

Tree Transplanting in Brisbane

Evolving Methodologies



Arboricultural
ASSOCIATION

51st National Amenity Conference
Exeter, Devon – September 2017



Tree Transplanting – Brisbane Style

What's On:

- Thank you
- Apologies
- A Very Brief History
- Modern Techniques
- Case Studies



Tree Transplanting – A Very Brief History

There is little doubt the practice of relocating trees, maybe not of significant size, has been practiced for many centuries especially for ensuring continuity of food supply from species with edible fruit. In more recent times the relocation of trees for amenity purposes has become more common.

Much historical information is available and includes Practitioners and authors such as:

18th Century

Lancelot “Capability” Brown and his Magnificent Tree Moving Machine.

19th Century

1823 Sir Henry Steuart - *“The Planter’s Guide”*

1844 Colonel George Greenwood - *“The Tree Lifter”*

1873 Charles R. Kelly - *“Transplanting Large Trees and Shrubs”*



Tree Transplanting – A Very Brief History

Brisbane in the Early 70's & Early 80's

Species –

Mostly palms:

- | | |
|------------------|-----------------------------------|
| – Cocos palm | <i>Syagrus romanzoffiana</i> |
| – Alexander palm | <i>Archontophoenix alexandrae</i> |
| – Bangalow palm | <i>A. cunninghamiana</i> |

Occasionally:

- | | |
|-------------------|----------------------------|
| – Canary Is. palm | <i>Phoenix canariensis</i> |
|-------------------|----------------------------|

Shade trees:

- | | |
|--------------|------------------------------|
| – Poinceana | <i>Delonix regia</i> |
| – Jacaranda | <i>Jacaranda mimosifolia</i> |
| – Small figs | <i>Ficus sp.</i> |



The majority of specimen trees and palms used for transplant into landscape projects were sourced from residential front and back yards using cash or 'beer' dollars and occasionally some were 'borrowed' from vacant allotments.

Tree Transplanting – A Very Brief History

Early 70's & Early 80's

Digging for the transplant of trees was usually performed by backhoe or a skid steer loader with a side tilting/angle chain trencher.

Lifting was by mobile tractor cranes or small truck mounted hydraulic cranes of 20 to 30T capacity.

Advantages – Other than getting the job done, none.

Disadvantages – Slow cranes with limited lifting capacity
– Excessive root damage,
– Poorly formed root balls,
– Stem damage from poor lifting techniques,
– Wounds from works often resulted in long term tree decline and or failure.



Tree Transplanting – A Very Brief History

Mid to Late 80's

Tree spades were introduced into Qld by Jensen International for use both on and off a 100 acre tree farm the company had established on the southern outskirts of Brisbane.



60" Tree Spade and *Jacaranda mimosifolia*.

Tree Transplanting – A Very Brief History

Mid to Late 80's



The late 80's also saw the arrival of the 'Franna' crane - a 4WD, articulated, all terrain, crane that provided much improved lifting capacity and good road speed. Frannas were readily mobile on rough sites, could 'pick and carry' 4 to 5 tonnes and were economical to hire.

Late 80's 12T capacity Franna transporting a lifted Hill's Fig.

Tree Transplanting – A Very Brief History

As Franna cranes evolved the lifting capacity increased; here a 25T Franna prepares to lift a 8T Canary Island Date Palm in 2013.



Tree Transplanting – A Very Brief History

Late 80's & Early 90's

About 1990, Garry Edmonds, a palm nursery owner from northern NSW, was experimenting with the use of a very large, truck mounted, high pressure cleaner for digging palms and trees.

The best setup for the water cutter was found to be 55L/min at 6000psi. This combination will cut woody roots of less than 75mm diameter in less than 5 passes. Non woody roots, e.g. palm roots, are usually cut with a single pass.

