard \(GDS\) M-54.1, "Impact Bar Probe"](#)) to perform tasks in this procedure.

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PROCEDURE STEPS

1 Pipeline Marker Requirements

NOTE

Pipeline indicators (see [Section 4, "Types of Pipeline Markers and Indicators"](#)) are not subject to the pipeline marker regulations outlined in this section and do not meet the marker lettering dimension specifications described in federal code.

- 1.1 Install pipeline markers, also known as "line markers" or "markers," according to [Code of Federal Regulations \(CFR\) Title 49: Transportation, Part 192—Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards, Section \(§\) 707, "Line markers for mains and transmission lines."](#)

- Install markers on each side of a pipeline crossing of a public road, railroad, levee OR as necessary to identify the location of the buried main and transmission line in order to reduce the possibility of damage or interference.

NOTE

Pipeline markers at crossing of waterways and levees are no longer required by [49 CFR Part 192, "Transportation of Natural and other Gas by Pipeline: Minimum Federal Safety Standards"](#)

- 1.2 Install markers at levees per [California Code of Regulations \(CCR\), Title 23. Waters, Division 1. "Central Valley Flood Protection Board," Chapter 1, "Organization, Powers and Standards," Article 8. "Standards," §123, "Pipelines, Conduits, and Utility Lines."](#)

1. Markers must be:

- a. Appropriate.
- b. Visible.
- c. Acceptable to the local maintaining agency, as appropriate.

2. IF pipeline runs through a levee,

THEN install markers as follows:

- At both levee toes, if pipeline does not surface near the levee.
- On the levee slope adjacent to the either shoulder, if pipeline crosses levee at an angle.



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3. IF pipeline crosses navigable waters (defined per [33 CFR, Chapter II "Corps of Engineers, Department of the ARMY, Department of Defense," Part 329 "Definition of Navigable Water of the United States," § 329.4 "General definition"](#)),

THEN install interstate or foreign waterway signs on each side of the channel that face the channel.

- a. Install pipeline crossings signs, where practical, facing the water on each side of the channel. See [GDS L- 21, "Cable and Gas Line Crossing Signs,"](#) for construction details.
- b. Install crossing signs, in conjunction with pipeline markers, at stream crossings where, in the judgment of the local engineer, they could be of value in providing protection and public awareness for the waterway and levee crossing. See [Figure 1, "Cross Section,"](#) and [Figure 2, "Plan View"](#) below for location of markers.

