PROJECT REPORT

ON

ROUTE SURVEY

OF

OKE-OSE- SENTU ROAD, OFF OLD JEBBA ROAD, ILORIN EAST LOCAL GOVERNMENT AREA, KWARA STATE.

BY

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MATRIC NO.: ND/23/SGI/FT/067

BEING A PROJECT REPORT SUBMITTED TO THE DEPARTMENT OF SURVEYING AND GEO-INFORMATICS, INSTITUTE OF ENVIRONMENTAL STUDIES.

IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF ORDINARY NATIONAL DIPLOMA (OND) IN SURVEYING AND GEO-INFORMATICS, KWARA STATE POLYTECHNIC, ILORIN.

JUNE, 2025

CERTIFICATE

I, **OLAREWAJU BOLUWATIFE ADURAMIGBA** with Matric Number **ND/23/SGI/FT/067**

hereby certify that the information contained in this project report were obtained as a result of observations and movements taken by me and the Topographical Survey was done in accordance to Surveying rules and regulations and Departmental instructions.

Signature of student: ______________________________

Name of student: ______________________________

Date of completion: ______________________________

Matric Number: ND/23/SGI/FT/076

CERTIFICATION

This is to certify that **OLANREWAJU BOLUWATIFE ADURAMIGBA** with Matric number ND/23/SGI/FT/067 carried out this project and has been approved as meeting the requirement for the award of National Diploma (ND) in Surveying and Geo-informatics in the Department of Surveying and Geo-informatics of the Institute of Environmental Studies, Kwara state polytechnic, Ilorin.

____________________ ……………………………

Surv. Abdulsalam Ayuba Sign and Date
Project supervisor

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Surv. B. Y. Oguntayo Sign and Date
Project supervisor

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Surv. S. A. Awoleye Sign and Date
Project Coordinator

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Surv. I. I. Abimbola Sign and Date
Head of Department

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External Examiner Sign and Date

DEDICATION

This project is dedicated to Almighty God, the creator of heaven and earth, ancient of days, the I am that I am the beginning and the end whose supremacy in the knowledge of everything is absolute.

ACKNOWLEDGEMENT

All thanks, glory and adorations are due to Almighty Allah, The Creator of all and The Designer of every fate; for making this path (SURVEYING) part of my fate and for His blessing, mercy, favor, guidance, and assistance in seeing me through from the start to the end of my program and making the program a success.

I am lucky to have family and friends who have aided my academic pursuit in the ways they wouldn’t even know. I thank my parents Mr. and Mrs. OLAREWAJU for their love, kindness, prayers, and supports both morally and financially. To my siblings for their prayers and advice words cannot be enough to express my gratitude.

And I also give thanks to my project supervisors in the person of Surv. Abdulsalam Ayuba and Suvr. Benard Oguntayo for their strictly and through supervision. I will like to thank all lecturers of this noble department starting from H.O.D Surv. Abinbola isau, Surv. A. Ayuba, Mr. Bello Felix Diran, Surv. Williams Kzeem, Surv. A.O. Akinyede, and also the Director of special duty in IES Surv. A.G. Aremu and other supportive staff of the department of Surveying and Geo-informatics, Kwara State Polytechnic, Ilorin.

To everyone who has supported me thus far, I am sincerely grateful and I will never forget. MAY GOD BLESS YOU ALL. AMEN

ABSTRACT

This project report contains the reconnaissance, field work, data processing exercise, and every other procedure undertaken in the course of this project which focused on Route Survey which involves acquisition of data for the purpose of road construction design for the road from GT junction to SENTU Road in Oke-Ose Ilorin East local government of Ilorin, Kwara State. The field work involved, reconnaissance, distance measurement with DGPS and, the numbers of intersection point (I.P), benchmark (B.M), using CORS. The acquired data were processed using appropriate formulae. The plans were produced from the processed data at suitable scales both in digital and graphic formats. Finally a project report was written.

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CHAPTER ONE

1.0 INTRODUCTION

Surveying forms the bedrock of any engineering endeavor. From road alignments to dam construction, irrigation schemes, tunnels, and buildings, no project can begin without accurate spatial data. Surveying ensures that infrastructure is planned, designed, and built based on the realities of the terrain and the environment in which it exists. Its application spans physical measurements of the earth's surface, as well as data collection for understanding human activity and environmental impact.

Surveys are, fundamentally, systematic approaches to data gathering. Whether used to map the landscape or assess public opinion, they serve a common purpose: to provide reliable information for decision-making. In engineering, surveying is essential at every phase—from feasibility studies to post-construction evaluation. It provides detailed knowledge of terrain features, elevations, boundaries, and potential challenges, all of which are critical for ensuring safety, accuracy, and cost-effectiveness in project execution.

WHAT IS ROUTE SURVEYING?

Route surveying is a specialized branch of engineering or geodetic surveying focused on the design and construction of linear infrastructure such as roads, railways, canals, pipelines, and power lines. It involves the measurement and mapping of a narrow corridor to determine the best possible path for construction, considering both horizontal alignment (direction) and vertical alignment (elevation).

This type of survey collects detailed data about the land along a proposed route, including slopes, elevations, surface features, man-made structures, and natural obstacles. The purpose is to create a clear and accurate picture of the terrain so that designers and engineers can decide how best to lay out the infrastructure for stability, safety, and efficiency.

PURPOSE AND OBJECTIVES OF A ROUTE SURVEY

The purpose of a route survey goes beyond just mapping a path. It includes:

1. Identifying the most suitable alignment for the infrastructure by analyzing elevation profiles, soil conditions, and environmental features.
2. Providing essential data for engineering drawings, including plan views, profiles, and cross sections.
3. Assessing potential risks such as steep gradients, flood-prone areas, or zones of environmental or cultural sensitivity.
4. Supporting design and construction by giving engineers the precise measurements and layouts they need for accurate implementation.

Additionally, route surveys are often used in the rehabilitation or expansion of existing infrastructure, where data is needed to understand how existing conditions can be improved or modified for better performance.

ROLE IN ENVIRONMENTAL AND SOCIAL PLANNING

Route surveying also plays an important role in environmental and social impact assessments. Before any major construction project begins, it is crucial to understand how the proposed route might affect ecosystems, water bodies, historical sites, and local communities. Through detailed field observations and geospatial analysis, surveyors help identify and document sensitive zones so that planners can take steps to avoid or mitigate harm.

For example, if a route passes through a wetland, the survey will inform engineers of its location, size, and ecological value, allowing for adjustments in design or the implementation of protective measures. This ensures that infrastructure development is not only functional but also sustainable and socially responsible.

KEY CONSIDERATIONS IN PLANNING A ROUTE SURVEY

A well-executed route survey requires careful planning and attention to technical details. The surveyor must:

1. Understand the project specifications and design criteria.
2. Choose the most appropriate instruments and techniques, such as GPS, total stations, drones, or digital levels.

3. Optimize the route to minimize construction costs, environmental damage, and land acquisition issues.
4. Provide accurate data that enables the design team to make well-informed decisions.

The ultimate goals during route survey planning include:

1. Facilitating transportation and communication between affected communities.
2. Reducing project complexity and duration by avoiding difficult terrain or heavily built-up areas.
3. Collecting all necessary field data to guide the construction engineer during the design stage.

1.1 AIM OF THE PROJECT

The main aim of the project is to gather data of the existing ground level along the proposed route to aid engineering design and construction of the road, and to establish the horizontal and vertical alignment of the road.

1.2 OBJECTIVE OF THE PROJECT

- Determine the optical route
- Gathering accurate data
- Minimize costs and risk
- Ensuring safety and functionality
- Supporting detailed design

1.3 SCOPES OF THE PROJECT

- Reconnaissance survey of the project site
- Office planning
- Preliminary survey (Data collection)
- Detailed survey
- Monumentation
- Data acquisition using Differential GPS
- Data downloading editing
- Data processing and analysis
- Information presentation both hard/soft copies

1.4 PERSONNEL

The personnel involved in the survey are;

NAME	MATRIC NUMBER	ROLE
OLAREWAJU BOLUWATIFE	**ND/23/SGI/FT/0067**	**AUTHOR**
AWOSUNLE BOLUWATIFE .O	**ND/23/SGI/FT/0072**	**MEMBER**
KAZEEM FARIDAH ENIOLA	**ND/23/SGI/FT/0069**	**MEMBER**
MURITALA MUJIDAH KEHINDE	**ND/23/SGI/FT/0068**	**MEMBER**
BADMUS FATHIA ARIKE	**ND/23/SGI/FT/0070**	**MEMBER**
AZEEZ FARUQ AOMIDE	**ND/23/SGI/FT/0060**	**MEMBER**
ALADE FLORENCE ABOSEDE	**ND/23/SGI/FT/0071**	**MEMBER**

1.5 LOCATION

The study area is at Sentu – Oke-Ose Road, off Old Jebba road, Ilorin East Local Government Area Kwara State. The length of this project is 5km covered the Latitude (8º32’54.40”)N Longitude (4º39’10.90”)E and Latitude (8º30’52.57”)N Longitude (4º40’55.30”)E.

