

APPENDIX A

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IN THE COURT OF APPEAL
OF THE STATE OF CALIFORNIA
SIXTH APPELLATE DISTRICT

THE PEOPLE,	No. H042668
Plaintiff and Respondent,	(Santa Clara County
v.	Super. Ct. No. 214054)
DAN LUO,	
Defendant and Appellant.	

After an unsupported excavation at a construction site caved in and killed a worker, a jury convicted defendant Dan Luo of involuntary manslaughter (Pen. Code, § 192, subd. (b)) and three counts of willfully violating an occupational safety or health order causing death (Lab. Code, § 6425, subd. (a)). Defendant contends there is insufficient evidence to support his conviction, and that the trial court committed instructional error and improperly limited cross-examination of certain witnesses. He also contends he was not given adequate notice of the charges, that the prosecution failed to elect a particular criminal act, and that the statute prohibiting the willful violation of occupational safety orders is unconstitutionally vague. For the reasons explained, we find no error and will affirm the judgment.

I. BACKGROUND

Defendant Dan Luo worked for Richard Liu, a real estate agent in Fremont.¹ In addition to being a real estate agent, Liu was a licensed general contractor who had completed a number of residential construction projects. Defendant was neither a licensed Realtor nor a contractor but he acted as Liu's assistant, tending to administrative matters and showing properties to potential buyers.

In April 2010, Liu represented the seller of a parcel of bare land located on a hillside in a gated residential community in Milpitas. Liu received an inquiry from someone who wanted to buy the property to build a home, and directed defendant to meet the potential buyer for a showing. Liu told the buyer that he offered "one-stop shopping" for new home construction; that is, the buyer could purchase the land through him and also retain his services as a general contractor to design and build a home.

The buyer purchased the land for \$620,000 and later entered into a residential construction contract with Liu's corporation for \$731,800. The buyer also agreed to a design contract providing that Liu's company would retain architectural and engineering professionals to design the home, at a cost of \$133,500. The final plans called for a multi-level single story residence built into the hillside. The design required

¹ Richard Liu was convicted of involuntary manslaughter as a codefendant in this case. He appealed from the judgment, but prior to briefing we ordered his appeal dismissed at his request.

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significant excavation to dig out areas for walls and the foundation.

Liu hired a licensed contractor with whom he had worked on past projects to do the foundation and framing work for the house. The contractor and his crew began the process of digging out the hillside according to the plans. They excavated what was to be a hallway by digging a deep, rectangular cut into the hill. At the far end of the excavation was a 12-foot high dirt wall with an overhanging ledge of soil at the top. The dirt wall was not supported and there was no sloping or benching (steps cut into the soil) in the hillside above the wall to decrease the weight bearing on it. The contractor acknowledged the wall area was “a dangerous place.”

Defendant, who described himself as the project manager for the construction, was onsite every week observing the work. Because Liu was often out of the country, it was defendant who oversaw construction and dealt with the property owner and workers. The owner communicated by e-mail with Liu, but only met him in person on a few occasions and never saw him at the construction site.

By December 2011, the foundation work was not complete. The contractor had not been paid by Liu’s company for two weeks and ultimately walked off the job on January 6, 2012. At that time, the hallway excavation still had the 12-foot high, unsupported dirt wall with an overhanging ledge, and there were numerous unresolved issues with the construction.

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Defendant had to find new workers to complete the job, which was by then behind schedule. The one licensed contractor he asked to take over declined the job because he had not been timely paid the last time he worked with Liu's company. The person defendant found to finish the work was not a licensed contractor, but rather a union carpenter who would sometimes independently take on side construction projects. Defendant agreed to pay him \$35 per hour to complete the foundation work, and the carpenter understood that he was being hired as an employee of Liu's company.

The carpenter began work on January 16, 2012, and considered himself a worker under the supervision of defendant, and not responsible for the safety of the jobsite.² Defendant did not put in place any job safety plan nor did he meet with the workers to discuss safety. In addition to the carpenter, several other workers were hired on an hourly basis to help complete the job. One of those workers was 39-year-old Raul Zapata.

On January 25, 2012, an inspector from the City of Milpitas came to the jobsite and handed defendant a "Stop Work Notice." The notice states, "As authorized by Milpitas Municipal Code Section II-1-11.04, you are hereby directed to stop all construction work for the following reasons: [¶] Excavation without required shoring and/or excavation. Consult with soils engineer

² The carpenter's credibility on this point was vigorously disputed at trial. We view the facts in the light most favorable to the jury's verdict, as we must. (*People v. Massie* (2006) 142 Cal.App.4th 365, 371.)

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on recommendation.” At the bottom of the single-page notice, in a shaded box, the following text prominently appears: “DO NOT PROCEED [¶] with this job until the above has been approved for correction by the building and safety department.” [Capitalization omitted.]

Defendant did not tell any of the workers about the notice and he did not direct anyone to stop work. Instead, he told the workers that the city wanted benching cut into the hill above the wall. He took the notice to the engineer who had prepared the initial soils report for the project and told him the city was requiring a shoring system for the excavation. They discussed fashioning a rudimentary shoring system out of plywood, but the engineer did not visit the site or provide recommendations specific to the hallway excavation area. Defendant never sought approval from the city to continue the construction.

Two days after the Stop Work Notice was given to defendant, he specifically instructed the workers to work in the excavation area. He told them to start putting boards alongside the dirt walls forming the hallway because the owner was going to be visiting the site soon and would want some visible progress. The next day, Raul Zapata was working at the end of the hallway excavation, nailing together wood forms. At around 10:45 a.m., the excavation wall collapsed directly on top of him, crushing his skull and killing him.

Two and a half years later, a grand jury was convened and returned an indictment charging defendant

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with involuntary manslaughter (Pen. Code, § 192, subd. (b)), and three counts of willfully violating safety orders (Lab. Code, § 6425, subd. (a)).³ After a jury convicted defendant of all charges, the court sentenced him to the mitigated term of two years (to be served in county jail, under Pen. Code, § 1170, subd. (h)).

II. DISCUSSION

A. SUFFICIENCY OF THE EVIDENCE

1. Standard of Review

“The standard of review of the sufficiency of the evidence to support a conviction is well known. [Citation.] In reviewing the entire record, the sole function of the appellate court is to review the evidence in the light most favorable to the judgment, presume in support of the judgment every fact that can be reasonably deduced from the evidence, and ‘determine . . . whether a reasonable trier of fact could have found that the prosecution sustained its burden of proof beyond a reasonable doubt.’” (*People v. Mehserle* (2012) 206 Cal.App.4th 1125, 1139.) “Reversal is not warranted unless it appears “that upon no hypothesis whatever is there sufficient substantial evidence to [support the conviction].”” (*Ibid.*)

³ The underlying orders were: California Code of Regulations, title 8, section 1541, subdivision (j)(1) (requiring protections for employees from loose rock or soil), subdivision (k)(1) (requiring daily inspections of excavation sites) and section 1541.1, subdivision (a) (requiring protective systems for employees in excavations).

2. Involuntary Manslaughter

Defendant contends there was insufficient evidence to support his conviction for involuntary manslaughter because the prosecution did not present expert witness testimony to establish he owed a duty to the victim or that he breached a duty. In order to prove involuntary manslaughter under Penal Code section 192, subdivision (b), the prosecution must show the defendant unintentionally killed the victim in either of two ways: (1) in the commission of an unlawful act that is not a felony; or, (2) in the commission of a lawful act which might produce death, in an unlawful manner, or without due caution and circumspection. Here, the prosecution proceeded on the second theory – commission of a lawful act in an unlawful manner, without due caution and circumspection. This requires a showing of criminal negligence. (*People v. Butler* (2010) 187 Cal.App.4th 998, 1007.)

Criminal negligence is defined as conduct that is “such a departure from what would be the conduct of an ordinarily prudent or careful [person] under the same circumstances as to be incompatible with a proper regard for human life, or, in other words, a disregard of human life or an indifference to [the] consequences.” (*People v. Penny* (1955) 44 Cal.2d 861, 879.) Criminal negligence is also described in terms of objective foreseeability, that is, one acts with criminal negligence when a person “of ordinary prudence would foresee that the act would cause a high degree of risk of death or great bodily harm.” (*People v. Rodriguez* (1960) 186 Cal.App.2d 433, 440.) It is not necessary

that a defendant subjectively appreciate the risk and consciously disregard it – that would be the more serious offense of second degree murder. (*People v. Butler; supra*, 187 Cal.App.4th at p. 1008.) A defendant can be convicted of involuntary manslaughter despite a good faith belief that the conduct posed no risk, if that belief was objectively unreasonable under the circumstances. (*Id.* at pp. 1008-1009.)

These legal standards for proving involuntary manslaughter reveal the flaw in defendant’s argument that he could not be convicted without expert testimony. Defendant asserts expert testimony was required to establish the duty, or standard of care, with which he was required to act, and whether his conduct amounted to a breach of that duty. But expert testimony is only appropriate where the subject of the testimony is “beyond common experience.” (Evid. Code, § 801, subd. (a).) Whether a person of ordinary prudence would foresee a risk of death or bodily harm in certain conduct is not beyond common experience – it is necessarily within it. Expert testimony is not required where the question is what a reasonable person would do.

Defendant cites no authority suggesting that expert testimony is required in a criminal negligence case and his citations to tort cases are unavailing. Defendant posits that “[t]he prosecution was required to present evidence sufficient to prove each element of the *tort* of negligence” (italics added), but that is an incorrect statement of law. The two cases defendant cites, *Garabedian v. Superior Court* (1963) 59 Cal.2d 124 and

Barber v. Superior Court (1991) 1 Cal.App.4th 793, do not involve criminal negligence; they simply stand for the unremarkable proposition that the prosecution is required to prove each element of a charged offense. Defendant also relies on *Miller v. Los Angeles County Flood Control Dist.* (1973) 8 Cal.3d 689, 702 (*Miller*), for the proposition that the prosecution was required to present evidence as to the standard of care owed by defendant “in his capacity as an unlicensed person and assistant to a general contractor.” But as a civil case, *Miller* is inapposite. The issue here is whether defendant acted without the same regard for human life that an ordinary person – without regard to occupation – would have observed. (*People v. Mehserle, supra*, 206 Cal.App.4th at p. 1146 [“(California criminal negligence law) makes no exceptions for any particular occupation. Such an exception would, we presume, be a matter for the Legislature and not for the courts.”].)

Further, defendant’s analogy to civil professional negligence cases is not viable here because this situation is not equivalent to one where, due to a defendant’s occupation (such as a doctor, a lawyer, or a building contractor), a plaintiff seeks to hold the defendant to a different standard of care than would apply to an ordinary person, and therefore needs an expert in the particular field to establish the applicable standard of care. Under the theory of criminal negligence advanced in this case, defendant was not being held to any heightened standard of care, only an ordinary standard: to avoid acting in a manner that creates

an objectively foreseeable risk of death or bodily harm. As such, no expert testimony was needed.

Defendant also argues expert testimony was required to establish that he violated the Stop Work Notice issued by the city of Milpitas. Defendant complains that the prosecution “insinuate[ed]” the Stop Work Notice was violated, without any expert testimony to establish that it was in fact violated. But the theory of involuntary manslaughter advanced by the prosecution does not depend on proof that defendant violated the technical requirements of a Stop Work Notice. The prosecution only needed to establish that defendant acted without appropriate regard for human life. As such, the failure to establish a violation of the Stop Work Notice, standing alone, is not a basis for finding insufficient evidence to support the conviction.

The prosecution presented evidence that defendant was in a supervisory position at the construction site, took no action to enhance the safety of the workplace, violated several applicable safety regulations, did not inform the workers that he had been ordered by the city to stop work due to a dangerous condition, and directed the victim to work in the dangerous area even after receiving the Stop Work Notice. The evidence was sufficient for a rational jury to conclude that defendant committed involuntary manslaughter by performing a lawful act that might produce death, without due caution or circumspection.

3. Willful Violation of a Safety Order

Defendant contends the evidence was insufficient to support his conviction on three counts of violating Labor Code section 6425, subdivision (a) (willful violation of a health or safety order causing death) because no expert testimony was presented regarding the issue of causation. Defendant asserts, in effect, there was no evidence from which the jury could infer that his violation of the underlying safety regulations (Cal. Code Regs., tit. 8, § 1541, subds. (j)(1), (k)(1), and § 1541.1, subd. (a)) proximately caused the victim's death.

We find ample evidence presented from which to infer noncompliance with the regulations caused the death in this case. The applicable regulations require an adequate protective system for employees working in excavation sites, and that the excavation be inspected daily. They also require some sort of barricade to protect employees from loose rock or soil. An expert in excavation safety testified that excavation work presents a high risk of cave-in and that the entire purpose of the regulations is to protect employees from cave-ins. Photographs were admitted into evidence showing unsupported dirt walls that the expert testified did not have the cave-in protections required by the regulations. The jury heard testimony that the victim was crushed when soil collapsed on him and saw graphic photographs showing his body buried in dirt. Defendant speculates based on the expert's testimony that the victim was killed when an overhanging dirt ledge fell on him, rather than the face of the dirt wall, so that compliance with the regulations would not have

prevented the death. But the record does not support that theory – indeed, the evidence points to the opposite conclusion. We find sufficient evidence to support the causation element of the three regulatory violation counts.

B. NO INSTRUCTIONAL ERROR

Defendant argues the trial court committed a number of errors in instructing the jury. We review claims of instructional error independently to determine whether the trial court “‘fully and fairly instructed on the applicable law.’” (*People v. Ramos* (2008) 163 Cal.App.4th 1082, 1088.) As explained below, we find no error in the jury instructions.

1. No Instruction Required on Distinct Acts Forming the Basis of “Construction of a Residence”

The trial court instructed the jury on the prosecution’s theory that defendant committed involuntary manslaughter by performing a lawful act with criminal negligence. The instruction regarding the elements of involuntary manslaughter specified the lawful act that defendant performed as “construction of a residence” in Milpitas, California. Defendant argues this instruction was inadequate because the trial court should have further defined for the jury what distinct acts were included within “construction of a residence.” But the instruction is a pattern jury instruction that correctly states the applicable law (CALCRIM No.

581), and defendant never proposed an alternative or additional instruction further defining “construction of a residence.”⁴ Since defendant did not propose a different or additional instruction defining the term, he forfeited any claim of instructional error. (*People v. Jackson* (1996) 13 Cal.4th 1164, 1228-1229 [failure to request an instruction waives the issue on appeal].)

Given the obvious forfeiture of any challenge premised on the failure to give an instruction he never requested, defendant urges that the trial court had a sua sponte instructional duty. There was no sua sponte duty to define the term “construction of a residence,” because it does not involve a general principle of law. (*People v. Saille* (1991) 54 Cal.3d 1103, 1120.) Defendant relies on *People v. Breverman* (1998) 19 Cal.4th 142, 154, but that case holds only that a court must instruct on “general principles of law relevant to the issues raised by the evidence.” The trial court adequately instructed on all of the general principles of law applicable to involuntary manslaughter. Defendant also relies on *People v. Hudson* (2006) 38 Cal.4th 1002, 1012, for the proposition that the jury must be instructed on the technical, legal meaning of a word or phrase if that meaning differs from its ordinary usage. That case is distinguishable because it held a court must properly define the technical meaning of a term

⁴ Defendant appears to have provided the trial court with a copy of a jury instruction given in an unrelated case where a physician was charged with involuntary manslaughter and the alleged criminally negligent act was described as administering a particular medication to the victim. Defendant never asked the trial court to give that instruction.

in a penal statute under which the defendant is charged because failing to do so would result in an incorrect instruction of law. This principle does not apply when the term in question is not found in a statute.

2. No Instruction Required Regarding Defendant's Duty

Defendant contends the trial court erred in not giving an instruction regarding the extent of the duty he owed to others in connection with constructing a residence. As we have explained in connection with defendant's insufficient evidence contention, no heightened duty applied to defendant. He was obligated only to act in an objectively reasonable manner to avoid the risk of death or bodily harm, a concept that is adequately explained by the trial court's instruction on the elements of involuntary manslaughter. No further instruction was required.

3. The Trial Court Properly Refused Defendant's Special Instruction Regarding the Stop Work Notice

Defendant contends the trial court erred in not giving the following special instruction he proposed: "The prosecutor has made certain uncalled for insinuations that Dan Luo ignored a 'Stop Work Notice'. The prosecutor has absolutely no evidence to present to you to back up these insinuations. You must disregard these improper, unsupported remarks and insinuations that Dan Luo ignored a 'Stop Work Notice.'"

Beyond its argumentative tone, the instruction has no legal basis. Evidence was presented at trial that defendant ignored a Stop Work Notice: he did not tell any of the workers about it, did not tell them to stop working, and instead instructed them to work in the dangerous area. Defense counsel was free to argue otherwise, but there was no basis for instructing the jury to disregard the prosecution's argument on that point. The trial court properly refused the instruction.

4. No Error in Providing Jury with the Applicable Regulations

Defendant asserts that the trial court erred by giving to the jury along with the jury instructions a copy of the text of the safety regulations he was charged with willfully violating. Defendant was charged in counts 2, 3, and 4 with a violation of Labor Code section 6425, subdivision (a) (unspecified statutory references are to this code). That section provides: "Any employer and any employee having direction, management, control, or custody of any employment, place of employment, or of any other employee, who willfully violates any occupational safety or health standard . . . and that violation caused death to any employee . . . is guilty of a public offense punishable by imprisonment in a county jail for a term not exceeding one year. . . ."

