

**CS Part 9. Excavating, Trenching, and Shoring
Compared With
29 C.F.R. 1926 Subpart P – Excavations**

Summary: The significant differences between CS Part 9. Excavating, Trenching, and Shoring and 29 C.F.R. 1926 Subpart P – Excavations are in:

- Locating utility lines
- Excavation; consideration of soil types; water; slide hazards
- Excavation; obstructions; retaining materials; egress; guarding; heavy equipment
- Excavation; angle of repose
- Supporting systems; angle of repose; tie backs; tight sheeting; additional bracing
- Additional requirements for trench support systems
- Benching and sloping
- Trenching boxes and shields
- Caisson excavation; employee protection
- Walkways, sidewalks, roadways
- Openings in roadways
- Adjacent structures; protection; design; inspection of shoring, bracing, and underpinning

The comparisons show only those provisions where MIOSHA rules are different than OSHA or where MIOSHA rules are not included in 29 C.F.R.

MIOSHA	OSHA
<p>R 408.40931. Locating utility lines.</p> <p>Rule 931. (1) An employer shall not excavate in a street, highway, public place, a private easement of a public utility, or near the location of a public utility facility owned, maintained, or installed on a customer's premises, without having first ascertained the location of all underground facilities of a public utility in the proposed area of excavation.</p> <p>(2) Upon receiving the information from the public utility, an employer shall exercise reasonable care when working in close proximity to the underground facilities of any public utility. If the facilities are to be exposed, or are likely to be exposed, only hand digging shall be employed in such circumstances and such support, as may be reasonably necessary for protection of the facilities, shall be provided in and near the construction area.</p> <p>(3) When any contact with or damage to any pipe, cable or its protective coating, or any other underground facility of a public utility occurs, the public utility shall be notified immediately by the employer responsible for operations causing the damage. If an energized electrical cable is severed, an energized conductor is exposed, or dangerous fluids or gasses are escaping from a broken line, the employer shall evacuate the employees from the immediate area while awaiting the arrival of the public utility personnel.</p>	<p>1926.651(b) Underground installations.</p> <p>(1) The estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, shall be determined prior to opening an excavation.</p> <p>1926.651(b)(2) Utility companies or owners shall be contacted within established or customary local response times, advised of the proposed work, and asked to establish the location of the utility underground installations prior to the start of actual excavation. When utility companies or owners cannot respond to a request to locate underground utility installations within 24 hours (unless a longer period is required by state or local law), or cannot establish the exact location of these installations, the employer may proceed, provided the employer does so with caution, and provided detection equipment or other acceptable means to locate utility installations are used.</p> <p>No comparable OSHA provision</p>

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<p>R 408.40932. Excavation; consideration of soil types; water; slide hazards.</p> <p>Rule 932. (1) If different textured soils are encountered in the side of an excavation, each soil type of the excavation shall be cut to the proper angle of repose, except that the slope shall not steepen between the toe of the slope and the ground level where soft clay or running soil is encountered in the lower cut.</p> <p>(2) If the excavation is a trench, a trench shoring system shall be used or the sides shall be properly sloped to protect against a cave-in.</p> <p>(3) 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. 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, or the use of a safety harness and lifeline.</p> <p>(4) If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operation shall be monitored by a qualified person or a monitoring system to ensure that the equipment is properly operated.</p> <p>(5) An ongoing inspection of an excavation or trench shall be made by a qualified person. After every rainstorm or other hazard-producing occurrence, an inspection shall be made by a qualified employee for evidence of possible slides or cave-ins. Where these conditions are found, all work shall cease until additional precautions, such as additional shoring or reducing the slope, have been accomplished</p> <p>(6) An excavation that is cut into a rock formation shall be scaled to remove loose material.</p> <p>(7) When installed forms, walls, or similar structures create a trench between the form, wall, or structure and the side of the excavation, an employer shall comply with the provisions of R 408.40941 to R 408.40944</p>	<p>1926.652 Requirements for protective systems.</p> <p>(b) Design of sloping and benching systems.</p> <p>The slopes and configurations of sloping and benching systems shall be selected and constructed by the employer or his designees and shall be in accordance with the requirements of paragraph (b)(1); or, in the alternative, paragraph (b)(2); or, in the alternative, paragraph (b)(3); or, in the alternative, paragraph (b)(4), as follows: See Options.</p> <p>No comparable OSHA provision</p> <p>1926.651(h)(1) Employees shall not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline.</p> <p>1926.651(h)(2) If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations shall be monitored by a competent person to ensure proper operation</p> <p>1926.651(k) Inspections.</p> <p>(1) Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard increasing occurrence. These inspections are only required when employee exposure can be reasonably anticipated.</p> <p>1926.652 (j) Protection of employees from loose rock or soil.</p> <p>(1) Adequate protection shall be provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection shall consist of scaling to remove loose material; installation of protective barricades at intervals as necessary on the face to stop and contain falling material; or other means that provide equivalent protection.</p> <p>No comparable OSHA provision</p>

