

MONTANA EXCAVATION SAFETY HANDBOOK 2023

Know what's below.
Tap, Click, or Call
811 Before you dig.



Preface

This booklet is to help reduce damage to utilities, avoid interruption of service, and protect the worker and the general public. Mainly intended for excavation professionals, we encourage use by anyone.

The information is from various sources and provides guidelines for safe excavation, particularly involving underground utilities. It does give some guidelines for laborers working in and around trenches and equipment. For complete guidelines for working in and around trenches, please refer to your company's policy, OSHA, or other reliable sources.

This handbook for safe digging contains certain sections of Montana Code Annotated 2021 (MCA) 69-4-5. In addition, it uses information provided by the Montana Utilities Coordinating Council (MUCC), a nonprofit organization established in 1988, on using the 811-call center, as well as details on how to comply with the Montana dig law. With an increasing number of utilities installed underground, the MUCC works to achieve the orderly planning and installation of buried facilities.

We acknowledge the contribution of the Common Ground Alliance (CGA), whose *Best Practices* Version 18.0 was published in June 2021. For a complete copy of the latest CGA *Best Practices*, you can go to www.commongroundalliance.com. It is available for download in pdf format or hardcopy orders.

Please send feedback to Montana811.org or the MUCC

Montana811—Call Center

Call—Dial “811” or “1-800-424-5555.”

Online—Montana811.org

Montana811– Questions Clint Kalfell

Call—406-442-3070

Email– Clint.kalfell@montana811.org

Copy of Submitted Ticket

www.managetickets.com

General Excavation Safety Guidance

www.osha.gov/SLTC/trenchingexcavation/

To review the complete dig-law, which has precedence over anything in this book, go to:

Montana Code Annotated 69-4-5 Excavations Near Underground Facilities

https://leg.mt.gov/bills/mca/title_0690/chapter_0040/part_0050/sections_index.html

Quick Link URL - <https://qr.go.page.link/Uc7xH>



Acknowledgments:

Washington Utilities Coordinating Council, Common Ground Alliance, Montana Utilities Coordinating Council, Washington 811, Northwest Utility Notification Center, One Call Concepts, and ELM Locating.

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Important Numbers

For a Life or Death Emergency, call – 911

Two full business days before You Dig: CALL 811 or 1.800.424.5555

You can request a locate online using ITICnxt, ITIC Mobile, or the Montana811 App for tablets and smartphones. Go to Montana811.org, then choose “Excavators” or “Homeowners” Professional excavators must sign up by providing contact info and a username. Once a staff member at the Call Center emails you a password, you can log in to submit your locate request. Homeowners will have to provide an email address. In both cases, there is no more waiting on the phone!

Submitting Locate Requests Online

Online via ITICnxt (Montana811.org)

ITIC Lite – For Homeowners and DIY'ers

This service is available for homeowners that have a known and findable address. Go to Montana811.org and click on the “ITIC Lite – Homeowner/DYI'er” button. You must agree to the terms and conditions, fill in your email address and click on register. You will receive an email with instructions and a link to enter more information. After you enter the additional information, submit the form.

The call center will contact you with additional information and the locate ticket information. Just like the phone call, there is no charge for this service.

Follow the instructions until you receive a final email with your TICKET NUMBER and the list of notified utilities. Be sure to hang on to the TICKET NUMBER if you have any further questions.

ITICnxt / iSITE – Professional Excavators and Others

ITICnxt is the latest generation of online ticket submission using real-time interactive tools that allows you to enter your locate requests and updates live with the Call center. This service is available for Professional excavators, farmers/ranchers, or anyone needing more features or not having a specific address for their excavation location.

If you want to submit a ticket online, Go to Montana811.org and click on the “ITICnxt – Professional Excavator – Farmer/Rancher” button. If you are a first-time user, please click on Register. For all other users, please enter your username and password.

Tickets types are:

- 2 Business Days ticket
- Emergency ticket (*Only if you have submitted 40 tickets in a row without any errors*)
- Agriculture
- Safety Notify
- Damage Notify
- Unknown Facility Notify

For more information about ITICnxt / iSITE, visit Montana811.org.

Locate Ticket – Ticket Status / Positive Response

Communication is at the heart of the One-Call / Call Before You Dig system and the purpose of having Ticket Status / Positive Response. Two-way communication is essential and even vital to the successful location of underground lines. However, that isn't always available, so we have Ticket Status.

After a locate ticket is submitted, there is a minimal time frame for communicating between the locator and the excavator.

Only 2 days; and is less, due to :

- Daylight/working hours.
- Ticket transmission time and review at the utility/locator level until the locator determines that particular response or status is needed.
- Then the time for an excavator to become aware of the status notification is because of email or going to the website to look at the ticket status.

Since this leaves little time for communication via this method, Ticket Status is only one-way communication - Locator to the excavator only.

The Call Center will email status updates to the email address provided on the ticket. You can also check online via the ITICnxt / iSITE portal using the iSITE "Search and Status" at www.managetickets.com.

Montana811 Ticket Statuses and Definitions

Clear/No Conflict

The reporting member is stating the work area, as defined on the ticket, is clear of their facilities and that no marks may be visible. This status may be accompanied by their locator writing "Clear" or "OK" in the color of the utility type and the company name abbreviation.

Marked/Completed

The reporting member states that the work area defined on the ticket is marked.

Note: If the excavator has any questions regarding specific markings, they should contact that locator directly via the number listed for that utility.

Work-in-Progress – Not Yet Completed

The reporting member states that the locating was started, and some marks may be on the ground but are not completed yet. Marking is expected to be completed in 2 full business days from the date the ticket was submitted.

Not Marked - Contact Locator ASAP

The reporting member states the locator is having issues contacting the excavator and has questions regarding the locate request and needs the excavator to contact them to help complete the locate promptly. The locator may enter information into the remarks section to explain the issue, unable to access the excavation area, or other such problems.

It does not allow the utility or locator not to locate or go past the 2 full business days from the date the ticket was submitted.

Marked, Utility Representative Required

The reporting member is stating the work area, as defined on the ticket, has been marked, but they require a representative of the utility company to be present when excavating near their facility.

Does Not Report

Although technically not a response by the utility. Does Not Report is displayed when a member does not report the status of their locating to the Call Center. An excavator will need to contact them directly to find out the status of their locating on this ticket.

Guidelines for a Safe Excavation

Six Basic Steps to a Safe Dig:

1. Identify your excavation area and obtain location descriptions. We recommend you outline/mark your planned dig site in white marking paint or flags. Ensure access is made available to the locators.
2. Two business days before you dig, CALL 811 (Remember, the day you call does not count).
3. Do not dig until the locators mark all known utilities.
4. Preserve the marks.
5. Determine the precise location of the marked utilities by hand digging or using low-impact vacuum excavation.
6. Dig safely using proven excavating methods.

Identify the city, county, and any prominent landmarks of your excavation area. Determine distance and direction from the nearest cross street. If no specific road or address is available or not clear, use the work site's township, range, section, and quarter-section.

Be prepared to provide additional details such as 1) the nature of the work, 2) the date and time you plan to begin digging, 3) the name of your customer, and 4) the phone number.

An excavator must provide adequate information to the owners of underground facilities to locate and mark the location of underground facilities. If the locator cannot determine the path of the proposed excavation based on markings or other communications with the excavator. The excavator shall meet with the person completing the locate at the proposed site. *(MCA 75-6-303(2))*

The information may include but is not limited to marking the location of the proposed excavation with white paint, marking the path of the proposed excavation with white flagging, or other clear markings that allow the locator to determine the proposed excavation.

Providing some sort of document or mapping of the project is very beneficial to the locators to understand and locate the excavation area. Documentation can be attached via ITICnxt.

Keep a Copy of Your Locate Request

When finished, you will receive your ticket number. It is proof that you called. If you need to call back or talk with a utility company or their locator you will need that ticket number – please keep it handy.

We recommend to print a copy of your locate request. Your ticket will list the companies responding and their contact phone numbers. You will get a copy emailed if you submit your request via ITIC or provide an email address. You can also go to www.montana811.org to obtain a copy.

Those members have two full business days to locate and mark their locatable buried facilities or provide reasonably available information on un-locatable lines. Please remember the day of your call doesn't count.

[Pre-marking](#) allows the excavators to accurately communicate to facility owners/operators and their locator where excavation is to occur. The 1997 safety study "*Protecting Public Safety through Excavation Damage Prevention*" by the National Transportation Safety Board concluded that pre-marking is a practice that helps prevent excavation damage. Facility owners/operators can avoid unnecessary work by not locating facilities not associated with planned excavation.

See the section **Guidelines for Excavation Delineation** starting on page 60.

[Locate request size](#) is restricted to:

- 2 miles long by 1,000 feet wide in a rural area.
- 2,000 feet long by 300 feet wide within city limits and the area of an authority (see *MCA 75-6-304*).

[Agricultural Activity](#), including requests for locates before soil probing or testing, is limited by the size of the field where work is taking place.

Note: Locates that cover a larger area than allowed by law will be broken into two or more locates. Keep in mind that locates are for work you expect to start within 10 days. Locate requests online via the ITICnxt or the iSITE automatically breaks your excavation area into appropriate-sized tickets.

Limits of Locating and Marking

Private Property

Utilities and other underground facility owners mark only the lines they own, which is usually up to the meter. However, each utility owner is different. Please get in touch with your utility using the number on your locate ticket to find out precisely what they will be locating and what they will not locate. Underground lines beyond the meter or service entrance usually belong to the property owner and are that person's. Private locators are available to provide this service for a fee. You can find a list at: www.montana811.org.

PRIVATELY-OWNED LINES CAN BE LOCATED FOR A FEE

Water, natural gas, and residential electric lines are **usually** owned by the utility up to the meter. Some sewer districts own only the mains; others extend their ownership to laterals up to the property line. The customer typically owns everything beyond these points.

Check with your local utility provider to verify what they will be locating. You can find their phone number on your locate ticket.

Customer owned lines usually include propane tanks and lines, water wells, hot tubs, security lighting, pools, natural gas grills and any lines that serve outbuildings.

The free locating service available through 811 applies **ONLY** to facilities owned by utilities. The diagram below shows a variety of utilities, some owned by the utility and some by the homeowner.

These utilities marked by dotted lines are typically owned by the homeowner. Private locating services will mark these for a fee.

WATER (Blue line)
SEWER (Green line)
GAS AND OIL (Yellow line)

ELECTRIC (Red line)
PHONE AND CABLE (Orange line)

DON'T FORGET!
After calling 811, you must wait two business days before you begin digging!

811
Know what's below.
Call before you dig.

Homeowner Property Line

Pre-excavation Meeting or Meet on Site

When practical, the excavator can request a meeting with the facility locator at the job site before marking the facility locations. On major or large projects, an on-site pre-excavation meeting between the excavator, facility owners/operators, and locators (where applicable) is recommended. Including road, sewer, water, or other projects that cover a large area that progresses from one area to the next or that are located near critical or high-priority facilities. Such as high-pressure gas, high-voltage electricity, fiber-optic communication, and major pipe or water lines.



If a pre-excavation meeting or meet-on-site is requested, it does not obligate a locator to complete their markings at that time. The completion of the meeting will not affect the requirement to have the locates completed within 2 business days.

NO digging is to take place until ALL known utilities are marked or otherwise accounted for with information provided by the facility operator (*MCA 69-4-502(1)(a)*).

Any excavator that violates these rules, and damages buried lines, may be liable for fines and penalties and may be held responsible by the owner to pay to restore the damaged facility.

Large Non-Continuous Work Areas

(i.e., Highway signage project or delineator installation)

The preference for a locate request largely depends on the density of the work or excavation areas. Locate request size is restricted to:

Locate requests for agricultural activity, including soil probing or testing, are limited to the size of the field where the testing is being conducted.

Note: Larger areas need to be broken up into two or more locates. Keep in mind that locates are for work you expect to start within ten days.

Excavators will need to designate the starting and ending points of the route, along with each point along the way. If you are unsure how to proceed, call the Call Center and request the Help Desk to assist you with making the locate request work for everyone involved.

Large Area – Low-Density Example

Suppose you have a highway sign project that covers 2 miles of roadway and has only 9 points of excavation along that route. In that case, it usually means there will be a further distance between locations, making it difficult to manage and describe the location of each point. In this case, you must submit a separate ticket for each excavation location.

Smaller Area – Hi-Density Example

A smaller area, such as 2 miles, has 39 points along that route where excavation is taking place, you could put them on one ticket, providing that each excavation site along the route is marked separately. Ideally, mark the pavement edge with a white arrow pointing to the excavation area in the ditch. The excavation area would be marked with a stake with a white ribbon and placed at the center of the excavation area. Having a unique number or identifier on the stake would also be beneficial, identifying the site and how it matches the information provided on the Locate Request Ticket.