Advantages:

- Very quick and economical
- Excellent adventitious root production
- Minimal root splitting and decay
- Excellent for tight access sites

Disadvantages:

- Mud and plenty of it!
- Needs reliable clean water supply
- Very dangerous if used incorrectly



Tree Transplanting – A Very Brief History

Late 80's & Early 90's



Water cutting very old Canary Island Date Palms.

Tree Transplanting – A Very Brief History

Late 80's & Early 90's



Water cut pandanus root ball.



Water cut palm root ball.

Tree Transplanting – A Very Brief History

Late 80's & Early 90's



DIY tourist attraction; a water cut *Pandanus tectorius* getting some sun during a morning walk along Mermaid Beach, Gold Coast.

Tree Transplanting – A Very Brief History

Late 80's & Early 90's



Night Moves

A water cut Bottle tree,
Brachychiton rupestris
being loaded.



Tree Transplanting – A Very Brief History

Late 80's & Early 90's



Night Moves

A water cut Bottle tree,
Brachychiton rupestris
being loaded.

Tree Transplanting – A Very Brief History

Late 80's & Early 90's



Tree Transplanting – A Very Brief History

Late 80's & Early 90's



Undercutting a fig growing in demolition debris.



Time for a scrub?

Tree Transplanting – A Very Brief History

Late 80's & Early 90's



Fibrous root production on fig,
2 weeks after water cutting.



Fibrous root production on fig,
3 weeks after water cutting.

Tree Transplanting – Modern Techniques

Lifting Bolts

The requests for the relocation of much larger trees, in particular figs and poinceanas, revealed the many problems associated with lifting trees from the stem and the resultant deformation, collapse or complete disintegration of the root ball.

The use of high tensile bolts inserted through the branch structure as lifting points was used for many lifts including several trees well in excess of 100 tonnes.

Advantages:

- Quick and economical to install,
- Localised branch damage,
- Load sharing between bolts if correctly rigged,
- Bolts can be installed horizontally between codominant stems,
- Minimised stem damage.

Disadvantages:

- Branch damage with remnant hole
- Severe decay; not suitable for all species,
- Root ball disintegration,
- Complex rigging adds weight to load,
- Bent and jammed bolts,
- Limited by number of bolts,
- Limited by crane lifting capacity.



