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Doc Custodian: Safety Supervisor		Refinery Safe Work Procedure
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1.0 Purpose

The purpose of this practice is to establish the steps necessary to identify underground and overhead utilities containing hazardous energy, to prevent cave-ins, to prevent unauthorized vehicle/personnel entry, and to ensure that work performed in the excavation is done in a safe manner.

Excavations and trenches present some unique hazards. These hazards include puncturing process lines or electrical conduit while digging, contact with energized overhead power lines; undermining nearby foundations or power poles; fall hazards for personnel, materials or vehicles; and cave-in.

2.0 Scope

To protect the health and safety of all persons working in excavations and trenches, and to comply with all applicable federal and state requirements, an excavation permit is required

- whenever power digging, hydro excavation, auger digging, pile driving or sinking a caisson is performed, or
- whenever an excavation is expected to be greater than four feet deep, or
- whenever the potential exists to intersect underground pipelines/ utilities, or whenever the potential exists for cave-in.

A Safe Work Permit (SWP) and an Excavation Permit is used to facilitate communication between Owing Department and Servicing Group representatives, to define the scope-of-work, to identify potential hazards and the required protective systems, and to control the trench and excavation procedures. This practice does not preempt or eliminate any more stringent requirements of other safety practices or guides. This practice applies to all MPC employees and contractors performing excavation work at the site.

3.0 Procedure

3.1 Responsibilities

3.1.1 Supervision – Supervision is responsible for ensuring that this practice is implemented consistently from shift to shift and from unit to unit; and for providing appropriate training and resource materials.

3.1.2 Owning Department Representative – An Owning Department representative is responsible for:

3.1.2.1 Completing the Safe Work Permit (SWP),

3.1.2.2 Executing the Isolation procedure (if required).

Note: For non-operating areas, the role of the Owning Department representative will be filled by the equipment “owner” (e.g. Maintenance Shop, Truck Garage, Laboratory, etc.).

3.1.3 Servicing Group Representative – A Servicing Group Representative is responsible for:

3.1.3.1 Initiating the SWP,

3.1.3.2 Verifying any applicable Isolation procedure...

3.1.3.3 Determining the probing criteria

3.1.3.4 Filling out the Probe Card Report to document obstruction as applicable.

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3.1.3.5 Ensure all soil probing results are provided to the MPC Servicing Department Supervisor, to be sent to Information Management to be update in the Master Underground Plot drawing in ePlot.

Work Crew Member (MPC and Contractor) – Each work crew member is responsible for:

- 3.1.3.6 Reviewing the SWP,
- 3.1.3.7 Reviewing and signing the Job Safety Analysis (JSA),
- 3.1.3.8 Applying their Personal lock to the control of hazardous energy lockbox (if required),
- 3.1.3.9 Reviewing the excavation permit prior to the initial start of the job on their shift and for understanding and complying with the requirements.

3.1.4 MPC Servicing Group Supervisor – A MPC Servicing Group Supervisor is responsible for;

Before the excavation job starts shall consider the following:

- Size and purpose of the excavation.
- Nature of ground and soil classification.
- Proximity of adjacent structures or roads.
- Position of underground obstructions such as pipes and cables.
- Weather and moisture content
- Sources of vibration.
- Method of excavation.

The consideration of these factors will help determine the safety measures that must be implemented and if the excavation will require sloping, shielding, or shoring.

- 3.1.4.1 Communicating the requirements of this practice to the contractor
- 3.1.4.2 Confirming that a trained Excavation Competent person is assigned to the job;
- 3.1.4.3 Initiating the Excavation Permit
- 3.1.4.4 Providing the contractor with assistance in locating underground obstructions.
- 3.1.4.5 Reviewing plot plans and other drawings for underground pipelines, electrical utilities, third party pipelines and Inspection clamp list of the area prior to excavations starting. Ensure once identified, underground installations shall be marked in the field with flags, stakes, and/or paint by the group performing the excavation work prior to starting the excavation.
- 3.1.4.6 Notifying One-Call (811) system for 3rd Party Underground Easement, Right of Way or when excavating outside Refinery fence line.

3.1.5 Contractor Representative – A contractor representative is responsible for ensuring their employees understand and follow the requirements of this practice.