Large, Multiple-contractor Projects

(i.e., Community-wide Fiber Optic Installation, Sewer Replacement Projects)

We recommend that project managers and engineering firms contact the Montana811 Administrator to coordinate a “Safe Excavation Roundtable” several months before the project starts. If the project has a pre-construction meeting, it is a great time to include a roundtable.

Provide contact information for all general and subcontractors involved with the project. Also include the project's scope, area, dates, and crews involved.

The Montana 811 Administrator may be able to contact the potentially affected parties and create an opportunity to understand and discuss the requirements needed to provide underground locates for the project effectively and safely. This preconstruction meeting is a valuable tool that has proved to help alleviate confusion and frustration when these large multi-contractor projects happen. It also allows the affected underground facility owners time to ensure they have enough staff to complete the locates on time throughout the project.

Large Continuous Work Area

(i.e., Fiber Optic Long Haul installation, Transmission Pipeline Construction, Road Construction)

Tickets should be staggered over several days and submitted 5 -10 days before the excavation work is planned to start. If you can provide information on the full project at the beginning of the project to the affected underground facility owners. It will allow them time to ensure they are staffed well enough to complete the locates on time throughout the project.

Separate Locate Requests

Every excavator on the job should have their own one-call reference number before excavating. There are often several excavators on a job site performing work. The construction schedule may simultaneously dictate different work requiring excavation from other specialty contractors. In these situations, each excavator must obtain a one-call reference number before excavation to ensure that the specific areas are appropriately marked by any affected underground facility owner/operator.

Underground Facility Location Markings

Underground facility owners must complete markings within two full business days of receiving notification of excavation and requesting underground facility location marks. (MCA 69-4-503(3)(a)).

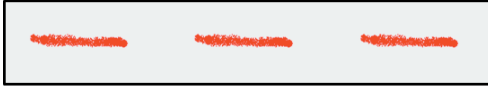
The markings will use the American Public Works Association (APWA) Uniform Color Code to identify the type of underground facility.

White	PROPOSED EXCAVATION
Fluorescent Pink	TEMPORARY SURVEY MARKINGS
Red	ELECTRIC POWER LINES, CABLES, CONDUIT AND LIGHTING CABLES
Yellow	GAS, OIL, STEAM, PETROLEUM OR GASEOUS MATERIALS
Orange	COMMUNICATION, ALARM OR SIGNAL LINES, CABLES OR CONDUIT
Blue	POTABLE WATER
Purple	RECLAIMED WATER, IRRIGATION AND SLURRY LINES
Green	SEWERS AND DRAIN LINES

The markings will be either one or a combination of paint, pin-flags, or whiskers in the color identifying the type of underground facility depending on the terrain, vegetation, and weather conditions.



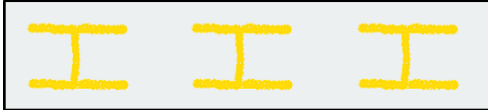
Common Paint Marks



Stripe – used to mark smaller sized cables & pipes.
Marks should be approximately 18 inches long and 2 inches wide.



Dots – used to mark cables & pipes in decorative, landscaped areas & sidewalks.
Dots should be approximately the size of a grapefruit or softball.



Lazy "H" – **Not used everywhere**
used to mark larger sized pipes, usually 4 inches in diameter or larger.
Width of "H" should match diameter of pipe.
Sometimes used to mark an "unknown" number of cables, or ducts.



Duct – **Marks can vary regionally**
used to mark multiple cables which are buried together and placed in conduit.
Width of marks should correspond to number and arrangement of conduit.

Locate Verification

Upon arrival at the excavation site and before beginning the excavation, an excavator does the following:

- Verify that the dig site matches the one-call request and is timely
- Verify that all facilities are marked, review color codes, and discuss with the facility owner if in doubt.
- Verify all service feeds from buildings and homes.
- Check for signs of underground facilities, such as pedestals, risers, meters, and new trench lines.
- Check for any facilities that are not members of the one call center and contact someone to get them located, e.g., propane lines and tanks, water well service, sprinkler systems, and private electrical lines.

A pre-excavation checklist is recommended by insurers and practiced by responsible excavating contractors.

Facility Owner/Operator Failure to Respond

When the facility owner/operator fails to respond or to notify the excavator within two full business days of the excavator's locate request, the excavator should contact the locator listed on the ticket for the missing utility. Talking directly with the locator is always the best and fastest method to find out what is happening with the locate. The facility owner/operator and the excavator must partner to ensure that facilities are marked in an acceptable time frame to allow underground facility protection. If it is a chronic problem, contact the Montana 811 Administrator.

Unlocatable Underground Lines

If there is an identified but unlocatable underground facility, the underground facility owner shall provide the excavator with the best available information as to their locations. An excavator who proceeds in a careful and prudent manner is not responsible for damages to an underground facility that the underground facility owner cannot locate. (*MCA 69-4-503(5)*).

Preserve the Marks

Respect the marks which identify the location of the buried facilities. Once the owner/operator of the underground utility marks their buried lines, it is the excavator's responsibility to preserve the marks (*MCA 69-4-503(5)*) for the length of the project. A locate ticket is only good for 30 days from the "work to begin date" on the ticket. Compliance with preserving marks may be attained by following the recommended guidelines below.

[Best Practices for preserving Locate Marks](#)

Onsite personnel responsible for maintaining the marks should determine which method will be most effective for the job. Individual utility companies may impose separate compliance requests depending on the job/area and size/complexity.

Preserve or protect as many of the original marks as possible.

You can use offset staking in areas where excavation or weather continuously destroys original locate marks. The offset staking must be uniformly aligned and accurately indicate the location of the original markings.

The use of digital images, other permanent imaging, or drawings (both to scale) can be used in areas where excavation or weather will destroy original locate marks.

Use white paint or flags to maintain the original markings.

Bookend the original locate marks with solid white squares or brackets.

Paint white dots between the original locate marks every eighteen to twenty-four inches for the whole length of the original markings. Include the type of facility marks, e.g., T for telephone, G for natural gas, W for water, etc.

On multiple requests for re-locates, the utility owner/operators reserve the right to recover costs of remarking. Requests for re-locates should include information such as the specific sight (area) that needs to be re-located and which utilities need to be re-marked.

Documentation of Marks

Excavators and locators need to document the location of markings before excavation work begins. An excavator should use pictures with embedded date and time stamps, videos, or sketches (with distance from markings to fixed objects recorded) to document the original placement of markings before excavation work begins. These will assist in resolving situations where the locate marks may or may not be accurate. Documentation will help to avoid unnecessary litigation and expensive legal fees for all parties involved. The documentation will help if there is any question of whether the marks are still visible after time or weather has passed.

Work Site Review with Company Personnel

Before starting work, the excavator should review the location of underground facilities with site personnel. Sharing information and safety issues during an on-site meeting between the excavator and the excavating crews helps avoid confusion and unnecessary damage to underground facilities.

Facility Avoidance

The excavator should use reasonable care to avoid damaging underground facilities. The excavator should plan the excavation to prevent damage or to

minimize interference with the underground facilities in or near the work area. Foremost on any construction project is safety. Excavators using caution around underground facilities significantly contribute to the safe excavation of existing facilities.

Digging parallel to and slightly away from the underground facility marks while using mechanical excavation is recommended. Many pipeline companies will require staying 5 feet from the marks with mechanized equipment until safe excavation methods expose the line. Checking with any pipeline companies before excavation around their facilities will aid in knowing any requirements.

Excavation Observer

The excavator should use an observer to assist the equipment operator when operating excavation equipment around exposed underground facilities. The excavator designates a worker (an observer) who watches the excavation activity and warns the equipment operator if they are close to damaging that exposed facility. In most cases, mechanical equipment should not be operating with 18 inches of the existing exposed utility

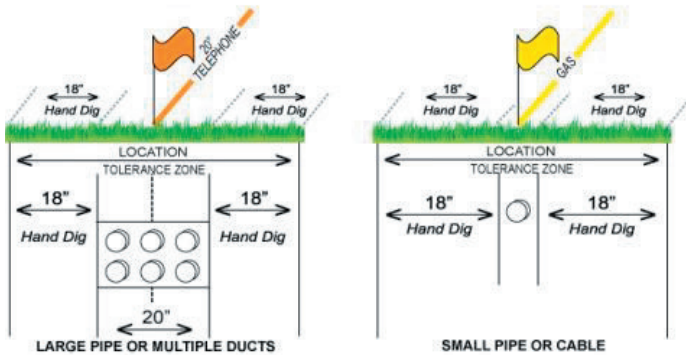


Locate Mark Expiration

Locate marks expire 30 days from the work to begin date of the locate request. The date of expiration is listed on the ticket. If you need to continue to excavate, call three days before the expiration date so you will not have a gap between tickets.

Excavation Tolerance Zone

TOLERANCE ZONE



Owner/operators of buried utilities are required to mark their locatable buried lines with reasonable accuracy. MCA 69-4-501(26) states, “Reasonably accurate means location within 18 inches of the outside dimensions of both sides of an underground facility.” This area is called the “Tolerance Zone” (See Tolerance Zone illustration below).

Excavation Within Tolerance Zone

When excavation occurs within the specified tolerance zone, the excavator must exercise necessary and reasonable care to protect any existing underground facility in or near the excavation area. This can be accomplished under certain climate or geographical conditions, by hand digging, when practical, soft digging, vacuum excavation methods, or pneumatic hand tools. Other mechanical methods or other technical methods may be developed with the approval of the facility owner/operator

Hand digging and non-invasive methods are not required for pavement removal.

Safe, prudent, non-evasive methods that require the excavator to manually determine the actual location of a facility are considered “safe excavation practices.” MCA 69-4-503(8) states the excavator must excavate in a careful and prudent manner to avoid damaging underground facilities. An excavator shall determine the precise location of underground facilities which have been marked. The accepted industry opinion is that the precise determination of an underground utility can only be made by exposing the buried utility. Depending

on site conditions, one, or a combination of the following options, is recommended: careful hand digging, potholing, and vacuum excavation, hand tools that use air or water under pressure, or other non-invasive methods. (Although considered non-invasive by many, care should be used when using these methods near pipe coating. They have been known to cause damage to the wrapping.) A list of available non-invasive or low-impact excavators is listed at www.montana811.org.

Exposing buried utilities via any mechanized method (e.g., backhoe, grader, jackhammer, etc.) is unacceptable.

Potholing

Potholing is the practice of digging a test hole to expose underground utilities to ascertain the horizontal and vertical location of the facility.

Some municipalities and utilities viewed potholing as an essential phase of underground construction for all types of excavation, including horizontal directional drilling (HDD) operations. This practice applies to all potholing activities for both construction and design applications. For detailed guidance, go to the Potholing Practice section.

Vacuum Excavation

Vacuum excavation, when used appropriately, is an efficient, safe, and effective alternative to hand digging within the designated underground facility tolerance zone. The safe exposure of underground facilities within the tolerance zone is essential to damage prevention. Site conditions may make using hand tools to expose underground facilities difficult or even impractical. Vacuum excavation is often an appropriate alternative. Locates must be obtained before the commencement of work. Many underground facility owners/operators have specific criteria for safe excavation/exposure practices around their facilities. Some underground facility owners/operators accept vacuum excavation as an equivalent to hand excavation for exposing their facilities, and others have restrictions on its use. You should contact all utility companies listed on your tickets to determine their conditions. Vacuum excavation is an appropriate method of excavating safely around underground facilities provided that the equipment:

- has been specifically designed and built for this purpose;

- is operated by a worker trained and experienced in its operation;
- is operated under practices that provide appropriate levels of worker and public safety and prevent damage to buried facilities; and is used in compliance with state/provincial laws and/or local ordinances.

Service Laterals

Excavators need special attention regarding service laterals within public rights-of-way and utility easements. Each municipality, homeowner's association, and water and sewer districts have its own set of guidelines as to who owns service laterals and who is responsible for locating laterals. Excavators must contact the underground facility owner directly to see their ownership policy.

We recommend facility operators:

- Locate and paint service laterals if able to do so with reasonable accuracy;
- Place a triangle at the main utility pointed at the structure or property connected to your service;
- Arrange to meet with the excavator at their worksite and provide available information about the location of service laterals; or
- Provide copies of available records of the service laterals via other delivery methods (including electronic or mail).

An underground facility owner may attempt to identify the location of a private underground facility connected to the owner's facility, but the facility owner is not liable for the accuracy of the locate (*MCA 69-4-503(7)*)

Excavations Near Pipelines

Some Pipeline Companies require permits and the presence of a company representative while excavating near or crossing their pipelines. Ensure you understand and comply with each Pipeline Company's requirements while excavating near their facilities.

Mismarked Facilities

The excavator must notify the facility owner/operator directly if an underground facility is not found where one has been marked. Following this notification, the

excavator may continue work if the excavation can be performed without damaging the facility.

