Activity Hazard Analysis (AHA) — Site Clearing and Grubbing

Overall RAC: **M** · SAMPLE formatted to EM 385-1-1 (15 March 2024) and ENG Form 6206 (SEP 2024) conventions. Adapt every step, hazard and control to actual site conditions; requires competent-person preparation, SSHO review and Government acceptance before the definable feature of work begins (EM 385-1-1 2024, para 2-6). Contracts solicited before 15 March 2024 remain governed by the 2014 edition — verify which edition your contract cites.

JOB STEPS	HAZARDS	CONTROLS	RESIDUAL RAC
Mobilization, utility locates, and pre-clearing site survey	Strike on unknown underground utilities (electric, gas, communications, water) while grubbing stumps and ripping root mats	• Obtain a dig permit from the local public works organization or other authority having jurisdiction before any ground-disturbing work, processed through the USACE supervisor/KO or COR (25-8.f(1)). • Contact utility companies and responsible authorities to locate and mark all underground utilities within the clearing limits before mobilizing equipment (25-8.f(2)). • If grubbing or root ripping will occur within 3 ft of a marked utility, physically verify the utility location by non-destructive methods (hand digging or vacuum excavation) and neutralize the system before mechanical work (25-8.f(3)).	M
	Contact with overhead power lines during tree survey and equipment mobilization	• Have the Qualified Tree Worker make a visual inspection for electrical hazards before any tree maintenance or removal activity begins; treat all conductors as energized (31-8.b). • Establish and brief a minimum 10 ft separation distance from energized conductors for all tree workers who are not qualified line-clearance trimmers (31-8.b(4)). • Where trees cannot be safely cleared of electrical hazards, arrange with the power company to de-energize, test, isolate, and ground the conductors before work (31-8.b(1)).	M
	Exposure to poisonous plants, ticks, and stinging insects during walking survey	• Instruct all employees exposed to poison ivy, poison oak, and similar irritant plants on the hazards, protective clothing, and first aid, per OSHA 1926.604(a)(1). • Require long sleeves, gloves, and insect repellent for ground crews; identify and flag heavy irritant-plant areas during the pre-work walkdown. • Stock the first-aid kit with wash/decontamination supplies and brief the crew on reporting any allergic reaction immediately.	L
Establish work zone, access control, and staging areas	Unauthorized personnel or public entering the felling and equipment operating area	• Implement access control to the work site as required by the Tree Maintenance and Removal Plan (31-7.e): flag or barricade the clearing limits and post signage at access points. • Instruct each worker on the exact tasks to be performed; workers not directly involved in felling must keep clear of the work area (31-8.f(3)). • Establish felling paths at least twice as long as the height of the tallest tree being felled, to account for limbs and debris thrown after impact, before any felling starts (31-8.f(2)).	L
	Slips, trips, and falls on uneven, vegetated, or muddy terrain	• Walk down and flag holes, drop-offs, and unstable ground before equipment and foot traffic enter the area. • Require leather safety-toe boots with ankle support for ground crews and maintain cleared walking paths to work locations. • Suspend ground operations on steep or saturated slopes until conditions are evaluated by the Competent Person.	L

