THE WENCHI WATER PROJECT

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Summary:

The purpose of the Wenchi Water Project was to construct a pipeline from the Tain River, through the Water Treatment Plant and to the Reservoir to supply the community with clean water. In undertaking this project, the main objectives were to establish a pipeline route from the river to the treatment plant and finally to the reservoir, conduct a cadastral and topographic survey of the Water Treatment Plant area, establish control pillars along the way from the river to the reservoir, conduct a hydrographic survey of the Tain River and produce a planimetric map of the project area and a cross-section map of the river. In the course of the project, RTK surveys, static surveys and total station surveys were conducted for the coordination of unknown points, planting of survey pillars to serve as temporary control points and hydrographic survey to analyze the nature of the river. The results show a planimetric map of permanent features such as buildings, drains and poles within the project area and a suitable design for a pipeline route from the river to the reservoir as well as temporary control points for traverse surveys and a cross-sectional diagram of the nature of the river, taking into consideration the average river level, the meandering nature of the river and the nature of the water bed. These results are analyzed to come out with a perfect design for the pipeline route, a conduit, or a dike. The project shows the nature of the project area, specifically the exact positions of all permanent features.

AIMS AND OBJECTIVES

The aims and objectives for this project are listed below:

1. Produce a topographic map of the Water Treatment Site
2. Identify apipelinee route from the Tain River to the reservoir
3. Produce a hydrographic map of the Tain River
4. Establish control points from the Tain River to the reservoir

RESOURCES AND MATERIALS USED AND THEIR USES

- GPS receivers and loggers
- Measuring tape/surveyor's tape
- Head pan
- Trowel
- Wooden pegs
- Hammer
- Total station
- Tripod
- Tribrach
- Long poles
- Stone and ropes
- Flagging tape
- Iron rods
- Root digger
- Tripods with clips
- Prism target
- Survey pillars

METHODOLOGY

Producing a topographic map of the water purification site:

- A total station is used to obtain an imaginary straight line to serve as a path along which points are picked
- The points are picked by RTK survey
- In cases where there were obstructions, poles and trees were used to range to obtain a straight line
- Along the straight line, points are picked at intervals of 10m
- Structures such as buildings were also detailed within the area
- Points are picked in a straight line as possible to obtain a gridded form of the points for interpolation.

Challenges encountered

- certain weather conditions especially rainfall hindered the progress of the project
- cutting through thickets for picking points was time consuming
- thickets and the undulating nature of the land made it difficult to establish an imaginary straight line from the total station.

Identifying a pipeline route from the reservoir to the river:

- An RTK survey was carried out to obtain the positions of features within the field area
- Features included road signs, buildings, culverts, drains, electric poles, light poles, signboards, concrete floors, transmission lines, roads, etc.
- In identifying the pipeline route, a first point is established at a distance of 26.5m from the middle of the road to the side of the road

- Three more points are picked along a straight line from the first point at an interval of 8m-10m
- The first points picked 26.5m from the middle of the road are also picked at intervals of 25m along the same side of the road.