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<p>R 408.40933. Excavation; obstructions; retaining materials; egress; guarding; heavy equipment. Rule 933. (1) A tree, boulder, rock fragments, or other obstructions whose movement could cause injury to an employee shall be removed or supported.</p> <p>(2) An excavation that an employee is required to enter shall have excavated and other material stored and retained not less than 2 feet from the excavation edge.</p> <p>(3) When a shoring system is used, the system shall be designed and used to resist the added pressure when heavy equipment, material handling equipment, or material is located near an excavation.</p> <p>(4) When mobile equipment is utilized or permitted adjacent to an excavation where the operator's vision is restricted, stop logs or barricades shall be utilized or a signal person shall be used.</p> <p>(5) An excavation 48 or more inches in depth and occupied by an employee shall be provided with either a ladder extending not less than 3 feet above the top as a means of access or with a ramp meeting the requirements of subrule (6). Lateral travel along the wall of a trench to a ladder or other means of egress shall not exceed 25 feet.</p> <p>(6) An earth ramp may be used in place of a ladder if it meets all of the following requirements:</p> <ul style="list-style-type: none"> (a) The ramp material shall be stable. (b) 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. (c) The degree of angle of the ramp shall not be more than 45 degrees. (d) Vertical height between the floor of the trench and the toe of the ramp shall not exceed 30 inches. 	<p>1926.652 (j) Protection of employees from loose rock or soil. (1) Adequate protection shall be provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection shall consist of scaling to remove loose material; installation of protective barricades at intervals as necessary on the face to stop and contain falling material; or other means that provide equivalent protection.</p> <p>No comparable OSHA provision</p> <p>1926.652 (a)(2) Protective systems shall have the capacity to resist without failure all loads that are intended or could reasonably be expected to be applied or transmitted to the system.</p> <p>1926.651 (f) Warning system for mobile equipment. When mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system shall be utilized such as barricades, hand or mechanical signals, or stop logs. If possible, the grade should be away from the excavation.</p> <p>1926.651 (c)(2) Means of egress from trench excavations. A stairway, ladder, ramp or other safe means of egress shall be located in trench excavations that are 4 feet (1.22 m) or more in depth so as to require no more than 25 feet (7.62 m) of lateral travel for employees.</p> <p>No comparable OSHA provision</p>
<p>R 408.40941. Excavation; angle of repose. Rule 941. (1) The side of an excavation more than 5 feet deep shall be sloped as prescribed in table 1, unless supported as prescribed in this part. (2)****</p>	<p>1926.652 Requirements for protective systems. (b) Design of sloping and benching systems. The slopes and configurations of sloping and benching systems shall be selected and constructed by the employer or his designees and shall be in accordance with the requirements of paragraph (b)(1); or, in the alternative, paragraph (b)(2); or, in the alternative, paragraph (b)(3); or, in the alternative, paragraph (b)(4), as follows: See Options</p>

