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07.08.11 – Idaho Minimum Safety Standards and Practices for Logging – Skidding and Yarding

IDAPA 07
TITLE 08
CHAPTER 11

07.08.11 – IDAHO MINIMUM SAFETY STANDARDS AND PRACTICES FOR LOGGING – SKIDDING AND YARDING

000. LEGAL AUTHORITY.
Pursuant to the provisions of Section 67-2601A, Idaho Code, the Division of Building Safety has the authority to promulgate and adopt rules for affecting the purposes therein. (3-29-17)

001. TITLE AND SCOPE.
These rules shall be cited as IDAPA 07.08.11, "Idaho Minimum Safety Standards and Practices for Logging – Skidding and Yarding," and shall be applicable to the logging industry in the state of Idaho. (7-1-97)

002. WRITTEN INTERPRETATIONS.
There are no written statements which pertain to the interpretation of these rules. (7-1-97)

003. ADMINISTRATIVE APPEALS.
The procedure for appeals in logging safety matters is prescribed by IDAPA 07.08.16, "Idaho Minimum Safety Standards and Practices for Logging – Recommended Safety Program," and Title 67, Chapter 52, Idaho Code. (3-29-17)

004. INCORPORATION BY REFERENCE.
There are no documents that have been incorporated by reference into these rules. (3-29-17)

005. OFFICE – OFFICE HOURS – MAILING ADDRESS AND STREET ADDRESS.
The principal place of business of the Division of Building Safety, Logging Safety Program, is at the Division office located at 1090 E. Watertower Street, Suite 150, Meridian, Idaho 83642. The Logging Safety Program may also be contacted at 1250 Ironwood Drive, Suite 220, Coeur d'Alene, Idaho 83814, and at 2055 Garrett Way, Suite 4, Pocatello, Idaho 83201. All locations are open from 8:00 a.m. to 5:00 p.m., except Saturday, Sunday and legal holidays. The telephone number of the office is (208) 334-3950. The facsimile number of the office is 1-877-810-2840. The Department website is http://dbs.idaho.gov. (3-29-17)

006. PUBLIC RECORDS ACT COMPLIANCE.
The rules contained herein have been promulgated according to the provisions of Title 67, Chapter 52, Idaho Code, and are public records. (3-29-17)

007. -- 008. (RESERVED)

009. DEFINITIONS.
For definitions refer to IDAPA 07.08.01, "Idaho Minimum Safety Standards and Practices for Logging -- General Provisions," Section 007, and IDAPA 07.08.15, "Idaho Minimum Safety Standards and Practices for Logging – Commonly Used Logging Terms." (3-29-17)

010. SKIDDING AND YARDING.

01. General Requirements. (7-1-97)

a. All personnel shall wear approved head protection and proper clothing at all times in skidding and yarding. (7-1-97)

b. Getting on or off moving equipment is strictly prohibited. (7-1-97)

c. Equipment operators shall move rigging only upon the signal of an authorized person. (3-29-17)

d. Workers shall at all times watch for and protect themselves and their fellow workers from side-winders, rolling logs, up ending logs, snags, and other hazards caused by the movement of equipment, logs and/or

lines. (7-1-97)

e. Chokers should be placed near, but not closer than two (2) feet, from the ends of logs if possible. (7-1-97)

f. Choker holes shall be dug from the uphill side of a log if there is any danger of its rolling. (7-1-97)

g. Knots shall not be used to connect separate lengths of chain or cable. (7-1-97)

h. Chaser (hooker) shall not unhook logs (trees) until rigging has stopped and the equipment operator is aware of his location. (3-29-17)

i. Riding on drag or logs or any part of equipment used in skidding and yarding except in the area of the driver's seat is prohibited. (7-1-97)

j. A tool handle, stick, iron bar, or similar object shall be used in guiding lines onto drums. Guiding lines with hands is prohibited. (7-1-97)

k. Make sure all personnel are in the clear before skidding turn, drag, log, or tree into landing. (7-1-97)

l. All personnel shall keep out of the bight of line and clear of running lines. (7-1-97)

m. Logs shall not be swung over personnel. (7-1-97)

n. Knot bumping should be done before a log is loaded. (3-29-17)

011. CABLE YARDING.

01. Safety A. Personnel shall not ride hooks, lines, rigging, or logs suspended in the air or being moved. (3-29-17)

02. Safety B, Personnel shall not hold on to haywire, running lines, drop lines, or chokers as an assist when walking uphill. (3-29-17)

03. Safety C. Personnel shall not work in the bight of lines under tension. (3-29-17)

04. Safety D. Personnel shall be "in the clear" before any signal to move any lines is given. (3-29-17)

012. YARDING MACHINERY.

01. Equipment Assessment. When personnel arrive at a job site with a set of machinery on hand to perform yarding operations, evaluation of the conditions at the landing shall be made, and reassessment of the capacity of the available equipment shall be performed to determine if it meets the task. The principal options and features for yarders, log loaders, and processors are described in this section. (3-29-17)

02. Manufacturer's Manual. Yarders of various types are used in logging operations, including ground-based and rigged trees to lift the lines, and mobile steel towers. The manufacturer's manual shall always be consulted for essential features and inspection points on each particular machine. (3-29-17)

03. Types of Yarding Equipment. Yarding operations may include the use of, but is not limited to the following yarding equipment: (3-29-17)

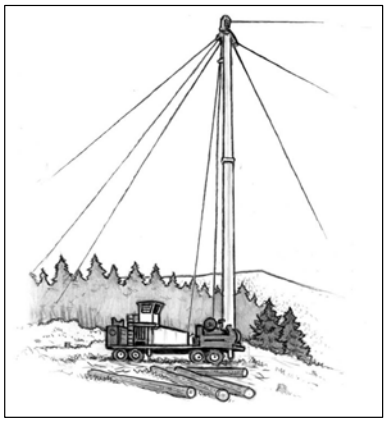
a. Straight Tube Telescoping Tower. This equipment uses a hydraulic ram or multiple-sheave cable system to raise the tower. Some telescoping towers allow use at the telescoped height. The tower may be used partially retracted if guyline anchors need to be placed closer to the landing or on steep slopes. (3-29-17)

i. This equipment may travel by self-propulsion, or be either trailer or track-mounted. It has long reach capacity with a typical height of ninety (90) to one hundred ten (110) feet. (3-29-17)

ii. The advantages of this equipment include the ability to operate heavy payloads, the tower height allows for more line deflection, and some yarders allow yarding one hundred eighty (180) degrees without moving yarder or guylines. (3-29-17)

iii. The disadvantages of this equipment are that it is heavy and difficult to move, it requires appropriate roads and it may have to be disassembled to move on public roads, it requires large landing areas, and it needs large guyline anchor capacity.

FIGURE 012.03-A



STRAIGHT TUBE TELESCOPING TOWER

(3-29-17)

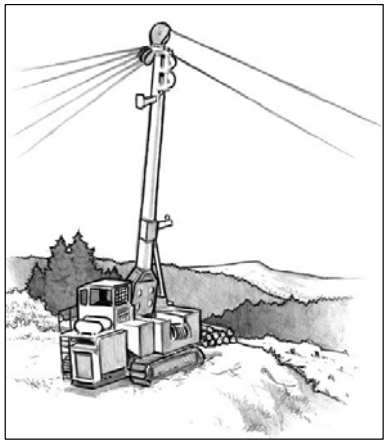
b. Fixed Leaning Tower. This equipment is a one (1)-piece tower that may be front-mounted vertical, or leaning. The height of the tower varies with make and model. (3-29-17)

i. This equipment may travel by self-propulsion, or be either trailer or track-mounted. It has medium reach capacity with a typical height of forty (40) to eighty (80) feet. (3-29-17)

ii. The advantages of this equipment include faster line setup, smaller landing area requirements, it is lighter and easier to move, and has lower guyline anchor requirements. (3-29-17)

iii. The disadvantages include a smaller yarding window which necessitates moving the tower and guylines more frequently, and smaller payloads than straight tube towers.