3.1.6 Excavation Competent Person (ECP) – The excavation competent person is responsible for:

- 3.1.6.1 Visiting the job site to assess hazards and safeguards and must remain in the refinery during excavation activities or transfer responsibilities to another ECP;

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- 3.1.6.2 Reviewing the SWP and JSA;
- 3.1.6.3 Completing the Excavation Permit and verifying that the Servicing Group Representative has reviewed the probing requirements;
- 3.1.6.4 Ensuring the excavation is dug in accordance with permit requirements and OSHA regulations;
- 3.1.6.5 Ensuring that the excavation work complies with the safeguards stipulated on the permit;
- 3.1.6.6 Inspecting the excavation at least once each shift prior to excavation entry and after any event that could change conditions (e.g., rainstorms, accumulation of water, etc.).
- 3.1.6.7 Identifying any pipe supports, cable trays/conduit supports not supported from an independent foundation. If needed, MPC civil/structural engineer shall be contacted for such identification.
- 3.1.6.8 Contacting the OSUE Supervisor if excavating within 20 feet of wooden power poles without an independent foundation.
- 3.1.6.9 Ensuring air monitoring is conducted during probing, excavation, and excavation entry.
- 3.1.6.10 Ensuring probing is conducted prior to excavation
- 3.1.6.11 Carrying their Excavation Competent Training Card at the job site.
- 3.1.7 Registered Professional Engineer – A registered professional engineer is responsible for:
 - 3.1.7.1 Approving any excavation more than 20 feet deep, or any excavation below the level of the base or footing of any foundation or retaining wall as required in 3.3.6.1 and 3.3.7.2; and
 - 3.1.7.2 Verifying that any shoring or shielding system that differs from the OSHA specifications or the tabulated data is adequate for the job. A registered professional engineer shall determine any alternate method of protection regarding soil composition. A copy of the data will be maintained at the job site.

3.2 General Requirements

The Texas One Call System (1-800-245-4545) shall be notified of any excavation greater than 16 inches in depth that is performed by mechanical means. Excavations greater than 16 inches that are not performed by mechanical means (such as manual digging or hydro-excavation) will not require notification to the Texas One Call System. Texas One Call shall be contacted at least 48 hours and not more than 14 days (not including weekends or holidays) before the proposed work and shall be asked to establish the location of the non-MPC underground installations prior to the start of actual excavation. A locate request ticket number will Q.) be issued and shall be affixed to the Excavation Permit.

- 3.2.1 A SWP and JSA are required for any probing and/or excavation.
- 3.2.2 An excavation permit is required for any excavation four feet deep or greater, or when power digging equipment is used, or when the potential exists to intersect underground pipelines or utilities, or when the potential exists for cave-in.
- 3.2.3 The excavation permit must be completed by a designated Excavation Competent Person (ECP). The completed excavation permit must be attached to the SWP posted at the work site.

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- 3.2.4 The excavation permit shall be retained by the facility for 30 days after the job is completed.
- 3.2.5 The initial excavation inspection should be performed as close as practical to the time entry is to begin. Inspections are required after any event that could change conditions (e.g., rainstorms, accumulation of water, etc.). The inspection must be completed by the ECP. The record of this inspection must be documented in the space provided on the excavation permit.
- 3.2.6 An inspection is valid for a maximum of fourteen (14) hours. In addition, no inspection is valid for more than two (2) hours past the end of the standard shift.

NOTE: When an excavation is found to have conditions, which do not comply with those listed on the permit, or when conditions in the excavation change such that work in the excavation is unsafe, the permit must be revoked, and the excavation permit removed from the job site. Excavation work activity cannot resume until the unsafe condition has been corrected, the excavation has been inspected by the ECP, and the excavation permit is reissued.

- 3.2.7 A confined space entry permit (PR-1 Confined Space Entry) required for entering any excavation four feet deep or greater.
- 3.2.8 A SWP for hot work is required if hot work is to be performed or mobile equipment is to be used in or near the excavation (PR-2 Hot Work).
- 3.2.9 Worker Protection

- 3.2.9.1 Excavation for Underground Leak Repair

- 3.2.9.1.1 Excavation Less than 4ft Deep.

- 3.2.9.1.2 Continuous air monitoring using a direct reading instrument (e.g., instrument containing a photoionization detector for total hydrocarbons, etc.) is required for chemical hazards that may become airborne at the locations where workers are present (e.g., inside or around the excavated hole, at the heavy equipment operator location, etc.). Plans must be made for protecting adjacent/downwind workers and may include downwind air monitoring, barricades, regulated areas, and communication of any potential odors.

- 3.2.9.1.3 When benzene readings indicate concentration of 0.5 ppm or greater, refer to PPE-5 practice for respiratory protection requirements and SM-4 Benzene Exposure Reduction.

