Bureau of Engineering

Special Order

June 24, 2022 Special Order No. 05-0622

To All: Deputy City Engineers
Senior Managers
Group Managers
Division/District Managers

Subject: **PNEUMATIC PIERCING METHOD**

The Pneumatic Piercing Method (PPM), also known as the Impact Moling Method, is a trenchless method for the installation of small diameter pipes over relatively short distances along shallow depths. The specialized tool uses a compaction approach to create a bore hole which the permanent pipe is slipped through. Most tools are non-steerable and tip advancement is usually not tracked. The alignment is typically set using general sighting equipment and a basic launching cradle. While the above limited uses and common installation practices makes this method cost-effective and easy to implement, it also has the potential of damaging existing utilities (cross-bore damage), misalignment, as well as resulting in soil heaving and/or ground settlement. As a result, the following guidelines are established to ensure public safety and to protect public and private property from damage due to poor planning and construction practices.

I. SCOPE (LIMITS OF USE)

A. This guideline is intended for the installation of pipes up to three inches in nominal diameter using pneumatic piercing tools.
B. Use of lines limited to service connections.
C. Installation is primarily occurring in the roadway.
D. Installed lines are intended to convey potable water, recycled water or natural gas. Lines conveying petroleum base products are not addressed.

II. GENERAL REQUIREMENTS

A. Proposed alignment(s), shall be straight.
B. Disturbed/damaged portion of roadway shall be properly restored in kind and in conformance with Standard Plan S-477. For concrete roadway pavement, confer with the District Office for additional requirements.
C. Roadway along alignment containing decorative and/or non-standard concrete or asphalt material shall also be required to be restored in kind.
D. PPM shall not be allowed if moist soil or groundwater is encountered during excavation of pits and during piercing operation along the proposed alignment.

E. PPM shall not be used in unstable soils such as: sands, gravel, rocky soils, where ground is densely packed and or proved to misalign the tool or result in caving as verified by the INSPECTOR.
F. No piercing alignment shall exceed 42 inches in depth.
G. Excavation of the piercing hole, receiving hole and/or witness holes to locate utilities shall conform to Special Order No. SO 01-0912 for shoring trenches 5 feet in depth or greater.
H. A competent person as described by CalOSHA, shall be present at all times during the excavation, use, and backfill of the proposed pits.
I. Maximum installation run, between insertion and final pit, shall not exceed 100 feet.
J. PPM shall not be used to cross under or over existing utilities until after they are fully exposed.
K. Provide intermediate observation pits. Pits shall not exceed 30 foot spacing.
L. Minimum depth of bored hole and clearances shall be as follows:

Table 1: Minimum Depth of Cover and Clearances

Nominal Pipe Diameter (inches)	Maximum Tool Size (inches)	Minimum Depth of Cover (inches)	Minimum Clearances from Adjacent Substructures or Utilities (inches)
1.0	1.75	24 (e)	18
1.5	2.5	24 (e)	18
2.0	3.0 (d)	30	18
2.5	3.5 (c)	36	24
3.0	4.0 (c)	42	24

Notes:

a. Depth of cover is determined as depth below the established grade of the gutter [see Los Angeles Municipal Code 62.03 (b) 1].
b. Any piercing operation that will pass below a structure may require further geotechnical review. The plan reviewer will make the determination and require sign-off by the Bureau of Engineering's (BOE) Geotechnical group.
c. For black galvanized steel pipes, maximum tool size may be 0.5 inch greater than shown.
d. Where a tool size used is smaller than the Maximum Tool Size allowed for the pipe diameter listed on Table 1, the corresponding Minimum Depth of Cover for the tool size used may apply, except as required per Note e below.
e. For installations in the roadway of a major or secondary highway, the minimum depth of cover shall be 30 inches.

III. REGULATION AND STANDARDS

A. An excavation (E or U) permit is required for any PPM work. Applicant and its agents shall comply with all conditions as stated therein.
B. Prior to beginning any PPM operations, applicants must satisfy the requirements of this policy, comply with all appropriate State and Federal requirements, and obtain all additional necessary permits. The most restrictive requirements shall govern.
C. These requirements and conditions are in addition to the latest edition of the "Standard Specifications for Public Works Construction" (SSPWC) adopted by the Board of Public Works and "Additions and Amendments to the SSPWC" (Brown Book) of the BOE.
D. Conform to applicable Standard Plans, including S-477.
E. Prior to starting the job notify DIG-ALERT to locate substructures. Since City of Los Angeles-owned facility such as sewer and storm drain will not be marked, location and depth determination are required. Approximate location and depth of sewer and storm drains may be obtained from as-builts. Open trench methods may be necessary if there are interfering existing utilities.

