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The theme:

"IMPACT OF MODERN TECHNOLOGY IN THE SURVEYING INDUSTRY"

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Route planning for remote terrains of Papua New Guinea

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Introduction

After 48 years of Independence, Papua New Guinea still struggles to serve its rural population in need of major road infrastructures. In performing efficiency in terms of road link connecting its rural population and the surrounding settlements, it promotes Sustainable Development and Agriculture activities to build long-term survival of the Countries Economy.

In consideration of the Rugged mountainous terrain and denser Canopy Forest leaves a greater challenges for the PNG Government and other stake holders to connect this missing puzzle.

Introduction

Introduction

- The Landform of Papua New Guinea and its surrounding terrain, climate, Canopy with other limitations has influence over the initial progress of Engineering Project planning. Construction Engineers and Surveyors face major constraints of Tee-off to pre-starting a project when dealing with most remote terrain of Highlands and higher landmass of New Guinea & Coastal regions.

Introduction

- It is evident that PNG Government and Department of Works faces major challenges in connecting the main Rural Economic Corridors to deliver sustainable economic growth and Agriculture sectors. Logging Companies have developed access roads however this only serves its purpose to transport the raw materials from Forest to Downstream mills.

Introduction

- The conventional methods of route feasibility involves labor, time and effort to produce the output. The Major constrains of the feasibility are line of sight, The Canopy with denser forest and fear of lost of life in jungle.

Introduction

- The paper introduce the challenges faced by the Professionals and Contractor where the feasibility stages are overlook resulting in cost inflation of the Project. Secondly it identifies a potential work flow in its methods to be considers and deliberate on improving the feasibility studies in Preliminary stages of the Project on Drawing board.

"Accessibility of Remote Terrains is one of the Major Challenges of Surveyors, Engineers and other allied Professional".

PROBLEMS

Aim & Objectives

- The primary **aim** of this paper was to pave a way forward for Decision Makers in Engineering Planning of Roads Projects in Remote Regions of PNG.
- Therefore in consideration of the aim, the paper suggested the following **objectives** by;
- **The provision of a preliminary Sustainable Road Design**
  - Extraction of DSM for overview of Terrain Planning
  - Creating a simple workflow for feasibility planning and preliminary Surveys