JOB STEPS	HAZARDS	CONTROLS	RESIDUAL RAC
Equipment inspection and setup (dozers, excavators, chipper, chainsaws)	Operating defective or unguarded clearing equipment	• Have the Competent Person inspect all machinery and mechanized equipment before it is placed into use, document the inspection on a checklist, sign it, and submit it to the USACE supervisor/KO or COR (18-5.b(1)). • Operator checks each vehicle and machine before each use (not more than once per shift) for brakes, tires, horn, steering, seat belts, operating controls, and safety devices such as back-up alarms (18-5.a(4)). • Verify dozers and similar clearing equipment have FOPS guards, canopies, or grills appropriate to the clearing operation, certified by the manufacturer or a licensed engineer (18-8.b(14)), and ROPS with seat belts (18-8.b(15), 18-8.b(11)). • Immediately tag out and remove from service any equipment found unsafe until corrected by a Qualified Person (18-8.a(2)).	L
	Chainsaw or chipper mechanical failure and missing safety devices	• Inspect and test chainsaws before each use per the manufacturer's instructions; remove defective saws from service (13-5.a). • Verify each chainsaw has a functioning clutch, automatic chain brake, throttle trigger latch, stop switch, rear hand guard, chain catcher, and spark arrestor per ANSI/OPEI B175.1/A1 (13-8.i(1)). • Verify the chipper's infeed protection: an 85-inch infeed hopper with flexible anti-kickback device, or a quick-stop and reversing device on mechanical infeed models, plus an ignition locking device (31-8.g(2)(b), (c), (f)). • Chock or otherwise secure trailer-mounted chippers when detached from the truck (31-8.g(2)(h)).	L
	Caught-in equipment during field repairs and adjustments	• Do not remove guards or safety devices except for immediate repairs, and only after the equipment is de-energized and hazardous energy control (LOTO) procedures are implemented (18-8.b). • Restrict tests, maintenance, and repairs to a Qualified Person working per the manufacturer's instructions, with all work documented (18-8.a(1)).	L
Tree felling and removal	Struck by falling tree, limbs, or thrown debris	• Before felling, the Qualified Tree Worker inspects each tree and the surrounding area for hangers, dead limbs, lean, root-mass stability, barber-chair potential, lodged trees, and foreign objects such as fence wire or nails (31-5.c). • Work to an accepted Tree Maintenance and Removal Plan identifying tree sizes, direction of fall, landing zone, and a retreat path for the sawyer (31-7.a(1), 31-7.d). • Establish felling paths at least twice the height of the tree; where that distance cannot be secured, limb the tree first (31-8.f(2)). • On trees over 5 inches diameter, use a proper notch and back cut — never slicing or ripping cuts — with notch depth no more than one-third the trunk diameter (31-8.f(5)). • Give an audible warning just before the tree falls and confirm all personnel are out of range; workers move away from the butt as the tree starts to fall (31-8.f(8), (11)).	M
	Chainsaw cuts and kickback	• Only operators trained per the manufacturer's recommendations in PPE, fueling, cutting techniques, kickback avoidance, and binding reaction may run chainsaws (13-3.c). • Start saws on the ground with the chain brake engaged — never drop start — and only after all co-workers are clear (13-8.i(4), (5), (3)). • Hold the saw with both hands during all cutting and never cut above shoulder height (13-8.i(8), (10)). • Wear chainsaw PPE: hard hat, eye protection, cut-resistant leg chaps, safety boots, and hearing protection; anyone assisting the sawyer at a stump wears the same level of PPE (31-8.a(1)-(3)). • Do not fuel a running or hot saw, and do not start it within 10 ft of the fuel container (13-8.i(7)).	L