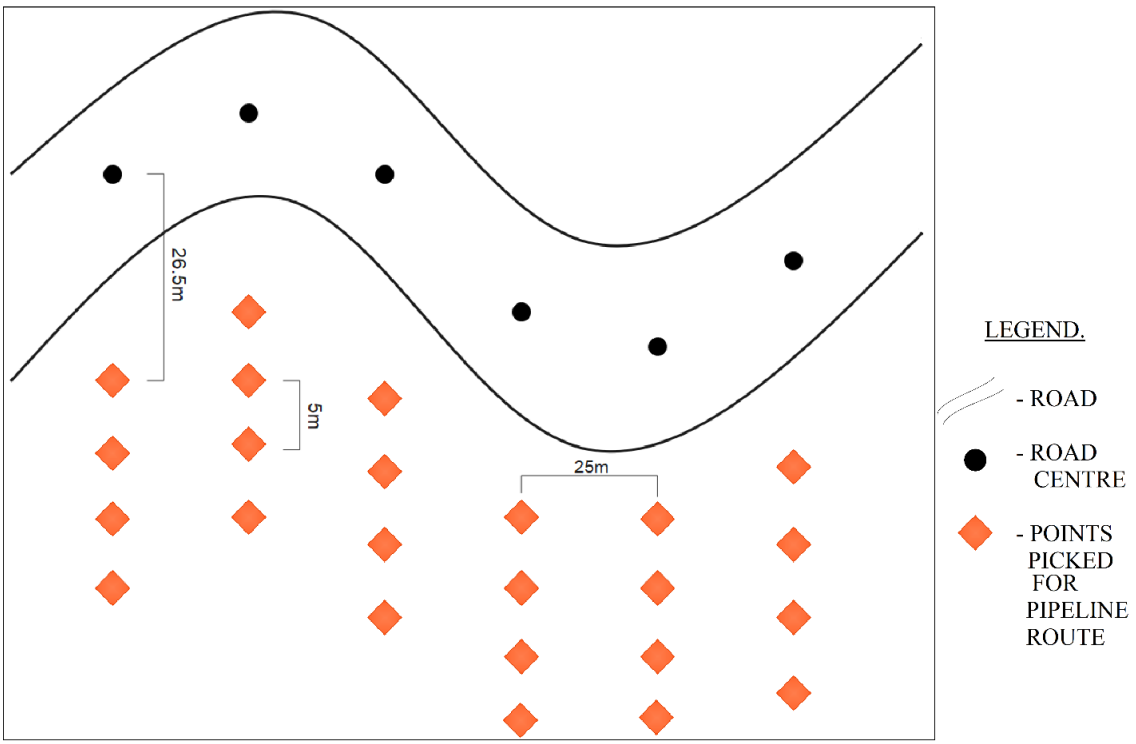

Fig. Illustration of how the pipeline route was obtained

Fig. Identifying the pipeline route by RTK survey

Challenges encountered

- Weeding through thickets along the road was time consuming
- Weather conditions like rainfall hindered the progress of the project
- Presence of canopies blocked satellite signals between the receivers and satellites.

Producing a hydrographic map of the Tain River

- This was carried out by establishing points along the riversides by RTK survey to serve as instrument stations and backsights for the total station survey to be carried out
- points were picked in a straight line from one end of the river bank to the opposite end.
- first, along the straight line, two points are picked on both ends of the river bank at intervals of 5m, followed by a point at the river edges, both by RTK survey then a minimum of three points picked in the river with the total station together with a prism target.
- Points coordinated for the instrument station and backsights are pegged for easy identification

- the river level was taken on a daily basis to monitor the rise and fall of the river (average river level)
- this survey covered a distance of 2km in the river; 19.5m to the west of the Tain bridge and 1.98km to the east from the bridge (with respect to the true north)

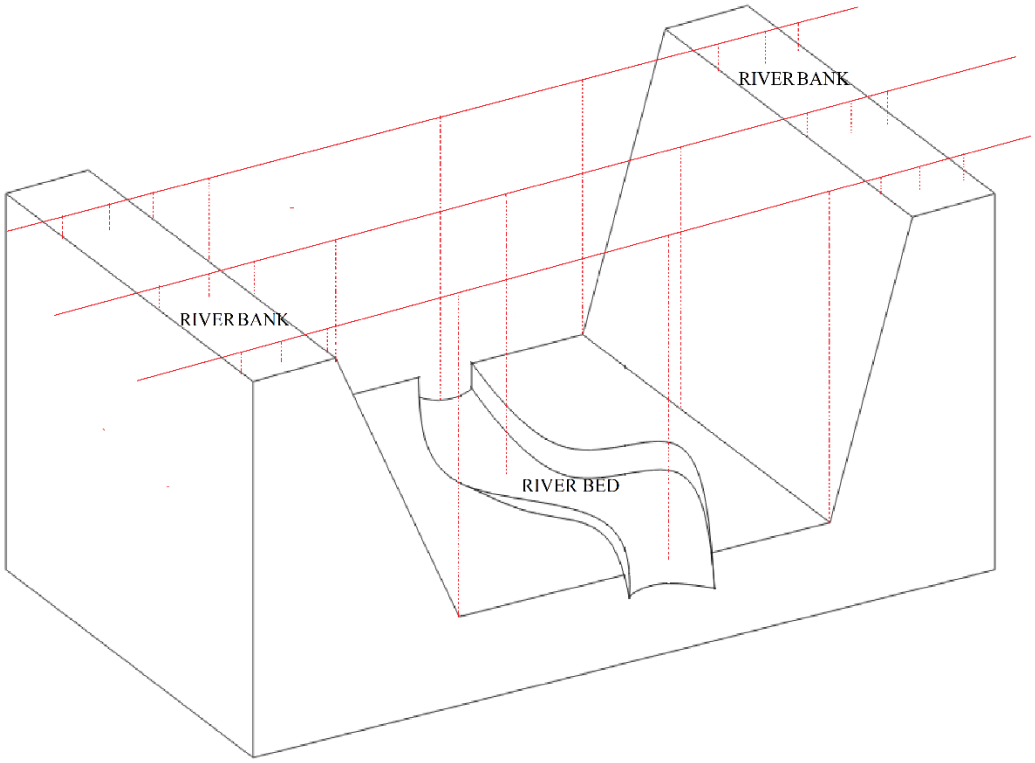

Fig. Illustration of how points were picked for during the hydrographic survey (The red broken lines indicate where the points were picked)

Fig. Picking of points in the river

Challenges encountered

- thickets in the river depriving visibility
- high water current which makes the stabilizing of the boat difficult
- certain weather conditions especially rainfall hindered the progress of the project
- cutting through thickets in the river for sighting through the total station was time consuming
- obstacles in the river, as well as its meandering course, made the maneuvering of the boat very difficult
- sediments, trees and root buttresses made it difficult to place the target pole right on the river bed
- high water current also made it difficult to keep the target pole vertical and firm to be sighted from the total station