Unmarked Facilities

When an excavator finds an unmarked facility, excavation should stop in the vicinity of the facility and notify the suspected facility owner or the One-Call Center. If excavation continues, the excavator should continue to practice safe excavation and look for additional facilities. You can submit an “Unknown Facility Notify” online or by calling the One-Call Center.

Exposed Facility Protection

Excavators should support and protect exposed underground facilities from damage. Protecting exposed underground facilities is as important as preventing damage to the facility when digging around the utility. Protecting exposed



underground facilities helps ensure that the utility is not damaged and, at the same time, protects employees working in the vicinity of the exposed facility. Exposed facilities can shift, separate, or be damaged when they are no longer supported or covered by the soil around them. Excavators should support or brace exposed facilities and protect them from moving or shifting, damaging the facility. Protection can be accomplished in different ways; for example, by shoring the facility site from below or providing timber support with hangers across the top of the excavation to ensure that the facility does not move or bend. In addition, workers are not to climb on, strike, or move exposed facilities that could damage protective coatings, bend conduit, separate pipe joints, damage cable

insulation, damage fiber optics, or in some way affect the integrity of the facility. The Occupational Safety and Health Administration (OSHA) also has addressed this issue in Subpart P—Excavation Standard 29 CFR 1926.651(b)(4), which states, “While the excavation is open, underground installations shall be protected, supported, or removed as necessary to safeguard employees.” For example, an unsupported sewer main could shift, causing the pipe joints to separate, resulting in the trench where employees are working flooding, consequently endangering the safety of employees.

Locate Request Updates

Any excavation that covers a large area and will progress from one location to the next over a while should be broken into segments when notifying the one call center to coordinate the marking with the actual excavation.

On long projects over 30 days, the excavator needs to call the One Call Center to refresh the ticket every 30 days from the date of the previous request. Any excavation not begun within ten days of the request should consider requesting an update.

New facilities were possibly installed in the area of your designated excavation site since the original notification and marking. This practice also helps in situations where multiple excavators are working in the same area simultaneously, and one installs a new underground line. An example is when two facility owners, such as a cable television company and a telephone company, are planning to serve a new subdivision section. In their pre-planning process, they see a vacant space in the right-of-way to place their new facility. Each excavator (internal or external) calls the one call center for locates, and each facility owner/operator comes and marks their respective facilities indicating that nothing exists. For one reason or another, one of the excavators gets delayed and does not start construction as planned. When returning to the job site to place their new facility, they damage the recently installed line that wasn't there during the subsequent marking request.

Keep in mind many facility owners/operators do not perform their own locates and utilize the services of a contracted facility locator. These contracted facility locators may not be aware of other work planned in the near future. By excavators refreshing the locate ticket, the contract locator has another opportunity to identify newly placed facilities. This practice also gives the facility owner/operator another chance to identify the location of their facilities and to

avoid possible damage and disruption of service if something was mismarked or missed on a previous locate. Excellent planning, generation, and updating of tickets enhance safety and reduces the unnecessary use of locate resources. We also encourage utility owners to mark all new construction underground lines after burying the lines to help prevent this lag in notification and marking problems.

Facility Damage Notification

If a jurisdictional pipeline (a pipeline carrying hazardous or flammable gas or liquid is damaged and there is a release of product, MCA 69-4-523 requires the excavator to make a 9-1-1 call and request emergency services immediately. As soon as practicable, the excavator must also contact the underground facility's owner. If the excavator cannot reach the underground facility owner, the excavator shall contact the proper notification center.

If you need a repair phone number for the facility owner/operator, look at a copy of locate request ticket.

Report all breaks, leaks, nicks, dents, gouges, grooves, or other damages to facility lines, conduits, coatings, or cathodic protection. The possibility of facility failure or endangerment of the surrounding population dramatically increases when a facility is damaged. Although the facility may not immediately fail, reporting the damage allows the underground facility owner/operator to inspect the damage and make appropriate repairs.

Notification of Emergency Personnel

If the damage results in the escape of any flammable, toxic, or corrosive gas or liquid or endangers life, health, or property, the excavator is responsible for notifying 911 and the facility owner/operator immediately. The excavator must take reasonable measures to protect everyone in immediate danger, the general public, property, and the environment, until the facility owner/operator or emergency responders arrive and complete their assessment. This practice



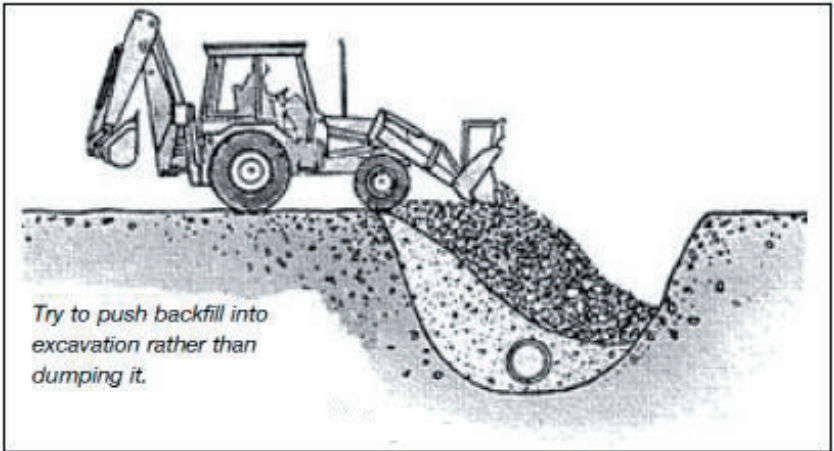
minimizes the danger to life, health, and/or property by notifying the proper authorities to handle the emergency. In these situations, local authorities can evacuate as appropriate and command substantial resources unavailable to the excavator or underground facility owner/operator. The excavator must take reasonable measures based on their knowledge, training, resources, experience, and understanding of the situation to protect themselves, people, property, and the environment until help arrives. The excavator responsible should remain on-site to convey pertinent information to responders that may help them safely mitigate the situation.

Emergency Excavation

In the case of an emergency excavation, maintenance or repairs may be made immediately, provided that the excavator notifies the One Call Center and facility owner/operator as soon as reasonably possible. Emergencies include situations involving danger to life, health, or property or requiring immediate correction to continue operating or ensure the continuity of public utility service or public transportation. (MCA 69-4-508).

Backfilling

The excavator needs to protect all facilities from damage when backfilling an excavation. Trash, debris, coiled wire, or other material that could damage existing facilities or interfere with the accuracy of future locates should not be buried in the excavation. Remove large rocks, sharp objects, and chunks of hard-packed clay or dirt. No trash or pieces of abandoned lines are to be backfilled into the trench. Using these guidelines will help prevent accidental damage to the facility during the backfill process.



As-built Documentation

Contractors installing underground facilities should notify the facility owner/operator if the actual placement is different than the expected placement. For a facility owner/operator to maintain accurate records of the location of their facilities, the contractor installing the new facility must notify the facility owner/operator of deviations from the planned installation. Some facility owners/operators do not require a full-time inspector and use a sampling process to ensure that a new facility is correctly installed in compliance with specifications. When this occurs, it becomes much more critical for the contractor to notify the facility owner/operator of changes. For example, it is common for the contractor to adjust the location of the new facility when rocks or other underground obstructions are encountered or when the location of the new facility conflicts with another existing underground facility. A change in plan can represent changes in horizontal or vertical distances from the specified plans.

The facility owner/operator establishes standards that require notification if a deviation is beyond specified tolerances, such as changes in depth of 6 in. or more and lateral measurement changes of greater than 1 ft. When changes to the expected location are communicated to the facility owner/operator, it is the owner/operator's responsibility to take appropriate action to update their records so that an accurate locate can be conducted in the future.

Trenchless Excavation

All stakeholders should comply with all best practices and the following general guidelines before, during, and after any trenchless excavation (as applicable). Also, see the "Potholing Practice" section.

The excavator requests the location of underground facilities at the entrance pit, trenchless excavation path, and exit pit by notifying the facility owner/operator through the One Call Center.

The trenchless equipment operator performs a site inspection, walks the trenchless excavation path before commencing work, and understands the job well.

All utilities along the route should be potholed to verify location and depth. Gas lines and liquid lines should be daylighted to verify the trenchless excavation tool cleanly passes under the pipeline without showing up in the excavation window.

When existing facilities are known to be present but cannot be potholed due to local conditions, the facility owner and the excavator must meet to discuss how to proceed safely with the excavation.

The trenchless excavation operator confirms and maintains the path and minimum clearances established by the project owner and design engineer by tracking and recording the path of the trenchless excavation until complete. Means of monitoring trenchless excavations include electronic locating/guidance devices, pipe lasers, water levels, visual inspection, etc.

The excavator stops the trenchless excavation operations if an abnormal condition, unknown substructure, or other hidden hazard is encountered. The excavator proceeds safely only after making a positive identification.

Emergency Coordination with Adjacent Facilities

Emergency response planning includes coordination with emergency responders and other aboveground and/or underground infrastructure facility owners/operators identified by the Incident Commander through the Incident Command System/Unified Command (ICS/UC) during an emergency. Many stakeholders are involved during emergencies: excavators, locators, owner/operators, first responders, One Call Centers, and the general public. Any actions taken by one stakeholder could adversely affect other stakeholders. Accordingly, emergency planning and response need to be coordinated.

Additional Safety and Excavation Information

The Occupational Safety and Health Administration (OSHA) governs construction safety, including excavations. OSHA 29 CFR, 1926 addresses construction industry safety regulations. OSHA, state statutes, and local ordinances must always be followed.

Potholing Practice

This section is to describe potholing methods and recommends procedures for potholing.

Potholing is the practice of digging a test hole to expose underground utilities to ascertain the horizontal and vertical location of the facility.

Potholing is accomplished through various types of excavation methods and equipment. This practice covers general processes and procedures. Procedures and practices associated with specific equipment should be based on the manufacturer's recommendations.

Potholing shall be utilized, as required and described herein, to prevent excavation damage to underground utilities.

Some municipalities and utility companies do not consider potholing to be an option. Instead, it is an essential phase of underground construction for all types of excavation, including horizontal directional drilling (HDD) operations. This practice applies to all potholing activities for both construction and design applications.

Backhoes

In the recent past, potholes were typically dug with backhoes. Digging potholes with a backhoe is a risky endeavor compared to other methods of potholing due to its potentially destructive nature. The backhoe method is inexact and cumbersome; even skilled backhoe operators risk hitting and damaging the utility they are trying to locate and protect.

The use of backhoes is not the preferred method of potholing. However, a “spotter” must be present for the entire excavation if a backhoe is utilized. A spotter is a person that observes the excavation process and communicates to the backhoe operator when a buried facility is sighted.

Hand Dig

Hand-digging a test hole is manually digging a pothole with handheld equipment such as a shovel. This method is labor-intensive and time-consuming. The advantage to hand digging is that it does not require expensive equipment and is relatively safe for locating most facilities. As with any excavation, extreme caution should be practiced if digging near hazardous utilities such as electric cables.

Vacuum Excavation

Vacuum excavation is the preferred method for non-destructive exposure of buried utilities. Vacuum excavation utilizes air or water pressure to break up the soil and a vacuum device to collect the spoil. Of the two methods, air vacuum excavation is generally preferred, though the specific site and environmental characteristics may lead to a decision to use water vacuum excavation.

Air-Vac

Air vacuum excavators utilize kinetic energy in a high-velocity air stream to penetrate, expand and break up soil. The loosened chunks of soil and rock are then removed from the hole using a powerful vacuum. A test hole is then created that reveals the buried utility. Holes vary in size and shape. A typical test hole is 6 inches to 12 inches in diameter and 4 to 6 feet deep. However, a test hole one-foot square is also typical. Holes can be considerably deeper if required. For example, holes in excess of 20 feet may be necessary to locate deep sewer mains. Dry or air excavation has several advantages over water vacuum excavation. For example, the air method is faster in most soils and eliminates the need for mud disposal. Since the spoil remains dry, it can immediately be used for backfilling. Air methods are safer for the operator and the utilities. One shortcoming of air units is that they are not effective in all soil types, especially wet, heavy clay, and caliche.

Water-Vac

Water vacuum excavation systems dig the pothole using high-pressure water to reduce and loosen the soil. A powerful vacuum removes the wet soil and mud

slurry to a spoil tank. Like air systems, a hole typically one-foot square or 6 to 8 inches in diameter is typical. The maximum hole depth for both systems is dependent on the vacuum limitations. The higher density of water produces powerful forces that are effective in most soils, including wet, heavy clays. Heated water systems can be used to excavate frozen ground allowing efficient potholing year-round. Operational caution is also necessary as high-pressure water systems have the potential of cutting through cables or damaging pipes if not used with care.

Construction Drawings

Construction drawings showing new construction and existing facilities should be present and utilized during potholing activities. Construction drawings should be compared to designating/locate paint marks to determine if all facilities shown on the drawings have been identified in the field. If drawings and paint marks do not match, consider additional potholing to determine accurate locations.