1.5.1 MAP OF THE SITE LOCATION

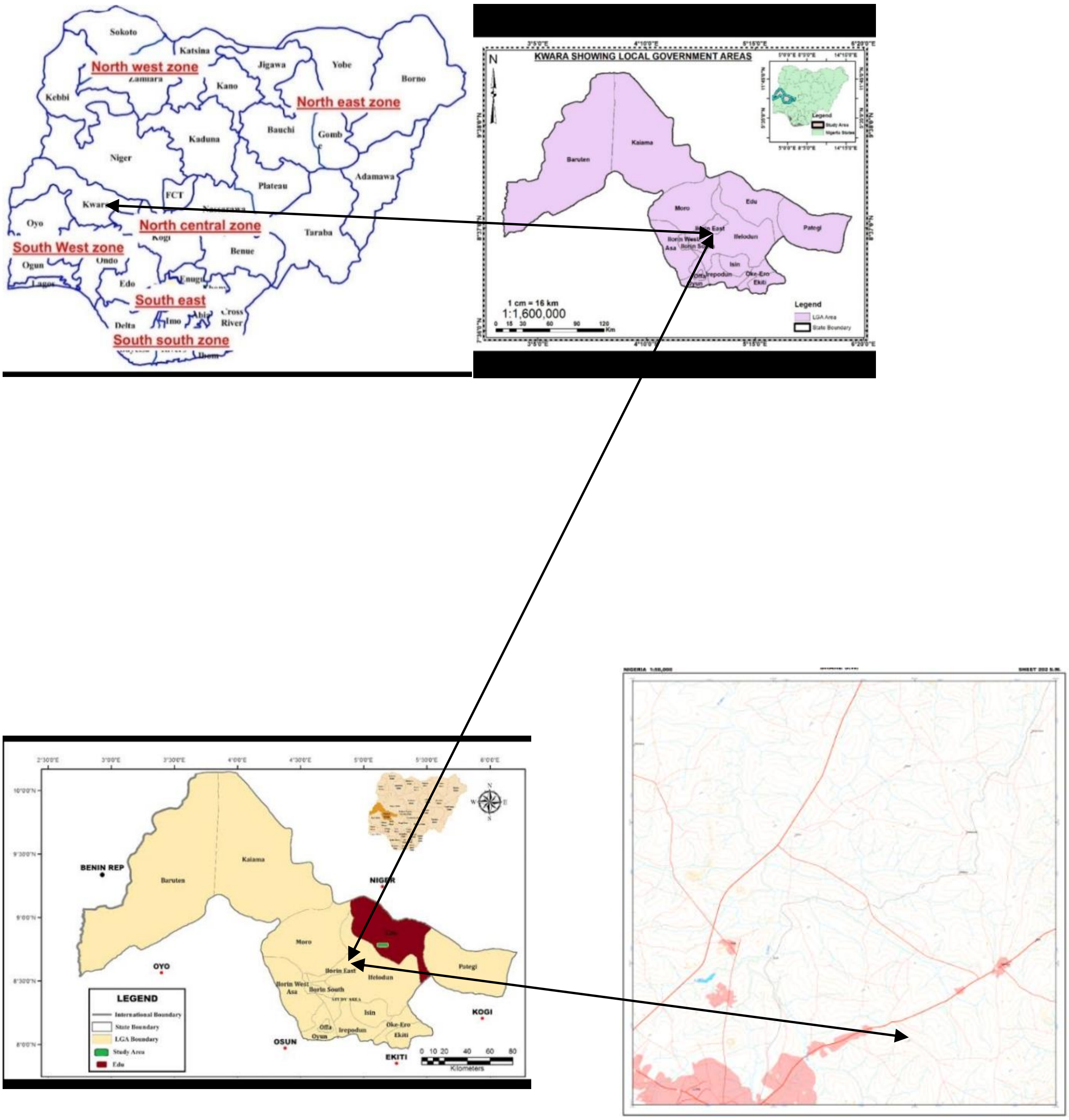

FIG.1.0 Showing Nigeria map, Kwara state map, and topographical map covering the project area .

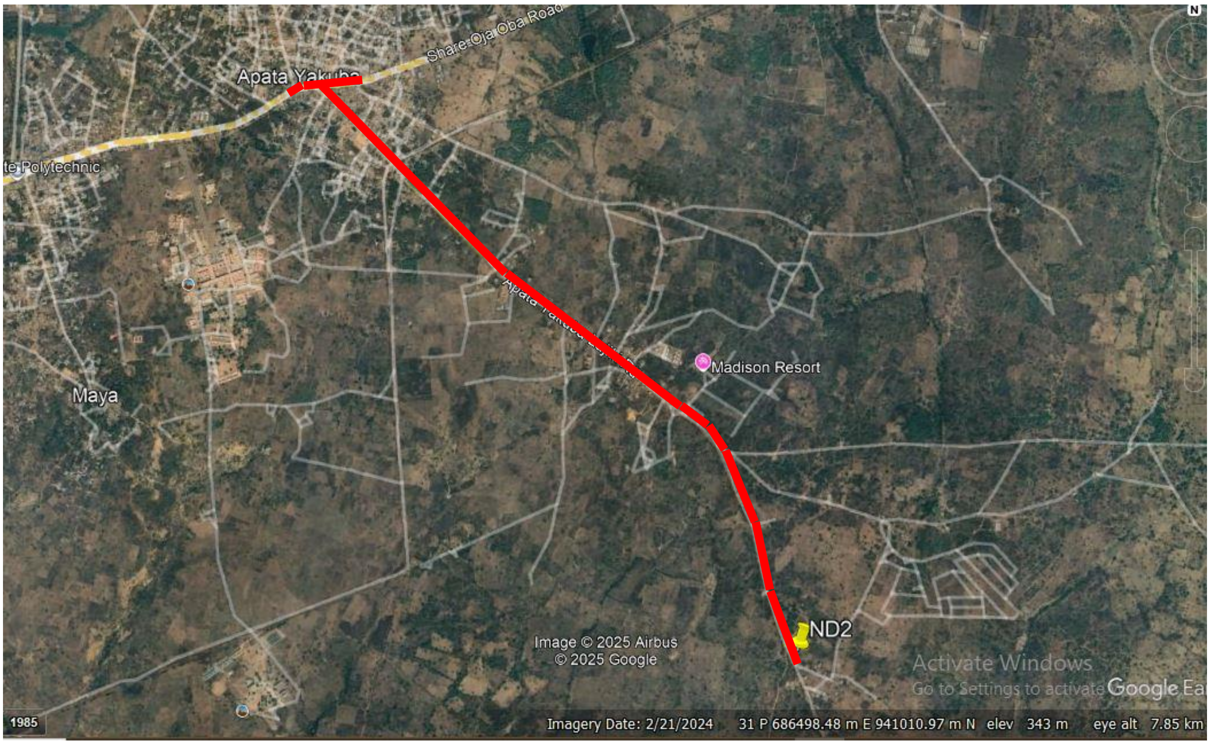

Fig. 1.1 showing the imagery covering the project area

CHAPTER TWO

LITERATURE REVIEW

Transportation networks are the backbone of modern civilization, facilitating the movement of people, goods, and services. Effective route planning and surveying are foundational to building such networks. According to the Local Planning Handbook (2015), simple, direct transit routes with minimal turns improve public understanding, reduce travel time, and enhance system efficiency. Transit systems with fewer deviations not only lower operational costs but also allow transit agencies to allocate resources more efficiently. These benefits underscore the importance of proper route planning supported by accurate and comprehensive surveying.

Urban planning strategies can reinforce efficient route design by promoting development along straight, high-density corridors and by enhancing street connectivity. This ensures that public transportation infrastructure can be effectively integrated into the urban environment, minimizing the need for complex detours or indirect routes.

Concept of Surveying and Route Surveying

Basak N.N. (2010) defined surveying as the science and art of determining the relative positions of objects or points on the Earth's surface through the measurement of distances, angles, and elevations. This data is then translated into maps or plans for various applications. One specialized branch of this practice is route surveying, which focuses on linear infrastructure development. It involves the measurement and analysis of terrain along a proposed route to determine its alignment, elevation profile, and cross-sectional features.

Route surveying is commonly used in the design and construction of transportation corridors, including roads, railways, pipelines, power lines, and canals. These surveys are carried out along a narrow corridor and typically include longitudinal sections (along the centerline) and transverse cross sections (across the width of the corridor). This data is vital in optimizing the alignment for safety, cost-effectiveness, drainage, and structural integrity.

Importance of Engineering Surveying

M. Seedat (2012) described engineering surveying as the branch of surveying related to the design and execution of engineering projects. It provides essential spatial information for construction layout, structural monitoring, and volumetric computations. The importance of engineering surveys is particularly evident in route development, where the following key tasks are performed:

1. Topographic Mapping – Capturing terrain features and elevation
data to guide the design process.

2. Setting Out – Translating design coordinates into physical markers on the ground to guide construction.

3. Monitoring – Ensuring constructed features maintain their intended alignments, elevations, and tolerances.

4. Volume Estimation – Calculating earthwork quantities for cutting, filling, and material transport.

These tasks rely on a variety of instruments, including GNSS (GPS), total stations, digital levels, and laser scanners.

Engineering surveyors play a pivotal role throughout the project lifecycle — from pre-construction feasibility studies to post-construction verification. The precision of their work directly impacts project cost, safety, and success.

Transportation and Economic Development

As Garber (2009) noted, transportation is both a driver and a product of development. A society cannot grow or sustain economic activities without an efficient transportation system. While it may not guarantee success, its absence severely limits regional development. Good roads promote migration, stimulate commerce, and foster national integration.

In Nigeria, over 95% of surface transportation occurs via roads. As such, the design and development of road networks depend heavily on route surveys. These surveys help determine the Right of Way (ROW), assess environmental impact, and guide compensation for affected landowners.

Case Study Examples:

The Abuja–Keffi Road Survey (52 km), conducted by Setraco Nigeria Ltd, utilized modern equipment such as GPS, EDM, and total stations to define alignment and right-of-way boundaries. Despite technical success, compensation delays led to encroachments along the corridor.

On the Jibiakaro–Gusau Road (161 km), Dentata and Sawoe Nigeria Ltd conducted route surveys to assess land use, property impact, and guide compensation. These surveys enabled informed decision-making and minimized legal disputes during construction (Idemudia, 2007).

Technical Considerations in Route Surveying

According to Mikhail (2001), route surveys begin with design and continue through construction. They establish the geometric layout, including horizontal and vertical curves, gradient profiles, and terrain adaptations. Surveyors must consider factors like:

Cut and Fill Balancing – Ensuring minimal material import/export.

Hydrology and Drainage – Preventing water accumulation and erosion.

Access and Safety – Designing routes that serve communities efficiently while maintaining safety standards.