Establishing control points from the Tain river to the reservoir

- Intervisible points were established along one side of the road
- points established were identified by a flagged wooden peg
- the established points are set out 500m apart but where intervisibility was not feasible (along curves and undulating areas) the distances between the points were reduced
- when the intervisible point is established from the river to the reservoir, pillars are planted in each point
- 'WWP' which stands for the Wenchi Water Project was written all pillars but assigned different numbers from 1 which was the first pillar at the Tain river to 34 which was at the reservoir (in that order)
- after the pillar was dried and firm in the ground, a static survey was conducted to assign each pillar a coordinate.

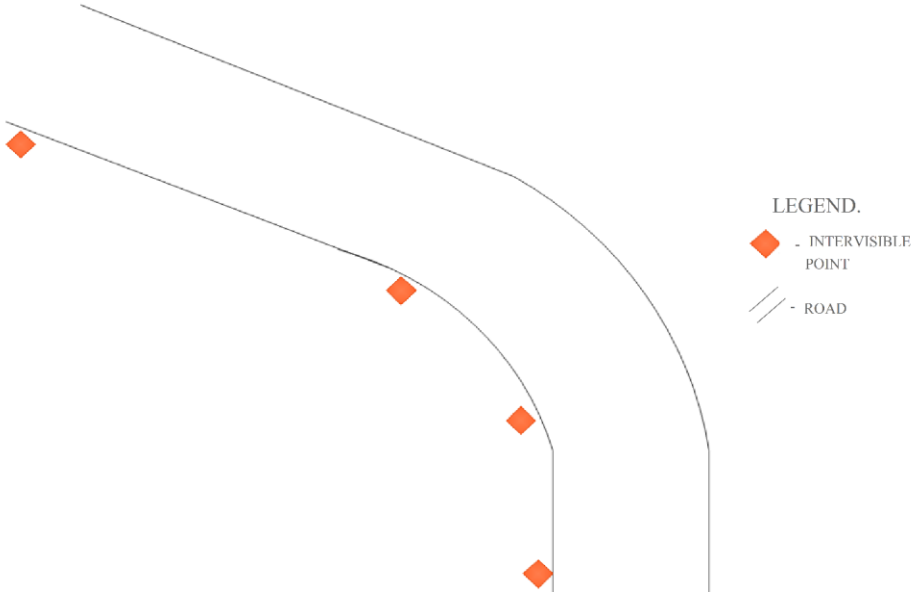

Fig. Illustration of how intervisible points were established

Fig. Static survey of established controls

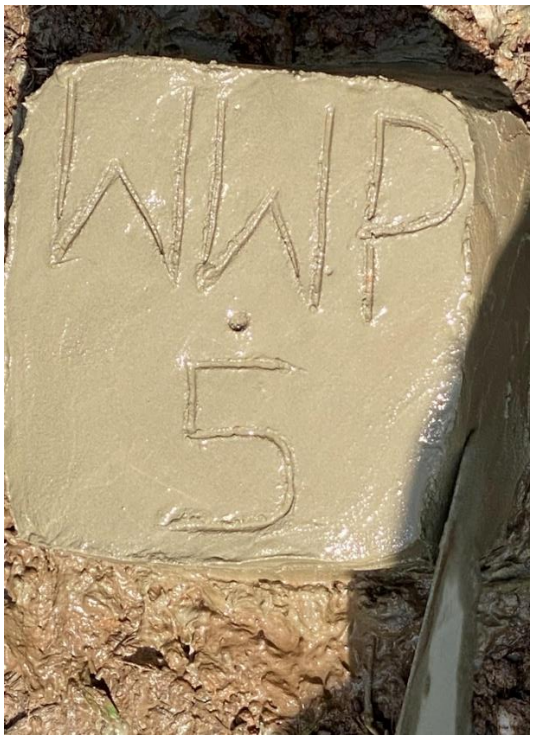

Fig. A dressed pillar

Challenges encountered

- certain weather conditions especially rainfall hindered the progress of the project

Conclusion

Despite all the challenges, the survey was carried out with nothing hanging. Established benchmarks were used for future traverse surveys during the setting out of the pipeline route, the data obtained from the hydrographic survey was used to produce a cross-section profile of the river and the detailed map produced

aided in designing a suitable pipeline route from the river to the reservoir through the town.

Reference:

(EYESON RONALD PAPA KOBINA, RPKE, 2022), 9 pages, Accra, Ghana.

Biographical notes:

Eyeson Ronald is a second-year Geomatic Engineering student of the Kwame Nkrumah University of Science and Technology (KNUST). His first internship in 2021 granted him a lot of opportunities like participating in the Wenchi Water Project as equipping the right skills needed in the Surveying field. He is very passionate about surveying and seeks to secure a good career in this field.

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