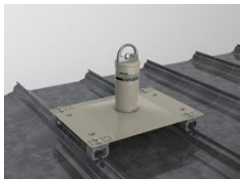
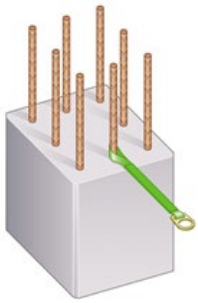
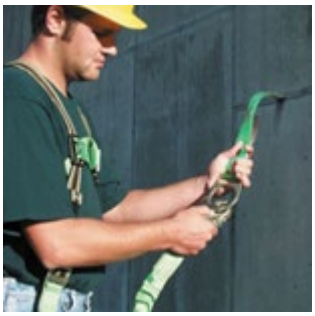
APPENDIX D--EXAMPLES: FALL PROTECTION ANCHORS BY TYPE

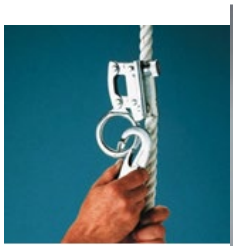
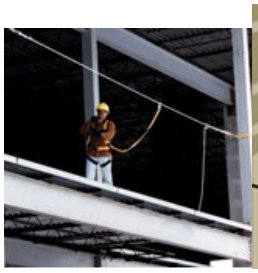
This appendix identifies various types of anchors, how they are generally used and shows an image of the anchor in use.

Anchor Type	Typical Use or Purpose	Illustration
Peak Anchor (One or Two D-Rings)	Typically used on a house roof after it is sheathed or fully constructed. They are typically left in place after the job is completed for future repairs.	 
Truss Anchor (including Spreaders)	Used before a structure is fully framed. A spreader is a method a qualified person may use to improve anchor point lateral stability before trusses are fully sheathed.	 
Engineered Clamp		
I-beam clamp and structural steel (vertical or horizontal beams)	The clamp adjusts to various steel beam sizes.	 
Trolley beam anchor	Allows a worker to have greater access to a larger area without a longer lanyard.	

Anchor Type	Typical Use or Purpose	Illustration
Standing seam metal roof anchor	For workers on standing seam metal roofs. This anchor clamps onto parallel seams.	
Doorway and window opening clamp	For anchoring between interior building framing or a window opening.	
Top Plate Anchor	For activities near the framed wall top plate.	
Strap Anchor		
Cable anchorage sling	For use around structural steel or I-beams.	
Drop-through anchor cable	Anchor point drops through a small hole in an overhead substrate (concrete or steel).	
Strap anchor (web)	For sturdy horizontal structures (e.g., beams or structural steel members). Sharp or rough edges could damage the strap.	

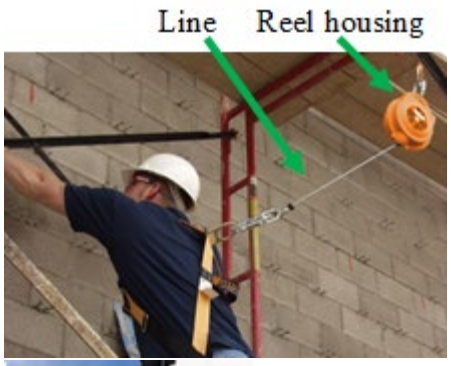
Anchor Type	Typical Use or Purpose	Illustration
Concrete Anchor		
Concrete anchor strap with D-ring	Often used by workers conducting foundation and formwork. The concrete anchor strap has a tough sleeve or wear-pad that protects it from abrasion where it contacts concrete.	  The strap loop slips over rebar and is left in place (with D-ring exposed) when concrete is poured. When no longer needed, the strap is cut flush with the concrete surface. Photo: a worker connects a shock-absorbing lanyard to an embedded concrete anchor strap.
Precast hollow core concrete anchor	For workers performing activities with precast hollow concrete. Allows a single worker to tie off.	
Bolt-on wall anchor	Temporary or permanent anchor point on a vertical concrete wall.	
Welded Anchor		
Welded D-ring anchor	Single D-ring temporary or permanent anchor point that is welded onto vertical structural steel.	