FIGURE 012.03-B



FIXED LEANING TOWER

(3-29-17)

c. Swing Yarder. This equipment is similar to the fixed leaning tower in nearly all respects; however, the swing yarder is also capable of swinging logs onto the road or landing, and capable of using a running skyline. Track mounts are more stable when moving. (3-29-17)

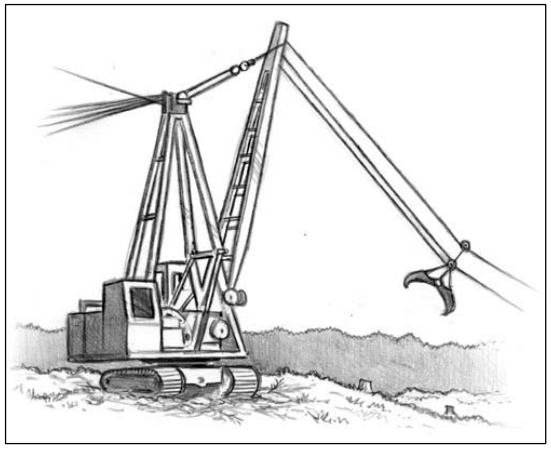
d. Grapple Yarder. This equipment uses a swing yarder or yoader system. The grapple is controlled by signals from the rigging slinger, or by the yarder engineer using a video link on the carriage. Swing capability is necessary to allow a wider logging corridor. A grapple system is typically used in conjunction with a machine anchor and elevated support on the back end of the unit, making for quick road changes. (3-29-17)

i. This equipment may travel by track-mount or rubber-tire mount. It has medium to short reach capacity. (3-29-17)

ii. The advantages of this equipment include the need for a smaller crew size, typically only a yarder engineer, landing worker, and a hooktender, and it is easier to rig up which is ideal for smaller logging areas. (3-29-17)

iii. The disadvantages of this equipment are that it requires extensive planning to achieve full production, it must have moderate to good deflection, access to the back of unit is generally necessary, and it possesses limited yarding width.

FIGURE 012.03-C



GRAPPLE YARDER

(3-29-17)

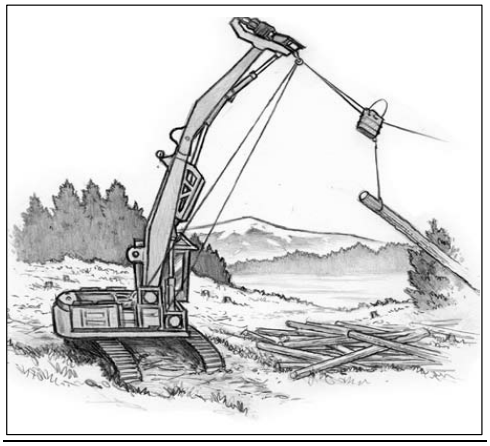
e. Yoader. This yarder is typically a log loader with two (2) drums mounted at the base of the boom. Both lines run through sheaves mounted on the boom or heel rack. The lines can be set up in a standing, live, or running skyline configuration, or a high-lead configuration. (3-29-17)

i. This equipment may travel by track-mount or rubber-tire mount. It has medium reach capacity. (3-29-17)

ii. The advantages of this equipment are that guylines are not necessary, it is easier to move, easy road changes, it is easier to rig up which is ideal for smaller logging areas, and it may be used as a loader. (3-29-17)

iii. The disadvantages of this equipment are that it requires/results in slower line speeds, it requires blocking up front of the tracks to create stability, and rigging height is limited.

FIGURE 012.03-D



YOADER

(3-29-17)

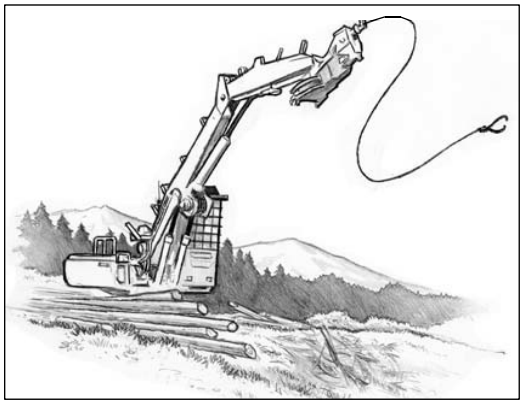
f. Tong-tosser/Jammer System. These are two (2) systems which basically use the same machine as the yoader, with either tongs or chokers on the end of the line to secure the logs. This version typically uses one (1) drum on the machine with a spitter wheel at the end of the boom to pull the line from the drum and push it out to the brush. The yarder engineer usually gets the tongs or chokers swinging and then tosses them to the waiting choker setters. (3-29-17)

i. This equipment travels by track-mount. It has short reach capacity. (3-29-17)

ii. The advantages of this equipment are that guylines are not necessary, it is easier to move, it is easier to rig up which is ideal for smaller logging areas, and it may be used as a loader. Additionally, it does not require line layouts or anchors. (3-29-17)

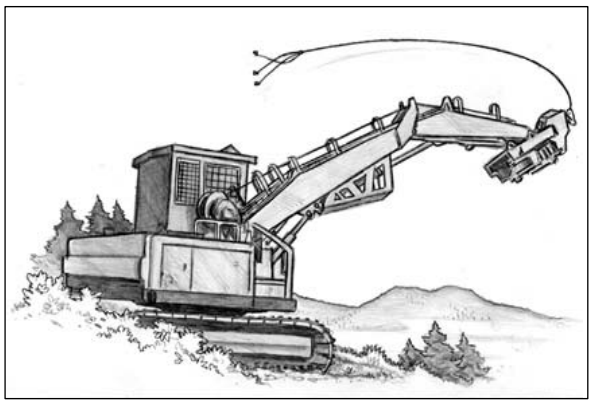
iii. The disadvantages of this equipment are that it results in slower line speeds, it requires blocking up front of the tracks to create stability, rigging height is limited, and there is a greater potential risk to the rigging crew.

FIGURE 012.03-E



TONG-TOSSER WITH GRAPPLE

FIGURE 012.03-F



JAMMER-SYSTEM WITH CHOKERS

(3-29-17)

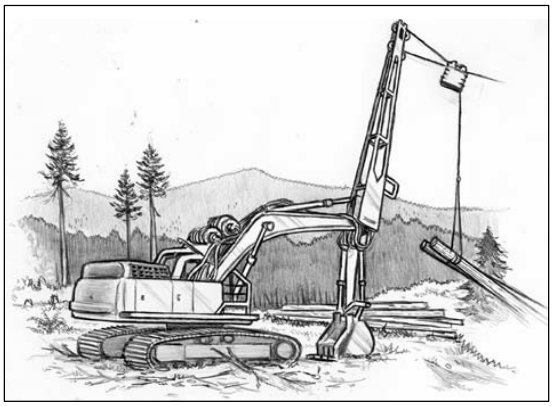
g. Stiff-leg Spar Yarder. One of various configurations for this yarder uses an excavator or log loader fitted with a third boom between the main and jib boom, which is elevated to provide lift. The elevated boom is typically rigged with two (2) or three (3) lines. Works with high lead, standing, running, or slackline configurations. (3-29-17)

i. This equipment travels by track-mount. It has medium reach capacity. (3-29-17)

ii. The advantages of this equipment are that guylines may not be necessary, it is easier to move, it is easier to rig up which is ideal for smaller logging areas, and it may be used as a loader or excavator. Additionally, it does not require line layouts or anchors. Additionally, jib boom offers greater stability, and the rigging height is greater than yoader or tong-tosser/jammer system. (3-29-17)

iii. The disadvantages of this equipment are that it results in slower line speeds, the attached tower boom may need to be removed for other operations, and it generates heavy stress on boom and components. (3-29-17)

FIGURE 012.03-G



STIFF-LEG SPAR YARDER

(3-29-17)

