1.0 PURPOSE

1.1 This procedure sets forth a uniform practice to perform any excavation and/or ground penetrating activities at the Detroit Refinery.

2.0 SCOPE

2.1 This procedure is developed pursuant to MIOSHA Construction Safety Standard, Part 9. Excavation, Trenching, and Shoring.

2.2 All Excavations 4 feet or greater in depth are considered confined spaces and must adhere to RSW-SAF-010-DT Confined Space Procedure.

2.3 This procedure applies to all persons, including all visitors and contractors, taking part in any excavation and/or ground penetrating activities on Detroit Refining (MRD) property.

3.0 PROCEDURE

3.1 Underground Installations

3.1.1 The excavator competent person (excavations) or representative (ground penetrations) must complete a Pre-Analysis Excavation and Ground Penetration Checklist prior to opening an excavation or performing a ground penetration greater than one foot below the earth's surface. The excavator competent person will complete a Daily Excavation Checklist prior to start of work for all excavations greater than one foot below the earth's surface, including adjacent areas and protective systems thereafter. Inspections must also be made after every rainstorm or other hazard increasing occurrence.

3.1.2 MISSDig (811)

3.1.2.1 The estimated location of all underground installations, sewer, telephone, fuel, electric, water lines, or any other underground installations that may be expected to be encountered must be determined prior to opening an excavation (excludes hand-digging, i.e. shovels and hydro-excavating). It is the responsibility of the excavator to provide MISSDig with a dig notice (ticket) at least three business days, but no more than 14 days before digging in all situations whether the excavation is inside or outside of the MRD fence line. The excavator must provide MISSDig with the name and phone number of the MPC Approver that is overseeing their work.

3.1.2.1.1 Tickets can be phoned in or entered electronically using the MISSDig E-Locate Form.

3.1.2.1.1.1 If the area of excavation cannot be accurately described in the ticket the excavator must mark the proposed area to be excavated in white paint, stakes with white flags or white flags.

3.1.2.1.2 If there are multiple excavators on the same site, each excavator shall provide its own dig notice.

3.1.2.2 The excavator is responsible for beginning the excavation within 14 days of the dig start date on the MISSDig ticket. They must obtain a new ticket if the excavation has not occurred within that time frame.

3.1.2.3 If the marks on the ground are destroyed, the excavator must place a call to MISSDig for re-marks. Utility owners have 24 hours to complete re-marking.

3.1.2.4 A MISSDig ticket is only valid for 21 days from the start date of the excavation. It may be valid

up to 180 days if the dig notice indicates that the excavation will not be completed within 21 days of the excavation start date.

3.1.2.5 In the event of an emergency or underground leak, the excavator must contact MISSDig and wait at least three hours for someone to respond before they begin to excavate. If there is no response, the excavator may begin excavating. In either case, the excavator shall take reasonable precautions to protect underground facilities (e.g., reviewing drawings, contacting personnel who know the area such as the Owning Department or the Fire Chief, and utilizing manual probing). The underground drawings should also be reviewed by the Contractor Coordinator.

3.1.2.6 Marathon Pipeline (MPL) will receive all MRD dig notifications from MISSDig.

3.1.2.6.1 For work performed inside of the MRD fence line by an outside utility company (e.g. Buckeye Pipeline, DTE, etc.); the Tank Program Manager will ensure that all known refinery owned utilities are marked, provide outside utility company with underground drawings, and respond back to MISSDig with a positive response. Additionally, an MRD representative must accompany the outside utility company during the time of excavation.

3.1.2.6.2 For work performed inside the refinery by an MRD supervised contractor; the MPC Approver will provide underground drawings to the contractor, respond back to MISSDig with a positive response, and ensure that soft excavation methods are used to identify any known utilities prior to the start of mechanical digging methods or ground penetrating activities.

3.1.2.6.3 For work performed outside of the refinery fence line; MPL will be responsible to mark all known refinery owned utilities and respond back to MISSDig with a positive response.

3.1.2.7 The MRD piping drawings that MPL has been provided are as follows: D25-2553 Sheet #1, D25-2553 Sheet #2, D25-2553 Sheet #3, D25-2553 Sheet #4, D25-2553 Sheet #5, D25-2553 Sheet #6, D25-2553 Sheet #7, D25-2553 Sheet #8, D25-2553 Sheet #9, D25-2553 Sheet #10, D25-2553 Sheet #11, D25-2553 Sheet #12, D25-2553 Sheet #13, D25-2553 Sheet #14, D25-2553 Sheet #15.

3.1.3 The excavator is to ensure that the underground drawing has been received and reviewed with the responsible engineer for the project prior to the start of the excavation.

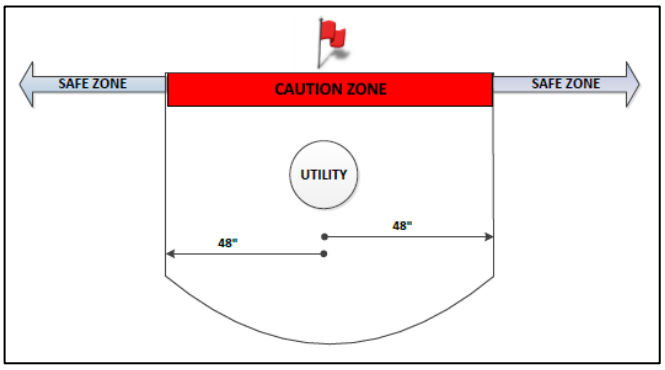
3.1.3.1 The Underground Reference Drawings folder on the MRD O-drive contains copies of all the MRD underground drawings that are currently available. The most current version of these drawings can be accessed using Document Librarian.