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	Electrocution felling trees near energized lines	• Assign only a Qualified Line-Clearance Tree Trimmer (or supervised trainee) to work in close proximity to conductors that cannot be de-energized (31-8.b(2)). • All other tree workers maintain at least 10 ft separation from energized conductors per table 11-4 (31-8.b(4)). • Use wedges, block and tackle, rope, or cable to control fall direction away from lines — except where an electrical hazard exists — and limb trees so they fall clear of wires (31-8.f(9)).	M
Brush cutting and chipping	Caught in brush chipper infeed	• Operate the chipper per the manufacturer's instructions with all operators trained per para 31-3.d (31-8.g(2)(a)). • Never place hands, arms, feet, or any body part on the feed table while the chipper is operating or the rotor is turning; feed with push-sticks that can be consumed by the chipper or with long branches (31-8.g(2)(j)). • Feed from the side of the centerline (curbside on roadways) and turn away immediately as the brush is taken into the rotor (31-8.g(2)(k)). • Workers feeding the chipper wear eye protection and must not wear loose clothing, gauntlet gloves, rings, or watches (31-8.g(2)(i)). • Never raise or remove the discharge chute or cutter housing cover while any part of the chipper is turning (31-8.g(2)(m)).	M
	Struck by flying chips and ejected material	• Do not feed stones, nails, sweepings, or other foreign material into the chipper (31-8.g(2)(l)). • Verify the chipper is equipped with a discharge chute of sufficient length or design to prevent contact with the blade (31-8.g(2)(e)). • Keep cutting bars and blades sharp, properly adjusted, and maintained per the manufacturer's recommendations (31-8.g(2)(g)).	L
	Struck by hand-carried brush and hand tool injuries	• Keep the site clear of accumulated brush and logs so no hazards are created at the work site (31-8.g(1)). • Organize and position multiple workers cutting on the same area so the actions of one worker do not create a hazard for another (31-8.h(2)(a)); give an audible warning before limbs are dropped (31-8.h(1)(b)). • Carry hand tools in bags, belts, or sheaths designed for them — not in pockets or boot tops (31-8.c(2)).	L
Grubbing — stump and root removal with dozer/excavator	Equipment rollover on slopes, stumps, and uneven ground	• Grub with crawler equipment fitted with ROPS (18-8.b(15)) and require operators to wear seat belts at all times (18-8.b(11)). • Work slopes up-and-down rather than across where practicable, and have the Competent Person evaluate steep or unstable areas before equipment enters. • Comply with OSHA 1926.602 for earthmoving equipment operations, including brakes, access, and audible alarms.	L
	Operator struck by falling or flying objects (springing roots, thrown stumps, falling snags)	• Equip all dozers, tractors, and similar equipment used in clearing operations with guards, canopies, or grills appropriate to the nature of the clearing work, certified by the manufacturer or a licensed engineer (18-8.b(14)). • Fell or remove dead snags and lodged trees identified in the pre-work tree inspection before grubbing beneath them (31-5.c(1)(k)). • Keep ground personnel outside the swing radius and travel path of grubbing equipment; use a warning device or signal person where persons are endangered by moving equipment (18-8.b(2)).	L
	Underground utility strike while ripping roots and pulling stumps	• Grub only within areas cleared by the dig permit and utility markout (25-8.f(1), (2)). • Within 3 ft of any marked utility, stop mechanical grubbing and physically verify the utility by non-destructive means before continuing (25-8.f(3)). • Brief operators on the utility markings daily and stop work immediately if unidentified pipe, conduit, or cable is uncovered; notify the SSHO and the USACE supervisor/KO or COR.	M

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	Ground personnel struck by reversing equipment	• Verify back-up alarms are installed, audible above surrounding noise, operate automatically through the entire backward movement, and are never removed or disabled (18-8.b(1)). • Use a signal person when the point of operation is not in full view of the operator, when backing more than 100 ft, on hazardous terrain, or when two or more vehicles back in the same area; otherwise the operator walks behind the vehicle before backing (18-8.c(14)). • Require high-visibility apparel for all ground personnel working around equipment.	L
Loading and hauling debris off site	Workers struck by loaders and dump trucks during loading	• Workers stand clear of vehicles being loaded to avoid being struck by spillage or falling material (25-8.e(2)). • Drivers leave the cab during loading when exposed to danger from suspended loads or overhead loading equipment unless the cab is adequately protected (18-8.c(16)(a)). • Use a signal person for truck backing in the loading area when the operator's view is obstructed (18-8.c(14)).	L
	Unstable or oversized loads and unsafe dump trucks on haul routes	• Do not load vehicles in a manner that obscures the driver's view ahead or to either side or interferes with safe operation (18-8.c(16)(b)). • Inspect and document all dump trucks brought onto the project before they are placed in service (18-5.a(3)). • Secure logs and debris loads per DOT requirements before entering public roads and confirm the designated haul route with the KO or COR.	L
Demobilization and site cleanup	Residual brush, logs, and stump holes left as hazards for follow-on trades	• Keep the site clear of brush and logs so no hazards are created at the work site; complete debris removal before releasing the area (31-8.g(1)). • Backfill or barricade and flag stump holes and depressions before demobilizing, and document remaining hazards in the turnover to the next DFOW. • Update the AHA and notify the approval authority if site conditions at turnover differ from those assumed (2-6.d(5)).	L
	Caught-in/struck-by while loading equipment onto transport trailers	• Use a signal person to guide equipment onto trailers whenever the operator's view of the point of operation is not full (18-8.c(14)). • Keep all personnel clear of the loading ramp path and between towed and towing vehicles except when hooking or unhooking (18-8.c(12)). • Distribute, chock, tie down, and secure the equipment on the trailer (18-8.c(16)(c)); do not move unusually heavy loads until the driver has the required permits, verified vehicle and load weights, and a designated route (18-8.c(13)).	L

Equipment To Be Used

• Crawler dozer with certified FOPS guards/canopy and ROPS (18-8.b(14), (15))

