

Federal Railroad Administration



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Text in italic font of this manual is regulatory language, whereas indented paragraphs provide field guidance for FRA inspectors. Indented paragraphs are not to be construed as regulatory language in any manner.

CHAPTER 2

Bridge Worker Safety Standards

Introduction

On January 30, 1991, FRA published a Notice of Proposed Rulemaking on Bridge Worker Safety Standards (56 FR 3434) (“NPRM”) that set forth proposals to address those hazards encountered by railroad bridge employees. The proposal included standards for fall protection, personal protective equipment, and contingencies for working over or adjacent to water. As noted in the preamble of the NPRM, pertinent, applicable regulations promulgated by the Occupational Safety and Health Administration (“OSHA”) existed, but confusion concerning the authority and enforcement of those standards was prevalent. FRA determined that the safety interests of railroad employees would best be served through a regulatory program of its own.

The Final Rule was published on June 24, 1992 (57 FR 28116), and further refinements were made by various interim final rules and final rules. See 59 FR 30879 (June 16, 1994), 67 FR 1903 (January 15, 2002), 67 FR 11055 (March 12, 2002), 70 FR 7047 (February 10, 2005), and 70 FR 43325 (July 27, 2005). The rule sets forth a comprehensive regulatory program to address and reduce the exposure to risk faced by those who work on railroad bridges, including personal fall arrest systems, safety nets, standards for scaffolding, contingencies for working over or adjacent to water, and head, eye, face, and foot protection.

These regulations follow the guidelines set forth by OSHA’s construction and general industry standards. There are several reasons for this. Because many of OSHA’s existing regulations would no longer apply to railroad employees after the effective date of this rule, FRA necessarily made every attempt to ensure that the rule would not encompass safety rules that would in any way diminish the protection bridge workers were afforded under OSHA’s authority. As OSHA’s primary mission involves developing industry and construction work practices that will decrease or prevent occupational hazards, many federal agencies and manufacturers rely on OSHA’s research abilities and expertise in formulating procedural guidelines and performance criteria that reduce exposure to the risk of injury in the workplace. Thus, in writing this regulation, FRA relied both on OSHA’s greater expertise in occupational health and safety and on FRA’s own expertise in railroad safety.

The Rule addresses a broad range of safety concerns that confront railroad bridge workers. However, where additional working conditions exist that are not addressed in this rulemaking, such as exposure to lead, respiratory, hearing and welding protection, or hazard communication standards, the OSHA regulations that address these subject areas apply.

FRA’s Policy Statement (43 FR 10583, March 14, 1978) set forth which Federal agency would maintain authority to regulate workplace safety hazards for railroad employees. OSHA, long recognized as the agency expert in occupational health issues, would cover those areas that required health-related expertise, and FRA would maintain primary authority to address safety issues intrinsic to the railroad environment. Welding protective equipment and lead exposure standards fall within those areas requiring extensive health-based expertise and are therefore, best regulated by OSHA. Thus, FRA defers to OSHA’s existing authority with respect to these issues, but with publication of this final rule asserts authority over the personal safety issues addressed by Part 214 that can be readily included in routine FRA inspections for fall protection.

Section and Guidance

§ 214.101 Purpose and scope

101(a) The purpose of this subpart is to prevent accidents and casualties arising from the performance of work on railroad bridges.

101(b) This subpart prescribes minimum railroad safety rules for railroad employees performing work on bridges. Each railroad and railroad contractor may prescribe additional or more stringent operating rules, safety rules, and other special instructions not inconsistent with this subpart.

Guidance. This section contains statements of general application. A separate section, [§ 214.103](#), is set aside for the height threshold and exceptions to the fall protection requirements. Use of “minimum railroad safety rules” in paragraph (b) reflects traditional regulatory language. This terminology encourages railroads and their contractors to revise or improve these standards and employee safety as new technology and information become available, so long as this is done without contradicting the standards in this rule.

101(c) These provisions apply to all railroad employees, railroads, and railroad contractors performing work on railroad bridges.

101(d) Any working conditions involving the protection of railroad employees working on railroad bridges not within the subject matter addressed by this chapter, including respiratory protection, hazard communication, hearing protection, welding and lead exposure standards, shall be governed by the regulations of the U.S. Department of Labor, Occupational Safety and Health Administration.

Guidance. Paragraph (d) discusses the complementary jurisdiction of FRA and OSHA with respect to occupational hazards in the railroad workplace. Paragraph (d) states that any working conditions involving the protection of railroad employees working on railroad bridges not within the subject matter addressed by the regulations found in Chapter II of title 49 of the Code of Federal Regulations (i.e., all railroad safety regulations), including respiratory protection, hazard communications, hearing protection, welding and lead exposure standards, is governed by OSHA’s regulations. This language reiterates the jurisdictional delineations that were set forth in FRA’s 1978 Policy Statement (43 FR 10583), and provides additional clarity for employees and railroads who must comply with Federal regulations.

§ 214.103 Fall protection, generally

103(a) Except as provided in paragraphs (b) through (d) of this section, when employees work twelve feet or more above the ground or water surface, they shall be provided and shall use a personal fall arrest system or safety net system. All fall protection systems required by this section shall conform to the standards set forth in § 214.105 of this Subpart.

Guidance. Either a personal fall arrest system or a safety net system must be provided and used where employees are working twelve or more feet above the ground or water surface. Three exceptions to this requirement follow in paragraphs (b) - (d).

The twelve-foot standard best provides necessary fall protection for railroad bridge employees. Unlike traditional building construction sites where the point of attachment for a fall arrest system is overhead, the configuration of most railroad bridges would require that the point of attachment be at foot-level or would require installation of superstructure at considerable risk to those performing that work. Most railroad bridges do not have secure

structures above the rails that would support such attachment. A standard six-foot lanyard attached at the rail on one end and to the body harness on the other would allow an employee who is standing and walking very little movement while working on the bridge. To the extent work is rendered impractical or significant discomfort or annoyance is caused to the wearer, compliance would likely have suffered, and it is possible that any habit of non-compliance could have been carried over to work at greater heights. Thus, FRA rejected the six-foot standard and adopted the twelve-foot standard that is currently in the rule.

When a standard fall arrest system is engaged, the length of an extended lanyard and deceleration device totals approximately 9 ½ feet. If the surface below is not farther from the working surface than 9 ½ feet, and if the protective device is attached at the rail on the side of the bridge being worked on, an employee would hit the ground or water surface below before the system begins to arrest the fall. A possible alternative to this scenario would be to attach the system to the opposite side of the bridge being worked on, which would take up approximately four feet of the lanyard length. However, this would greatly restrict the movement of the employee and would introduce tripping hazards that do not otherwise exist. With the low likelihood of serious injury from short falls and the sharply increased risk of injury from tripping over lanyards strung along a bridge surface, FRA believes employees are safer on railroad bridges at low heights without personal fall arrest systems.

Given that the length of the fully engaged fall arrest system itself is close to ten feet, and that the length of the legs and torso that would hang below the body harness must also be considered, a twelve-foot standard provides the safest and most practical height threshold for fall protection devices.

Safety nets are an alternative to the body harness and lanyard system, but are nearly impossible to install effectively at a height of less than twelve feet, given the distance a body would deflect the net upon contact.

Paragraph (a) permits selection of the appropriate fall protection, either a fall arrest system or safety nets, by the railroad or railroad contractor. This approach is particularly advantageous in the railroad environment. Where railroad bridge configurations make nets impossible, or where the exposure to risk is of minimal duration, the personal fall arrest system can be used. However, where a major renovation that may go on for months is undertaken, nets can be chosen. If chosen, nets must be installed at the same height threshold as personal fall arrest devices.

Portable ladders used in conjunction with railroad bridge work present a fall hazard. Therefore, bridge workers are subject to the same fall protection requirements when climbing a ladder to access a location on a bridge as they would be when working on a railroad bridge. For example, if during the climb a worker's feet will be twelve or more feet above the ground, a personal fall arrest system must be used.

Permanent ladders attached to bridge superstructures or substructures present another fall hazard. Unlike OSHA regulations, FRA does not recognize ladder cages or wells to be a compliant form of fall protection under this Subpart. Therefore, if a bridge worker will exceed a height of twelve feet while climbing a fixed ladder, a personal fall arrest system must be used regardless of whether the ladder is equipped with a cage.

Guidance regarding use of fall restraint systems

FRA has received inquiries regarding whether a fall restraint system can be used in lieu of a fall arrest system, even though the regulation does not have any particular provisions allowing for this substitution. In considering these inquiries, FRA recognizes that a properly arranged restraining system, such as short lanyards that hold the worker away from the edge of a bridge deck, eliminates the possibility of a fall. As with fall arrest systems, a fall restraint system is not suitable if care is not taken with setting up the system. For example, where harnesses, lanyards, and similar devices are used for fall restraint, FRA can only endorse the use of equipment suitable for fall arrest systems. FRA is concerned that if non-standard equipment is used for fall restraint, the potential is great that it might be mixed with fall arrest equipment, with undesirable results.

Under some conditions, it is possible that a properly arranged restraining system can provide at least the equivalent level of safety as a properly arranged fall arrest system. For this reason, until a regulatory change can be made to address potential requirements for fall restraint systems, FRA will exercise discretion and not seek to take enforcement action against any person who complies with the following guidance and conditions when using a fall restraint system.

