Informational Summary Report of Serious or Near Serious CAL FIRE Injuries, Illnesses and Accidents

GREEN SHEET

Limb Strike

June 5, 2019

Fork Incident

19-CA-MEU-006683

19-CA-MEU-006700

California Northern Region

SUMMARY

On Wednesday, June 5, 2019, at approximately 12:15 PM, a CAL FIRE employee was injured during tree limbing and removal operations east of Fort Bragg in Mendocino County, California. While tending a lowering system, the branch used for rigging failed unexpectedly and broke away from the tree, falling a distance of 74 feet onto the employee. The employee was transported by air ambulance to a trauma center and was treated for serious injuries.

https://www.surveymonkey.com/r/ZG89C8C

CONDITIONS

Weather (McGuires RAWS):
Temperature: 75° Fahrenheit
Relative Humidity: 49%
Winds: NW 4 MPH
Visibility: Clear

Fuel Type: Timber (Redwood Trees)
Topography: Flat

SEQUENCE OF EVENTS

On Wednesday, June 5, 2019, at approximately 9:00 AM, personnel from the Mendocino Unit were removing tree limbs from several redwood trees near state buildings. The limb removal was necessary due to the life hazard they presented to personnel assigned at the CAL FIRE/California Department of Corrections and Rehabilitation (CDCR) facility.

All personnel involved were given an operational and safety briefing by the trained climber (C1) before operations began. C1 detailed the plan, objectives, emergency procedures, and hazards. An equipment inspection was conducted of all ropes, rigging and hardware being used. Fire Captain 1 (FC1) was assigned as Operations for the event, and was also given the responsibility of overseeing ground operations.

C1 proceeded to use a 'line launcher' (a weighted bag with line attached) to place ropes into the first tree (TREE1) to facilitate the climbing and limbing process. The 'line launcher' drags a small rope behind it when it is launched up and over branches and is used to drag a larger rope through the same path. TREE1 is an 'inosculated tree', with 2 stalks coming from a single trunk. After C1 established the first line in TREE1, a second rope was placed in TREE1 to be used as a life safety line.

Work continued with C1 using the 'line launcher' on the second tree (TREE2). TREE2 was to be used for the 'crane and anchor' line. A lowering system (crane system) was anchored in place in TREE2, by passing the rope over a high branch. Once the rope was placed over the high 'anchor' branch, a pulley was attached to the rope for lowering of tree debris. The rope end, opposite the pulley, was secured to the bottom of TREE2 using several wraps around the base of TREE 2 with a Bowline knot. The crane line suspended a pulley for the rigging line, which was used to lower the debris from TREE1, passing the load over the pulley in TREE2 back through a friction device (Porta-wrap). The rope system was tended by the ground crew for controlled lowering. The height of the 'anchor branch' was 74 feet from the ground.

In TREE1, the access line was passed over a high branch, with a pulley on one end, then secured around the base of TREE1 with a Bowline knot. A DRT (Double Rope Technique) was used by C1 to run over the pulley to the Bowline knot, with a second rope on the same access point. The DRT system allows the ground crew to assist C1 with ascending.

Once the ropes were placed in TREE1, C1 ascended TREE1 and began the process of securing a limb, cutting the limb, and in some cases, grouping limbs for lowering. The ground crew, using the rigging line in TREE2, lowered the debris to the ground. Due to the positioning of TREE1 and TREE2, C1 had no visual contact with either the crane or rigging line during the lowering evolution.

At times, multiple branches from TREE1 were grouped on the rigging line. Each branch received a 4 foot piece of looped webbing (utilizing a girth hitch and carabiner) to secure the rigging line as they were cut. After up to 3 branches were cut, the group of branches were lowered to the ground.

After approximately 6 evolutions (17 branches), a group of 3 branches were being cut. Branch 1 and 2 were secured, cut and suspended. Prior to the 3rd branch being cut, webbing was placed and attached to the rigging line. Slack was pulled out of the rigging line by the ground crew, which also lifted Branches 1 and 2. As the cut for Branch 3 was completed, the crane line supported the load of all three branches. The branches were then being lowered toward the ground. At some point, a “POP” was heard in TREE2 as the crane line limb snapped, the timing of which conflicts with several witness statements.