013. WIRE ROPE.

01. General Characteristics. Wire rope comes in many grades and dimensions, and every rope has its own characteristics with regard to strength and resistance to crushing and fatigue. A larger rope will outlast a smaller rope of the same materials and construction, used in the same conditions, because wear occurs over a larger surface. Similarly, a stronger rope will outlast a weaker rope, because it performs at a lower percentage of its breaking strength, with reduced stress. (3-29-17)

02. Wire Rope Terms. Common grades of wire rope include extra improved plow steel (EIPS) and swaged powerflex, among others. The following terms are commonly used for wire rope: (3-29-17)

a. Abrasion Resistance. Ability of outer wires to resist wear. Abrasion resistance is greater with larger wires. (3-29-17)

b. Core. The foundation of a wire rope which is made of materials that will provide support for the strands under normal bending and loading conditions. A fiber core (FC) can be natural or synthetic. If the core is steel, it can be a wire strand core (WSC) or an independent wire rope core (IWRC). (3-29-17)

c. Crushing Resistance. Ability of the rope to resist being deformed. A rope with an independent wire core is more resistant to crushing than one with a fiber core. (3-29-17)

d. Die-form Line. Made from strands that are first compacted by drawing them through a drawing die to reduce their diameter. The finished rope is then swaged or further compressed. (3-29-17)

e. Fatigue Resistance. Ability of the rope to withstand repeated bending without failure (the ease of bending a rope in an arc is called its "bendability"). Fatigue resistance is greater with more wires. (3-29-17)

f. Strength. Referred to as breaking strength, usually measured as a force in pounds or tons. The breaking strength is not the same as the load limit, which is calculated as a fraction of the breaking strength to ensure safety. (3-29-17)

g. Swaged Line. Manufactured by running a nominal-sized line through a drawing die to flatten the outer crown and thus reduce the rope diameter. This compacted rope allows for increased drum capacity and increased line strength. (3-29-17)

03. Typical Wire Rope Specifications. The table below lists a few examples of wire-rope breaking strengths. (3-29-17)

TABLE 012.09-A -- Typical Wire Rope Specifications

6x26 Improved Plow Steel			6x26 Swaged		Swaged Compact-Strand	
Diameter (inches)	Weight (lbs/ft)	Breaking Strength (tons)	Weight (lbs/ft)	Breaking Strength (tons)	Weight (lbs/ft)	Breaking Strength (tons)
1/2	0.46	11.5	0.6	15.2	0.63	18.6
9/16	0.59	14.5	0.75	19	0.78	23.7
5/8	0.72	17.9	0.93	23.6	1.01	28.5
11/16			1.10	28.8	1.18	35.3
3/4	1.04	25.6	1.37	34.6	1.41	42.2
13/16			1.56	39.6	1.63	49.3
7/8	1.42	34.6	1.83	46.5	1.91	56.0
15/16			1.95	53.3	2.20	66.1
1	1.85	44.9	2.42	60.6	2.53	73.7
1-1/8	2.34	56.5	2.93	75.1	2.97	92.9
1-1/4	2.89	69.3	3.52	92.8	3.83	112.1
1-3/8	3.5	83.5	4.28	108.2	4.62	128.6

TABLE 013.03-A

6x26 Improved Plow Steel			6x26 Swaged		Swaged Compact-Strand	
Diameter (inches)	Weight (lbs/ft)	Breaking Strength (tons)	Weight (lbs/ft)	Breaking Strength (tons)	Weight (lbs/ft)	Breaking Strength (tons)
½	0.46	11.5	0.6	15.2	0.63	18.6
9/16	0.59	14.5	0.75	19	0.78	23.7
5/8	0.72	17.9	0.93	23.6	1.01	28.5
11/16			1.10	28.8	1.18	35.3

TABLE 013.03-A						
6x26 Improved Plow Steel			6x26 Swaged		Swaged Compact-Strand	
Diameter (inches)	Weight (lbs/ft)	Breaking Strength (tons)	Weight (lbs/ft)	Breaking Strength (tons)	Weight (lbs/ft)	Breaking Strength (tons)
¾	1.04	25.6	1.37	34.6	1.41	42.2
13/16			1.56	39.6	1.63	49.3
7/8	1.42	34.6	1.83	46.5	1.91	56.0
15/16			1.95	53.3	2.20	66.1
1	1.85	44.9	2.42	60.6	2.53	73.7
1-1/8	2.34	56.5	2.93	75.1	2.97	92.9
1-1/4	2.89	69.3	3.52	92.8	3.83	112.1
1-3/8	3.5	83.5	4.28	108.2	4.62	128.6

Source: Cable Yarding Systems Handbook. 2006. Worksafe BC. Table lists typical breaking strengths. See manufacturer's specifications for specific lines. (3-29-17)

04. Synthetic Rope. High-tensile strength synthetic lines are considerably lighter than standard wire rope; however, some lines are dimensionally as strong as standard wire rope. Accordingly, high-tensile strength synthetic lines are permitted to be used in appropriate logging applications, including as substitutes for brush straps, tree straps, tail and intermediate support guylines, guyline extensions, skyline extensions, and haywire. Manufacturers' standards and recommendations for determining usable life or criteria for retirement of such lines shall be followed. Personnel shall examine the lines for broken or abraded strands, discoloration, inconsistent diameter, glossy or glazed areas caused by compression and heat, and other inconsistencies. Rope life is affected by load history, bending, abrasion, and chemical exposure. Most petroleum products do not affect synthetic ropes. (3-29-17)

05. Inspection and Care. (3-29-17)

a. Wire rope shall be inspected daily by a qualified individual and repaired or taken out of service when there is evidence of any of the following conditions: (3-29-17)

i. Twelve and five tenths percent (12.5%) of the wires are broken within a distance of one (1) lay. (3-29-17)

ii. Evidence of chafing, sawing, crushing, kinking, crystallization, bird-caging, corrosion, heat damage, or other damage that has weakened the rope structure. (3-29-17)

b. Qualified personnel shall closely inspect those points subject to the most wear, including the knob ends of lines, eye splices, and those sections of line that most often run through blocks or carriages. If there is doubt about the integrity of the line, it is far safer to replace a suspect line, or cut out and resplice a defective area, than risk a failure during operation. Evaluation of the load-bearing yarder lines shall be stringent. A qualified person shall also inspect all other lines used on site and remove any that are unsafe. (3-29-17)

06. Additional Precautions. The following precautions shall also be observed: (3-29-17)

a. Ensure the working load limit for any line is adequate for the intended use. (3-29-17)

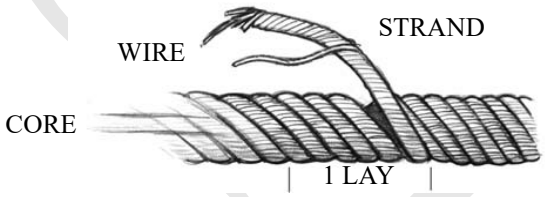
b. The manufacturer's specifications with regard to assigned breaking strength shall be followed. Such specifications as determined by engineering test results should factor the grade of the wire, number of strands, number of wires per strand, filler wire construction, lay pattern of the wires, and the diameter of the line. (3-29-17)

07. Safety Factor. Operators shall follow the manufacturer's specifications in determining load limits. The working load limit is a fraction of a line's breaking strength – a factor of three (3), or one-third (1/3) the breaking strength, is commonly used as a safety factor for running and standing lines, when workers are not exposed to breaking lines or loads passing overhead. A safety factor of three (3) is commonly used to determine the working load limit for a standing or running line. A standard six (6) x twenty-six (26) IWRC wire rope with a diameter of one (1) inch has a breaking strength of approximately forty-five (45) tons – divide by three (3) – equals fifteen (15) tons working load limit. (3-29-17)

08. Wire Labeling. (3-29-17)

a. The elements of a typical wire rope are labeled, for example, six (6) x twenty-five (25) FW PRF RL EIPS IWRC. The label indicates a six (6)-strand rope with twenty-five (25) wires per strand (six (6) x twenty-five (25)), filler-wire construction (FW), strands pre-formed in a helical pattern (PRF), laid in a right-hand lay pattern (RL), using an extra-improved plow steel (EIPS) grade of wire, and strands laid around an independent wire rope core (IWRC). See figure 013.08-A for proper labeling of wire rope. (3-29-17)