In order for a fall restraint system to satisfy the definition of the term personal fall arrest system, the following conditions, actions, and components must be present:

1. All fall restraint system components shall meet the requirements for components of a personal fall arrest system, as set forth in [§ 214.105](#). This is necessary to ensure that no substandard components find their way into personal fall arrest systems through error or misunderstanding.
2. All bridge workers using fall restraint shall be trained in its proper use.
3. All fall restraint system procedures shall be followed at all times in order to eliminate the possibility of a fall. In order to be considered effective and thereby allow fall restraint in place of fall arrest, these procedures must prevent a bridge worker from reaching an edge or opening where they could fall.
4. On a bridge deck with no handrails, walkways or roadways as described in [§214.103\(c\)](#), the protected person shall use a double lanyard, with one lanyard attached to each rail or equivalent anchorage. On a bridge deck with one roadway or handrail and walkway, the protected person will attach the lanyard to the rail nearest to the handrail and walkway or roadway.

103(b)(1) This section shall not apply if the installation of the fall arrest system poses a greater risk than the work to be performed. In any action brought by FRA to enforce the fall protection requirements, the railroad or railroad contractor shall have the burden of proving that the installation of such device poses greater exposure to risk than performance of the work itself.

Guidance. Paragraph (b)(1) of this section states that the fall protection requirements shall not apply if installation of the system poses greater risk than performing work without fall protection. The railroad or contractor has the burden of showing this in any action brought by FRA to enforce the fall protection requirements. In other words, once FRA had demonstrated the absence of fall protection in a situation where it would normally be required, the burden would shift to the railroad to justify its absence by demonstrating that it properly determined that installation posed a greater risk.

The term “installation” applies to the process of setting up a fall arrest system, up to and

including the act of the individual hooking the personal fall arrest lanyard to a lifeline or point of anchorage. This provision will often be applied by bridge inspectors who have training and experience in moving on or about bridges to locations not usually occupied by maintenance employees.

The question of “greater risk” is relative, and should account for the risk inherent in the work being performed, the training and experience of the person conducting the work, and the factors upon which that person’s decision was based. For instance, if the decision was based upon a directive from a supervisor to work without protection in a place where the employee had properly determined that protection should be used, the railroad or contractor would carry a heavy burden to prove that this provision applied.

Likewise, the employee’s decision should not be based upon a requirement to accomplish a mission for which the employer did not provide the proper equipment. An employee with equipment available for use who rationally decides that it would be safer to work without installing the equipment is much more justified in doing so than an employee who was not furnished with the proper fall protection equipment at all.

103(b)(2) This section shall not apply to bridge workers engaged in inspection of railroad bridges conducted in full compliance with the following conditions:

(i) The railroad or railroad contractor has a written program in place that requires training in, adherence to, and use of safe procedures associated with climbing techniques and procedures to be used;

(ii) The bridge worker to whom this exception applies has been trained and qualified according to that program to perform bridge inspections, has been previously and voluntarily designated to perform inspections under the provisions of that program, and has accepted the designation;

(iii) The bridge worker to whom this exception applies is familiar with the appropriate climbing techniques associated with all bridge structures the bridge worker is responsible for inspecting;

(iv) The bridge worker to whom this exception applies is engaged solely in moving on or about the bridge or observing, measuring, and recording the dimensions and condition of the bridge and its components; and

(v) The bridge worker to whom this section applies is provided all equipment necessary to meet the needs of safety, including any specialized alternative systems required.

Guidance. Paragraph (b)(2) was added in the 1994 amendment to permit qualified, designated bridge inspectors to perform their work in the manner in which they have been trained without a regulatory requirement to use fall protection while inspecting. The rule requires a formal, written program for training and designation of bridge inspectors, and for safe procedures to be used by inspectors in accordance with their training and abilities.

Designation as a bridge inspector must be voluntary on the part of the employee. The employee must be free to use trained judgment as to procedures for inspecting a bridge. That judgment must be based upon the situation at hand, and not upon the failure of the employer or the employee to have safety equipment available for use should such equipment be necessary for safety.

This paragraph applies only while the employee is moving on the bridge, observing, measuring and recording. In other words, the employee must be able to devote full attention to maintaining a safe position on the bridge while moving, or to take a position that will permit safe performance of inspection functions. While working under the provisions of

this paragraph, FRA does not intend for the prompt rescue provisions of [§ 214.105\(a\)\(6\)](#) to be triggered by an inspector tying off in order to safely conduct bridge inspection activities.

103(c) This section shall not apply where employees are working on a railroad bridge equipped with walkways and railings of sufficient height, width, and strength to prevent a fall, so long as bridge workers do not work beyond the railings, over the side of the bridge, on ladders or other elevation devices, or where gaps or holes exist through which a body could fall. Where used in place of fall protection as provided for in § 214.105, this paragraph (c) is satisfied by:

(1) Walkways and railings meeting standards set forth in the American Railway Engineering Association's Manual for Railway Engineering; and

(2) Roadways attached to railroad bridges, provided that bridge workers on the roadway deck work or move at a distance six feet or more from the edge of the roadway deck, or from an opening through which a person could fall.

Guidance. Paragraph (c) concerning walkways and railings states that fall protection is not required where stable walkways and railings are present, so long as employees do not work beyond the railings, over the side of the bridge, on ladders or other elevation devices, or where large holes exist. If the handrail or walkway is deteriorated to the point that it does not retain the capacity to resist loads or is otherwise compromised so that it cannot maintain its proper position, it does not comply with this requirement. Death and significant injuries have occurred when bridge workers have stepped on walkway grating that was not adequately supported or secured and the grating tipped or shifted allowing the worker to fall to a lower level, water or the ground. Accidents are more prevalent when individual sections of unsecured grating are not full length (20 – 24 foot long) sections, but are found in much shorter sections that are more prone to tip when a person steps onto one end. In these cases, inadequate support or securement results in a walkway lacking sufficient strength or stability to be relied upon as an alternative to fall protection. FRA has no tolerance for any bridge gang, supervisor, or manager that allows workers to walk on unsecured walkways of any length without a personal fall arrest or safety net system.

The rule states that the walkways must be of sufficient height, width, and strength to prevent an employee fall. This language provides pertinent guidance to railroads, contractors, and employees as to what constitutes “secure” walkways and railings.

Consideration should be given in situations where the walkway surface is substantially lower than the track structure as may occur on ballast deck bridges when the track has been raised and the walkway left at its original elevation. Under such circumstances, the typical railing height measured from the walkway may be insufficient to provide fall protection unless the horizontal distance from the work area to the railing is great enough to prevent a bridge worker that trips or stumbles while at track level from pitching over the railing.

Paragraph (c)(1) states that walkways and railings that meet the standards set forth in the American Railway Engineering Association's (AREA) Manual for Railway Engineering will satisfy this subsection. This does not limit the design to those found in the manual, but permits the use of a design that meets the same functional requirements. It should be noted that while the regulation refers to the American Railway Engineering Association (AREA), the name of this organization was changed to the American Railway Engineering and Maintenance-of-Way Association (AREMA) in 1997 upon the merger of AREA with two other railroad engineering support organizations. Therefore reference should be

made to the AREMA Manual for Railway Engineering to determine appropriate walkway and railing standards.

The regulation does not specify a minimum railing height but only requires that railings possess sufficient height and strength to prevent a fall. Depending on which chapter of the AREMA Manual is consulted, the minimum railing height varies from 33 inches to 42 inches above the walkway surface. Railings with a height between 33 and 39 inches may not be sufficient to provide adequate fall protection and should be analyzed on a case by case basis. Railings with a height of less than 33 inches are clearly inadequate and do not meet the requirements of [§ 214.103\(c\)](#).

Portable handrails that meet the AREMA standards, and which are attached at or within the edge of the bridge surface so that the bridge surface forms the walkway, are acceptable for this purpose if the bridge surface itself meets the strength and dimension requirements of a walkway. The surface need not be specially designed as a walkway but it must safely perform the function.

Paragraph (c)(2) was added in the 1994 amendment to permit work to be performed where a roadway attached to a bridge would protect persons on the bridge from falling over the side.

It is intended that persons should remain 6 feet from the side or edge of a roadway or the edge of any opening through which a person could fall. This is sufficient to permit one step backward and a fall to the surface without going over the side or through the opening.

103(d) This section shall not apply where bridge workers are performing repairs or inspections of a minor nature that are completed by working exclusively between the outside rails, including, but not limited to, routine welding, spiking, anchoring, spot surfacing, and joint bolt replacement.

Guidance. This paragraph permits an exception to fall protection when employees are performing minor repairs in any discipline, or are doing inspections, so long as those activities can be accomplished by working exclusively between the outside rails of the bridge. The outside rails are those which carry the wheels of railroad cars and locomotives, not the planks or straps located on the outer ends of bridge ties, sometimes called “outer guard rails.” Furthermore, FRA considers “working exclusively between the outside rails” to mean that the work surface and therefore the weight bearing portions of the employee are located approximately between the top of tie and the top of rail. For example, if a bridge worker is accessing or located in the bed of a truck located on a bridge, this exception does not apply and fall protection must be used.

An employee working between two tracks on a multiple-track bridge would come within this exception, so long as there are no gaps in the area between the rails through which a person could fall. The rails may be those of an abandoned track if they are in their original position.