At the time of the crane line branch snapping, the 3-branch load was 211 pounds. It was reported that Fire Captain 2 (FC2) was utilizing their full body weight pulling down on the other end of the crane line. This was to assist with getting branches 1 & 2 lifted, and to take the slack out of the webbing for the third branch. FC2 was estimated at 160lbs. Estimated total load on the crane and rigging lines was approximately 371lbs.

When the crane line branch failed, the ground crew was located near the base of TREE2, where the debris was being caught, and pulled out of the way.

As the crane line branch separated from the tree, it was witnessed by FC1 and the ground crew. FC1 yelled, “BRANCH, GET OUT!”, as most of the ground crew were able to move away from the area near the base of TREE2, however, Fire Captain 3 (FC3) did not, and remained near the bottom of TREE2. FC2 anticipated that FC3 would escape to a safe area along with the rest of the ground crew, however, he did not, and maintained a position directly under the tree. FC1 witnessed FC3 looking upward toward the branch falling out of the tree when the branch impacted FC3 on the helmet. The impact caused FC3 to lose consciousness and fall to the ground.

When struck by the branch, FC3 rolled over twice, coming to rest supine with the limb laying on top of their body with legs entangled within the branch. A chainsaw was

utilized to remove the limb off FC3, to allow for patient care. The limb was moved a short distance from where it fell.

Patient care was immediately initiated by the ground crew. A medical response was requested, including an Air Ambulance. The patient was transported to the pre-designated landing zone. All further operations were suspended, and equipment left in position for investigation purposes.

INJURIES/DAMAGES

- FC3 was struck in the helmet by the falling limb resulting in injuries affecting the spine, chest, shoulder, and head.
- After a thorough review and examination of the helmet, no structural damage was noted.
- The chinstrap was secured behind the brim of the helmet, indicating it was not in place at the time of the impact.
- No mechanism/correlation could be found between the laceration injuries and the helmet structure.

