

REPORT N° 20812-003

ZEAT BEAD - FEEDER ROADS PROJECT

LOT 2: ACHOL PAGONG TO AYIEN
MARKET FEEDER ROAD

DETAIL DESIGN REPORT

VOLUME 1



APRIL 2016

ZEAT BEAD - FEEDER ROADS PROJECT

ACHOL PAGONG TO AYIEN MARKET
FEEDER ROAD

DESIGN REPORT

VOLUME 1

UNOPS

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ACRONYMS

ACRONYM	MEANING
BoQ	Bill of Quantities
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EU	European Union
FAO	Food and Agricultural Organisation
GIS	Geographic Information System
GPS	Global Positioning System
HARD	Help Africa Relief and Development
ICSS	Interim National Constitution of Southern Sudan
NBeG	North Bahr-el-Ghazal State
NGO	Non-Government Organisation
NTFPs	Non Timber Forest Products
RAP	Resettlement Action Plan
SSDP	South Sudan Development Plan
UNOPS	United Nations Office for Project Services
USAID	United States United States Agency for International Development
WBeG	West Bahr-el-Ghazal State
WSP/PB	WSP/Parsons Brinkerhoff
ZEAT BEAD	Zonal Effort for Agricultural Transformation: Bahr-el-Ghazal Effort for Agricultural Development

2

EXECUTIVE SUMMARY

The European Union (EU) recently established the 'Zonal Effort for Agricultural Transformation: Bahr-el-Ghazal Effort for Agricultural Development' (ZEAT BEAD) program, based on the 2011 South Sudan Development Plan. As part of the program, a rural feeder roads construction and maintenance project is considered in four of the ten South Sudan States. The Achol Pagong - Ayien Market road project, which is located in the Warrap state, was identified by UNOPS to be feasible.

The purpose of this report is as follows:

- Apply the road design principles and philosophies in accordance with the South Sudan Low Volume Roads Design Manual;
- Addressing the challenges of the South Sudan Road Environment pertaining to the climate, hydrology, materials, traffic, terrain, construction and maintenance regimes;
- Route selection and Investigations;
- Geometric design determined by traffic, cross sections, alignment and safety;
- Pavement Design using available materials;
- Constructability and the use of locally available resources;
- Drainage and structures;
- Road side slope stability and protection;
- Taking into account the maintenance regime onwards.

Included in this report is traffic analysis, road pavement condition investigations, topographical and aerial survey, road drainage inventory, borrow pit investigations, road safety issues and routine maintenance.

3

INTRODUCTION

The South Sudan Development Plan (SSDP) was completed in 2011. The plan identified that rural infrastructure development is a vital action to address chronic food insecurity, improve livelihoods, and stimulate development. The European Union (EU) has committed to supporting the implementation of the Plan in the Greater Bahr-el-Ghazal Zone. In order to contextualise its supporting role, the UN established the 'Zonal Effort for Agricultural Transformation: Bahr-el-Ghazal Effort for Agricultural Development' (ZEAT BEAD) program. As part of the program, a rural feeder roads construction and maintenance project is considered in four of the ten South Sudan States.

The ZEAT BEAD programme leads to the establishment of the 'Feeder Road Construction in support of Trade and Market development in South Sudan' project in 2015. The project is aimed at increasing the rural small farm holder's food production and creating a sustainable livelihood through market connection and trade development. The project is in line with the EU's strategic objectives. The EU and United Nations Office of Project Services (UNOPS) have signed a contribution agreement for the implementation of the project. The project will focus on the following aspects:

- The construction and maintenance of feeder roads in the target States; and
- The implementation of a maintenance and capacity building program with the State Ministries of Physical Infrastructure and local contractors, as well as community engagement and labour intensive support activities.

In addition to the road construction, the project aims to build capacity in the state government and local contractors to plan and conduct road maintenance and rehabilitation of feeder roads to ensure sustainable (on-going) access to markets.

Critical to the success of the project is the on-going dedication of the State government and the local community members to maintain the roads to ensure the project is a long-term sustainable solution to market constraints.