The term “exclusively” further defines those activities that will be categorized as “minor,” and therefore truly merit being accomplished without fall protection of any sort. Given the obvious risks inherent in working without fall protection, this exception will be enforced as literally and narrowly as possible. Therefore, if an activity involves movement requiring one to stand or travel with one or more weight-bearing portions of the body beyond the boundaries of the rails, no matter how slight the duration, fall protection must be provided.

Replacing ties on the bridge would not constitute repairs of a minor nature that can be

completed exclusively between the rails. Walking between the rails on the bridge to visually inspect the ties would come within the exception in this section. Walking between the rails from one work location to another is generally permissible, as is standing between the rails while not actually engaged in the work.

This section has led to a considerable amount of discussion because of its obvious convenient use, under certain circumstances, to permit work without use of fall protection equipment. The two paragraphs above are taken from the preamble of the original rule as published in the Federal Register. The statement that “Given the obvious risks inherent in working without fall protection, this exception will be enforced as literally and narrowly as possible” was published as a clear statement of FRA policy at that time, and that policy has not changed. In addition to replacing bridge ties, FRA does not consider replacing a rail to be work of a minor nature.

The term “weight-bearing portions of the body” can include hands and arms as well as feet and legs. For example, if a person were kneeling with both feet and knees between the rails, the weight-bearing portions of the body would be between the rails. From that position, one could safely insert a bolt through a joint from the gauge to the field side, and hand thread a nut onto the field end of the bolt. However, if the person were to stand, even with both feet between the rails, place a track wrench on the nut and tighten it, the hands and arms would become weight-bearing portions of the body by exerting forces on the wrench, and fall protection would be required.

While this example might sound legalistic, it is actually a practical example of limiting risk. A person kneeling between the rails is very unlikely to fall from the bridge from that position. However, if a track wrench were to slip while the person operating it was off balance, as in reaching across the rail, a fall would be much more likely.

Defect Code: 0103Ai

Failure to provide fall protection.

Discussion: This non-complying condition arises from an overall failure to provide a fall protection system when one is required. Fall protection is required anytime an employee of a railroad or railroad contractor is performing construction, inspection, testing or maintenance of a railroad bridge and the employee is working more than 12 feet above the ground or water surface, unless one of the exceptions in 214.103 (b), (c) or (d) applies.

Distance above the ground or water surface is considered to be the vertical distance from the lowest point on the person's body to the water surface, or the lowest point on the ground to which the person could fall from the work position. Changing water levels, as from tides, will be considered when determining if a point is more than 12 feet above water at the particular time work is being performed.

The duty to provide fall protection rests with the employer of the affected persons. An individual willful violation would result from an individual agent of the employer, such as a supervisor, requiring persons to work without fall protection, after clearly having knowledge that a fall protection system is required.

Defect Code: 0103Aii

Failure to use fall protection.

Discussion: The failure to use a fall protection system implies that a fall arrest system has been properly provided, and an individual employee has failed to make use of the system while in a position in which it is required. This is an individual violation, and as such it must be shown to be willful. A penalty can be assessed against an individual only for a willful violation.

§ 214.105 Fall protection systems standards and practices

Guidance, General. The standards in this section reflect OSHA performance standards in effect when the rule was published. The procedural requirements of this section should be incorporated in the required published procedures and training of each employer.

105(a) General Requirements. All fall protection systems required by this subpart shall conform to the following:

105(a)(1) Fall protection systems shall be used only for personal fall protection.

Guidance. This requirement prohibits the use of fall protection equipment to hoist tools or materials, or to secure items other than persons being protected. The use of fall protection equipment for other purposes renders the equipment susceptible to damage or overloading that would render it incapable of withstanding the loads that would be imposed by arresting the fall of a person.

Defect Code: 0105A1

Fall protection equipment used for other purposes.

Discussion: This non-complying condition is an act that must be witnessed either by the inspector or by a person who provides a proper statement to this effect. Fall protection equipment is designed with marked differences in appearance from materials handling equipment. An inspector finding distinctive fall protection equipment in use for other purposes should not depend upon a statement that the equipment is no longer being used for fall protection. The presence of fall protection equipment that is no longer suitable for use as such at a worksite is extremely hazardous.

105(a)(2) Any fall protection system subjected to impact loading shall be immediately and permanently removed from service unless fully inspected and determined by a competent person to be undamaged and suitable for reuse.

Guidance. An impact loading could result from a fall, or from the system or component being struck by a foreign object while in service. The competent person should be one qualified and designated as such by the employer. Most manufacturers specify that their equipment is no longer certified for service after having arrested a fall unless it is returned to the manufacturer for inspection. A manufacturer of equipment that complies with the standards of this rule may be considered a competent person for compliance with this section.

Defect Code: 0105A2

Failure to remove fall protection equipment from service after impact loading.

Discussion: Fall protection equipment that is unsuited for use must be removed from service in such a manner that it cannot be mistakenly or otherwise used again for fall protection. One effective means of doing so is to permanently mark it as defective and remove it from the job site as soon as possible. A reasonable time frame would be at the conclusion of the work shift.

105(a)(3) All fall protection system components shall be protected from abrasions, corrosion, or any other form of deterioration.

Guidance. Equipment found in service, or available for service, with corrosion or abrasions, for instance, is evidence of failure to comply. Equipment placed where it is

subject to abrasion, for instance a cable lifeline rubbing on the edge of a steel column, is evidence of failure to comply.

Defect Code: 0105A3

Failure to protect fall protection equipment from deterioration.

Discussion: The provider and the user of fall protection equipment are required to protect the equipment from deterioration. It is not necessary to show that actual deterioration has taken place, although that is good evidence of failure to protect. An example would be a lifeline that is being permitted to rub on the sharp edge of a girder. The deterioration might not be immediately visible, but the fact that the lifeline is placed in a position to abrade is failure to protect from deterioration.

105(a)(4) All fall protection system components shall be inspected prior to each use for wear, damage, corrosion, mildew, and other deterioration. Defective components shall be permanently removed from service.

Guidance. The inspection may be performed by the user, provided that necessary training in use and maintenance of the equipment has been provided. Permanently removed from service means marked or placed so that it cannot mistakenly be used by any person for fall protection.

Defect Code: 0105A4i

Failure to inspect fall protection equipment prior to use.

Discussion: It is not simple, without a record-keeping requirement, to prove that a required inspection did not actually take place. However, obvious evidence of deterioration that should not have escaped inspection is evidence of failure to inspect. Other evidence would be a statement from a person who was ordered to use equipment without being given sufficient time to inspect it, or witnessing equipment being removed from a box at the job site and being put into service without inspection.

Defect Code: 0105A4ii

Failure to remove defective fall protection equipment from service.

105(a)(5) Prior to use and after any component or system is changed, bridge workers shall be trained in the application limits of the equipment, proper hook-up, anchoring and tie-off techniques, methods of use, and proper methods of equipment inspection and storage.

Guidance. Proper techniques should correspond with manufacturer's instructions as well as employer policy. Nearly all manufacturers of safety equipment provide comprehensive information and instructions on its proper use. Those instructions are as much a part of the entire system as the equipment itself, and are very specifically directed to the particular manufacturer's devices. An employer's program should specify how this training is to be conducted. A person who depends upon fall protection equipment that is improperly inspected, arranged or used is being placed in a severely hazardous situation.

Defect Code: 0105A5

Failure to train personnel using fall protection equipment.

Discussion: When investigating whether there has been a failure to train personnel, company management should be contacted in writing with a request to supply training records. A failure to supply records in a reasonable amount of time can be described in the violation report narrative, along with a copy of the written request, in lieu of a written statement from the company admitting that the training was not conducted. Although statements from persons who are required to use fall protection equipment that they have not been trained in its use may be included as corroborating evidence of a violation, it

should not be the sole evidence upon which a violation report is based. A violation report may include a report of interview from a supervisor that includes comments regarding what the training program entails. However, if the training program itself is at issue, a copy of the training program should be procured for inclusion with the violation report.

Particular attention should be directed to employees who do not regularly use fall protection equipment, such as trackmen or electricians who only occasionally work on bridges. They are often not as familiar as bridge workers with the necessity for fall protection or how to use the equipment. For instance, it is easier for them to miss out on any training program, and they are often at higher risk simply due to unfamiliarity with working at heights.

105(a)(6) The railroad or railroad contractor shall provide for prompt rescue of bridge workers in the event of a fall.

Guidance. In order to ensure that the employer would be able to provide for prompt rescue “in the event of a fall,” the employer must have the means for rescue in place prior to allowing a bridge worker to work in a situation where fall protection is required and where a fall could occur. In other words, the means for rescue must be in place whether or not a fall has actually occurred.

The means of rescue should be appropriate to the work being performed, and to the fall protection systems in use. If an individual is using a fall arrest system in circumstances in which a fall might occur, then the means must be available to rescue that individual in the event that the fall arrest system is deployed. In other words, if the individual goes over the side, the employer has to be able to get the individual promptly and safely back to the bridge deck or down to the ground.

FRA considers a rescue using a power operated hoist such as a boom truck or a crane to be undesirable due to inherent risk of causing severe personal injury if the person being rescued were to become entangled in or come in contact with the bridge structure and hoisting is not stopped immediately. However, since the rule does not specifically prohibit the use of such equipment, FRA is unable to cite a defect or violation for using or planning to use such equipment should a rescue be needed. When a railroad or railroad contractor relies on such equipment, all employees that might be required to use such hoisting equipment to carry out a rescue must be trained and qualified on the equipment. It is of paramount importance that this training be performed in advance and in a controlled environment so that it is not necessary for rescuers to learn on the fly and risk further injury to a fallen worker.