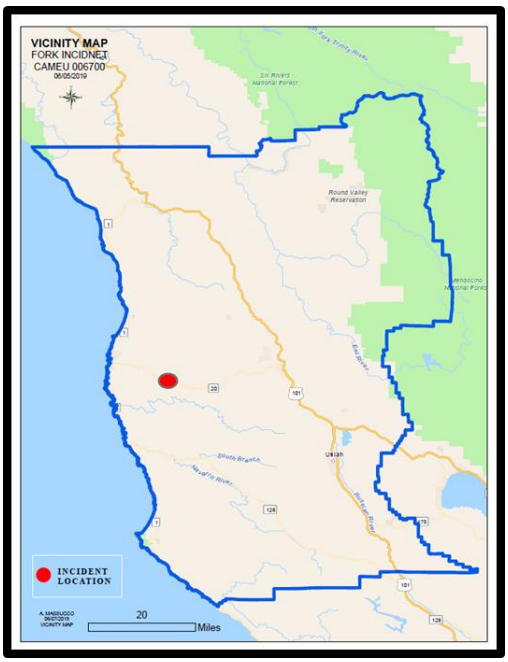
SAFETY ISSUES FOR REVIEW

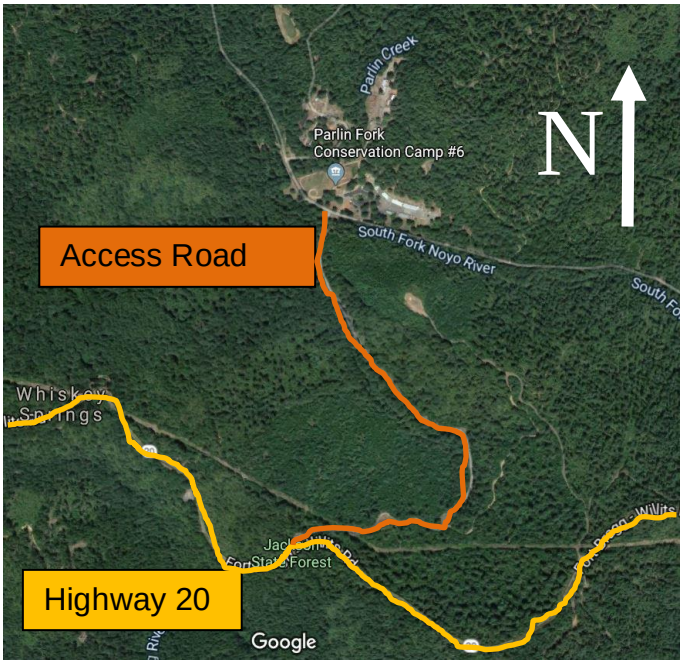
- Follow all Industry Standards for all aerial tree operations and limb removal projects.
- Ensure all applicable safety equipment is in place, including safety glasses and chinstraps.
- While performing tree removal or limb removal projects, do not overload any part of the rope system that is utilized during aerial operations.
- While performing tree removal or limb removal projects, avoid shock loading any part of the rope system during aerial operations.
- Ensure a lookout is utilized to make sure the crane rope does not walk out on the crane anchor limb after each lowering operation.
- Use caution when working directly underneath an anchor.
- Utilize Industry Standards to estimate load weight and adequate anchor strength when employing anchors for rope systems.
- Ensure all trees being worked on are analyzed for stability.
- Maintain situational awareness, and validate as conditions change.
- Make sure all unnecessary personnel are out of the work area during operations.
- Utilize Lookout(s), Communication(s), Escape Route(s), and Safety Zone(s) (LCES) when engaged in chainsaw operations.
- Establish lookouts for all components during operations.
- Ensure that escape routes/safety zones are scouted and clearly identified.