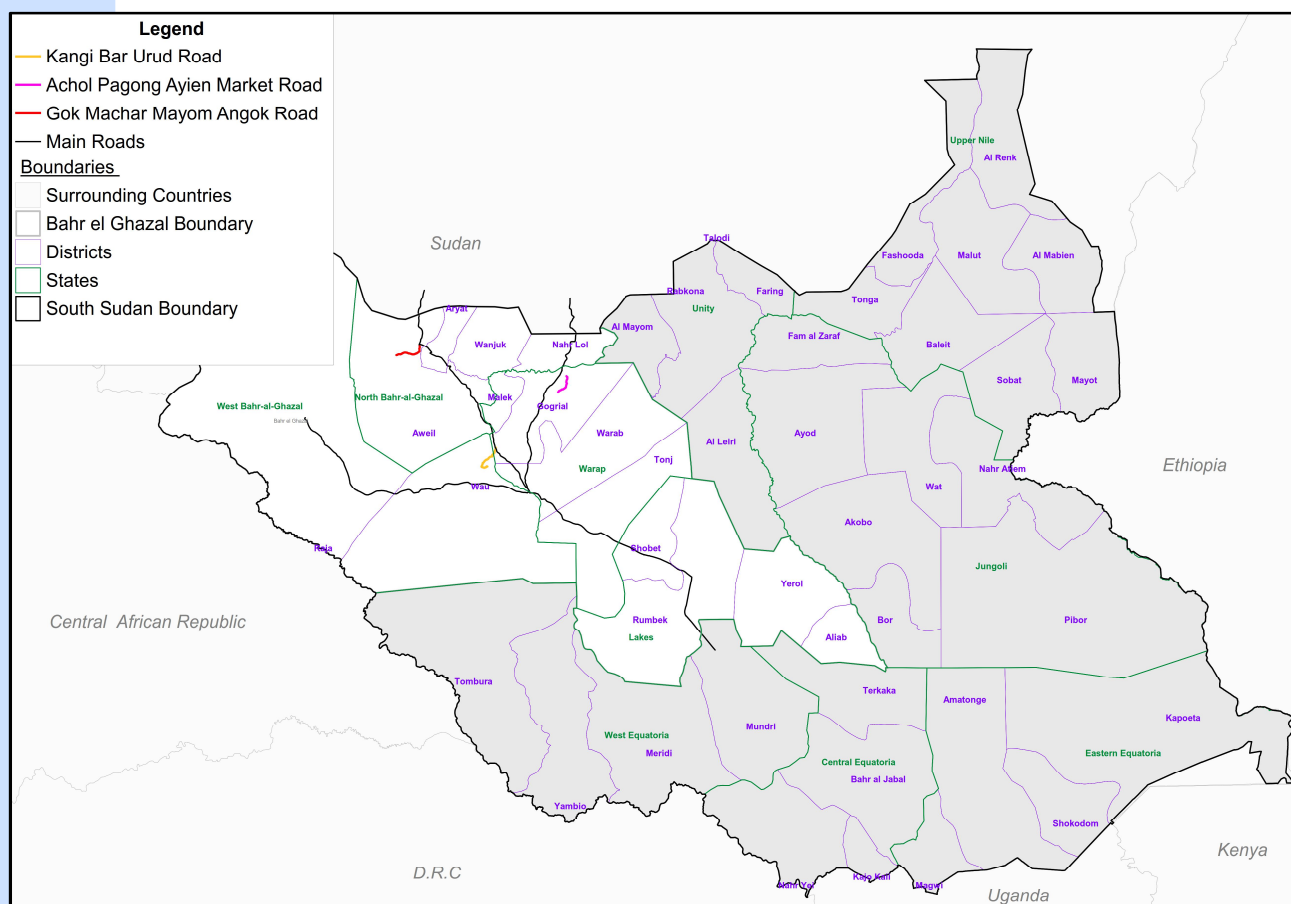


Figure 3.1 Regional Locality Plan

4

BACKGROUND OF PROJECT

The project involves the construction of one of three feeder roads in three different states. The greater project is aimed at stimulating crop production and sustainable farming activities, and providing access to agricultural markets and social services such as health and education facilities in the feeder road areas.