- 3.2.9.1.4 Excavation 4 ft Deep or Greater

- 3.2.9.1.5 When the excavation is 4 feet deep or greater, the confined space entry permit requirements (PR-1 Confined Space) apply which addresses the monitoring requirements for other toxins. Confined space entry excavations must be tested for total hydrocarbons and benzene.

- 3.2.9.2 Excavation Other Than Underground Leak Repair (e.g. Projects, Turnaround, etc.). If soil is found to be contaminated plans must be made for protecting workers and adjacent work areas from the chemical hazards present. The plans must be developed with input from the IH department and, depending on the type and extent of contamination, may include personal exposure monitoring and/or area monitoring of chemicals that might become airborne.

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Plans shall be submitted to the IH Department 5 days in advance prior to the start of the excavation.

- 3.2.10 When excavating through known entry ways to and from tank firewalls, an excavation permit is not required once it is proven that there are no underground pipelines/utilities and the soil is not contaminated. However, the soil removed shall be replaced back at the end of the shift if it is an external firewall for in service tanks. Refer to ENV-29 for management of excavated soil.

3.3 Pre-excavation Hazard Assessment and Notifications

3.3.1 Initial Activities

Servicing Group Representative, MPC Servicing Group Supervisor (if applicable) and appropriate Owning Department Representative will review underground drawings (A4045-12-1, 5050, 5010, 5001, 5002 drawings, Inspection Clamp List of the area or other drawings that apply) along with test probing data to identify underground obstructions. **Reference attachment C for information on viewing underground obstacles.**

Based upon information above, surface obstructions, access and recess considerations and site experience, Servicing Group Representative, MPC Servicing Group Supervisor (if applicable) and Owning Department Representative agree on an excavation process at each individual excavation site prior to work beginning.

- 3.3.2 Buried lines once identified must be well marked by either marking the ground with paint or flagging using the below color coding.

- White — Proposed Excavation
- Orange — Communication, Alarm, or Signal Lines, Cables, or Conduit
- Pink — Temporary Survey Markings
- Blue — Potable Water
- Red — Electric Power Lines Cables, Conduit and Lighting Cables
- Red & White – Fire Water
- Purple — Reclaimed Water, Irrigation and Slurry Lines
- Yellow — Gas, Oil, Steam, Petroleum or Gaseous Materials
- Florescent Green – Safety Shower and Eye Wash
- Sky Blue – Caustic
- Green — Sewers and Drain Lines

- 3.3.3 NOTE: Red concrete contains electrical conduit. The use of power tools and power digging equipment is prohibited on this concrete unless that energy source is isolated, de-energized, and secured (PR-14, Energy Isolation).

- 3.3.4 Starting at grade level (***elevated areas like dike walls, etc. workers shall determine grade level prior to breaking the surface***) Probing of the area must be conducted unless hydro excavating or hand digging. Probing can be done by hydro probing or mechanical probing.

3.3.4.1 For vertical shaft probing, probe analysis of the area shall be conducted prior to excavating

3.3.4.1.1 Probing procedure for vertical shaft drilling and belled shape excavation can be found in Attachment A.

3.3.4.1.2 For all probing operations, PR-4B Probe Card shall be completed.

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- 3.3.4.1.3 Whenever an obstruction is found during a probe operation, the obstruction is documented on the probe card, and Owning Department Supervisors are notified.
- 3.3.4.1.4 MPC Servicing Group Supervisor will ensure probing results are sent to information Management to update the Master Underground Plot drawing in ePlot. If the crew leaves the area, obstructions must be marked prior to leaving the area.
- 3.3.4.2 For probing that will be performed in conjunction with excavation, have the following requirements been reviewed by Servicing Group Representative
 - 3.3.4.2.1 Scrape no more than 12 inches of surface prior to probing, using a backhoe with a straight blade. Scraping depth for asphalt or stabilized surfaces may be greater than 12 inches, but no more than 24 inches, provided material is removed with multiple passes and is addressed in the SWP and Job Safety Analysis.
 - 3.3.4.2.2 Scraping and probing shall continue in multiple passes. Scraping shall stop within 12 inches of buried process piping. From that point, other means, such as hydro excavating or hand digging, shall be used to uncover process piping.
- 3.3.5 Identify, de-energize, and lockout any overhead utility lines within a 20' radius of excavator swings.
- 3.3.6 Identify any foundations or retaining walls that may be undermined by the excavation. A registered professional engineer must approve any excavation below the level of the base or footing of any foundation or retaining wall per requirements below.
 - 3.3.6.1 A PE is required when the following apply:
 - 3.3.6.1.1 If the surface encumbrance, (tree, foundation, etc.), is within a 1:1 line (45 degrees) from the bottom of the excavation it influences the stability of the excavation and should be removed. If the encumbrance cannot be removed, it shall be looked at by a Registered Professional Engineer.
 - 3.3.6.1.2 On retaining walls the 1:1 line should be drawn from bottom front toe of the footing. Any excavation that intersects that line shall be looked at by an engineer.
 - 3.3.6.2 A PE is not required:
 - 3.3.6.2.1 If the structure is on a pile foundation and the piles go below the bottom of the excavation or are outside the 1:1 influence line we assume underpinning or support are not needed.
- 3.3.7 Telephone Poles
 - 3.3.7.1 Contact the OSUE Supervisor if excavating within 20 feet of a wooden power pole without an independent foundation.
 - 3.3.7.2 If the pole is on an independent foundation, see PE requirements.
- 3.3.8 As part of job walk down, Excavation Competent Person (ECP) shall identify any pipe supports and/or cable tray/conduit supports directly anchored to pavement (any support not supported from independent foundation). If such supports are in close vicinity (within 5 ft) of areas to be excavated, MPC Civil Structural Engineer shall be consulted prior to