Self-rescue might be possible in some cases. For instance, an individual climbs a ladder using a vertical lifeline and a rope grab connected to a short lanyard. If the individual should slip and fall, the fall arrest system should bring the individual to the ladder and allow resumption of climbing, at least in the downward direction. In that case, the hazard of not being rescued from a fall would be very slight. Except where a definite known procedure for self-rescue exists, it would be difficult for one individual to perform a self-rescue without another individual being present to assist.

Where properly configured fall restraint is being used, this should be considered in the evaluation of the necessity for a rescue procedure. If the employee is working in a circumstance in which falls are prevented rather than arrested, then the rescue procedure would arguably not be necessary from a safety standpoint. Please see the [guidance](#) under § 214.103(a) for FRA’s position on fall restraint systems.

It is good practice to have means of rapid communication from a worksite to local emergency responders and rescue services, but this should not be considered as the sole

means of rescue, since the responders or rescue services may not arrive promptly enough and may not be trained or equipped for this type of rescue.

Defect Code: 0105A6

Failure to provide for prompt rescue after fall.

Discussion: The responsible person at a job site should be able to explain how the rescue of a fallen person would be accomplished. If the means are not at hand for a prompt rescue, or the persons responsible for accomplishing the rescue are not properly aware of the procedure, then you should provide that information in your inspection report narrative as evidence of non-compliance. Of course, if a person were to actually fall and suffer from not having been promptly rescued, a violation would have occurred.

105(a)(7) Connectors shall have a corrosion-resistant finish, and all surfaces and edges shall be smooth to prevent damage to interfacing parts of the system.

Guidance. Use of (or placing in service) connectors without a corrosion-resistant finish, regardless of whether corrosion is actually present, would be in contravention of this rule. So too would be the use of (or placing in service of) connectors where the corrosion-resistant finish has deteriorated to the point where corrosion is present, as the surface would no longer be smooth. Sharp edges can develop from wear as well as manufacturing flaws, and should be included in inspections. Corrosion weakens the connector. Sharp edges and surfaces can nick or tear other parts connected to them.

Defect Code 0105A7

Failure to use conforming connectors to prevent damage to fall protection equipment.

Discussion: This deficiency would apply where connectors or other components of a fall arrest system did not have a corrosion resistant finish, were corroded, or had sharp edges, or were improperly applied or assembled, resulting in damage or potential damage to the system or its components.

105(a)(8) Connectors shall be drop forged, pressed or formed steel, or made of equivalent- strength materials.

Guidance. Cast material is subject to hidden cracks and flaws, and is not suitable. Connectors will generally be certified by the manufacturer for compliance with corresponding OSHA standards. Connectors found in use that were not designed for fall arrest systems should be investigated further.

Defect Code: 0105A8

Failure to use proper connectors with fall protection equipment.

Discussion: This deficiency would apply where connectors used with fall protection equipment were made of non-conforming material and had either insufficient or unknown capacity.

105(a)(9) Anchorages, including single- and double-head anchors, shall be capable of supporting at least 5,000 pounds per bridge worker attached, or shall be designed, installed, and used under the supervision of a qualified person as part of a complete personal fall protection system that maintains a safety factor of at least two.

Guidance. The strength of lifelines and anchorages is the subject of detailed engineering analysis and design in many cases. The actual loads imposed on each component are highly dependent upon the geometry of the system and the tension applied during installation. In the case of designing, installing, and using anchorages and lifelines,

“under the supervision of a qualified person” means they must be designed, installed, or used by a person who is either under the direct supervision of a qualified engineer, or capable of understanding and installing the system in strict conformance with specifications prepared by a qualified engineer.

Defect Code: 0105A9

Failure to use proper anchorages with fall protection equipment.

Discussion: Some detailed investigation might be required to determine if anchorages in use are proper for the fall protection system in use. However, more obvious non-complying conditions would involve, for instance, lifelines connected to handrails or other lightly constructed bridge members that could not possibly restrain 5,000 pounds per employee attached.

105(b) Personal fall arrest systems. All components of a personal fall arrest system shall conform to the following standards:

105(b)(1) Lanyards and vertical lifelines that tie off one bridge worker shall have a minimum breaking strength of 5,000 pounds.

Guidance. The breaking strength will be stated by the manufacturer of each component. This strength requirement is much greater than the weight of one person in order to accommodate impact loads caused by sudden deceleration at the limit of the fall protection device.

105(b)(2) Self-retracting lifelines and lanyards that automatically limit free fall distance to two feet or less shall have components capable of sustaining a minimum static tensile load of 3,000 pounds applied to the device with the lifeline or lanyard in the fully extended position.

Guidance. The lower strength requirement accommodates the lesser loads imposed by a fall of two feet or less, compared with the maximum permitted by a free-fall system.

105(b)(3) Self-retracting lifelines and lanyards that do not limit free fall distance to two feet or less, ripstitch, and tearing and deformed lanyards shall be capable of withstanding 5,000 pounds applied to the device with the lifeline or lanyard in the fully extended position.

Guidance. These devices must retain the original specified strength when fully extended because of the higher impact of free falls between two and six feet.

105(b)(4) Horizontal lifelines shall be designed, installed, and used under the supervision of a competent person, as part of a complete personal fall arrest system that maintains a safety factor of at least two.

Guidance. In the case of designing, installing, and using horizontal lifelines, “under the supervision of a competent person” means they must be designed, installed, or used by a person who is either under the direct supervision of a qualified engineer, or capable of understanding and installing the system in strict conformance with specifications prepared by a qualified engineer.

105(b)(5) Lifelines shall not be made of natural fiber rope.

Guidance. Natural fiber rope is subject to excessive stretch and hidden damage from abrasion or overstress, and the material is not of sufficient uniformity for use in fall arrest systems. Most lifelines are made of metal wire rope. This provision applies only to lifelines, not lanyards or other components, although natural fiber rope is not the best material for use in any component of a fall protection system.

105(b)(6) Body belts shall not be used as components of personal fall arrest systems.

Guidance. This change was made in the January 15, 2002 Final Rule because it was noted that a body belt does not distribute loads evenly about the body; rather, it concentrates them at the bottom of the rib cage. Even without that impact force, a person hanging from a body belt for more than one minute is in serious jeopardy because of compression of internal organs within the rib cage.

105(b)(7) The personal fall arrest system shall limit the maximum arresting force on a bridge worker to 1,800 pounds when used with a body harness.

Guidance. The body harness, properly connected at the back, distributes loads evenly to the body, and to points of the body more able to withstand the loads.

105(b)(8) The personal fall arrest system shall bring a bridge worker to a complete stop and limit maximum deceleration distance a bridge worker travels to 3.5 feet.

Guidance. This provision places a practical limit on deceleration devices. The maximum free fall distance of 6 feet plus the maximum deceleration distance of 3.5 feet limits travel to 9.5 feet. This includes all possible deflection of lifelines and lanyards from stretching.

105(b)(9) The personal fall arrest system shall have sufficient strength to withstand twice the potential impact energy of a bridge worker free falling a distance of six feet, or the free fall distance permitted by the system, whichever is less.

Guidance. This requirement extends the “factor of safety of two” principle to the fall arrest gear used by the individual.

105(b)(10) The personal fall arrest system shall be arranged so that a bridge worker cannot free fall more than six feet and cannot contact the ground or any lower horizontal surface of the bridge.

Guidance. This rule corresponds to the strength requirement of (b)(9) above, and limits the forces in a fall to those that can be safely withstood by the personal equipment and the individual. The six-foot free fall begins when the individual’s feet leave the surface upon which they were placed, and ends when the deceleration device begins to take effect.

105(b)(11) Personal fall arrest systems shall be worn with the attachment point of the body harness located in the center of the wearer’s back near shoulder level, or above the wearer’s head.

Guidance. Attachment points must be at the rear because front attachment will snap the vertebrae backward, causing severe back injury. The attachment for a body harness must not be situated where it would strike a person in the neck or the back of the head when loaded in a fall.

105(b)(12) When vertical lifelines are used, each bridge worker shall be provided with a separate lifeline.

Guidance. Vertical lifelines are used to permit personnel to work up and down a ladder or vertical surface. They are typically used with devices such as rope grabs to permit vertical movement under control, but to prevent unrestricted fall. If two employees were attached to the same vertical lifeline, falling could well impact the one below, or pull the one above into a fall if the lifeline were to stretch slightly.

105(b)(13) Devices used to connect to a horizontal lifeline that may become a vertical lifeline shall be capable of locking in either direction.

105(b)(14) Dee-rings and snap-hooks shall be capable of sustaining a minimum tensile load of 3,600 pounds without cracking, breaking, or taking permanent deformation.

Guidance. This provision effectively sets a minimum strength limit for the elastic behavior or yield point of dee-rings and snap-hooks.

105(b)(15) Dee-rings and snap-hooks shall be capable of sustaining a minimum tensile load of 5,000 pounds.

Guidance. This requirement effectively sets an ultimate strength limit for dee-rings and snap-hooks. Manufacturers will state the strength of these components, or will state compliance with OSHA or ANSI standards that incorporate these same requirements. For snap-hooks, this minimum strength is measured while loading the throat of the hook, not the gate.