The three project roads are being established to connect farming communities to local and regional market places. The project feasibility study of 2015 was the steering phase to the current design phase. The contractor intends to break ground on the first road in January/February 2016 with the construction phase lasting for approximately 18 months per road.

This report focusses on the Achol Pagong to Ayien Market Road which is 26.992 km in length and is located within the Gogrial West county of Warrap State. The Warrap state is located east of the NBeG State and the WBeG State, and to the west of the Lakes State and the Western Upper Nile State. The state is divided into Counties, Gogrial East, Gogrial West, Tonj South, Tonj North, Tonj East, and Twic. Villages and/or Bomas occur at irregular intervals along the route. The route begins at Achol Pagong and ends at the Ayien Market.

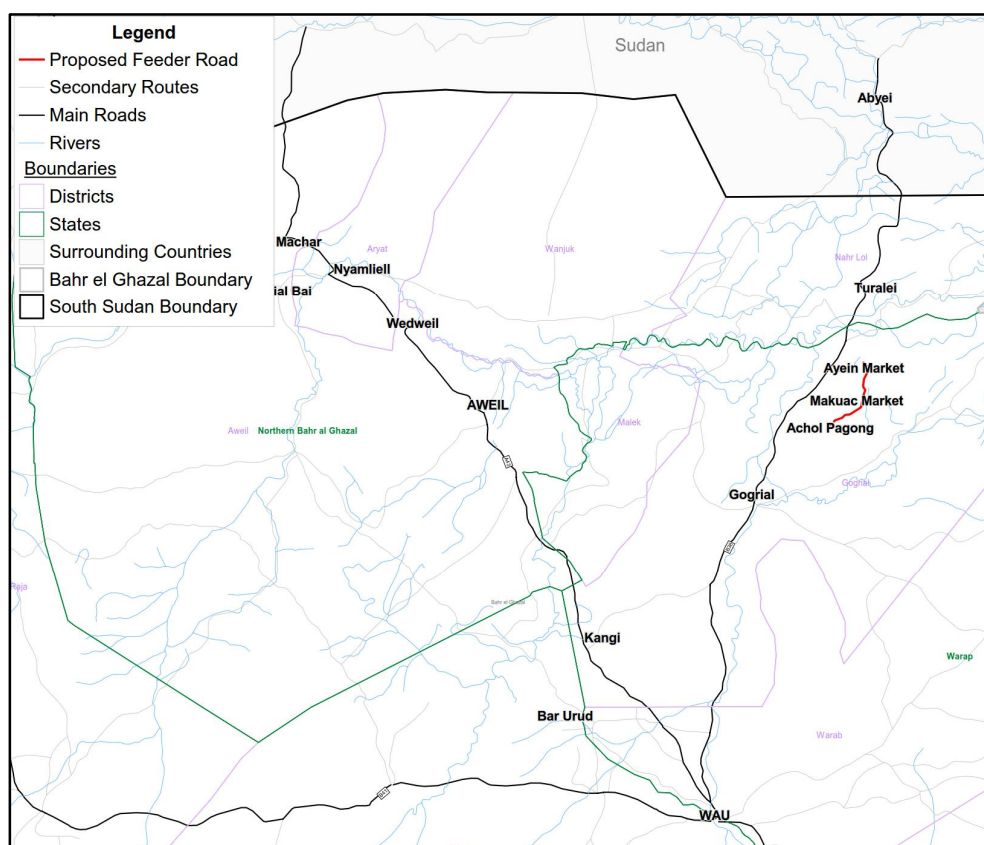


Figure 4.1 Achol Pagong to Ayien Market Road Locality

The road will be constructed using one of two pavement structures, depending on the prevailing conditions. One pavement structure comprises of three primary layers, namely a wearing course (upper layer in a roadway), formation level (layer supporting the wearing course), and insitu material roadbed (founding layer). The other is similar with an additional mechanically stabilised formation layer directly beneath the wearing course. The geogrid¹ will also be applied to the roadbed in areas with poor material and/or poor drainage conditions.