Ghilani and Wolf (2006) emphasized that route surveys should ideally progress between control points in the most direct and practical way possible, taking into account field constraints like topography, vegetation, and built-up areas.

Uren (1994) outlined the importance of both longitudinal and cross-sectional data in route design. Longitudinal sections aid in vertical profile planning (e.g., gradients, cut/fill), while cross-sections define construction widths and slope stabilization measures. Pegging along the corridor helps define boundaries and guides machinery during construction.

Modern route surveys often use a mix of plane-table, tacheometric, aerial photogrammetry, and LiDAR techniques. For small-scale upgrades, only basic data might be needed, but large-scale projects require complex datasets, including geotechnical, environmental, and socioeconomic inputs.

Surveyors must also be well-versed in:

1. Curve geometry and route alignment theory
2. Terrain data collection and modeling
3. Earthwork calculations and staking
4. Post-construction verification and "as-built" surveys
5. Use of Modern Technology in Route Surveys

Modern route surveys benefit from advancements in technology. Differential GPS (DGPS) and Continuously Operating Reference Stations (CORS) now allow for real-time, high-precision data collection over large distances without needing temporary base stations. These tools improve efficiency, save time, and maintain centimeter-level accuracy over extended routes.

Additionally, instruments like laser scanners, drones, and geographic information systems (GIS) support data visualization, terrain analysis, and spatial planning. This technological integration allows survey teams to deliver more accurate, faster, and cost-effective results.

Project-Specific Survey Application

The route survey conducted from GT Junction to Sentu Junior Secondary School Road, covering approximately 5 kilometers, demonstrates the application of these principles in practice. The use of Differential GPS integrated with the CORS network significantly enhanced spatial accuracy while reducing logistical burdens. The methodology avoided the need for repeated base station setups, making the project both efficient and cost-effective. Survey markers were placed along the route for setting out and control, and data were collected at intervals appropriate for route profiling and cross-section analysis.

This survey not only provided data for road alignment but also helped assess the terrain's suitability for construction, identify potential drainage challenges, and determine land ownership boundaries for future development stages.

CHAPTER THREE

3.0 METHODOLOGY

This can be termed as a set of methods and principles used to perform a particular activity. For the activities to be successfully performed, proper planning is very important. This involves development of a work plan showing how goals and objectives are to be accomplished. Hence, planning is one of the essential factors for the effective project execution and management. Proper planning was taken for the execution of this project and this involved;

1. The choice of the most appropriate techniques for carry out of the project
2. Selection of equipment used
3. The design of a monitoring scheme that really helped in achieving the required accuracy for the project, starting from reconnaissance to the final product of the project.

3.1 RECONNAISSANCE

This is an important and first aspect in any survey project carried out to obtain the general view of the study area in terms of the nature of the terrain and to adequately plan the best ways to the set aim and objectives of the project. The importance of reconnaissance to any survey work of any size and nature cannot be over-emphasized. Experience has proved that time spent in carrying out a good reconnaissance is not a wasted time since it contributes to the quick execution of any survey exercise and promotes easy survey work. Reconnaissance simply connotes the summation of all activities preceding the actual execution of a survey job. It involves taking a general study or view of an area of operation with a view of knowing how best the operation is to be carried out in terms of energy and time. As this project was concerned, the reconnaissance was carried out in two stages.

The two stages of reconnaissance are;

i. Office planning
ii. Field planning

3.1.1 OFFICE PLANNING

Office planning is also known as office reconnaissance. It is a vital component of route surveying, enabling surveyors to gather existing data and information before conducting fieldwork. This process involves a thorough review of available resources, including maps, aerial imagery, and existing reports.

3.1.2. FIELD PLANNING

The field reconnaissance was first carried out before the actual operation. This aspect involved site visitation to the project site by all the group members to have a pre-requisite knowledge of how it looks and how the field operation will be carried out.

During the visit, the control points planned to be used were marked, the reconnaissance facilitated the planning and carrying out of the actual survey as it was taking into consideration, the possible problem that are likely to be encountered, how such problems can be overcome or reduced to the barest minimum.

3.2 FIELD PREPARATION

This involved the operation carried out before the actual observation. The operation involved marking of chainages which is done at 25cm interval.

3.3. MOMENTATION

Temporary bench mark (TBM) were established and coordinated along the entire route of the project, which were meant to serve as controls for establishing Centerline chainage, setting out of curve and other road features during the actual construction.

The position of these beacons were selected in such a way that they are intervisible to each other, not too far from the proposed road and considerable number of Centerline can be set out from them.

The property beacon used were precast with dimensions 18cm square by 75cm in length. 65cm of the precast beacon was buried beneath the surface and 10cm above. This was done in compliance with the specification of cadastral survey regulations as specified in CAP 425 law of the federation of Nigeria. The property beacon was made of concrete mixture of ratio 3:2:1 of sand, granite and cement. The iron rod protruding at the center of the beacon formed the station mark.

The numbering was done serially from the beginning to the end of the proposed road and were prefixed with the identification number KP ND11 001

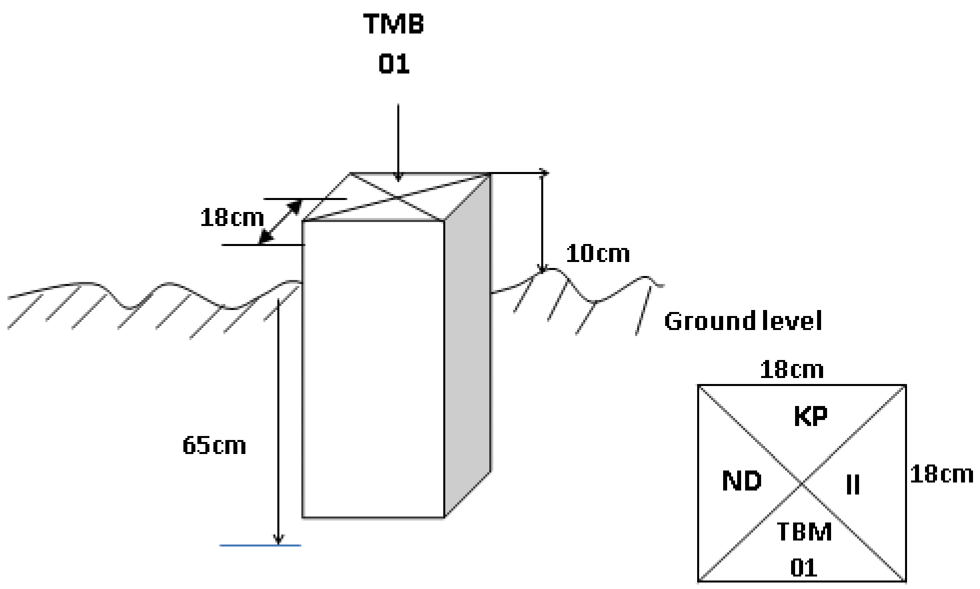

Fig. 3.0 Showing typical survey beacon

3.4. EQUIPMENT USED

3.4.1 HARDWARE USED

i. Differential GPS
ii. Handheld GPS
iii. Linen tape
iv. Power supplies
v. Nails and bottles cork
vi. Hammer
vii. Cabling and connectors

3.4. 11. SOFTWARE USED

i. AutoCAD/ CivilCAD 2014
ii. Microsoft office (word and excel)
iii. Notepad

3.5. METHOD USED

CORS TECHNOLOGY

CORS stands for (Continuously Operating Reference Station). It is a type of GPS or GNSS (Global Navigation Satellite System) station that:

1. Collects and transmits GPS/GNSS data continuously.
2. Provides real-time corrections to improve the accuracy of GPS signals.

CORS are used to enhance the precision and reliability of GPS positioning for various applications, including surveying, mapping, navigation, and more.

How you use a CORS with a data logger when collecting survey data:

How to Use a CORS with a Data Logger

1. Set Up Your GNSS Receiver & Data Logger

- Mount the GNSS antenna securely on your survey pole or tripod.
- Connect your data logger/controller to the GNSS receiver. The data logger is usually a handheld device or tablet used to configure settings and record data.

2. Configure the CORS Connection

- On the data logger, enter the CORS network settings:
- Enter the username
- IP address & port of the CORS provider.
- You’ll need mobile internet (, hotspot) on your data logger or receiver to access the CORS network in real time.

3. Select Correction Service Type

- Choose RTK corrections (Real-Time Kinematic) if you want live centimeter-level accuracy.

- Some systems also allow post-processing (PPK), where you log raw data and apply CORS corrections later.

4. Start Receiving Corrections

- Once connected, the GNSS receiver will start applying correction data from the CORS.
- The data logger will show “Fixed RTK” or “Float RTK” status, indicating correction quality.

5. Begin Surveying & Logging Points

- Move to the points you want to survey.
- Use the data logger to record positions, adding descriptions, codes, or attributes as needed.
- Each recorded point will have high-precision coordinates

6. Save & Export Data

- After collecting your points, you can export the data (CSV, DXF, shapefiles, etc.) from the data logger for further use in GIS, CAD, or mapping software.

In Simple Terms:

The CORS sends corrections to your rover via the internet.Your data logger controls the receiver and records corrected point data.

CHAPTER FOUR

4.0 DATA PROCESSING AND RESULT ANALYSIS

This stage involves downloading of the acquired data on field from the digital equipment to the personal computer for further processing. The data obtained were downloaded using a data transfer cable. After successfully downloaded of those data, they were edited using Microsoft Excel and Notepad Software which made it possible to easily import the edited copy into AutoCAD for drafting and designing. The coordinate obtained were in X, Y, Z format which were used for plotting the route’s longitudinal profile

4.1. DATA DOWNLO1ADING

1. The instrument was connected to the personal computer via downloading cable, the corresponding software was launched and the instrument port was selected.
2. All the folders on the instrument were displayed. The folder containing the data for the group was then copied and pasted on another folder already created on the local drive of the personal computer.
3. The folder was launched and the file containing the data was opened with notepad application.