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the start of the excavation, for requirement of temporary supports. A sketch showing adjacent equipment must be attached to the excavation permit.

- 3.3.9 MPC civil/structural engineer must be consulted for temporary support for all above ground supports within close vicinity of any excavation greater than 3 ft. deep.
- 3.3.10 The Servicing Group Supervisor shall call One Call System (811) at least 48 hr. prior to the start of the excavation when digging in a third-party underground facility easement or right-of-way or when digging outside the facility fence line. If in doubt, call 811.
- 3.3.11 The railroad company must be notified at least 48 hours in advance of any excavations within 10 feet of the edge of a railroad track. If the railroad tracks must be closed the "blue flag/derailleur" must be set.
- 3.3.12 The fire department, OMCC, and security must be notified at least 24 hours in advance of any road closures that will result from excavation activity.
- 3.3.13 A contingency plan shall be developed when there is a potential soil contamination encountered during excavation (i.e. benzene contamination). Refer to ENV-29 practice for soil management guidance and plume map information.
- 3.3.14 Spotters shall be present during excavating equipment operation (e.g., while moving or digging).
- 3.3.15 Hydro-Excavation Safeguards

When using equipment that has the capability of producing pressure greater than 750 PSIG, the following safeguard must be provided:

- 3.3.15.1 Metatarsal protection
- 3.3.15.2 Face shield
- 3.3.15.3 A trigger at the working end of the hose
- 3.3.15.4 A pressure dump device at the working end of the hose.
- 3.3.15.5 A means for the Truck/Pump Operator to maintain constant contact with the Hydro-excavation Operator during excavation process.
- 3.3.15.6 If conditions change, stop work and reassess task.
- 3.3.15.7 If pressure is greater than 5000 psi, refer to PR-38 Hydro-blasting work practice.

3.4 Excavation Protective Systems

- 3.4.1 No one is permitted in the excavation directly under a load being lifted or lowered.
- 3.4.2 Work in excavations in which there is accumulated water is not permitted unless adequate precautions have been taken to protect the workers. Protection includes, but is not limited to, water removal equipment and/or dikes.
- 3.4.3 A means of access/egress, such as a ladder, steps or ramp must be provided for all excavations four feet or greater in depth. The means of egress must require no more than 25 feet of lateral travel.
- 3.4.4 Safe access/egress should be maintained by ensuring slipping/tripping hazards are mitigated. Attention should be on the bottom of access/egress location.
- 3.4.5 Structural ramps that are used solely by employees as a means of access or egress from excavations shall be designed by an excavation competent person.