Construction of the road's wearing course and formation layers will be accomplished through the use of the available materials. Locally obtained gravel materials will be used for the wearing course while the surrounding soils along the route will be tested and utilised in the formation layers. One borrow area has been identified approximately 85 km from the project road. Further potential borrow areas, which still need to be tested, have been identified along the route. The depth of the borrow pits will depend on the depth of the material source.

The project road is situated in a high lying area and does not require any special drainage measures. Furthermore, no streams or rivers, requiring major drainage structures, are encountered along the route.

Following construction, the road should be maintained on an on-going basis depending on the technical requirements of the road design. The operational phase of the project is considered critical by the European Union (Donor). This phase will require capacity building with state departments and communities within the immediate affected area. The longevity of the road surface is very much dependent on the road maintenance efforts post-construction.

¹ A geosynthetic material grid that is used to contain and strengthen the layer that it is applied to.

5

DESIGN PHASE

5.1

APPROACH TO DESIGN

The design was approached as follows:

- The adoption of the road design principles and philosophies specified in the South Sudan Low Volume Roads Design Manual;
- Addressing the challenges of the South Sudan Road Environment pertaining to the climate, hydrology, materials, traffic, terrain, construction and maintenance regimes;
- Route selection with regard to topography and community recommendations;
- Geometric design determined by traffic, cross sections, alignment and safety;
- Pavement design using available materials;
- Constructability and the use of locally available resources;
- Drainage and structures;
- Road side slope stability and protection;
- The forward maintenance regime.

5.2

DATA COLLECTION AND SURVEYS

Collection of all relevant and available data and required surveys relating to traffic analysis, road pavement condition investigations, topographical and aerial survey, road drainage inventory, borrow pit investigations and road safety issues commenced immediately following the effective contract date. The data collected to date is summarised in Table 5.2.1.

Table 5.2.1 Data Summary

DESCRIPTION	SOURCE	STATUS
Visual road assessment	Site inspection 24th October 2015	Completed
Hydrological assessment	Site inspection 24th October 2015, Local knowledge transfer and available GIS data bases	Completed
Environmental & social assessment	Site inspection 24th October 2015	Completed
Topographical survey	Southern Mapping Company and Eyat Roads & Bridges Co.	Completed
Aerial survey	Southern Mapping Company and Eyat Roads & Bridges Co.	Completed
Materials investigation	Site inspection 24th October 2015, South Sudan UNOPS and Eyat Roads & Bridges Co.	Completed

6

ENVIRONMENT

The environmental assessment's primary focus was to determine the baseline natural and social environments, assess the impact of the project on the baseline, and determine the most environmentally appropriate design. The environmental assessment considered the following:

- Hydrology of the baseline area;
- Direct environmental and social impact; and
- Geology of the baseline area.

6.1 HYDROLOGY

The Warrap State is characterised by high rainfall with a long wet season and a four to five month dry season. November to March is dry while April to October experiences high rainfall.

The average temperature is 27.6°C, with April being the warmest month with an average temperature of 30.6°C. December is the coolest month with an average temperature of 26°C. Average annual precipitation is 898 mm (weather station report). August is the peak wet season with average precipitation of 206 mm.

6.2 ENVIRONMENTAL AND SOCIAL IMPACT

The Gogrial West and Twic Counties are affected by the proposed project. Two Payams fall along the proposed route including the Myom Payam and the Torale Payam. Each contains Bomas and villages, as follows:

- < Within the Myom Payam, the Achol Pagong, Makwec Pagong and Majok Bomas are impacted; and
- < Within the Torale Payam, one Boma is affected, namely the Ayien Boma.

Each Boma contains numerous villages some of which are impacted. Some Bomas/villages occur at a distance of about ½ - 1 hour walk on average. Each Boma/village cluster has an estimate average of 40-60 households. (A description of the regional genealogy is provided in Appendix A.) The prominent people grouping along the project feeder route are the Dinka. Local communities have poor access to rural services and infrastructure. Road accessibility, especially during the rainy season, further constrains villagers in terms of access to services. Walking is the leading means of transport, followed by bicycle and motorbike. Agriculture is the major livelihood for communities. Sorghum, groundnuts and sesame are the most important staple crop production.