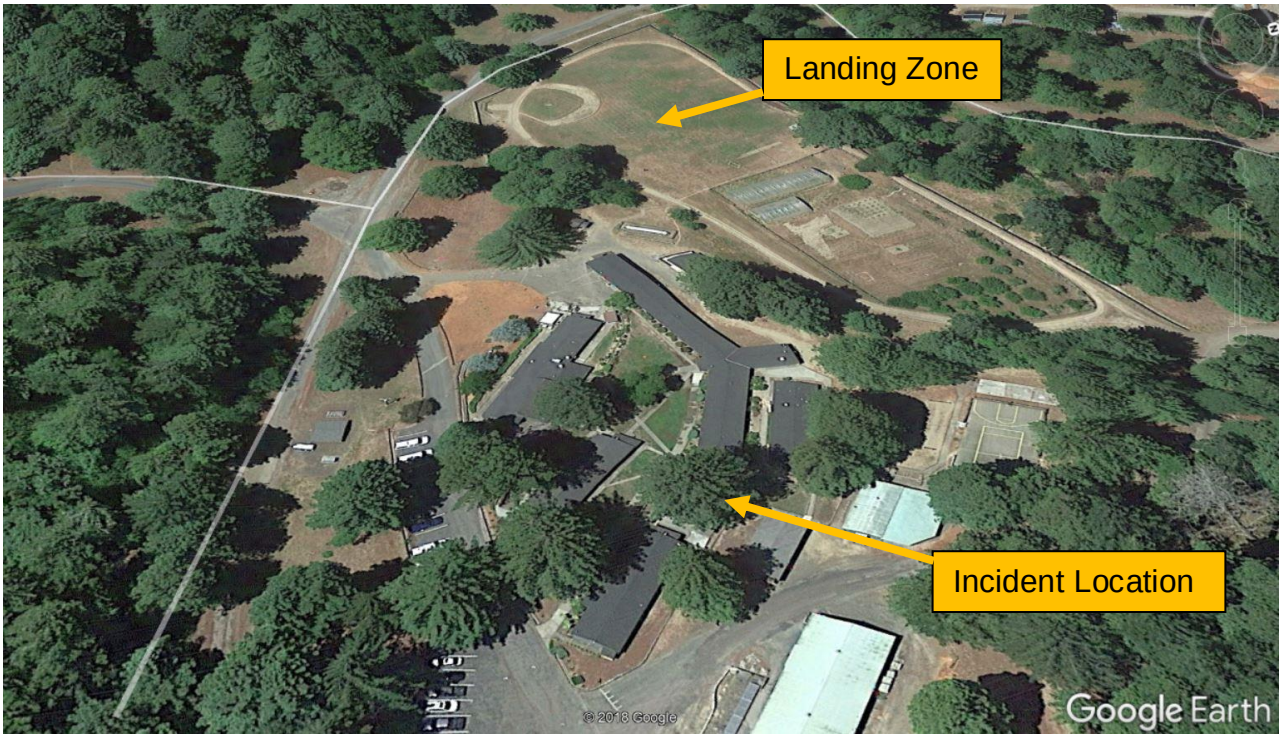
INCIDENTAL ISSUES/LESSONS LEARNED

- FC3 was wearing full, appropriate PPE for chain saw operations. PPE performed as expected, and was instrumental in limiting the extent of the injuries, specifically the helmet.
- Rescue efforts were successful due to proper planning, training and decisive action; always plan and train for the worst-case scenario.
- Personnel were knowledgeable of and trained on equipment and operations.
- Specialized programs require continuous training and ongoing review.
- Personnel participating in technical programs, need to communicate and provide feedback on plan and safety concerns.
- No deviations should be made from the project plan unless they are approved by the project supervisor and discussed with personnel at the tailgate session. If work procedures are changed, a new project plan will be prepared, approved, and discussed with personnel as outlined above.
- Ensure safety work plans/job hazard analysis (IIPP2 and IIPP3) are prepared and posted at the work sites. Keep IIPP 2's and IIPP 3's on file.
- Keep unnecessary personnel out of the immediate area.