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- 3.4.6 Ramps and runways constructed of two or more structural members shall have the structural members connected to prevent displacement.
- 3.4.7 Structural members used for ramps and runway shall be of uniform thickness.
- 3.4.8 Cleats or other appropriate means used to connect runway structural members shall be attached to the bottom of the runway or shall be attached in a manner to prevent tripping.
- 3.4.9 Structural ramps used in lieu of steps shall be provided with cleats or other surface treatments on the top of surface to prevent slipping.
- 3.4.10 Excavated materials and equipment must be located as far as practical from the edge of the excavation but must be no closer than two feet from the edge. Excavated materials must be placed on plastic sheeting or in roll-off boxes and the Environmental Department contacted to determine proper disposal.
- 3.4.11 When personnel must cross over excavations, a 22" walkway with 42" standard railings are to be provided. Toe boards are required if personnel may be working below the walkway.
- 3.4.12 Excavations must be barricaded to prevent vehicles or personnel from falling into the excavation. Barricades must be located at least six feet from the edge of the excavation. Flasher lanterns should be used in addition to barricades if excavations are left open overnight. A guardrail system may be located at the edge of the excavation and used in lieu of a barricade.
- 3.4.13 Fall protection must be provided for personnel working at the edge of excavations four feet deep or greater.
- 3.4.14 Where hazardous atmospheres exist or where workers may encounter deep or confined footing excavations, a harness and lifeline will be worn. Such lines will be separate from any line used to handle material. Adequate respiratory protection will also be required per PPE-5 Respiratory Protection practice.
- 3.4.15 Following the completion of work, the excavation must be backfilled as soon as possible. The following must be followed when backfilling the excavation:
 - 3.4.15.1 Soil contaminated from a spill or other hydrocarbon or chemical source shall not be placed back in the excavated hole. Refer to ENV-29 Soil Excavation practice requirements.
 - 3.4.15.2 Soil that may have splintered or other wood mixed in should not be used for backfilling.
 - 3.4.15.3 Where possible, backfilling should not be done over wood placed in the excavated hole to support pipe or other equipment. The wood should be removed prior to setting the pipe. Wood cribbing shall not be left under carbon steel piping.
 - 3.4.15.4 When the backfilling of an excavation does not require flowable fill, then the initial backfill padding material shall be placed in compaction layers up to 12 inches and to a minimum depth of 18 inches above the top of any pipe or other items being covered that need to be protected.
 - 3.4.15.5 Padding material shall be soil or sand, free of gravel or rock and does not contain vegetation, organic materials, or any other detrimental matter or foreign objects that could harm the item below the padding
 - 3.4.15.6 Once initial padding material has been placed, backfill can be placed in compacted layers to a level equivalent to surrounding terrain or to any specified crowns, additional voids found in the area around the

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excavation, or slopes for normal run-off as specified by others. Ref SP-00-06 requirements.

- 3.4.15.7 Original soils from the excavation can be re-used as backfill material if suitable. If new backfill material is needed it should be made of loose earth or sand that does not contain rock greater than 12 inches in diameter, organic material, vegetation, or any other detrimental matter or foreign objects unless previously approved.

3.5 Excavation Cave-In Protective Systems

3.5.1 Excavations less than four feet deep.

- 3.5.1.1 No sloping or shoring is normally required. Extreme conditions could necessitate some type of protective system.

3.5.2 Excavations four feet to twenty feet deep

- 3.5.2.1 All soil in the Galveston Bay Refinery shall be considered Type "C".

- 3.5.2.2 Cave-in protection is required. This protection can be in the form of sloping, shoring, or shielding. Options are:

3.5.2.2.1 The slope design for Type "C" soil is at an angle of one and one-half horizontal to one vertical.

3.5.2.2.2 Utilize designs per manufacture's tabulated data, such as charts supplied with aluminum hydraulic shoring, shields, etc.

3.5.2.2.3 If aluminum shoring is utilized, use according to OSHA tables if manufacturer's data is not available.

3.5.2.2.4 If timber shoring must be used, use per OSHA tables. However, it is recommended that slopes, shields or aluminum hydraulic shoring be used in lieu of timbers when practical.

- 3.5.2.3 Benching is not allowed.

3.5.3 Excavations greater than twenty feet deep, a registered professional engineer must:

3.5.3.1 Approve tables and charts which specify the safe construction of sloping, shoring or support system, and one copy of the tabulated data shall be maintained at the job site during construction.

3.5.3.2 Design a protective system for each excavation.

If the above services are required or desired for a contracted project, the contractor will be required to engage these services from a qualified professional engineer. MPC Engineering will obtain these services for projects completed by MPC Servicing Group and/or MPC Project Group.

3.6 Excavating or Operating Mobile Equipment around LPG Line

- 3.6.1 Good judgment must always be exercised when excavating around any underground LPG lines or when operating heavy mobile equipment over such lines. The approximate location of underground lines should be determined before the use of any mobile equipment is started. Good workmanship should always be exercised when operating any machinery around these facilities. Authorization of hot work rests with facility supervision. A Safe Work Permit for hot work and gas test must be issued in accordance with the work prior to performance of excavation in the area. Work shall be authorized in accordance with PR-3 Safe Work Permit and PR-4 Excavation.