The basis for count 2 was defendant's violation of California Code of Regulations, title 8, section 1541.1, subdivision (a), which requires certain protective measures for employees working in excavations. Count

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3 alleged a violation of California Code of Regulations, title 8, section 1541, subdivision (j)(1), which requires certain protective measures to prevent injuries to employees from loose rock or soil. And count 4 alleged a violation of California Code of Regulations, title 8, section 1541, subdivision (k)(1), which requires daily inspections of excavation sites. In connection with these charges, the trial court instructed the jury on the essential elements of a violation of section 6425, subdivision (a): that defendant was an employer or employee; had direction, management, or control; willfully violated an occupational safety order; and the violation caused death. The instruction indicated that “[t]he language of each safety order is set forth in a separate instruction.”

The court also gave an instruction entitled “Safety Orders,” which provided a summary version of the underlying safety regulation defendant allegedly violated in connection with each count. Finally, the court provided to the jury as an attachment to final jury instructions, a 47-page document containing the full text of the applicable safety regulations. Defendant argues the court erred in providing the jury with the applicable regulations because they were provided “without guidance as to how the instruction was to be applied to Count 1 [involuntary manslaughter], if at all,” and could have been used by the jury to presume a violation of the regulations meant defendant was “strictly liable” for involuntary manslaughter. We reject this argument because the instructions for the involuntary manslaughter charge in count 1 do not refer to the safety

regulations, do not allow for strict liability, and properly instruct the jury on the elements of involuntary manslaughter. We must presume the jury followed the instructions. (*People v. Nguyen* (1995) 40 Cal.App.4th 28, 37.) The record does not suggest otherwise.

The verbatim text of the underlying safety regulations is by definition a correct statement of the law. And while the regulations are long and fairly complex, nothing in the record indicates the jury was misled by them, particularly given the clear instruction as to the elements of a violation of section 6425, subdivision (a) and the accompanying instruction summarizing each applicable underlying regulation. Providing the jury with the full text of the regulations along with those instructions was not error.

5. Trial Court Properly Instructed on the Elements of the Labor Code Section 6425, Subdivision (a) Offense

Defendant contends the trial court did not properly instruct the jury on the elements of section 6425, subdivision (a) (willful violation of an occupational safety regulation). The thrust of defendant's argument is that the underlying safety regulations (Cal. Code Regs., tit. 8, § 1541, subds. (j)(1), (k)(1), and § 1541.1, subd. (a),) do not state they apply to supervisors (as opposed to employers), and therefore the court should have instructed the jury that defendant could be found liable for violating section 6425, subdivision (a) only if it first found he was an employer.

Defendant ignores the controlling statutory language, which plainly applies to both employers *and* employees with supervisory roles. (§ 6425, subd. (a) [“Any employer and any employee having direction, management, control, or custody of any employment, place of employment, or of any other employee, who willfully violates any occupational safety or health standard . . .”].) The trial court’s instruction to the jury on the elements of the offense appropriately tracked that language.

Defendant’s cited authorities discussing whether criminal liability can be imposed on supervisors under regulations that are silent or ambiguous regarding to whom they apply have no application here, since section 6425, subdivision (a) expressly encompasses supervisors. Defendant’s assertion that section 6425, subdivision (a) is merely a penalty provision that does not create a substantive offense is incorrect. The statute does create a criminal offense. (*People v. Superior Court (Solus Industrial Innovations, LLC)* (2014) 224 Cal.App.4th 33, 40.) The trial court properly instructed the jury on the elements of that offense.

Defendant also argues that the instructions “judicially imposed a duty” on defendant not found in the regulations, again based on the theory that if the underlying regulations do not state they apply to supervisory employees, defendant could only be convicted of violating section 6425, subdivision (a) if he was an employer. Again, this argument disregards the intent of the Legislature as expressed in the plain language of the statute that it is a crime for an employee with the

described supervisory control to willfully violate the underlying safety regulations. Defendant's reliance on *Kraus & Bros. v. United States* (1946) 327 U.S. 614 is misplaced. In that case, the Supreme Court held that regulations promulgated by an administrative agency were not sufficiently definite to sustain a criminal prosecution because the regulations did not sufficiently define what conduct was prohibited. Here, defendant does not argue that the regulations are unclear as to what conduct is prohibited; rather, he argues it is unclear that he can be held criminally liable for engaging in that prohibited conduct in his capacity as a supervisory employee. As we have discussed, section 6425, subdivision (a) creates criminal liability for both employers and supervisory employees who violate the regulations. The trial court's instructions did not impose any obligations beyond what the Legislature dictated in enacting section 6425, subdivision (a).

**C. NO ABUSE OF DISCRETION IN SUSTAINING
OBJECTIONS TO CROSS-EXAMINATION OF TWO
WITNESSES**

Defendant contends that the trial court erred when it sustained objections to certain questions he posed to two prosecution witnesses (the owner of the property and an expert in excavation safety). We review claims of evidentiary error for abuse of discretion. (*People v. Waidla* (2000) 22 Cal.4th 690, 717.)

During the cross-examination of the property owner, defense counsel attempted to elicit from him a statement made by defendant, and the prosecution objected: “Q: And is it correct that Dan [Luo], on January 24, told you that a man from the Milpitas Building Department came by – [¶] [Prosecutor]: Objection. Hearsay.” The court sustained the objection, and counsel then made a similar attempt to elicit defendant’s statement, again drawing an objection: “Q: On January 24 . . . did you receive some information from any source that a city – that an inspector came by the job site? [¶] [Prosecutor]: Objection. It calls for hearsay. This is an end run.” Defense counsel explained she was attempting to establish whether the witness remembered defendant informing him he had received a Stop Work Notice. She argued that defendant’s statement regarding receiving a Stop Work Notice was admissible because it was being offered to show the witness’s state of mind. The trial court again sustained the hearsay objection.

Invoking the “state of mind” exception to the hearsay rule (Evid. Code, § 1250, subd. (a)), counsel indicated the statement was being offered to prove the state of mind of the testifying witness, that is, the person to whom the statement was made. But that exception applies only to statements offered to show the state of mind of the *declarant*, not the listener. (Evid. Code, § 1250, subd. (a)(1) [“ . . . evidence of a statement of the declarant’s then existing state of mind . . . is not made inadmissible by the hearsay rule when: [¶] (1) The evidence is offered to prove the declarant’s state of

mind . . . ”].) Whether defendant told the owner about the Stop Work Notice would be admissible for the non-hearsay purpose of showing that defendant took the action of informing someone about the notice, and was therefore arguably less negligent.⁵ Defendant did not articulate this basis for admissibility at the time of the objections, so the argument is forfeited. (*Shaw v. County of Santa Cruz* (2008) 170 Cal.App.4th 229, 282 [failure to make an adequate offer of proof in the trial court precludes review of allegedly erroneous exclusion of evidence].) Regardless, we see no cognizable prejudice resulting from the exclusion of this evidence. Even if defendant mentioned the notice to the owner, it was undisputed he never told any of the workers about it and never sought permission from the city to continue construction.

During the cross-examination of an excavation safety and construction standards expert, defense counsel asked the witness whether he had an opinion regarding who constructed the residence at issue in the case. The trial court sustained a prosecution objection on the grounds that the witness lacked personal knowledge and the question called for an improper opinion. Given that the expert only inspected the project site after the excavation collapsed and never observed the site during construction, we find no abuse

⁵ The underlying *truth* of the statement – that defendant received the notice – is actually a fact favorable to the prosecution, the objecting party. What was potentially harmful to the prosecution was the fact that defendant engaged in the act of telling someone about it.

of discretion in ruling that the question called for testimony beyond the witness's personal knowledge and fields of expertise.

D. DEFENDANT HAD ADEQUATE NOTICE OF THE CHARGES AND THE DOCTRINE OF ELECTION DOES NOT APPLY

Presenting the contention to us as a claim of instructional error, defendant advances arguments relating to notice of the charges and the doctrine of election.⁶ Defendant asserts that “as a matter of fundamental fairness the accused is entitled to notice as to which of his acts the prosecution claims were criminal,” and that the prosecution’s failure to specify what it alleged to be defendant’s criminally negligent conduct beyond construction of a residence did not provide him with adequate notice of the charges. “Due process of law requires that an accused be advised of the charges against him in order that he may have a reasonable opportunity to prepare and present his defense

⁶ We will address those arguments despite the noncompliance with the rule of court requiring each point to be stated under a separate heading or subheading. (Cal. Rules of Court, rule 8.204(a)(1)(B); *In re S.C.* (2006) 138 Cal.App.4th 396, 408 [“ . . . appellant’s brief ‘must’ [Citations.] ‘[s]tate each point under a separate heading or subheading summarizing the point. This is not a mere technical requirement; it is ‘designed to lighten the labors of the appellate tribunals by requiring the litigants to present their cause systematically and so arranged that those upon whom the duty devolves of ascertaining the rule of law to apply may be advised, as they read, of the exact question under consideration, instead of being compelled to extricate it from the mass.’”].)

and not be taken by surprise by evidence offered at his trial.” (*In re Hess* (1955) 45 Cal.2d 171, 175.) “Under modern pleading procedures, notice of the particular circumstances of an alleged crime is provided by the evidence presented to the committing magistrate at the preliminary examination, not by a factually detailed information.” (*People v. Jennings* (1991) 53 Cal.3d 334, 358; see also *People v. Thomas* (1987) 43 Cal.3d 818, 829, fn. 5 [“So long as the information adequately alleges murder, the evidence adduced at the preliminary hearing will adequately inform the defendant of the prosecution’s theory regarding the manner and degree of killing.”].)

This case proceeded by way of grand jury indictment rather than preliminary examination, but the principle remains the same. Though defendant was not present during the grand jury proceedings, he makes no claim that he was not provided with a complete transcript of those proceedings before trial (and indeed, he quotes from the grand jury transcript at length in his opening brief). We find no indication in the record that defendant was inadequately apprised of the nature of the charges against him or subjected to unfair surprise at trial.

Defendant also frames his complaint about the prosecution not specifying the facts supporting the criminal negligence allegation as a failure to elect which of defendant’s acts constitute the charged crime. But the doctrine of election requires that when the evidence suggests more than one discrete *crime*, either the prosecution must elect which criminal act it seeks

a conviction on, or the court must instruct the jury that it is required to unanimously agree which crime defendant has committed. (*People v. Russo* (2001) 25 Cal.4th 1124, 1132.) That doctrine has no application where, as here, the evidence shows only a single discrete crime (one count of involuntary manslaughter) but there is disagreement as to exactly how the crime was committed. (*Ibid.* [“ . . . the jury need not unanimously agree on the basis or, as the cases often put it, the ‘theory’ whereby the defendant is guilty.”].)

Even if the prosecution were required to elect the particular facts that support its theory of how the crime was committed, there would be no error because the trial court instructed the jurors they had to unanimously agree on the acts giving rise to defendant’s criminal liability: “In order to prove the defendant is guilty of Involuntary Manslaughter in Count 1, the People have presented evidence of more than one act. You may not find the defendant guilty unless all of you agree that the People have proved the defendant committed at least one of these alleged acts and you all agree which act he committed.” Since the evidence showed only one discrete crime, the unanimity instruction was not required, but defendant only benefited from it being given.

Defendant argues the failure to elect particular acts within the generally described conduct of “construction of a residence” resulted in a lack of notice and inability to intelligently defend against the charges. But as we have already explained, defendant was adequately apprised of the nature of the charges and the

theory of the prosecution's case through the grand jury proceedings and pretrial discovery. We therefore reject defendant's claim of error based on the doctrine of election.

**E. LABOR CODE SECTION 6425, SUBDIVISION
(A) IS NOT UNCONSTITUTIONALLY VAGUE**

Defendant contends that the statute prohibiting the willful violation of an occupational safety order (§ 6425, subd. (a)) violates the due process clause of the United States Constitution because it does not provide adequate notice of what conduct is prohibited and allows for arbitrary and discriminatory enforcement. We review de novo the question of whether a statute is unconstitutional. (*Sanchez v. State of California* (2009) 179 Cal.App.4th 467, 486.)

A penal statute will be upheld against a facial vagueness challenge so long as it warns of what conduct is prohibited with a reasonable degree of certainty, as measured by common understanding and experience. (*People v. Ellison* (1998) 68 Cal.App.4th 203, 208.) Defendant asserts the statute is vague because it does not provide sufficient warning that supervisory employees, in addition to employers, may be prosecuted for willful violations of safety regulations. Defendant does not maintain that the language of the statute itself is vague; rather, his argument is that a person reading only the text of the underlying regulations would not have notice that the statute subjects

supervisory employees to criminal liability for violating them.

Defendant's narrow focus on the regulations ignores the plain language of section 6425, subdivision (a), which provides clear notice that both employers and supervisory employees are criminally liable for violating a safety regulation. Defendant argues that "[t]here is no way that any employee of an employer, even if given certain supervisory responsibilities, could know that he or she is legally responsible under pain of possible criminal prosecution" for complying with applicable safety regulations. But, of course, there is a way to know that it is a crime for a supervisory employee to willfully violate safety regulations, and that is by reading section 6425, subdivision (a): ". . . any employee having direction, management, control, or custody of any employment, place of employment, or of any other employee, who willfully violates any occupational safety or health standard . . . is guilty of a public offense punishable by imprisonment in a county jail. . . ." Since, as we have previously explained, section 6425, subdivision (a) is the statute that creates the substantive criminal offense (*People v. Superior Court (Solus Industrial Innovations, LLC)*, *supra*, 224 Cal.App.4th at 40), it makes little sense to completely discard it and focus exclusively on the regulations.

Defendant's argument that the statute allows for arbitrary and discriminatory enforcement is similarly flawed. He argues there is nothing to prevent criminal enforcement against any individual working on a construction site, but section 6425, subdivision (a) limits

criminal enforcement to employers and those employees who exercise direction, management, and control. Defendant's assertion that the regulations must be read in isolation is neither persuasive nor supported by authority.

III. DISPOSITION

The judgment is affirmed.

Grover, J.

WE CONCUR:

Premo, (Acting) P.J.

Mihara, J.

Filed 10/25/17

CERTIFICATION FOR PUBLICATION

IN THE COURT OF APPEAL OF
THE STATE OF CALIFORNIA
SIXTH APPELLATE DISTRICT

THE PEOPLE,
Plaintiff and Respondent,
v.
DAN LUO,
Defendant and Appellant.

H042668
(Santa Clara County
Super. Ct. No. 214054)
**ORDER GRANTING
REQUEST FOR
PUBLICATION**

BY THE COURT:

Pursuant to California Rules of Court, rule 8.1105(b), the request for publication is hereby granted. It is ordered that the opinion in this matter, filed on October 4, 2017, shall be certified for publication.

Date:

Grover, J.

Premo, Acting P. J.

Mihara, J.

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Trial Court:	Santa Clara County Superior Court, Case No.: 214054
Trial Judge:	Hon. William J. Monahan
Attorneys for Plaintiff/ Respondent: The People	Xavier Becerra Attorney General of California Christopher W. Grove Deputy Attorney General Amit Arun Kurlekar Deputy Attorney General Roni Pomerantz Deputy Attorney General
Attorneys for Defendant/ Appellant: Dan Luo	Marlene Thomason Attorney at Law

APPENDIX B

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**Superior Court of California
County of Santa Clara
Department 16**

The People Of the
State Of California,

Plaintiff,

vs.

Dan Luo,

Defendant.

Case No.: 214054

VERDICT OF THE JURY

**COUNT ONE:
INVOLUNTARY
MANSLAUGHTER**

(Filed May 19, 2015)

COUNT ONE

We the Jury in the above-entitled cause, find the
defendant, Dan Luo, GUILTY of the
GUILTY/NOT GUILTY

crime of **INVOLUNTARY MANSLAUGHTER**, a felony, in violation of Penal Code section 192(b), in that, on or about and between August 15, 2011 and January 28, 2012, Dan Luo did unlawfully and without malice, kill Raul Zapata Mercado, a human being, as charged in the Indictment.

05.19.2015

Date

/s/ Juror # 6 redacted

**Superior Court Of California
County of Santa Clara
Department 16**

The People Of the
State Of California,

Plaintiff,

vs.

Dan Luo,

Defendant.

Case No.: 214054

VERDICT OF THE JURY

COUNT TWO:

**WILLFUL VIOLATION
OF A SAFETY ORDER
CAUSING DEATH OF
AN EMPLOYEE**

(Filed May 19, 2015)

COUNT TWO

We the Jury in the above-entitled cause, find the
defendant, Dan Luo, GUILTY of the
GUILTY/NOT GUILTY

crime of **WILLFUL VIOLATION OF A SAFETY ORDER CAUSING DEATH OF AN EMPLOYEE**, a felony, in violation of Labor Code section 6425(a), in that, on or about January 28, 2012, Dan Luo, as an employer or employee having direction, management, or control of employment, place of employment, or of another employee, did willfully violate an occupational safety and health standard, order, or special order, specifically Title of the California Code of Regulations, section 1541.1(a), by failure to protect an employee in an excavation from cave-in by an adequate protective system,

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and that violation caused the death of an employee,
Raul Zapata Mercado, as charged in the Indictment.

05.19.2015

/s/ Juror # 6 redacted

Date

**Superior Court Of California
County of Santa Clara
Department 16**

The People Of the
State Of California,

Plaintiff,

vs.

Dan Luo,

Defendant.