Contact Information

Have contact names and phone numbers for all known underground facility providers available. These numbers are on the one-call ticket under the heading "Utilities Notified."

If a utility cannot be located through potholing used in conjunction with drawings and locate marks, the facility owner should be contacted, and/or the state One Call Center should be notified.

Conditions Requiring Potholing

State statutes require that any excavation within 18 inches of marked utilities be performed carefully. The following sections are intended to advocate a careful and prudent method to protect existing underground facilities.

Close Proximity

We recommend that potholing be used to expose utilities for any excavation, especially horizontal directional drilling (HDD), within the tolerance zone of the marked utility. The tolerance zone (also known as the "approximate location") is typically a strip of land equal to the width of the underground utility plus 18 inches on either side.

We recommend HDD bore paths parallel to a utility within 3 feet, pothole at the beginning and end of the bore, and every 50 feet along the route. HDD bore paths parallel to a utility within 5 feet; pothole at the beginning and end of the bore and every 200 feet along the route.

Watch the boring bit enter and travel through the pothole to ensure it clears the existing facility.

Watch during the pullback of equipment and utilities through the bore. Back reamers are especially concerning since they are usually larger than the initial bore and could catch the existing facility.

Backhoe excavation should not be allowed within two feet of existing facilities.

Congested Utilities

In congested areas that have several facilities nearby and/or crisscrossing each other, locates have more significant potential to be considerably less accurate. It is recommended that potholing be utilized for excavations near congested utility areas.

Hazardous and Vital Systems

Hazardous systems include electric cables and all types of natural gas pipelines, including transmission, distribution, and service lines. Vital systems include telephone transmission lines, fiber optics, and other communication cables.

For the preservation and protection of human life and vital facilities, it is recommended that excavations with 3 feet of hazardous or critical systems utilize potholing to locate the facility.

Protecting Exposed Facilities

As with all excavation, facilities exposed during potholing must be protected throughout the project. Exposed facilities can shift or sag when the soil that was supporting and protecting the utility is removed. Utilities rendered unsupported due to potholing should be temporarily supported by shoring or other means. The utility should also be protected from heavy and sharp items falling into the excavation, which could crush or cut the facility.

Backfill and Restoration

After the underground utility has been located, the pothole should be restored within 24 hours or as directed. Appropriate sediment controls should be utilized during all potholing activities to prevent stormwater pollution. The pothole should be clean and dry before backfilling. Backfilling of the excavation and the restoration of pavement or surfacing shall be in accordance with the governing authority's standards and specifications.

Drilling mud or remaining spoil material should be cleaned up and the area restored to its original condition or better. The contractor is responsible for disposing of any drilling mud or remaining spoil material in an environmentally suitable manner.

Additional information can be found in the Occupational Safety and Health Administration, Construction Industry Regulations, 29 Code of Federal Regulations, 1926, Subpart P, Excavation Standard, OSHA.

Natural Gas Pipeline Safety

Information about specific natural gas pipeline companies is available by calling them directly using the contact information provided in the Locate Request Ticket.

Note: Most of these guidelines can apply to propane distribution systems; however, please beware that natural gas rises in the air and propane sinks. Also, most propane lines are private and not included in the One Call Center. Most of these guidelines also apply to liquid gas pipelines. In any case, if unsure, contact the pipeline operator directly.

Natural Gas Demands Respect

A leading cause of natural gas pipeline incidents is third-party damage. As with buried electric cables, excavators must take particular care when working and digging near natural gas pipelines.

Natural gas is a safe, reliable, and predictable fuel when properly handled and consumed.

Natural gas ignition occurs with a gas-to-air ratio between 4% to 14% and 1100 degrees temperature. Natural gas has a specific gravity of .6, is lighter than air, allowing it to rise. A distinctive odorant is added to aid in leak detection. If a pipeline rupture or leak occurs, natural gas may migrate under paved or hard surfaces into buildings and surrounding areas. If you detect a leak, leave the site immediately and contact your natural gas provider or 911. Do nothing to create a spark.

Natural gas is distributed in a variety of pressures and types of pipe. Steel and plastic pipelines are widely used throughout Montana. They range in size from 1/2 to 36 inches in diameter. Operating pressures vary between low pressure (LP 6" Water Column), Intermediate pressure (IP 60 psig), and high pressure (HP100+ psig). Any excavation occurring around high pressure (HP) pipelines must be monitored continuously by utility personnel.

Natural Gas Incidents

Always call 911 first! Then call the local utility company immediately to report any damage, leaks, or other natural gas incidents. If gas is leaking, immediately evacuate areas where gas is present. Keep people and traffic away and remove any ignition sources (open flames, turn off engines /equipment, radios, etc.) around the area of the damaged line until first responders and local utility company personnel arrive.

Don't try to repair a damaged or broken natural gas line by covering, crimping, bending, or otherwise restricting the flow. Don't touch a plastic pipe that is leaking. A spark from static electricity on a plastic pipe could become an ignition source. The local natural gas provider must make all repairs. Any time pipe is dented, or the wrap is scraped, the local natural gas provider will need to inspect it before it is buried or covered with fill. Even if the pipe is just nicked or bent, leave it exposed so the local natural gas provider can inspect it and make any necessary repairs. Care should be taken to avoid breaking the small wires located on or near natural gas pipelines. Companies with buried pipelines use different types of wires, some are for locating plastic pipelines, and others are necessary to monitor steel pipelines for proper protection from corrosion. If the wire is broken, call the local utility so repairs can be made to the damaged facilities

Don't try to extinguish a gas flame or fire. If natural gas is burning, let it burn and call 911.

Excess Flow Valve (EFV)

An EFV is a safety device designed to stop or restrict natural gas flow if an underground pipe is broken or severed.

The EFV is installed underground on the service line between the gas main located in the public right of way or a dedicated utility easement and the natural gas meter. Generally, the EFV is installed as close as possible to the gas main. In some instances, The location may need to be installed further from the gas main to accommodate interference from other buried structures.

Such damage is usually the result of some type of excavation. Although an EFV may help limit the effects or damage of such an incident, the best way to protect against such incidents is to ensure that anyone excavating on your property has called 811 to have buried pipelines properly marked before digging.

Work Practices

Directional boring: Gas lines must be pot-holed and identified before boring operations. Contact the local utility to verify pot-holed facilities before the bore operation. Leave pot-holes open and periodically inspect the facilities during the bore operation. Notify the utility immediately of any concerns.

Open trenches: Once exposed, all facilities must be adequately supported and protected from damage. If excavating parallel to a gas pipeline, call your local natural gas company to help determine adequate support, protection, and separation of the pipeline. Failure to properly support pipelines could result in a break or rupture. Use acceptable back-fill material with no sharp rocks, gravel, or slurry, which can damage the coating on steel pipelines and cause the failure of plastic pipelines over time.

Encroachment: Don't build any structures, such as sheds, decks, etc., over any pipelines or other facilities. Aside from being a serious safety issue, natural gas utilities must always have access to their buried gas lines. Always check with the utility owners when planning on building any structure, fence, or other facilities near a gas or liquid pipeline.

A minimum of 12 inches of separation shall be maintained when crossing or running parallel to distribution lines. High-pressure supply lines require 24 to 36 inches of separation unless the utility owner grants special permission.

Supporting Exposed Gas Pipeline

Excavators must provide structural support for underground facilities that have been undermined or exposed by excavation activity. Each structural support used for an exposed pipeline must be made of durable, noncombustible material and must be designed and installed such that:

- Free expansion and contraction of the pipeline between supports or anchors are not restricted.
- Movement of the pipeline does not cause disengagement of the support equipment.

Damage to the pipe and its coating is prevented where the pipe contacts the support or anchor.

When steel piping is supported or anchored, the pipe shall be insulated from the support or anchor. The temporary support or anchor shall be removed in its entirety without damage to the pipe and its coating. Steel cables, steel chains, or any sharp object shall not be used to support gas piping.

Backfilling Natural Gas Pipelines and Hazardous Liquid Pipelines

When a trench or bell hole is backfilled, it must be completed in a manner that provides firm support under the pipe and prevents damage to the pipe and pipe coating from equipment or from the backfill material. Always use sand or rock-free dirt and backfill six inches above and below natural gas pipelines and avoid compacting directly over the pipeline.

Backfill material shall not contain: garbage, cans, glass, recycled glass products, decomposable organic material, construction debris, washed gravels (including pea gravel), material that will not compact, sharp objects, frozen clods, large rocks or stones, pieces of pavement, wood skids or wedges, timbers, hay bales, boulders, or other material that may cause damage to the pipe, pipe coating, or casing/conduit.

NOTE: Do not unload backfill or pile it directly on top of any pipe until proper support from compacted backfill is provided for the pipe. The area under utilities must be backfilled and compacted without voids that will allow movement or stress to the pipe.

Backfill for General Construction

Initial backfill shall be sand, rock-free native soil, or soil-based select material that does not contain any rocks. If the native soil contains rocks, then a total of 12 inches of initial backfill shall be placed over the gas pipeline and across the entire width of the trench.

Final backfill may be soil-based select material or native soil but shall not contain rocks larger than 10 inches in diameter to prevent impedance of gas system maintenance.

Final backfill shall be sufficient to withstand normal wear and tear from foot traffic, weather, and other activities that may cause erosion.

Compaction

The excavator shall consolidate all backfill according to the terms of applicable permits and right-of-way agreements. The backfill shall be consolidated in unimproved areas to match the original soil structure.

Care shall be taken to prevent damage to the buried gas facilities and other underground lines when compacting backfill.

Care shall be taken when compacting around service and branch connections and points of transition between polyethylene and steel to ensure well-compacted support and to protect the pipe and fittings from excessive external loads.

Backfill material shall be compacted in lifts thick enough to prevent damage to the pipe. If the trench is wide enough, the spaces to the sides of the pipe shall be compacted first. If compaction is done by:

- Powered hand-operated equipment (such as Bigfoot or Jumping Jack), the initial backfill lift over the pipe shall be a minimum of 12 inches.
- Machine-operated equipment (such as Hoe-Pack or Hydro-Hammer), then the initial backfill lift over the pipe shall be a minimum of 24 inches.

Electricity

Electricity Demands Respect

Electricity can shock, burn, or kill workers if it is not handled correctly on the job site. Since it is always seeking the easiest path to the ground, you or any other type of conductor (metal, wet wood, trees, machinery/equipment, tools, etc.) touching a power line could provide a direct path to the ground. The result can be severe injury or death.

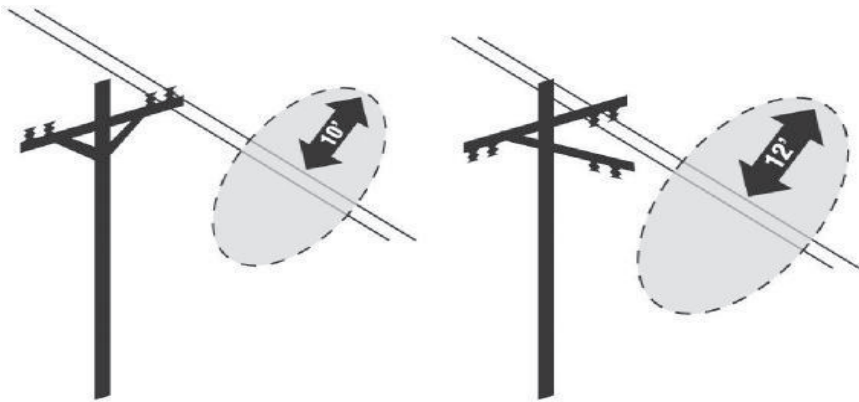
Before Starting to Work, Think about Safety!

Be observant. If you have work near power lines or power facilities, always consider them energized or hot.

Call the local utility company for more information or make arrangements to guarantee safe working conditions. For your safety, the utility company may turn off electricity, place barriers on lines, or relocate them as a last resort. Because it takes time to complete this work, allow for this time in your job schedule and let the utility know. For example, advance notice is required if it is feasible to take lines out of service. There may be a charge for work performed by the utility company.

Basic Rules for Electrical Safety

Ten feet is a minimum safe and legal clearance for equipment, tools, and people when working near overhead power lines and facilities. Never assume that power installations are insulated. State regulations require that a minimum of ten feet must be maintained from energized overhead high-voltage electrical conductors (up to 50,000 volts) with the extra distance needed for higher voltages (for example, 12 feet 2 inches is required for 115,000 volts). (See Legal Clearance illustration below.)



Legal Clearance

Equipment near lines can contact the line accidentally and injure the worker using the equipment. Hand-carried tools or materials are a common cause of accidents. Use extreme caution when carrying ladders, scaffolding poles, piping, or high-rise metal tools near power lines. Heavy or large equipment can be driven into lines accidentally. Care should be taken with cranes, front-end loaders, backhoes, and concrete pump trucks, as they may have sufficient reach to get into power lines.