4. The results were in the format; Point ID, Easting, Northings and Height. The downloaded data were edited in Notepad, Microsoft Excel and scripts were prepared in Notepad in order to be plotted in AutoCAD.

4.2 DATA PROCESSING

Data processing is a critical component of route surveys, enabling the transformation of raw data into usable information for design, analysis, and decision-making. Route surveys involve collecting vast amounts of data, including topographic information, environmental factors, and infrastructure details.

The data processing stage involves several key steps, including data cleaning, transformation, analysis, and visualization. Data cleaning removes errors, inconsistencies, and outliers, ensuring the accuracy and reliability of the data. Data transformation converts the data into suitable formats, while data analysis applies algorithm

The downloaded data from the equipment was further edited using Microsoft Excel and Notepad, the final edited copy was saved as text file containing X, Y, Z coordinates of all points observed in the field.

4.3 RESULT ANALYSIS

The results were analyzed so as to check the accuracy of the job by comparing the result obtained with the minimum allowable error acceptable for this order of survey job in accordance with survey rules and departmental instructions.

4.3.1 LONGITUDINAL /HORIZONTAL ALIGNMENT PROFILE

1. In CivilCAD environment, Road menu was clicked and HORIZONTAL ALIGNMENT chosen

2. Options button was clicked in the appeared dialogue box and Define section was then clicked to choose the section format and the distance between the sections. Format 2 was chosen and the distance between sections was taken to be 25m.

3. Having chosen these options, OK was clicked twice.

4. Pick tool was selected from the right pane dialogue box to pick the intersection points (IP), and appropriate radius values of curve was given to each IP as specified by the client.

5. Apply button was then clicked to effect all the given parameters on the drawing. On each IP position, information about the IP is been displayed.

Such information are; IP number ,X coordinate, Y coordinate, Radius of Curve, Length of curve, Deflection angle and so on.

4.4 INFORMATION PRESENTATION/ PLAN PRODUCTION

The data acquired were processed into plan for visual presentation with AutoCAD CivilCAD. The visual display graphical information in AutoCAD was printed as hardcopy of the plan. The longitudinal section and profile were plotted.

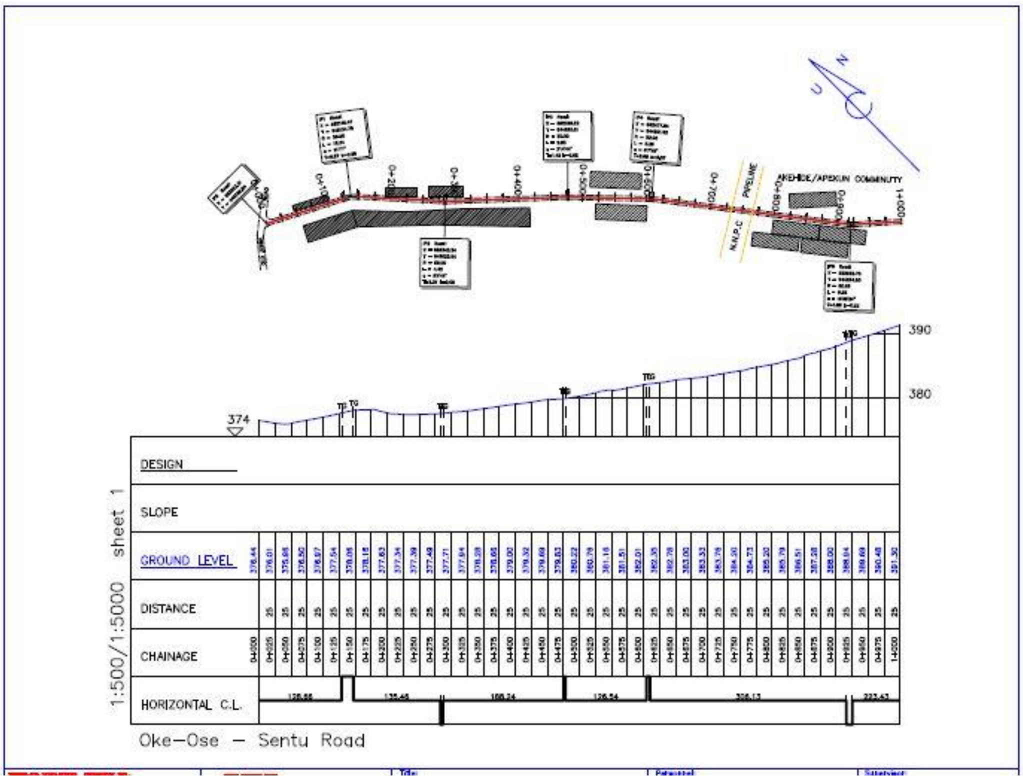

Fig. 4.0 showing the Profile and Longitudinal Section from Chainage 0+000 – 1+000

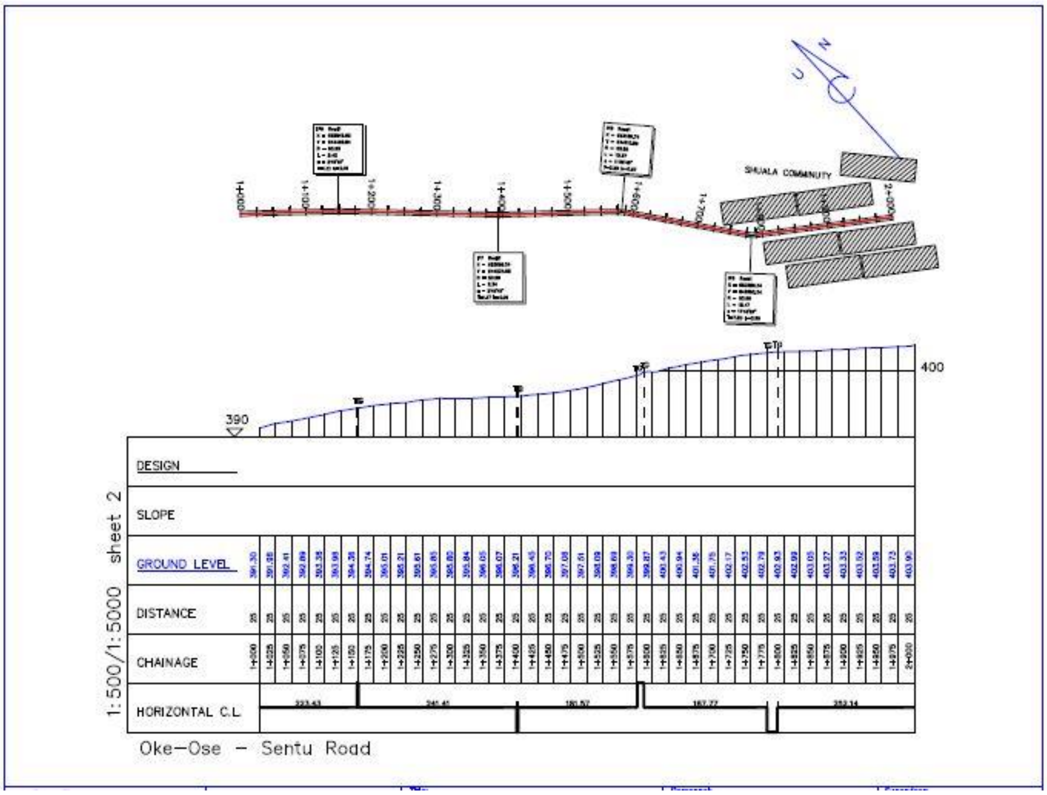

Fig. 4.1 showing the Profile and Longitudinal Section from Chainage 1+000 – 2+000

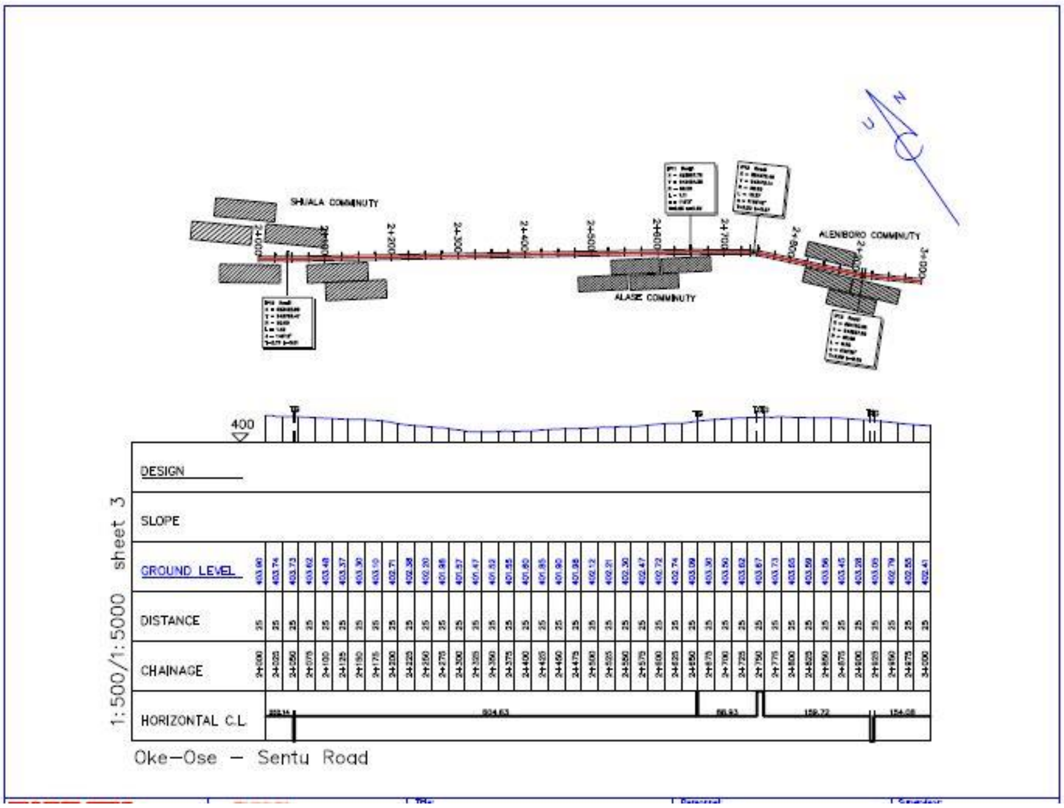

Fig. 4.2 showing the Profile and Longitudinal Section from Chainage 2+000 – 3+000