Tree Transplanting – Modern Techniques

Lifting Bolt Installation



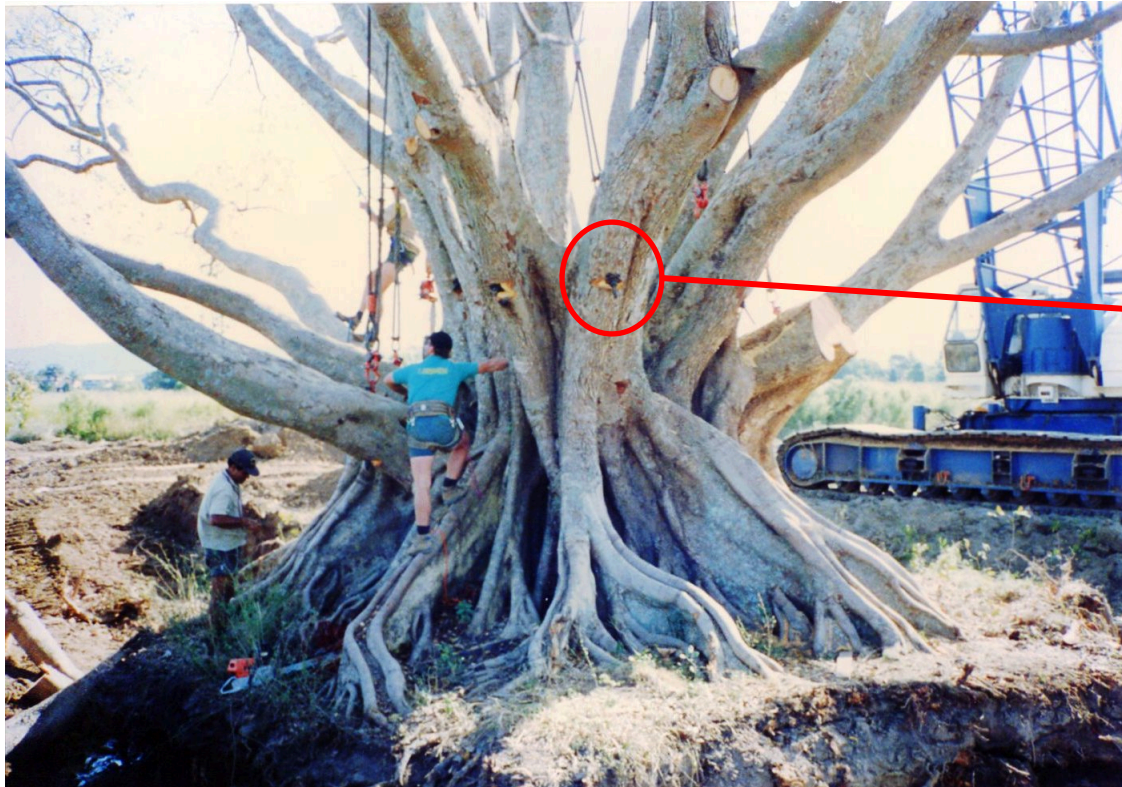
Tree Transplanting – Modern Techniques

Lifting Bolt Installation



Tree Transplanting – Modern Techniques

Lifting Bolt Installation



March 1990



September 2017

Tree Transplanting – Modern Techniques

Unsuitable Lifting Bolt Installation



Large areas of bark necrosis
and wood decay.



Wood decay with bolt hole
filled with expansion foam.

Tree Transplanting – Modern Techniques

Pipe & Beam

The continued problems with root ball loss necessitated the design of a method which would allow lifting of very heavy loads, e.g. well in excess of 200 tonnes, from under the root mass. The Pipe and Beam System was developed after observing the relocation/transport of old houses.

Early use relied on the installation of Universal Columns (UC) as a raft through horizontal holes bored under the root mass. Universal Beams (UB) placed under and perpendicular at each end of the UC raft enabled lifting of the tree by cranes or jacking systems.

The system worked well but was very slow and the engineering was a little 'suspect'. Replacement of the UC raft with a high tensile drill pipe raft removed much of the uncertainty of the engineering.

Advantages:

- Quick and economical to install for large trees,
- No stem or branch damage,
- Large rigid root plates with reduced root loss,
- Enormous load carrying capacity,
- Several lift methods available, not reliant on FBC's for lifting,
- Pipes provide line of perforation to allow for root plate separation.

Disadvantages:

- Drill pipe hard to source
- Large work space required
- Engineers who cannot grasp the concept.