Case No.: 214054

VERDICT OF THE JURY

**COUNT THREE:
WILLFUL VIOLATION
OF A SAFETY ORDER
CAUSING DEATH OF
AN EMPLOYEE**

(Filed May 19, 2015)

COUNT THREE

We the Jury in the above-entitled cause, find the
defendant, Dan Luo, GUILTY of the
GUILTY/NOT GUILTY

crime of **WILLFUL VIOLATION OF A SAFETY ORDER CAUSING DEATH OF AN EMPLOYEE**, a felony, in violation of Labor Code section 6425(a), in that, on or about January 28, 2012, Dan Luo, as an employer or employee having direction, management, or control of employment, place of employment, or of another employee, did willfully violate an occupational safety and health standard, order, or special order, specifically Title of the California Code of Regulations, section 1541(j)(1), by failure to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face, and that violation caused

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the death of an employee, Raul Zapata Mercado, as charged in the Indictment.

05.19.2015

/s/ Juror # 6 redacted

Date

**Superior Court Of California
County of Santa Clara
Department 16**

The People Of the
State Of California,

Plaintiff,

vs.

Dan Luo,

Defendant.

Case No.: 214054

VERDICT OF THE JURY

COUNT FOUR:

**WILLFUL VIOLATION
OF A SAFETY ORDER
CAUSING DEATH OF
AN EMPLOYEE**

(Filed May 19, 2015)

COUNT FOUR

We the Jury in the above-entitled cause, find the
defendant, Dan Luo, GUILTY of the
GUILTY/NOT GUILTY

crime of **WILLFUL VIOLATION OF A SAFETY ORDER CAUSING DEATH OF AN EMPLOYEE**, a felony, in violation of Labor Code section 6425(a), in that, on or about January 28, 2012, Dan Luo, as an employer or employee having direction, management, or control of employment, place of employment, or of another employee, did willfully violate an occupational safety and health standard, order, or special order, specifically Title of the California Code of Regulations, section 1541(k)(1), by failure to perform daily inspections of excavations, adjacent areas, and protective systems by a competent person for evidence of possible cave-ins and other hazardous conditions, and that violation

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caused the death of an employee, Raul Zapata Mercado, as charged in the Indictment.

05.19.2015

/s/ Juror # 6 redacted

Date

APPENDIX C

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Court of Appeal, Sixth Appellate District –
No. H042668

S244989

IN THE SUPREME COURT OF CALIFORNIA

En Banc

THE PEOPLE, Plaintiff and Respondent,

v.

DAN LUO, Defendant and Appellant.

(Filed Jan. 31, 2018)

The petition for review is denied.

CANTIL-SAKAUYE

Chief Justice

APPENDIX D

**CALCRIM 581.
INVOLUNTARY MANSLAUGHTER**

Each defendant is charged in Count 1 with involuntary manslaughter in violation of Penal Code section 192(b).

As to each defendant, to prove that the defendant is guilty of this crime, the People must prove that:

1. The defendant committed a lawful act in an unlawful manner;
2. The defendant committed the act with criminal negligence;

AND

3. The defendant's acts caused the death of another person.

The People allege that each defendant committed the following lawful acts with criminal negligence: construction of a residence at 814 Calaveras Ridge Drive, Milpitas, California.

Criminal negligence involves more than ordinary carelessness, inattention, or mistake in judgment. A person acts with criminal negligence when:

1. He or she acts in a reckless way that creates a high risk of death or great bodily injury;

AND

2. A reasonable person would have known that acting in that way would create such a risk.

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In other words, a person acts with criminal negligence when the way he or she acts is so different from the way an ordinarily careful person would act in the same situation that his or her act amounts to disregard for human life or indifference to the consequences of that act.

An act causes death if the death is the direct, natural, and probable consequence of the act and the death would not have happened without the act. A natural and probable consequence is one that a reasonable person would know is likely to happen if nothing unusual intervenes. In deciding whether a consequence is natural and probable, consider all of the circumstances established by the evidence.

There may be more than one cause of death. An act causes death only if it is a substantial factor in causing the death. A substantial factor is more than a trivial or remote factor. However, it does not need to be the only factor that causes the death.

The failure of Raul Zapata Mercado or another person to use reasonable care may have contributed to the death. But if the defendant's act was a substantial factor causing the death, then the defendant is legally responsible for the death even though Raul Zapata Mercado or another person may have failed to use reasonable care.

If you have a reasonable doubt whether the defendant's act caused the death, you must find him not guilty.

Great bodily injury means significant or substantial physical injury. It is an injury that is greater than minor or moderate harm.

UNAMINITY

In order to prove the defendant is guilty of Involuntary Manslaughter in Count 1, the People have presented evidence of more than one act. You may not find the defendant guilty unless all of you agree that the People have proved that the defendant committed at least one of these alleged acts and you all agree on which act he committed.

APPENDIX E

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[Attachment to Final Jury Instructions
People v. Richard Liu and Dan Luo
Case No. 214054]

§ 1541.1. Requirements for Protective Systems.

- (a) Protection of employees in excavations.
 - (1) Each employee in an excavation shall be protected from cave-ins by an adequate protective system designed in accordance with Section 1541.1(b) or (c) except when:
 - (A) Excavations are made entirely in stable rock; or
 - (B) Excavations are less than 5 feet in depth and examination of the ground by a competent person provides no indication of a potential cave-in.
 - (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.
- (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 designee and shall be in accordance with the requirements of Section 1541.1(b)(1), Section 1541.1(b)(2), Section 1541.1(b)(3), or Section 1541.1(b)(4), as follows:
 - (1) Option (1) – Allowable configurations and slopes.
 - (A) Excavations shall be sloped at an angle not steeper than one and one-half horizontal to one

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vertical (34 degrees measured from the horizontal), unless the employer uses one of the other options listed below.

(B) Slopes specified in Section 1541.1(b)(1)(A) shall be excavated to form configurations that are in accordance with the slopes shown for Type C soil in Appendix B to this article.

(2) Option (2) – Determination of slopes and configurations using Appendices A and B. Maximum allowable slopes, and allowable configurations for sloping and benching systems, shall be determined in accordance with the conditions and requirements set forth in Appendices A and B to this article.

(3) Option (3) – Designs using other tabulated data.

(A) Designs of sloping or benching systems shall be selected from and be in accordance with tabulated data, such as tables and charts.

(B) The tabulated data shall be in written form and shall include all of the following:

1. Identification of the parameters that affect the selection of a sloping or benching system drawn from such data;
2. Identification of the limits of use of the data, to include the magnitude and configuration of slopes determined to be safe;
3. Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.

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4. At least one copy of the tabulated data which identifies the registered professional engineer who approved the data, shall be maintained at the jobsite during construction of the protective system. After that time the data may be stored off the jobsite, but a copy of the data shall be made available to the Division upon request.

(4) Option (4) – Design by a registered professional engineer.

(A) Sloping and benching systems not utilizing Option (1) or Option (2) or Option (3) under Section 1541.1(b) shall be stamped and signed by a registered professional engineer.

(B) Designs shall be in written form and shall include at least the following:

1. The magnitude of the slopes that were determined to be safe for the particular project;
2. The configurations that were determined to be safe for the particular project;
3. The identity of the registered professional engineer approving the design.

(C) At least one copy of the design shall be maintained at the jobsite while the slope is being constructed. After that time the design need not be at the jobsite, but a copy shall be made available to the Division upon request.

(c) Design of support systems, shield systems, and other protective systems. Designs of support systems,

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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 Section 1541.1(c)(1); or, in the alternative, Section 1541.1(c)(2); or, in the alternative, Section 1541.1(c)(3); or, in the alternative, Section 1541.1(c)(4) as follows:

(1) Option (1) – Designs using Appendices A, C and D. Designs for timber shoring in trenches shall be determined in accordance with the conditions and requirements set forth in Appendices A and C to this article. Designs for aluminum hydraulic shoring shall be in accordance with Section 1541.1(c)(2), but if manufacturer's tabulated data cannot be utilized, designs shall be in accordance with Appendix D.

(2) Option (2) – Designs Using Manufacturer's Tabulated Data.

(A) Design of support systems, shield systems, or other protective systems that are drawn from manufacturer's tabulated data shall be in accordance with all specifications, recommendations, and limitations issued or made by the manufacturer.

(B) Deviation from the specifications, recommendations, and limitations issued or made by the manufacturer shall only be allowed after the manufacturer issues specific written approval.

(C) Manufacturer's specifications, recommendations, and limitations, and manufacturer's approval to deviate from the specifications, recommendations, and

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limitations shall be in written form at the jobsite during construction of the protective system. After that time this data may be stored off the jobsite, but a copy shall be made available to the Division upon request.

(3) Option (3) – Designs using other tabulated data.

(A) Designs of support systems, shield systems, or other protective systems shall be selected from and be in accordance with tabulated data, such as tables and charts.

(B) The tabulated data shall be in written form and include all of the following:

1. Identification of the parameters that affect the selection of a protective system drawn from such data;
2. Identification of the limits of use of the data;
3. Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.

(C) At least one copy of the tabulated data, which identifies the registered professional engineer who approved the data, shall be maintained at the jobsite during construction of the protective system. After that time the data may be stored off the jobsite, but a copy of the data shall be made available to the Division upon request.

(4) Option (4) – Design by a registered professional engineer.

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(A) Support systems, shield systems, and other protective systems not utilizing Option 1, Option 2, or Option 3, above, shall be approved by a registered professional engineer.

(B) Designs shall be in written form and shall include the following:

1. A plan indicating the sizes, types, and configurations of the materials to be used in the protective system; and
2. The identity of the registered professional engineer approving the design.

(C) At least one copy of the design shall be maintained at the jobsite during construction of the protective system. After that time, the design may be stored off the jobsite, but a copy of the design shall be made available to the Division upon request.

(d) Materials and equipment.

(1) Materials and equipment used for protective systems shall be free from damage or defects that might impair their proper function.

(2) Manufactured materials and equipment used for protective systems shall be used and maintained in a manner that is consistent with the recommendations of the manufacturer, and in a manner that will prevent employee exposure to hazards.

(3) When material or equipment that is used for protective systems is damaged, a competent person shall examine the material or equipment and evaluate its

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

(e) Installation and removal of supports.

(1) General.

(A) Members of support systems shall be securely connected together to prevent sliding, falling, kickouts, or other predictable failure.

(B) Support systems shall be installed and removed in a manner that protects employees from cave-ins, structural collapses, or from being struck by members of the support system.

(C) Individual members of support systems shall not be subjected to loads exceeding those which those members were designed to withstand.

(D) Before temporary removal of individual members begins, additional precautions shall be taken to ensure the safety of employees, such as installing other structural members to carry the loads imposed on the support system.

(E) Removal shall begin at, and progress from, the bottom of the excavation. Members shall be released slowly so as to note any indication of possible failure of

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the remaining members of the structure or possible cave-in of the sides of the excavation.

(F) Backfilling shall progress together with the removal of support systems from excavations.

(2) Additional requirements for support systems for trench excavations.

(A) Excavation of material to a level no greater than 2 feet below the bottom of the members of a support system shall be permitted, but only if the system is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the support system.

(B) Installation of a support system shall be closely coordinated with the excavation of trenches.

(f) Sloping and benching systems. Employees shall not be permitted to work on the faces of sloped or benched excavations at levels above other employees except when employees at the lower levels are adequately protected from the hazard of falling, rolling, or sliding material or equipment.

(g) Shield systems.

(1) General.

(A) Shield systems shall not be subjected to loads exceeding those which the system was designed to withstand.

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(B) 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.

(C) Employees shall be protected from the hazard of cave-ins when entering or exiting the areas protected by shields.

(D) Employees shall not be allowed in shields when shields are being installed, removed, or moved vertically.

(2) Additional requirements for shield systems used in trench excavations. The sides of the shield shall extend a minimum of 18 inches above the vertical walls of compound excavations as shown in Appendix B, figures B-1, B-1.2 and B-1.3. On vertically cut trenches, the shield shall extend to at least the catch point of the trench. Excavations of earth material to a level not greater than 2 feet below the bottom of a shield shall be permitted, but only if the shield is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the shield.

(h) Uprights shall extend to the top of the trench with the lower end of the upright not more than 2 feet from the bottom of the trench.

Appendix A

Soil Classification

(a) **Scope and application.**

(1) **Scope.** This appendix describes a method of classifying soil and rock deposits based on site and environmental conditions, and on the structure and composition of the earth deposits. The appendix contains definitions, sets forth requirements, and describes acceptable visual and manual tests for use in classifying soils.

(2) **Application.** This appendix applies when a sloping or benching system is designed in accordance with the requirements set forth in Section 1541.1(b)(2) as a method of protection for employees from cave-ins. This appendix also applies when timber shoring for excavations is designed as a method of protection from cave-ins in accordance with Appendix C to this article, and when aluminum hydraulic shoring is designed in accordance with Appendix D. This appendix also applies if other protective systems are designed and selected for use from data prepared in accordance with the requirements set forth in Section 1541.1(c), and the use of the data is predicated on the use of the soil classification system set forth in this appendix.

(b) **Definitions.**

Cemented soil. A soil in which the particles are held together by a chemical agent, such as calcium carbonate, such that a hand-size sample cannot be

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crushed into powder or individual soil particles by finger pressure.

Cohesive soil. Clay (fine grained soil), or soil with a high clay content, which has cohesive strength. Cohesive soil does not crumble, can be excavated with vertical side slopes, and is plastic when moist. Cohesive soil is hard to break up when dry, and exhibits significant cohesion when submerged. Cohesive soils include clayey silt, sandy clay, silty clay, clay and organic clay.

Dry soil. Soil that does not exhibit visible signs of moisture content.

Fissured. A soil material that has a tendency to break along definite planes of fracture with little resistance, or a material that exhibits open cracks, such as tension cracks, in an exposed surface. **Granular soil.** Gravel, sand, or silt (coarse grained soil) with little or no clay content.

Granular soil has no cohesive strength. Some moist granular soils exhibit apparent cohesion. Granular soil cannot be molded when moist and crumbles easily when dry.

Layered system. Two or more distinctly different soil or rock types arranged in layers. Micaceous seams or weakened planes in rock or shale are considered layered.

Moist soil. A condition in which a soil looks and feels damp. Moist cohesive soil can easily be shaped into a ball and rolled into small diameter threads before crumbling. Moist granular soil that contains some

cohesive material will exhibit signs of cohesion between particles.

Plastic. A property of a soil which allows the soil to be deformed or molded without cracking, or appreciable volume change.

Saturated soil. A soil in which the voids are filled with water. Saturation does not require flow. Saturation, or near saturation, is necessary for the proper use of instruments such as a pocket penetrometer or sheer vane.

Soil classification system. A method of categorizing soil and rock deposits in a hierarchy of Stable Rock, Type A, Type B, and Type C, in decreasing order of stability. The categories are determined based on an analysis of the properties and performance characteristics of the deposits and the environmental conditions of exposure.

Stable rock. Natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed.

Submerged soil. Soil which is underwater or is free seeping.

Type A soil. Cohesive soils with an unconfined, compressive strength of 1.5 ton per square foot (tsf) or greater. Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A. However, no soil is Type A if:

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- (1) The soil is fissured; or
- (2) The soil is subject to vibration from heavy traffic, pile driving, or similar effects; or
- (3) The soil has been previously disturbed; or
- (4) The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater; or
- (5) The material is subject to other factors that would require it to be classified as a less stable material.

Type B soil:

- (1) Cohesive soil with an unconfined compressive strength greater than 0.5 tsf but less than 1.5 tsf; or
- (2) Granular cohesionless soils including: angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam.
- (3) Previously disturbed soils except those which would otherwise be classed as Type C soil.
- (4) Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration; or
- (5) Dry rock that is not stable; or
- (6) Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but

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only if the material would otherwise be classified as Type B.

Type C soil:

- (1) Cohesive soil with an unconfined compressive strength of 0.5 tsf or less; or
- (2) Granular soils including gravel, sand, and loamy sand; or
- (3) Submerged soil or soil from which water is freely seeping; or
- (4) Submerged rock that is not stable, or
- (5) Material in a sloped, layered system where the layers dip into the excavation or a slope of four horizontal to one vertical (4H:1V) or steeper.

Unconfined compressive strength. The load per unit area at which a soil will fail in compression. It can be determined by laboratory testing, or estimated in the field using a pocket penetrometer, by thumb penetration tests, and other methods.

Wet soil. Soil that contains significantly more moisture than moist soil, but in such a range of values that cohesive material will slump or begin to flow when vibrated. Granular material that would exhibit cohesive properties when moist will lose those cohesive properties when wet.

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(c) Requirements.

- (1) Classification of soil and rock deposits. Each soil and rock deposit shall be classified by a competent person as Stable Rock, Type A, Type B, or Type C in accordance with the definitions set forth in paragraph (b) of this appendix.
- (2) Basis of classification. 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 a competent person using tests described in paragraph (d) below, or in other approved methods of soil classification and testing such as those adopted by the American Society for Testing Materials, or the U.S. Department of Agriculture textural classification system.
- (3) Visual and manual analyses. The visual and manual analyses, such as those noted as being acceptable in paragraph (d) of this appendix, shall be designed and conducted to provide sufficient quantitative and qualitative information as may be necessary to identify properly the properties, factors, and conditions affecting the classification of the deposits.
- (4) Layered systems. In a layered system, the system shall be classified in accordance with its weakest layer. However, each layer may be classified individually where a more stable layer lies under a less stable layer.
- (5) Reclassification. If, after classifying a deposit, the properties, factors, or conditions affecting its classification change in any way, the changes shall be evaluated

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by a competent person. The deposit shall be reclassified as necessary to reflect the changed circumstances.

(d) Acceptable visual and manual tests.