PHOTOS/SITE DIAGRAMS/MAPS







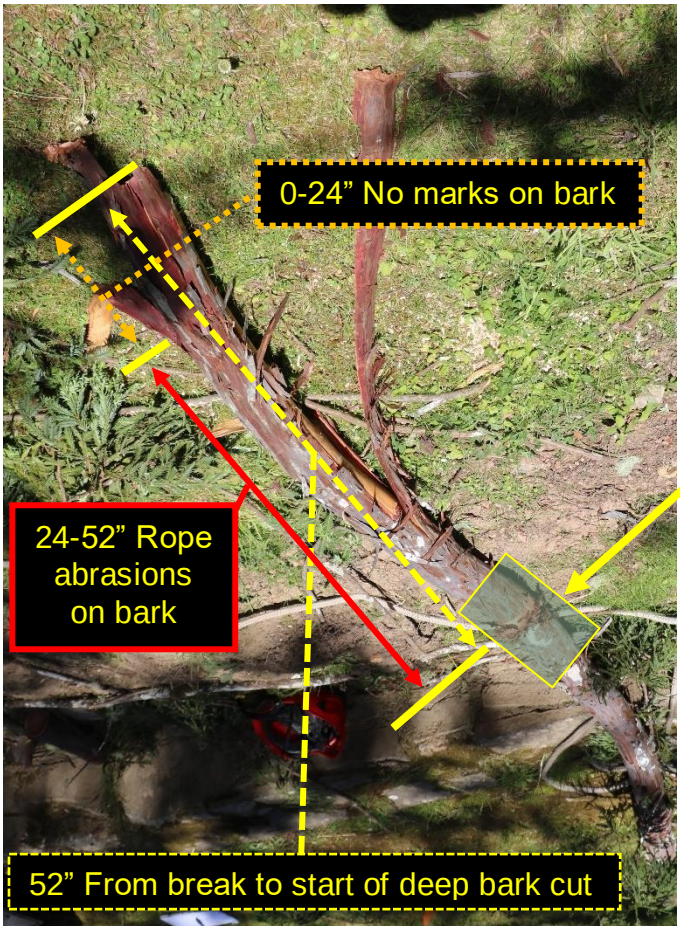
PHOTOS/SITE DIAGRAMS/MAPS

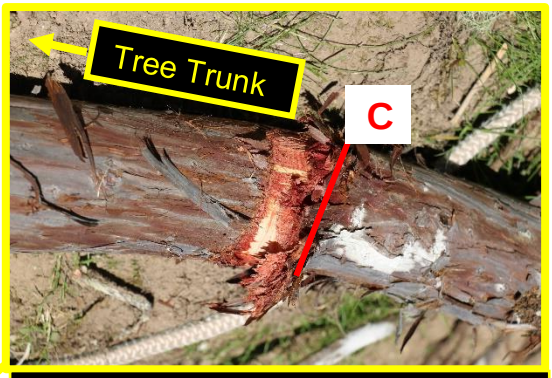
Victim position before and after impact.

PHOTOS/SITE DIAGRAMS/MAPS

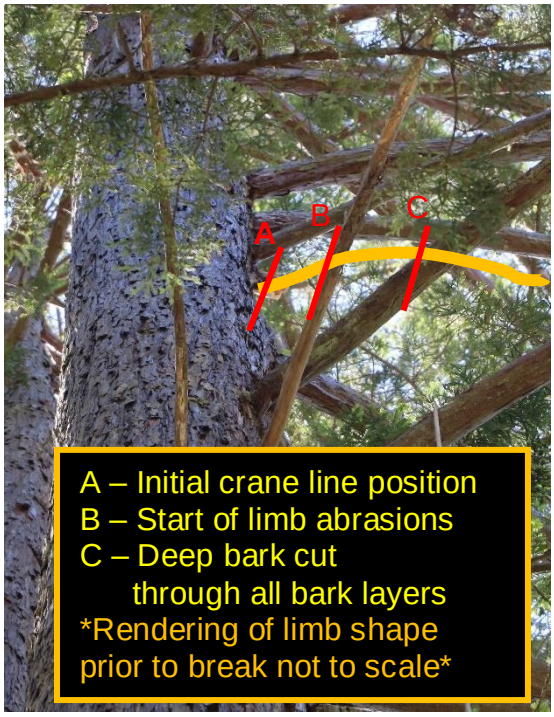
Glasses and helmet location after impact.

PHOTOS/SITE DIAGRAMS/MAPS

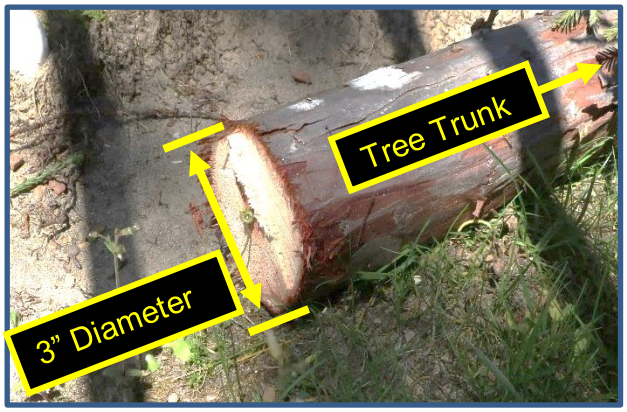




Deep bark cut 52-54” from break



A – Initial crane line position
B – Start of limb abrasions
C – Deep bark cut through all bark layers
Rendering of limb shape prior to break not to scale



Branch diameter at the break was 4½” tapering to 3”, where a cut was made to remove the log off FC3.