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<p>(3) If 1 side of a trench is 5 feet or less in depth and the other side is deeper than 5 feet, the side deeper than 5 feet shall be protected as provided in this part. All excavating material shall be placed on the low side if possible.</p> <p>(4) Special attention shall be given to a side that may be adversely affected by weather or moisture content.</p>	<p>1926.652 (a) Protection of employees in excavations.</p> <p>(1) Each employee in an excavation shall be protected from cave-ins by an adequate protective system designed in accordance with paragraph (b) or (c) of this section except when:</p> <p>(ii) Excavations are less than 5 feet (1.52 m) in depth and examination of the ground by a competent person provides no indication of a potential cave-in.</p>
<p>R 408.40942. Supporting systems; angle of repose; tie backs; tight sheeting; additional bracing.</p> <p>Rule 942. (1) 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:</p> <p>(a) Depth of cut and type of soil.</p> <p>(b) Possible variation in the water content of the material while the excavation is open.</p> <p>(c) Anticipated changes in the material due to exposure to air, sun, water, or freezing.</p> <p>(d) Load imposed by structures, equipment, overlying material, or stored material.</p> <p>(e) Vibration from traffic, equipment, or blasting.</p> <p>(2) A support system shall be designed by a qualified employee. The design of the supporting system shall be maintained at the jobsite. Changes from the design of the support system shall be approved by a qualified employee.</p> <p>(3) Tie rods and other forms of tie backs used to restrain the top of sheeting shall be anchored a minimum of 10 feet. The measurement to the anchor point shall start at the intersection of an angle of repose with the surface of the soil retained. The tie back and anchor shall be capable of restraining any pressure exerted on the system.</p> <p>(4) When tight sheeting or sheet piling is used, pressures due to existing ground water conditions shall be considered in the design. Sheet piling shall be driven to the predetermined depth set forth in the required design. Changes from the design shall be approved by the designer of the support system.</p> <p>(5) Materials used for a supporting system shall be in good serviceable condition. When timbers are used, they shall be sound and free of large or loose knots.</p> <p>(6) A supporting system shall include additional bracing approved by the designer of the support system when the sides of excavations are cut adjacent to a previous known excavation or a known fill, particularly when the separation between the previous excavation and the new excavation is less than the depth of the excavation.</p> <p>(7) Tight sheeting shall be braced or anchored at the bottom and along the vertical plane to prevent lateral movement</p>	<p>1926.652 Requirements for protective systems.</p> <p>(b) Design of sloping and benching systems.</p> <p>The slopes and configurations of sloping and benching systems shall be selected and constructed by the employer or his designees and shall be in accordance with the requirements of paragraph (b)(1); or, in the alternative, paragraph (b)(2); or, in the alternative, paragraph (b)(3); or, in the alternative, paragraph (b)(4), as follows: See Options</p> <p>1926.652 (c) Design of support systems, shield systems, and other protective systems.</p> <p>Designs of support systems shield systems, and other protective systems shall be selected and constructed by the employer or his designee and shall be in accordance with the requirements of paragraph (c)(1); or, in the alternative, paragraph (c)(2); or in the alternative, paragraph (c)(3); or, in the alternative, paragraph (c)(4) as follows: See Options.</p>

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<p>R 408.40943. Additional requirements for trench support systems. Rule 943. (1)**** (2) In unstable or running soil, the jacks and braces shall be removed from above the trench after employees have cleared the trench. (3)****</p>	<p>No comparable OSHA provision</p>
<p>R 408.40944. Benching and sloping. Rule 944. (1) The angle of repose shall be flattened when an excavation has water conditions, silty materials, loose boulders, or areas where erosion, deep frost action, or slide planes appear. (2) When benching the side of an excavation, the vertical rise shall not be more than 5 feet and the step back shall extend at least to the angle of repose as required by table 1. (3) When benching a side of a trench, the height of the lower bench shall not be more than the lesser of 5 feet or width of the trench measured at the bottom. (4) An employee shall not be permitted to work on sloped or benched excavations at levels above another employee, except when an employee at the lower level is protected from the hazard of falling, rolling, or sliding material or equipment.</p>	<p>Appendix B to Subpart P of 1926</p>
<p>R 408.40945. Trenching boxes and shields. Rule 945. (1) 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 or shields 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.</p>	<p>1926.652 (g) Shield systems (1) General. (i) Shield systems shall not be subjected to loads exceeding those which the system was designed to withstand. (ii) Shields shall be installed in a manner to restrict lateral or other hazardous movement of the shield in the event of the application of sudden lateral loads. (iii) Employees shall be protected from the hazard of cave-ins when entering or exiting the areas protected by shields.</p>
<p>R 408.40946. Caisson excavation; employee protection. Rule 946. The requirements for employee protection during caisson excavation are found in R 408.41482 of construction safety standard, Part 14. Tunnels, Shafts, Caissons, and Cofferdams, being R 408.41401 et seq. of the Michigan Administrative Code.</p>	<p>No comparable OSHA provision</p>
<p>R 408.40951. Walkways, sidewalks, roadways. Rule 951. (1) A walkway or sidewalk shall be kept clear of excavated material and other obstructions. (2) The walkways and sidewalks shall be lighted if used during hours of darkness.</p>	<p>No comparable OSHA provisions except:</p>