3.1.3.2 Copies of all underground drawings for the area where the excavation or ground penetration is taking place must be attached to the Pre-Analysis Excavation and Ground Penetration Checklist and remain at the jobsite while work is taking place.

3.1.4 The excavator shall notify Owning Department Supervision of the proposed work prior to the start of excavation.

3.1.5 Only soft excavation is allowed in the caution zone (48 inches on either side of the utility markings) and must be used to identify any known utilities prior to the start of mechanical digging methods or ground penetrating activities (i.e. exploratory excavation). Soft excavation is also required periodically within the caution zone parallel to a utility (see graphic) in order to ensure that the utility is still in the same location. The excavator may use power tools and power equipment in a caution zone only after the facilities are exposed and the precise location of the facilities is established.

3.1.5.1 Soft excavation must be used at all times within 12 inches of any underground process line, even if a portion of the process line has already been exposed.



3.1.6 All hardened surfaces (i.e. concrete, asphalt, etc.) must be swept and water washed along the cut lines prior to the start of any saw cutting or other form of demolition in order to identify any red concrete, signifying an electrical duct bank.

NOTE: Most electrical conduit is encased in red cement, while most other conduit is bare. Extreme caution should be taken when red concrete is uncovered.

3.1.7 Backhoes and other mechanical digging equipment shall not be operated in the refinery unless a second employee acts as a signal man and probes the soil with a rod to determine the presence of underground pipe or other underground obstructions.

3.1.8 All excavators/backhoes must have a straight bar affixed to and covering the teeth on the bucket when used for digging purposes.

3.1.9 The use of “Ditch Witches” or similar trenching machines is prohibited inside the refinery fence line.

3.1.10 Hand probing an established grid area is an acceptable method of determining the presence of underground obstructions. If no obstructions are detected using the hand probe, then mechanical excavation (only when outside of the “caution zone” or when the utility has been exposed) may proceed for half the depth of the probing. If excavation must proceed deeper, then a new grid must be established and additional probing must be conducted.

3.1.11 Ground Penetrating Radar (GPR) should be considered whenever there is uncertainty with existing diagrams or when manual probing may pose great risk when identifying pipe lines or flare lines.

3.1.12 If GPR is used, then:

3.1.12.1 Obstructions found during the GPR Process shall be designated on the surface (e.g., marking with a specific colored paint).

3.1.12.2 The degree of the GPR’s effectiveness should be confirmed by the company performing the GPR.

3.1.12.3 Drawings of the GPR scan will be developed by the surveyors and administered to the civil contractor performing the underground work.

3.1.13 While the excavation is open, underground installations will be protected, supported or removed as necessary to safeguard employees.

3.1.14 During excavations and/or ground penetrations if any pipe, cable, conduit or other underground installation is damaged, the utility owner, area coordinator/supervisor and the closest operation satellite

control building must be notified. If the damage results in the escape of any flammable, toxic, or corrosive gas or liquid, or endangering life, health, or property, the excavator shall call 911 emergency services by dialing 6-9-1-1 and provide immediate notice to the facility owner or facility operator.

NOTE: If an energized electrical cable is severed, an energized conductor is exposed, or a gas and/or fluid is escaping from a damaged line, employees must evacuate from the area.

3.2 Excavated Material

3.2.1 Excavated material shall not be stored less than 2' from the side of an excavation. In lieu of this, effective barriers or other retaining devices may be used to prevent excavated material from falling into the excavation.

3.3 Surface Encumbrances & Adjacent Structures

3.3.1 Must be supported or removed from the site if they create a hazard.

3.3.2 Where the stability of adjacent buildings, walls, sidewalks, roads or other such structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning shall be provided to ensure the stability of such structures.

3.3.3 Excavations and/or ground penetrations below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard shall not be permitted unless a support system is provided to ensure the stability of the structure.

3.3.4 Before the excavation and/or ground penetration begins, the design of the protection used shall be set forth by a competent person (as defined in Section 4.5).

3.4 Walkways

3.4.1 A walkway or sidewalk shall be kept clear of excavated material and other obstructions.

3.4.2 Designated walkways and sidewalks shall be lighted if used during the hours of darkness.

3.4.3 A walkway or sidewalk adjacent to an excavation shall be separated from the excavation and protected by a guard rail as prescribed in the MIOSHA Construction Safety Standard, Part 45, Fall Protection.

3.4.4 An employee routed from a sidewalk or walkway into a roadway to detour an excavation shall be protected on both sides by guardrails or barricades as prescribed in the MIOSHA Construction Safety Part 45, Fall Protection.

3.4.5 Where personnel or equipment is required and permitted to cross a trench or ditch, a walkway, runway, ramp, or bridge shall be provided with a designated capacity of not less than three times the imposed load. A guardrail shall be provided as prescribed in the MIOSHA Construction Safety Standards, Part 21 (Guarding of Walking and Working Areas) and Part 45 (Fall Protection).

3.5 Working Under Loads

3.5.1 No personnel shall be underneath loads handled by lifting or digging equipment, nor exposed to spillage or falling material from vehicle loading or unloading.

3.6 Barricades

3.6.1 Excavations are to be barricaded at all times, except on the side where work is taking place. Barricades must be no less than 36" high. Excavations are to be covered by a steel plate where vehicles or personnel are expected to cross. Plywood or other materials are not to be used.

3.6.2 When mobile equipment is operated adjacent to an excavation where the operator's vision is restricted, a warning system such as barricades or stop logs shall be utilized.

3.6.3 When mobile equipment or vehicular traffic is present, next to an excavation:

3.6.3.1 Stop logs or concrete barriers shall be used to protect workers.

3.6.3.2 Warning lights must be on the barricades. Warning lights must be in good operating condition and explosion proof in process areas.