Anchor Type	Typical Use or Purpose	Illustration
Weld-on anchor post	This permanent anchor point is welded onto an I-beam.	
Trench Box Guardrail Anchor	For performing deep excavation. The trench box guardrail is designed with an anchor point on a post near the guardrail.	 
Anchor Not Bolted or Clamped in Place		
Mobile fall protection system	Intended for a single worker using a fall arrest system. It allows quick mobility from place to place on a job site. Larger versions allow multiple workers to anchor.	
Rotating retractable anchor mast	For use on sloped residential roofs. Allows the worker greater range of motion (up to 360 degrees for some models) and helps elevate the anchor point above the worker.	
Dead weight anchor	For use on roofs where penetrating the surface is not an option. Anchorage is provided by the weight of heavy materials (e.g., concrete, steel, water bladder).	 

Anchor Type	Typical Use or Purpose	Illustration
Bolt hole anchor	For use in horizontal steel bolt holes.	
Vertical Lifeline		
Rope grab (with vertical lifeline)	Rope lifeline attaches to an anchorage at the top and hangs vertically down through the work area. Movable rope grab attaches to the rope. Lanyard connects the rope grab to workers' harness.	  To move up and down the work area, the worker can slide the rope grab up and down the lifeline, then relock it in place. If the worker falls, the rope grab locks onto the rope to break the fall. This system's effectiveness depends on how well the worker is trained to reposition the rope grab while moving about. The grab can slide off the end of the rope if the rope is too short, if a knot is not tied near the end of the rope, or if the grab is not installed properly.
Horizontal Lifeline	This hybrid system uses one line (firmly anchored at both ends) as the anchorage for another. This allows the worker greater lateral movement than a fixed anchor point. The components are the same as other personal fall protection systems. A deceleration device or rip-stitch lanyard can be included.	  In some cases, more than one worker will connect to the horizontal lifeline if approved by the manufacturer and a qualified person.
Photos used with permission of the manufacturers.		

Examples: Lanyards, Deceleration Devices, Harnesses, and Body Belts

Device Type		Typical Use or Purpose	Illustration
Lanyard	Lanyard (typical 2-foot and 6-foot lengths)	Lanyards are available in a variety of lengths.	
	Y-lanyard (or twin-leg lanyard)	Typically used during work on cranes, rebar and steel structures, and poles. By attaching and reattaching the legs in different positions, the worker can move across the work face, remaining connected by at least one leg of the lanyard at all times.	
Deceleration Device	Rip-stitch-style Shock Absorbing Lanyard	These typically expand by approximately 3.5 feet during deceleration, which reduces the force on the worker.	 
	Stretch-type Shock-Absorbing Lanyard	These absorb force in a fall by stretching (or by a similar mechanism) on impact to provide a controlled deceleration.	

Device Type		Typical Use or Purpose	Illustration
	Self-retracting lifeline (line wound on a reel in a reel-housing)	The lifeline is wound on a reel and automatically extends or retracts to take up slack in the line as the worker moves about. A sudden extension in the line activates a locking mechanism that typically includes a deceleration device. Some self-retracting lanyards can be set to restrict the distance traveled and so can also function as part of a properly designed fall restraint system.	 
Body Harness		Used in personal fall protection systems. Has a D-ring on the back between the shoulders when used for fall arrest and fall restraint systems. Workers need to be fitted with the correct harness size. Available with special features such as an integrated high-visibility vest, extra D-rings (for use with positioning devices), life vest (for over-water work), or various buckle and closure styles.	  

Device Type	Typical Use or Purpose	Illustration
Body Belt	In general, harnesses are preferable to body belts. Body belts may be used in limited instances (e.g., as part of a positioning device system).	
Thimble	Thimbles provide a protective interface between the eye of a rope loop and a connector. They are used to prevent pinching or abrasion of the rope. The thimble needs to be firmly seated in the eye of the rope loop.