Plan ahead. If your equipment will operate in the vicinity of power facilities, check to ensure there is no possibility of accidentally striking a power line or digging into a buried cable.

Don't touch electrical equipment; never attempt to move or raise electric lines or equipment, whether overhead or underground. If you need help to make the lines safe or have any doubts or questions about the safety of your job site, call the utility company.

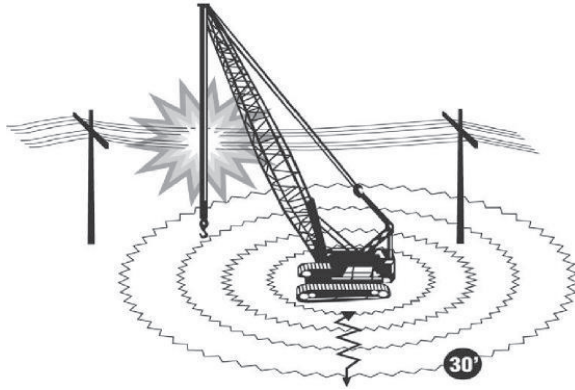
If Electrical Contact Occurs with Equipment

Do not panic! Remain on the equipment! You should be safe where you are. Do not try to get off the crane or excavator. Touching the power source and the ground simultaneously could be fatal.

If the equipment is on fire and it is necessary to exit the vehicle or equipment, jump clear of the vehicle while keeping both feet together, avoiding any wires on the ground. Stay calm and carefully jump so you don't fall back against the

equipment or simultaneously touch the earth and the equipment. Then shuffle with both feet close together, keeping both feet on the ground and always touching. Continue shuffling for at least 30 feet from the accident site.

Instruct all other personnel to stay at least 30 feet away from the equipment, ropes, and load. The equipment, the load, and the ground around them could be energized.



The equipment operator may remove the contact (only if it is safe to attempt) unaided and without anyone approaching the equipment. Move away from the line in the reverse direction to that which caused the contact (for example, if you swung left into the wire, swing right to break the contact). Remember: Once an arc has been struck, it can draw out a considerable distance before it breaks, so keep moving away from the line until the arc breaks and then continue moving until you are at least 10 to 15 feet away from the line.

Caution: If the wire rope/material appears to be welded to the power line, do not move away from the line, as it may snap and whip. Stay where you are until help arrives.

If the equipment cannot be moved away or disengaged from the contact, remain onboard until a qualified electrical utility worker de-energizes the circuit and confirms that conditions are safe.

Report every incident involving contact with a live line to the local electric utility company so inspections and repairs can be made to prevent damaged power lines from failing later.

Underground Power-line Safety

Digging trenches or excavating in areas where there might be underground power lines can be dangerous and expensive. One misplaced shovel or bucket could cause serious injury, knock out services, or damage surrounding homes and businesses. Excavators are responsible for ascertaining the location and voltage of any underground electric lines that employees may be working around and providing any protective measures and methods for working safely around them.

If an accident does happen, stay calm!

There are several basic steps to follow in case of an electrical accident:

- Do not touch the injured or any equipment in contact with the injured person. Even if the accident caused the electricity to be de-energized, use caution. Always assume the power lines are hot or energized. Power lines usually relay back into service and become energized several times within seconds following an accident, or they may not shut down.
- Do not attempt to rescue, and be sure to prevent others from approaching the victim and any electrically energized vehicles, objects, or structures.

DO NOT ATTEMPT TO DE-ENERGIZE HIGH-VOLTAGE POWER LINES.

CALL the local electric utility IMMEDIATELY!

Send for help. Call 911 to notify both the police and the fire department. Also, call the utility so they can turn the electricity off.

Water, Sewer, and Storm Lines

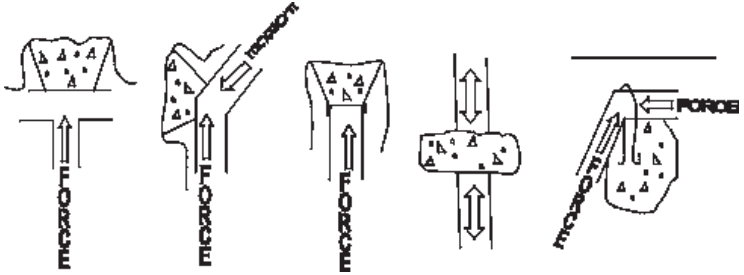
The following material is included to help excavators avoid problems when excavating near pressurized water lines.

[Pressurized water lines](#) are used to provide drinking water, fire protection, and irrigation. If a pressurized water line is damaged during construction, it can cause significant loss of service, property damage, and injury. The pressure range can be from 25 psi (pounds per square inch) to above 200 psi. When

working in any area near water lines, make sure the valve boxes remain accessible in case an emergency shutdown is needed.

Bends, Tees, Caps, and Thrust Blocks

Bends, tees, and caps are installed on lines to change the direction of piping. Thrust blocks are installed at the bends, tees, and caps to keep the pipe in place and absorb the force the pressurized waterline exerts when deflected in different directions. Thrust blocks are typically designed for the ground's bearing area.



Example: At 25 psi, an 8" line could have 1256 pounds of force exerted on the thrust block. At 200 psi, this 8" line could have 10,048 pounds of pressure exerted on the thrust block (not considering surcharging).

Do not disturb the ground around the thrust block or the thrust block itself. This may result in major leaks or break in water lines.

Do not expose a pressurized water main line for a distance greater than one stick of pipe, or it may move vertically or horizontally and rupture. Create a support line and excavate or expose only enough of the pressurized line to complete the crossing.

Do not use calcified backfill material against water lines such as concrete or CDF unless water lines are wrapped in 8 ml plastic.

Water Services

Water services can be made of pliable materials such as soft copper or polyethylene or more rigid material such as galvanized pipe, schedule 40 or 80 PVC, or other materials. Before backfilling, water service lines should be bedded in sandy, rock-free material. Caution should be taken when compacting to prevent damaging of service or pulling from the mainline.

Do not pull or dent water services. Dents and kinks may not leak immediately, but the water moving inside the service will wear on the defect and create a leak in the future. Report any dents, kinks, or pulling to the water purveyor.

Do not shut down water mains without the purveyor's permission. Tampering with a public water system is a federal offense (US Code Title 42, Section 300i-1). Most water purveyors also have policies with fine schedules that forbid an excavator from tampering with or shutting down the existing public system. Conditions or customers such as clinics, hospitals, and home medical equipment cannot have the water shut off without notice.

Always contact the water purveyor if you have any questions.

Sanitary Sewer Lines

Sanitary sewer lines are primarily used to dispose of human, industrial, and commercial waste that can contain fecal matter, chemicals, gases, and blood-borne pathogens. If damaged during construction, sanitary sewer lines can cause significant loss of service, costly property or wildlife damage, and injury. When working in any area where the sewer is nearby, ensure the maintenance hole lids remain accessible in case of an emergency backup or damage.

Maintenance holes

Maintenance holes contain contaminants, flammables, and raw sewage that can affect the air quality inside the maintenance hole. For that reason, confined space entry procedures required by federal, state, or local agencies should be followed for maintenance hole entry if entry is allowed by the sewer purveyor.

Do not allow construction debris or fluids to enter the maintenance holes or sewer line at any time. This may cause costly blockage and back-ups. If debris enters the sewer system, contact the sewer purveyor.

Do not excavate enough material near the maintenance hole to create uneven loading on the sides of the structure, or it may topple.

Excavation and backfill practices near sewer main and services

Sewer lines (mains and services) consist of many types of pipe, such as clay, concrete, PVC, HDPE, ductile iron, steel, cast iron, etc. Older brittle pipes may be present. Use extreme caution when excavating near existing sewer lines. An 18" minimum vertical separation is required when crossing perpendicular above the existing sewer line. Sewer lines should be re-bedded in rock-free material. Take caution when compacting to prevent damaging the pipeline.

Anticipate side sewer laterals that service structures nearby.

Do not pull, damage, or dent any sewer mainline or service. The damaged area may not leak immediately but could in the future. Report any damage to the sewer purveyor immediately.

Most sewers are gravity flow, but some areas have sewer force mains similar to water mains. If working near a sewer force main under pressure, familiarize yourself with the "working around water main guidelines" and contact the sewer purveyor for more information.

Fiber Optic Lines

Various organizations use fiber optic lines to transfer large volumes of information efficiently. They can be costly and time-consuming to repair, with additional monetary penalties related to the temporary loss of provided services. The amount of underground fiber optic facilities is increasing as more organizations deploy them.

Existing facilities include direct bury, poly conduit, metal conduit, or clay. Damage can disrupt public, private, or governmental services and critical emergency service communications, including 911. The repair and lost service cost justify any extra effort to avoid damage. The fiber optic owner may have differing requirements from the suggestions and recommendations listed below. The following are suggested guidelines and are not intended to be all-inclusive or exclusive of local requirements.

Safety

If a fiber line is damaged, never look directly into the fiber, as non-visible laser light can damage the eye. Use caution with the fiber strands themselves, as small particles of glass can enter the body and be undetectable by X-Ray.

Locating Fiber

Some fiber optic cables do not contain metal, making them difficult to locate. In some cases, the locating conductor is contained within the conduit or as a separate locating wire. When using a locator, always use the direct connection method as opposed to induction. The fiber optic owner should be contacted if there are any problems in finding a suitable connection.

Contact is key

An on-site pre-construction meeting with the excavator and facility owner will provide an opportunity to acquire plans and contact information. Some organizations insist on having a spotter present during any excavation.

Damage

Always immediately alert the fiber optic owner to even small amounts of damage to a fiber optic cable. Disruptions in service and reliability may not always be visible or may manifest themselves over time. Never attempt to repair a damaged line or backfill over it. Always notify the owner of any damage in the conduit or the locating wires.

Glossary of Terms and Definitions

For the purpose of the Common Ground Study, a standard set of definitions is used. These definitions were established by a consensus process similar to the methodology used to identify the best practices.

Abandoned Line or Facility: Any underground or submerged line or facility no longer in use.

Agricultural Locate Request: means a request for a locate and mark that is requested based on the perimeter boundary of an agricultural field: (a) by a property owner or excavator prior to agricultural activity; or (b) by a property owner or excavator prior to conducting soil probing or testing. *(MCA 69-4-501(1))*

Alternative Dispute Resolution (ADR): Any process or procedure other than litigation that is agreed to by the disputing parties as the means for resolving a dispute and is binding or non-binding pursuant to the agreement by the disputing parties. ADR includes, but is not limited to, advisory boards, arbitration, mini-trials, mediation, partnering, and standing neutrals.

As-built Drawing: A detailed depiction of facilities as installed in the field.

Attribute: Characteristic that helps describe the data.

Backfill: To fill the void created by excavating.

Bar Hole: means a hole made in the soil or pavement with a hand-operated bar for the specific purpose of testing the subsurface atmosphere with a combustible gas indicator.

Business Day: means any day, beginning at midnight and ending 24 hours later, other than Saturday, Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day. When a holiday listed above occurs on a Saturday, the preceding Friday is not considered a business day. When a holiday listed occurs on a Sunday, the following Monday is not considered a business day. *(MCA 69-4-501(2))*

Cathodic Protection: The process of arresting corrosion on a buried or submerged structure by electrically reversing the natural chemical reaction. This includes, but is not limited to, the installation of a sacrificial anode bed, the use of a rectifier-based system, or any combination of these or other similar systems. Wiring is installed between the buried or submerged structure and all anodes and rectifiers; wiring is also installed to test stations that are used to measure the effectiveness of the cathodic protection system.

Compliance: Adherence to the statute and its regulations.

Damage or damages: means any impact upon or removal of support from an underground facility as a result of excavation or demolition that, according to the operating practices of the underground facility owner, would necessitate the repair of the facility. (MCA 69-4-501(5))

Damage Reporting: The immediate reporting to a one-call center and the facility owner/operator of any damage caused or discovered in the course of excavation or demolition work; to immediately alert the occupants of premises as to any emergency that such person may create or discover at or near such premises; to contact emergency responders, if necessary, as quickly as practical.

Demolition Work: The partial or complete destruction by any means of a structure served by or adjacent to an underground line or facility.

Designer: Any architect, engineer, or other person who prepares or issues a drawing or blueprint for a construction or other project requiring excavation or demolition work.

Digital Imagery: A computer-compatible version of land-related information including, for example, topography, physical features, road/street networks, and buried facility networks obtained from a variety of sources, including, for example, aerial photographs, satellite photographs, road maps, survey plans, and buried facility records.

Downtime: Lost time reported by a stakeholder on the Damage Information Reporting Tool (DIRT) field form for an excavation project due to the failure of one or more stakeholders to comply with applicable damage prevention regulations.

Electronic Positive Response: Communication by telephone, fax, e-mail, or Internet from a facility owner/operator to an excavator providing the status of an owner/operator statutorily required response to a notice of intent to excavate.