Tree Transplanting – Modern Techniques

Pipe & Beam



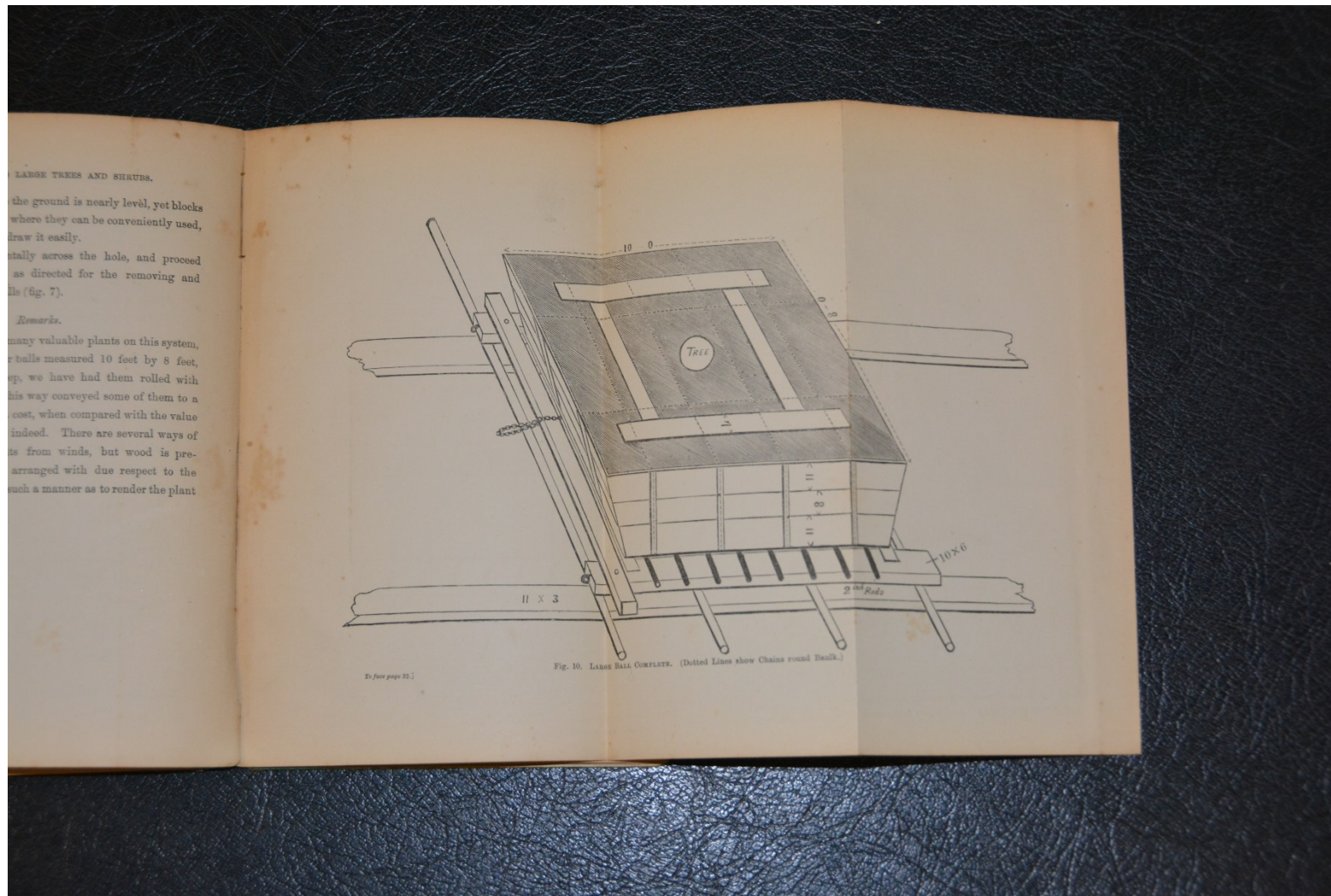
Pipe installation with rock hammer on 30T excavator.



Crane lifted 160T fig with close spaced pipes to aid in root plate separation in heavy clay.

Tree Transplanting – Modern Techniques

Pipe & Beam



In
“*Transplanting
Large Trees and
Shrubs*”.
Charles R. Kelly
1873

Tree Transplanting – Modern Techniques

Pipe & Beam



Crane lifted
poinciana with
gratuitous city views.

Tree Transplanting – Modern Techniques

Pipe & Beam



220T fig in sand, 'double piped' to prevent sand loss. Note use of hydraulic jacks to negate need for heavy lift cranes.

Tree Transplanting – Modern Techniques

Pipe & Beam



Shorter pipes and lighter beams.



What is the collective noun for a group of engineers?

