

ASWP 16 R0

Use of a Mobile Crane to Remove Trees



Revision History

Version	Revision Date	Brief Description of Revisions
R0	February 2016	Document has been updated to new format.

ARBORIST SAFE WORK PRACTICES

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Workplace Safety & Prevention Services wishes to express its appreciation to those who have assisted in the preparation of the **Arborist SafeWorkPractices** guide.

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1.0 Introduction

This document outlines the safe work practices for removing trees using a mobile crane.

2.0 Hazards

The following hazards have been identified to aid in establishing and maintaining a safe work environment when operating a crane to remove trees:

Biotic Conditions
Climatic Conditions
Electrical Conditions
Ergonomics
Mechanical
Pedestrian
Gravity

Note: The above list of hazards is not a complete list and a thorough job plan should be completed to identify existing hazards found at the work site.

3.0 Legislation / Safe Work Practices

The following information has been provided listing arborist safe work practices and legislation requirements:

- ASWP01 General Legislation
- ASWP01 Work in a Safe Environment
- ASWP02 Protect Self and Others
- ASWP02 Arborist Job Planning
- ASWP03 Ascending Trees
- ASWP04 Working at Heights
- ASWP06 Rigging Trees
- ASWP11 Aerial Device Operation
- ASWP12 Chain Saw Operation
- Temporary Conditions – Ontario Traffic Manual

Legislation	RRO / RSO	Section Referenced
Industrial	851/90	51, 60
Construction	213 / 91	150, 156, 168, 180

4.0 Mandatory Information / Work Practices

The following are the general mandatory requirements for an arborist when working with a crane to remove trees.

Arborist aloft shall be:

- Competent to calculate wood weights using various methods including: green wood weight chart, estimating by sight, application of suitable safety factors, wood strengths and variability, and tree characteristics
- Familiar with crane performance charts (range and capacity)
- Familiar with crane operations and suitable crane dimensions
- Only competent personnel, deemed by the employer, shall work with a crane
- Familiar with characteristics, defects and imperfections in trees
- Knowledgeable of wood strength in tension wood
- Familiar with safe work procedures to identify hazards and place barriers to the hazards general and specific to crane work
- Able to communicate using – standard crane hand signals and or verbally
- Advanced knowledge in rigging techniques and equipment
- Familiar with the required Personal Protective Equipment and climbing equipment needed (inspection, maintenance and use)
- Familiar with appropriate safe work practices to access trees
- Familiar with safe work practices using a chain saw (aloft) and practical application of cuts when utilizing a crane
- Familiar with rigging and control options available when using a crane
- Aware of electrical hazards and appropriate procedures

Crane operators shall have:

- A valid certification (operator's license) Cranes 8 tons capacity and above or competency in operation of cranes 8 tons and below
- Knowledge and performed Critical Lifts
- Familiarity with the specific hazards associated with tree removal such as:
 - Estimating tree weight calculations
 - Safety factors used
 - Load balancing
 - Movements of load
 - Experience on uneven and unknown ground support conditions
 - Wind / sail conditions
 - Uneven or unbalanced loading
 - Challenging communication situations
 - Load paths through possible traffic areas
 - Landing zone restrictions
- Awareness of electrical hazards and appropriate procedures
- The operators manual available and be familiar with the contents

Crane Equipment:

The ASWP committee recommends that a load cell should be part of the mandatory equipment of the crane. The load cell can be used to verify the load being lifted against the estimated load to verify estimates and to ensure future loads will be adjusted accordingly. The ASWP committee recognizes that all mobile cranes do not have load cells and that crane operators develop a sense of what the loads are based on previous work experiences

Ground personnel and Arborist on ground shall have specific training in:

- Communication techniques with crane operator
- Sling usage
- Hazards associated with crane use and lifting heavy loads
- Lifting paths including lifting near pedestrian and or traffic areas
- Landing zone restrictions including releasing of loads on cranes, balancing loads on ground to ensure they do not roll, and clean up procedures

5.0 Work Practice

The following information will provide general information that is required when working with a crane to remove trees.