Emergency: A sudden or unforeseen occurrence involving a clear and imminent danger to life, health, or property; the interruption of essential utility services; or the blockage of transportation facilities that require immediate action.

Emergency Excavation: means an excavation in response to an emergency locate request that is necessary to: (a) alleviate a condition that constitutes a clear and present danger to life or property; or (b) repair a customer outage involving a previously installed utility-owned facility. *(MCA 69-4-501(8))*

Emergency Locate request: means a request for a locate and mark that is requested for: (a) a condition that constitutes a clear and present danger to life or property; or (b) a customer outage for which repairs on a previously installed utility-owned facility are required. *(MCA 69-4-501(9))*

Emergency Notice: A communication to the one call center to alert the involved underground facility owners/operators of the need to excavate as a result of a sudden or unforeseen occurrence or national emergency involving a clear and imminent danger to life, health, environment, or property (including the interruption of essential utility services or the blockage of transportation facilities) that requires immediate excavation.

Emergency Response: A facility owner/operator's response to an emergency notice.

Event: means damages to an underground facility if: (a) the underground facility is not a jurisdictional pipeline, and (b) the underground facility owner determines the damages are not an incident. *(MCA 69-4-501(11))*

End User: means any utility customer or consumer of utility services or commodities provided by a facility operator.

Equipment Operator: means an individual conducting an excavation.

Excavate or Excavation: means an operation in which earth, rock, or other material in the ground is moved, removed, or otherwise displaced by means or use of any tools, equipment, or explosives. The term includes but is not limited to

grading, trenching, digging, ditching, drilling, angering, tunneling, scraping, and cable or pipe plowing and driving.

Excavation does NOT include: surface road grading maintenance or road or ditch maintenance that does not change the original road or ditch grade or flow line;

Or plowing, cultivating, planting, harvesting, or similar agricultural activities in areas cultivated: (A) within the last ten years, unless the activities disturb the soil to a depth of 18 inches or more; or (B) within the last 14 months, to a depth greater than 18 inches, unless the activities disturb the soil to a depth of more than 24 inches;

Or gardening by homeowners or occupants in a previously established garden area unless the gardening disturbs the soil to a depth of 12 inches or more, or landscaping by homeowners or occupants unless using mechanized equipment or disturbing soil to a depth of 12 inches or more. (MCA 69-4-501(12))

Excavator: means a person conducting the excavation activities defined in Excavate or Excavation. (MCA 69-4-501(13))

Facility: An underground or submerged conductor, pipe, or structure used to provide electric or communications service (including, but not limited to, traffic control loops and similar underground or submerged devices); or an underground or submerged pipe used in carrying, providing, or gathering gas, oil or oil product, sewage, storm drainage, water, or other liquid services (including, but not limited to, irrigation systems) and appurtenances thereto.

Facility Owner/Operator: 1) Any person, utility, municipality, authority, political subdivision, or other person or entity who owns, operates, or controls the operation of an underground line/facility. 2) means any person who owns an underground facility or is in the business of supplying any utility service or commodity for compensation. "Facility operator" does not include a utility customer who owns a service lateral that terminates at a facility operator's main utility line.

Gas: means natural gas, flammable gas, or toxic or corrosive gas.

Geographic Information System (GIS): An organized collection of computer hardware, software, and geographic data used to capture, store, update, maintain, analyze, and display all forms of geographically referenced information.

Geospatial Data: Data that identifies the geographic location and characteristics of natural or constructed features and boundaries on the earth.

Global Positioning System (GPS): A system consisting of 25 satellites that provide precise position, velocity, and time information to users anywhere on earth. Location information can be received using a GPS receiver. The GPS receiver helps determine locations on the earth's surface by collecting signals from three or more satellites through triangulation. Simple and inexpensive hand-held receivers provide an accuracy of ± 100 meters of an accurate position. More sophisticated receivers that use other technologies or that post-process the original GPS data can provide sub-meter location accuracy.

Grade: The surface of the earth (i.e., ground level) upon which a structure is built or prepared.

Grounding Systems: A system of one or more ground conductors or ground rods providing a low-resistance path-to-earth ground potential through a mechanical connection to structures, conductors, and equipment.

Hazardous Liquid: means: (a) Petroleum, petroleum products, or anhydrous ammonia as those terms are defined in 49 C.F.R. Part 195 as in effect on March 1, 1998; (b) Carbon dioxide; and (c) Other substances designated as hazardous by the secretary of transportation and incorporated by reference by the commission by rule.

Identified But Unlocatable Underground Facility: means an underground facility that has been identified but cannot be located with reasonable accuracy. (MCA 69-4-501(14))

Incident: means: (a) notwithstanding MCA 69-4-529(6), unless the underground facility is owned by the excavator, a violation of the provisions of MCA 69-4-502 or MCA 69-4-503 by an excavator that, at a single location on a single day, results in damage to an underground facility; or (b) a violation of the provisions of MCA 69-4-503(3) by an underground facility owner that, at a single location on a single day, results in damage to an underground facility. (MCA 69-4-501(15))

Joint Trench: A trench containing two or more facilities that are buried together by design or agreement.

Jurisdictional pipeline: means a pipeline subject to regulation by the U.S. department of transportation pipeline and hazardous materials safety administration under 49 CFR 190-199, the Montana public service commission, or both. *(MCA 69-4-501(16))*

Land Base: Mapped data that depicts features of the surface of the earth and is tied to real-world geographic coordinates, such as latitude and longitude.

Large/Complex Project: A single project or a series of repetitive, small, short-term tasks related in scope that impact facilities over a long time or a large area.

Latitude (Lat): Distance measured north or south of the equator.

Line: See “Geographic Information System (GIS)”

Locate: To indicate the existence of a line or facility by establishing a mark through the use of stakes, paint, flagging, whiskers, or some other customary manner that approximately determines the location of that line or facility.

Locate Request: A communication between an excavator and one call center personnel in which a request for locating underground facilities is processed.

Locatable underground facility: means an underground facility that can be field-located and field-marked with reasonable accuracy. *(MCA 69-4-501(17))*

Locate: means the use of specialized equipment to identify the location of underground facilities or the actual location of underground facilities identified by the use of specialized equipment. *(MCA 69-4-501(18))*

Locator: A person whose job is to locate lines or facilities.

Longitude (Long): Distance measured east or west from a reference meridian (Greenwich).

Mark: means the use of stakes, paint, or other clearly identifiable material to show the field location or absence of underground facilities, per the current color code standard of the American Public Works Association. Marking must include

identification letters indicating the specific type of underground facility and the width of the facility if it is greater than 6 inches. (MCA 69-4-501(19))

Marking Standards: The methods by which a facility owner/operator indicates its line or facility according to the APWA guidelines. (See Appendix A, "Uniform Color Code and Marking Guidelines.")

Member Database: Structured collection of data defined for a particular use, user, system, or program; it may be sequential, network, hierarchical, relational, or semantic.

Membership: Persons who participate voluntarily in a one-call center because they want to protect their lines or facilities or because they have a statutory responsibility to protect lines or facilities.

Minor or Routine Maintenance of Transportation Facilities: The adding of granular material to unpaved roads, road shoulders, airport runways, airport taxiways, and railroad roadbeds; removal and application of patches to the surface of paved roads, runways, and taxiways; cleaning and sealing road, airport, and canal lock facility cracks or joints; replacing railroad ties and related appliances excluding road crossings; adjusting ballast on top of railroad roadbed; cleaning of paved drainage inlets and paved ditches or pipes.

Near Miss: An event where damage did not occur but had the clear potential.

Notice: (See Notify:, :Notice:, or :Notification

Notification center: means an entity whose membership is open to and is contracting with underground facility owners with underground facilities within a notification center's designated service area. (MCA 69-4-501(20))

Notify:, :notice: or :notification: means the completed delivery of information to a person. The delivery of information includes but is not limited to the use of electronic data transfer. (MCA 69-4-501(21))

Notification Period: The time beginning when notice is given and ending when the work may begin.

One Call Center: See notification center.

Orthophoto: An aerial photograph of a site that has been differentially rectified to correct the distortion caused by the terrain and attitude (tip, tilt, and yaw) of the camera. A multicolored, distortion-free, photographic image.

Person: means an individual, partnership, firm, joint venture, corporation, association, municipality, governmental unit, department, or agency and includes a trustee, receiver, assignee, or personal representative of the listed entities. (MCA 69-4-501(23))

Pipeline or Pipeline System: means all or parts of a pipeline facility through which hazardous liquid or gas moves in transportation, including, but not limited to, line pipe, valves, and other appurtenances connected to line pipe, pumping units, fabricated assemblies associated with pumping or compressor units, metering and delivery stations and fabricated assemblies therein, and breakout tanks. "Pipeline" or "pipeline system" does not include process or transfer pipelines.

Pipeline Company: means a person or entity constructing, owning, or operating a pipeline for transporting hazardous liquid or gas.

Planning: An activity at the beginning of a project where information is gathered and decisions are made regarding the route or location of a proposed excavation based on constraints, including the locations of existing facilities, anticipated conflicts, and the relative costs of relocating existing facilities, or more expensive construction for the proposed facility.

Plat: A map or representation on paper of a piece of land subdivided into lots, with streets, alleys, etc., usually drawn to a scale.

Positive Response: means notification through an electronic system provided by a notification center that is available to underground facility owners and excavators and is used for communicating and documenting the status of a request for a locate. (MCA 69-4-501(24))

Pre-marking or Positive Site Identification: The marking of the proposed excavation site/work area, consistent with APWA guidelines.

Property Owner: a person owning real property in Montana, its agents, and its employees. The term does not include the owner of an easement. (MCA 69-4-501(25))

Public: The general population or community at large.

Railroad Operating Corridor: The property that is essential to a railroad company to enable it to discharge its function and duties as a common carrier by rail. It includes the roadbed, right of way, tracks, bridges, stations, and such like property.

Reasonable Accurate: means location within 18 inches of the outside lateral dimensions of both sides of an underground facility. *(MCA 69-4-501(26))*

Request for a Locate: means the process by which an excavator communicates with a notification center a request for underground facilities to be located and marked in an area where an excavation is planned. A request for a locate that is not an agricultural locate request and is not within city limits or within an area of an authority as defined in 75-6-304 may not exceed 2 miles long by 1,000 feet wide. A request for a locate that is not an agricultural locate request and is within city limits or within an area of an authority as defined in 75-6-304 may not exceed 2,000 feet long by 300 feet wide. *(MCA 69-4-501(27))*

Root Cause: The primary reason an event occurred.

Service Lateral: means an underground water, stormwater, or sewer facility located in a public right-of-way or utility easement that connects an end user's building or property to a facility operator's underground facility and terminates beyond the public right-of-way or utility easement.

Subsurface Utility Engineering (SUE): An engineering process for accurately identifying the quality of underground utility information needed for excavation plans and for acquiring and managing that level of information during the development of a project.

Test Hole: Exposure of a facility by safe excavation practices used to ascertain the precise horizontal and vertical position of underground lines or facilities.

Ticket Number: A unique identification number assigned by the One Call Center to each locate request.

The excavator receives and maintains a ticket number from the one call center that verifies that the locate was processed. The computer-generated request identifies the locate request's date, time, and sequence number. This number

distinguishes this ticket from all other tickets so that it can be archived and retrieved upon request to provide only the details of that request. The ticket number is used on all locate request messages. The excavator needs to record this number; it is proof of notification to the underground facility owners/members.

Third-party: means a person who is not an excavator or an underground facility owner. *(MCA 69-4-501(28))*

Tolerance Zone: The space in which a line or facility is located and in which special care is to be taken. See excavation in the Tolerance Zone. In Montana, it is 18 inches on both sides of the mark.

Underground Facility: means a facility buried or placed below ground for use in connection with the storage or conveyance of water, sewage, electronic, telephonic, or telegraphic communications, cable tv, fiber optics, electrical energy, oil, gas, or other substances. The term includes but is not limited to pipes, sewers, conduits, cables, valves, lines, wires, maintenance holes, and attachments to the listed items.

The term does not include: (i) shallow underground water systems designed to irrigate lawns, gardens, or other landscaping; (ii) privately owned water and sewer lines from private property extending into public rights-of-way to interconnect with public water and sewer; or (iii) an underground facility used solely to furnish services or commodities to real property if no part of the underground facility is located in a public street, alley, or right-of-way dedicated to the public use. *(MCA 69-4-501(29))*

Underground Facility Owner: means a person owning, controlling, or having the responsibility to maintain an underground facility. *(MCA 69-4-501(30))*

Vacuum Excavation: A means of soil extraction through a vacuum; water or air jet devices are commonly used for breaking the ground.

White Lining: When the excavation site cannot be clearly and adequately identified on the locate ticket, the excavator designates the route and/or area to be excavated using white pre-marking, either onsite or electronically (when available through the one call center), before or during the request for the locate ticket.