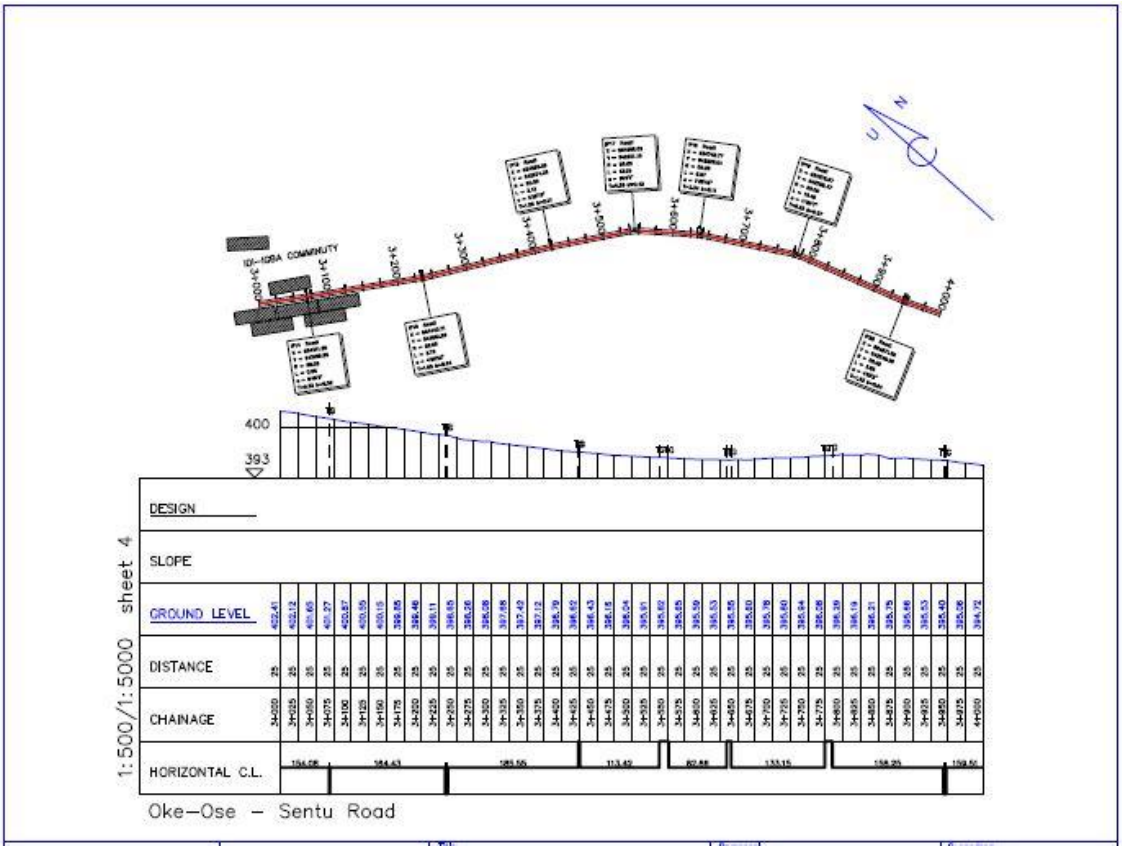

Fig. 4.3 showing the Profile and Longitudinal Section from Chainage 3+000 – 4+000

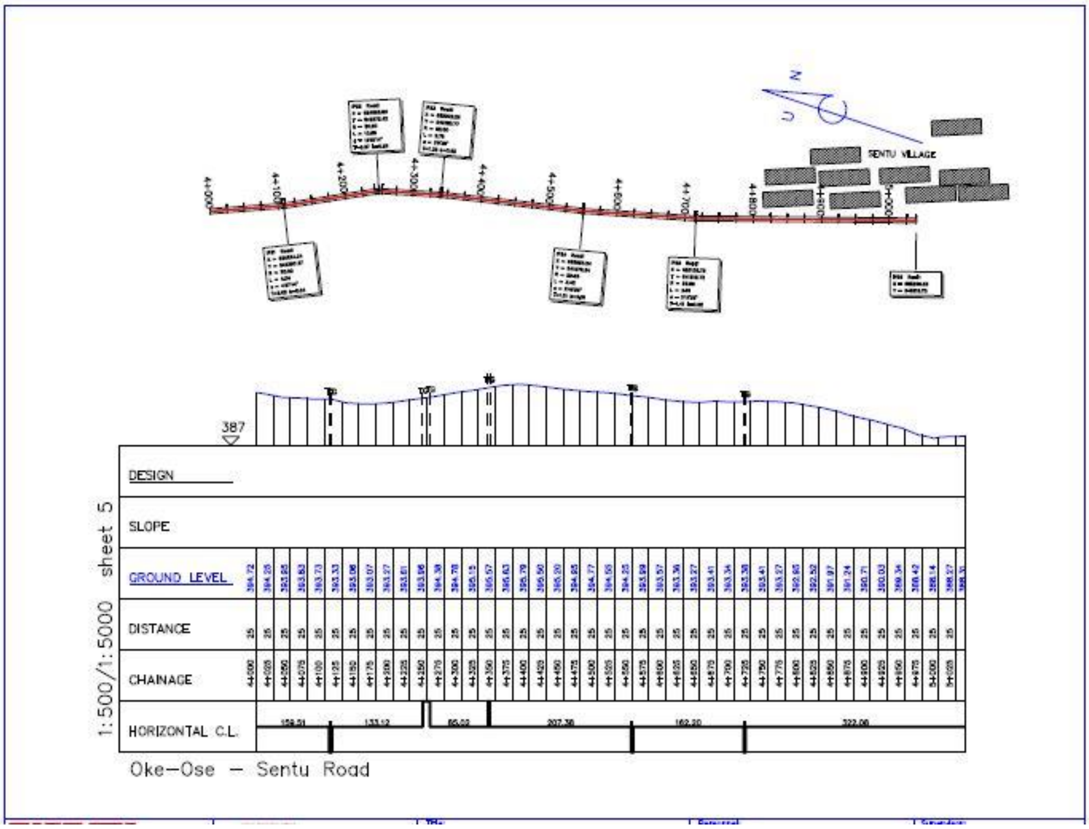

Fig. 4.4 showing the Profile and Longitudinal Section from Chainage 4+000 – 5+025

CHAPTER FIVE

5.0 SUMMARY, PROBLEM ENCOUNTERED, CONCLUSION AND RECOMMENDATIONS

5.1 SUMMARY

The aim and purpose of this project was to carry out route survey of OkeOse - Sentu Road, off Old Jebba road Ilorin East. We started with reconnaissance which involved Office Planning and Field Planning. Reconnaissance entails total planning and usually visitation to study area to get familiarize to the site. The instrument used was examined to make sure that it is in good working condition. The raw data obtained from the field work were downloaded into a computer system using downloading cable and later process using software (CivilCAD). The processed data were used for the production of digital plan using a suitable sale in order to appreciate the work done so far and to make the work understandable to others.

5.2 PROBLEM ENCOUNTERED

The following problem were encountered when project is going on

- ❖ The movement of the masses and vehicle from one place to another along the selected road for the project was a great problem which had an effect on the rate at which the operation was carried out.
- ❖ There’s poor mobile network coverage in some areas
- ❖ There’s no instrument to be used from the department, we need to rent instruments outside in order to execute our project
- ❖ Accuracy decrease distance from the CORS station. Interference from vegetation or buildings which also affect signal quality.

5.3 SOLUTION TO THE PROBLEMS

Optimize station placement: Choose CORS stations that are strategically located for optimal coverage and accuracy in your survey area.

Use higher-quality receivers: Employ survey-grade GPS receivers that are more robust to interference and capable of maintaining high accuracy. Implement error detection and correction techniques: Utilize post-processing techniques or real-time kinematic (RTK) methods to minimize errors.

5.5 RECOMMENDATION

Using CORS in route surveys offers significant advantages in terms of accuracy, efficiency, and cost-effectiveness. By leveraging this technology, surveyors can achieve higher quality results while reducing project timelines and expenses.

5.4 CONCLUSION

The goal of this project was successfully achieved in which all operation was carried out in accordance to survey rules and regulation and high data integrity was ensured. Moreover, this project has broadened my knowledge in carrying out route survey within an area and a good background in surveying operation. CORS systems are a valuable tool for route surveys, providing accurate, reliable, and efficient positioning solutions. With their ability to deliver centimeter-level accuracy and streamline survey workflows, CORS systems are becoming increasingly important for a wide range of surveying and mapping applications. The survey plan of selected location (GT Junction to Sentu Junior School) was finally produced showing the alignments and levels.