Tree Transplanting – Modern Techniques

**ENGINEER. SOMEONE WHO CAN
QUOTE THE VISCOSITY OF VEGEMITE.**



**BUT CAN'T ACTUALLY
GET THE LID OFF THE JAR.**

imgflip.com



Tree Transplanting – Modern Techniques



Tree Transplanting – Modern Techniques

Pipe and Beam - Arborlift

As tree sizes and weights increased, the cost of craneage also increased at an almost exponential rate. After watching a documentary on ship building, Mark Hartley – The Tree Movers, Sydney, adapted the use of cylindrical air bags or bladders to lift and move the trees by rolling on a slightly modified pipe and beam system where the beam is placed on top of the pipes. The ‘Arborlift’ system, as it is now known, does not require the use of heavy lift cranes and can lift and move trees weighing many hundred tonnes using only low pressure compressed air.

‘Arborlift’ is now patented to the Environmental Design Group in Texas and requires payment of a licensing fee if used by other contractors.

Advantages:

- May be used on any soil type and wet sites,
- Very low risk with low air pressures and low lift heights,
- Very economical – no cranes, no trucks,
- Quick establishment.

Disadvantages:

- Punctures – usually repairable.
- Not suitable for long distance moves,
- Suitable only for level and gently sloping sites.



Tree Transplanting – Modern Techniques

Arborlift



Early application of Arborlift using 5m long bladders to relocate a small *Ficus obliqua* in 2008.

Tree Transplanting – Modern Techniques

Arborlift



Application of Arborlift using 9m long bladders to relocate a large *Ficus macrophylla*.

Tree Transplanting – Modern Techniques

Arborlift



Tree Transplanting – Case Studies



The Cathedral Square Fig – *Ficus virens* – 1987 – Est 55 tonnes.

Tree Transplanting – Case Studies



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Tree Transplanting – Case Studies



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Tree Transplanting – Case Studies



The Cathedral Square Fig – *Ficus virens* – 1987 – Est 55 tonnes.

Tree Transplanting – Case Studies



The Cathedral Square Fig – *Ficus virens* – March 2017.

Tree Transplanting – Case Studies



The Hollywell Fig – *Ficus virens* – 2005 – Est 220 tonnes.

Tree Transplanting – Case Studies



The Hollywell Fig – *Ficus virens* – ‘Can never have too much drill pipe’.

Tree Transplanting – Case Studies



The Hollywell Fig – *Ficus virens* – Spear pump installation.

Tree Transplanting – Case Studies



The Hollywell Fig – *Ficus virens* – Undercut for beam placement.

Tree Transplanting – Case Studies



The Hollywell Fig – *Ficus virens* – Undercut for beam placement.

Tree Transplanting – Case Studies



The Hollywell Fig – *Ficus virens* – Hydraulic jack installation.

Tree Transplanting – Case Studies



The Hollywell Fig – *Ficus virens* – Hydraulic jacks and cribs.

Tree Transplanting – Case Studies



The Hollywell Fig – *Ficus virens* – Ready to load.

Tree Transplanting – Case Studies



The Hollywell Fig – *Ficus virens* – Loaded.

Tree Transplanting – Case Studies



The Hollywell Fig – *Ficus virens* – A little extra push.

Tree Transplanting – Case Studies



The Hollywell Fig – *Ficus virens* – Transport.

Tree Transplanting – Case Studies



The Hollywell Fig – *Ficus virens* – Time for a brown lemonade.

Tree Transplanting – Case Studies



The Hollywell Fig – *Ficus virens* – Planting.

Tree Transplanting – Case Studies



The Hollywell Fig – *Ficus virens* – Planted.

Tree Transplanting – Case Studies



The Hollywell Fig – *Ficus virens* – September 2017.

Tree Transplanting – Case Studies



The Hollywell Fig – *Ficus virens* – September 2017.