(1) Visual tests. Visual analysis is conducted to determine qualitative information regarding the excavation site in general, the soil adjacent to the excavation, the soil forming the sides of the open excavation, and the soil taken as samples from excavated material.

(A) Observe samples of soil that are excavated and soil in the sides of the excavation. Estimate the range of particle sizes and the relative amounts of the particle sizes. Soil that is primarily composed of fine-grained material is cohesive material. Soil composed primarily of coarse-grained sand or gravel is granular material.

(B) Observe soil as it is excavated. Soil that remains in clumps when excavated is cohesive. Soil that breaks up easily and does not stay in clumps is granular.

(C) Observe the side of the opened excavation and the surface area adjacent to the excavation. Crack-like openings such as tension cracks could indicate fissured material. If chunks of soil spall off a vertical side, the soil could be fissured. Small spalls are evidence of moving ground and are indications of potentially hazardous situations.

(D) Observe the area adjacent to the excavation and the excavation itself for evidence of existing utility and other underground structures, and to identify previously disturbed soil.

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(E) Observe the opened side of the excavation to identify layered systems. Examine layered systems to identify if the layers slope toward the excavation. Estimate the degree of slope of the layers.

(F) Observe the area adjacent to the excavation and the sides of the opened excavation for evidence of surface water, water seeping from the sides of the excavation, or the location of the level of the water table.

(G) Observe the area adjacent to the excavation and the area within the excavation for sources of vibration that may affect the stability of the excavation face.

(2) Manual tests. Manual analysis of soil samples in conducted to determine quantitative as well as qualitative properties of soil and to provide more information in order to classify soil properly.

(A) Plasticity. Mold a moist or wet sample of soil into a ball and attempt to roll it into threads as thin as 1/8-inch in diameter. Cohesive material can be successfully rolled into threads without crumbling. For example, if at least a two inch length of 1/8-inch thread can be held on one end without tearing, the soil is cohesive.

(B) Dry strength. If the soil is dry and crumbles on its own or with moderate pressure into individual grains or fine powder, it is granular (any combination of gravel, sand, or silt). If the soil is dry and falls into clumps which break up into smaller clumps, but the smaller clumps can only be broken up with difficulty, it may be clay in any combination with gravel, sand or silt. If the dry soil breaks into clumps which do not

break up into small clumps and which can only be broken with difficulty, and there is no visual indication the soil is fissured, the soil may be considered unfissured.

(C) Thumb penetration. The thumb penetration test can be used to estimate the unconfined compressive strength of cohesive soils. Type A soils with an unconfined compressive strength of 1.5 tsf can be readily indented by the thumb; however, they can be penetrated by the thumb only with very great effort. Type C soils with an unconfined compressive strength of 0.5 tsf can be easily penetrated several inches by the thumb, and can be molded by light finger pressure. This test should be conducted on an undisturbed soil sample, such as a large clump of spoil, as soon as practicable after excavation to keep to a minimum the effects of exposure to drying influences (rain, flooding), the classification of the soil must be changed accordingly.

(D) Other strength tests. Estimates of unconfined compressive strength of soils can also be obtained by use of a pocket penetrometer or by using a hand-operated shearvane.

(E) Drying test. The basic purpose of the drying test is to differentiate between cohesive material with fissures, unfissured cohesive material, and granular material. The procedure for the drying test involves drying a sample of soil that is approximately one inch thick and six inches in diameter until it is thoroughly dry:

1. If the sample develops cracks as it dries, significant fissures are indicated.

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2. Samples that dry without cracking are to be broken by hand. If considerable force is necessary to break a sample, the soil has significant cohesive material content. The soil can be classified as an unfissured cohesive material and the unconfined compressive strength should be determined.

3. If a sample breaks easily by hand, it is either a fissured cohesive material or a granular material. To distinguish between the two, pulverize the dried clumps of the sample by hand or by stepping on them. If the clumps do not pulverize easily, the material is cohesive with fissures. If they pulverize easily into very small fragments, the material is granular.

Appendix B

Sloping and Benching

(a) Scope and application. This appendix contains specifications for sloping and benching when used as methods of protecting employees working in excavations from cave-ins. The requirements of this appendix apply when the design of sloping and benching protective systems is to be performed in accordance with the requirements set forth in Section 1541.1(b).

(b) Definitions.

Actual slope means the slope to which an excavation face is excavated.

Distress means that the soil is in a condition where a cave-in is imminent or is likely to occur.

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Distress is evidenced by such phenomena as the development of fissures in the face of or adjacent to an open excavation; the subsidence of the edge of an excavation; the slumping of material from the face or the bulging or heaving of material from the bottom of an excavation; the spalling of material from the face of an excavation; and ravelling, i.e., small amounts of material such as pebbles or little clumps of material suddenly separating from the face of an excavation and trickling or rolling down into the excavation.

Maximum allowable slope means the steepest incline of an excavation face that is acceptable for the most favorable site conditions as protection against cave-ins, and is expressed as the ratio of horizontal distance to vertical rise (H:V).

Short term exposure means a period of time less than or equal to 24 hours that an excavation is open.

(c) Requirements.

(1) Soil classification. Soil and rock deposits shall be classified in accordance with Appendix A to Section 1541.1.

(2) Maximum allowable slope. The maximum allowable slope for a soil or rock deposit shall be determined from Table B-1 of this appendix.

(3) Actual slope.

(A) The actual slope shall not be steeper than the maximum allowable slope.

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(B) The actual slope shall be less steep than the maximum allowable slope, when there are signs of distress. If that situation occurs, the slope shall be cut back to an actual slope which is at least 1/2 horizontal to one vertical (1/2H:1V) less steep than the maximum allowable slope.

(C) When surcharge loads from stored material or equipment, operating equipment, or traffic are present, a competent person shall determine the degree to which the actual slope must be reduced below the maximum allowable slope, and shall assure that such reduction is achieved. Surcharge loads from adjacent structures shall be evaluated in accordance with Section 1541(i).

(4) Configurations. Configurations of sloping and benching systems shall be in accordance with Figure B-1.

TABLE B-1

MAXIMUM ALLOWABLE SLOPES

SOIL OR ROCK TYPE	MAXIMUM ALLOWABLE SLOPES (H:V) [1] FOR EXCAVATIONS LESS THAN 20 FEET DEEP [3]
STABLE ROCK	VERTICAL (90°)
TYPE A [2]	3/4:1 (53°)
TYPE B	1:1 (45°)
TYPE C	1½:1 (34°)

NOTES:

1. Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.
2. A short-arm maximum allowable slope of 1/2H:1V (63 degrees) is allowed in excavations in Type A soil that are 12 feet or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet in depth shall be 3/4H:1V (53 degrees).
3. Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.

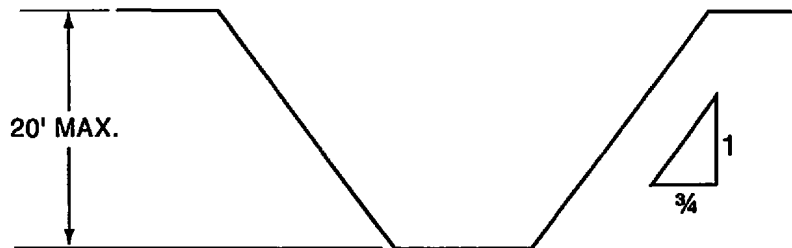
FIGURE B-1

SLOPE CONFIGURATIONS

(All slopes stated below are in the horizontal to vertical ratio)

B-1.1 Excavations made in Type A soil.

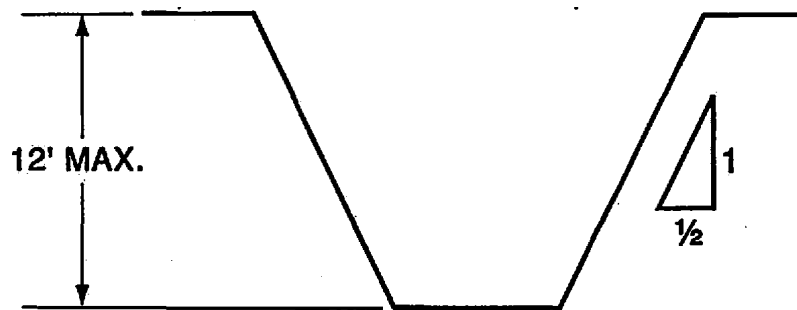
1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 3/4:1.



Simple Slope – General

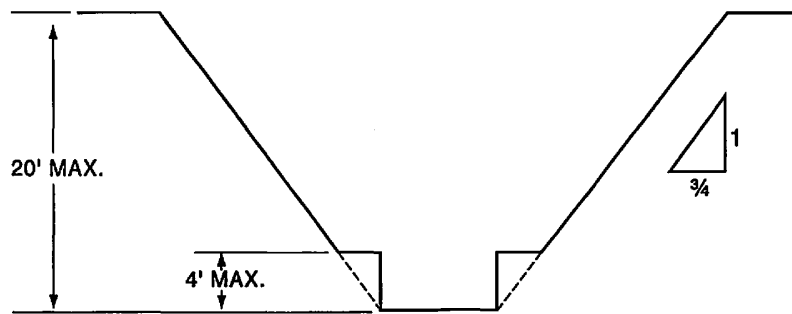
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Exception: Simple slope excavations which are open 24 hours or less (short term) and which are 12 feet or less in depth shall have a maximum allowable slope of 1/2:1.



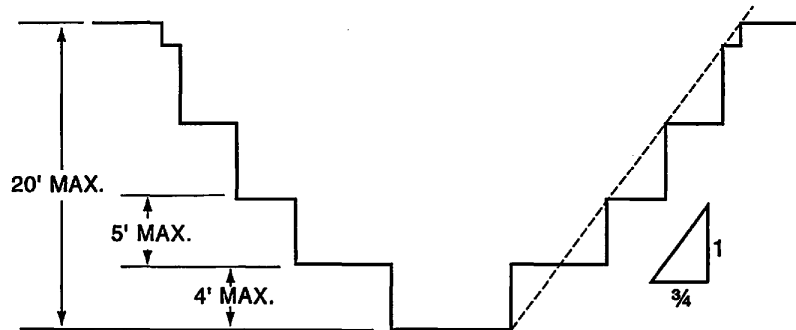
Simple Slope – Short Term

2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of 3/4 to 1 and maximum bench dimensions as follows:



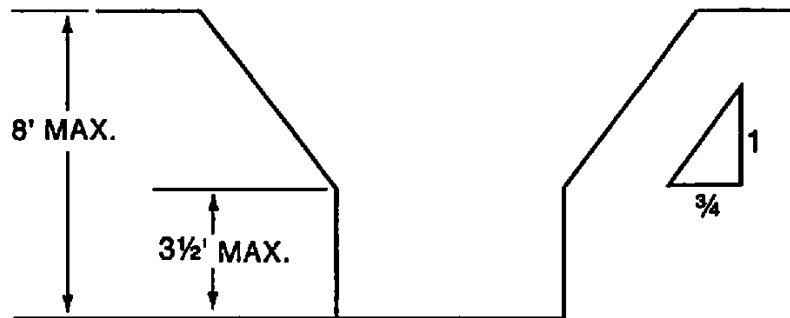
Simple Bench

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Multiple Bench

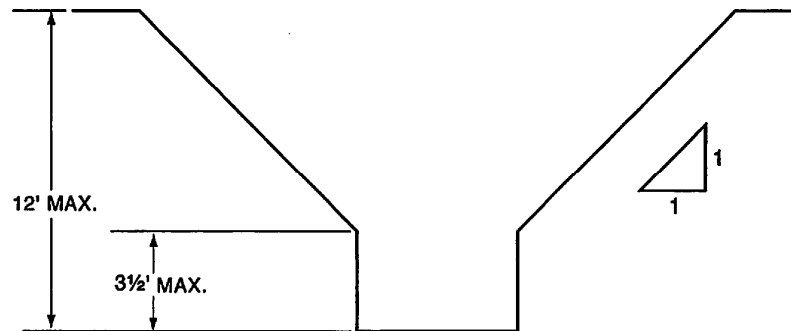
3. All excavations 8 feet or less in depth which have unsupported vertically sided lower portions shall have a maximum vertical side 3 1/2 feet.



Unsupported Vertically Sided Lower Portion –
Maximum 8 Feet in Depth

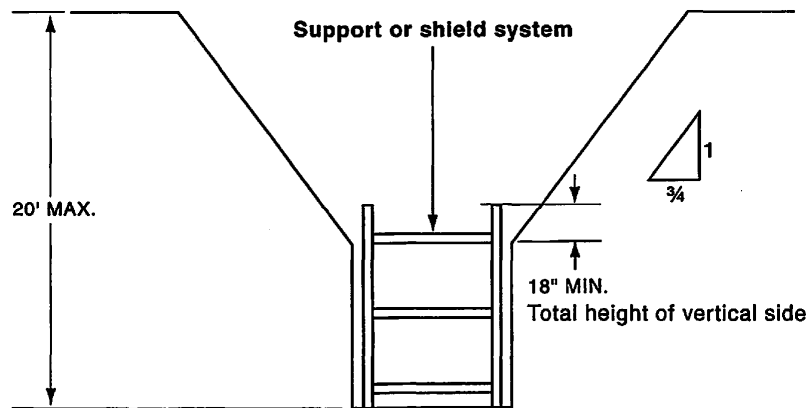
All excavations more than 8 feet but not more than 12 feet in depth with unsupported vertically sided lower portions shall have a maximum allowable slope of 1:1 and a maximum vertical side of 3 1/2 feet.

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Unsupported Vertically Sided Lower Portion –
Maximum 12 Feet in Depth

All excavations 20 feet or less in depth which have vertically sided lower portions that are supported or shielded shall have a maximum allowable slope of 3/4:1. The support or shield system must extend at least 18 inches above the top of the vertical side.



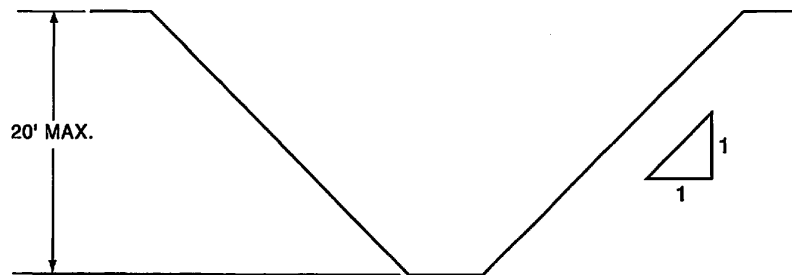
Supported or Shielded
Vertically Sided Lower Portion

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4. All other simple slope, compound slope, and vertically sided lower portion excavations shall be in accordance with the other options permitted under 1541.1(b).

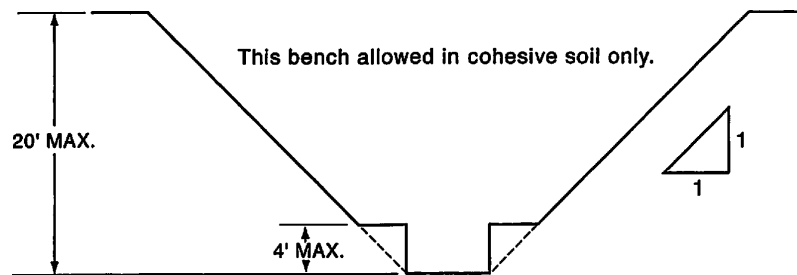
B-1.2 Excavations Made in Type B Soil

1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1.



Simple Slope

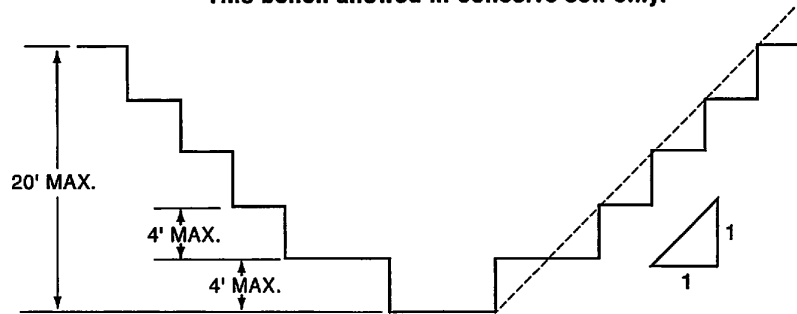
2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1 and maximum bench dimensions as follows:



Single Bench

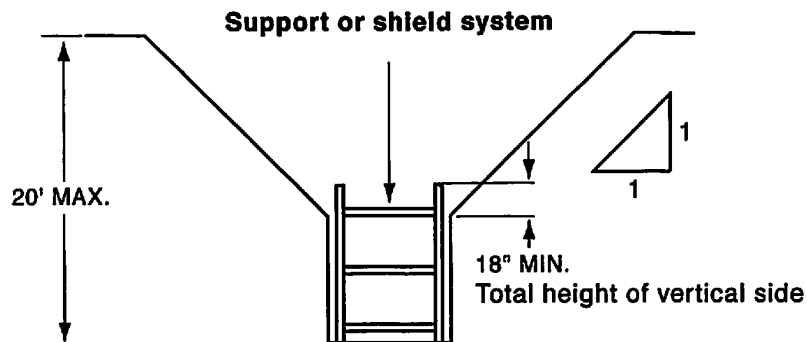
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This bench allowed in cohesive soil only.



Multiple Bench

3. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1:1.