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3.6.2 Whenever motorized digging equipment is operated around LPG lines, the machine shall be operated with travel of the bucket parallel to the lines whenever possible. When any motorized digging equipment is used, continuous gas monitors shall be set between the machine and the digging area to warn the operator of flammable vapors nearing the machine.

3.6.3 Mobile equipment may be utilized to excavate around underground LPG lines except as specifically prohibited below.

3.6.4 Butane Charge Station

Excavating in this area by mobile equipment will be permitted as long as the digging is not within ten feet of any of the pumps, valves or headers.

3.6.5 Spheroids

3.6.5.1 Excavating by mobile equipment will be permitted inside the firewall as long as the digging is not within ten feet of any header, master valve, or line valve.

3.6.5.2 Mobile equipment for lifting will be permitted as long as permission is granted by the OMCC.

3.6.6 Spheres

3.6.6.1 No mobile equipment may enter inside the firewall of the spheres for any reason except by the express permission of the Area Team Leader.

3.6.6.2 Relief valves, plug cocks, and gauging equipment shall be removed from the spheres by utilizing cranes operating from the perimeter roads, unless provided express permission above.

3.6.6.2.1 The East/West Plant heavy equipment pad on the south firewall, or from the inside east firewall area of Tank 560.

3.6.6.3 All excavating work inside the sphere firewall shall be by hand or hydro excavation.

3.6.6.4 All operating mobile equipment shall be turned off immediately should the warning beacons located around the spheres light up.

3.7 Training

3.7.1 All personnel (MPC and contractor) must receive initial training as it relates to their duties for excavations. Refresher training will be conducted every two years or when there is a change in the practice. All training must be documented.

3.7.2 Excavation Competent Persons must be trained on the following topics and information.

3.7.3 The Training Department will maintain a list of qualified Excavation Competent Persons. To be qualified, an individual must successfully complete an ECP specific initial training program and an ECP specific refresher training program every two years.

3.7.3.1 Excavation hazard recognition.

3.7.3.2 General Excavation requirements (OSHA 29 CFR 1926.651-652).

3.7.3.3 Soil classification system and determination of soil type.

3.7.3.4 Cave-in protective systems (sloping, shoring, shielding allowable configurations).

3.7.3.5 Types and locations of drawings to assist in the identification of underground obstructions.

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- 3.7.4 Excavation Competent Person is required to carry their Excavation Competent Person training card with them at the job site.
- 3.7.5 Excavation Competent Persons will have the following information available for reference:
- 3.7.5.1 OSHA Excavation Standard 29 CFR 1926.650-652 (Standard available at HSSE Department)
 - 3.7.5.2 Copies of any available manufacturers tabulated data or approved engineering tables for shoring equipment used.
 - 3.7.5.3 Copy of approved engineering design for excavations with specifically designed shoring or sloping systems
 - 3.7.5.4 Third party Pipeline Drawing No. A-4045-12-1, "Rights of Way and Easements Across GBR Refinery." **As can be seen in ePlot Real Estate View, 3rd Party layer.**
 - 3.7.5.5 **5050, 5020 5010, 5001 and 5002 series drawings. Reference Attachment C on Underground Obstacles**
- 3.7.6 Contractors must ensure its employees receive and maintain regulatory required training. When requested, contractors must provide compliance documentation (i.e. training records) to MPC.

4.0 **Definitions**

- 4.1 **Composed** – of soil particles that do not cohere.
- 4.2 **Excavation** – Any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.
- 4.3 **Excavation Competent Person** – A person that has received ECP specific training in the OSHA Excavation Standard and can identify existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous or dangerous to employees and has the authorization to take prompt corrective action to eliminate them.
- 4.4 **Faces or Sides** – The vertical or inclined earth surface formed as a result of excavation (i.e., walls or slopes).
- 4.5 **Registered Professional Engineer** – A person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any state is deemed to be a "registered professional engineer" within the meaning of OSHA Excavation Standard when approving designs for "manufactured protective systems" or "tabulated data" to be used in interstate commerce.
- 4.6 **Shield (Shield System)** – A structure that can withstand the forces imposed on it by a cave-in and thereby protects employees within the structures. Shields can be permanent structures or can be designed to be portable and moved along as the work progresses. Additionally, shields can be either pre-manufactured or job-built in accordance with the OSHA excavation standard 1926.652. Shields used in trenches are usually referred to as "trench boxes" or "trench shields".
- 4.7 **Shoring (Shoring System)** – A structure such as a metal hydraulic, mechanical, or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.
- 4.8 **Sloping (Sloping System)** – A method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation to prevent cave-ins. The

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angle of incline required to prevent a cave-in varies with differences in such factors as soil type, environmental conditions of exposure, and application or surcharge loads.