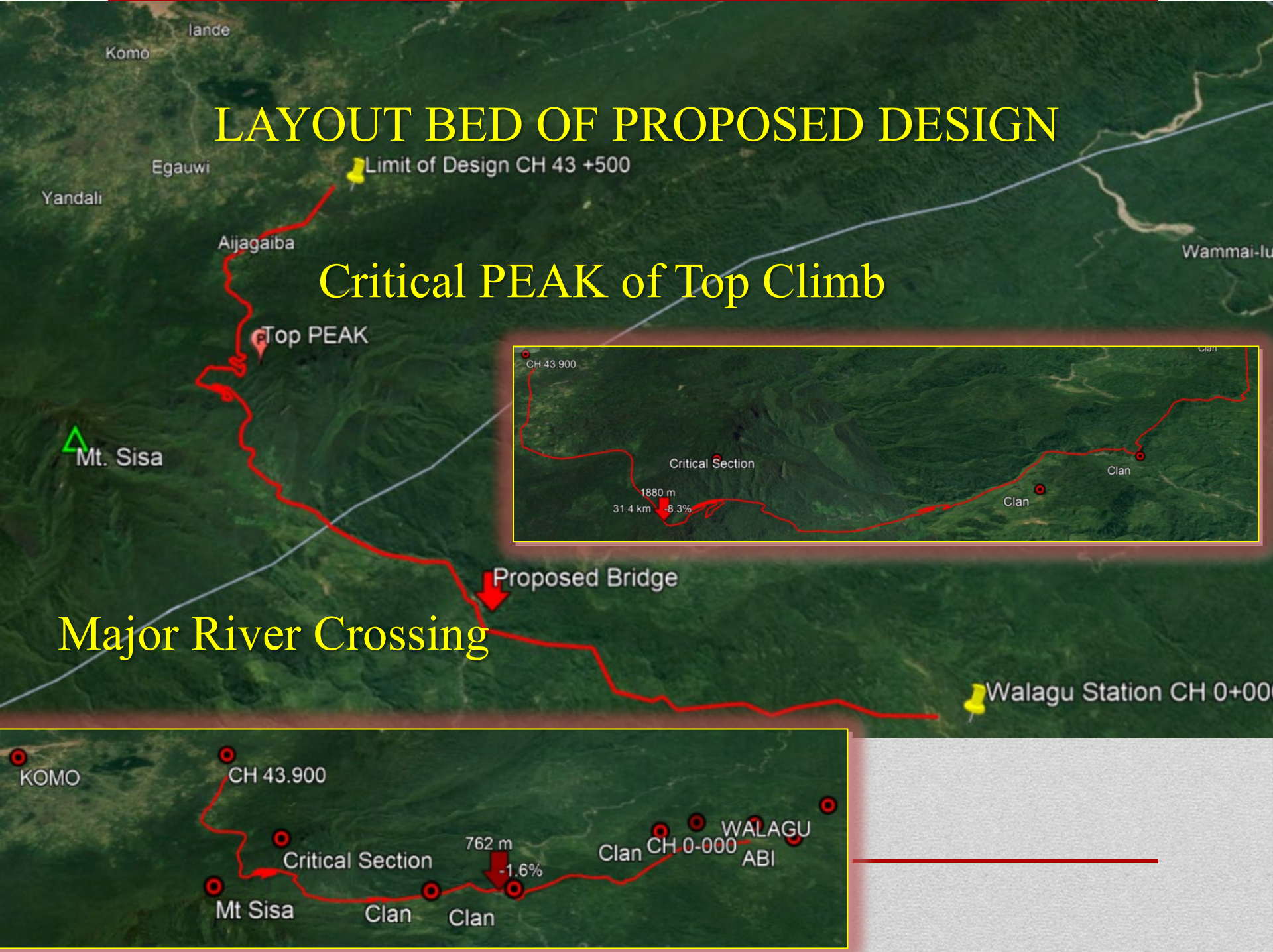
Methodology

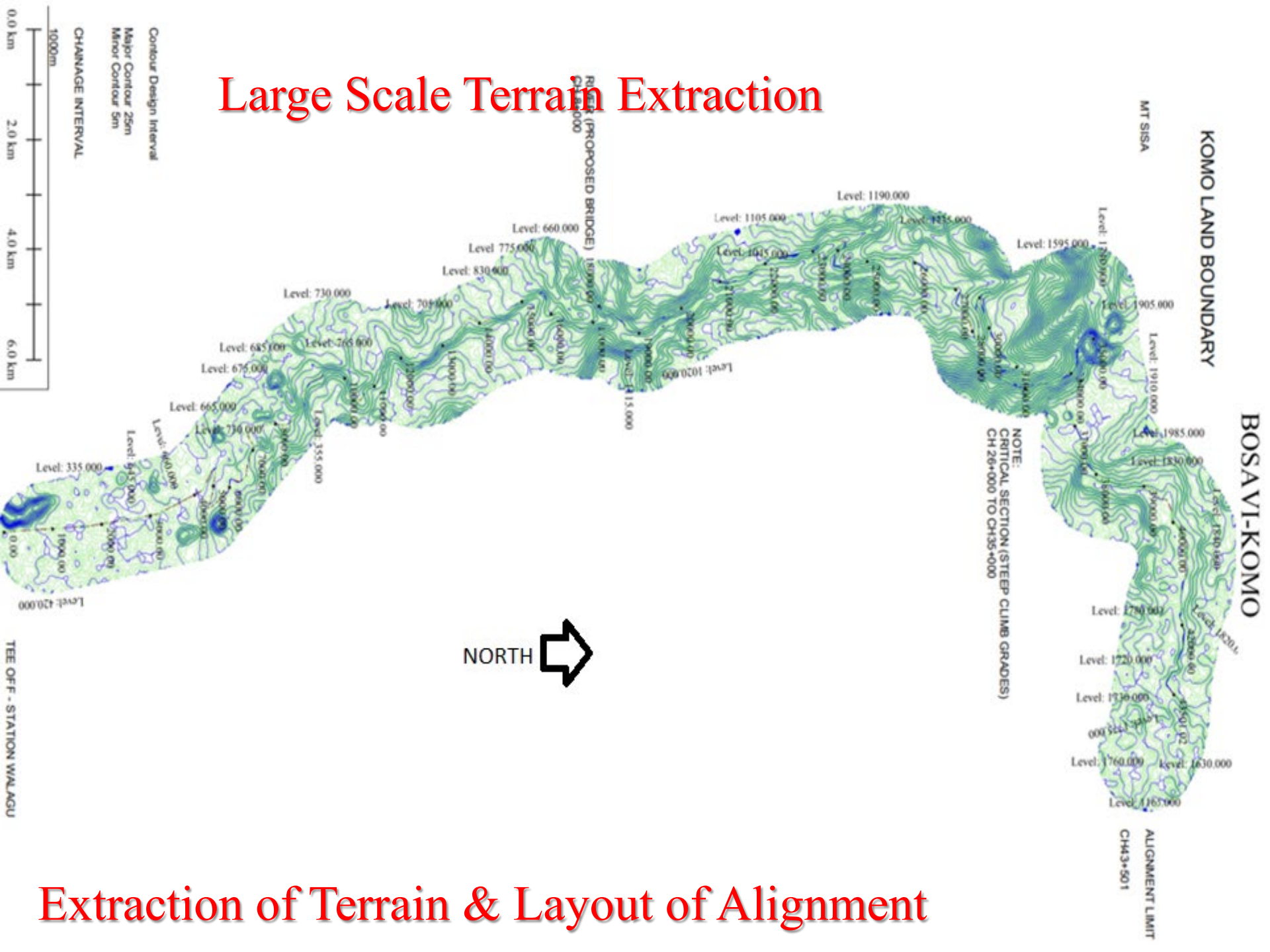
- Area Of Interest
- Proposed Route Selected (Stakeholders)
- Selection of Technology and Systems (CW30)
- Establishment of GNSS Controls (3 hours observations)
- Compilation of GNSS to BASE MAP
- Online Datasets SRTM from USGS
- Creation of Linear Connections & Buffering
- Point Cloud Extractions
- Creating DEM & Contour
- Extraction of Profiles
- Preliminary Designs
- Volume Computations