FIGURE 013.08-A



(3-29-17)

b. Out of Service Standard Example. A six (6) x twenty-five (25) IWRC wire rope = six (6) strands in one (1) lay with twenty-five (25) wires per strand = one hundred fifty (150) wires. The rope must be taken out of service when twelve and five tenths percent (12.5%), or one-eighth (1/8), of the wires are broken within the distance of one (1) lay = one hundred fifty (150) divided by eight (8) = eighteen and seventy-five one hundredths (18.75), or nineteen (19) broken wires. (3-29-17)

09. Wire Line Life. Table 013.08-A provides the allowable life of a line in million board feet in accordance with line size and use. Figure 013.09-A illustrates both the correct and incorrect manner in which to measure line size (diameter). (3-29-17)

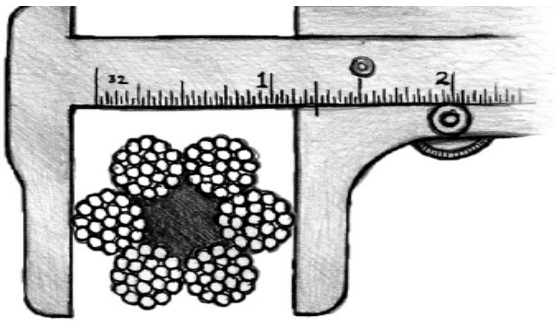
TABLE 013.08-A
LINE LIFE BY WOOD HAULED

System	Use	Line Size (inches)	Line Life (million board feet)

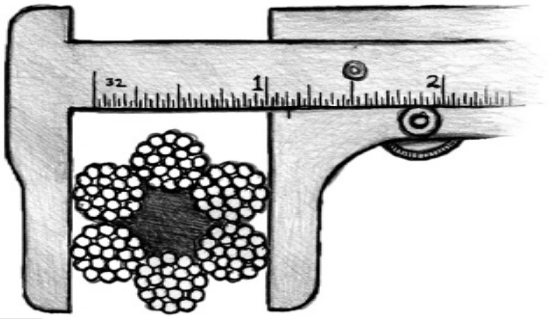
Standing Skyline	Skyline	1-3/4	20-25
		1-1/2	15-25
		1-3/8	8-15
	Mainline	1 to 1-1/8	15-20
		1	10-15
	Haulback	3/4 to 7/8	8-12
Live Skyline	Skyline	1-1/2	10-20
		1-3/8	8-15
		1	6-10
	Mainline	1	10-15
		3/4	8-12
		5/8	8
	Haulback	3/4 to 7/8	8-12
		1/2	6-10
	Dropline	7/16	5-8
High Lead	Mainline	1-3/8	8-15
		1-1/8	6-12

Source: Willamette Logging Specialist's Reference by Keith L McGonagill. 1976. Portland, OR: Willamette National Forest. Calculations of line life refer to EIPS 6x21 wire rope for the skyline, and EIPS 6x26 for other lines. Figures will be different for other classes of wire rope. (3-29-17)

FIGURE 013.09-A



Correct way to measure line diameter



Incorrect way to measure line diameter

(3-29-17)

10. Dynamic Loads. Operators shall consider high dynamic loads when calculating safe working limits of wire ropes. Wire ropes are often subjected to high dynamic loads, which greatly multiply the force on a line and may exceed the safe working limit. Even a split second of time over the limit can lead to premature failure of a line. Typical dynamic loads occur when a turn hits a stump, a turn comes down off of the back hillside to full suspension, or when excessive force is applied to pulling a turnout of its bed. A high dynamic load or a sudden shock load that exceeds the working limit may not result in immediate failure, but rope strands may stretch and weaken, and may fail at a later time. (3-29-17)

11. Other Common Wire Rope Considerations. (3-29-17)

a. Wire Rope Stretching and Line Diameter. A stretched wire rope has a reduced diameter. Operators shall check for stretched lines by measuring the diameter, particularly on older lines and any line used in stressful situations. (3-29-17)

b. Older Wire Rope. Standing lines and guylines are often kept in service for multiple years (four (4) to five (5), and as long as ten (10) years in some instances) without exhibiting any obvious signs of excessive wear other than rust. Operators shall check date stamps of wire rope and evaluate line life. Operators shall also inspect the core of older lines periodically for a fractured or dry core, which could indicate other deficiencies such as broken wires, excessive wear, or line deformation. (3-29-17)

c. Hard Use. The life of a wire rope is also affected by hard use. Line life can be measured by the volume of wood hauled (see Table 013.08-A). Line life is reduced when a line exceeds its elastic limits, is heavily shocked, or rubbed against rocks or other lines. As a line wears, the safe working load limit shall be lower and the payload adjusted appropriately. (3-29-17)

d. Wire Rope endurance and elastic limits. Working within the endurance and elastic limits of lines can help preserve line life. The following principles shall be observed when evaluating the integrity and safe use of wire rope: (3-29-17)

i. The "endurance limit" for all lines is fifty percent (50%) of the breaking strength. If wire rope tensioning regularly exceeds the endurance limit, the life of the line is reduced through fatigue. (3-29-17)

ii. The "elastic limit" for all lines is sixty to sixty-five percent (60-65%) of the breaking strength. When a wire rope is loaded to its normal safe working limit, the line stretches, but then returns to its original size when the load is released. If a load increases past the elastic limit through prolonged exertion or repeated stress, the line will stretch and stay stretched, resulting in a permanent reduction in the breaking strength. (3-29-17)

e. Lubrication and Abrasion. Wire rope is lubricated in the factory to reduce internal friction and corrosion, and prolong the life of the rope. Heat from friction causes the internal lubricant to deteriorate. Friction occurs when the rope stretches under load, particularly in places where it bends around sheaves or other objects. An

improperly lubricated line can pick up particles of dirt and sand that will increase abrasion. Accordingly, operators shall: (3-29-17)

i. Check for and ensure the proper lubrication of all lines and wire rope, following the manufacturer's instructions. Commercial wire rope lubricants are available. (3-29-17)

ii. Carefully inspect lines for faults in areas where dust and sand may collect. (3-29-17)

iii. Store all wire rope and lines off the ground. (3-29-17)

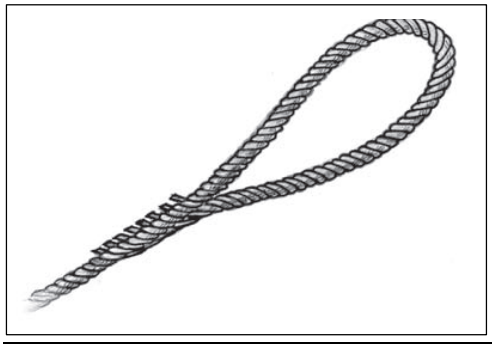
12. Line Connections. (3-29-17)

a. Inspection. Operators shall regularly inspect shackles, hooks, splices, and other connecting equipment for damage and wear, as well as ensure the connectors are the correct type and size for the line and intended use. (3-29-17)

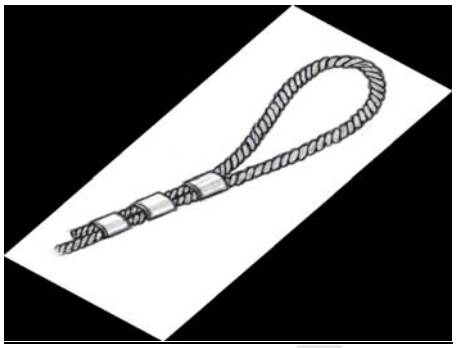
b. Wire Splicing. Splices are used to form an eye at the end of a line, extend the length of a line, or repair a broken or damaged line. The splicing of wire rope requires special skill and shall only be performed under the supervision of a competent person with using the proper tools. Reference materials are available with detailed instructions for numerous types of splices. Individuals splicing wire shall always wear appropriate eye protection while splicing or assisting with a splicing procedure. (3-29-17)

c. The logger's eye splice and three (3)-pressed eye are the most common methods to form an eye for use as a skyline terminal. See Figure 013.12-A. The spliced eye is approximately eighty percent (80%) efficient. A three (3)-pressed eye can reach ninety percent (90%) line strength. The pressed eye is typically performed at the rigging shop. Spliced eyes may be placed in the field, but may require additional time to install. (3-29-17)