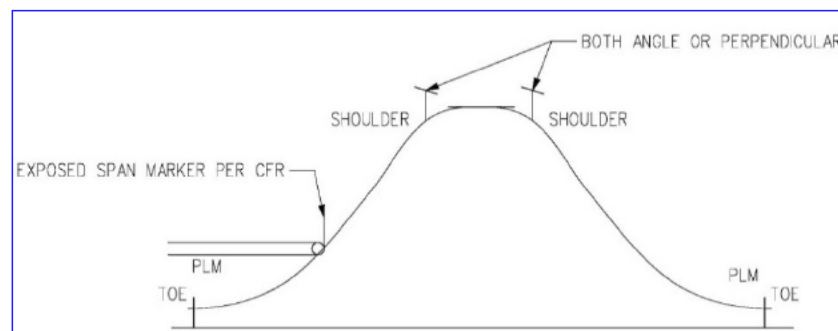


Figure 1. Cross Section



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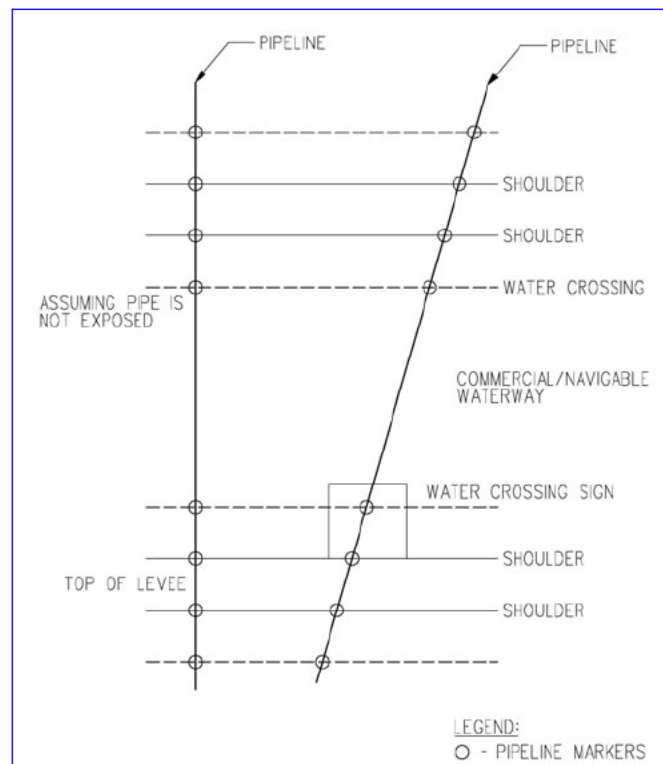


Figure 2. Plan View

- 1.3 Install markers within line of sight of one another (by the unaided eye). Markers should be installed at significant turn points.
 1. IF installing marker within line of sight is impracticable,
THEN follow the pipeline marker intake process referred to in [Step 2.4](#).
- 1.4 IF electrolysis test stations (ETS) are installed,
THEN install markers wherever practical in accordance with [GDS O-10.1, "Electrolysis Test Stations."](#)
- 2 **Pipeline Markers Intake Process**
 - 2.1 Submit request(s) for missing markers or for pipeline marker(s) needing repair to the pipeline execution team by completing the following steps:
 1. Send an email to PipelineMarkers@pge.com (subject: Marker Intake – [Division / District]) with a description of current status of pipeline marker.
 - a. Include location details (GPS coordinates, address, route, mile point (MP), etc.) of the marker in question.



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- b. Provide photos of the marker; showing both sides of the marker and the surrounding area (to help determine line of sight).
- 2.2 The pipeline execution team must review intake information and schedule a scout team to perform a field investigation to determine if the marker needs to be repaired or relocated.
- 2.3 Field supervisors complete the following steps if the marker needs to be installed or repaired:
 1. IF the existing marker needs to be repaired,
THEN perform the following steps:
 - a. Fill out [Form TD-4412P-09-F01, "Pipeline Marker Installation and Repair Form."](#)
 - Be sure to record the location of the removed marker in the upper part of the form (GPS location preferred).
 - Write status in the "Comments" section of [Form TD-4412P-09-F01](#).
 - b. Send the completed form to PipelineMarkers@pge.com (subject: Marker intake – [Division / District]).
 2. IF the marker needs to be relocated,
THEN perform the following steps:
 - a. Fill out [Form TD-4412P-09-F01](#).
 - In the "Comments" section, include the following:
 - Write "Re-installation."
 - Provide the location (GPS location preferred) of the original location of the marker being relocated.
 - Be sure to record the location of the new installation in the upper part of [Form TD-4412P-09-F01, "Pipeline Marker Installation and Repair Form."](#)
 - b. Remove the existing marker.
 - c. Install the marker in the new location.
 - d. Send the completed form to PipelineMarkers@pge.com (subject: Marker Re-installation – [Division / District]).



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NOTE

Marker removal must be approved by the pipeline execution team. Damage or removal of pipeline markers is a federal offense subject to a fine and/or up to 1 year imprisonment per 49 U.S.C. §60123(c).

- 2.4 IF markers are to be removed and neither replaced nor relocated,
THEN field supervisor must complete or oversee the following steps:
1. Send an email to PipelineMarkers@pge.com (subject: Marker Removal – [Division / District]) with a description of current status of pipeline marker.
 - a. Include location details (GPS coordinates, address, route, MP, etc.) of the marker in question.
 - b. Provide photos of the marker, showing both sides of the marker and the surrounding area (to help determine line of sight).
 - c. Fill out [Form TD-4412P-09-F01](#).
 - In the “Action Required,” select “Other.”
 - In the “Comments” section, write “Marker removal request.”
 2. The pipeline execution team must review the request and provide a response that either approves or denies the request.
 - a. IF the request is approved,
THEN the process continues as follows:
 - Fill out [Form TD-4412P-09-F01](#).
 - In the “Action Required,” select “Other.”
 - In the “Comments” section, write “De-installation.”
 - Remove the existing marker.
 - Send the completed form to PipelineMarkers@pge.com (subject: “Marker De-Installation” – [Division / District]).
 - b. IF request is denied,
THEN the marker must remain in place.



