Helicopter Aided Construction
(What to Know for Efficient and Cost-Effective Projects)

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ECI has designed hundreds of miles of lattice tower and steel poles lines that employed helicopter construction methods ranging from minimal use to hand dug foundations and 100% helicopter access.

We have been able to use our experience to work with contractors to both reduce costs and risks associated with helicopter construction.
Helicopter specific concerns

• Aggregation of work within a geographic area
• Safety
• Landing zone
• Fuel
• Dust abatement
• Rotor wash
• Noise
• Highway
• Airspace clearance
Support aspects

• Ground crews
  • Experienced crewmembers
  • Adequate and appropriate rigging
  • Understanding of safety
  • Appropriate radios

• Aerial Crews
• Engineering
• Environmental
Phases- Planning /Design and Construction

The **planning/design phase** should be started years before construction. Should include-

- basic line route
- structure types
- access and environmental restrictions

**Construction phase** should be allowed to modify aspects of the design as issues are discovered.
Concurrent Planning and Design

- Structure Locations
- Construction Staging
- Access
- Foundation types
- Geotech
Structure Locations

• Typical structure capacity, height, line clearance design

• Can we keep the structures close to access or away from environmental/cultural considerations?

• Soil types, foundations options?
• LiDAR survey is very helpful
• Ground survey of actual locations and critical clearance issues
• Helicopters can increase the range and effectiveness of survey crews
Route and Structure Access

Full Access
Route and Structure Access

Only tracked Equipment
Seasonal Access

No Heavy Equipment
• High profile golf course
• Limited acceptance of matting or construction traffic
Geotechnical Investigations

• Typically done using a truck mounted drill to collect samples from depths ~ 50’
• Tracked rigs and balloon tired ATV rigs are available
Alternative Geotech Methods

- Rock Mapping
- Seismic Refraction
- Historical data
- Others?
Foundation Options

- Direct embedded
- Drilled piers
- Hand-dug piers
- Grillages
- Spread footing
- Rock anchors
- Micro-piles
- Helical piers
Hand Dug Foundation Considerations

- Spoons and long-handled shovels typical for direct embedded poles
- Elbow room- less than 4ft diameter is not practical to build
- Soil type-
  - Rock can shrink foundation size
  - Water?
  - Casings required?
- Safety
  - Shoring inside excavation
  - Fire danger
Helicopters are used to:

- Haul personnel
- Generators
- Jackhammers
- Large compressors
- Survey equipment
- Rebar
- Concrete forms
- Hand tools
- Porta potty
- Emergency equip
- Lunch...
Construction Staging

- Good access by truck
- Close to the work area
- Assembly and storage of structures in condition ready to fly
- Allowances for fuel and water (fire fighting) storage
- Fuel
- Dust
- Rotor Wash
- Fire fighting
- Radio
- Matted landing area
- Safe approach
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Construction Phase -
Prepping for Concrete
Hauling Concrete

• Comparatively labor, time and flight intensive
• Typically requires a medium lift capacity helicopter with 3,000-5,000lb payload capacity at your project elevation
• Concrete weighs approximately 150lb/cu-ft, or 4,000lb/cu-yd
• Flights will typically haul ½-1cu-yd of concrete each, or **25 flights for a single 18cu-yd pier**
Concrete Considerations

• Increased set time (adding chemical delay)
  Try to get the entire pier placed prior to concrete setting

• Lightweight aggregate?
  125lbs/cu-ft vs. 145lbs/cu-ft
  Only a 540lb savings, or 4.5cu-ft additional capacity

• Small load volumes per truck
  Frequent changeover = fresh concrete

• Testing pre and post haul to determine changes of slump and air content

• Provisions and Engineering for unplanned joints
Setting Structures

Very dependent on the size of helicopter used. Usually a fast process, 3-5 picks per hour. Tower components should be previously assessed by the engineer and the helicopter company to determine suitability for flying and breakdown.
Wire Stringing

• Among the most common uses of helicopters in T-line construction
• Often a very economical method of stringing
• Pulling sock line
• Installing marker balls and bird diverters
• Clipping
• 2800ft double spans
• Large bundled conductor
• No mid-span access
Problem Solving, Inspection and Environmental
Visible Casting Numbers
Common Questions

• What kind of helicopter do I need?
  • Light
  • Medium
  • Heavy

• How much can be done in a day/week?
  • Concrete: ¾ cu-yd every 5-10 minutes
  • Structures: 10-50 picks per day
  • Stringing: 1-2 pulls/week at 3-5 miles each
QUESTIONS?