- 4.9 **Trench (Trench Excavation)** – A narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6m). If forms or other structures are installed or constructed in an excavation to reduce the dimension measured from the forms or the structure to the side of the excavation to 15 feet (4.6m) or less (measured at the bottom of the excavation), the excavation is also considered a trench.
- 4.10 **Probing** – A method for locating underground obstructions utilizing probe rods.
- 4.11 **Flowable Fill** – Flowable fill refers to a cementitious slurry consisting of a mixture of fine aggregate or filler, water, and cementitious material(s), which is used primarily as a backfill in lieu of compacted earth. This mixture can fill all voids in irregular excavations and hard to reach places (such as under and around pipes), is self-leveling, and hardens in a matter of a few hours without the need for compaction in layers.
- 4.12 **Hazardous Atmosphere** – An atmosphere which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury.
- 4.13 **Hydro Probing** – A method of probing that uses a probe rod (i.e. pipe) with a single jet pointing downward and water injection.
- 4.14 **Hydro Excavation** – Use of pressurized water and vacuum system to loosen and remove soil with a minimum amount of water. Benefits include accuracy of defining the opening with a narrow stream of water, less manual labor and injury associated with hand digging, minimizing environmental incidents due to accidental impact of piping, and preferred method in confined spaces where traditional equipment (back hoes) cannot be easily positioned and used. Hydro excavating is often the preferred excavation method from a safety and environmental standpoint.
- 4.15 **Protective System** – A method of protecting employees from cave-ins, material that could fall or roll into an excavation, or the collapse of adjacent structures.
- 4.16 **Stable Rock** – Refers to natural solid mineral matter which can be excavated with vertical sides and remain intact while exposed.
- 4.17 **Type A Soil** – Is cohesive with an unconfined compressive strength of 1.5 tons per square foot (test). Type A soils include clay, silty clay, sandy clay, clay loam, caliche, hardpan, and sometimes-silty clay loam and sandy clay loam. No soil should be classified as Type A if it is fissured; subject to vibration from traffic, pile driving, or similar effects; previously disturbed; or part of a sloped, layered system where the slope is four horizontals to one vertical or greater.
- 4.18 **Type B Soil** – Is cohesive soil with an unconfined compressive strength greater than 0.5 test but less than 1.5 test. Type B soils include granular cohesionless soils like angular gravel, silt, silt loam, sandy loam, and sometimes silty clay loam and sandy clay loam; previously disturbed soils that are not Type C; fissured soils and soils subject to vibration that would otherwise be classified as Type A; dry rock that is not stable; and material that is part of a sloped, layered system where the layers dip on a slope less steep than four horizontal to one vertical.

5.0 References

- 5.1 OSHA 29 CFR 1926.650 through 652 -- Excavations
- 5.2 Texas Engineering Extension Service Publication -- "Excavation Safety"
- 5.3 GBR PPE-7 Fall Protection

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- 5.4 GBR PR-1 Confined Space Entry
- 5.5 GBR PR-2 Hot Work
- 5.6 GBR PR-3 Safe Work Practice
- 5.7 GBR PR-14 Energy Isolation
- 5.8 Refining Core Specification SP-00-06 -- Site Preparation, Earthwork, Chain Link Fencing, and Asphaltic Concrete Paving

6.0 Attachments

- 6.1 Attachment A: Excavation Permit
- 6.2 Attachment B: Probe Card
- 6.3 Attachment C: Links to Refinery Drawings
- 6.4 Attachment D: Probing Procedure for Vertical Shaft Drilling and Belled Shape Excavation

7.0 Revision History

Revision Number	Description of Change	Written by	Approved by	Revision Date	Effective Date
0	Original issue. Consolidates GBR-HESS-PR-04 and RSW-0025-TC and addresses lessons learned under MOC 64986.	A. G. Roberts	V. J. Meeks	9/12/2019	9/30/2019
1	Incorporated GBR-HESS-PR-23 to address Excavating or Operating Mobile Equipment around LPG Line under MOC 67676.	A. G. Roberts	V. J. Meeks	11/21/2019	12/19/2019
2	Updated section 3.2.9.1.3 to align with SM-4 Benzene Exposure Reduction under MOC 69267.	M. K. Alberts	V. J. Meeks	2/11/2020	2/11/2020
3	Updated section 3.4.15.6 to align with Refining Core Spec SP-00-06.	A. G. Roberts	E. R. Kaysen	4/24/2020	4/24/2020
4	Updated Underground obstacle references (ePlot, eSearch).	A. G. Roberts	E. R. Kaysen	10/21/2020	10/22/2020