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3 General Marker Installation Guidelines

- 3.1 For details regarding the materials and tools required for pipeline marker and indicator installation, consult the following GDS:
- [GDS L-10, "Non-Metallic Pipeline Markers and Decals"](#)
 - [GDS L-11.1, "Pipeline Paddle Markers"](#)
 - [GDS L-12, "Pipeline Warning Decals"](#)
 - [GDS L-14.1, "Aerial Marker Plate and Bracket"](#)
 - [GDS L-15, "Pipeline Indicators"](#)
 - [GDS L-21, "Cable and Gas Line Crossing Signs"](#)
- 3.2 Install the marker posts in the upright position.
- 3.3 CALL Underground Service Alert (USA) by dialing **8-1-1** at least 2 working days, but no more than 14 calendar days, before excavating to install pipeline markers.
- 3.4 Installations must be made in accordance with Company safe excavation guidance documents. See [Utility Procedure TD-4412P-05, "Excavation Procedures for Damage Prevention,"](#) and [TD-4621M, "Excavation Safety Manual."](#)
- 3.5 Do not excavate within 5 feet (ft) of a critical facility without a designated and qualified standby person present. See [Utility Procedure TD-5811P-301, "Performing a Standby,"](#) and [Job Aid TD-5811P-105-JA04, "Identifying the Need for Site Visit, Field Meet, and Standby,"](#) for instructions on field meet and standby requirements.
- 3.6 Where practical, install each marker paddle perpendicular to the pipeline with the lowest corner's vertical drip line pointing vertically downward towards the pipeline. See [Figure 3, "Paddle Marker Installation,"](#) below, and [GDS L-11.1, "Pipeline Paddle Markers,"](#) for design specifications.
1. Use of foam polyurethane kit is acceptable for pipeline marker footings construction, Material Code M015490. See [Step 4.3](#) for installation steps and [GDS L-11.1, "Pipeline Paddle Markers"](#) for excavation dimensions.
- 3.7 IF aerial marker plate and bracket is in need of repair OR retrofit,
- THEN remove and replace with pipeline paddle marker as specified in Figure 4 of [GDS L-11.1, "Pipeline Paddle Markers."](#)
- 3.8 IF aerial marker plate and brackets are in good condition,
- THEN verify that decals meet current specifications per [GDS L-12, "Pipeline Warning Decals."](#)



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- 3.9 Install non-metallic pipeline marker posts vertically so that they are perpendicular to the pipeline. See [GDS L-10, "Non-Metallic Pipeline Markers and Decals"](#) for design specifications.
- 3.10 Install warning decals on all pipeline markers as specified in [GDS L-10](#) and [GDS L-12](#).
- 3.11 IF installing a marker over the pipeline within 1 ft. of outside edge of line is not practical, THEN use offset markers.
- The offset marker must be labeled using the decals specified in [GDS L-10](#) and [GDS L-11.1](#) to show the direction of the offset.
 - Install paddle markers after offset decals are affixed.
- 3.12 IF parallel pipelines exist, THEN install a marker for each pipeline.
- 3.13 Install markers at significant turn points, terrain prominence, and reasonable fence lines to indicate the pipeline route.
- 3.14 IF attempting to install markers in private or public landscaped areas or public rights-of-way (ROW), THEN obtain permission of the appropriate property owner or government agency before installing.

NOTE

DO NOT USE pipeline markers to locate pipelines for USA purposes.