IV. SUBMITTALS

The applicant shall submit the following information to the appropriate BOE District Office:

A. Lines Less Than or Equal to 2-inches in Nominal Diameter
   1. Plans - Provide a general plan to scale, depicting the piercing alignment and including the following information:
      a. General plan layout and location of line relative to a permanent benchmark or reference point, and tie-in to the main line.
      b. Pipe depth, proposed pipe information, and size of tool planned consistent with Table 1.
      c. Location, size, and depth of launching and receiving pits, intermediate observation pits, and any planned potholing. Show relative location of existing parkways (if applicable), curb, gutter and property line to alignment.
      d. Location, elevation, and clearances of sewer and storm drain laterals within five of the proposed alignment.
      e. Property lines and public easements, when crossed by alignment.
   2. Limits:
      a. Depth of piercing alignment shall not exceed 42 inches.

B. Lines Greater than 2-inches in Nominal Diameter
   1. Plans - Provide plan and profile drawing to scale of the piercing alignment, signed and stamped by a State of California Registered Civil Engineer, which includes the following:
      a. Existing ground surface elevation.
      b. Location, depth, diameter, and material type and series of the proposed pipe information, and size of tool planned consistent with Table 1.

c. Location, size, and depth of launching and receiving pits, intermediate observation pits, and any planned potholing. Show relative location of existing parkways (if applicable), curb, gutter and property line to alignment.
d. Location, elevation, and clearances of all crossing and adjacent utilities, including but not limited to the sewer house connection laterals.
e. Property lines and public easements, when crossed by alignment.

2. As-Built Drawings: As-built drawings must be submitted within 90 days after completion of the work, conforming to the following requirements:
   a. Submitted drawings in an electronic format (*.pdf, *.dwg).
   b. Plans shall be generated using Computer Aided Design (CAD) software, conforming to the BOE CAD Standard, and Standard Plan S-627.

C. Pipe Information - The following information shall be listed on the plans for all jobs:
1. Material (Copper, High Density Polyethylene, etc.)
2. Type/Grade Series (i.e. Type L copper) or Standard Dimension Ratio
3. Nominal diameter
4. Joint system
5. Length scheduled to be installed

D. Equipment Information - PPM Installer shall have the following equipment information readily available on site prior to start of excavation and make information available to the INSPECTOR upon request:
1. Pneumatic piercing tool to be used, slighting tools, launching cradle and trench support frame.
2. Manufacturer's tolerance of capacity and tolerances of piercing tool.
3. Type and location of tracking system on piercing tool (if applicable).

E. For lines greater than 2-inches in nominal diameter, the PPM Installer shall have a ground surface movement monitoring plan (settlement or heave) readily available on site prior to start of excavation and make available to the INSPECTOR upon request.

F. Contingency Plans
1. A sewer contingency/emergency response plan, reviewed and approved by LA Sanitation and Environment, shall be filed with each District Office~~s~~, every two years, to address actions to take and personnel to contact in the event a sewer or storm drain is damaged or cross-boring occurs in the course of installing a utility line.
2. A general utility contingency and/or emergency response plan for inadvertently boring into or damaging live power line, natural gas line, water line, fiber optic cables, unstable substance or any other substructure.
3. All contingency plans shall be signed and dated by the applicant and readily available on-site prior to start of excavation.

G. Personnel Qualification Certification or proof of training in the use of PPM shall be made available to INSPECTOR upon request.

H. Material Safety Data Sheet of all lubricant used shall be made available for the INSPECTOR upon request.

I. Slurry/Controlled Low Strength Material mix design used for abandonment of errant bores for lines with a nominal diameter greater than 2 inches.

V. QUALITY ASSURANCE - QUALITY CONTROL

A. The installer shall have proof of training which shows completion of the minimum course in the operations and safety of PPM equipment as contained in the PPM Equipment Manufacturer's Operator's Manual. This training shall be provided by the PPM equipment manufacturer or an authorized dealer or qualified company trainer.

B. Protection of Pavement and Other Utilities
   1. Prior to any excavation, the installer shall check the entire area of the intended bore and excavations to ensure there are no signs of utilities or substructures which may not have been previously identified. This includes identifying lines associated with surface lids and covers within proximity of the proposed bored alignment.
   2. The new pipe or conduit shall have a clearance of two feet from any existing pipe/conduit substructure when placed in parallel to the conduit, conditions permitting, A one foot separation is allowable when the existing pipe/conduit is either abandoned or owned by the same utility.
   3. All crossing utilities, including sewer laterals, shall be exposed using vacuum excavation, hand excavation, by mechanical means, or approved methods to confirm depth. For sewer and storm drains, the contractor has the option to not expose the sewers and storm drains, given that the contractor provides documentation such as record drawings showing the depth of the existing sewer or storm drain is anticipated to be deeper than two feet from the proposed PPM alignment. It shall be further verified in the field by opening the nearest maintenance holes prior to any PPM operations.
   4. Positively identify exact location and depth of existing substructures that are within two feet of proposed alignment by exposing no less than 12 inches all around for a 4 feet length of pipe to ensure the piercing head will not hit it. See Table 1 for additional requirements. If for some reason the piercing tool strikes a substructure, stop the work and notify its owner and the INSPECTOR immediately.