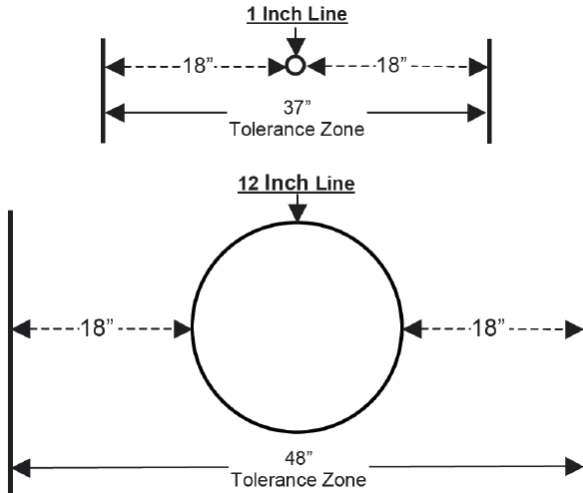
APPENDIX A

Uniform Color Code and Marking Guidelines

White	Proposed Excavation
Pink	Temporary Survey Markings
Red	Electric Power Lines, Cables, Conduit, and Lighting Cables
Yellow	Gas, Oil, Steam, Petroleum, or Gaseous Materials
Orange	Communication, Alarm or Signal Lines, Cables, or Conduit
Blue	Potable Water
Purple	Reclaimed Water, Irrigation, and Slurry Lines
Green	Sewers and Drain Lines

Tolerance Zone

The following examples are of tolerance zones for a 1-inch line and a 12-inch line:

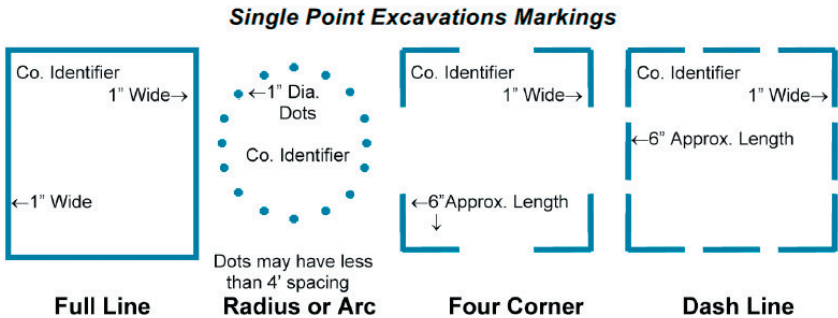


Guidelines for Excavation Delineation

The following marking illustrations show how excavators may choose to mark their area of the proposed excavation. The use of white marking products (e.g., paint, flags, stakes, whiskers, or a combination of these) may be used to identify the excavation site.

Single Point Excavations Markings

Delineate in white paint the proposed excavation area using a continuous line, dots marking the radius or arcs, dashes marking the four corners of the project, or dashes outlining the excavation project. Limit the size of each dash to approximately six in. to 12 in. long and one in. wide with interval spacing about 4 ft to 50 ft apart. Reduce the separation of excavation marks to a length that can reasonably be seen by the operator's locators when the terrain at an excavation site warrants. Dots of approximately one inch in diameter typically is used to define arcs or radii and may be placed at closer intervals instead of dashes.

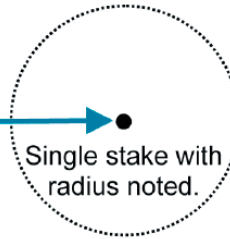


Single Stake Marking Center Point of Excavation Site

When an excavation site is limited to a 50 ft maximum radius or less, it can be delineated with a single stake positioned at the proposed excavation center. When the excavator chooses this type of delineation, they must convey that they have delineated the excavation site with a single stake at the center of the excavation and include the radius of the site in the notification to the one call center. This single stake is white and displays the excavator's company identifier (name, abbreviations, or initials) and the radius of the excavation site in black letters on the stake or with a notice attached to the stake.

Single Stake Marking Center Point of Excavation Site

The single stake defines the proposed center of the excavation site. The radius of the excavation site is to be clearly indicated on the stake.



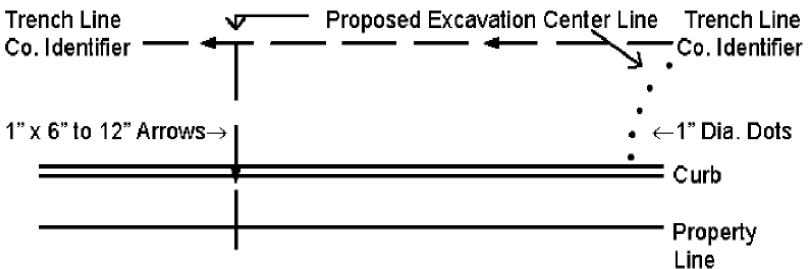
This circle illustrates the radius indicated on the stake.

Trenching, Boring, or Other Continuous-Type Excavations

Continuous Excavation Marking

Mark in white paint the proposed centerline of the planned excavation using 6 in. to 12 in. x 1 in. arrows approximately 4 ft to 50 ft apart to show the direction of excavation. Reduce the separation of excavation marks to a length that can reasonably be seen by the operator's locators when the terrain at an excavation

Trenching, Boring, or Other Continuous-Type Excavations



site warrants. Mark lateral excavations with occasional arrows showing excavation direction from the centerline with marks at the curb or property line if crossed. Dots may be used for curves and closer interval marking.

Stake, Flag, or Whisker Excavation Markers

Delineate the proposed excavation area using stakes, flags, or whiskers instead of spray paint to mark the radius or arcs, the four corners of the project, or when outlining the excavation project. Limit the interval spacing to approximately 4 ft. to 50 ft. Reduce the separation of excavation marks to a length that can reasonably be seen by the operator's locators when the terrain at an excavation site warrants. Stakes, flags, or whiskers provided to illustrate arcs or radii may be placed at closer intervals to define the arc or radius. Stakes, flags, or whiskers are white and display the excavator's company identifier (name, abbreviations, or

Stake, Flag, or Whisker Excavation Markers



**Stakes, Flags or Whiskers
Marking Four Corners**

**Stakes, Flags or Whiskers
Marking Outline of Excavation**

initials).

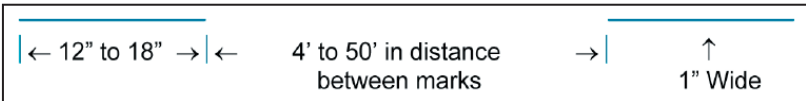
Guidelines for Operator's Facility Field Delineation

Operator markings of facilities include the following:

- The appropriate color for their facility type
- Their company identifier (name, initials, or abbreviation) when other companies are using the same color
- The total number of facilities and the width of each facility
- A description of the facility (HP, FO, STL, etc.)

Use paint, flags, stakes, whiskers, or a combination to identify the operator's facility(s) at or near an excavation site.

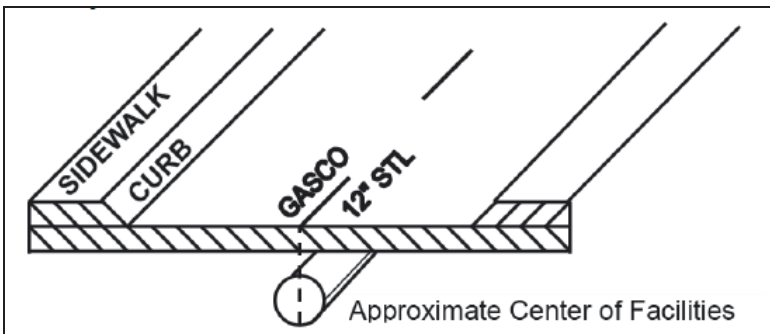
Marks in the appropriate color are approximately 12 to 18 inches long and one inch wide, spaced about 4 to 50 feet apart. When marking facilities, the operator needs to consider the location, the land's terrain, the type of excavation being done, and the method required to adequately mark the facilities for the excavator.



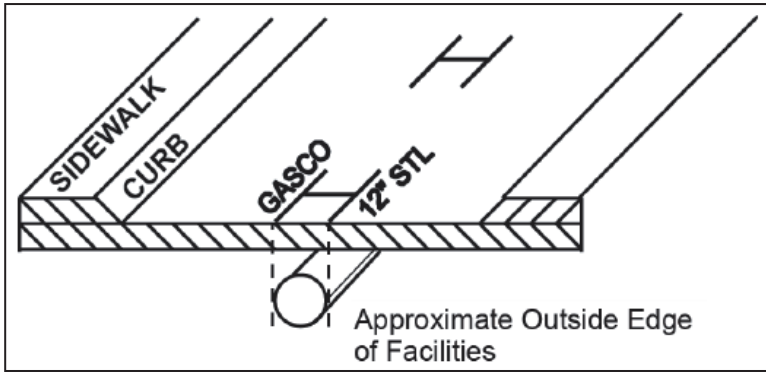
Marking examples:

Single Facility Marking: Used to mark a single facility. This can be done in one of two ways—

- 1) placing the marks over the approximate center of the facility:



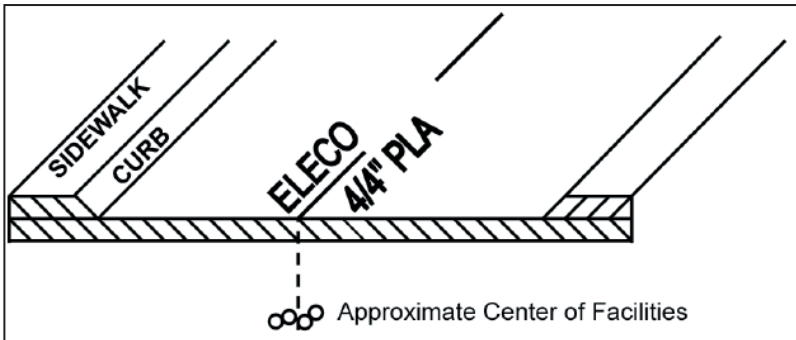
or 2) placing the marks over the approximate outside edges of the facility with a line connecting the two horizontal lines (in the form of an H) to indicate there is only one facility:



These examples indicate an operator's 12-inch facility. When a facility can be located or toned separately from other facilities of the same type, it is marked as a single facility.

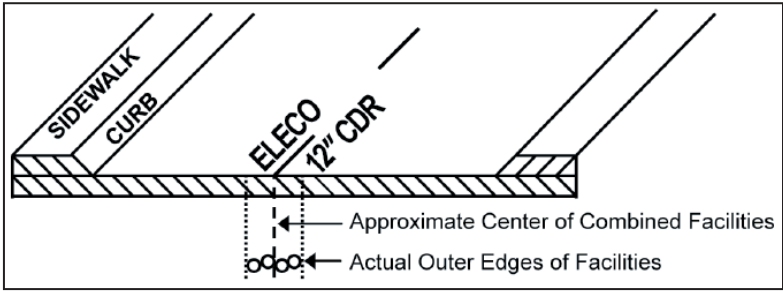
Multiple Facility Marking: Used to mark multiple facilities of the same type (e.g., electric), where the separation does not allow for a separate tone for each facility, but the number and width of the facilities are known. Marks are placed over the approximate center of the facilities and indicate the number and width of the facilities.

Example: four plastic facilities that are four in. in diameter (4/4" PLA)



Conduit Marking: Used for any locatable facility being carried inside conduits or ducts. The marks indicating the outer extremities denote the actual located edges of the facilities being represented.

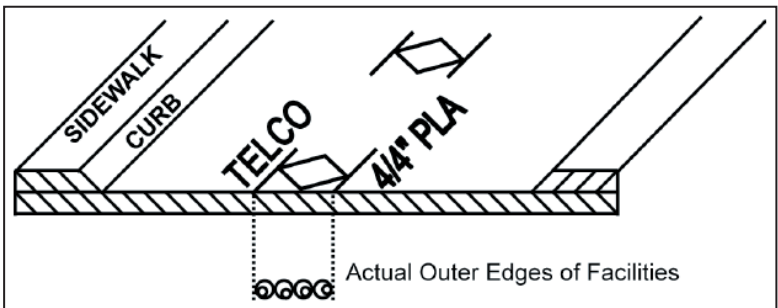
Example: four plastic conduits that are four inches in diameter (4/4" PLA), and the marks are 16 inches apart, indicating the actual left and right edges of the



facilities.

Corridor Marking: Used to mark multiple facilities of the same type (e.g., electric), bundled or intertwined in the same trench, where the total number of facilities is not readily known (the operator has no record on file for the number of facilities). Marks are placed over the approximate center of the facilities and indicate the width of the corridor. The width of the corridor is the distance between the actual located outside edges of the combined facilities.