Accident limb details

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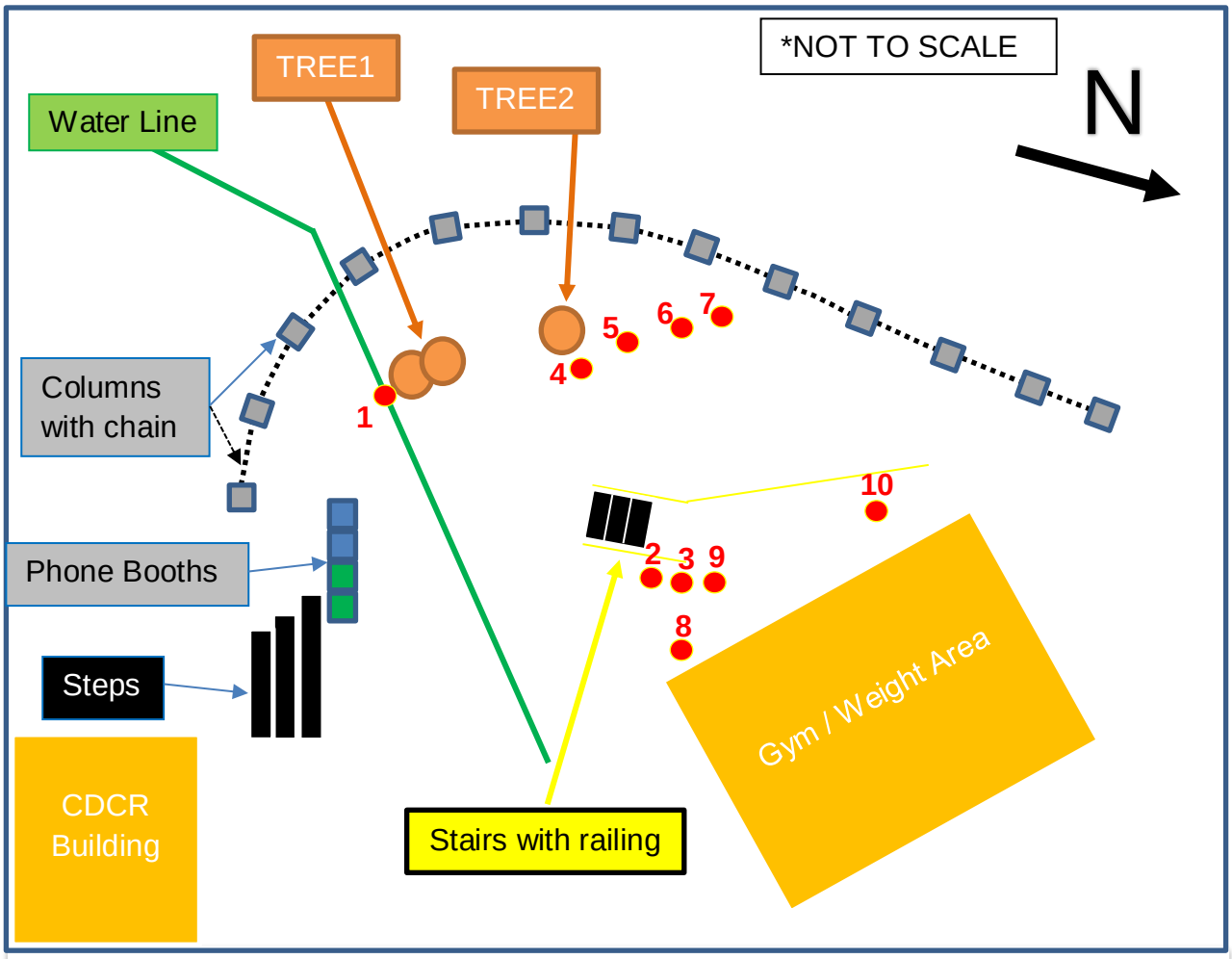


Crew Position Numbers:

1 – C1 – Climber

2 – FC1 – Fire Captain 1

3 – FC4 – Fire Captain 4

4 – FC2 – Fire Captain 2

5 – FC3 – Fire Captain 3

6 – FF1 – Firefighter 1

7 – FF2 – Firefighter 2

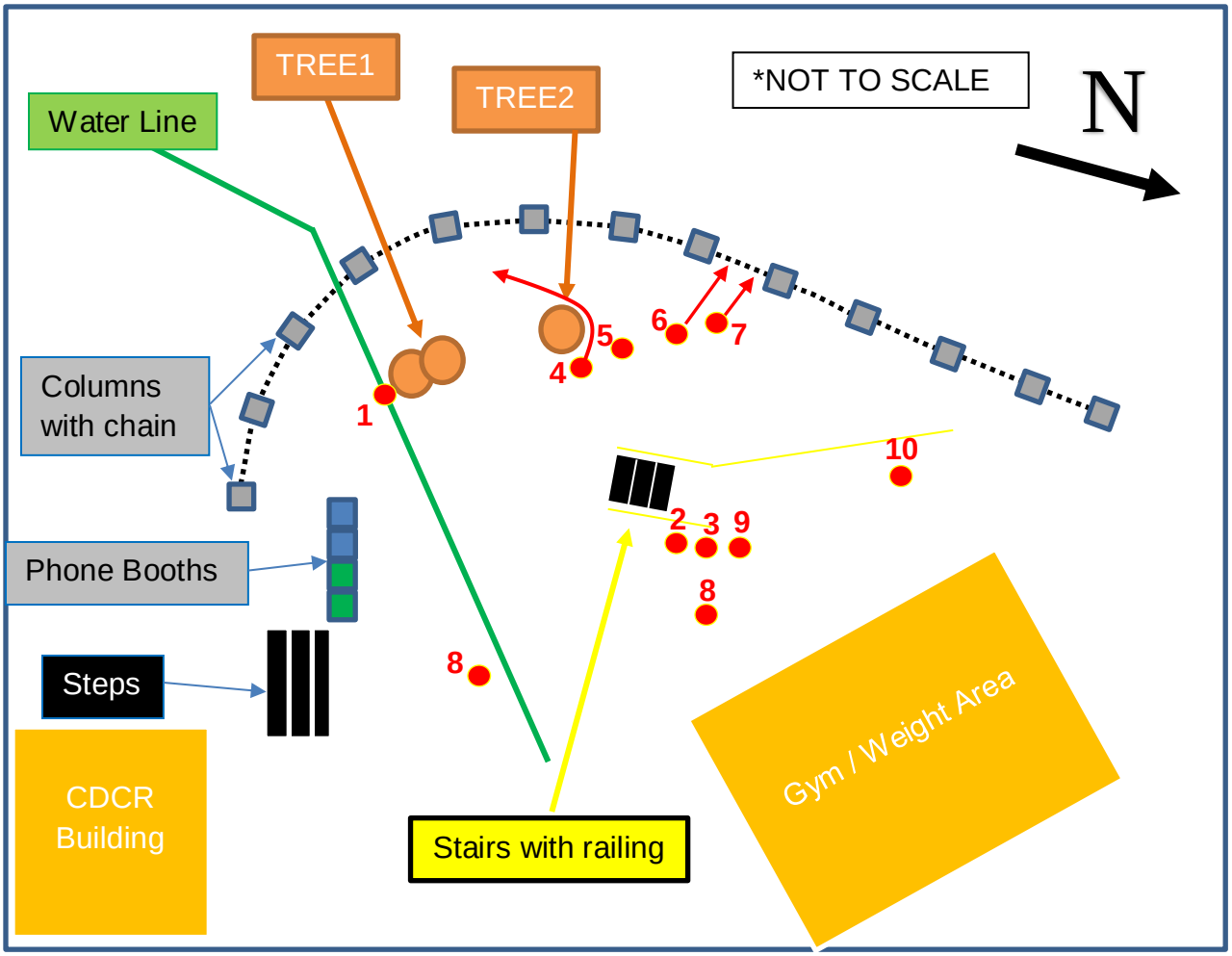
8 – FAE1 – Fire Apparatus Engineer 1

9 – FC5 – Fire Captain 5

10 – FF3 – Firefighter 3

Overhead scene diagram prior to incident.

PHOTOS/SITE DIAGRAMS/MAPS



Overhead scene diagram personnel routes of travel.

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