3.7 Inspections

3.7.1 **For all excavations AND/OR ground penetrations greater than one foot below the earth's surface**, a Pre-Analysis Excavation and Ground Penetration Checklist must be completed by the excavator competent person or representative prior to the start of work.

NOTE - The Pre-Analysis Excavation and Ground Penetration Checklist only needs to be completed and signed by an excavator competent person for excavations (i.e. a man-made cut, cavity, or depression made in the earth's surface by earth removal). A Representative may sign for all other ground penetrating activities (e.g. probing, drilling, boring, the driving of piles and/or grounding rods, etc.).

3.7.2 The Pre-Analysis Excavation and Ground Penetration Checklist shall be verified and approved by a MPC Approver. A copy shall also be posted with the Safe Work Permit (SWP) for the duration of the job. The Pre-Analysis Excavation and Ground Penetration Checklist shall be turned in to the Safety Department upon completion of the job.

A MPC Approver (**e.g., MPC Coordinator, MPC Engineer, or in case of an emergency an MPC Shift Foreman**) is a Marathon employee or Contracted Leased employee who shall verify the persons on Attachment A are the correct personnel to adequately provide guidance in their areas of expertise pertaining to the project and have reviewed and understand the Pre-Analysis Excavation and Ground Penetration Checklist.

3.7.3 **For all excavations greater than one foot below the earth's surface**, the excavator competent person must complete a daily inspection by completing the Daily Excavation Checklist and post with the safe work permit at the jobsite prior to the beginning of each day. excavator competent person must also review and sign off on the safe work permit. The Daily Excavation Checklist will be turned in to the Owning Dept. upon closing out the SWP. The Owning Dept. will place the Daily Excavation Checklist with the SWP and return to Safety.

3.7.4 Additional inspections are required by the excavator competent person, when personnel exposure to a hazard can be anticipated, such as rainstorms or other hazards. The excavator competent person will look for evidence of a situation that could cause a cave-in (e.g., cracks on excavation surface, bulging of material at the bottom of the excavation wall, or material trickling into the excavation), hazardous atmosphere, failure of a protective system, sources of vibration that may affect the stability, or any other hazardous situation. All work will cease until the necessary precautions have been taken to safeguard the employees.

3.7.5 If any factors or conditions could affect the soil classification (i.e., rainstorm) in any way, these conditions shall be re-evaluated as set forth in section 3.10, 3.11, and 3.12 of this procedure. Soil, protective systems (i.e., shoring and bracing), and angle of repose shall be re-evaluated as necessary to reflect the changed circumstances. These changes shall be noted on a Daily Excavation Checklist.

3.7.6 The shoring, bracing, and underpinning shall be inspected daily or more often, as conditions warrant, by the excavator competent person.

3.7.7 When materials and equipment that is used for protective systems is damaged, the

excavator competent person shall examine the equipment and evaluate its suitability for continued use. If the excavator competent person **cannot** assure the protective system equipment is able to support the intended loads or is otherwise suitable for safe use, then such equipment shall be removed from service. If the equipment is removed from service it shall be evaluated and approved by a registered professional engineer before being returned to service.

3.7.8 When shoring/support systems have been designed by a registered professional engineer, the system must conform with the engineers design prior to entry into the excavation.

3.8 Blasting

3.8.1 Blasting as a means of excavation is not allowed in the refinery.

3.9 Hazardous Atmospheres

3.9.1 If at any point during excavations less than 4 feet there are signs of smell or heavy soil discoloration, safety and/or environmental shall be summoned.

3.9.2 All excavations/trenches 4 feet or greater shall be tested for hazardous atmospheres by the MRD Safety Dept in accordance with RSW-SAF-010-DT Confined Space Entry Procedure. Benzene testing shall be included in the atmospheric testing for all excavations 4 feet or greater on company property Pursuant to the Confined Space Entry procedure, a confined space entry permit shall be obtained from the Owning Department prior to entering excavations 4 feet or greater.

3.9.3 Personnel subjected to a hazardous atmosphere or oxygen deficient atmosphere shall be protected by providing proper ventilation or respiratory equipment. Continuous atmospheric monitoring in the areas where entrants are working shall be required.

3.10 Requirements for Classification of Soil Types

3.10.1 The classification of soil shall be made by an excavator competent person in accordance with MIOSHA Part 9, Excavation, Trenching, and Shoring, and Appendix A (Soil Classification) of OSHA 1926 Subpart P.

3.10.2 Soil testing is required to gather information for the correct benching/sloping angles of repose as well as loads imposed on support systems (e.g., trench boxes and sheeting).

3.10.3 No soil on Detroit Refinery property shall be classified as Solid Rock Formation, Fractured Rock Formation, Stiff Clay, or Firm Clay per Attachment A. The maximum allowable angle of repose is a slope of 45 degrees or a 1:1 bench. A more conservative angle of repose may be required if indicated during the soil analysis process.

3.10.3.1 The classification of the deposits shall be made based on the results of at least one visual and at least one manual analysis. Such analyses shall be conducted by an excavator competent person using tests described in section 3.11, or in other recognized methods of soil classification or testing such as those adopted by the American Society for Testing Materials, or the U.S. Department of Agriculture textural classification system.

3.11 Acceptable Visual and Manual Analyses for Soil

3.11.1 A Visual analysis is conducted by an excavator competent person to determine qualitative information regarding the excavation site in general. The following locations shall be used for a visual analysis: the soil adjacent to the excavation, the soil forming the sides of the open excavation, and the soil from the excavated material.