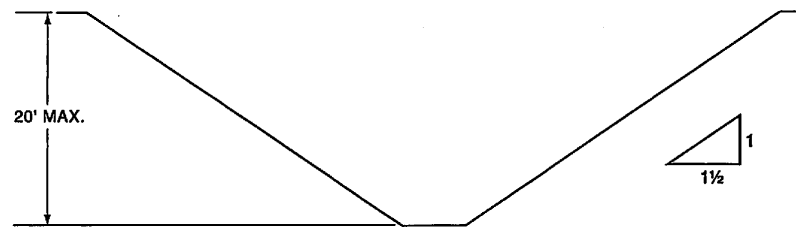


Vertically Sided Lower Portion

4. All other sloped excavations shall be in accordance with the other options permitted in 1541.1(b).

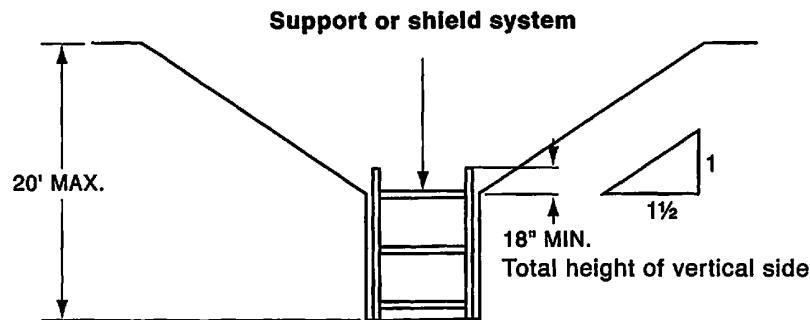
B-1.3 Excavations Made in Type C Soil

1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1 1/2:1.



Simple Slope

2. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1 1/2:1.

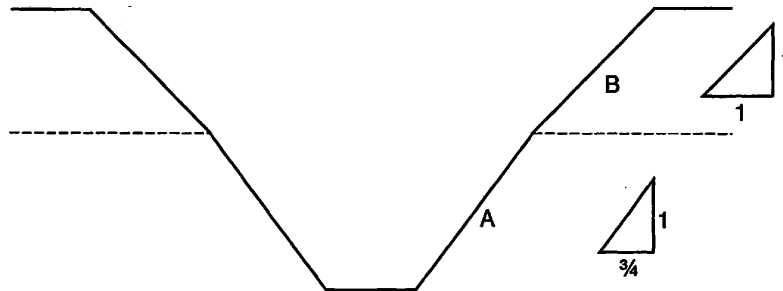


Vertically Sided Lower Portion

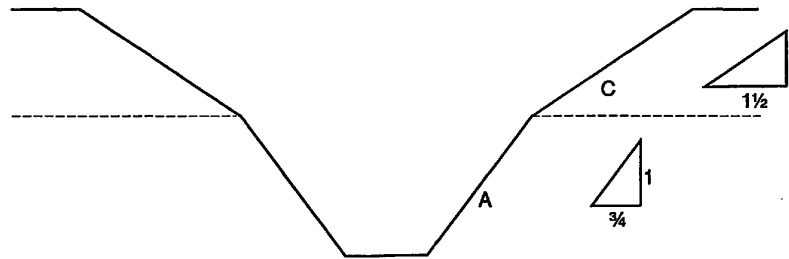
3. All other sloped excavations shall be in accordance with the other options permitted in 1541.1(b).

B-1.4 Excavations Made in Layered Soil

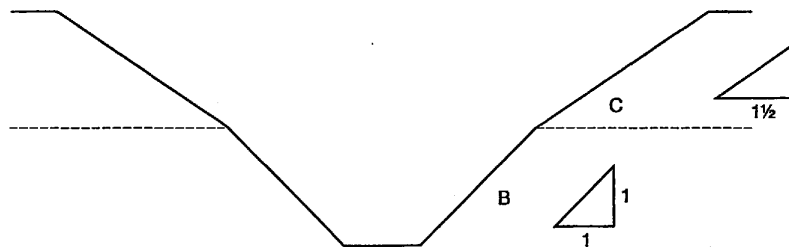
1. All excavations 20 feet or less in depth made in layered soils shall have a maximum allowable slope for each layer as set forth below:



B OVER A

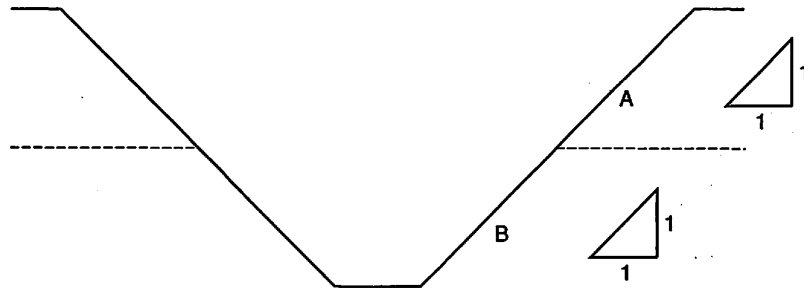


C OVER A

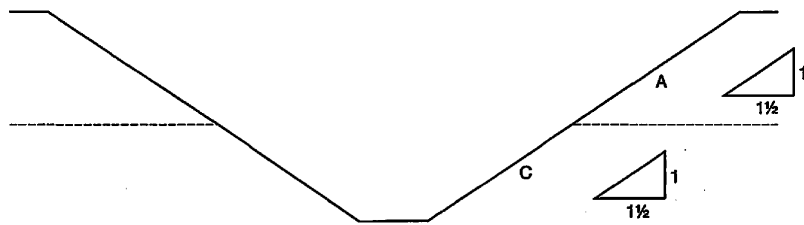


C OVER B

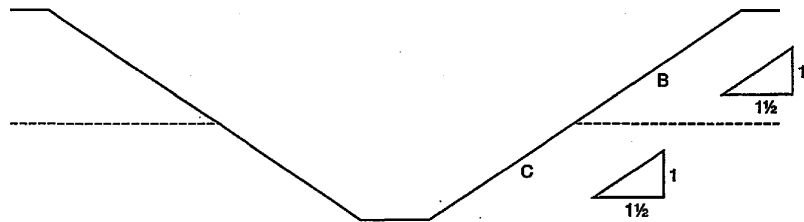
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A OVER B



A OVER C



B OVER C

2. All other sloped excavations shall be in accordance with the other options permitted in 1541.1(b).

Appendix C

Timber Shoring for Trenches

(a) Scope. This appendix contains information that can be used when timber shoring is provided as a method of protection from cave-ins in trenches that do not exceed 20 feet in depth. This appendix must be used when design of timber shoring protective systems is to be performed in accordance with Section 1541.1(c)(1). Other timber shoring configurations; other systems of support such as hydraulic and pneumatic systems; and other protective systems such as sloping, benching, shielding, and freezing systems must be designed in accordance with the requirements set forth in Section 1541.1(b) and 1541.1(c).

(b) Soil Classification. In order to use the data presented in this appendix, the soil type or types in which the excavation is made must first be determined using the soil classification method set forth in Article 6.

(c) Presentation of Information.

Information is presented in several forms as follows:

(1) Information is presented in tabular form in Tables C-1.1, C-1.2 and C-1.3, and Tables C-2.1, C-2.2 and C-2.3 following Section (g) of Appendix C. Each table presents the minimum sizes of timber members to use in a shoring system, and each table contains data only for the particular soil type in which the excavation or portion of the excavation is made. The data are arranged to allow the user the flexibility to select from among several acceptable configurations of members based on

varying the horizontal spacing of the crossbraces. Stable rock is exempt from shoring requirements and therefore, no data are presented for this condition.

(2) Information concerning the basis of the tabular data and the limitations of the data is presented in Section (d) of this appendix, and on the tables themselves.

(3) Information explaining the use of the tabular data is presented in Section (e) of this appendix.

(4) Information illustrating the use of the tabular data is presented in Section (f) of this appendix.

(5) Miscellaneous notations regarding Tables C-1.1 through C-1.3 and Tables C-2.1 through C-2.3 are presented in Section (g) of this appendix.

(d) Basis and limitations of the data.

(1) Dimensions of timber members.

(A) The sizes of the timber members listed in Tables C-1.1 through C-1.3 are taken from the National Bureau of Standards (NBS) report, "Recommended Technical Provisions for Construction Practice in Shoring and Sloping of Trenches and Excavations." In addition, where NBS did not recommend specific sizes of members, member sizes are based on an analysis of the sizes required for use by existing codes and on empirical practice.

(B) The required dimensions of the members listed in Tables C-1.1 through C-1.3 refer to actual dimensions and not nominal dimensions of the timber. Employers

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wanting to use nominal size shoring are directed to Tables C-2.1 through C-2.3, or have this choice under Section 1541.1(c)(3).

(2) Limitation of application.

(A) It is not intended that the timber shoring specification apply to every situation that may be experienced in the field. These data were developed to apply to the situations that are most commonly experienced in current trenching practice. Shoring systems for use in situations that are not covered by the data in this appendix must be designed as specified in Section 1541.1(c).☒

(B) When any of the following conditions are present, the members specified in the tables are not considered adequate. Either an alternate timber shoring system must be designed or another type of protective system designed in accordance with Section 1541.1.

1. When loads imposed by structures or by stored material adjacent to the trench weigh in excess of the load imposed by a two-foot soil surcharge. The term “adjacent” as used here means the area within a horizontal distance from the edge of the trench equal to the depth of the trench.

2. When vertical loads imposed on crossbraces exceed a 240-pound gravity load distributed on a one-foot section of the center of the crossbrace.

3. When surcharge loads are present from equipment weighing in excess of 20,000 pounds.

4. When only the lower portion of a trench is shored and the remaining portion of the trench is sloped or benched unless: The sloped portion is sloped at an angle less steep than three horizontal to one vertical; or the members are selected from the tables for use at a depth which is determined from the top of the overall trench, and not from the toe of the sloped portion.

(e) Use of Tables. The members of the shoring system that are to be selected using this information are the crossbraces, the uprights, and the wales, where wales are required. Minimum sizes of members are specified for use in different types of soil. There are six tables of information, two for each soil type. The soil type must first be determined in accordance with the soil classification system described in Appendix A. Using the appropriate table, the selection of the size and spacing of the members is then made. The selection is based on the depth and width of the trench where the members are to be installed and, in most instances, the selection is also based on the horizontal spacing of the crossbraces. Instances where a choice of horizontal spacing of crossbracing is available, the horizontal spacing of the crossbraces must be chosen by the user before the size of any member can be determined. When the soil type, the width and depth of the trench, and the horizontal spacing of the crossbraces, the size and vertical spacing of the crossbraces are known, the size and vertical spacing of the crossbraces, the size and vertical spacing of the wales, and the size and horizontal spacing of the uprights can be read from the appropriate table.

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(f) Examples to Illustrate the Use of Tables C-1.1 through C-1.3.

(1) Example 1.

A trench dug in Type A soil is 13 feet deep and five feet wide. From Table C-1.1, four acceptable arrangements of timber can be used.

Arrangement #1

Space 4X4 crossbraces at six feet horizontally and four feet vertically. Wales are not required.

Space 3X8 uprights at six feet horizontally. This arrangement is commonly called “skip shoring.”

Arrangement #2

Space 4X6 crossbraces at eight feet horizontally and four feet vertically.

Space 8X8 wales at four feet vertically.

Space 2X6 uprights at four feet horizontally.

Arrangement #3

Space 6X6 crossbraces at 10 feet horizontally and four feet vertically.

Space 8X10 wales at four feet vertically.

Space 2X6 uprights at five feet horizontally.

Arrangement #4

Space 6X6 crossbraces at 12 feet horizontally and four feet vertically.

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Space 10X10 wales at four feet vertically.

Space 3X8 uprights at six feet horizontally.

(2) Example 2.

A trench dug in Type B soil is 13 feet deep and five feet wide. From Table C-1.2 three acceptable arrangements of members are listed.

Arrangement #1☒

Space 6X6 crossbraces at six feet horizontally and five feet vertically.

Space 8X8 wales at five feet vertically.

Space 2X6 uprights at two feet horizontally.

Arrangement #2

Space 6X8 crossbraces at eight feet horizontally and five feet vertically.

Space 10X10 wales at five feet vertically.

Space 2X6 uprights at two feet horizontally.

Arrangement #3

Space 8X8 crossbraces at 10 feet horizontally and five feet vertically.

Space 10X12 wales at five feet vertically.

Space 2X6 uprights at two feet vertically.

(3) Example 3.

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A trench dug in Type C soil is 13 feet deep and five feet wide.

From Table C-1.3 two acceptable arrangements of members can be used.

Arrangement #1

Space 8X8 crossbraces at six feet horizontally and five feet vertically.

Space 10X12 wales at five feet vertically.

Position 2X6 uprights as closely together as possible.

If water must be retained use special tongue and groove uprights to form tight sheeting.

Arrangement #2

Space 8X10 crossbraces at eight feet horizontally and five feet vertically.

Space 12X12 wales at five feet vertically.

Position 2X6 uprights in a close sheeting configuration unless water pressure must be resisted. Tight sheeting must be used where water must be retained.

(4) Example 4.

A trench dug in Type C soil is 20 feet deep and 11 feet wide. The size and spacing of members for the section of trench that is over 15 feet in depth is determined using Table C-1.3. Only one arrangement of members is provided.

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Space 8X10 crossbraces at six feet horizontally and five feet vertically.

Space 12X12 wales at five feet vertically.

Use 3X6 tightsheeting.

Use of Tables C-2.1 through C-2.3 would follow the same procedures.

(g) Notes for all Tables.

1. Members sizes at spacings other than indicated are to be determined as specified in Section 1541.1(c), "Design of Protective Systems."
2. When conditions are saturated or submerged use Tight Sheeting. Tight Sheeting refers to the use of specially-edged timber planks (e.g., tongue and groove) at least three inches thick, steel sheet piling, or similar construction that when driven or placed in position provide a tight wall to resist the lateral pressure of water and to prevent the loss of backfill material. Close Sheeting refers to the placement of planks side-by-side allowing as little space as possible between them.
3. All spacing indicated is measured center to center.
4. Wales to be installed with greater dimension horizontal.
5. If the vertical distance from the center of the lowest crossbrace to the bottom of the trench exceeds two and one-half feet, uprights shall be firmly embedded or a mudsill shall be used. Where uprights are embedded, the vertical distance from the center of the lowest

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crossbrace to the bottom of the trench shall not exceed 36 inches. When mudsills are used, the vertical distance shall not exceed 42 inches. Mudsills are wales that are installed at the toe of the trench side.

6. Trench jacks may be used in lieu of or in combination with timber crossbraces.

7. Placement of crossbraces. When the vertical spacing of crossbraces is four feet, place the top crossbrace no more than two feet below the top of the trench. When the vertical spacing of crossbraces is five feet, place the top crossbrace no more than 2.5 feet below the top of the trench.

TABLE C-1.1

TIMBER TRENCH SHORING – MINIMUM TIMBER REQUIREMENTS*
SOIL TYPE A P_a - 25 X H + 72 psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (ACTUAL) AND SPACING OF MEMBERS **													
	CROSS BRACES							WALES		UPRIGHTS				
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE	4	5	6	8
5 TO 10	UP TO 6	4x4	4x4	4x6	6x6	6x6	4	Not Req'd	- - -				2x6	
	UP TO 8	4x4	4x4	4x6	6x6	6x6	4	Not Req'd	- - -					2x8
	UP TO 10	4x6	4x6	4x6	6x6	6x6	4	8x8	4			2x6		
	UP TO 12	4x6	4x6	6x6	6x6	6x6	4	8x8	4				2x6	
10 TO 15	UP TO 6	4x4	4x4	4x6	6x6	6x6	4	Not Req'd	- - -				3x8	
	UP TO 8	4x6	4x6	6x6	6x6	6x6	4	8x8	4		2x6			
	UP TO 10	6x6	6x6	6x6	6x8	6x8	4	8x10	4			2x6		
	UP TO 12	6x6	6x6	6x6	6x8	6x8	4	10x10	4				3x8	
15 TO 20	UP TO 6	6x6	6x6	6x6	6x8	6x8	4	6x8	4	3x6				
	UP TO 8	6x6	6x6	6x6	6x8	6x8	4	8x8	4	3x6				
	UP TO 10	8x8	8x8	8x8	8x8	8x10	4	8x10	4	3x6				
	UP TO 12	8x8	8x8	8x8	8x8	8x10	4	10x10	4	3x6				
OVER 20	SEE NOTE 1													

* Mixed oak or equivalent with a bending strength not less than 850 psi.

** Manufactured members of equivalent strength may be substituted for wood.

TABLE C-1.2

TIMBER TRENCH SHORING – MINIMUM TIMBER REQUIREMENTS*
SOIL TYPE B P_a - 45 X H + 72 psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (ACTUAL) AND SPACING OF MEMBERS **													
	CROSS BRACES							WALES		UPRIGHTS				
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE	2	3		
5 TO 10	UP TO 6	4x6	4x6	6x6	6x6	6x6	5	6x8	5			2x6		
	UP TO 8	6x6	6x6	6x6	6x8	6x8	5	8x10	5			2x6		
	UP TO 10	6x6	6x6	6x6	6x8	6x8	5	10x10	5			2x6		
	See Note 1													
10 TO 15	UP TO 6	6x6	6x6	6x6	6x8	6x8	5	8x8	5		2x6			
	UP TO 8	6x8	6x8	6x8	8x8	8x8	5	10x10	5		2x6			
	UP TO 10	8x8	8x8	8x8	8x8	8x10	5	10x12	5		2x6			
	See Note 1													
15 TO 20	UP TO 6	6x8	6x8	6x8	8x8	8x8	5	8x10	5	3x6				
	UP TO 8	8x8	8x8	8x8	8x8	8x10	5	10x12	5	3x6				
	UP TO 10	8x10	8x10	8x10	8x10	10x10	5	12x12	5	3x6				
	See Note 1													
OVER 20	SEE NOTE 1													

* Mixed oak or equivalent with a bending strength not less than 850 psi.