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APPENDIX I

1. Digital plans

APPENDIX II

Name	N	E	H
Base_0	937113.1	671374.3	290.1564
PT1	945199.3	682040.6	376.7882
PT2	945213.6	682040.1	376.9413
PT3	945211.5	682003.7	375.523
PT4	945195.8	682006.7	375.3559
PT5	945196.7	682015.1	376.0015
PT6	945195.3	682015.3	375.6575
PT7	945198.1	682029.9	376.6706
PT8	945197	682030	376.6791
TBM	945198.3	682030.3	376.5831
PT9	945196.8	682023.3	376.4395
TBM2	945195.5	682016	376.149
PT10	945180.9	682042.2	375.4776
PT11	945189.1	682045.9	376.1932
PT12	945185.8	682044.1	375.9832
PT13	945169.6	682068.4	375.8128
PT14	945173.3	682070.4	376.1018
PT15	945177.4	682070.2	376.1243
PT16	945164.7	682102.3	377.128
PT17	945158.5	682099.6	376.68
PT18	945154.6	682097.6	376.4599
PT19	945140.1	682122.3	376.9666
PT20	945144.6	682125.7	377.2596
PT21	945148.2	682127.9	377.3442
PT22	945120.7	682147.4	377.4701
PT23	945124.2	682150.8	378.0427

PT24	945125.9	682152.4	378.0537
PT25	945098.5	682168.5	378.0107
PT26	945101.5	682173.1	378.1797
PT27	945105.2	682176.5	378.1743
PT28	945081	682188.1	377.3532
PT29	945075.5	682192.4	377.1792
PT30	945070.3	682187.8	376.6787
PT31	945073.3	682183.8	376.4857
PT32	945080.9	682194.6	377.4948
PT33	945085.9	682197.4	377.5604
PT34	945063.1	682219.9	377.4999
PT35	945058.1	682215.5	377.3388
PT36	945052.9	682210.7	377.3088
PT37	945031.9	682232.7	377.3118
PT38	945036	682236.9	377.4859
PT39	945040.9	682242.2	377.962
PT40	945019.5	682262.2	377.834
PT41	945015.2	682258.3	377.7304
PT42	945011	682255.5	377.7909
PT43	944991.5	682273.8	377.8099
PT44	944994.4	682278.7	377.9765
PT45	944998.6	682283.3	378.3025
PT46	944979.2	682305.5	378.9486
PT47	944974.5	682300.9	378.4325
PT48	944970.2	682296.8	378.4865
PT49	944949.1	682317.9	378.8185
PT50	944953.3	682323.2	378.8761
PT51	944958.3	682328.4	379.2777

PT52	944942.5	682346.5	379.5567
PT53	944939.2	682351.6	379.7302
PT54	944949	682356.3	379.9093
PT55	944952.4	682352.9	379.9308
PT56	944934.6	682344.2	379.2306
PT57	944928.6	682339.6	379.1981
PT58	944909.6	682361.3	379.4121
PT59	944915.3	682366.2	379.7087
PT60	944919	682370.1	380.1443
PT61	944900	682390.6	380.2548
PT62	944895.8	682386.2	379.8353
PT63	944891.8	682382.8	379.7662
PT64	944872.1	682400.3	380.2427
PT65	944876.4	682405.1	380.2813
PT66	944879.6	682408.2	380.6578
PT67	944862.6	682424.9	380.9054
PT68	944858.9	682421.8	380.8158
PT69	944855.1	682417.9	380.8773
PT70	944851.4	682421.7	381.0128
PT71	944843.4	682416.4	380.5042
PT72	944848.8	682411.8	380.4407
PT73	944836.2	682437.8	381.1378
PT74	944835.4	682436.9	381.2068
PT75	944839.1	682440.6	381.1278
PT76	944843.1	682444.7	381.3639
PT77	944817.3	682455.6	381.5858
PT78	944816.1	682454.6	381.7118
PT79	944820.7	682459.4	381.6384

PT80	944824.3	682463.1	381.8139
PT81	944806	682480.9	382.633
PT82	944797.9	682472.8	382.1354
PT83	944801.9	682477	382.1574
PT84	944785.9	682496.9	382.6775
PT85	944778.8	682489.9	382.4644
PT86	944782.6	682493.5	382.4369
PT87	944764.9	682513	382.8735
PT88	944762.1	682509.8	382.9524
PT89	944758.6	682506.3	382.7369
PT90	944737.4	682521	383.1014
PT91	944740.6	682526.5	383.1414
PT92	944744.8	682531	383.4055
PT93	944721.6	682544.4	383.583
PT94	944718.3	682540.9	383.5089
PT95	944715.2	682536.7	383.4319
PT96	944694.3	682552.6	383.8999
PT97	944687.7	682545.1	383.3217
PT98	944678.5	682553.9	383.4058
PT99	944684.7	682563.7	384.1829
PT100	944691.4	682573.8	384.36
PT101	944702.8	682568.4	384.2641
PT102	944705.4	682578.7	384.5537
PT103	944698.9	682584.3	384.4892
PL	944699.7	682541.9	383.8583
PL1	944671.7	682562.9	384.1068
PT104	944679	682577.9	384.475
PT105	944676.2	682575.2	384.6084

PT106	944671.7	682571.4	384.1429
PT107	944654.1	682586.9	384.8209
PT108	944657.7	682590.8	385.0929
PT109	944661	682594.8	384.9365
PT110	944640.3	682610.2	385.5405
PT111	944637.8	682607	385.5779
PT112	944633.8	682603.1	385.6409
PT113	944614	682619.2	386.2424
PT114	944612.7	682618.6	386.0484
PT115	944616.5	682623.3	386.1459
PT116	944619.5	682626.9	386.2865
PT117	944598.9	682640.3	386.9915
PT118	944592.9	682633.9	387.0579
PT119	944598.5	682628.4	386.9764
PT120	944586.2	682627.1	387.1628
PT121	944584.8	682632	387.3333
PT122	944575	682630.7	387.2937
PT123	944575.1	682626.5	387.2332
PT124	944573.1	682649.1	387.7229
PT125	944575.7	682653.2	387.7684
PT126	944578.9	682658.2	387.681
PT127	944558.3	682672.7	388.857
PT128	944554.5	682669.7	388.8159
PT129	944550.8	682667.6	388.7539
PT130	944535.3	682684.2	389.5004
PT131	944537.9	682688	389.5585
PT132	944540.6	682690.9	389.5255

Akehinde Apekun Community	944577.7	682638.6	387.7788
Akehinde Apekun Community1	944518.9	682702.6	390.1885
PT133	944522.5	682706	390.2825
PT134	944525.4	682708.1	390.3206
PT135	944509.9	682727.9	391.0931
PT136	944505.8	682725.4	391.1421
PT137	944501.5	682723	391.112
PT138	944486.2	682741.6	391.9906
PT139	944488.9	682744.5	391.8936
PT140	944492	682747.1	391.7972
PT141	944476.5	682767.2	392.2418
PT142	944472.7	682765	392.3517
PT143	944468.2	682762	392.3047
PT144	944451.4	682782.2	392.9462
PT145	944455	682785.1	392.8338
PT146	944458.7	682787.8	393.0683
PT147	944441.5	682807.9	393.1609
PT148	944438.6	682804.9	393.3268
PT149	944433.6	682801	393.3697
TBM4	944424.8	682795.9	393.9601
TBM5	944435.8	682821.7	393.8164
PT150	944424.5	682828.5	393.5674
PT151	944419.9	682824.7	393.9648
PT152	944415.5	682820.9	393.9723
PT153	944399.9	682839	394.2888
PT154	944403.6	682842.6	394.3559

PT155	944409.9	682847.6	394.176
PT156	944390	682864.5	394.4079
PT157	944385.6	682860.7	394.7839
PT158	944380.6	682856.8	394.8008
PT159	944364.9	682872.9	395.0643
PT160	944368.9	682876.6	395.0744
PT161	944373.9	682881.5	394.702
PT162	944354.8	682897.6	395.1435
PT163	944350.9	682892.9	395.2114
PT164	944347.4	682889.1	395.5428
PT165	944330.1	682906.4	395.8108
PT166	944334.3	682912.1	395.6854
PT167	944338.7	682916.6	395.3885
PT168	944320.8	682935	395.728
PT169	944315.9	682930.3	395.9204
PT170	944311.3	682926.1	395.8679
PT171	944296.1	682942.1	395.8444
PT172	944299.5	682946.2	395.8974
PT173	944304.1	682951.5	395.673
PT174	944289	682967.9	395.7765
PT175	944283.3	682964.5	395.8435
PT176	944277	682958.6	395.9109
PT177	944262.5	682977.1	396.1149
PT178	944267.7	682981.6	396.042
PT179	944273.4	682986.3	395.8726
PT180	944255.4	683004.7	396.0681
PT181	944250.1	683000.1	396.048
PT182	944245.1	682995.7	396.0924

PT183	944230.6	683014.2	396.131
PT184	944234.6	683018.3	396.144
PT185	944237.9	683022.1	396.0736
PT186	944223.4	683039	396.3541
PT187	944219	683035.5	396.4091
PT188	944214.8	683032.7	396.3505
PT189	944199.5	683049.1	396.6295
PT190	944203.9	683052.7	396.5721
PT191	944207.9	683056.3	396.4497
PT192	944191.8	683073.5	396.8382
PT193	944186.1	683070.4	396.9311
PT194	944182.9	683068	396.9721
PT195	944169.1	683086.8	397.4131
PT196	944171.7	683089.9	397.2822
PT197	944174.7	683092.7	397.2282
PT198	944160.1	683110.5	397.8203
PT199	944157.2	683108.5	397.7892
PT200	944153.1	683104.5	397.7321
PT201	944137.1	683123.9	398.4182
PT202	944140.5	683127.2	398.4042
PT203	944143.3	683129.7	398.3403
PT204	944127.5	683147.2	398.7463
PT205	944124.6	683144.5	398.9343
PT206	944121.7	683142	399.0392
PT207	944105.7	683158.6	400.0922
PT208	944110.8	683159.7	399.4933
PT209	944106.7	683155.6	399.5002
PT210	944113.4	683164.4	399.2974

PT211	944098.7	683178.1	399.5654
PT212	944095	683174.7	399.7783
PT213	944091.5	683171.6	399.8762
PT214	944074.9	683183.7	400.4902
PT215	944077.8	683189.3	400.3653
PT216	944080.9	683193.5	400.1593
PT217	944063.6	683204	400.6243
PT218	944061.2	683200.2	400.8602
PT219	944058.2	683196.6	400.8792
PT220	944040.4	683210.2	401.2952
PT221	944043	683214.5	401.1792
PT222	944045.5	683218.2	401.4213
PT223	944028.7	683229.1	401.7632
PT224	944025.9	683225.4	401.5782
PT225	944023.6	683223	401.6441
PT226	944005.5	683234.9	402.0471
PT227	944007.6	683238.4	401.8831
PT228	944009.8	683241.8	402.0652
PT229	943990.8	683255.3	402.3592
PT230	943987.5	683250.9	402.3871
PT231	943985.1	683247.3	402.353
PT232	943965.5	683261.2	402.636
PT233	943968.2	683265.1	402.6051
PT234	943971.1	683267.8	402.6341
PT235	943953.9	683283.3	402.9241
PT236	943950.3	683280.3	402.867
PT237	943946.2	683276.6	402.855
PT238	943930	683293.6	403.034