105(b)(16) Snap-hooks shall not be connected to each other.

105(b)(17) Snap-hooks shall be dimensionally compatible with the member to which they are connected to prevent unintentional disengagement, or shall be a locking snap-hook designed to prevent unintentional disengagement.

Guidance. The snap-hook referred to in the regulation as a “locking snap-hook” is typically called a “double locking snap-hook” in the industry. Snap-hooks without the locking feature are subject to unintentional disengagement. A typical situation is termed “roll out” in which the rope to which a snap-hook is attached is doubled back around the snap or gate and pulled into the hook through the gate opening. The rope then totally disengages from the snap-hook.

105(b)(18) Unless of a locking type, snap-hooks shall not be engaged: (i) Directly next to webbing, rope, or wire rope;

(ii) To each other;

(iii) To a dee-ring to which another snap-hook or other connector is attached;

(iv) To a horizontal lifeline; or

(v) To any object that is incompatibly shaped or dimensioned in relation to the snap-hook so that unintentional disengagement could occur.

Guidance. This section effectively limits the use of non-locking snap-hooks to circumstances in which the snap-hook is connected to a device that is specifically designed to restrict its unintentional release. One such dimensionally compatible combination is one in which the diameter of the dee-ring to which a snap-hook is attached is greater than the inside length of the snap-hook measured from the bottom (hinged end) of the snap-hook keeper to the inside curve of the top of the snap-hook, so that no matter how the dee-ring is positioned or moves (rolls) with the snap-hook attached, the dee-ring cannot touch the outside of the keeper so as to depress it open. This section effectively prohibits the use of non-locking snap-hooks to connect personal fall arrest systems to lifelines or common structural members.

Defect Code: 0105B

Failure to provide or use conforming equipment in a personal fall arrest system.

Discussion: The high level of detail in this section makes it impractical to provide a separate defect code for every deficiency variation that might be found. The nature of each deficiency written should be indicated on the inspection report.

105(c) Safety net systems. Use of safety net systems shall conform to the following standards and practices:

Guidance. The installation and maintenance of safety nets is a highly specialized function. Typically, the work will be performed either by contractors or railroad personnel who specialize in this work. The qualified persons who install a net should either provide the continued inspection and maintenance services, or should provide detailed instructions on the use, inspection and maintenance of that particular net installation, available for reference at the job site.

A fall of more than 30 feet to a safety net can be hazardous. A net does not qualify as a fall protection system for personnel working more than 30 feet above it, or without a clear fall path from the worksite to the net. Those employees would require personal fall arrest systems. Others, working less than 30 feet above the net with an unobstructed fall path, could still be protected by the net.

105(c)(1) Safety nets shall be installed as close as practicable under the walking/working surface on which employees are working, but shall not be installed more than 30 feet below such surface.

Defect Code: 0105C1

Excessive distance from working surface to safety net.

Discussion: Safety nets are included as one acceptable means of fall protection, as long as the protected employees are within range of the protection of the net, and the net complies in all respects with the regulation. The proper deficiency codes to use in situations involving nets should be selected according to the hazard presented to the largest number of persons. For instance, if a group of ten persons were working twelve feet above a good net, and one person were climbing forty feet above the net, the circumstance would best be described by 0105C2 (below) to describe the situation of the one person. However, if a group was working 37 feet over a net, and the person in charge stated that the net was providing fall protection, then 0105C1 would be a proper defect code.

105(c)(2) If the distance from the working surface to the net exceeds 30 feet, employees shall be protected by personal fall arrest systems.

Defect Code: 0105C2

Failure to provide a personal fall arrest system for person working more than 30 feet above safety net.

Discussion: This defect code should be used where a person is working more than 30 feet above a net without any other fall protection being provided. It describes the situation in more detail than would 0103Ai - Failure to provide fall protection. However, if the system were provided but not used, the proper code would be 0103Aii - Failure to use fall protection.

105(c)(3) The safety net shall be installed such that any fall from the working surface to the net is unobstructed.

Defect Code: 0105C3

Failure to provide for unobstructed fall to net.

Discussion: Obviously, a falling person who strikes a solid object before landing in a safety net is at risk of serious injury. If areas exist on a job site where the path of a fall to a net is obstructed, persons working in those areas must use some other means of fall protection that will keep them away from the obstruction in case of a fall.

105(c)(4) Except as provided in this subsection, safety nets and net installations shall be drop- tested at the jobsite after initial installation and before being used as a fall protection system, whenever relocated, after major repair, and at six-month intervals if left in one place.

The drop- test shall consist of a 400-pound bag of sand 30 inches, plus or minus two inches, in diameter dropped into the net from the highest (but not less than 3½ feet) working surface on which bridge workers are to be protected.

105(c)(4)(i) When the railroad or railroad contractor demonstrates that a drop-test is not feasible and, as a result, the test is not performed, the railroad or railroad contractor, or designated competent person, shall certify that the net and its installation are in compliance with the provisions of this section by preparing a certification record prior to use of the net.

Guidance. An example of circumstances in which a drop test is not feasible would be a net placed above a public thoroughfare where the test could endanger the public below.

105(c)(4)(ii) The certification shall include an identification of the net, the date it was determined that the net was in compliance with this section, and the signature of the person making this determination. Such person's signature shall certify that the net and its installation are in compliance with this section. The most recent certification for each net installation shall be available at the jobsite where the subject net is located.

Defect Code: 0105C4

Failure to test or provide certification that the safety net and its installation are in compliance.

Discussion: Absence of either a record of test, or certification of a net system without test, is evidence of noncompliance.

105(c)(5) Safety nets and their installations shall be capable of absorbing an impact force equal to that produced by the drop test specified in this section.

Guidance. If the drop test fails, the net has failed this section. All of the equipment and components of the net installation must be individually capable of withstanding the loads produced by the specified drop test.

Defect Code: 0105C5

Use of safety net and installation not capable of absorbing specified impact force.

Discussion: A net system is no stronger than its weakest component. If any component is incapable of withstanding the loads of the drop test, then that component constitutes improper equipment.

105(c)(6) The safety net shall be installed such that there is no contact with surfaces or structures below the net when subjected to an impact force equal to the drop test specified in this section.

Guidance. The net must not contact a surface or structure at any point after that point has been deflected the same amount as that demonstrated in the drop test. The drop test need not be made at the point of potential contact in order for this determination to be valid.

Defect Code: 0105C6

Failure to install safety net so as to prevent contact with surfaces or structures below when subjected to specified impact force.

Discussion: The use of this defect code will require an approximation of the distance from the net to the surface below if the net is not actually in contact with the surface. If the distance from the surface is less than the deflection of the net during the drop test, the net is not in compliance for use as a fall protection system.

105(c)(7) Safety nets shall extend outward from the outermost projection of the work surface as follows:

Guidance. In order to allow for the fact that objects tend to drift horizontally while falling vertically, the net must extend outward from the edge of the work surface according to the distance of the vertical drop from the workplace to the net.

105(c)(7)(i) When the vertical distance from the working level to the horizontal plane of the net is 5 feet or less, the minimum required horizontal distance of the outer edge of the net beyond the edge of the working surface is 8 feet.

Guidance. The minimum permitted extension of the net is 8 feet beyond the edge of the working surface. This would catch all of an individual who fell in a horizontal attitude at a right angle to the edge.

105(c)(7)(ii) When the vertical distance from the working level to the horizontal plane of the net is [more than] 5 feet, but less than 10 feet, the minimum required horizontal distance of the outer edge of the net beyond the edge of the working surface is 10 feet.

Guidance. The required extension is increased to 10 feet beyond the edge where the fall is between 5 and 10 feet.

105(c)(7)(iii) When the vertical distance from the working level to the horizontal plane of the net is more than 10 feet, the minimum required horizontal distance of the outer edge of the net beyond the edge of the working surface is 13 feet.

Guidance. Where the fall is between 10 and 30 feet, the required extension is 13 feet beyond the edge of the working surface.

Defect Code: 0105C7

Failure to install safety net so that it extends outward for the specified distance.

Discussion: This defect code applies to nets being used for fall protection that have improper dimensions for persons at the working level.

105(c)(8) Defective nets shall not be used. Safety nets shall be inspected at least once a week for mildew, wear, damage, and other deterioration. Defective components shall be removed permanently from service.

Guidance. In most cases, the inspection requires going into the net to look at it.

Defect Code: 0105C8i

Failure to remove defective net components from service or inspect net once a week for deterioration.

Discussion: Defective nets must be removed or repaired promptly. Should a net become defective during a work period, suitable precautions could include informing all persons on the bridge, and providing alternate fall protection until the defective net is removed and replaced with a non-defective net.

105(c)(9) Safety nets shall be inspected after any occurrence that could affect the integrity of the safety net system.

Guidance. Such occurrences could be impact loads from falling persons or material, contact with objects moving under a bridge, fires or contact with hot objects, high winds, etc.

Defect Code: 0105C9

Failure to inspect net after any occurrences that could affect the integrity of the net system.

Discussion: It is implied that the inspection must be of sufficient detail as to detect any damage to the net, or any changes that affect the suitability of the net for service.

105(c)(10) Tools, scraps, or other materials that have fallen into the safety net shall be removed as soon as possible, and at least before the next work shift.

Guidance. The purpose of this rule is to prevent a person who falls into the net from striking a foreign object.