- 3.15 Locate and mark techniques may be applied by locators holding non-expired [OQ 05-01 OR OQ 05-04](#) to:
- Determine the approximate location of the pipeline.
 - Mark pipeline location per [TD-5811M, "Damage Prevention Handbook."](#)
- #### 4 Types of Pipeline Markers and Indicators
- 4.1 Install pipeline markers to identify the location of a pipeline. Three classes of markers are a "metallic marker," a "non-metallic marker," and a "pipeline indicator."
- Refer to Table 1, "Installation Cross-Reference" below for marker installation guideline when installing metallic and non-metallic markers. Note that some of the markers have additional steps that must be followed during the installation process.
 - Refer to individual marker sections below for additional information.



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Table 1. Installation Cross-Reference

Order of preference by type of marker	Delineate installation area	Contact USA	Confirm pipeline location with locate and mark OQ	Backfill hole, and compact around base
Paddle Marker	Required	Required	Required	Required
Tri-View Marker	Required	Required	Required	Required
Composite Marker	Required	Required	Required	Required
Plastic Post Marker	Required	Required	Required	Required
Pipeline Indicator, drilling required for installation	Required	Required	Required	Required
Pipeline Indicator, adhesive required for installation	Not Required	Not Required	Required	Not Required

4.2 Make field judgment about the type of marker that should be installed.

NOTE

Paddle markers are the preferred markers to install over Company pipelines.

4.3 Install Metallic Markers also called “paddle markers.”

1. Install the vertical plane of the orange and white paddle perpendicular to the pipeline, with the lowest corner’s vertical drip line pointing vertically downward toward the pipeline. See [Figure 3, “Paddle Marker Installation”](#) below.



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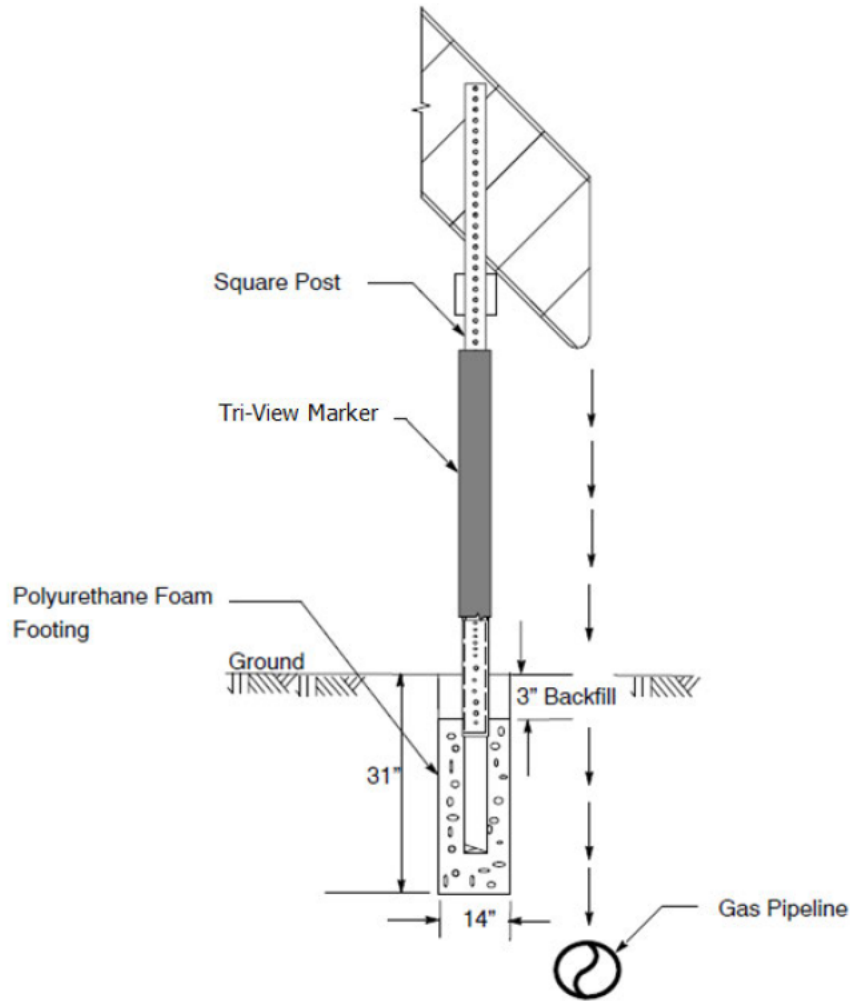


Figure 3. Paddle Marker Installation

- a. IF a bracket is needed,

THEN mount bracket on each paddle to allow the paddle to be more easily seen from the air. Refer to [GDS L-11.1, "Pipeline Paddle Markers"](#) for details.