3.11.2 A Manual analysis of soil samples is conducted to determine quantitative as well as qualitative properties of soil and to provide more information in order to classify soil properly. A qualitative manual

analysis and a quantitative manual analysis should both be used together.

3.11.2.1 The following are examples of accepted types of qualitative manual analysis: plasticity test, dry strength test, thumb penetration test.

3.11.2.2 The following are examples of accepted types of quantitative manual analysis: using a hand-operated penetrometer, using a hand-operated shearvane, or collecting boring samples for laboratory analysis.

3.12 The Angle of Repose

3.12.1 The side of an excavation 4 feet or greater shall be sloped according to the proper angle of repose as prescribed in Attachment A (Maximum Allowable Angle of Repose), unless supported.

3.12.2 An excavation less than 4 feet in depth shall also be effectively protected if an examination of the ground indicates hazardous earth movement may be expected.

3.12.3 If one side of a trench is less than 4 feet in depth and the other side is 4 feet or greater in depth, the side 4 feet or greater in depth shall be protected as provided in this procedure (e.g., benching, sloping, shoring). All excavated material shall be placed on the low side if possible.

3.12.4 Special attention shall be given to a side that may be adversely affected by weather or moisture content.

3.13 Design of Sloping and Support Systems

3.13.1 The design of a slope/bench, support, shield, or other protective systems shall be approved and signed off by an excavator competent person but reviewed by the MPC Approver. The determination of slopes and support systems shall be conducted in accordance with Attachment A (Maximum Allowable Angles of Repose) and MIOSHA Part 9 (Excavation, Trenching, and Shoring).

3.13.2 The angle of repose and the design of the supporting system for a side of an excavation shall be based on the evaluation of all of the following factors:

3.13.2.1 Depth of cut and type of soil.

3.13.2.2 Possible variation in the water content of the material while the excavation is open.

3.13.2.3 Anticipated changes in the material due to exposure to air, sun, water, or freezing.

3.13.2.4 Load imposed by structures, equipment, overlying material, or stored material.

3.13.2.5 Vibration from traffic or equipment.

3.13.3 When benching the side of an excavation, the vertical rise shall be less than 4 feet and the step back shall extend to at least the angle of repose as required in Attachment A.

3.13.4 Personnel cannot work on the face of the slope or bench if it would expose workers in the excavation to falling, rolling, or sliding material or equipment.

3.13.5 If it is necessary to operate power shovels, trucks, materials or other heavy objects on a level above and near an excavation, the side of the excavation shall be supported as necessary to resist the extra pressure due to the imposed loads.

3.13.6 A shoring/support system shall be designed by a competent person (as defined in Section 4.5). Changes from the design of the shoring/support system shall be approved by a competent person (as defined in Section 4.5).

3.13.7 Portable trench boxes or sliding trench shields may be used for the protection of personnel in place of a shoring system or sloping. Where such trench boxes are used, they shall be designed, constructed, and maintained in a manner that provides protection equal to or greater than the sheeting or shoring required for the trench.

3.13.8 Personnel are not allowed to be in the shields when they are being installed, removed or moved.

3.13.9 The use of any shoring/support system or shielding/trench box used as a protective system shall possess documentation at the jobsite detailing the proper use and design.

3.13.10 The use of benching in conjunction with a portable trench box is permitted when the toe of the trench box is not more than 2 feet above the trench bottom, but only if the trench box is designed to resist the forces calculated for the full depth of the trench and if there are no indications, while the trench is open, of a possible cave-in below the bottom of the trench box.

3.14 Access and Egress

3.14.1 All excavations 4 feet or more in depth (are considered confined spaces - RSW-SAF 010-DT will apply) and occupied by an employee shall be provided with either a ladder extending not less than 3' above the top, a structural ramp with cleats, a set of stairs compliant with section 3.1.16 of RSW-SAF-066-DT Fall Protection Procedure, or an earth ramp that meets the requirements specified in section 3.14.3 of this procedure as a means of access and egress.

3.14.1.1 Long term excavations (open for more than one week) that do not utilize a trench box and/or other means of shoring/sheeting and excavations that are benched and/or sloped shall utilize either a set of stairs or an earth ramp for access and egress.

3.14.2 Step ladders shall not be used as a straight ladder by leaning it against a wall or other support. A portable ladder in use shall possess appropriate safety feet to avoid sinking into the earth unless the ladder is tied, blocked, or otherwise secured to prevent it from being displaced. A board or plank may be used to support footing on uneven/unstable ground.

3.14.3 An earth ramp may be used in place of a ladder if it meets all of the following requirements:

3.14.3.1 The ramp material shall be stable.

3.14.3.2 The sides of the excavation above the ramp shall be maintained to the angle of repose or sheeted or shored along the means of egress.

3.14.3.3 The degree of angle of the ramp shall not be more than 45 degrees.

3.14.3.4 Vertical height between the floor of the trench and the toe of the ramp shall not exceed 30 inches.

3.14.4 Lateral travel along the wall of a trench to a ladder or other mean of egress shall not exceed 25'.

3.15 Other Personal Equipment

3.15.1 Personnel shall wear a reflective warning vest or other high visibility material when exposed to vehicular traffic. In excavations 4 feet or greater, the entrant shall be equipped with a safety harness, as outlined in the Confined Space Entry Procedure.

3.16 Water Accumulation

3.16.1 An employee shall not work in an excavation in which there is accumulated water or in which water is accumulating unless precautions have been taken to protect employees against the hazards posed by

water accumulation.

3.16.1.1 The precautions necessary to protect employees adequately vary with each situation, but may include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, and additional attention given to soil deterioration with weight loads imposed.