Defect Code: 0105C10

Failure to remove foreign objects from net system.

Discussion: It is possible that so much foreign material could be in a net that it presents a clear danger to any person who might fall into it. Such a situation must be corrected immediately, even if before the next work shift. Photographs would be very useful to establish evidence of non-compliance with this section.

105(c)(11) Each safety net shall have a border rope or webbing with a minimum breaking strength of 5,000 pounds.

Guidance. The border rope or webbing extends around the outside of the net, and provides the securement for the ends of the mesh. It must have adequate strength to support any expected impact load with a safety factor.

Defect Code: 0105C11

Failure to use net with border rope or webbing with a minimum breaking strength of 5000 pounds.

105(c)(12) The maximum size of each safety net mesh opening shall not exceed 36 square inches and shall not be longer than 6 inches on any side measured center-to-center of mesh ropes or webbing. All mesh crossing shall be secured to prevent enlargement of the mesh opening.

Guidance. The 36 square-inch requirement is met by a square of 6 inches by 6 inches. If the mesh is hexagonal or octagonal the maximum opening size would govern, because a hexagon of 6-inch sides would exceed 36 square inches of area. The mesh crossings must be secured to each other to prevent enlargement of the opening. If the opening should enlarge, a falling person could fall through the net.

Defect Code: 0105C12

Failure to use net with conforming net mesh opening.

105(c)(13) Connections between safety net panels shall be as strong as integral net components and shall be spaced not more than 6 inches apart.

Guidance. Nets are frequently assembled from smaller panels. This requirement carries the integrity requirements to the panel connection to assure that the net will act as a cohesive unit in any fall.

Defect Code: 0105C13

Failure to use conforming connections between net panels.

§ 214.107 Working over or adjacent to water

107(a) Bridge workers working over or adjacent to water with a depth of four feet or more, or where the danger of drowning exists, shall be provided and shall use life vests or buoyant work vests in compliance with U.S. Coast Guard requirements in 46 CFR sections 160.047, 160.052, and 160.053. Life preservers in compliance with U.S. Coast Guard requirements in

46 CFR 160.055 shall also be within ready access. This section shall not apply to bridge workers using personal fall arrest systems or safety nets that comply with this subpart or to bridge workers who are working under the provisions of § 214.103(b)(2), (c) or (d) of this subpart.

Guidance. Most bridge workers can stand in water four feet deep with no threat of drowning. If the particular body of water contains swift currents or dangerous rock formations, life vests are required under the “danger of drowning” portion of paragraph (a). Therefore, the two clauses together would provide adequate protection.

The reason for requiring a personal flotation device (PFD) is to prevent a person who falls from a bridge into water from drowning. If a bridge worker is prevented from falling to the ground by a method that is valid at heights more than 12 feet above dry land, then it follows that the bridge worker using that same method also has adequate protection from falling into the water, but prior to the February 10, 2005 Interim Final Rule and the July 27, 2005 Final Rule, the regulation treated these scenarios differently. In order to remedy this inconsistency, the regulation was amended.

The preamble explained that the exceptions from requirements for fall protection over dry land found in § 214.103(b)(2), (c) and (d) were also deemed adequate to prevent a bridge worker from falling into the water. Sub-paragraph [214.103\(b\)\(2\)](#) exempts qualified bridge inspectors from an absolute requirement to use fall protection, and they are also exempted by section [214.107\(a\)](#) when they are working above or below a bridge deck. Sub-paragraph [214.103\(c\)](#) exempts employees from the requirement to use fall protection when they are prevented from falling by walkways and handrails, or by remaining six feet or more away from an edge from which one could fall. Sub-paragraph [214.103\(d\)](#) permits employees to perform work of a minor nature that is completed by working exclusively between the rails. Each of these exceptions is also deemed applicable to the requirement to wear a PFD, as a fall would be effectively prevented in the above situations.

The exception in [§ 214.103\(b\)\(1\)](#) was not applied to wearing PFD's, because that sub-paragraph deals with the relative risk of installing a personal fall arrest system versus working without one, and there is no risky installation involved with the use of a PFD. Most manufacturers mark their flotation devices with the applicable section of 46 CFR to provide for proper usage and identification. The markings should be legible.

Defect Code: 0107Ai

Failure to provide life vest.

Discussion: This deficiency is appropriate where the distance to the water is less than 12 feet and conforming life vests are not provided. Where the distance to the water is 12 feet or greater, fall arrest systems are required by [§ 214.103](#), and that section should be used to describe the defect.

Defect Code: 0107Aii

Failure to use life vest.

Discussion: This is an individual violation, which must be shown to be willful. It would apply to a person working less than 12 feet above water with a life vest available but not used.

107(b) Prior to each use, all flotation devices shall be inspected for defects that reduce their strength or buoyancy by designated individuals trained by the railroad or railroad contractor. Defective units shall not be used.

Guidance. There is no requirement for written designation of individuals, or for records of designation. A verbal statement of designation and training by the individual to the FRA inspector will suffice so long as the individual's performance does not raise questions of competency.

Defect Code: 0107B**Failure to inspect floatation equipment.**

Discussion: The existence of defective units in use or available for use is evidence of noncompliance with this section. The rule states that defective units shall not be used, so the existence of defective units is evidence of failure to inspect.

107(c) Where life vests are required by paragraph (a) of this section, ring buoys with at least 90 feet of line shall be provided and readily available for emergency rescue operations. Distance between ring buoys shall not exceed 200 feet.

Guidance. In the application of this rule, it is not necessary for ring buoys to be distributed every 200 feet along a bridge if the employees to be protected are only occupying a small area. The intent of the 200-foot interval is to provide a ring buoy within 100 feet of any person working on the bridge.

Defect Code: 0107C**Failure to provide ring buoys.**

Discussion: The absence of properly placed ring buoys while persons are in position to require life vests is evidence of noncompliance. The buoys need not be permanently installed; the employees may carry them along as work progresses.

107(d) Where life vests are required, at least one lifesaving skiff, inflatable boat, or equivalent device shall be immediately available. If it is determined by a competent person that environmental conditions, including weather, water speed, and terrain, merit additional protection, the skiff or boat shall be manned.

Guidance. This section permits railroads or contractors to choose the type of boat, skiff or other such device to be utilized according to the terrain that must be traveled to reach the work site, as well as the type of water present. This discretion should be used to enhance safety. The rule requires that where environmental conditions, including water and air temperature, wind, precipitation, water speed, and streambed terrain, merit additional protection, the lifeboat will be manned. This determination shall be made by a competent individual present at the work site. Inflatable boats need not necessarily be kept inflated, provided they are capable of immediate inflation and use when needed. Boats with built-in emergency inflation systems are available. Reliance upon a separate air compressor to inflate a boat would generally not meet the requirement for immediate availability.

A boat is not required simply because an employee on a bridge is wearing a life vest. The employee would have to be in a situation where this regulation requires the life vest before the boat is required.

Defect Code: 0107Di**Failure to provide boat or skiff.**

Discussion: This defect code describes a circumstance in which a boat or skiff is required by conditions but none has been provided.

Defect Code: 0107Dii**Boat or skiff not ready for immediate use.**

Discussion: This defect code describes a circumstance in which a boat or skiff is provided but not kept ready for immediate use, which is equivalent to not having one at all.

Defect Code: 0107Diii**Boat or skiff not manned where conditions require.**

Discussion: Where conditions require a boat or skiff to be manned, such as the distance to the water or the difficulty of entry to the water, this defect code describes a failure to provide

a person to man the vessel.

§ 214.109 Scaffolding

Guidance, General. This rule is based upon the most recent proposals from OSHA (at the time the rule was written) with suggested weight thresholds, which serve as an accurate measure of scaffold and scaffold-component strength. Scaffold design, construction, and repair should only be undertaken by individuals with experience, knowledge, and appropriate training in order to prevent safety hazards.

This section does not apply to motorized, ground based aerial lifts. Use of these devices is governed by OSHA regulations.

109(a) Scaffolding used in connection with railroad bridge maintenance, inspection, testing, and construction shall be constructed and maintained in a safe condition and meet the following minimum requirements:

109(a)(1) Each scaffold and scaffold component, except suspension ropes and guardrail systems, but including footings and anchorage, shall be capable of supporting, without failure, its own weight and at least four times the maximum intended load applied or transmitted to that scaffold or scaffold component.

Guidance. This rule provides a minimum factor of safety for scaffolds of four.

109(a)(2) Guardrail systems shall be capable of withstanding, without failure, a force of at least 200 pounds applied within two inches of the top edge, in any outward or downward direction, at any point along the top edge.

Guidance. The guardrail system extends around the work surface of the scaffold. Design of a guardrail system to these criteria requires engineering expertise or certification.

109(a)(3) Top edge height of top rails, or equivalent guardrail system member, shall be 42 inches, plus or minus three inches. Supports shall be at intervals not to exceed eight feet. Toeboards shall be a minimum of four inches in height.

Guidance. Supports for guardrails are vertical posts or stanchions. Guardrails may span a maximum length of eight feet. Although the requirement for toeboards has been removed from bridge walkways, it remains effective with scaffolds in order to protect persons below from tools and material slipping over the edge of the work surface.

109(a)(4) Midrails, screens, mesh, intermediate vertical members, solid panels, and equivalent structural members shall be capable of withstanding, without failure, a force of at least 150 pounds applied in any downward or outward direction at any point along the midrail or other member.