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4.3 (continued)

2. Put together entire paddle marker assembly and install decals. Refer to [GDS L-11.1](#) for details.
 - a. IF marker installation requires a footing,
THEN excavate a hole 14 inches (-in.) in diameter and 31-in. in depth.
 - b. When using the foam polyurethane kit to install marker footing, perform the following steps:

NOTE

- Foam sets quickly and when the kit components are mixed the reaction cannot be stopped.
- Foam cannot be installed in wet weather or saturated soil conditions.



WARNING

Polyurethane vapors are poisonous. Prevent breathing in the vapors. Mix kit in a well ventilated location.

In case of fire, wear self-contained breathing apparatus pressure-demand and full protective gear.

- (1) Set marker assembly in center of excavation.
- (2) Verify that marker is upright.
- (3) Mix foam kit components close to the hole AND immediately pour mix into footing excavation. Wait a few seconds and mix will expand.
 - Walk around the excavation while pouring to evenly dispense around the structure.
- (4) Hold marker upright for 10 minutes after the foam has expanded.
 - In cold temperatures, the foam mix takes longer to set. In hot temperature, the foam mix sets faster.



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4.3 (continued)

- (5) Place backfill around the base of the pole.
 - When installing marker on leveled ground, use 3-in. of backfill.
 - When installing marker on a slope, use 6-in. of backfill to prevent footing exposure when erosion occurs.
- (6) Complete all required information on [Form TD-4412P-09-F01, "Pipeline Marker Installation and Repair Form."](#)

NOTE

Non-metallic markers should be used only when metallic (paddle) markers are unavailable or impractical to install.

- 4.4 Install non-metallic markers. Three types of non-metallic markers are: Tri-View™, composite, and plastic post.
 1. The Tri-View™ marker is designed to provide 360 degree (°) visibility to assist with field identification. Spread out the hooks located at the bottom of the marker. Refer to [GDS L-10, "Non-Metallic Pipeline Markers and Decals"](#) for more information.
 2. IF the Tri-View™ markers are unavailable at the time of the installation,
THEN a composite marker may be installed.
 - a. Refer to [GDS L-10](#) for more information.
 - b. Consider using composite markers on flat surfaces such as walls, fences, or other structures. Use a driver to install the marker.
 3. IF a Tri-View™ or composite marker is not available at the time of installation,
THEN a plastic post marker may be installed. Refer to [GDS L-10](#) for more information.
- 4.5 IF installation of metallic or non-metallic pipeline markers is not practical,
THEN use indicators to identify the location of the pipeline.
 1. Install indicators to indicate the approximate pipeline location where it is both safe and practical to do so.
 2. IF indicator installation requires to drilling,
THEN call USA by dialing **8-1-1** at least 2 working days, but no more than 14 calendar days, before excavating to install pipeline markers.



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NOTE

A variety of pipeline indicators can be used as needed in developed areas. These indicators may be shown and explained to the property owner by the PG&E ground service personnel on site.

- 4.6 Install pavement indicators on recessed hard surfaces, such as concrete, asphalt, sidewalks and driveways. See Figure 4, "Pavement Indicator," below.
1. Perform pipeline locate and mark process, per [TD-5811M, "Damage Prevention Handbook."](#)
 2. Drill a 3/4-in. hole to determine the location and appropriate spacing of indicator using a special direct system (SDS) drill and bit.