C. Monitoring and Tracking
   1. Monitor the advancement of the piercing tool during installation. If misalignment is detected, stop the effort and take corrective actions, including introducing an intermediate pit if necessary.
   2. Closed Circuit Television (CCTV) Requirements for Mainline (Non-lateral or 6 inches or larger): For any crossing sewer or storm drain line which is not exposed in accordance with Section V.B.3., a Bonded Sewer Contractor must perform a post-installation CCTV inspection in the presence of the INSPECTOR of the mainline and verify that no damage has been caused by the PPM. Should any damage be discovered, the location shall be identified and repaired as noted in Section VI.

3. CCTV Requirements for Laterals: For PPM lines greater than 2 inches in nominal diameter, a Bonded Sewer Contractor must perform a post-installation CCTV inspection in the presence of the INSPECTOR to any sewer or storm drain laterals within 3 feet of the PPM alignment (or as determined by the BOE District Office Engineer) and verify that no damage has been caused by the PPM. Should any damage to the laterals be discovered, the location shall be identified and repaired as noted in Section VI.

VI. DAMAGE AND REPAIR OF EXISTING UTILITIES

A. If a substructure installation is damaged by any portion of the PPM operation by puncture, cracking, or direct contact, the Installer will be responsible for repairing the damage to the satisfaction of the utility/ substructure owner/operator, without regard to the amount of time elapsed since the drilling operation was conducted.
B. The Installer will be responsible for repairing any other damage attributed to the PPM operation for a period of one year from completion of the work.
C. All repairs shall commence immediately after the notification of the damage and be completed within a reasonable time. The cost of all repair work, including permit fees, will be borne by the permittee.
D. If the owner of the damaged utility/substructure installation chooses to do the repair work, the permittee shall reimburse the utility owner for all associated costs.
E. Sewer laterals or house connections shall be repaired according to the method and plan reviewed and approved by the BOE under an S-Permit obtained by a Bonded Sewer Contractor.

VII. EXCAVATION AND SURFACE RESTORATION

A. All pavement removed shall have straight edges. Cuts shall be made to a minimum depth of 1-1/2 inches. All cuts shall be neat, straight, vertical cuts with no broken edges.
B. All surfaces affected by the work shall be restored using the same standards that are required for traditional open excavation work. All pavement markings in the project area showing locations of crossing or adjacent utilities shall be removed or covered to the satisfaction of the INSPECTOR.
C. Structure soil backfill may be used to fill borehole and/or test pits provided it is compacted per SSPWC to a minimum of 90 percent relative compaction. Compaction verification must be performed in the presence of the INSPECTOR.
D. Roadway surface restoration shall conform to Std Plan S-477.

VIII. PRODUCTS

A. Pneumatic Piercing Tool
   1. The piercing tool shall be Grundomat Pneumatic, Hammerhead, or approved equal.
   2. For lines greater than 2 inches in nominal diameter, tool shall be fitted with a front locating tracking unit to verify tip location.

3. Under proper operation procedures, the tool selected shall be capable of establishing the line and grade of the bore to within 1 percent (horizontally and vertically).

IX. EXECUTION

A. Verify proposed alignment, and ground conditions do not exceed the limits of this guideline.
B. Identify all substructure crossing along proposed alignment.
C. Prepare appropriate viewing/inspection ports near substructure crossings per this guideline.
D. Excavate piercing pit and receiving pit. Excavation shall be cut with 90-degree angles and base shall be flat and level. When shoring of excavation is necessary, refer to Cal-OSHA requirements or as required by the BOE District Office Engineer.
E. Use piercing tool to construct bore along proposed alignment. If the alignment deviates by ½ inch vertically or horizontally, or refusal is encountered, abandon alignment and fully slurry fill borehole. Move five diameters of tool Outer Diameter laterally and re-start piercing effort.
F. Once borehole has been constructed successfully, slip pipe line into hole.
G. Perform CCTV in the presence of the INSPECTOR as required.
H. Sanitize, lubricate, etc. depending on fluid or gas being conveyed.
I. Once line service is established, backfill pits and viewing ports and restore roadway as required.

(EA WT RMK AM)

EXE/WCE/TA/bg/gva Special Order No. 05-0622	Approved By: Gary Lee Moore Gary Lee Moore, PE, ENV SP City Engineer