109(a)(5) Midrails shall be installed at a height midway between the top edge of the guardrail system and the walking/working level.

Guidance. The midrail is parallel to the guardrail, halfway between it and the work surface. Its purpose, or that of an equivalent structural member, is to prevent persons and material from falling over the edge of the scaffold below the guard rail.

109(b) Scaffolds shall not be altered or moved while they are occupied. This paragraph does not apply to vertical movements of mobile scaffolds that are designed to move vertically while occupied.

109(c) An access ladder or equivalent safe access shall be provided.

Guidance. Employees must be provided safe access to the scaffold.

109(d) All exposed surfaces shall be prepared and cleared to prevent injury due to laceration, puncture, tripping, or falling hazard.

Guidance. Sharp points, slippery spots or projections on a scaffold surface or rail are hazardous.

109(e) All scaffold design, construction, and repair shall be completed by competent individuals trained and knowledgeable about design criteria, intended use, structural limitations, and procedures for proper repair.

Guidance. The results indicate the competency of the individual responsible for a scaffold.

109(f) Manually propelled mobile ladder stands and scaffolds shall conform to the following:

109(f)(1) All manually propelled mobile ladder stands and scaffolds shall be capable of carrying the design load.

109(f)(2) All ladder stands, scaffolds, and scaffold components shall be capable of supporting, without failure, displacement, or settlement, its own weight and at least four times the maximum intended load applied or transmitted to that ladder stand, scaffold, or scaffold component.

109(f)(3) All exposed surfaces shall be free from sharp edges or burrs.

109(f)(4) The maximum work level height shall not exceed four times the minimum or least base dimensions of any mobile ladder stand or scaffold. Where the basic mobile unit does not meet this requirement, suitable outrigger frames shall be employed to achieve this least base dimension, or equivalent provisions shall be made to guy or brace the unit against tipping.

Guidance. A mobile ladder stand or scaffold 20 feet high, for instance, must be at least 5 feet wide and deep, or be guyed or braced against tipping.

109(f)(5) The minimum platform width for any work level shall not be less than 20 inches for mobile scaffolds (towers). Ladder stands shall have a minimum step width of 16 inches. The steps of ladder stands shall be fabricated from slip resistant treads.

109(f)(6) Guardrails and midrails shall conform to the requirements listed in paragraph (a) of this section.

109(f)(7) A climbing ladder or stairway shall be provided for proper access and egress, and shall be affixed or built into the scaffold and so located that in its use it will not have a tendency to tip the scaffold.

109(f)(8) Wheels or casters shall be capable of supporting, without failure, at least four times the maximum intended load applied or transmitted to that component. All scaffold casters shall be provided with a positive wheel and/or swivel lock to prevent movement. Ladder stands shall have at least two of the four casters and shall be of the swivel type.

Defect Code: 0109

Use of nonconforming equipment for scaffolding.

Discussion: It would be impractical to provide a deficiency code for every possible situation under this rule. A full description of the circumstances surrounding each deficiency shall be provided by the inspector.

§ 214.111 Personal protective equipment, generally

With the exception of foot protection, the railroad or railroad contractor shall provide and the bridge worker shall use appropriate personal protective equipment described in this Subpart in all operations where there is exposure to hazardous conditions, or where this subpart indicates the need for using such equipment to reduce the hazards to railroad bridge workers. The railroad or railroad contractor shall require the use of foot protection when the potential for foot injury exists.

Guidance. Requiring personal protective equipment is critical to the success of any safety program for railroad bridge workers. The requirement for personal protective equipment (PPE) as found in this section is specific to railroad bridge workers as defined in this Part and where there is exposure to hazardous conditions. The requirement for PPE in other situations is predicated on each railroad's policy. Use of the personal protective equipment addressed in this final rule is a reasonably straightforward safety issue that can be addressed during normal FRA safety inspections. FRA has tracked OSHA's language in this rule. OSHA's rules on subject matters related to the safety of railroad bridge workers that are not addressed in this rule remain in effect.

National consensus standards (ANSI Standards) are shown in the rule with the effective date of the ANSI standard that was in effect when the rule was amended in 1994. Equipment that conforms to a corresponding ANSI standard with a later effective date should be considered as being in compliance unless specific information to the contrary is received from FRA Washington Headquarters.

ANSI standards applicable to individual items of equipment are plainly marked on each item, including protective helmets, safety goggles, and safety shoes. In 2005, the ANSI standard relating to safety shoes was replaced by two ASTM International (ASTM) standards and the ANSI standard was withdrawn. An item that does not display a required ANSI or ASTM standard reference can be deemed not in compliance with this rule, except that safety shoes might have the ANSI or ASTM reference on the inside worn off by foot contact. Steel toe shoes can be detected with a magnet. However, some winter boots and non-conducting safety shoes have non-metallic safety toes that cannot be so detected, so the magnet test is not fully conclusive.

§ 214.113 Head Protection

113(a) Railroad bridge workers working in areas where there is a possible danger of head injury from impact, or from falling or flying objects, or from electrical shock and burns, shall be provided and shall wear protective helmets.

Guidance. Helmets are required where there is danger of head injury. This rule does not actually require protective helmets at all times while on a bridge. However, if construction or repair work is being conducted on the bridge, it is difficult to imagine a circumstance in which persons at or near the work site would not be in danger of head injury from either impact or from falling or flying objects.

Defect Code: 0113Ai

Failure to provide head protection.

Discussion: The employer of a person who is on a bridge and in danger of head injury would be in violation if the employee were not provided with a safety helmet, or if the employee were permitted to work without a helmet where one is required.

Defect Code: 0113Aii**Failure to use head protection.**

Discussion: This is an individual act of non-compliance that would apply if an employee had been provided a helmet, was required by the employer to wear it properly, and had failed to do so. The failure to comply must be willful to warrant a violation.

The ANSI standard does not encompass helmets worn backward, with the long brim over the neck, as they were not tested for effectiveness in that orientation. A helmet worn incorrectly such that it does not conform to the ANSI standard for that helmet does not comply with this rule. In such a case, consideration should be given to whether the worker knew that wearing the helmet backward was non-compliant in deciding whether to cite a defect or recommend a violation.

113(b) Helmets for the protection of railroad bridge workers against impact and penetration of falling and flying objects, or from high voltage electrical shock and burns shall conform to the national consensus standards for industrial head protection (American National Standards Institute, Z89.1-1986, Protective Headwear for Industrial Workers). This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from the American National Standards Institute, 25 West 43rd Street, New York, NY 10036. Copies may be inspected at the Federal Railroad Administration, Docket Clerk, 1200 New Jersey Avenue, SE., Washington, DC, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: <http://www.archives.gov/federal-register/code-of-federal-regulations/ibr-locations.html>.

Defect Code: 0113B**Use of non-conforming equipment for head protection.**

Discussion: Light-weight headgear commonly referred to as "bump caps" sometimes found in car and locomotive shops or meat packing plants do not comply with this rule. Headgear that complies with the ANSI standard is plainly marked as such inside the helmet.

§ 214.115 Foot Protection

115(a) The railroad or railroad contractor shall require railroad bridge workers to wear foot protection equipment when potential foot injury may result from impact, falling or flying objects, electrical shock or burns, or other hazardous condition.

Guidance. Not every railroad employee on a bridge is subject to potential foot injury, but any person at or near a site at which bridge-size material or tools are being handled is at risk. Bridge inspectors who find it necessary to wear other specialized footwear for safe climbing would not be in violation if there is no other source of foot injury present at their worksites.

The Rule does not require the employer to furnish safety footwear. The employer is obligated to require its use where foot injury hazards exist.

115(b) Safety-toe footwear for railroad bridge workers shall conform to the national consensus standards for safety-toe footwear (American National Standards Institute, American National Standard Z41-1991, Standard for Personal Protection-Protective Footwear). This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from American National Standards Institute, 25 West 43rd Street, New York, NY 10036. Copies may be inspected at the Federal Railroad Administration, Docket Clerk, 1200 New Jersey Avenue, SE., Washington, DC, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go

to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

Guidance. In 2005, two new ASTM International standards, F 2412, Test Methods for Foot Protection, and F 2413, Specification for Performance Requirements for Protective Footwear, replaced the former ANSI Z41 standard, Standard for Personal Protection Protective Footwear, which has now been withdrawn.

In an ASTM press release issued in 2005, ASTM stated in part:

“The new ASTM standards contain minimal changes from the withdrawn ANSI Z41-1999 standard with regard to test methodology. The major performance characteristics that have changed from the old ANSI standard to the new ASTM standard are the removal of those for Type II Static Dissipative and Class 30 for impact and compression requirements. Therefore, the majority of existing industry inventory of product and product-information that is labeled or advertised as in compliance with the ANSI Z41-1999 standard should be compliant with the new ASTM standards.

Since the ANSI Z41-1999 standard has been formally withdrawn, all new footwear, not including those already in inventory, found in compliance with the new protective footwear standards ASTM F 2412-05 and ASTM F 2413-05 may be labeled as such. References to the old ANSI Z41-1999 may be replaced with labeling indicating that the footwear is compliant with the new ASTM standards for new product.”

FRA is aware that new safety footwear is currently being marketed as compliant with ASTM F2413-05 (which references the test methods found in ASTM F2412-05). Because ANSI Z41.1 no longer exists and new safety footwear is being tested and designed to comply with the new ASTM standards, FRA will consider safety footwear which is labeled as meeting the requirements of the new ASTM standards as equivalent to the ANSI Z41.1 standard.