5.1 Worksite Assessment

Step	Action
Determine if crane can be used on worksite	<ul style="list-style-type: none">• Ensure crane can access the location (i.e. road conditions/weight limitations, access over/under bridges etc.), mobility within site, maintaining safe working loads at various boom angles• There is enough outrigger room and security• Ground stability for the crane• Ensure crane setup location will provide adequate protection from hazards such as electrical, overhead structures, buildings, septic systems, underground obstructions and services etc.• Ensure there is adequate space available for the crane, and applicable, work equipment (i.e. aerial device, chippers or trucks) to complete the work• Ensure there is adequate space for the crane and its boom to move freely in and maintain appropriate limits of approach to electrical apparatus• Assess tree for: rot, structural weaknesses, animal nests, loose bark, branching characteristics and any potential hazards for the lifting operation
Determine crane size required	<ul style="list-style-type: none">• Assess weights of potential loads

Step	Action
	<ul style="list-style-type: none"> Consider crane lifting capacity and Safe Work Loads at various boom angles for various crane sizes

Note: Prior to contracting a crane to perform the work, a thorough site analysis with the crane operator is needed to determine the size of crane required and whether the location is appropriate for a crane to safely work.

5.2 Worksite Setup

Step	Action
Determine potential lifting locations on tree from ground to establish a lifting plan for cuts – “picking the load”	<ul style="list-style-type: none"> Discuss with crane operator potential lift locations on the tree plus sequence of lifts to be conducted Assess potential loads considering: <ul style="list-style-type: none"> Wood weights using the Green Wood Weight Charts. Branching of tree sections Tree condition (i.e. dead or rotten wood) Centre of gravity of the load being lifted Weather conditions (wind, rain, sunlight) Bark conditions <p>Note: The potential of slippage of chokers must be considered when determining where to cut and the final weight of the cut section.</p> <ul style="list-style-type: none"> The estimated weight of the load and a safety factor of the lift shall be determined by competent workers Loads should be rigged butt heavy using the 2/3 rule for placing a choker on stem. Use of additional rigging equipment e.g. ropes, blocks etc. to control the load should be considered Consider use of multi leg sling configuration
Determine crane load path to Landing Zone	<ul style="list-style-type: none"> Ensure that the size of the section to be cut and the amount of room available to lower the cut section is adequate Install pedestrian / worker barriers to keep people from under load
Setup Landing Zone	<ul style="list-style-type: none"> Ensure adequate communications between workers and crane operator using either hand or radio communications Install pedestrian / worker barriers to keep people from under load being moved overhead <p>Note: Do not walk under load suspended by crane.</p>

Step	Action
Conduct Tailboard Conference	<ul style="list-style-type: none"> • Ensure all participants at the work site, including crane operator and ground persons, are part of the discussion • Instruct how slings are attached and used • Discuss positive locking pins for attachment points on the crane for devices that could come in contact with the tree • Identify hazards and Drop Zone(s)

5.3 Arborist Work Positioning

Step	Action
Ascend to predetermined work position in tree	<ul style="list-style-type: none"> • Ascend the tree using predetermined climbing techniques or aerial device (Refer to ASWP03 Climbing trees and or ASWP11 Aerial Device Operations) • Assess the tree condition throughout the ascending process to ensure tree is structurally sound for the work that will be conducted
Secure choker on tree	<ul style="list-style-type: none"> • Ensure there is an agreement between crane operator and climber for the choker location • Load should lift balanced • Ensure choker positioning will move the load away from climber when hoisted • Ensure location will consider the load twisting when tension is applied to the choker • Ensure tree section is structurally sound to support the lift • Ensure that the choker will not move due to bark slippage • If possible, place choker below a branch union • If needed for better control, attach butt and/or guide ropes to the section to be removed • Consider the location of the tree with respect to the energized conductor and other obstructions and the intended lowering location • Determine if multi leg sling rigging is needed to secure the load • Determine if further rigging to control the load will be required