3.16.2 If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operation shall be periodically monitored by an excavator competent person or a monitoring system to ensure that the equipment is properly operating.

3.16.3 Consideration must be given to the possibility of soil deterioration and undermining, due to water accumulation, which could result in soil collapse or cave-in.

3.17 Mobile Hydraulic Excavators

3.17.1 Operator Training

3.17.1.1 The excavator shall ensure that all operators working for their company have been trained on the following:

3.17.1.1.1 The capabilities of the equipment and attachments.

3.17.1.1.2 The purpose, use and limitations of controls.

3.17.1.1.3 The making of daily inspections.

3.17.2 Inspection Requirements

3.17.2.1 A thorough annual inspection of all mobile hydraulic excavators shall be made by a competent person. The excavator shall maintain, on the jobsite or attached to the equipment, a copy of the latest equipment inspection record with the date and results for each piece of equipment.

3.17.2.2 At a minimum, the operator shall perform a daily inspection of all control mechanisms for maladjustment that interferes with proper operation and for excessive wear of components and contamination by lubricants or other foreign matter.

3.17.2.3 All mobile hydraulic excavators shall also be inspected in accordance with the manufacturer's specifications.

3.17.3 Fire Protection

3.17.3.1 A portable fire extinguisher with a rating of not less than 10BC shall be kept in the cab or operating enclosure or within a 200-foot radius of the excavator.

3.17.4 Hand Signals

3.17.4.1 When using hand signals, the signal person, operator, or lift director shall use one of the following methods:

3.17.4.1.1 Standard hand signals for excavators as shown in Attachment C – Standard Hand Signals for Excavators.

3.17.4.1.2 Non-standard hand signals. When used, the signal person, operator, and lift director, when there is one, shall contact each other prior to the operation and agree on the

non-standard hand signals that will be used.

3.17.5 Operations

3.17.5.1 An operator shall not leave an mobile hydraulic excavator unattended with the boom or load suspended above the ground, floor, or platform during working operations. The operator shall not leave a bucket or blade suspended above the ground when a machine is unattended.

3.17.5.2 Windows of a mobile hydraulic excavator shall be equipped with safety glass or its equivalent. Visual distortions that are caused by broken or defective glass and which would affect the safe operation of the equipment when in use shall be corrected.

3.17.5.3 The boom or bucket shall not be used for hoisting or transporting employees.

3.17.5.4 A mobile hydraulic excavator shall not be loaded beyond the rated load.

3.17.5.5 Hooks that are attached to the bucket or boom that are used for hoisting material shall be equipped with self-closing latches or their equivalent.

3.17.5.6 Materials being hoisted shall be rigged to prevent unintentional displacement.

3.17.5.7 A load shall not be moved in a manner that could contact obstructions.

3.17.5.8 All excavators shall also comply with the requirements of the Power Crane and Shovel Association (PCSA) standard No. 5 “Mobile Hydraulic Excavator Standards,” 1983 edition and “Referenced Material for PCSA Standards No. 4 and No. 5”, 1982 edition.

3.17.6 Pinch Point and Struck by Protection

3.17.6.1 If an employee could be struck by the rotating superstructure of a mobile hydraulic excavator or if clearances between the rotating or moving structure of a mobile hydraulic excavator can create a pinch point for an employee, the excavator shall do either of the following:

3.17.6.1.1 Barricade the hazardous area.

3.17.6.1.2 Train and instruct each employee to stay out of the danger area and require a danger sign be affixed to the rear and sides of the house and counterweight. The danger sign shall have additional lettering to indicate that the counterweight is swinging.

3.18 Electrical Hazards

3.18.1 When operating any equipment in proximity to electrical overhead lines, a minimum clearance of 20ft shall be maintained OR contact a Marathon Electrical Department Representative to verify that the line is not energized or get approval to follow the clearances listed in Table A.

3.18.1.1 If equipment must be operated closer than 20ft from any energized electrical overhead lines, the MPC Electrical Department Representative shall determine if a “Qualified Overhead Line Spotter” is needed. This spotter’s sole responsibility is to observe safe working clearances around all overhead lines and to direct the operator accordingly. This person shall wear a bright colored vest so that he/she is clearly visible to the at all times.

3.18.2 If it is difficult for the operator to maintain the required clearance by visual means, then the excavator shall designate an employee to observe the clearance and give timely warning to the operator.

TABLE A MINIMUM CLEARANCE DISTANCES	
Voltage (nominal, kV, alternating current)	**Minimum clearance distance (feet)**
up to 50	10
over 50 to 200	15
over 200 to 350	20
over 350 to 500	25
over 500 to 750	35
over 750 to 1,000	45
over 1,000	(as established by the utility owner or operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution)
Note: The value that follows "to" is up to and includes that value. For example, over 50 to 200 means up to and including 200kV.	

3.19 Excavation/Trench Rescue

3.19.1 Excavations and trenches 4 feet or greater are considered confined spaces, rescue of personnel shall be done in accordance with the Rescue Section of RSW-SAF-010-DT Confined Space Entry Procedure.

3.19.1.1 All Excavations/Trenches 4 feet or greater will require 3 *Confined Space Rescue* personnel on the Work Permit. Confined Space Rescue personnel will respond and be able to provide assistance to personnel in any situation other than cave-in type events.

3.19.1.2 *Trench Rescue* personnel are not required to be listed on the permit. In the event of a cave-in, contact security through channel Main CX1 on the radio or dial 297-"6911". Security will activate an ERT response.

3.20 Responsibilities

NOTE: All personnel must review and adhere to the responsibilities section in RSW-SAF-010-DT Confined Space Entry Procedure, as well as any additional responsibilities listed below.