Tree Transplanting – Case Studies



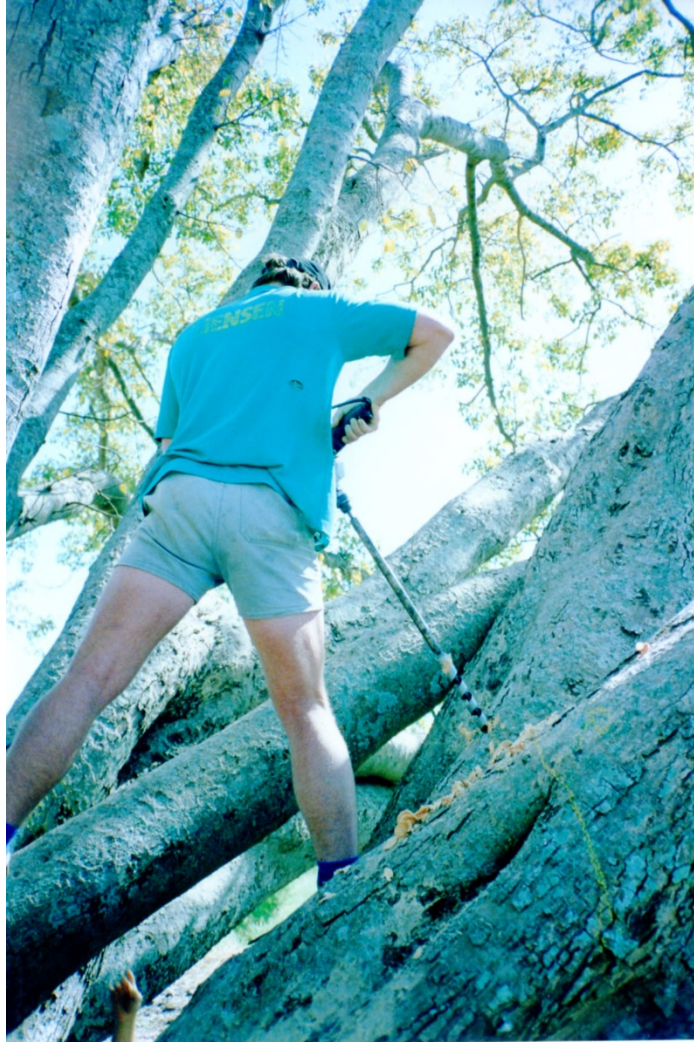
The Ashmore Fig – *Ficus virens* – 1991 – Est 120 tonnes.

Tree Transplanting – Case Studies



The Ashmore Fig – *Ficus virens* – Root pruning.

Tree Transplanting – Case Studies



The Ashmore Fig – *Ficus virens* – Lifting bolt installation.

Tree Transplanting – Case Studies



The Ashmore Fig – *Ficus virens* – Rigging.

Tree Transplanting – Case Studies



The Ashmore Fig – *Ficus virens* – Unloading.

Tree Transplanting – Case Studies



The Ashmore Fig – *Ficus virens* – 25 years on.

Tree Transplanting – Case Studies

1991



2017



The Ashmore Fig – *Ficus virens* – 26 years on.

Tree Transplanting – Case Studies



The Ashmore Fig – *Ficus virens* – 26 years on.

Tree Transplanting – Case Studies



The Ashmore Fig – *Ficus virens* – 26 years on.

Tree Transplanting – Case Studies



The Ashmore Fig – *Ficus virens* – 26 years on.

Tree Transplanting – Case Studies



The Ashmore Fig – *Ficus virens* – September 2017.

Tree Transplanting – Case Studies



The Ashmore Fig – *Ficus virens* – September 2017.

Tree Transplanting – Case Studies



The Ashmore Fig – *Ficus virens* – September 2017.

Thanks to all involved in our tree transplanting exploits over 30+ years....

Especially:

Richard Hewitt – Master rigger and the most lateral of lateral thinkers....he's so far outside the square he's in the next postcode

Also:

Garry Edmonds –water cutting genius and a man who never sees a spade.... only a @#\$%@g shovel....

As well as:

The Arboricultural Association for the kind invitation to share some of our adventures.



“What do you mean oversize??”