FIGURE 013.12-A



THE LOGGER'S EYE SPLICE



THREE-PRESSED EYE

(3-29-17)

d. Guyline Care. Guylines are a vital link in holding up a tower. Guyline extensions shall not be excessively moved around by dragging on the ground, or left on the ground for long periods of time as they will deteriorate faster. (3-29-17)

e. Line Deformity. A line may deform where it loops around a shackle or pin, producing weakness that may result in line failure. A thimble in the loop protects the line. Thimbles may be used on standing lines, but not on running lines. Examples of the appearance of deformed lines and the use of thimbles in shackles are illustrated in Figure 013.12-B. (3-29-17)

FIGURE 013.12-B

DEFORMED EYE

EYE WITH THIMBLE

(3-29-17)

13. Shackles and Hooks. (3-29-17)

a. Hooks. Hooks shall be inspected to ensure that they have not sprung open. Ensure that shackles are positioned correctly to bear the load. Haywire swivels shall be inspected frequently, due to their susceptibility to wear rapidly. (3-29-17)

b. Shackle Safety. Proper bells or shackles shall be used to connect the guylines to the stumps, and the guyline lead blocks to the ring at the top of the tower. Connections shall have at least one and a half (1-1/2) times the strength of the guyline. The pins of the shackles must be secured to protect against dislodgement, and a nut and cotter key, or a nut and molly may be used for that purpose. The use of loops or mollies to attach guylines is prohibited. Examples of the appearance of some shackle equipment is illustrated in Figure 013.13-A.

FIGURE 013.13-A

SHACKLE WITH SAFETY PIN

HAYWIRE SWIVEL

HAYWIRE HOOKS

(3-29-17)

c. The following practices shall be observed in order to ensure the safe use of shackles: (3-29-17)

i. A shackle must have a rated breaking strength greater than the rated breaking strength of the lines attached to it, and the manufacturer's rated strengths to determine oversized requirements shall be used. Accepted industry standards shall be utilized and adhered to when determining the correct shackle size based on the type and nature of the logging operation being performed. Examples of the appearance of some shackle equipment for the purposes of proper selection is illustrated in Figure 013.13-B. (3-29-17)

ii. Shackles with pins, and securing nuts with mollies or a cotter key shall be used on standing or overhead rigging. (3-29-17)

iii. Screw shackle pins shall not be used in any standing or overhead rigging. (3-29-17)

iv. Screw shackle pins, where allowed to be used, shall be tightened securely. (3-29-17)

v. Shackle pin mollies shall be rolled sufficiently and fit the pin hole fully. Mollies shall be tucked a minimum of three (3) times. (3-29-17)

vi. The shackle shall always be placed with the pin nearest to the yarder, so that in the event the shackle fails the least amount of hardware may be thrown at the yarder. (3-29-17)

vii. Replace shackles that are bent, broken, or show excess wear on the inner surfaces. Examples of the appearance of some damaged or non-conforming shackles are illustrated in Figure 013.13-A.

FIGURE 013.13-A

REPLACE SHACKLES THAT ARE BENT, BROKEN, OR SHOW
EXCESS WEAR ON THE INNER SURFACES.

FIGURE 013.13-B

SLEEVE WITH
KNOCKOUT PIN

BELL WITH
KNOCKOUT PIN

SLEEVE WITH
SAFETY PIN

FLUSH PIN
STRAIGHT SIDE

(3-29-17)

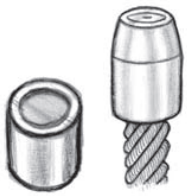
14. Knobs, Ferrules, and Eyes. (3-29-17)

a. Poured nubbins and a double-end hook are acceptable connectors in place of shackles in some instances. The use of quick nubbins (wedge buttons) as guylines and skyline end fittings is prohibited unless attaching guylines to guyline drums. Operators shall follow the manufacturer's recommendations when attaching sockets and similar end fastenings. (3-29-17)

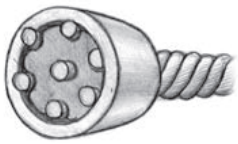
b. Poured nubbins achieve ninety-nine percent (99%) of line strength and may be used. Quick nubbins only achieve a maximum of sixty-five percent (65%) under ideal conditions, and accordingly operators shall consider whether they are appropriate for safe use in any given application. Pressed ferrule are not certifiable for strength, and shall not be used. Examples of the appearance of some knob, ferrule, and nubbin equipment are illustrated in Figure 013.14-A. (3-29-17)

c. Operators shall inspect knobs, ferrules, and eyes at cable ends for loose or broken wires, and corroded, damaged, or improperly applied end connections. Poured nubbins shall be date stamped.

FIGURE 013.14-B



BABBITED KNOB & PRESSED FERRULE

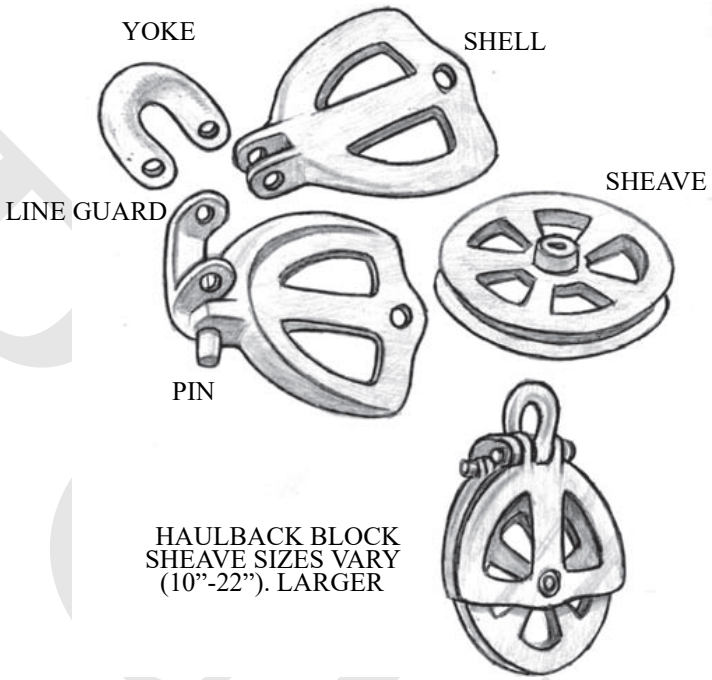


QUICK NUBBIN (WEDGE BUTTON)

(3-29-17)

15. Brush Blocks. Brush blocks shall be thoroughly inspected for cracks, wear, or deterioration. Operators shall closely examine the areas subject to the most wear, including bearings, sheave, frame, yoke, and pins. Defective parts shall be replaced immediately. Blocks shall be greased every time before each use.