3.20.1 Owning Department

3.20.1.1 Ensure the Pre-Analysis Excavation and Ground Penetration Checklist is completed with all signatures present and attached to the Safe Work Permit.

3.20.1.2 Ensure the Daily Excavation Checklist is filled out by an excavator competent person and attached to the Confined Space Permit.

3.20.2 MPC Approver (**Construction or Maintenance Coordinator or in case of an emergency an MPC Shift Foreman)**

3.20.2.1 Verify the persons that assist in completing the Pre-Analysis Excavation and Ground Penetration Checklist are the correct personnel to adequately provide guidance in the areas of expertise pertaining to the project and have reviewed and understand the Checklist.

3.20.2.2 Retrieve all underground drawings (i.e. piping, process and electrical) from the Project/Area Team Engineer for the area to be excavated and provide the drawings to the company performing the excavation.

3.20.2.3 Respond back to MISSDig with a positive response for dig tickets entered by an MRD supervised contractor.

3.20.2.4 Ensure that soft excavation methods are used to identify any known utilities prior to the start of mechanical digging methods or ground penetrating activities (i.e. exploratory excavation).

3.20.3 Supervisors

3.20.3.1 Review the procedure and make recommendations.

3.20.3.2 Ensure compliance with and enforcement of RSW-SAF-021-DT Excavation, Trenching, and Shoring Procedure.

3.20.3.3 Ensure that Marathon and Contractor workers have a written excavation procedure prior to performing the work.

3.20.4 Safety Department

3.20.4.1 Ensure the Pre-Analysis Excavation and Ground Penetration Checklist is completed with all signatures present and attached to the Safe Work Permit prior to co-signing for any initial entry.

3.20.4.2 Ensure the Daily Excavation Checklist is filled out by an excavator competent person and attached to the confined space permit prior to co-signing for any initial entry.

3.20.4.3 Review the safety procedure to maintain regulatory compliance.

3.20.4.4 Review the procedure and make recommendations.

3.20.4.5 Coordinate training for employees for competent person classification.

3.20.4.6 Maintain and update original policy and procedure.

3.20.4.7 Communicate and make available this procedure to necessary employees.

3.20.5 Excavator Competent Person

3.20.5.1 Inspect the excavation site prior to beginning work each day by completing the Daily Excavation Checklist and as an ongoing inspection throughout the day.

3.20.5.2 Ensure the Pre-Analysis Excavation and Ground Penetration Checklist is completed with all signatures present and attached to the Safe Work Permit on a daily basis for the duration of the job.

3.20.5.3 Identify existing or predictable hazards in the excavation area.

3.20.5.4 Identify and correct working conditions that are unsanitary or hazardous to employees.

3.20.5.5 Perform the required analysis for soil classification.

3.20.5.6 Identify the proper angle of repose.

3.20.5.7 Monitor water removal equipment to ensure equipment is properly operated if such equipment is being used to prevent the accumulation of water.

3.20.5.8 Inspect excavation after every rainstorm or other hazard-producing occurrence for evidence of possible slides or cave-ins.

3.20.5.9 Take prompt and corrective measures to eliminate hazardous conditions.

3.20.5.10 Create an as built drawing displaying any discrepancies between what is observed in the field and the engineered drawings pertaining to the underground installations for the specific job.

3.20.5.10.1 Communicate / provide the as built drawing to the MPC Approver.

3.20.5.11 Be familiar with and adhere to RSW-SAF-021-DT Excavation, Trenching, and Shoring

Procedure.

3.20.6 Marathon/Contractor Project Engineer (for Construction Projects) OR Marathon Area Team Engineer (for Routine Maintenance)

3.20.6.1 Obtain all underground drawings (i.e. piping, process and electrical) for the area to be excavated from Document Librarian and provide them to the MPC Approver prior to signing off on the Pre-Analysis Excavation and Ground Penetration Checklist.

3.20.6.2 Any unidentified underground utilities found during the excavation by service provider should reported to construction coordinator to report to PM for updating underground grid drawing number XXXX. This is also added in Daily Excavation Checklist

3.20.7 Excavation Worker

3.20.7.1 Practice safe working procedures while excavating.

3.20.7.2 Be familiar with and adhere to RSW-SAF-021-DT Excavation, Trenching, and Shoring Procedure.

3.20.7.3 Only occupy excavation site when it's deemed safe to enter by an excavator competent person.

3.20.7.4 Receive Confined Space Training prior to entering an excavation/trench.

3.20.8 Attendant

3.20.8.1 Be aware of physical hazards associated with the excavation/trench (e.g., cracks on excavation surface, bulging of material at the bottom of the excavation wall, material trickling into the excavation, or water intrusion).

3.20.8.2 Evacuate all personnel from the space if any physical hazards exist and notify the excavator competent person so the excavator competent person can perform additional inspections.

3.20.9 Rescue Coordinators

3.20.9.1 Review and adhere to the Rescue Coordinator's responsibilities in RSW-SAF-010-DT Confined Space Entry Procedure.

3.20.10 Confined Space Rescue Team Members

3.20.10.1 Respond and provide assistance to personnel in any situation other than cave-in (soil collapse).

3.20.10.2 Review and adhere to the Rescue Team Member's responsibilities in RSW-SAF-010-DT Confined Space Entry Procedure.

3.20.11 Emergency Response Team Members (Trained in Trench Rescue)

3.20.11.1 Respond to soil cave-in emergencies to provide additional shoring/bracing and extraction of personnel.

3.20.11.2 Review and adhere to the Emergency Response Plan – Organization in RSW-ERP-003-DT, the Emergency Response Plan – Medical Emergency in RSW-ERP-008-DT, and any other Emergency Response Plan that may apply.