PT239	943937.8	683302.3	402.9241
PT240	943934.5	683298.7	402.9391
PT241	943922.9	683319.2	403.0002
PT242	943918.8	683316.4	403.1341
PT243	943914.3	683313.5	403.171
PT244	943900.2	683331	403.3321
PT245	943905.3	683335.2	403.3572
PT246	943909.6	683338.2	403.0542
PT247	943896.5	683357.2	403.2603
PT248	943892	683355	403.4442
PT249	943886.5	683352.5	403.4612
PT250	943874.9	683368.9	403.4962
PT251	943880.5	683372.6	403.4413
PT252	943885.1	683375.7	403.2514
PT253	943875.4	683394.6	403.4564
PT254	943869	683391.3	403.5534
PT255	943861.9	683387.7	403.7203
PT256	943850.9	683406.5	403.4833
PT257	943855.2	683410.6	403.6394
PT258	943859.4	683413.5	403.4705
PT259	943845	683434.6	403.5495
PT260	943841.1	683433.2	403.7225
PT261	943834.4	683432.3	403.7144
PT262	943823.2	683448.8	403.5955
PT263	943827.3	683452.4	403.7766
PT264	943831.5	683456.2	403.7476
PT265	943818	683475.5	403.5397
PT266	943814.3	683472.6	403.7506

PT267	943809.1	683469.6	403.6386
SUHALLAH COMMUNITY	943829.5	683463.2	404.2717
PT268	943804.4	683495.6	403.6028
PT269	943799.5	683493	403.7517
PT270	943794.4	683489.8	403.5156
TBM6	943829.4	683463.1	404.2497
PT271	943791.1	683515.3	403.5258
PT272	943786.5	683512	403.6738
PT273	943781.5	683509	403.4507
PT274	943777.3	683536	403.4439
PT275	943772.1	683532.8	403.5268
PT276	943768.3	683529.1	403.3418
PT277	943755.1	683548.2	403.3119
PT278	943759.4	683551.8	403.3889
PT279	943763.8	683554.9	403.425
PT280	943749.8	683573	403.3001
PT281	943745.3	683570.5	403.414
PT282	943740.2	683568.9	403.22
PT283	943727.7	683587.6	402.9841
PT284	943731.9	683591.5	403.2912
PT285	943736.2	683594.5	403.1083
PT286	943723.5	683614.3	402.8764
PT287	943718.5	683611.9	403.0073
PT288	943713.2	683608.8	402.8282
PT289	943701.6	683627	402.5364
PT290	943706.2	683630.6	402.6514
PT291	943709.9	683633.3	402.3815

PT292	943698.1	683652.8	402.3056
PT293	943693.6	683650.3	402.3576
PT294	943688.5	683647.2	401.9605
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PT296	943680.3	683670.3	402.1567
PT297	943684.1	683672.8	402.0927
PT298	943661.1	683686.9	401.5427
PT299	943666	683689.7	402.0488
PT300	943669.9	683693	401.6279
PT301	943656.8	683711.7	401.458
PT302	943652.5	683710.4	401.4469
PT303	943645.9	683707.4	401.3538
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PT305	943638.6	683728.8	401.502
PT306	943642.6	683732.5	401.4641
PT307	943628.5	683753.3	401.6352
PT308	943626.2	683750.7	401.4542
PT309	943622.4	683748.9	401.4881
PT310	943610.3	683766.1	401.4962
PT311	943612	683767.3	401.5643
PT312	943617.2	683773.3	401.5304
PT313	943604.4	683790	401.5655
PT314	943601.1	683787.6	401.6204
PT315	943598.2	683786.3	401.6554
PT316	943586	683803.2	401.7885
PT317	943588.5	683805.9	401.8065
PT318	943591.7	683808.3	401.8456
PT319	943579.1	683826.5	401.9187

PT320	943575.4	683824.7	401.8486
PT321	943571.4	683822.3	401.9046
PT322	943561.4	683841	401.9397
PT323	943563.7	683842.6	401.8987
PT324	943567	683844.8	401.9258
PT325	943554.4	683864.9	402.0649
PT326	943551.4	683862.7	402.0289
PT327	943548.9	683861.3	402.0618
PT328	943535.8	683879.3	402.1429
PT329	943538.9	683881.2	402.114
PT330	943542.1	683883.1	402.204
PT331	943530.9	683903.2	402.2822
PT332	943526.9	683900.9	402.2491
PT333	943523.2	683899	402.4031
PT334	943511.5	683917.6	402.2792
PT335	943514.7	683919.6	402.2862
PT336	943518	683921.5	402.3533
PT337	943505.8	683941.2	402.4984
PT338	943501.2	683938.9	402.5274
PT339	943497.3	683936.9	402.5353
ALASE VILLAGE	943494.8	683935.2	402.6553
PT340	943487.3	683956.8	402.7385
PT341	943489.8	683959.7	402.7575
PT342	943493.1	683961.9	402.6666
PT343	943480.1	683981.2	402.8557
PT344	943477.5	683979.1	402.7316
PT345	943473.3	683976.6	402.8186

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PT347	943467	683999.7	403.3348
PT348	943464.3	683997.8	403.0817
PT349	943448.8	684014.6	403.3758
PT350	943451.9	684017.1	403.2569
PT351	943454.9	684019.1	403.3959
PT352	943443.2	684038.5	403.588
PT353	943439.8	684037	403.432
PT354	943435.2	684034.5	403.5069
PT355	943423	684052.1	403.583
PT356	943427.3	684055.4	403.6141
PT357	943430.5	684057.4	403.6992
PT358	943414.9	684079.3	403.8163
PT359	943410.1	684075.5	403.6772
PT360	943407.4	684073.9	403.5122
PT361	943388.6	684091.5	403.7762
PT362	943391.8	684094.3	403.7163
PT363	943395.6	684098.3	403.7253
PT364	943379.3	684114.2	403.6714
PT365	943375.8	684111.6	403.6683
PT366	943372.6	684109.1	403.6363
PT367	943355.7	684124.8	403.5133
PT368	943358.2	684127.4	403.6634
PT369	943361.6	684130.6	403.6694
PT370	943344.2	684147	403.5245
PT371	943340.8	684143.2	403.5764
PT372	943338.1	684139.7	403.5203
PT373	943320.7	684154.6	403.5264

PT374	943323.6	684158.2	403.5614
PT375	943327.6	684162.3	403.4665
PT376	943309.8	684176.9	403.4535
PT377	943306	684172.2	403.3285
PT378	943301.7	684169.1	403.5694
ALENIBORO COMMUNITY	943295.2	684165.9	403.0973
PT379	943284.4	684187.7	403.1025
PT380	943287.9	684190.6	403.1965
PT381	943291.5	684193.6	403.4116
PT382	943277.6	684210.4	403.1217
PT383	943273.9	684207.8	402.9646
PT384	943270.9	684205.8	402.9056
PT385	943256.6	684222.1	402.6606
PT386	943261.4	684225.9	402.7717
PT387	943264.2	684227.8	402.9428
PT388	943242.7	684239.7	402.5087
PT389	943246.5	684242.8	402.5398
PT390	943250.5	684245.9	402.5219
PT391	943235.6	684264.6	402.2889
PT392	943231.3	684261.2	402.3969
PT393	943226.9	684258.4	402.4078
PT394	943213.6	684275.3	402.0999
PT395	943217.4	684278.3	402.158
PT396	943221.3	684281.9	402.013
PT397	943205.2	684300.2	401.8681
PT398	943201.3	684296.6	401.715
PT399	943198.1	684293.6	401.552

PT400	943184.5	684309	401.327
PT401	943187	684311.4	401.3761
PT402	943190.6	684314.5	401.3481
PT403	943176.7	684332.8	401.1502
PT404	943173.7	684330.5	400.8842
PT405	943170.3	684328.3	401.0601
PT406	943155.2	684345.6	400.8052
PT407	943157.8	684348.9	400.6273
PT408	943161.3	684352	400.7473
PT409	943145.2	684369.7	400.2214
PT410	943142.3	684367.6	400.2464
PT411	943138.9	684364.7	400.4823
PT412	943123.2	684381.9	400.2554
PT413	943126.2	684384.6	399.9804
PT414	943129.1	684387.6	400.0895
PT415	943114.8	684405.8	399.7496
PT416	943111.1	684403.8	399.6165
PT417	943107.5	684401	399.6505
PT418	943091.8	684419	399.2945
PT419	943095.4	684421.5	399.1506
PT420	943099	684423.8	399.3997
PT421	943085.3	684442.7	399.0988
PT422	943081.9	684440.7	399.0557
PT423	943078.5	684438.6	398.9587
IDI IGBA COMMUNITY	943075.7	684436.2	399.0676
PT424	943066	684459	398.5508
PT425	943068.5	684460.3	398.3778