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<p>(3) A sidewalk shall not be undermined unless it is shored to support a live load of not less than 125 pounds per square foot.</p> <p>(4) A walkway or sidewalk that is adjacent to an excavation shall be separated from the excavation and protected by a guardrail as prescribed in Part 45. Fall Protection, being R 408.44501 et seq. of the Michigan Administrative Code.</p> <p>(5) An employee who is 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 Part 45. Fall Protection, being R 408.44501 et seq. of the Michigan Administrative Code, or Part 22. Signals, Signs, Tags, and Barricades, being R 408.42201 et seq. of the Michigan Administrative Code.</p> <p>(6) If an employee or equipment is required or permitted to cross a trench or ditch, a walkway, runway, ramp, or bridge shall be provided and shall have a designed capacity of not less than 3 times the imposed load. A guardrail prescribed by the provisions of Part 21. Guarding of Walking and Working Areas and Part 45. Fall Protection, being R 408.42101 and R 408.44501 et seq., respectively, of the Michigan Administrative Code, shall be provided.</p> <p>(7) If equipment is routed across or onto a roadway, protection shall be provided as prescribed in rule 2223 of Part 22. Signals, Signs, Tags, and Barricades, being R 408.42233 of the Michigan Administrative Code.</p> <p>(8) Guardrails or barricades, as prescribed in Part 22. Signals, Signs, Tags, and Barricades and Part 45. Fall Protection, being R 408.42201 et seq. and R 408.44501 et seq., respectively, of the Michigan Administrative Code, shall be provided at all remotely located excavations. All wells, pits, and shafts shall be barricaded or covered. Temporary wells, pits, and shafts shall be barricaded or covered. Temporary wells, pits, and shafts shall be backfilled when exploration and similar operations are completed</p>	<p>1926.651 (i) Stability of adjacent structures.</p> <p>(3) Sidewalks, pavements, and appurtenant structure shall not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures.</p> <p>(1) Walkways shall be provided where employees or equipment are required or permitted to cross over excavations. Guardrails which comply with 1926.502(b) shall be provided where walkways are 6 feet (1.8 m) or more above lower levels</p>
<p>R 408.40952. Openings in roadways.</p> <p>Rule 952. An open cut into a roadway shall be provided with a barricade on all sides as prescribed in rule 2223 of Part 22. Signals, Signs, Tags, and Barricades. Warning lights shall be provided during hours of darkness.</p>	<p>No comparable OSHA provision.</p>
<p>R 408.40953. Adjacent structures; protection; design; inspection of shoring, bracing, and underpinning.</p> <p>Rule 953. (1) A structure that is adjacent to an excavation or trench below the level of the base or footing of any foundation or retaining wall shall be protected against settlement, lateral movement, undermining, or washout.</p>	<p>1926.651 (i) Stability of adjacent structures.</p> <p>(1) Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning shall be provided to ensure the stability of such structures for the protection of employees.</p> <p>(2) Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to employees shall not be permitted except when:</p> <p>(i) A support system, such as underpinning, is provided to ensure the safety of employees and the stability of the structure; or</p> <p>(ii) The excavation is in stable rock; or</p>

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	<p>(iii) A registered professional engineer has approved the determination that the structure is sufficiently removed from the excavation so as to be unaffected by the excavation activity; or</p> <p>(iv) A registered professional engineer has approved the determination that such excavation work will not pose a hazard to employees.</p>
<p>(2) Before the excavation begins, the design of the protection used shall be set forth by a qualified person who is knowledgeable in the subject area.</p> <p>(3) The shoring, bracing, and underpinning shall be inspected daily or more often, as conditions warrant, by a qualified employee.</p>	<p>1926.651(k) Inspections.</p> <p>(1) Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard increasing occurrence. These inspections are only required when employee exposure can be reasonably anticipated.</p> <p>(2) Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.</p>

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