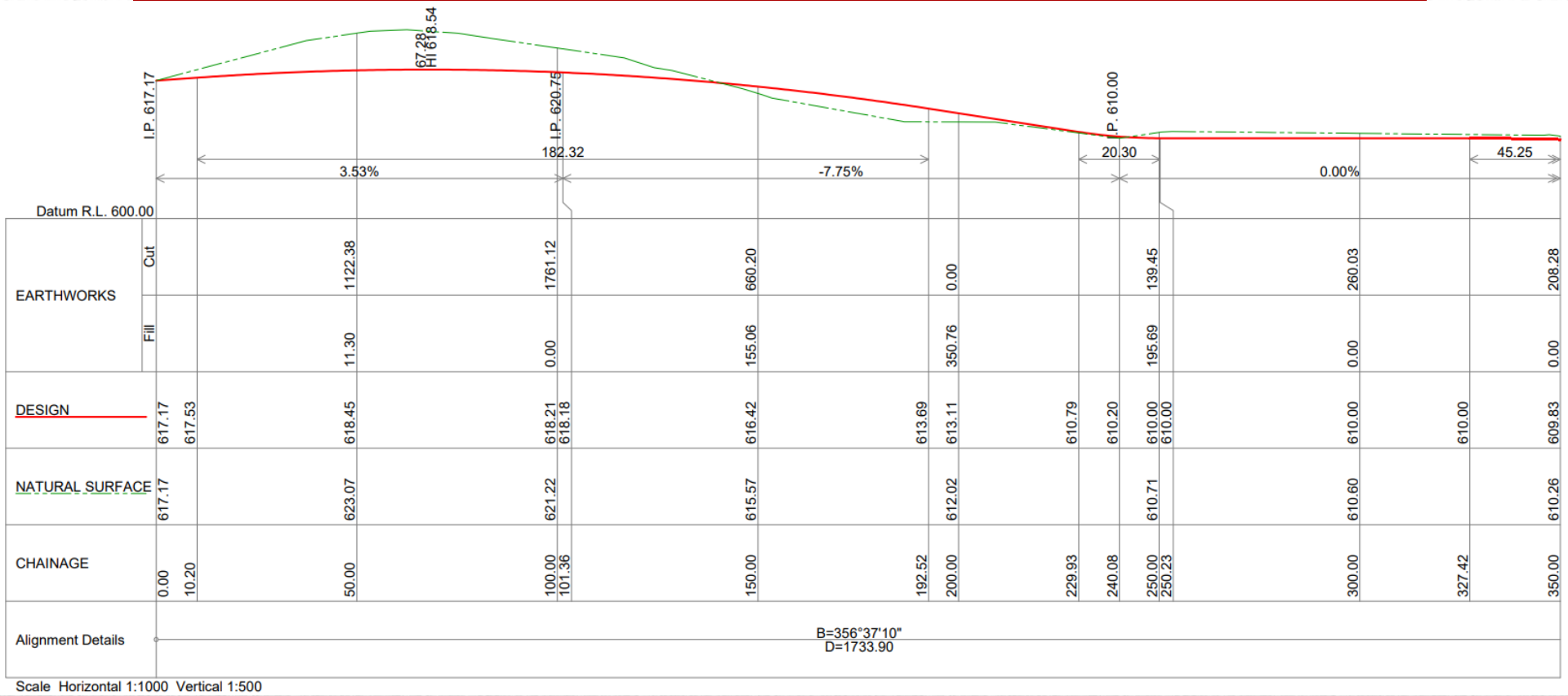
PROPOSED ROUTE SELECTION

KOMO-BOSAVI LINK CONNECTION 2021

LAYOUT BED OF PROPOSED DESIGN

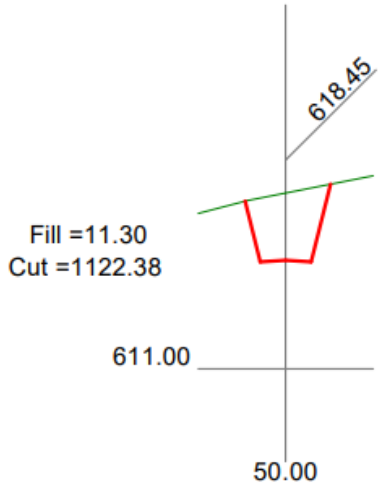


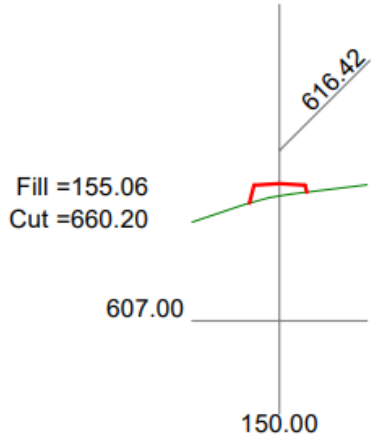

Large Scale Terrain Extraction
Extraction of Terrain & Layout of Alignment
Contour Design Interval
Major Contour 25m
Minor Contour 5m
CHAINAGE INTERVAL
1000m
0.0 km
2.0 km
4.0 km
6.0 km
RIVER (PROPOSED BRIDGE)
CH15+000
MT SISA
KOMO LAND BOUNDARY
BOSAVI-KOMO
NOTE:
CRITICAL SECTION (STEEP CLIMB GRADES)
CH 26+000 TO CH35+000
NORTH
TEE OFF - STATION WALAGU
ALIGNMENT LIMIT
CH43+501
Level: 335.000
Level: 420.000
Level: 665.000
Level: 675.000
Level: 685.000
Level: 730.000
Level: 660.000
Level: 775.000
Level: 830.000
Level: 1190.000
Level: 1105.000
Level: 1595.000
Level: 1905.000
Level: 1910.000
Level: 1985.000
Level: 1830.000
Level: 1720.000
Level: 1760.000
Level: 1630.000