• Hydraulic excavator with hydraulic thumb (grubbing/stump removal)

• Brush chipper with compliant infeed protection and ignition lock (31-8.g(2))

• Chainsaws meeting ANSI/OPEI B175.1/A1 with chain brake, chain catcher, spark arrestor (13-8.i(1))

• Dump trucks with back-up alarms, inspected before service (18-5.a(3), 18-8.b(1))

• Chainsaw PPE: hard hat, eye and hearing protection, cut-resistant leg chaps, safety-toe boots (31-8.a)

• High-visibility apparel for ground personnel

• Wedges, tag lines, block and tackle for directional felling (31-8.f(9))

• Push-sticks for chipper feeding (31-8.g(2)(j))

• Utility locating equipment / marking paint and dig permit documentation (25-8.f)

Training Requirements

• Equipment operators trained, qualified by license/certificate/permit, and designated in writing by the employer for each machine operated (18-3.a); proof of qualification carried and presented on request (18-3.b)

• Operator training and evaluation by independently certified examiners, including a practical operating exam on the equipment (18-3.e)

• Chainsaw operators trained per manufacturer's recommendations: PPE, fueling, safe handling, cutting techniques, kickback and binding avoidance (13-3.c; 31-3.f)

• Brush chipper operators trained per the manufacturer's instructions including safe operating procedures (31-3.d)

• Qualified Line-Clearance Tree Trimmer qualification per 29 CFR 1910.269 for any work in close proximity to energized conductors (31-3.c)

• Instruction on irritant and toxic plants, protective equipment, and first aid for exposed employees (OSHA 1926.604(a)(1))

• AHA review and signature by every involved employee before starting work (2-6.d(2))

Inspection Requirements

• Competent Person inspection of all machinery and mechanized equipment before it is placed into use, documented on a signed checklist submitted to the USACE supervisor/KO or COR (18-5.b(1))

• Operator pre-use/shift check of brakes, tires, horn, steering, seat belts, controls, and safety devices including back-up alarms (18-5.a(4)); records maintained at the site (18-5.a(5))

• Dump truck inspection and documentation before trucks are placed in service on the project (18-5.a(3))

• Hand and power tool (chainsaw) inspection and test before each use; defective tools removed from service (13-5.a)

• Qualified Tree Worker inspection of each tree and surrounding area before tree work: hangers, dead limbs, lean, root stability, foreign objects, overhead lines, flying-debris potential (31-5.c)

• Chipper and other tree equipment inspected, maintained, and used per the manufacturers' instructions (31-5.b)

• AHA reviewed and updated when site conditions or work methods change; resubmitted if the RAC increases (2-6.d(5))

Competent / Qualified Person Requirements

• Competent Person to prepare the AHA and designated by name in writing on it (2-6.d(1), 2-6.d(4)(g))

• Competent Person for pre-use inspection of machinery and mechanized equipment (18-5.b(1))

• Qualified Tree Worker to develop the Tree Maintenance and Removal Plan, conduct tree/site inspections, and direct felling operations (31-4, 31-5.c, 31-7)

• Qualified Line-Clearance Tree Trimmer for any tree work in close proximity to energized conductors that cannot be de-energized (31-8.b(2), 31-3.c)

• Qualified Person for equipment tests, maintenance, and repairs (18-8.a(1))

References

• EM 385-1-1 (2024) Ch 18 — Vehicles, Machinery, and Mechanized Equipment (18-8.b(14) FOPS guards/canopies for clearing equipment; 18-8.b(15) ROPS; 18-5 inspections)

- EM 385-1-1 (2024) Ch 31 — Tree Maintenance and Removal (31-8.g Brush Removal and Chipping; 31-8.f Felling; 31-7 Tree Maintenance and Removal Plan)
- EM 385-1-1 (2024) Ch 13 — Hand and Power Tools (13-3.c chainsaw training; 13-8.i chainsaw requirements)
- EM 385-1-1 (2024) Ch 25 — Excavation and Trenching (25-8.f underground utility locates before grubbing/root ripping)
- EM 385-1-1 (2024) Ch 2 — Safety and Occupational Health Program Management for Contractors (2-6 AHA requirements)
- 29 CFR 1926.604 — Site Clearing (Subpart O)
- 29 CFR 1926.602 — Material Handling Equipment (Subpart O)