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Attachment A – Excavation Permit

[PR-4 Attachment A Excavation Permit](#)

Attachment B – Probe Card

[PR-4 Attachment B Probe Card](#)

Attachment C – Links to Refinery Drawings

[A-4045-12-1 Rights of Way and Easements Across GBR Refinery](#)

[A-5010-1 General Refinery Layout Key to Layout Drawings](#)

GBR Underground Obstacle Information:

[ePlot](#)

- 1) Use Underground View and Underground Obstacle Layers
- 2) Use Underground View and Soil Probing Layer
- 3) Use Real Estate View and 3rd Party Layers

[eSearch](#)

- 1) Additionally, use search selections
Doc_01: Diagram – Layout, and
Doc_02: Underground – Layout (Conduit, Piping, Sewer).

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Attachment D – Probing Procedure for Vertical Shaft Drilling and Belled Shape Excavation

Probing **SHALL** start at grade level

NOTE: Elevated areas like dike walls, backfill above grade, etc. is not grade level. Workers shall determine grade level prior to breaking the grade surface and once identified follow probing requirements. Refer to PR-04 Excavation Policy for further details of the expectations.

Probe results must be reported to MPC Civil Structural Engineer/Project Engineer. A copy of the results SHALL stay with the PR-4 Attachment A Excavation Permit.

1. Approach A
 - a. Starting at grade level, scrape no more than 12 inches of surface, using a backhoe with a straight blade. Scraping depth for asphalt or stabilized surfaces may be greater than 12 inches, but no more than 24 inches, provided material is removed with multiple passes and is addressed in the Safe Work Permit and Job Safety Analysis.
 - b. Probe 3.5 feet with 3 inches centers in a 72-inch (approximate) diameter, using template.
 - c. Using a backhoe, dig 72-inch (approximate) diameter excavation 2.5 feet deep.
 - d. Starting at grade level, Probe using template to a minimum depth of 5 feet. If no obstructions are found complete excavation per engineered design with the following process in place;
Once the bell has been excavated, bell should be filled with concrete, while entry into the area above the bell is restricted. After bell is filled with concrete, contractor shall sink the rebar cage, and then finish the shaft concrete pour.
2. Approach B
 - a. Starting at grade level, Probe diameter of shaft to a depth of 2 feet at 3-inch centers.
 - b. Drill shaft 1 foot deep.
 - c. Repeat process until the bottom of the shaft has been reached.
 - d. Using a metal detector and reciprocating through the shaft to the bottom of the excavation, scan along the walls of the excavation and the bottom of the excavation for obstructions.

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3. Approach C

- a. Scrape no more than 12 inches of surface, using a backhoe with a straight blade.
- b. Starting at grade level, Probe 8 feet with 3-inch centers in a 72-inch (approximate) diameter, using template.
- c. If no obstructions are found, complete excavation per engineered design with the following process in place:
Once the bell has been excavated, bell should be filled with concrete, while entry into the area above the bell is restricted. After bell is filled with concrete, contractor shall sink the rebar cage and then finish the shaft concrete pour.

4. Approach D

Hydro probing procedure – belled or drilled shaft footings

- a. Starting at grade level, the area to be probed shall be excavated to a depth not to exceed 1.0 foot along the outer perimeter of the template. The hole shall then be probed on 3-inch centers along the outer perimeter of the template to a depth of 5.0 feet using a 5-foot long hydro probe apparatus.
- b. If no obstructions are encountered probe at least an additional 5 feet on 3-inch centers along the outer parameter of the template, which will result in a minimum total depth of 10 feet that has been verified to be obstruction free.

Note: the hydro probe apparatus shall be as such:

- The probe rod shall be stiff to avoid deflection when encountering an obstruction. Suggest using ¼ inch pipe.
 - The tip of the probe shall utilize a coned tip with a single jet pointing downward and be sized to minimize water injection into the probed area yet still provide enough water to lubricate and assist in pushing soil material out of the path of the probe without substantially washing out soils from the probe hole.
 - The motive water for probing shall be no more than 120 PSIG. Use firewater.
 - The probe shall use a fiberglass handle.
 - There shall be a quarter turn shutoff valve at the probe on the water supply to shutoff and turn on the water flow thru the probe.
- c. Any location discrepancies and/or underground obstructions shall be reported to the contractor's project engineer and MPC Civil Structural Engineer to assess the situation. The contractor project engineer will coordinate design revision(s) if required.