** Manufactured members of equivalent strength may be substituted for wood.

TABLE C-1.3

TIMBER TRENCH SHORING – MINIMUM TIMBER REQUIREMENTS*
SOIL TYPE C P_a - 80 X + 72 psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (ACTUAL) AND SPACING OF MEMBERS **													
	CROSS BRACES									UPRIGHTS				
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				(See Note 2)				
5 TO 10	UP TO 6	6x8	6x8	6x8	8x8	8x8	5	8x10	5	2x6				
	UP TO 8	8x8	8x8	8x8	8x8	8x10	5	10x12	5	2x6				
	UP TO 10	8x10	8x10	8x10	8x10	10x10	5	12x12	5	2x6				
	See Note 1													
10 TO 15	UP TO 6	8x8	8x8	8x8	8x8	8x10	5	10x12	5	2x6				
	UP TO 8	8x10	8x10	8x10	8x10	10x10	5	12x12	5	2x6				
	See Note 1													
	See Note 1													
15 TO 20	UP TO 6	8x10	8x10	8x10	8x10	10x10	5	12x12	5	3x6				
	See Note 1													
	See Note 1													
	See Note 1													
OVER 20	SEE NOTE 1													

* Mixed oak or equivalent with a bending strength not less than 850 psi.

** Manufactured members of equivalent strength may be substituted for wood.

TABLE C-2.1

TIMBER TRENCH SHORING – MINIMUM TIMBER REQUIREMENTS*
SOIL TYPE A P_a - 25 X + 72 psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (ACTUAL) AND SPACING OF MEMBERS **													
	CROSS BRACES							WALES		UPRIGHTS				
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE	4	5	6	8
5 TO 10	UP TO 6	4x4	4x4	4x4	4x4	4x6	4	Not Req'd	Not Req'd				4x6	
	UP TO 8	4x4	4x4	4x4	4x6	4x6	4	Not Req'd	Not Req'd					4x8
	UP TO 10	4x6	4x6	4x6	6x6	6x6	4	8x8	4			4x6		
	UP TO 12	4x6	4x6	4x6	6x6	6x6	4	8x8	4				4x6	
10 TO 15	UP TO 6	4x4	4x4	4x4	6x6	6x6	4	Not Req'd	Not Req'd				4x10	
	UP TO 8	4x6	4x6	4x6	6x6	6x6	4	6x6	4		4x6			
	UP TO 10	6x6	6x6	6x6	6x6	6x6	4	8x8	4			4x8		
	UP TO 12	6x6	6x6	6x6	6x6	6x6	4	8x10	4		4x6		4x10	
15 TO 20	UP TO 6	6x6	6x6	6x6	6x6	6x6	4	6x8	4	3x6				
	UP TO 8	6x6	6x6	6x6	6x6	6x6	4	8x8	4	3x6	4x12			
	UP TO 10	6x6	6x6	6x6	6x6	6x8	4	8x10	4	3x6				
	UP TO 12	6x6	6x6	6x6	6x8	6x8	4	8x12	4	3x6	4x12			
OVER 20	SEE NOTE 1													

* Douglas fir or equivalent with a bending strength not less than 1500 psi.

** Manufactured members of equivalent strength may be substituted for wood.

TABLE C-2.2
TIMBER TRENCH SHORING – MINIMUM TIMBER REQUIREMENTS*
SOIL TYPE B P_a - 45 X H 72 psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (ACTUAL) AND SPACING OF MEMBERS **													
	CROSS BRACES							WALES		UPRIGHTS				
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE	2	3	4	6
5 TO 10	UP TO 6	4x6	4x6	4x6	6x6	6x6	5	6x8	5			3x12 4x8		4x12
	UP TO 8	4x6	4x6	6x6	6x6	6x6	5	8x8	5		3x8		4x8	
	UP TO 10	4x6	4x6	6x6	6x6	6x8	5	8x10	5			4x8		
	See Note 1													
10 TO 15	UP TO 6	6x6	6x6	6x6	6x8	6x8	5	8x8	5	3x6	4x10			
	UP TO 8	6x8	6x8	6x8	8x8	8x8	5	10x10	5	3x6	4x10			
	UP TO 10	6x8	6x8	8x8	8x8	8x8	5	10x12	5	3x6	4x10			
	See Note 1													
15 TO 20	UP TO 6	6x8	6x8	6x8	6x8	8x8	5	8x10	5	4x6				
	UP TO 8	6x8	6x8	6x8	8x8	8x8	5	10x12	5	4x6				
	UP TO 10	8x8	8x8	8x8	8x8	8x8	5	12x12	5	4x6				
	See Note 1													
OVER 20	SEE NOTE 1													

* Douglas fir or equivalent with a bending strength not less than 1500 psi.

** Manufactured members of equivalent strength may be substituted for wood.

TABLE C-2.3

TIMBER TRENCH SHORING – MINIMUM TIMBER REQUIREMENTS*
SOIL TYPE C P_a - 25 X H + 72 psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (ACTUAL) AND SPACING OF MEMBERS **													
	CROSS BRACES							WALES		UPRIGHTS				
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE				
5 TO 10	UP TO 6	6x6	6x6	6x6	6x6	8x8	5	8x8	5	3x6				
	UP TO 8	6x6	6x6	6x6	8x8	8x8	5	10x10	5	3x6				
	UP TO 10	6x6	6x6	8x8	8x8	8x8	5	10x12	5	3x6				
	See Note 1													
10 TO 15	UP TO 6	6x8	6x8	6x8	8x8	8x8	5	10x10	5	4x6				
	UP TO 8	8x8	8x8	8x8	8x8	8x8	5	12x12	5	4x6				
	See Note 1													
	See Note 1													
15 TO 20	UP TO 6	8x8	8x8	8x8	8x10	8x10	5	10x12	5	4x6				
	See Note 1													
	See Note 1													
	See Note 1													
OVER 20	SEE NOTE 1													

* Douglas fir or equivalent with a bending strength not less than 1500 psi.

** Manufactured members of equivalent strength may be substituted for wood.

Appendix D

Aluminum Hydraulic Shoring for Trenches

(a) **Scope.** This appendix contains information that can be used when aluminum hydraulic shoring is provided as a method of protection against cave-ins in trenches that do not exceed 20 feet in depth. This appendix must be used when design of the aluminum hydraulic protective system cannot be performed in accordance with Section 1541.1(c)(2).

(b) **Soil Classification.** In order to use data presented in this appendix, the soil type or types in which the excavation is made must first be determined using the soil classification method set forth in Appendix A of this Article.

(c) **Presentation of Information.** Information is presented in several forms as follows:

(1) Information is presented in tabular form in Tables D-1.1, D-1.2, D-1.3 and D-1.4. Each table presents the maximum vertical and horizontal spacings that may be used with various aluminum member sizes and various hydraulic cylinder sizes. Each table contains data only for the particular soil type in which the excavation or portion of the excavation is made. Tables D-1.1 and D-1.2 are for vertical shores in Types A and B soil. Tables D-1.3 and D-1.4 are for horizontal waler systems in Types B and C soil.

(2) Information concerning the basis of the tabular data and the limitations of the data is presented in Section (d) of this appendix.

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- (3) Information explaining the use of the tabular data is presented in Section (e) of this appendix.
- (4) Information illustrating the use of the tabular data is presented in Section (f) of this appendix.
- (5) Miscellaneous notations (footnotes) regarding Table D-1.1 through D-1.4 are presented in Section (g) of this appendix.
- (6) Figures, illustrating typical installations of hydraulic shoring, are included just prior to the Tables. The illustrations page is entitled "Aluminum Hydraulic Shoring: Typical Installations."
- (d) Basis and limitations of the data.
 - (1) Vertical shore rails and horizontal wales are those that meet the Section Modulus requirements in the D-1 Tables. Aluminum material is 6061-T6 or material of equivalent strength and properties.
 - (2) Hydraulic cylinders specifications.
 - (A) 2-inch cylinders shall be a minimum 2-inch inside diameter with a minimum safe working capacity of no less than 18,000 pounds axial compressive load at maximum extension. Maximum extension is to include full range of cylinder extensions as recommended by product manufacturer.
 - (B) 3-inch cylinders shall be minimum 3-inch inside diameter with a safe working capacity of not less than 30,000 pounds axial compressive load at extensions as recommended by product manufacturer.

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(3) Limitation of application.

(A) It is not intended that the aluminum hydraulic specification apply to every situation that may be experienced in the field. These data were developed to apply to the situations that are most commonly experienced in current trenching practice. Shoring systems for use in situations that are not covered by the data in this appendix must be otherwise designed as specified in Section 1541.1(c).

(B) When any of the following conditions are present, the members specified in the Tables are no considered adequate. In this case, an alternative aluminum hydraulic shoring system or other type of protective system must be designed in accordance with Section 1541.1.☒

1. When vertical loads imposed on crossbraces exceed a 100 pound gravity load distributed on a one foot section of the center of the hydraulic cylinder.

2. When surcharge loads are present from equipment weighing in excess of 20,000 pounds.

3. When only the lower portion of a trench is shored and the remaining portion of the trench is sloped or benched unless: The sloped portion is sloped at an angle less steep than three horizontal to one vertical; or the members are selected from the tables for use at a depth which is determined from the top of the overall trench, and not from the toe of the sloped portion.

(e) Use of Tables D-1.1, D-1.2, D-1.3 and D-1.4. The members of the shoring system that are to be selected

using this information are the hydraulic cylinders, and either the vertical shores or the horizontal wales. When a waler system is used the vertical timber sheeting to be used is also selected from these tables. The Tables D-1.1 and D-1.2 for vertical shores are used in Type A and B soils that do not require sheeting. Type B soils that may require sheeting, and Type C soils that always require sheeting, are found in the horizontal wale Tables D-1.3 and D-1.4. The soil type must first be determined in accordance with the soil classification system described in Appendix A to Section 1541.1. Using the appropriate table, the selection of the size and spacing of the members is made. The selection is based on the depth and width of the trench where the members are to be installed. In these tables the vertical spacing is held constant at four feet on center. The tables show the maximum horizontal spacing of cylinders allowed for each size of wale in the waler system tables, and in the vertical shore tables, the hydraulic cylinder horizontal spacing is the same as the vertical shore spacing.

(f) Example to Illustrate the Use of the Tables:

(1) Example 1.

A trench dug in Type A soil is 6 feet deep and 3 feet wide. From Table D-1.1: Find vertical shores and 2 inch diameter cylinders spaced 8 feet on center (o.c.) horizontally and 4 feet on center (o.c.) vertically. (See Figures 1 & 3 for typical installations.)

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(2) Example 2:

A trench is dug in Type B soil that does not require sheeting, 13 feet deep and 5 feet wide. From Table D-1.2: Find vertical shores and 2 inch diameter cylinders spaced 6.5 feet o.c. horizontally and 4 feet o.c. vertically. (See Figures 1 & 3 for typical installations.)

(3) Example 3:

A trench is dug in Type B soil that does not require sheeting, but does experience some minor raveling of the trench face. The trench is 16 feet deep and 9 feet wide. From Table D-1.2: Find vertical shores and 2 inch diameter cylinder (with special oversleeves as designated by footnote #2) spaced 5.5 feet o.c. horizontally and 4 feet o.c. vertically. Plywood (per footnote (g)(7) to the D-1 Table) should be used behind the shores. (See Figures 2 & 3 for typical installations.)

(4) Example 4:

A trench is dug in previously disturbed Type B soil, with characteristics of a Type C soil, and will require sheeting. The trench is 18 feet deep, and 12 feet wide. 8 foot horizontal spacing between cylinders is desired for working space. From Table D-1.3: Find horizontal wale with a section modulus of 14.0 spaced at 4 feet o.c. vertically and 3 inch diameter cylinder spaced at 9 feet maximum o.c. horizontally, 3 x 12 timber sheeting is required at close spacing vertically. (See Figure 4 for typical installation.)

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(5) Example 5:

A trench is dug in Type C soil, 9 feet deep and 4 feet wide. ☒ Horizontal cylinder spacing in excess of 6 feet is desired for working space. From Table D-1.4: Find horizontal wale with a section modulus of 7.0 and 2 inch diameter cylinders spaced at 6.5 feet o.c. horizontally. Or, find horizontal wale with a 14.0 section modulus and 3 inch diameter cylinder spaced at 10 feet o.c. horizontally. Both wales are spaced 4 feet o.c. Vertically, 3x12 timber sheeting is required at close spacing vertically. (See Figure 4 for typical installation.)

(g) Footnotes, and general notes, for Tables D-1.1, D-1.2, D-1.3, and D-1.4.

(1) For applications other than those listed in the tables, refer to Section 1541.1(c)(2) for use of manufacturer's tabulated data. For trench depths in excess of 20 feet, refer to Section 1541.1(c)(2) and 1541.1(c)(3).

(2) 2-inch diameter cylinders, at this width, shall have structural steel tube (3.5 x 3.5 x 0.1875) oversleeves, or structural oversleeves of manufacturer's specification, extending the full, collapsed length.

(3) Hydraulic cylinders capacities.

(A) 2-inch cylinders shall be a minimum 2-inch inside diameter with a safe working capacity of not less than 18,000 pounds axial compressive load at maximum extension. Maximum extension is to include full range of cylinder extensions as recommended by product manufacturer.

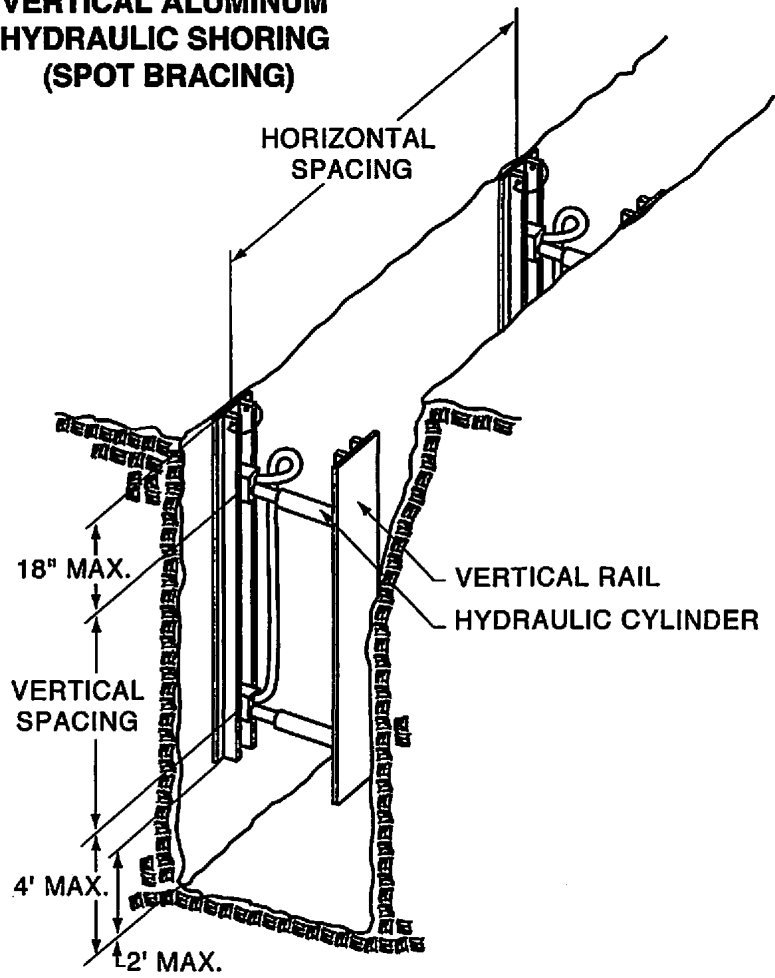
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- (B) 3-inch cylinders shall be a minimum 3-inch inside diameter with a safe work capacity of not less than 30,000 pounds axial compressive load at maximum extension. Maximum extension is to include full range of cylinder extensions as recommended by product manufacturer.
- (4) All spacing indicated is measured center to center.
- (5) Vertical shoring rails shall have a minimum section modulus of 0.40 inch.
- (6) When vertical shores are used, there must be a minimum of three shores spaced equally, horizontally, in a group.
- (7) Plywood shall be 1.125 inches thick of wood or 0.75 inch thick, 14 ply, arctic white birch (Finland form). Please note that plywood is not intended as a structural member, but only for prevention of local raveling (sloughing of the trench face) between shores. Equivalent material may be used if it has been approved in accordance with Section 1505(a).
- (8) See Appendix C for timber specifications.
- (9) Wales are calculated for simple span conditions.
- (10) See Appendix D, Section (d), for basis and limitations of the data.

