Kenya National Highways Authority

Quality Highways, Better Connections

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COMPUTATION OF CURVE STAKING OUT COORDINATES ON THE EXCEL SPREADSHEET

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Management of road reserves often requires setting out of the alignment for:

1. Engineering design
   - Land acquisition

2. Road Construction
   - Staking of the road centreline

3. Marking road reserve extents
   - Deter encroachments

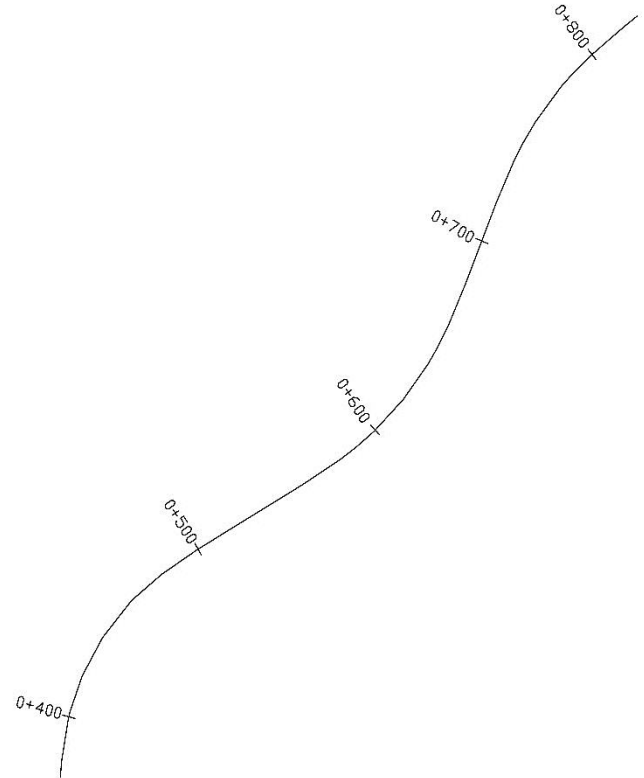4. Determining cases arising from encroachments

Road alignment Defined

Road alignment can be compared to a string that can be partitioned or divided and calibrated into segments.

Road segments can be defined by:

- Origin – Destination data
- Chainages
- Position – X,Y,Z Coordinates for each point

0+800

0+700

0+600

0+500

0+400

Elements of Road alignment

1. Straights
   - Intersection points

2. Curves
   - Deflection angle
   - Radius of curve
   - Chord length

   Transition Curve
   - Shifts
   - Deflection angle
   - Chord length

Principal Points

- TS – The tangent to the transition curve (transition curve origin)

- SC/BCC – The end of transition curve and beginning of circular curve

- CS/ECC – The end of circular curve (Circular curve to transition)

- CT – Transition to tangent

- Chainages

Principal Points

Data required:

1. X,Y,Z Coordinates of the road centreline points
   - Generated from engineering design software

2. Design drawing
   - Hard copy map
   - Digital format

Common situation encountered during staking out

Problem
- Setting out data (Coordinates) is unavailable
  - Only a hardcopy of the design drawing is available
- Coordinates are in different systems
  - Cassini/UTM

Possible Solution
- Design elements in hardcopy map extracted
  - Use Excel spreadsheet to compute the staking out data and to perform coordinate transformations

WHY USE EXCEL?

- Is a Microsoft product
  - Widely available

- No prior knowledge of programming
  - Functions are in-built
  - Can be easily called

- Computations are repetitive
  - Copy and paste

Conclusion

Using this method, you can compute:

– Coordinates of the road alignment points

– Running chainages along the alignment

The results obtained are the same as can be obtained from a computer program

Demo

An example of road alignment using data computed from the Excel Spreadsheet

- KMZ File - Google earth
- Internet connection