4.0 DEFINITIONS

4.1 Accepted engineering practices - those requirements which are compatible with standards of practice required by a registered professional engineer.

4.2 Angle of Repose – the maximum allowable slope as determined by Attachment A.

4.3 Benching – A method of protecting employees from cave-ins by shaping the sides of an excavation to form one (1) or a series of horizontal levels or steps.

4.4 Braces – The horizontal cross members of a shoring system that bear against the uprights or stringers.

4.5 Competent Person (aka. Qualified Person as specified by MIOSHA) – An individual from the excavator company (company performing the actual digging and/or ground penetrating activities) who, by possession of a recognized degree or certificate of professional standing, or who, by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter and work. Additionally, this person must be trained as an "Excavation Competent Person" (course content and proof of completion must be provided to MRD safety upon request).

NOTE: When designing shoring/support systems, this person must be a registered professional engineer who is capable of providing detailed information on the requirements and limitations of the designed system. This registered professional engineer does not need to be an employee of the excavator company.

4.6 Earth's Surface – Any type of soil, rock, and/or concrete/asphalt slab on grade.

4.7 Electrical Designee – Is the electrical subject matter expert who can appropriately answer the questions associated with the Pre-Analysis Excavation and Ground Penetration Checklist.

4.8 Excavator – Company who will be performing the actual digging and/or ground penetrating activities.

4.9 Excavation – Any man-made cut, cavity, or depression made in the earth's surface by earth removal.

4.10 Exploratory Dig – An invasive method for locating underground facilities without damaging them. Techniques include but are not limited to probing and hand digging.

4.11 Firm Clay (Soil) – A clay-type soil that is resistant to forces causing rupture displacement. A firm clay has a minimum unconfined compressive strength of 1.5 tons per square foot.

4.12 Granular Material (Soil) – a course grained soil that does not possess cohesion but derives its strength from internal friction.

4.13 Ground Penetration - Any type of work (other than excavation) that involves the penetration of the earth's surface (e.g. probing, drilling, boring, the driving of piles and/or grounding rods, etc.).

4.14 Mobile Hydraulic Excavator – A self-propelled machine with an upper structure capable of continuous rotation and which digs, elevates, swings, and dumps material by action of the boom and arm or telescoping boom with bucket. Equipment that does not rotate 360 degrees, such as rubber-tired backhoe, is not considered to be an excavator.

4.15 Running Soil – Any type of soil that has insufficient strength to stand unsupported. Running soil tends to run or slough into the excavation as the excavation is being dug.

4.16 Sheet Piling – A continuous row of timber or steel piles driven in close contact to provide a tight wall to resist lateral pressure of water, adjacent earth, or other materials.

4.17 Shield (shield system) - a structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the structure.

4.18 Shoring - A mechanical system that supports the sides of an excavation and which is designed to prevent cave-ins.

4.19 Sloping (Sloping System) – a method of protecting employees from cave-ins by excavating to form sides of an excavations that are inclined away from the excavation so as to prevent cave-ins. The angle of repose required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

4.20 Soft Clay (Saturated Granular Material) – A clay-type soil that has an unconfined strength of less than 1.0 ton per square foot.

4.21 Soft Excavation – Excavation which uses non-damaging, non-invasive excavation tools, reducing risk/harm to buried utilities. Examples include hand-digging, hydro-vac or air vacuum excavation technologies.

4.22 Stiff Clay – A clay-type soil that is very resistant to forces causing rupture or displacement. A stiff clay has a minimum unconfined compressive strength of 2.5 tons per square foot.

4.23 Support (Support System) – A total system necessary to restrain the sides of an excavation from moving (e.g. shoring, bracing, underpinning, etc.).

4.24 Surface Encumbrances - Any moveable aboveground object or material.

4.25 Trench - An excavation that is “narrow compared to its length” and does not exceed 15’ wide at its bottom. If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structures to the other side of the excavation to 15 feet or less (measured at the bottom), the excavation is also considered to be a trench.

4.26 Visible Indicators – Visual observations that indicate the potential presence of an underground facility such as the presence of utility markers, access covers (e.g., manholes), vegetation changes, scarring of the ground surface, soil changes, ground surface highs or lows, adjacent structures.

