TECHNICAL NOTE

Power Line Construction Process and Construction Camps

The Construction Process

The following is a process that will be adopted for the entire route, beginning at the starting point of the new line. Each activity will follow the previous one, such that at any one point an observer will see a chain of events, with different teams involved over time. At any one time some or all of the different teams may be working at different points along the line. There may be days of no activity in the process. There are some 35 active days of construction at any point, though this may take place over a period of two years.

The following details are provided for each construction activity:

> Approximate team size per contractor: -
> An indication of the likely number of construction staff involved in each exercise.
> Approximate duration at a point: -

An indication of the likely time spent by the team at a point (typically a tower location) as they move along the route. These times may vary significantly depending on local conditions.

Activity		**Approx team size**	**Approx. duration at a point**
1.	Centre line pegging and identification of new gates *(light vehicle access)*	3	1 day
2.	Access Negotiations > an access plan is developed and agreed to by the landowner, Eskom and the contractor > rehabilitation measures are agreed > photographs are taken before hand > access road will be established through recurring use (i.e. there will be no blading or scraping of a new road) *(light vehicle access)*	1	1 day
3.	Tower Pegging > the contractor will appoint a surveyor to undertake this work > the footing of the pylons will be set out > the contractor will report back if anything odd is found and the tower will be moved accordingly *(light vehicle access)*	5	1 days
4.	New gate installation *(light vehicle access)*	5	1 days

Activity		Approx team size	Approx. duration at a point
5.	Foundation nominations (for main structure and anchors) > soil types are checked to determine foundation requirements > trial pits are dug at the main foundation points – usually using mechanical back-actor/auger methods, though in a few circumstances manual labour may be used. *(heavy vehicle access)*	5	2 days
6.	Excavation of foundation > foundations of up to 4 m x 4 m square are excavated and up to 4m deep depending on soil conditions > foundation pit then need to be covered or fenced off until foundation is poured *(heavy vehicle access)*	10	2 days
7.	Foundation steelwork (reinforcing) > the steelwork is usually made up at the base camp and brought on to site by truck > all fitting, wiring is done on site (limited welding on site) *(heavy vehicle access)*	10	2 days
8.	Foundation (concrete) pouring > shuttering > standard concrete truck used > if there are access problems, concrete will be mixed on site helicopters will be used in exceptional circumstances > 28 day period required after concrete has been laid *(heavy vehicle access)* *(heavy usage of the servitude roads during this phase)*	20	2 days
9.	Delivery of tower steelwork > steelwork is delivered in sections and assembled on site > one truck can transport one tower > transported from the factory to site (the towers are individually designed for each location) > access roads are clearly marked to ensure the correct tower is delivered *(heavy vehicle access)* *(extra long trucks will be used)*	5	1 day
10.	Assembly team / Punching and painting > the steelwork is fitted together and assembled on the ground > nuts are punched and non-corrosive paint is placed on the nuts *(light vehicle access)*	10	3 days
11.	Erection > Cranes (minimum of 50 tonne cranes) pick up the towers for final assembly. *(abnormal load vehicle access)*	20	2 days

Activity	Approx team size	Approx. duration at a point
12. Stringing > cable drums are placed next to each other within the servitude > stringing takes place in both directions from the drum stations –up to 4km can be strung from 1 station each way. > the working area at each drum station will be as long as 130m, but will be confined to the servitude width. Intensive vehicle movement may take place within this working area > a pilot tractor will place the pilot cable on the ground < this cable is then pulled up through the use of a pulley < conductors are never to touch the ground < in mountainous areas, a helicopter can be used or the pilot rope can be shot across valleys *(abnormal load vehicle access)* *(intensive vehicle activity likely within the working area)*	50	7 days
13. Sag and tension The line is tensioned from each cable station to ensure minimum ground clearance heights are achieved (15m for 765kv lines) *(heavy vehicle access)*	10	3 days
14. Rehabilitation > rehabilitation is a continuous process during the construction phase > rehabilitation will typically only commence after the first 100 towers have been strung > there is a one year guarantee on the contractors work during which rehabilitation must be concluded– thereafter he is paid the outstanding amount *(heavy and light vehicle access)*	5 - 15	2 – 10 days dependent on site conditions

The location of construction camps

Construction Camps

The entire construction workforce is usually accommodated at various 'construction camps' that will be situated at various points along the route. The location is selected by the contractor who will take into account such aspects as access to the construction site, access to services, access to materials, etc. The contractor will enter into an agreement with a landowner for the establishment of the construction camp.

The various teams will travel from the camp to the construction site each day. The site moves continuously with the progression of the line, so the teams will perhaps travel a different distance to the site each time.

All materials are stored at the construction camp with the exception of the steel towers (which may come direct from the factory) and concrete (unless the site is very remote, when concrete may be mixed on site)

As a rule of thumb, there is usually one construction camp per 100km of transmission line. It is therefore anticipated that there will be between three and five construction camps along the route.