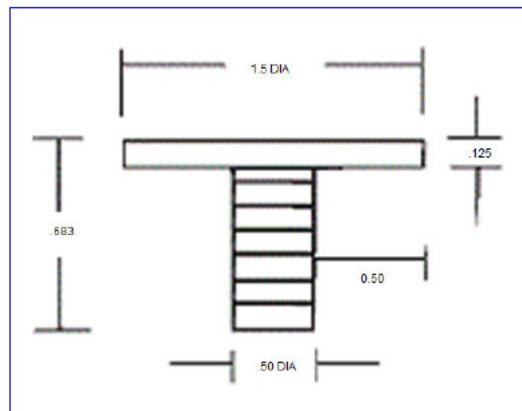


Figure 4. Pavement Indicator

3. Drill hole to the crown of the bit.
4. Use compressed air to blow out any debris.
5. Apply adhesive to the back of the pavement indicator.
6. Tap pavement indicator into hole.
7. Ensure tag is recessed slightly.



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NOTE

Make sure to install the indicator so that it does not pose a trip hazard.

- 4.7 Install curb Indicators on curbs and surfaces on top of gutters or spillways to provide a permanent warning message and location of the pipeline curb. See Figure 5, “Curb Indicator Installation” below.
1. Remove any loose debris from the installation location with a wire brush.
 2. Degrease the surface with isopropyl alcohol.
 3. Apply adhesive to the back of the indicator following the illustrated pattern of a concentric circle.
 4. Press the indicator onto the surface using even pressure. Adhesive should form a bead around the entire outer edge of the indicator to prevent water intrusion.



Figure 5. Curb Indicator Installation

- 4.8 Install pavement decals on concrete and asphalt and prepare a skid-resistant surface.
1. Surface must be dry and free of any loose debris. Wire brush surface to prepare.
 2. Peel paper backing off backside of decal and use alcohol to degrease.
 3. Allow time to dry.
 4. Firmly place decal over intended surface.
 5. Mechanically move air bubbles out of decal.
 6. Ensure that the long axis of the decal is parallel to and over the pipeline.
- 4.9 Install 4-in. round top and an 8-in. stake with anchors soil Indicators
1. In extremely hard soil conditions, use an impact bar with a non-conductive handle to make a pilot hole.
 2. Hold soil indicator upright, gripping the stake.



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4.9 (continued)

3. Using a rubber mallet strike the center of the indicator to drive it into the ground.
4. Install indicator flush with surface

5 Maintenance of Markers

- 5.1 Maintain pipeline markers in an upright position.
- 5.2 IF decals are not legible, missing, or if the phone number is not consistent with [GDS L-10, "Non-Metallic Pipeline Markers and Decals,"](#) and [GDS L-12, "Pipeline Warning Decals,"](#)
THEN install or replace the warning decals on the markers.
- 5.3 Maintain areas around and on the ROW to maximize line of sight visibility to the greatest extent possible.
- 5.4 Report encroachments or vegetation overgrowth to the M&C or GT supervisor responsible for the pipeline.

6 Decals

- 6.1 Place decals on all markers, per [GDS L-10, "Non-Metallic Pipeline Markers and Decals,"](#) and [GDS L-12, "Pipeline Warning Decals."](#)
- 6.2 Place decals on vent stacks at both railroad crossings and regulator stations where they are publically accessible, per [GDS L-10](#) and [GDS L-12](#).

7 Reporting

- 7.1 After a pipeline marker is installed, fill out [Form TD-4412P-09-F01, "Pipeline Marker Installation and Repair Form."](#)
- 7.2 Submit an electronic scan of the completed form, which requires supervisor review, and email to: PipelineMarkers@pge.com.
- 7.3 Place a hardcopy of the form in the local binder.
- 7.4 Retain records per the Record Retention Schedule.

END of Instructions

DEFINITIONS

Crossing: A place where the pipeline crosses a river, railroad, or highway, for example. The term "crossing" does not include a situation where a main or transmission line is within a road and passes through a cross road intersection or railroad crossing, due to the impracticability of maintaining a marker in these locations.