5.0 REFERENCES

5.1 MIOSHA Construction Safety Standards, Part 9. Excavation, Trenching, and Shoring

5.2 OSHA Safety and Health Regulations for Construction, Subpart P - Excavations Sections 29 CFR 1926.650 - 1926.652

5.3 MIOSHA Construction Safety Standards, Part 45. Fall Protection.

5.4 MIOSHA Construction Safety Standards, Part 21. Guarding of Walking and Working Areas

5.5 MISSDig Underground Facility Damage Prevention and Safety Act

5.6 MIOSHA Construction Safety Standards, Part 15. Excavators, Hoists, Elevators, Helicopters, And Conveyors

6.0 ATTACHMENTS

6.1 RSW-SAF-021-Form1-DT Pre-Analysis Excavation and Ground Penetration Checklist

6.2 RSW-SAF-021-Form2-DT Daily Excavation Checklist

6.3 RSW-SAF-021-P001-DT - Excavation Safety Quick Reference Guide Bulletin

7.0 APPENDICES

7.1 Appendix A – Maximum Allowable Angle of Repose

7.2 Appendix B – Standard Hand Signals for Excavators

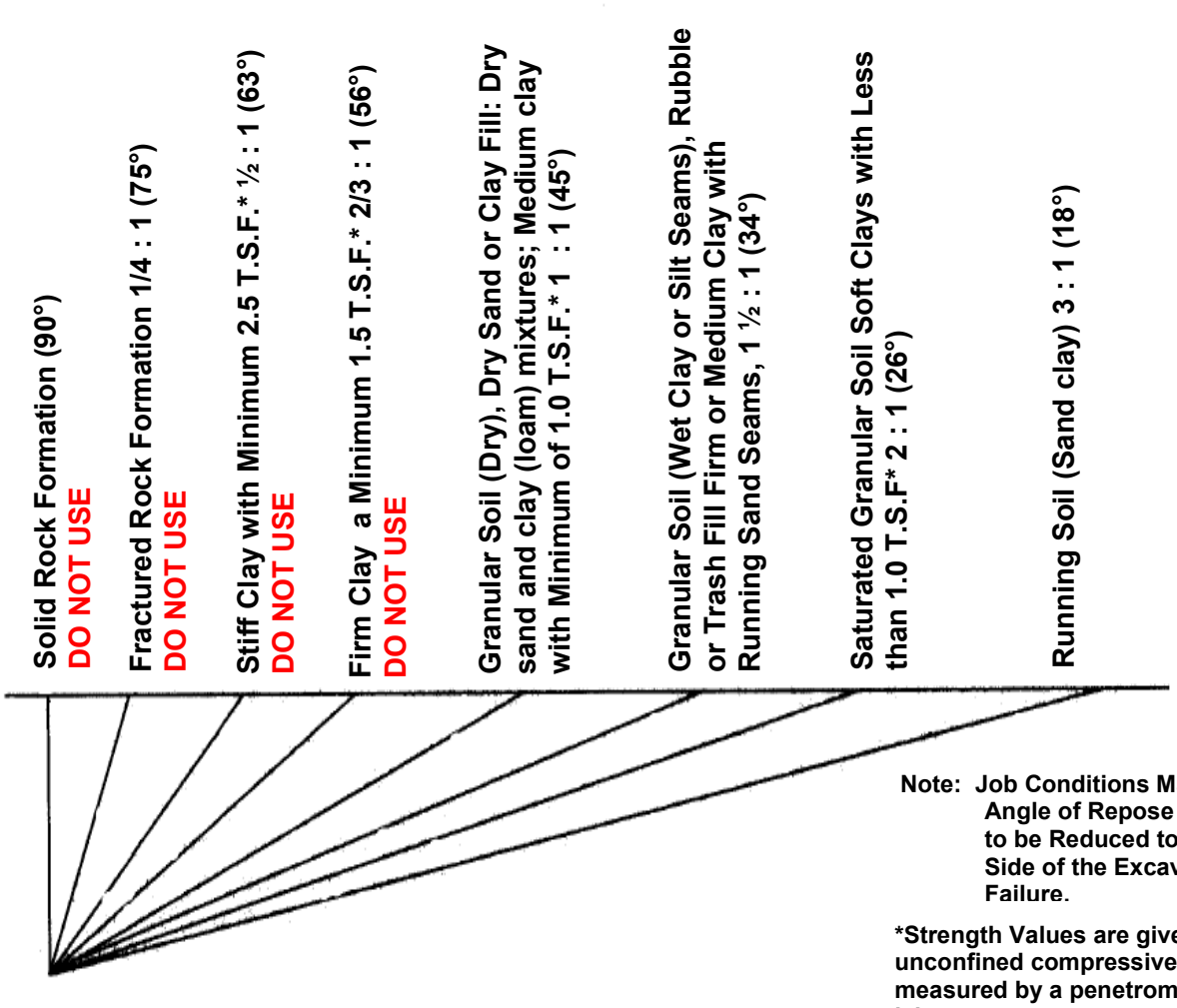
8.0 REVISION HISTORY

Revision number	Description of change	Written by	Checked by	Effective date
23	Daily Excavation Checklist (Rev. No. 12) – Added Servicing Group Foreman review and signature (recommendation from KMS INC-160702), offset barricade or swing gate provided at all ladder access points, and protection/support for exposed underground utilities and/or process piping.	J. Stefko	J. Rabideau	11/7/17
24	Updated Section 3.1.6 to require that all hardened surfaces be swept and water washed to identify surface duct banks prior to saw cutting or demoing. Updated Responsibilities section to clarify that the Project Engineer is required to collect all available underground drawing and the MPC Approver is required to provide these drawings to the excavating company. Pre-Analysis Checklist (Rev. No. 13) – Updated to reflect the responsibility updates listed above. Added surface duct banks to the examples of above ground hazards to look for during walk down. Added "N/A" checkbox for Miss Dig to be used only when hand digging. Daily Excavation Checklist (Rev. No. 13) – Added check box to account for the requirement made in section 3.1.6.	J. Stefko	J. Rabideau	5/11/18
25	Added "Area Team Engineer" responsibilities for Routine Maintenance jobs. Pre-Analysis Checklist (Rev. No. 14) – Updated to make note of the reliability of underground drawings and to remove the Electrical Designee signature.	J. Stefko	J. Rabideau	6/5/18
26	Added 3.20.6.2 Any unidentified underground utilities found during the excavation by service provider should reported to construction coordinator to report to PM for updating underground grid drawing number XXXX. This is also added in Daily Excavation Checklist	J. Reidy/E. Neubauer	Al Morales	10/23/19
27	5 Year Review – No Changes	J. Wolfe	Al Morales	9/21/20

APPENDIX A

TABLE 1

Maximum Allowable Angle of Repose for the Side of an Excavation in Excess of 4' Depth



Note: Job Conditions May Require the Angle of Repose shown in this to be Reduced to Prevent the Side of the Excavation from Failure.

***Strength Values are given in unconfined compressive strength as measured by a penetrometer or laboratory tests.**

APPENDIX B