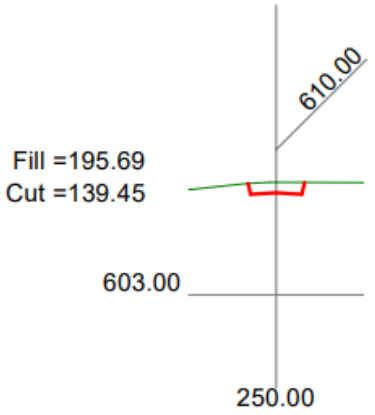


Long Section Profile

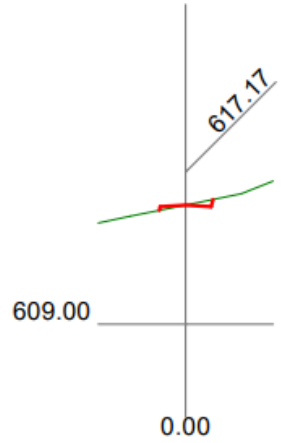
CH 0-00 to CH350

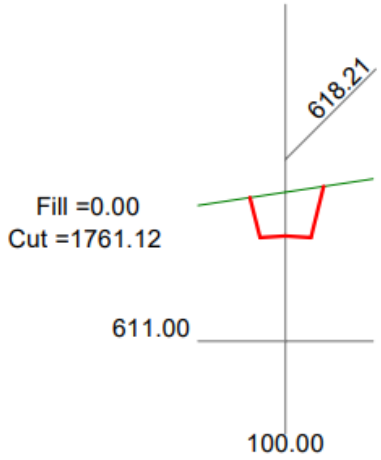


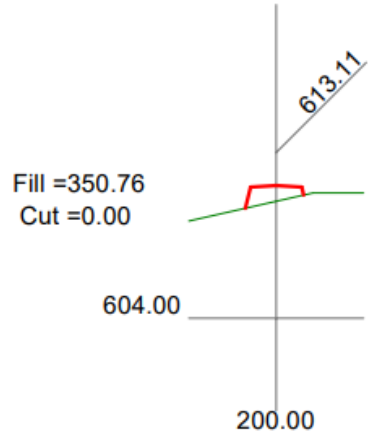




Section View [CH 0.00 to CH 250.00] & Earthworks







Scale Horizontal 1:1000 Vertical 1:500

SUMMARY of the Planning & Design

- The route of the road is a newly proposed alignment approximately 44 km. The Komo to Bosavi Road will be classified as rural a road thus standard specifications considered for road upgrading and reconstruction is done using DoW Roads and Bridges Specifications 1984.

- It is estimated that this road upgrade will cater for 100 to 400 vehicles with a design speed to be less than 100kph. Road formation shall be no greater than 12m and cross fall of 5%.

SUMMARY of the Planning & Design

- Anticipated vehicle class, types and model:
- 1. 4WD – Toyota Land-cruisers, Nissan Patrol, Ford Ranger, Mazda B50
- 2. Medium commercial vehicle – Toyota Dyna, Isuzu, Mitsubishi Canter
- 3. Single Unit 2 axles

- The Long section profile of the original ground surface is defined by 20 m interval on straight and 10m on Curve Alignments according to Survey Instruction of DoW. The Tee-off Reduced Level is a 40 m above Mean Sea Level where the highest Peak of the level in the subject road was found to be 1,910 at Chainage 36+000.

- Longitudinal Section Profile The general gradient of the proposed 44 km of the stretch adopted the PNG DoW rural road standards of less than 10%. According to the terrain and in areas where the proposed route cannot be diverted, the design gradient was proposed beyond the normal approved climb but still less than 15%.

SUMMARY of the Planning & Design

SUMMARY of the Planning & Design

- Cross Section and Cross Fall The 111.15 km of the proposed Corridor Link road is classed under Rural Road standard of PNG Department of Works. The roadway Platform consists of the following standard layout. Each lane has a width of 3.25, 1 m extension to the shoulders and 2m reserved for road drainage system. The recommended batter of the road was 0.5m Cut and Fill and where super-elevations were proposed, the width was extended according to the length of the curve usually for sharp bends.

- Cross Section Profile The typical cross-section profile extends to the limit of 50 m left and right from the defined centreline of the existing road for SRTM 90 m. This detail includes capturing of;
- Road Centreline
- Shoulders
- Natural relief of the site

EARTHWORKS

The earthworks would include excavation, shaping and trimming to all existing table drains to ensure that water is able to drain effectively. Drain excavation and shaping shall be carried out prior to pavement repair work and shall include cut batters. All excavated material shall be carted to a spoil site approved by the Superintendent.

SUMMARY of the Planning & Design

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- Taking into account the length of the length of the proposed route which is 42 km with a road width of 7 m, the earthworks volume was computed from projected road profile using Magnet Office software as follows;
- Stripping volume to a depth of 100 mm is 33,111.061 m3 ,
- Cut volume is 4262636.903 m3
- Fill volume is 273429.470 m3
- Net volume is 3989207.433 Cut

Key Identified Information

- SRTM live Online DataSet
- Extraction of Topographic at 1m interval
- Profiling
- Plan Visualization
- Extraction of Volumes
- Preliminary Costing

Concluding Concept

- This preliminary working method can be a wayfoward stages to the Concept of LINKING PNG and Connecting Rural

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