5.4 Crane Rigging

Step	Action
Determine load	<ul style="list-style-type: none">• Communicate with crane operator intended sling location and cut location• Determine weight of load to be cut using Green Wood Weight Charts, rules of thumb etc.• Relay weight of load to crane operator
Crane operator decides if load is within their lifting capabilities	<ul style="list-style-type: none">• Crane operator communicates acceptance or rejection of proposed cutting location based on whether load is within their capabilities• Crane operator and worker aloft will agree on the final cutting location
Set choker around section of tree	<ul style="list-style-type: none">• Ensure choker is secured to tree

5.4.1 Crane Rigging – Multi Leg Sling Configuration

Step	Action
Secure one leg of sling to limb Multi leg Sling Configurations	<ul style="list-style-type: none">• Place choker so that headache ball is over the centre of gravity of the limb• Ensure that the Safe Working Loads (SWL) of the sling is not encroached• Ensure that when sharp angles are placed on connection between slings and load the Safe work Load (SWL) is not compromised• Utilize a Sling Angle Load Chart• Ensure bend ratios for slings are not exceeded
Secure second leg of sling to limb	<ul style="list-style-type: none">• Ensure that there is no slack in the multi leg sling configuration

5.4.2 Crane Rigging – Single Sling Configuration

Step	Action
Place choker around tree and secure to headache ball	<ul style="list-style-type: none"> • Ensure choker is secured properly • Ensure sling bend ratios are not exceeded • Ensure the Safe Work Load (SWL) of the sling is not exceeded • Place choker so that when lifted the section of tree will move in a direction away from hazards or unintended targets • To prevent sling slippage it may be necessary to cut notches for securing slings
Communicate to crane operator to pretension line	<ul style="list-style-type: none"> • Communication between crane operator and arborist shall be clear and concise • Crane operator places tension on tree • Pretension on tree should normally equal the estimated weight of the load of the piece to be cut

5.5 Cut Section

Step	Action
Visually inspect rigging system to ensure it is secured to tree stem prior to lifting	<ul style="list-style-type: none"> • Check that the headache ball and crane lifting line are in a vertical line with the centre of gravity • Check that the choker(s) is secured • Check that there is no twisting of the lift line or choker(s) • Check that there is a direct path from choker(s) to hook and there are no limbs in the way
Worker aloft descends to cut location	<ul style="list-style-type: none"> • Cut location should be at shoulder level to allow for cut sections to swing away from the chain saw
Establish an escape route	<ul style="list-style-type: none"> • Escape route / method should allow the worker to move out of the way if a section or limb swings in a different direction than anticipated
Secure to tree using work positioning equipment – if ascending by climbing tree	<ul style="list-style-type: none"> • Ensure lift will not tangle climber's fall protection equipment
Determine style of chain saw cut to be made	<ul style="list-style-type: none"> • Angle Cut or Straight cut • Sawing should finish at the pinch point of the load working around the circumference of the section <p>Note: A Snap Cut should be avoided. The Snap Cut</p>

Step	Action
	requires the crane operator to break wood by creating lateral movements to the stem being cut through the boom and hoist line. This action can apply a great deal of stress to crane components.
Remove branches above the work location to ensure that other branches do not strike the worker	<ul style="list-style-type: none"> • Use appropriate fall protection with chain saw use • Ensure severed limbs are removed appropriately
Communicate to crane operator "beginning cut"	<ul style="list-style-type: none"> • Ensure crane operator has heard and responds
Perform chain saw cut	<ul style="list-style-type: none"> • Operate chain saw from the escape route side of the stem • Make a controlled cut • Monitor movement of tree stem • Communicate with crane operator to adjust lifting tension and or movement or direction to release tension on section as needed
Reposition to escape route/method	<ul style="list-style-type: none"> • Worker aloft moves to escape route/method • Worker communicates to crane operator to take the load
Crane operator takes load and lowers to ground	<ul style="list-style-type: none"> • Ensure load is moved away from climber and not over the climber's head • Ensure load is not transferred over ground workers
Remove choker(s) from cut section on ground	<ul style="list-style-type: none"> • Secure load from movement prior to releasing choker(s) • Be aware of potential swing of headache ball • Remove the choker(s) from the headache ball hook • Remove the choker from the tree section • Replace the choker on the headache ball • Remove butt/guide ropes as necessary • Do not use crane to free slings that are stuck. Reposition loads to free slings