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Planning and Surveying of Six laning of Vijayawada bypass from China Autupalli (Design Ch. 0.000) to Gollapudi (Design Ch. 30.000) in Vijayawada - Gundugolanu section of NH-16

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ABSTRACT

This is a learning-based course. The first phase in the construction project management concept of planning, coordinating, and monitoring project execution is planning. The job of construction project planning is to produce the master plan by project and construction managers and their key staff members. A highway is a significant thoroughfare, especially one that connects major cities and communities. It refers to any public or private road, as well as any other public path on property. It is used for major highways, as well as minor public roads and tracks. The National Roadways Authority of India (NHAI) constructs highways in India (National Highway Authority of India).Highway brings all round development in the region. a good road network helps in success of all development activites. It is in the in sphere of movement of people and goods, agriculture ,commerce, education ,health, and social welfare, or even maintenance of law and order and security. This report contains the development process and planning of the highway project. Six laning of Vijayawada bypass from China Autupalli (Design Ch.0.000) to Gollapudi (Design Ch.30.000) in Vijayawada – Gundugolanu section of NH-16 in the State of Andhra Pradesh .having total length 30km including 3major bridges,10 minor bridges & 2 ROBs ,6 VUPs ,2 flyovers, 11 LVUPs, 42 box culverts, 44 pipe culverts, 1 toll plaza. In the planning of this project we follow MORTH (Ministry of Road Transport & Highways, Government of india) & IRC (Indian Road Congress).

Keywords: Highway, NHAI, Morth, Totalstation

Introduction

The Government of India has taken up a massive program of up-gradation and development of National Highways. As a part of this program, the National Highways Authority of India (NHAI) has been entrusted with the project stretch (Package III) which aims in serving as a bypass for Vijayawada city starts near Chinna Avutapalli village (Km 0.000) on NH-16 and ends near Gollapudi village (Km 30.000), Krishna District in the State of Andhra Pradesh to 6-lane with paved shoulder configuration.

Krishna district is an administrative district in the Coastal Andhra region of the Indian state of Andhra Pradesh. Machilipatnam is the administrative headquarters and Vijayawada is the most populated city in the district. It has an area of 8,727 km2 (3,370 sqm) and had a population of 45, 29,009 as per2011 census of India. It is bounded by West Godavari on the east, Bay of Bengal on the South, Guntur and in the west and a portion of it also borders with the state of Telangana. The project consists of " Independent Engineer Services for supervision of Six laning of Vijayawada bypass from China Autupalli (Design Ch.0.000) to Gollapudi (Design Ch.30.000) in Vijayawada – Gundugolanu section of NH-16 in the State of Andhra Pradesh under Bharatmala Pariyojana on Hybrid Annuity Mode (Package-3) Total length of project is 30.000 km (6 Lane Length) from [Design Ch.0.00] to [Design Ch.30.000].

Following are the Quantities of materials required for construction of highway.

Major Quantities:

- Earthwork including RE Wall filling : **55,00,000 Cum**
- GSB : **2,60,000 Cum**
- CTB : **1,90,000 Cum**
- WMM : **73,322 Cum**
- DBM : **50,000 Cum**
- BC : **45,000 Cum**
- DLC : **3,500 Cum**
- PQC : **6,000 Cum**
- Structures (Concrete) : **2,50,000 Cum**
- RE Wall : **1,60,000 Sqm**

Major Materials required:

- Gravel : **55,00,000 Cum**
- Stone Aggregate : **20,00,000 MT**
- Cement : **95,000 MT**
- Steel : **12500 MT**
- HT Stands : **550 MT**
- Steel Girders : **4000 MT**
- Bitumen (VG-30) : **14,000 MT**
- Emulsion - SS : **698 MT**
- Emulsion - RS : **465 MT**

Details of Project Length

Sl. No.	Type of Cross-section	Type	Length (Km)	Remarks
1	Bypass Roads	Flexible	30.00	
2	Service Road/Slip Road	Flexible	11.17	

Following is a listing of the Key Project Milestones:

Milestone	Description	Target Date
Milestone-I	Concessionaire shall expended not less than 20% of the Total capital cost and shall have commenced construction of the project and achieved 20% of physical progress on 150th day from the Appointed Date.	17.07.2021
Milestone-II	Concessionaire shall expended not less than 35% of the Total capital cost and shall have commenced construction of the project and achieved 35% of physical progress on 330th day from the Appointed Date.	13.01.2022
Milestone-III	Concessionaire shall expended not less than 75% of the Total capital cost and shall have commenced construction of the project and achieved 75% of physical progress on 510th day from the Appointed Date.	12.07.2022
Scheduled Completion Date	Concessionaire shall have completed Project on 730th day from the Appointed Date.	17.02.2023

Road safety has been accorded very high priority. Traffic safety measures are adopted at all construction zones. Utmost care is being taken for safety of the labour force, plant areas, equipment as well as road users while carrying out the construction activities. Construction zones have been marked. Required PPE have been provided to all the workers at site. Safety officers have been designated for each section.

Traffic Management

Traffic is being regulated by providing flagmen, signage, and diversion at various locations along the project highway.

Detailed site-specific plans will be evolved for each construction site and reviewed time to time. A dynamic team of Safety Engineer and Officers has already been mobilized at all the camps. Safety audit and traffic management as per construction site requirement is constantly monitored.

Accident Report

No accident has been reported at site during this reporting month.

Safety Measures

Necessary Safety Measures undertaken during the reporting month. Safety teams appointed are constantly carrying out the safety audit of the sites.

• Dispensary at Site Camp with Doctor and trained male nurses/first aider to handle minor injuries.

• PPE distributed to all staff and Periodic Tool Box instructions conducted at site for various departments.

• Induction training given to all new employees.

• Safety Sign boards installed at various site locations.

• Fire Extinguishers installed at various places and locations are displayed near main gate.
• Barricading boards, delineators and sand bags provided at various construction sites.
• Dust control measures taken at site and crusher plant by water sprinkling method.
• First aid boxes placed at various places and locations are displayed near the main gate.
• Designated Flagmen placed for Road works where construction is under progress.

Role of Surveying

Total station surveys are a common way of surveying terrain. Traditional land surveying is one of the applications. Landform evolution is being tracked. To land use surveillance. Total stations are becoming typical tools in the geosciences and biological sciences for monitoring and detecting geomorphic changes in rivers. Streams. Beaches. And there's a lot of wasting of hill slopes. Because many total station surveys are currently being conducted in distant and/or underdeveloped areas, there is frequently no established local control network linked to a projected real-world coordinate system. As a result, many of these surveys are conducted using an un-projected assumed local coordinate system. GIS, on the other hand, has become a more commonplace tool for visualizing, modeling, and analyzing topographic data. Such surveys are becoming increasingly popular. The coordinate system of the entire world. The ability to overlay total station surveys with other datasets (e.g., aerial imagery, vector datasets of highways, political boundaries, etc.) and perform certain analysis is enhanced by converting total station surveys from an unprojected local assumed coordinate system to actual world coordinates. GIS programs have a variety of built-in and add-in features for performing transformations. The impact of applying the Georeferencing, Spatial Adjustment (Affine and Similarity), and Champ tools on the precision and relative accuracy of total station surveys is investigated in this research. This transformation necessitates the collection of real-world coordinates for at least two control points from various sources. This research also investigates the impact of employing geodetic GPS, handheld GPS, Google Earth (GE), and Bing maps as control point sources on total station survey precision and relative accuracy.

Significance of Thestudy

- By Using the Global Positioning System, determine and evaluate the position of spatial coordination.
- Total station is used to determine and assess surveying points in the form of points, polylines, and polygons.
- Geo transformation of data from the Global Positioning System and total station surveys.
- . Process of Geo referencing the spatial data (GPS) and assume value data (Total station)
- . In a Geographic Information System (GIS), non-spatial data and attribute entity information are collected.
- To conclude surveying and mapping for the case study with information about research area.