Example: a 12 in. corridor (12" CDR)

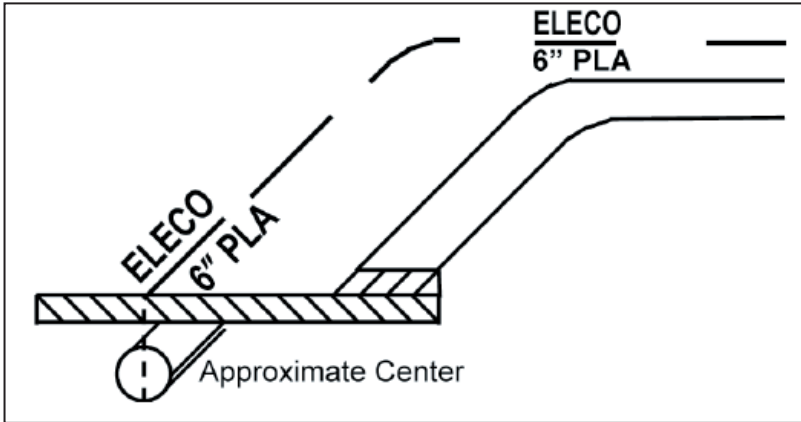


Changes in direction and lateral connections

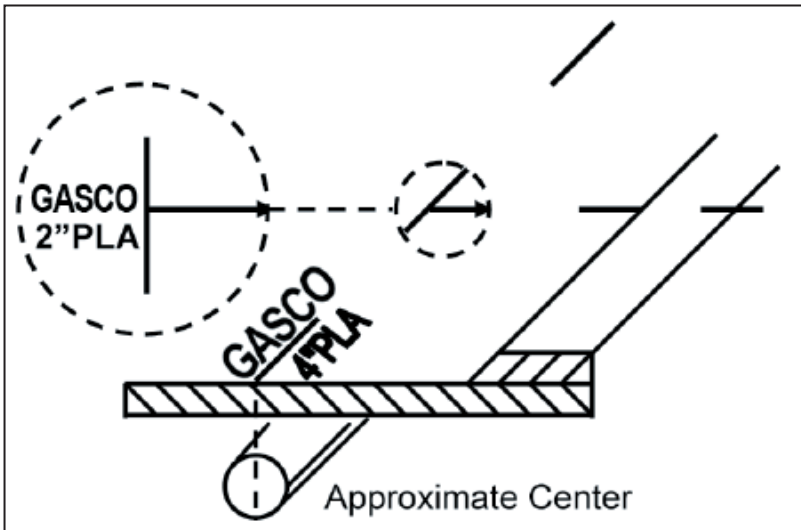
Clearly indicated at the point where the change in direction or connection occurs, with an arrow indicating the path of the facility. A radius is indicated with marks

describing the arc. When providing offset markings (paint or stakes), show the direction of the facility and distance to the facility from the markings.

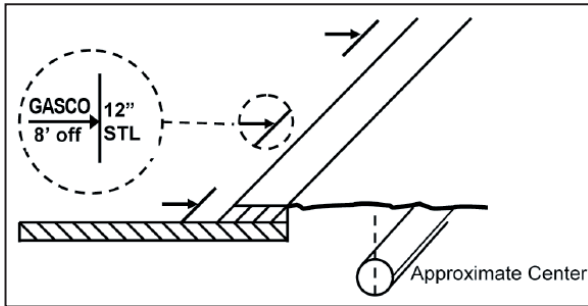
Example: radius



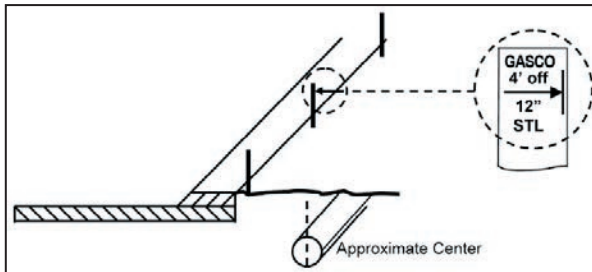
Example: lateral connection



Example: painted offset (off)



Example: staked offset (off)



[Operator's Identifier](#) (name, abbreviation, or initials) is placed at the beginning and at the end of the proposed work. In addition, subsequent operators using the same color mark their company identifier at all points where their facility crosses another operator's facility using the same color. Reduce the separation of excavation marks to a length that can reasonably be seen by the operator's locators when the terrain at an excavation site warrants.

Examples:

CITYCO

ELECO

TELCO

[Information regarding the size and composition](#) of the facility is marked at an appropriate frequency.

Examples: the number of ducts in a multi-duct structure, the width of a pipeline, and whether it is steel, plastic, cable, etc.

TELCO
9/4" CAB

GASCO
4" PLA

WATERCO
12" STL

Facilities installed in a casing are identified as such.

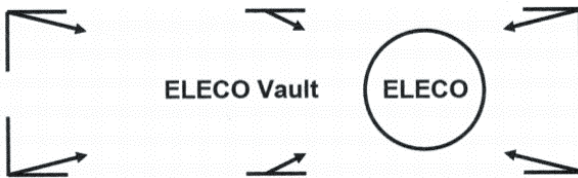
Examples: 6 in. plastic in 12 in. steel and fiber optic in 4 in. steel

GASCO
6" PLA/12" STL

TELCO
FO (4" STL)

Structures such as vaults, inlets, and lift stations that are physically larger than obvious surface indications are marked to define the structure's parameters.

Example:



Termination points or dead ends are indicated as such. Example:



"No Conflict" with the excavation, complete one or more of the following:

Operators of a single type of facility (e.g., TELCO) mark the area "NO" followed by the appropriate company identifier in the matching APWA color code for that facility.

Example: NO TELCO

Operators of multiple facilities mark the area “NO” followed by the appropriate company identifier in the matching APWA color code for that facility with a slash and the abbreviation for the type of facility for which there is “No Conflict.”

Example: NO GASCO/G/D illustrates that GASCO has no gas distribution facilities at this excavation site. The following abbreviations are used when appropriate: /G/D (gas distribution); /G/T (gas transmission); /E/D (electric distribution); /E/T (electric transmission).

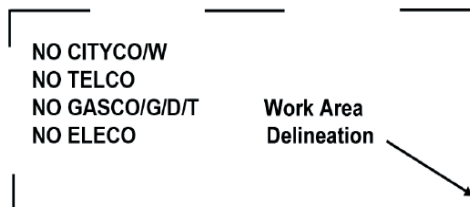
Place a clear plastic (translucent) flag that states “No Conflict” in lettering matching the APWA color code of the facility that is not in conflict. Include the operator’s identifier, phone number, a place to write the locate ticket number, and date on the flag. Operators of multiple facilities indicate on the flag which facilities are in “No Conflict” with the excavation (see the previous example).

If it can be determined through maps or records that the proposed excavation is obviously not in conflict with their facility, the locator or operator of the facility may notify the excavator of “No Conflict” by phone, fax, or e-mail or through the one call center, where the electronic positive-response is used. Operators of multiple facilities indicate a “No Conflict” for each facility (see the previous examples).

Place “No Conflict” markings or flags in a location that can be observed by the excavator and/or notify the excavator by phone, fax, or e-mail that there is “No Conflict” with your facilities. When the excavation is delineated using white markings, place the “No Conflict” markings or flags in or as near as practicable to the delineated area.

Caution: Allow adequate space for all facility mark-outs.

Example:



Common Abbreviations

Facility Identifier

CH	Chemical
E	Electric
FO	Fiber Optic
G	Gas
LPG	Liquefied Petroleum Gas
PP	Petroleum Products
RR	Railroad Signal
S	Sewer
SD	Storm Drain
SS	Storm Sewer
SL	Steam
STM	Street Lighting
SP	Slurry System
TEL	Telephone
TS	Traffic Signal
TV	Television
W	Water
W	Reclaimed Water "Purple"

Underground Construction Descriptions

CCDRD	Conduit Corridor Distribution Facility
DB	Direct Buried
DE	Dead End
JT	Joint Trench
HP	High Pressure
HH	Hand Hole

MH	Manhole / Maintenance Cover
PB	Pull Box
R	Radius
STR	Structure (vaults, junction boxes, inlets, lift stations)
T	Transmission Facility

Infrastructure Material

ABS	Acrylonitrile - Butadiene - Styrene
ACP	Asbestos Cement Pipe
CI	Cast Iron
CMC	Cement Mortar Coated
CML	Cement Mortar Lined
CPP	Corrugated Plastic Pipe
CMP	Corrugated Metal Pipe
CU	Copper
CWD	Creosote Wood Duct
HDPE	High-Density Polyethylene
MTD	Multiple Tile Duct
PLA	Plastic (conduit or pipe)
RCB	Reinforced Concrete Box
RCP	Reinforced Concrete
RF	Pipe Reinforced Fiberglass
SCCP	Steel Cylinder Concrete Pipe
STL	Steel
VCP	Vitrified Clay Pipe

Local Facility Owner Name Abbreviation

<u>Underground Facility Owner</u>	<u>Abbreviation(s)</u>
3 Rivers Communications	3RC, 3RT
Anadarko Minerals, Inc	AMI
Belfry Carbon County Water Sewer District	BCCWSD
Blackfoot Telephone Cooperative	BTC
Buffalo Rapids Irrigation District No.2	BR
CenturyLink	CLN, CTL
Charter Communications	CATV
City of Belgrade	<i>None</i>
City of Big Timber	CBT
City of Miles City	MC
Cutbank Gas Company	CBGC
Energy West - Cascade County	EW
Energy West - West Yellowstone	EWST
Express Pipeline	EXP
Fergus Electric Cooperative	FEC
Fort Peck Rural County Water District	FPRWD
Health Information Exchange of Montana	HIEM
InterBel Telephone	ITC
Lincoln Telephone	LTC
Mid-Rivers Communications	MRTC, MRC
Montana Sulphur & Chemical Company	<i>None</i>
NorthWestern Energy	NWE
Range Telephone Cooperative	RNG
Richland County IT	RCIT
Ronan Telephone / Access Montana	AMT
Southeast Electric Cooperative	<i>None</i>
Stillwater Mining Company	SMC
Sun River Electric Cooperative	SRE
Town of Manhattan	<i>None</i>
Vigilante Electric Cooperative	VEC
Western Montana Community Tel	AMT
Wide Open Network	WON
Yellowstone Pipeline	YPL, YPL HP

Guide for Abbreviation Use

Follow these guidelines when placing abbreviations in the field:

Place the Company Identifier at the top or at the left of the abbreviations.

Place the abbreviations in the following order: Company Identifier / Facility Identifier / Underground Construction Descriptions / Infrastructure Material.

Example: TELCO/TEL/FO/PLA indicates that TELCO has a telecommunication fiber optic line in a single plastic conduit. The use of the abbreviation /TEL is not necessary because the orange marking would indicate that the facility was a communication line, but its use is optional.

To omit one or more abbreviation types, use the order described above but omit the slash and abbreviation that does not apply.

Example: to omit /TEL), the result would be TELCO/FO/PLA.

APPENDIX B

Additional References

The references contained in Appendix B are intended to be supplemental references for existing and/or new practices found within this guidebook and CGA Best Practices.

References

American Gas Association (AGA), "Directional Drilling Damage Prevention Guidelines for the Natural Gas Industry," Technical Note, December 30, 2004.

American Society of Civil Engineers, ASCE Manuals and Reports on Engineering Practice No. 89, "Pipeline Crossings," 1996.

Bennett, R.D., S.T. Ariaratnam, and C. Como, "Horizontal Directional Drilling Good Practices Guidelines," HDD Consortium, Washington, DC, ISBN 1-928984-13-4, 2001.

California Department of Transportation, CALTRANS, "CALTRANS Encroachment Permits—Guidelines and Specifications for HDD Installations," July 14, 2003.

Directional Crossing Contractors Association (DCCA), "Guidelines for Successful Directional Crossing Survey Standards," Dallas, TX, 1999.

Directional Crossing Contractors Association (DCCA), "Horizontal Drilling Safe Operations Guidelines," Dallas, TX, 1995.

Gas Research Institute, "Final Report—Guideline for the Application of Guided Horizontal Drilling to Install Gas Distribution Piping," GRI-96-0368, September 1996.

National Transportation Safety Board, "Safety Study: Protecting Public Safety Through Excavation Damage Prevention," Washington, DC, December 1999.

National Utility Contractors Association (NUCA), "Trenchless Construction Methods and Soil Compatibility Manual," 3rd Edition, Washington, DC.

National Utility Locating Contractors Association (NULCA), "Excavation Practices & Procedures for Damage Prevention," Spooner, WI, 1996.

Notes

Safe Digging is No Accident



The Montana Excavation Safety Handbook (MESH)—is available free to everyone in Montana to help reduce damage to underground utilities, avoid service interruption, and protect workers and the general public. Mainly intended for excavation professionals, we also encourage use by anyone involved with excavation. Following the guidelines and safe practices in this handbook can be extremely helpful in preventing injury to you and other people and damage to underground facilities. Including saving you time and money!

Cover photo courtesy of Dale Schultz

Version 2.0—Printed—November 2022