Defect Code: 0115A

Failure to require use of foot protection.

Discussion: The absence of an employer rule or standard applicable to all employees subject to this rule is evidence of failure to require foot protection, if any employees should be found working without proper foot gear. Further, if a supervisor knowingly allows a bridge worker to work without foot protection, despite the employer’s rule or standard requiring its use in that situation, this would also be considered a failure of the employer to require foot protection, and the supervisor could be subject to an individual liability violation if his or her conduct could be shown to be willful.

Note that, unlike sections 214.113 (head protection) and 214.117 (eye and face protection), the employer is not required to provide this foot protection equipment, and the employee is not specifically required by Federal regulation to wear the foot protection. The regulation only states that the *railroad or railroad contractor* shall require bridge workers to wear such equipment. (See also, §214.111, which distinguishes foot protection from the other types of personal protective equipment described in this subpart.)

§ 214.117 Eye and Face Protection

117(a) Railroad bridge workers shall be provided and shall wear eye and face protection equipment when potential eye or face injury may result from physical, chemical, or radiant agents.

Defect Code: 0117Ai

Failure to provide eye and face protection.

Discussion: This defect code describes a situation in which the employer has failed to

provide complying eye and face protection for employees working where potential eye or face injury might result. The type of protection must be determined by the hazards present. For example, welders and associated workers require protection from welding splatter and arc flashes while painters require protection from chemical sprays and sandblasting agents.

Defect Code: 0117Aii

Failure to use eye and face protection.

Discussion: This is an individual violation that would apply if an employee had been provided with eye and face protection, had been required by the employer to wear it properly, and had failed to do so. The failure to comply must be willful.

117(b) Eye and face protection equipment required by this section shall conform to the national consensus standards for occupational and educational eye and face protection (American National Standards Institute, Z87.1-1989, Practice for Occupational and Educational Eye and Face Protection). This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from the American National Standards Institute, 25 West 43rd Street, New York, NY 10036. Copies may be inspected at the Federal Railroad Administration, Docket Clerk, 1200 New Jersey Avenue, SE., Washington, DC, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

Defect Code: 0117B

Use of non-conforming equipment for eye protection.

Discussion: All complying eye and face protection will have the appropriate ANSI standard marked upon it. As a matter of policy, an ANSI standard governing the same equipment as Z87.1-1968 will also be considered to be in compliance.

117(c) Face and eye protection equipment required by this section shall be kept clean and in good repair. Use of equipment with structural or optical defects is prohibited.

Defect Code: 0117C

Use of defective equipment for eye protection.

Discussion: The same requirement that the employer provide eye and face protection requires that defective or damaged equipment be replaced. The employee is equally bound to report and discontinue use of defective equipment. Inspector discretion should be exercised when deciding whether a defect rises to the level of a violation. Working with obstructed or obscured vision, or corrective lenses with improper optical properties, is obviously unsafe and may warrant a violation. In contrast, a minute scratch on the surface of the glass lens of safety glasses, while less obvious, is also defective equipment as the scratch will weaken the lens; however, such less obvious conditions should most likely be cited as defects unless FRA has detected a pattern or practice of ignoring such non-compliance.

117(d) Railroad bridge workers whose vision requires the use of corrective lenses, when required by this section to wear eye protection, shall be protected by goggles or spectacles of one of the following types:

117(d)(i) Spectacles whose protective lenses provide optical correction the frame of which includes shielding against objects reaching the wearer's eyes around the lenses;

117(d)(ii) Goggles that can be worn over corrective lenses without disturbing the adjustment of the lenses; or

117(d)(iii) Goggles that incorporate corrective lenses mounted behind the protective lenses.

Defect Code: 0117D

Failure to provide for corrective lenses in eye protection equipment.

Discussion: Working on a bridge with impaired vision is obviously unsafe. This rule requires either corrective lenses in safety glasses with side shields, or "coverall"-type goggles that either surround the corrective lenses or incorporate them. The employer is responsible for providing or accommodating corrective lenses in any eye and face protection.

Appendix A – Defect Codes**Note:**

- 1) All codes correspond to the rule text or a portion thereof. For example, 0103Ai corresponds to a portion of 214.103(a) and 0105A5 corresponds to 214.105(a)(5).
- 2) For penalty schedule, please refer 49 CFR Part 214.
- 3) Defect code descriptions are not exact regulatory language. They are subject to change as needed.

CODE	DESCRIPTION
0103Ai	FAILURE TO PROVIDE FALL PROTECTION.
0103Aii	FAILURE TO USE FALL PROTECTION.
0105A1	FALL PROTECTION EQUIPMENT USED FOR OTHER PURPOSES.
0105A2	FAILURE TO REMOVE FALL PROTECTION EQUIPMENT FROM SERVICE AFTER IMPACT LOADING.
0105A3	FAILURE TO PROTECT FALL PROTECTION EQUIPMENT FROM DETERIORATION.
0105A4i	FAILURE TO INSPECT FALL PROTECTION EQUIPMENT PRIOR TO USE.
0105A4ii	FAILURE TO REMOVE DEFECTIVE FALL PROTECTION EQUIPMENT FROM SERVICE.
0105A5	FAILURE TO TRAIN PERSONNEL USING FALL PROTECTION EQUIPMENT.
0105A6	FAILURE TO PROVIDE FOR PROMPT RESCUE AFTER FALL.
0105A7	FAILURE TO USE CONFORMING CONNECTORS TO PREVENT DAMAGE TO FALL PROTECTION EQUIPMENT.
0105A8	FAILURE TO USE PROPER CONNECTORS WITH FALL PROTECTION EQUIPMENT.
0105A9	FAILURE TO USE PROPER ANCHORAGES WITH FALL PROTECTION EQUIPMENT.
0105B	FAILURE TO PROVIDE OR USE CONFORMING EQUIPMENT IN A PERSONAL FALL ARREST SYSTEM.
0105C1	EXCESSIVE DISTANCE FROM WORKING SURFACE TO SAFETY NET.

CODE	DESCRIPTION
0105C2	FAILURE TO PROVIDE FALL ARREST SYSTEM FOR PERSON WORKING MORE THAN 30 FEET ABOVE SAFETY NET.
0105C3	FAILURE TO PROVIDE FOR UNOBSTRUCTED FALL TO NET.
0105C4	FAILURE TO TEST OR PROVIDE CERTIFICATION THAT THE SAFETY NET AND ITS INSTALLATION ARE IN COMPLIANCE.
0105C5	USE OF SAFETY NET AND INSTALLATION NOT CAPABLE OF ABSORBING SPECIFIED IMPACT FORCE.
0105C6	FAILURE TO INSTALL SAFETY NET SO AS TO PREVENT CONTACT WITH SURFACES OR STRUCTURES BELOW WHEN SUBJECTED TO SPECIFIED IMPACT FORCE.
0105C7	FAILURE TO INSTALL SAFETY NET SO THAT IT EXTENDS OUTWARD FOR THE SPECIFIED DISTANCE.
0105C8i	FAILURE TO REMOVE DEFECTIVE NET COMPONENTS FROM SERVICE OR INSPECT NET ONCE A WEEK FOR DETERIORATION.
0105C9	FAILURE TO INSPECT NET AFTER ANY OCCURRENCES THAT COULD AFFECT THE INTEGRITY OF THE NET SYSTEM.
0105C10	FAILURE TO REMOVE FOREIGN OBJECTS FROM NET SYSTEM.
0105C11	FAILURE TO USE NET WITH BORDER ROPE OR WEBBING WITH A MINIMUM BREAKING STRENGTH OF 5000 POUNDS.
0105C12	FAILURE TO USE NET WITH CONFORMING NET MESH OPENING.
0105C13	FAILURE TO USE CONFORMING CONNECTIONS BETWEEN NET PANELS.
0107Ai	FAILURE TO PROVIDE LIFE VEST.
0107Aii	FAILURE TO USE LIFE VEST.
0107B	FAILURE TO INSPECT FLOATATION EQUIPMENT.
0107C	FAILURE TO PROVIDE RING BUOYS.
0107Di	FAILURE TO PROVIDE BOAT OR SKIFF.

CODE	DESCRIPTION
0107Dii	BOAT OR SKIFF NOT READY FOR IMMEDIATE USE.
0107Diii	BOAT OR SKIFF NOT MANNED WHERE CONDITIONS REQUIRE.
0109	USE OF NONCONFORMING EQUIPMENT FOR SCAFFOLDING.
0113Ai	FAILURE TO PROVIDE HEAD PROTECTION.
0113Aii	FAILURE TO USE HEAD PROTECTION.
0113B	USE OF NON-CONFORMING EQUIPMENT FOR HEAD PROTECTION.
0115A	FAILURE TO REQUIRE USE OF FOOT PROTECTION.
0117Ai	FAILURE TO PROVIDE EYE AND FACE PROTECTION.
0117Aii	FAILURE TO USE EYE AND FACE PROTECTION.
0117B	USE OF NON-CONFORMING EQUIPMENT FOR EYE PROTECTION.
0117C	USE OF DEFECTIVE EQUIPMENT FOR EYE PROTECTION.
0117D	FAILURE TO PROVIDE FOR CORRECTIVE LENSES IN EYE PROTECTION EQUIPMENT.