FIGURE 013.15-A



(3-29-17)

16. Chains and Straps. Chains or straps shall always be sized and used correctly for the intended purpose. Determining which size to use may depend on various factors. Oversized trailer lift straps, for example, shall have a breaking strength equal to five (5) times the load to be lifted. Towing chains shall have a tensile strength equivalent to the gross weight of the towed vehicle. The manufacturer's specifications or other appropriate reference materials shall always be consulted to ensure the right chain or strap is used for a task. (3-29-17)

a. Operators shall periodically inspect chains for damaged, worn, or stretched links. Chains with more than ten percent (10%) wear at the bearing surface shall be replaced. Operators shall periodically inspect straps, and examine them for broken wires or wear. Examples of the appearance of damaged and safe chains are illustrated in Figure 013.16-A. (3-29-17)

FIGURE 013.16-A

GOOD CHAIN

STRETCHED CHAIN

WORN CHAIN (INSIDE LINKS)

(3-29-17)

014. TREE CLIMBING.

Loggers are often required to climb considerable heights to top trees or hang rigging on lift trees. All workers who may be exposed to fall hazards shall be specifically trained and equipped with fall protection. (3-29-17)

01. Rescue Plan. Before rigging any tree, the employer must develop rescue procedures, which includes identifying appropriate equipment, personnel, and training to perform a rescue in case a climber is injured or incapacitated in the tree. A second set of climbing gear and a person with climbing experience shall be readily available. Equipment and procedures that will support an injured climber's chest and pelvis in an upright position during a rescue shall be used. When an injured climber is wearing only a climbing belt, provisions must be made to prevent the climber from slipping through it; this may include using a rope to create an upper-body support system. Consideration should be made to replacing climbing belts with a climbing harness. (3-29-17)

02. Before Leaving the Ground. Employers shall check climbing equipment and immediately remove defective equipment from service. Personnel shall ensure that hardware and safety equipment is securely fastened before placing weight on the lanyard or life-support rope. All climbing knots shall be tied, dressed, and set prior to ascending. All personnel shall follow the recommendations of the manufacturer of the cordage with respect to the use of splices. (3-29-17)

03. Climbing Equipment. (3-29-17)

a. A climbing harness provides both pelvic and upper-body support, and may be a one (1)-piece, full-body harness, or any two (2)-piece design that meets industry standards. (3-29-17)

b. Climbing and life-support lines shall be conspicuous and easily identifiable. (3-29-17)

c. All lines and webbing used for life support shall have a minimum breaking strength of five thousand four hundred (5,400) pounds and may only be used for climbing. (3-29-17)

d. When a cutting tool is used in a tree, the climbing rope (lanyard) shall be a high-quality steel safety chain of three-sixteenths (3/16) inch size or larger, or a wire-core rope. (3-29-17)

e. A life-support rope evidencing excessive wear or damage or that has been subjected to a shock load shall be removed from climbing service. (3-29-17)

04. Climbing Operations. (3-29-17)

a. Ensure climbers are appropriately well-trained in climbing and in the use of all equipment to carry out assigned tasks. (3-29-17)

b. While climbing operations are underway, co-workers and others on the ground shall stay clear of potential falling objects. If co-workers must work directly below a climber, the climber shall stop any activity in which objects could be dropped or dislodged until the area below is cleared. Climbers shall provide warning whenever any material may be likely to fall or is dropped deliberately. Unsecured equipment, rigging, or material shall not be left in the tree. (3-29-17)

c. Yarding activity must cease within reach of a tree or guylines of a tree where a climber is working. Machinery may operate in reach of the climber to hoist rigging into the tree. In such circumstance the following shall apply: (3-29-17)

i. A spotter shall be utilized and yarding operations shall be performed with extra caution; (3-29-17)

ii. The machine operator and the spotter shall give the task their undivided attention; (3-29-17)

iii. Equipment that is nearby and which may be noisy, such as power saws, tractors, or logging machines shall be shut down if the noise interferes with signal communications with the climber; and (3-29-17)

iv. Lines attached to a tree in which a climber is working shall not be moved except on a signal from the climber. (3-29-17)

d. Tree climbers shall use a three (3)-point climbing system whereby three (3) points of contact must be firmly in place on a secure surface before moving to another point. Along with hands and feet, other points on the body, such as a hooked knee, can be considered a point of contact if it can support the full body weight. Additionally, the places of support must be secure, and climbers should use care to void unsound branches or stubs as a contact point. A lanyard around the tree secured to the safety harness or climbing belt on both ends constitute two (2) points of contact. (3-29-17)

e. Climbing without being secured to the tree is prohibited, except in conifers, when in the judgment of a qualified climber, the density of branches growing from the stem make attaching the lanyard more hazardous than simply climbing the tree. In such instances, the climber shall evaluate the tree farther up, and use attachments when it is safe to do so. (3-29-17)

05. Topping Trees. Only an experienced climber with experience felling trees shall top a tree. Cutters shall not cut when wind or other conditions make doing so hazardous. Standard safe felling procedures shall apply, with the additional following requirements: (3-29-17)

a. A chainsaw with a bar short enough to make both the face-cut and backcut easily from one side shall be used. (3-29-17)

b. Cutters shall determine the felling direction and ensure there are no obstructions. Consideration shall be given to the fact that an impact could cause violent movement in the tree being topped where the climber is perched. (3-29-17)

c. A safety chain shall be wrapped around the tree just below the cut to prevent the tree from splitting or slabbing down inside the climbing rope. (3-29-17)

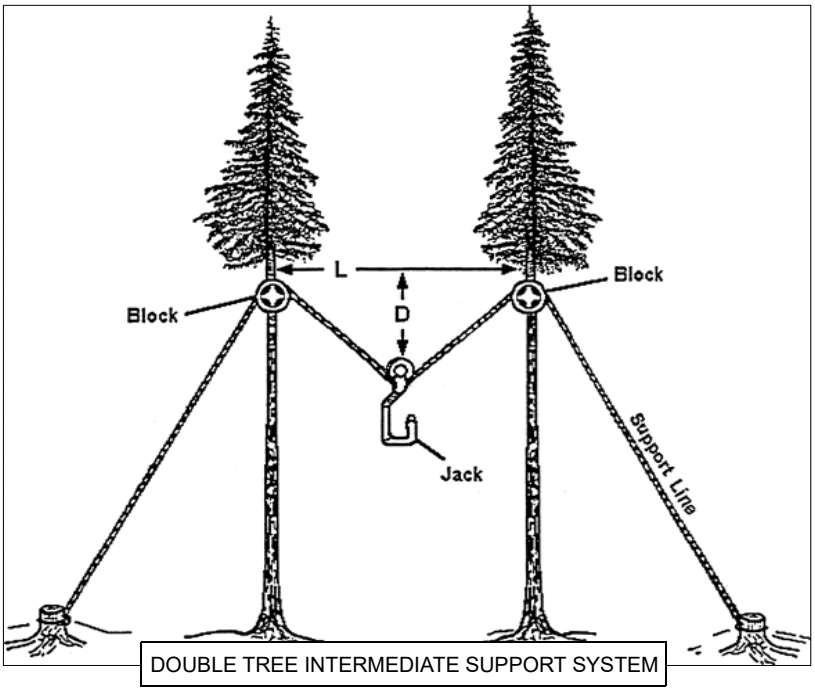
d. The cutter shall ensure he is comfortable, and avoid any awkward cutting position. (3-29-17)

e. Exact cuts should be made. There is no escape route for the climber to get away from the stem to avoid kickback or a splintered hinge. When making horizontal side cuts, extra care shall be used to stay on the line of the backcut to avoid wood breaking away with the saw as the top falls. (3-29-17)