PT426	943071.9	684463.4	398.8219
PT427	943056.6	684483	398.321
PT428	943054.5	684481.1	398.1469
PT429	943052.2	684479.7	398.1649
PT430	943038.9	684498.5	397.99
PT431	943041.6	684500.8	397.8441
PT432	943044.2	684502.6	397.9951
PT433	943030.7	684521.9	397.7282
PT434	943027.2	684519.9	397.5842
PT435	943024.1	684518	397.6521
PT436	943011.3	684536.3	397.4482
PT437	943014	684538.6	397.3783
PT438	943017.8	684541.3	397.3963
PT439	943003.6	684559.8	397.0914
PT440	943000.7	684557.8	397.0834
PT441	942996.4	684555	397.1223
PT442	942983.3	684573.3	396.8934
PT443	942987.1	684576.8	396.7625
PT444	942990.2	684578.7	396.8495
PT445	942977.3	684597.1	396.7316
PT446	942974.4	684595.6	396.6306
PT447	942970.1	684593.1	396.6015
PT448	942957.6	684611.6	396.4636
PT449	942961.3	684614.5	396.4547
PT450	942964.4	684616.6	396.4018
PT451	942948.4	684638.3	396.2329
PT452	942945.3	684636.3	396.1168
PT453	942942	684634.4	396.2358

PT454	942928.3	684652.7	396.0799
PT455	942931.6	684655	396.0239
PT456	942934.4	684657.2	396.01
PT457	942919.5	684675.9	395.8801
PT458	942916.5	684673.4	395.897
PT459	942913.4	684670.9	396.0229
PT460	942898.1	684689.1	395.992
PT461	942901.2	684692	395.8401
PT462	942903.6	684694.2	395.6701
PT463	942881.3	684705.4	395.6951
PT464	942883.5	684707.9	395.6491
PT465	942885.9	684710.8	395.6662
PT466	942863.4	684720.8	395.5871
PT467	942865.9	684724	395.6482
PT468	942867.8	684726.7	395.4832
PT469	942849.4	684738.7	395.5092
PT470	942847.1	684735.9	395.6041
PT471	942845.2	684732.9	395.5361
PT472	942823.2	684742.6	395.53
PT473	942828	684748.8	395.4821
PT474	942831.8	684754.3	395.5552
PT475	942814.7	684767	395.5912
PT476	942808.3	684778.1	395.5143
PT477	942802.6	684776.2	395.4882
PT478	942804.9	684770.5	395.5472
PT479	942800.7	684764.9	395.5571
PT480	942798.3	684761.2	395.465
PT481	942784.9	684770.4	395.723

PT482	942787.1	684773.9	395.6591
PT483	942789.1	684777.2	395.4491
PT484	942771.9	684790.5	395.7091
PT485	942769.6	684787.7	395.6871
PT486	942767.3	684783.1	395.841
PT487	942746.2	684794.2	395.841
PT488	942747.2	684798.3	395.719
PT489	942750.1	684802.4	395.9241
PT490	942728.6	684812.4	395.961
PT491	942726.5	684808.8	396.019
PT492	942724	684805.7	396.0389
PT493	942703.8	684815.8	396.1288
PT494	942705.5	684820	396.0899
PT495	942706.9	684823.5	396.205
PT496	942685.2	684832	395.9899
PT497	942683.3	684828.8	396.1598
PT498	942681.9	684824.9	396.3408
SABO COMMUNITY	942700.7	684830.8	396.12
PT499	942662.3	684838.5	396.1607
PT500	942660.6	684835.9	396.1627
PT501	942659.4	684832.4	396.1977
PT502	942637.5	684838.7	396.8165
PT503	942638.6	684844.3	395.8056
PT504	942640.3	684848.8	395.7327
PT505	942618.5	684855.9	396.0546
PT506	942617	684852	396.0585
PT507	942615.5	684848.3	395.6225

PT508	942594.7	684855	395.6774
PT509	942594.9	684860.6	395.6794
PT510	942596.2	684864.5	395.5445
PT511	942572.8	684870.5	395.4184
PT512	942571.9	684865.3	395.5373
PT513	942570.1	684861.2	395.5612
PT514	942547.4	684867.6	395.5091
PT515	942548.3	684871.6	395.4762
PT516	942549.5	684876.4	395.4712
PT517	942527.1	684883.1	395.1201
PT518	942525.3	684878.2	395.104
PT519	942523.8	684874.8	395.165
PT520	942504.5	684881.6	395.2779
PT521	942504.7	684886.6	394.918
PT522	942505.6	684890.5	394.842
PT523	942483.6	684899	394.4579
PT524	942481	684894.2	394.3448
PT525	942479.3	684890.8	394.3748
PT526	942459.5	684899	394.0797
PT527	942461.3	684903.1	393.9368
PT528	942462.9	684907.1	393.9938
PT529	942443.1	684917.1	393.9038
PT530	942440.8	684913.1	393.9077
PT531	942438.5	684909.2	394.0016
PT532	942417.9	684919.9	393.6826
PT533	942418.8	684923.7	393.6616
PT534	942420.7	684927.4	393.8017
PT535	942399.4	684937.8	393.8146

PT536	942397.4	684934.3	393.7496
PT537	942395.4	684931.4	393.8265
PT538	942376.3	684940.9	393.1745
PT539	942377.8	684945.1	393.1815
PT540	942379.9	684949.1	393.3016
PT541	942357.8	684960.9	392.8755
PT542	942355.1	684957	393.0325
PT543	942352.5	684953	392.9864
PT544	942333.7	684964.1	393.1104
PT545	942335.1	684966.8	393.0774
PT546	942336.9	684970.1	393.0615
PT547	942316.8	684980.7	393.4094
PT548	942315	684977.4	393.2634
PT549	942312.8	684974	393.4113
PT550	942292.9	684984.6	393.6503
PT551	942294.5	684988.8	393.5963
PT552	942295.8	684992.1	393.8044
PT553	942274.7	685002.9	394.0113
PT554	942272.4	684998.6	393.9422
PT555	942270.3	684995.2	394.0232
PT556	942250.1	685002.7	394.3881
PT557	942251.4	685006.3	394.2462
PT558	942252.9	685010.2	394.5312
PT559	942230.9	685016.9	394.6821
PT560	942229.3	685012.6	394.62
PT561	942228.5	685008.6	394.753
PT562	942205.9	685014	395.0919
PT563	942206.3	685017.4	394.9939

PT564	942207.4	685022.4	395.108
PT565	942184.5	685026.3	395.5768
PT566	942183.8	685022.3	395.4278
PT567	942182.4	685018.3	395.5327
PT568	942160.9	685023.1	395.6606
PT569	942161.6	685026.9	395.7736
PT570	942162.3	685031	395.7387
PT571	942138.4	685037.3	395.8365
PT572	942137.3	685032	395.9045
PT573	942136.1	685027.6	395.9264
PT574	942114.1	685033.3	395.6873
PT575	942114.6	685036.9	395.6823
PT576	942115.6	685041.7	395.5394
PT577	942091.7	685045.3	395.4452
PT578	942090.9	685041.8	395.3602
PT579	942089.5	685038	395.4101
PT580	942067.4	685042.8	395.185
PT581	942067.8	685046.3	395.104
PT582	942068.7	685050.1	395.1771
PT583	942045.6	685056	394.803
PT584	942044.4	685052.1	394.8289
PT585	942043.3	685047.6	395.2068
PT586	942022.1	685052.6	394.8137
PT587	942023	685057.5	394.6988
PT588	942024	685060.7	394.4838
PT589	942001.2	685064.5	394.5327
PT590	942000.6	685061.4	394.4856
PT591	941999.9	685057.7	394.6626

PT592	941977.9	685061.9	394.4264
PT593	941978.2	685065.2	394.2385
PT594	941978.6	685068.7	394.2355
PT595	941956.1	685074	394.0724
PT596	941955.4	685070.6	393.9873
PT597	941954.9	685067.3	394.1103
PT598	941931.1	685071.5	393.9181
PT599	941931.8	685075.7	393.5872
PT600	941932.6	685079	393.5632
PT601	941910.1	685084.5	393.4451
PT602	941908.9	685081.2	393.3271
PT603	941907.5	685077.6	393.454
PT604	941884.6	685083.9	393.3579
PT605	941886.8	685091.8	393.294
PT606	941885.6	685088.1	393.2559
PT607	941864.5	685098.7	393.3139
PT608	941862.4	685093.9	393.4578
PT609	941861.7	685089.2	393.2957
PT610	941840.8	685096.2	393.3476
PT611	941841.2	685100.2	393.3317
PT612	941842.5	685104.1	393.2928
PT613	941820.2	685110.7	393.4426
PT614	941818.7	685106.7	393.3076
PT615	941816.1	685101.4	393.4565
PT616	941795.8	685109.6	393.6834
PT617	941798.4	685117.8	393.4445
PT618	941797.1	685114.5	393.4265
PT619	941773.6	685116.6	393.4543

PT620	941774.7	685120.4	393.3884
PT621	941776.1	685125.5	393.5564
PT622	941752.8	685132.1	393.1173
PT623	941751	685126.7	393.2072
PT624	941749.3	685122.2	393.2872
PT625	941729	685128.8	392.9981
PT626	941729.5	685133.2	392.8461
PT627	941730.9	685137.2	392.7742
PT628	941709.3	685144.1	392.3991
PT629	941707.5	685139.3	392.423
PT630	941705.3	685135.4	392.5969
PT631	941685.8	685151.3	391.8119
PT632	941684.1	685145.7	391.8919
PT633	941682.6	685141.8	391.8788
PT634	941659.5	685148.9	391.2957
PT635	941660.7	685153.8	390.9597
PT636	941662.3	685158.4	391.1748
PT637	941642.6	685165.6	390.7387
PT638	941640.6	685161.2	390.6247
PT639	941638.7	685156.8	390.7506
PT640	941617.1	685164.8	390.1645
PT641	941618.4	685169.5	390.0186
PT642	941620.9	685174.6	390.0676
PT643	941599.5	685181.6	389.3895
PT644	941597.4	685176.9	389.4675
PT645	941595.2	685171.8	389.3384
PT646	941573.5	685179	388.6103
PT647	941574.9	685183.3	388.5753

PT648	941576.8	685187.9	388.2504
PT649	941555.5	685194.7	387.9843
PT650	941553.8	685190.8	387.9912
PT651	941552	685188.1	387.8992
PT652	941534.2	685203.7	388.6022
PT653	941510.7	685205.6	388.307