Materials in surveying

S.No	HARDWARE	MODEL NO.	USED FOR
1	Camera	Nikon D-80 SLR	Capturing images
2	GPS system	Garmin Etrex10 with base rover(single frequency)	Measuring position of exposure station
3	Total Station	Pentax R-425VN	Evaluation of point cloud (for marking locators)
4	Measuring tape,Plumbbob	Standard(30m) Standard	Object measurement and for centering tripod respectively
5	Laptop	Lenovo ideapad gaming 3(Ryzen 5)	Processing work

Establishing Reference Network:-

To assess the quality and precision of the surveyed data, a network of control sites has been built as a baseline against which RTK and TLS measurements can be compared. Using a Leica 1201 total station, a reference network of fourteen control points was built. Measurements were conducted in two faces with two rounds to determine the network with great precision. In order to transfer the datum from the local coordinate system to the needed coordinate system, SWEREF 99, four points of the reference network were also measured with static GPS.
As a result, this network functioned as a benchmark. On the basis of this reference value, the precision of the remaining RTK and TLS measurements was assessed.
As a result, field measurements were used to collect data in order to meet the project's goals. Three distinct surveying devices were used to take field measurements: –
1. Global Positioning System (GPS)
2. laser scaner (LS)
3. total station (TS).

GPS APPLICATIONS :

The Global Positioning System (GPS) is a space-based navigation system that works in all weather conditions. One of the most popular subjects in civilian applications is real-time kinematic (RTK) placement. Normally, RTK can be used to successfully and quickly collect land use change data. RTK, on the other hand, does not work in metropolitan settings or under trees because to overhead impediments.Then, to aid RTK, any standard terrestrial survey method, such as a total station (TS), can be utilized. Since the gathered land use change data will be incorporated into an existing land management system utilizing either an RTK or total station technology.As a result, from the perspective of a Geographic Information System, the land use change styles of the interesting region might be divided into a number of groupings (GIS).
It is vital to build an optimum and effective field surveying method by assessing the land use change styles and environmental factors of the interested region in order to reduce RTK and/or total station (TS) field surveying tasks.

To eliminate instrumental errors such as line of sight errors, tilting axis errors and vertical index errors, two face measurements were taken. Since the coordinates determined with total station are provided in local coordinate system, static GPS measurement was needed to transform the datum to SWEREF 99. Then, precision of the network has been obtained from network adjustment and verified for if there have been gross errors were occurred. Detail measurements (RTK on the network and, TLS and TS on the faÃade) were taken five times to evaluate the precision of the measurement. Finally, accuracy and precision of the detail measurements were tested by RMS and standard deviation analysis respectively.

Evaluation Of Accuracy And Precision

To evaluate the accuracy and precision of the measurement, RMS and standard deviation of the individual measurements were computed. RMS (root mean square error) is a measure of accuracy of the individual measurement. It can be computed from the deviations between true and measured values. True value of the measured quantity is the value which was determined with significantly higher precision. In this project the coordinates of the reference network were considered as true which is determined in 1mm level.

Choosing Suitable Control Points For The Netwrok And Detail Survey

Reconnaissance of the project area was the first step in the establishment of control network and followed by marking fourteen control points which are visible each other. Those control points were also suitable for satellite visibility, because RTK method was needed to compare with the TS control points. The points are marked with nails for sustainability reason. The project area was close to L building in the campus of PITS.

Setting Up Targets For Laser Scaning

In order to compare the results from total station and laser scanner, 21 target points were chosen at the North Eastern faÃ§ade of the L building. Six black and white target papers were marked as control points for the registration of Scan Worlds. Those target points were also measured with total station. There are requirements t be fulfilled when choosing black and white targets. As Quintero et al, (2008) stated out, not only is the station position important, the positioning of the targets carries equal importance. And so, it is important to note that:
1. Targets be widely separated.
2. Targets have different heights.
3. As few targets as possible on one single line.

CONCLUSION

The purpose of this research was to evaluate survey between two surveying methods such as GPS and Total station with GIS applications.
In every task survey measurements was recorded and converted to GIS environment. Then in order to evaluate survey with information about details pf the case study.
Therefore, it can be concluded that there were no gross errors in the environments because accuracy maintain compiling with total station and GIS. In this case study needful for our advanced environment information.

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References

IRC:37-2011 Design of Flexible Pavement.
IRC:58-2011 Design of Rigid Pavement.