015. TYPICAL RIGGING SYSTEMS.

01. See Figures 015.16-A through 015.16-H.

FIGURE 015.16-A



DOUBLE TREE INTERMEDIATE SUPPORT SYSTEM

FIGURE 015.16-B

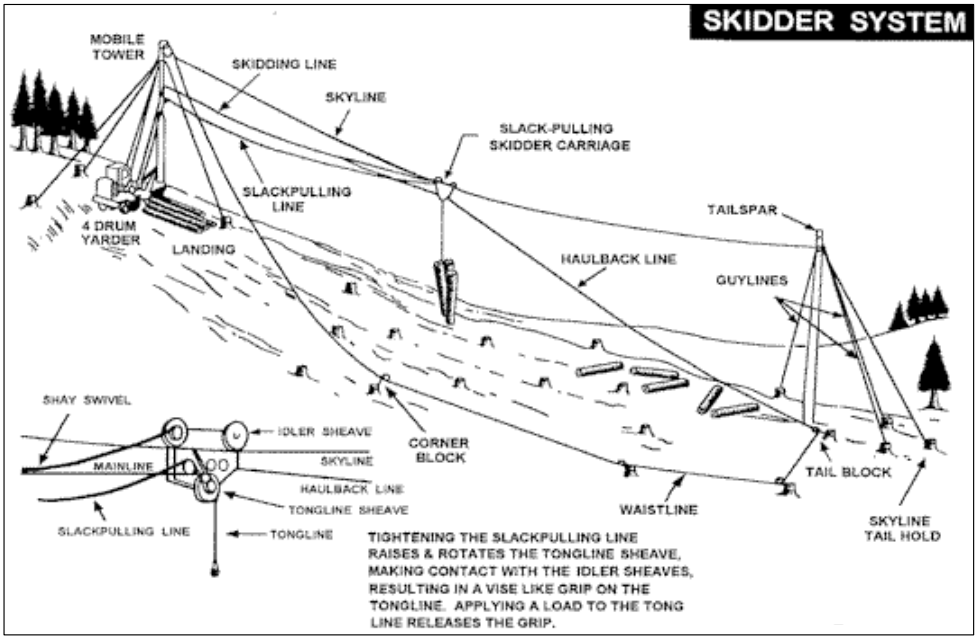


FIGURE 015.16-C

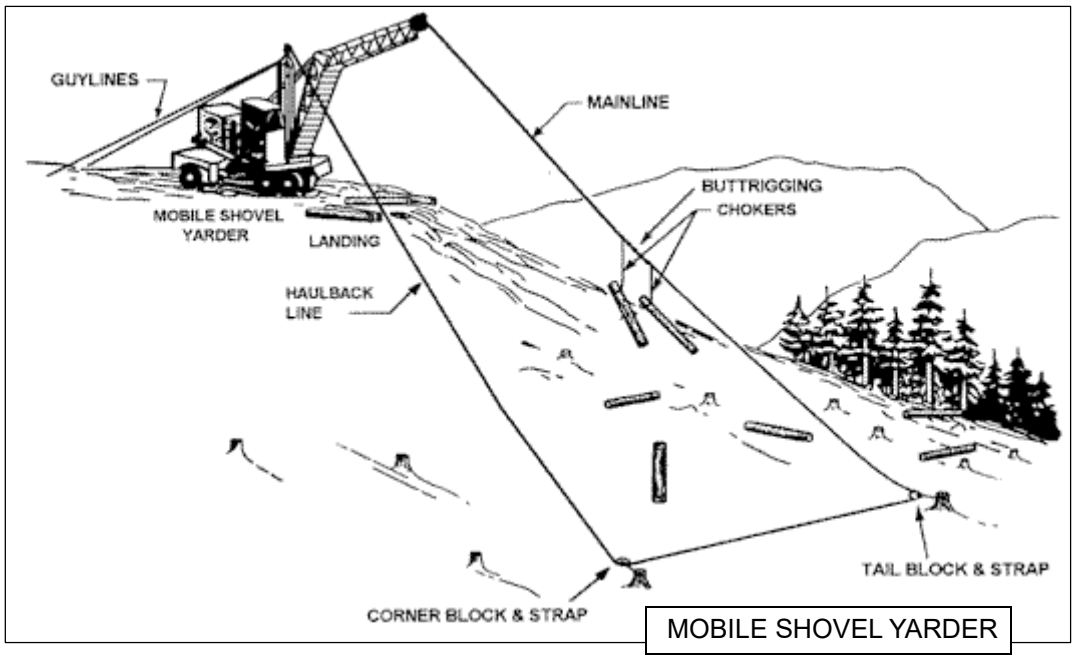
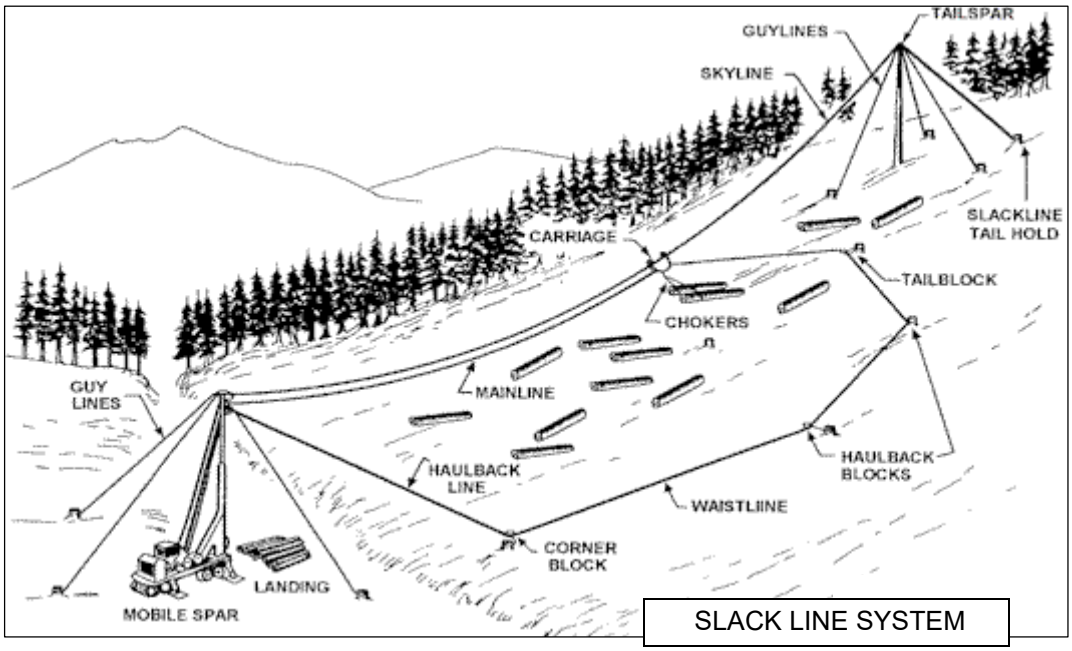
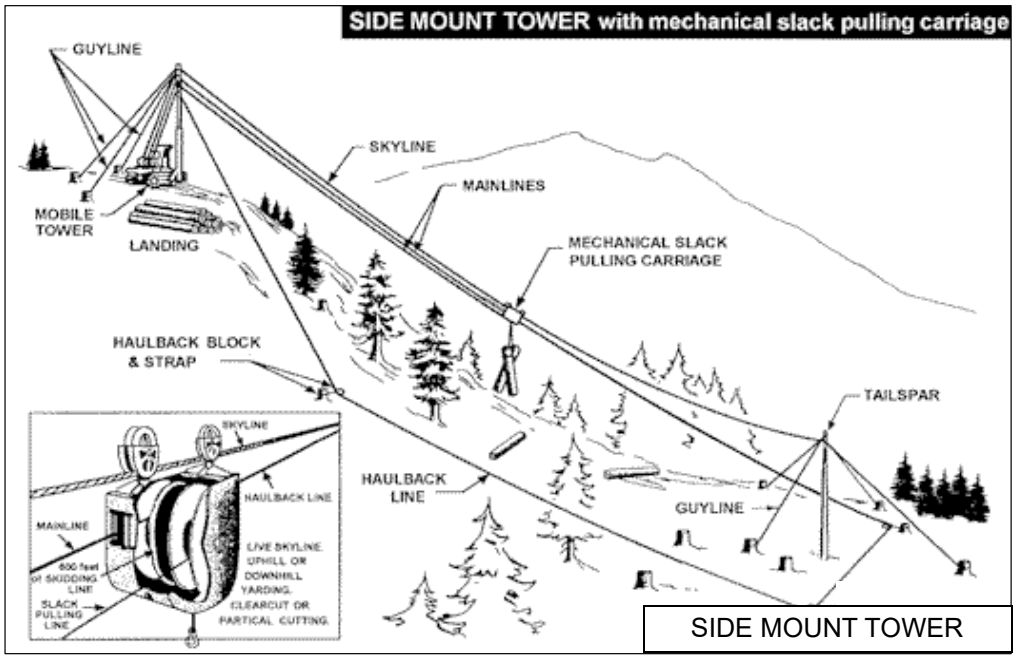