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Main: A distribution line that serves as a common supply source for more than one service line, as defined in [49 CFR §192.3, "Definitions."](#)

Navigable waters: As defined in [33 CFR §329, "Definition of Navigable Waters of the United States."](#)

Pipeline indicators ("indicators") are any and all products that identify the approximate location of pipeline but do not meet the marker lettering dimension specifications described in [49 CFR §192.707 \(d\), "Line markers for mains and transmission lines."](#)

Scout: Field investigator observing pipeline marker condition, e.g., work resources personnel.

Transmission line: A pipeline, other than a gathering line, that: (1) transports gas from a gathering line or storage facility to a distribution center, storage facility, or large volume customer that is not down-stream from a distribution center; (2) operates at a hoop stress of 20% or more of SMYS; or (3) transports gas within a storage field, per [49 CFR §192.3, "Definitions."](#)

IMPLEMENTATION RESPONSIBILITIES

An email communication will be send after publication to all the impacted groups. The pipeline execution team will schedule conference calls for supervisors of impacted groups to review documents changes, new forms and answer any questions. The target audience will receive a mandatory tailboard from supervisors; the supervisors will complete documentation of completion through training services.

GOVERNING DOCUMENT

[Utility Standard S4412, "Preventing Damage to Underground Facilities"](#)

COMPLIANCE REQUIREMENT / REGULATORY COMMITMENT

Code of Federal Regulations (CFR):

- [49 CFR §192.5, "Class Locations"](#)
- [49 CFR §192.707, "Line Markers for Mains and Transmission Lines"](#)
- [33 CFR §329.4, "Definition of Navigable Waters of the United States"](#)

[California Code of Regulations \(CCR\), Title 23. Waters, Division 1. "Central Valley Flood Protection Board," Chapter 1, "Organization, Powers and Standards," Article 8. "Standards," §123, "Pipelines, Conduits, and Utility Lines."](#)

REFERENCE DOCUMENTS

Developmental References:

NA



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Supplemental References:

[GDS L-10, "Non-Metallic Pipeline Markers and Decals"](#)

[GDS L-11.1, "Pipeline Paddle Markers"](#)

[GDS L-12, "Pipeline Warning Decals"](#)

[GDS L-15, "Pipeline Indicators"](#)

[GDS L-21, "Cable and Gas Line Crossing Signs"](#)

[GDS O-10.1, "Electrolysis Test Stations"](#)

[Utility Procedure TD-4412P-07, "Patrolling Pipelines"](#)

[SAFE-1001S, "Safety and Health Program Standard"](#)

APPENDICES

NA

ATTACHMENTS

[Form TD-4412P-09-F01, "Pipeline Marker Installation and Repair Form"](#)

DOCUMENT REVISION

This document supersedes Utility Procedure TD-4412P-09, "Gas Pipeline Markers and Indicators," Rev: 1, issued 09/2013.

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REVISION NOTES

Where?	What Changed?
Revision 2a	
Section 7	Added record retention statement.
Revision 2	
Safety section	Added disposable vinyl gloves to mix polyurethane foam components.
Before You Start section	Reformatted and added approved equipment information.
Section 1	Complete re-write.
Inserted new section 2, Pipeline Marker Intake Process	New section 2 was added and renumbered subsequent sections.
Section 3	Step 3.2 revised to align with California Government Code 4216. Added step 3.4 for standby and field meet reference. Step 3.5 added information for use of polyurethane foam for paddle marker footing. Added steps 3.6 and 3.7 to add guidance when aerial marker plates need repair and retrofit. Modified note 3.8 to address cancellation of Gas Design Standard L-14.1, "Aerial Marker Plate and Bracket."
Section 4	Update Table 1 to address requirement to call 8-1-1 when drilling is required for indicator installation. Added new figure 3 "paddle marker installation." Update step 4.3 to provide guidance for installation of polyurethane foam footing. Updated document reference in step 4.7.1. Updated step 4.9 to remove reference to Gas Design Standard L-14.1.
Section 7	Entire reporting section updated.
Definitions section	Added "scout."
Reference Document Section	Removed Gas Design Standard L-14.1.
Attachment Section	Updated Form TD-4412P-09-F01 to incorporate changes from revision cycle, and canceled Form TD-4412P-09-F02 as redundant.