ALUMINUM HYDRAULIC SHORING
TYPICAL INSTALLATIONS

FIGURE NO. 1

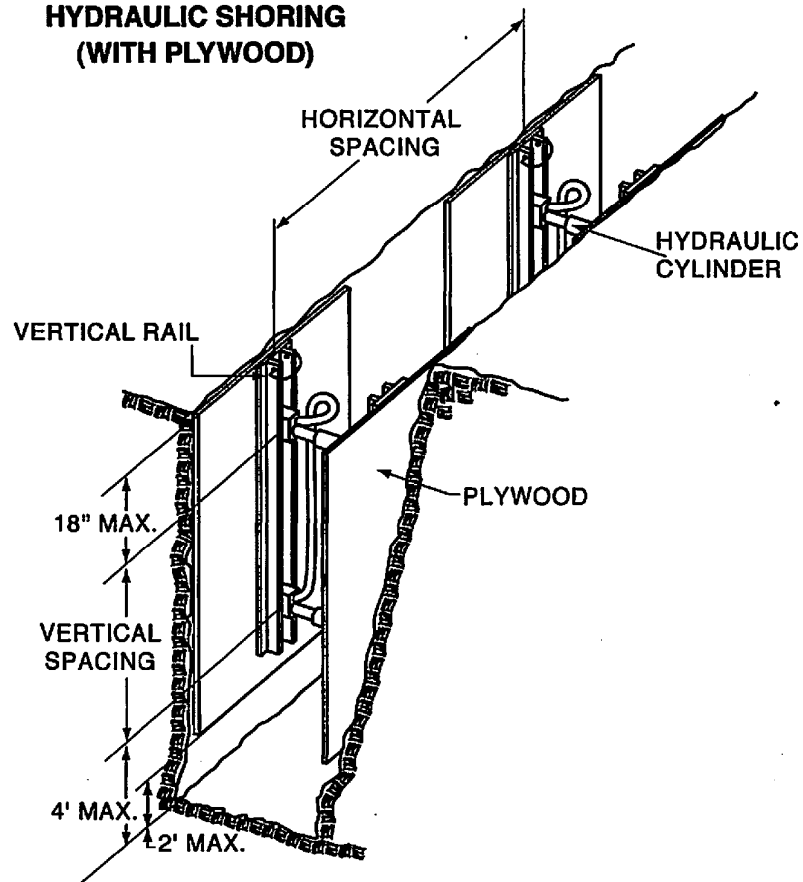
**VERTICAL ALUMINUM
HYDRAULIC SHORING
(SPOT BRACING)**



ALUMINUM HYDRAULIC SHORING
TYPICAL INSTALLATIONS

FIGURE NO. 2

**VERTICAL ALUMINUM
HYDRAULIC SHORING
(WITH PLYWOOD)**

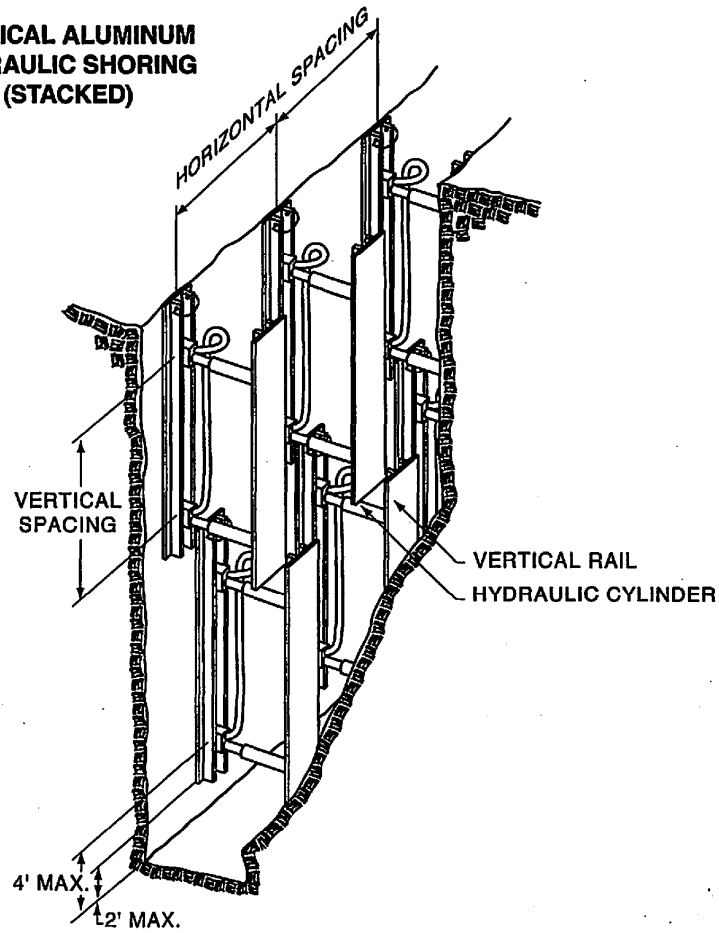


ALUMINUM HYDRAULIC SHORING

TYPICAL INSTALLATIONS

FIGURE NO. 3

**VERTICAL ALUMINUM
HYDRAULIC SHORING
(STACKED)**



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ALUMINUM HYDRAULIC SHORING
TYPICAL INSTALLATIONS
FIGURE NO. 4

**ALUMINUM HYDRAULIC SHORING
WALER SYSTEM (TYPICAL)**

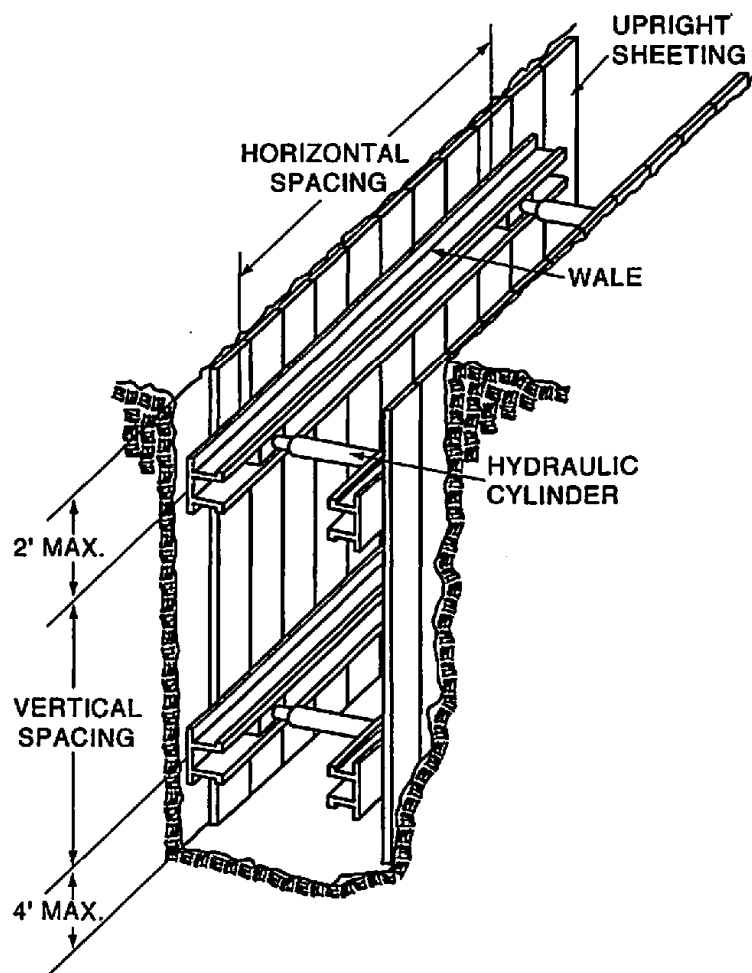


TABLE D-1.1
ALUMINUM HYDRAULIC SHORING
VERTICAL SHORES
FOR SOIL TYPE A

DEPTH OF TRENCH (FEET)	HYDRAULIC CYLINDERS				
	MAXIMUM HORIZONTAL SPACING (FEET)	MAXIMUM VERTICAL SPACING (FEET)	WIDTH OF TRENCH (FEET)		
			UP TO 8	OVER 8 UP TO 12	OVER 12 UP TO 15
OVER 5 UP TO 10	8	4	2 INCH DIAMETER	2 INCH DIAMETER NOTE (2)	3 INCH DIAMETER
OVER 10 UP TO 15	8				
OVER 15 UP TO 20	7				
OVER 20	NOTE (1)				

TABLE D-1.1

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g)

Note (1): See Appendix D, Item (g)(1)

Note (2): See Appendix D, Item (g)(2)

TABLE D-1.2
ALUMINUM HYDRAULIC SHORING
VERTICAL SHORES
FOR SOIL TYPE B

DEPTH OF TRENCH (FEET)	HYDRAULIC CYLINDERS				
	MAXIMUM HORIZONTAL SPACING (FEET)	MAXIMUM VERTICAL SPACING (FEET)	WIDTH OF TRENCH (FEET)		
			UP TO 8	OVER 8 UP TO 12	OVER 12 UP TO 15
OVER 5 UP TO 10	8	4	2 INCH DIAMETER	2 INCH DIAMETER NOTE (2)	3 INCH DIAMETER
OVER 10 UP TO 15	6.5				
OVER 15 UP TO 20	5.5				
OVER 20	NOTE (1)				

TABLE D-1.2

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g)

Note (1): See Appendix D, Item (g)(1)

Note (2): See Appendix D, Item (g)(2)

TABLE D-1.3
ALUMINUM HYDRAULIC SHORING
WALER SYSTEMS
FOR SOIL TYPE B

DEPTH OF TRENCH (FEET)	WALES		HYDRAULIC CYLINDERS						TIMBER UPRIGHTS*		
	VERTICAL SPACING (FEET)	SECTION MODULUS (IN")	WIDTH OF TRENCH (FEET)						MAX.HORIZ.SPACING (ON CENTER)		
			UP TO 8		OVER 8 UP TO 12		OVER 12 UP TO 15		SOLID SHEET	2 FT.	3 FT.
			HORIZ. SPACING	CYLINDER DIAMETER	HORIZ. SPACING	CYLINDER DIAMETER	HORIZ. SPACING	CYLINDER DIAMETER			
OVER 5 UP TO 10	4	3.5	8.0	2 IN	8.0	2 IN NOTE(2)	8.0	3 IN	—	—	3x12
		7.0	9.0	2 IN	9.0	2 IN NOTE(2)	9.0	3 IN			
		14.0	12.0	3 IN	12.0	3 IN	12.0	3 IN			
OVER 10 UP TO 15	4	3.5	6.0	2 IN	6.0	2 IN NOTE(2)	6.0	3 IN	—	3x12	—
		7.0	8.0	3 IN	8.0	3 IN	8.0	3 IN			
		14.0	10.0	3 IN	10.0	3 IN	10.0	3 IN			
OVER 15 UP TO 20	4	3.5	5.5	2 IN	5.5	2 IN NOTE(2)	5.5	3 IN	3x12	—	—
		7.0	6.0	3 IN	6.0	3 IN	6.0	3 IN			
		14.0	9.0	3 IN	9.0	3 IN	9.0	3 IN			
OVER 20	NOTE (1)										

TABLE D-1.3

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g)

Notes (1): See Appendix D, Item (g)(1)

Notes (2): See Appendix D, Item (g)(2)

* Consult product manufacturer and/or qualified engineer for Section Modulus of available wales.

** Douglas fir or equivalent with a bending strength not less than 1500 psi.

TABLE D-1.4
ALUMINUM HYDRAULIC SHORING
WALER SYSTEMS
FOR SOIL TYPE C

DEPTH OF TRENCH (FEET)	WALES		HYDRAULIC CYLINDERS						TIMBER UPRIGHTS*		
	VERTICAL SPACING (FEET)	SECTION MODULUS (IN")	WIDTH OF TRENCH (FEET)						MAX.HORIZ.SPACING (ON CENTER)		
			UP TO 8		OVER 8 UP TO 12		OVER 12 UP TO 15		SOLID SHEET	2 FT.	3 FT.
			HORIZ. SPACING	CYLINDER DIAMETER	HORIZ. SPACING	CYLINDER DIAMETER	HORIZ. SPACING	CYLINDER DIAMETER			
OVER 5 UP TO 10	4	3.5	6.0	2 IN	6.0	2 IN NOTE(2)	6.0	3 IN	3x12	—	—
		7.0	6.5	2 IN	6.5	2 IN NOTE(2)	6.5	3 IN			
		14.0	10.0	3 IN	10.0	3 IN	10.0	3 IN			
OVER 10 UP TO 15	4	3.5	4.0	2 IN	4.0	2 IN NOTE(2)	4.0	3 IN	3x12	—	—
		7.0	5.5	3 IN	5.5	3 IN	5.5	3 IN			
		14.0	8.0	3 IN	8.0	3 IN	8.0	3 IN			
OVER 15 UP TO 20	4	3.5	3.5	2 IN	3.5	2 IN NOTE(2)	3.5	3 IN	3x12	—	—
		7.0	5.0	3 IN	5.0	3 IN	5.0	3 IN			
		14.0	6.0	3 IN	6.0	3 IN	6.0	3 IN			
OVER 20	NOTE (1)										

TABLE D-1.4

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g)

Note (1): See Appendix D, Item (g)(1)

Note (2): See Appendix D, Item (g)(2)

*Consult product manufacturer and/or qualified engineer for Section Modulus of available wales.

**Douglas fir or equivalent with a bending strength not less than 1500 psi.

Appendix E to Section 1541.1

Alternatives to Timber Shoring

Figure 1. Aluminum Hydraulic Shoring

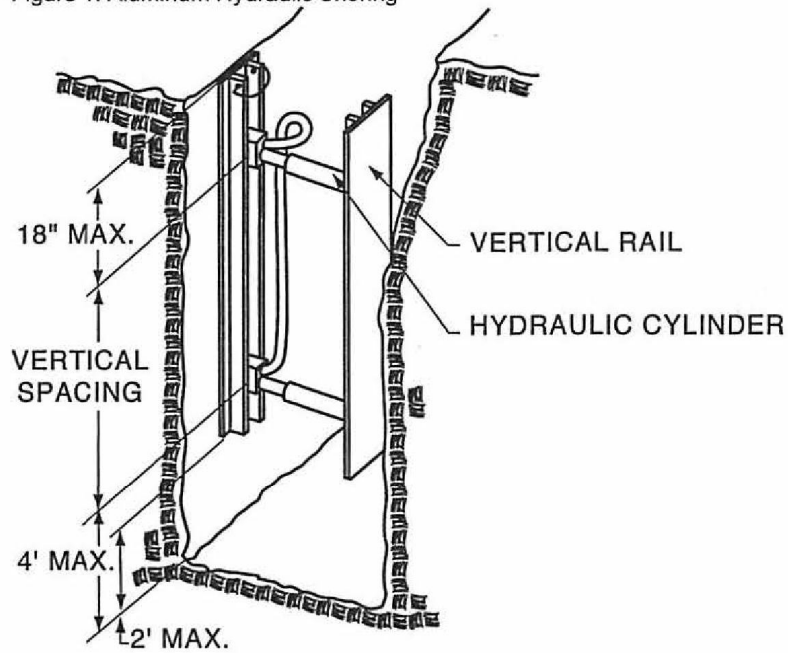
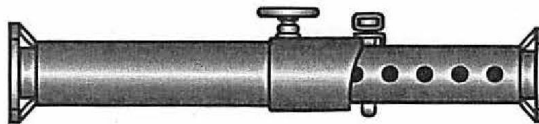
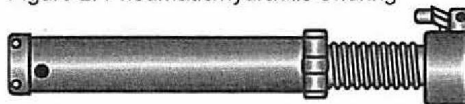


Figure 2. Pneumatic/hydraulic Shoring



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Figure 3. Trench Kacks (Screw Jacks)

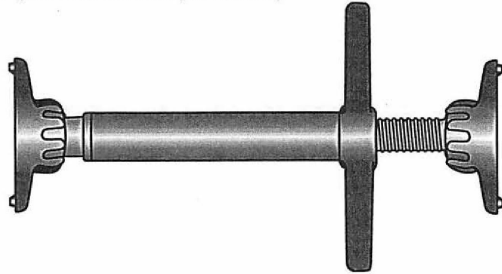
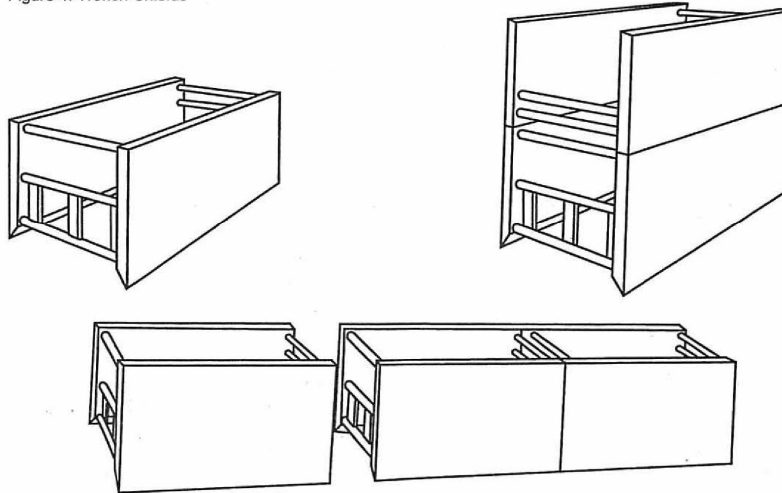


Figure 4. Trench Shields



Appendix F to Section 1541.1

Selection of Protective Systems

The following figures are a graphic summary of the requirements contained in Article 6 for excavations 20 feet or less in depth. Protective systems for use in excavations more than 20 feet in depth must be designed by a registered professional engineer in accordance Section 1541.1(b) and (c).

Appendix F to Section 1541.1 Selection of Protective Systems

The following figures are a graphic summary of the requirements contained in Article 6 for excavations 20 feet or less in depth. Protective systems for use in excavations more than 20 feet in depth must be designed by a registered professional engineer in accordance Section 1541.1(b) and (c).