FIGURE 015.16-D



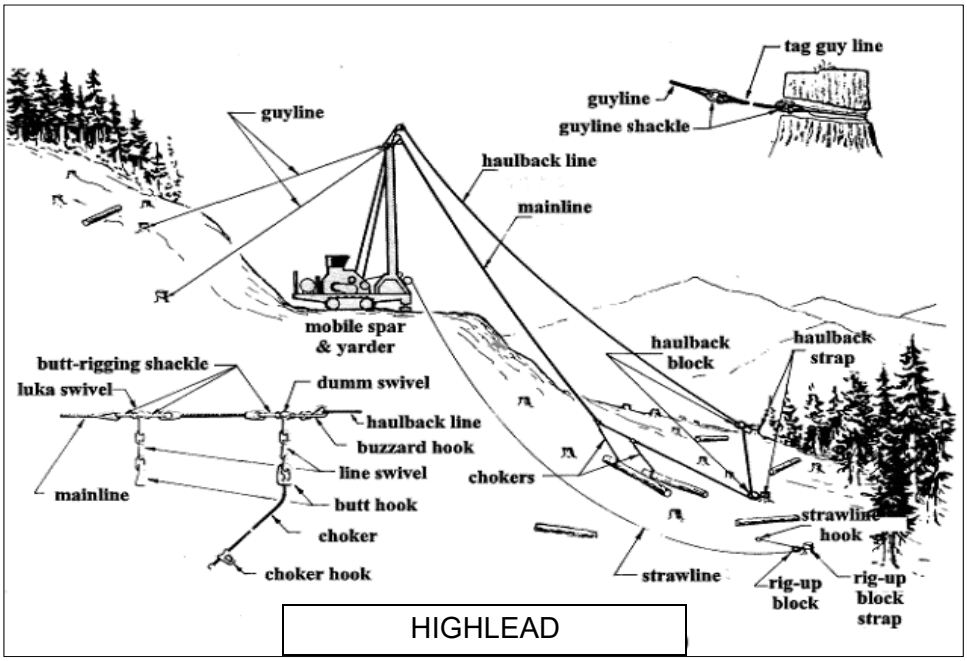
SLACK LINE SYSTEM

FIGURE 015.16-E



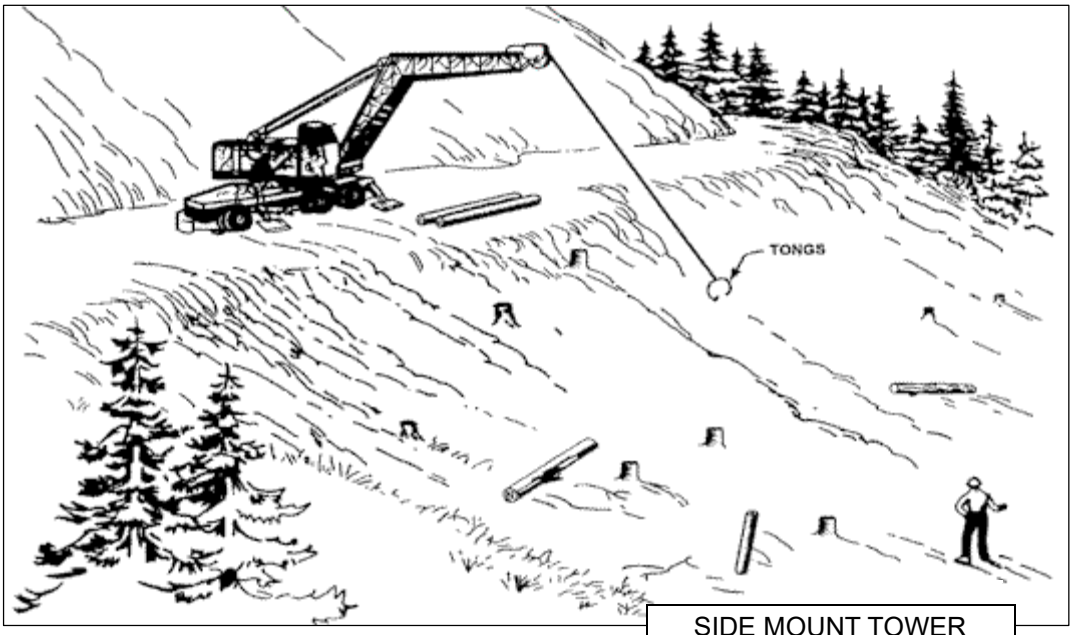
SIDE MOUNT TOWER

FIGURE 015.16-F



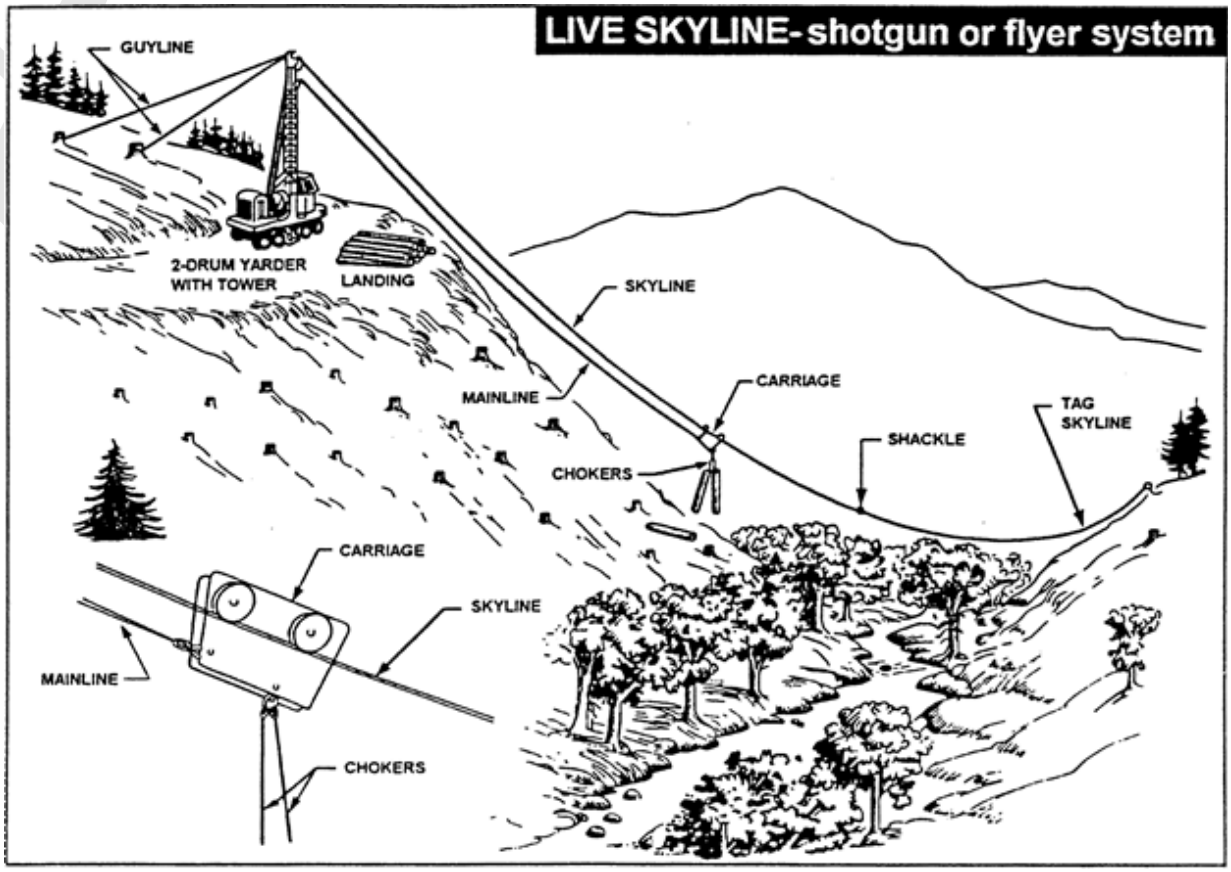
HIGHLEAD

FIGURE 015.16-G



SIDE MOUNT TOWER

FIGURE 015.16-H



(3-29-17)

016. -- 999. (RESERVED)

Subject Index