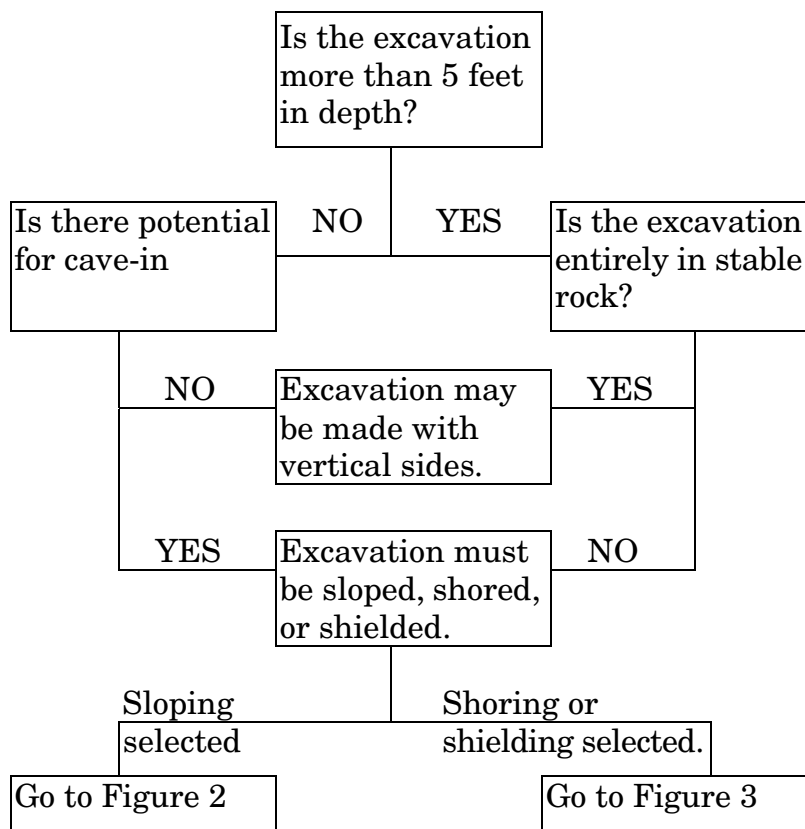


FIGURE 1 PRELIMINARY DECISIONS

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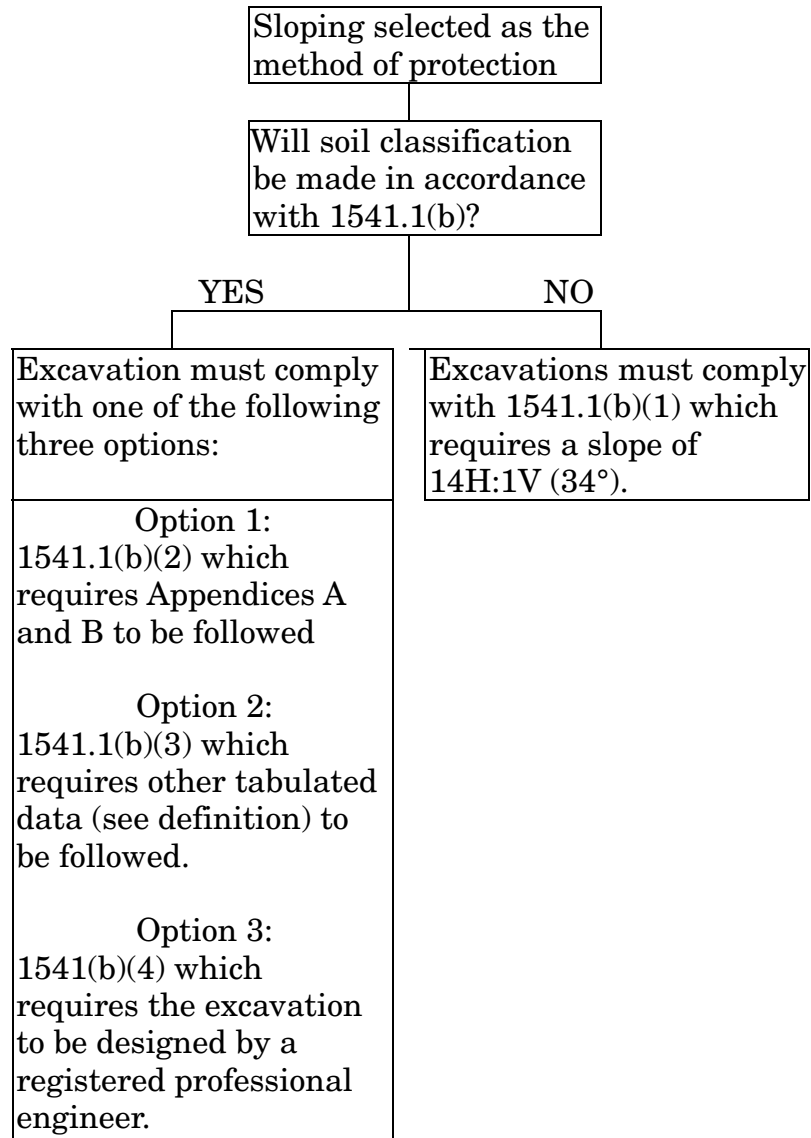


FIGURE 2 – SLOPING OPTIONS

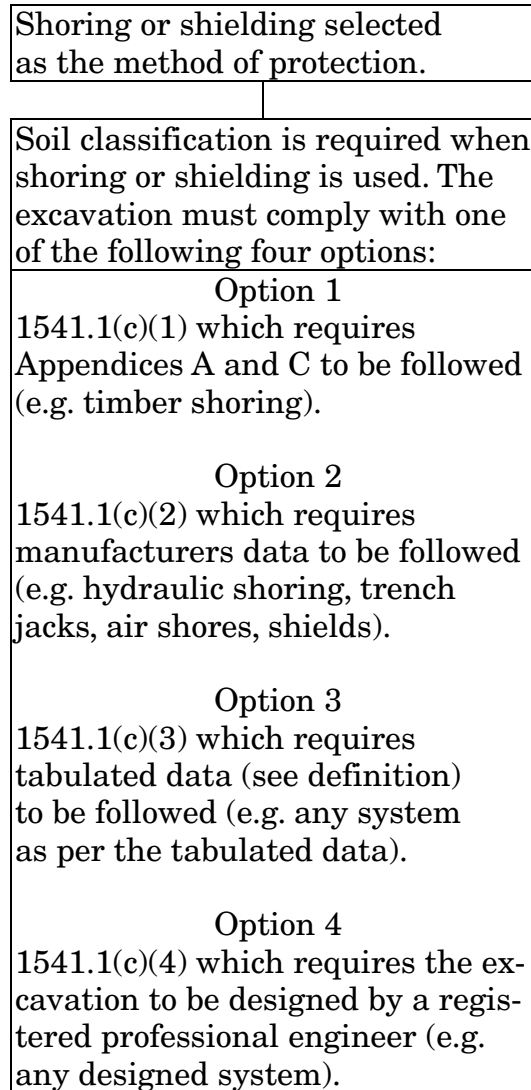


FIGURE 3 – SHORING AND SHIELDING OPTIONS

APPENDIX F

SC SUPERIOR COURT
 191 N FIRST STREET
 SAN JOSE, CA 95113
PEOPLE VS. DAN LUO
L.K.A. 47687 MARDIS ST 6
 FREMONT, CA 94539
JUDGE HON. WILLIAM J. MONAHAN
REPORTER Heather Gorley
DEF. ATTY. THOMASON, MARLEN(G)
CHARGES F(001)PC192(B)
 F(003)LC6425(A)

CASE NO. 214054
C: **CEN** 14519136
DATE 07/31/2015 10:00 AM **DEPT.** 16
 06/11/1978 CAD3220013 CDY BK:N
CLERK I. Hernandez ECZ139 M
HEARING HEARING ON MOTIONS
AGENCY SJ-43100- -
STATUS O-BB -50000/477644 **TW** N
APO
 D.A. Bud Porter
 F(002)LC6425(A)
 F(004)LC6425(A)
VIOLATION DATE
 08/15/2011

NEXT APPEARANCE

☒ Defendant Present ☐ Not Present ☒ Atty Present AR AD/PD/IDO/Special App
☐ An'd ☐ Adv ☐ Arr Wav ☐ Amend Comp/Info ☐ Arr ☐ Plea ☐ IDC ☐ PTC ☐ Prob/Sent ☒ Interpreter Mandarin- ☐ Sworn
☐ PC977 ☐ Filed ☐ On File ☐ Reprtr. Adv/Wav ☐ Bail/OR/SORP ☐ Rect Dr Rpt ☐ FAR/ERC Rebecca Chau am/Barry Lynn pm
☐ NG ☐ Entered by CRT ☐ NGBRI/Adv ☐ PSet ☐ Prelim ☐ Readiness ☐ S/B MTC ☐ Bail Apply ☐ Balance Exonerated
☐ Denies Priors/Allegations/Enhancements/Refusal ☐ Further ☐ Jury ☐ CT ☐ Peo/Def Wav Jury ☒ Bail Exonerated] ☐ Forfeited
☐ TW ☐ TNW ☐ TW/WD ☒ TW Sentence ☐ Ref'd Bond #
☐ Ref/Appt PD/ADO/IDO ☐ Con Decl ☐ Adm A/F ☐ APO/DADS/Prop 36 ☐ P36 Re-Assm't ☐ Reassumption Filed ☐ Forfeiture
☐ Relieved Appt'd ☐ [Illegible] Susp ☐ Rein ☐ Status Hrg ☐ Set Aside ☐ [Illegible] ☐ \$
☒ Hrg on Motion Bail Pending Appeal ☐ [Illegible] PC 1368 ☐ Costs Within 30 Days to Court
☐ Granted ☒ Denied ☐ Submitted ☐ Off Cal ☐ Subm on Report ☐ Found ☐ SORP/OR ☐ Revoked ☐ Reinstated
☐ Stip to Comm ☐ Drs. Appointed ☐ Max Term ☐ Committed ☐ May Post & Forfeit
☐ Prelim Wav ☐ Certified to General Jurisdiction ☐ MDA/COM Amended to ☐ BW Ordered \$ ☐ Stayed
☐ Amended to ☐ (M) VC12500(a)/VC23103(a) Deft's passport to remain w/Prob. until ☐ [Illegible]
PLEA Conditions: sentence complete ☐ No Cite Release/SCIT
☐ None ☐ No State Prison ☐ PC17 after ☐ Pur VC23103.5 ☐ DA Stmt Filed ☐ No Request ☐ Cash Only
 1 Yr Prob ☐ Includes VOP ☐ [Illegible]P. 47 ☐ BW Set Aside ☐ Recalled ☐ Filed
☐ ~~Jail/Prison Term of~~ ☐ Add to Cal ☐ Vacate [Illegible] date ☐ Proof of
☐ ~~Dismissal/Striking~~ This sentence is prison prior. ☐ Subm time of Sent ☐ Harvey Stip
☐ Adv Max Pen/Parole/Prob/Immig/Appeal ☐ Reg HS11590/PC290/PC457.1/PC166.30 ☐ FSF ☐ Fines/Fees
☒ [PC29800]29805/[30305]/666/VC14607.8

☐ Wav Right to ☐ Counsel ☐ Court/Jury Trial ☐ Subpoena/Confront/Examine Witnesses ☐ Self-Incrimination ☐ Written Waiver
 filed ☐ Plea/Absentia filed ☐ COP ☐ GUILTY ☐ NOLO CONTENDERE to charges & admits enhancements/allegations/priors
☐ PC17 ☐ Arbuckle ☐ Factual Basis found ☐ Findings stated ☐ Prop 36 Granted/Unamenable/Refused/Term ☐ DEJ Eligibility
 Filed ☐ DEJ Granted/Rein/Term Fee \$_____ ☐ Guilty Plea Rendered ☐ Waives Referral ☐ APO Full Rpt ☐ CR110 Issued
 Fines/Fees **Pay to:** ☒ DOR ☐ Traffic ☐ Court ☐ Today ☐ Audit # _____
☐ Sent Suspended _____ ☒ **PROBATION DENIED**

PROBATION ☐ Execution ☐ Imposition of sentence suspended for probation period ☐ COURT ☐ FORMAL PROBATION
 GRANTED for _____ Days/Mos/Yrs ☐ Report to APO within _____ Days ☐ Terminated ☐ Upon Release ☐ Perform _____ Hrs
 Volunteer Work as directed PO/SAP ☐ in lieu of fine/jail ☐ Not drive w/o valid DL & Ins ☐ Adv VC23600 ☐ HTO ☐ Re-refer
☐ MOP ☐ FOP ☐ 12 hrs ☐ 3 mos ☐ 9 mos Enroll within _____ days ☐ DL Susp/Restr'd/Rvk'd for _____ ☐ IID Not/Ordered/Rmv'd
 Term _____ Yrs ☐ No contact with victim or family/co-defts unless appr by APO ☐ PC1202.05 ☐ DVPO issued/mod/term'd
 Exp _____ ☐ Victim Present ☐ No Contact ☐ Peaceful Contact ☐ DSA thru APO/DOR/CRT ☐ Filed
☒ Not own/possess deadly weapons ☐ Destroy/return weapon _____ ☐ Stay away from _____
☐ Submit Search/Testing ☐ Educ/Voc Trng/Empl ☐ No alcohol/drugs or where sold ☐ Substance Abuse, Psych, Theft,
 Anger Mgmt, DV, Parenting cnsl/prgm ☒ PC296 (DNA) ☐ PC1202.1 HIV Test/Education

VOP: ☐ Wav ☐ Arr'd _____ ☐ Admits/Denies Viol ☐ Court Finds VOP/No VOP Prob Rein/Mod/Term'd/Revoked/Remains
 Revoked/Ext to _____
☐ Original Terms & Conditions Except as Amended herein ☐ Co-terminous with _____ ☐ No Further Penalties/Reviews
 Other: Notice of Appeal filed in crt today.

COUNT_____	\$_____	+	PA \$_____	☐ Purs HS11350d
COUNT_____	\$_____	+	PA \$_____	☐ PC290.3
AIDS/CPD	\$_____	+	PA \$_____	SORP _____
DPF	\$_____	+	PA \$_____	EMAT \$_____
LAB	\$_____	+	PA \$_____	
DRP/[RF]	\$ 480		Add'l RF \$_____	Susp'd PC1202 [illegible]
AEF	\$_____		Original Fine \$_____	
SECA/GORA	\$ 160		CTS PC2900.5	\$ _____
ICMF	\$ 120		TOTAL DUE	\$ _____
ICIN	\$_____		Payments Granted/Modified	
AR	\$_____		\$_____/Mo beginning _____	
SHELTER	\$_____		FINE STAYED _____	
DV	\$_____		Committed @ \$_____/day	☐ May Pay Out
ATTY	\$_____		Consec/Conc to _____	
ASF\$25/CPF\$10	\$_____		Fine/Fees ☐ Deemed Satisfied ☐ Commuted	
P/INVEST	\$_____		☐ P/SUP \$_____/Mo ☐ Waived	

CJAF \$129.75/\$259.50 \$_____ ☐ Addt'l Fees Waived
☐ SECA, ICMF, ICIN, CJAF, PINVEST, PSUP FEES NOT COND. OF PROB
☒ Restit ☒ Gen \$_____ to _____
☒ As determined by APO/Court ☐ Referred to VWAC ☐ Collect Civilly

JAIL/PRISON ☐ See Attachm't Pg ☐ CDCR/Parole collect restit from Def's earnings ☐ Blended Sentence

Count	F/M	Violation	Prison Term/Yrs	Enhancement/Priors	Yrs/Styd/Strkn	Count Jail HRS/DAYS/MOS
1	F	PC192(B)	(L) 2 yrs			
2	F	LC6425(A)	(L) 16 mos – stay purs. PC 654			
3	F	LC6425(A)	(L) 16 mos – stay purs. PC 654			
4	F	LC6425(A)	(L) 16 mos – stay purs. PC 654			

Enhancement Yrs/S Enhancement Yrs/S Enhancement Yrs/S Enhancement Yrs/S Enhancement Yrs/S Total

Crt not making recommendation but deft allowed to apply for all programs

CTS = 1 **ACT** + 0 ☒ 4019 ☒ 1/2 ☐ 1/3 ☐ PC2933.1 1 Total Total term 2 yrs ~~ODOR~~/[PC 1170h]
☒ Straight time ☐ In Camp ☐ WWP ☐ PC1209 Fees ☐ Waived ☐ Court Rec _____ All/Except ☐ EMP/PSP/ERP/DRP/Co Parole/NP _____
☐ Sent Deemed Srv'd ☐ Rpt to Parole/Prob w/in _____ ☒ Adv/CRS _____ Yrs/Mos Parole/MS/PRCS [Appeal] ☐ Consec
☐ Conc to _____
☐ Bal CJ Susp ☐ All but _____ Hrs/Days/Mos ☐ On Cond Complete Residential Treatment Prgm ☐ Serve Consec
MO/TU/WE/TH/FR/SA/SU _____
☐ Pre-process _____ AM/PM ☐ Stay/Surrender/Transport to _____ @ _____ AM/PM or Sooner

☐ REMANDED-BAIL \$ _____ ☐ REMAIN AS SET ☐ NO BAIL ☒ COMMITTED ☐ RELEASED ☐ OR ☐ SORP ☐ JAC
PHONE ASSM'T ☐ P36 ☐ AS COND OF SORP ☐ BAIL INCREASED/REDUCED ☐ TO PRGM AS REC BY JAC DOC TO
ARRANGE TRANSPORT UPON AVAIL BED