The existing track is impassable at times in the rainy season and thus hinders access to rural services and infrastructure. During the feasibility study, the local health officer reported that women and children under five years of age are most vulnerable to diseases and infections. Clinics are limited in the area in terms of numbers and quality of treatment therefore treatment is little to none in the project area. The majority of the local population have no mode of transport (bicycle, animal-drawn cart, motorbike or donkey) therefore walking is the main mode of transport.

Access to fresh water and the management of waste is generally poor. Locals are completely reliant on groundwater for drinking water as well as sustaining crops and livestock.

6.3 GEOLOGY

South Sudan is dominated by the following base rock types:

- à Alluvial material (i.e. sedimentary rock)
- à Clay and sand material
- à Basalt
- à Gneiss
- à Quartzite
- à Crystalline schists
- à Granite

Figure 6.3.1 provides evidence of the general distribution of main rock types across northern South Sudan. The figure indicates that the in situ surface material is recent alluvial deposits of transported soils (silts and clays) that are found along the floodplain. Below the alluvium is a sedimentary layer which was deposited in the Cenozoic Era (+/- 65 million years ago). The bedrock below the sedimentary layer is igneous rock however the depth of the sedimentary base is unknown.

The subgrade along the proposed route alignment is generally characterised by sand, loam and clay with no rock outcrops observed. Black clayey loam and sedimentary material occupies the isolated marshlands. There are no ferricrete deposits in the area.

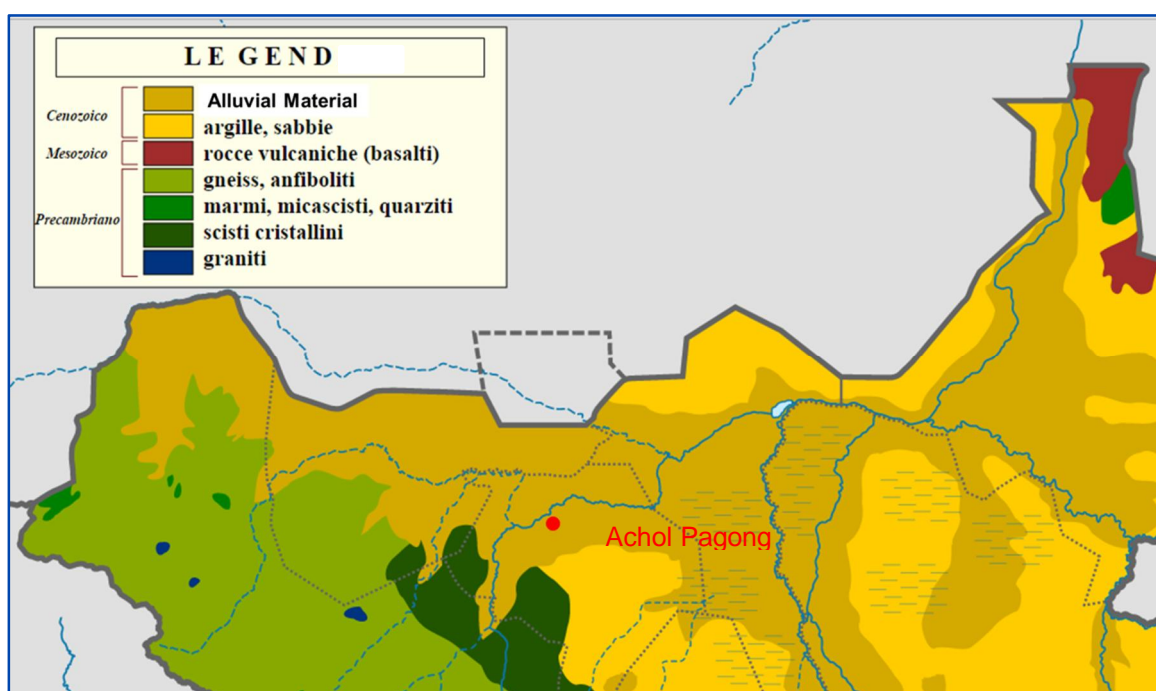


Figure 6.3.1: South Sudan regional soil classification

7

ROUTE SELECTION AND GEOTECHNICAL ASPECTS

This chapter discusses factors that influenced route selection, geotechnical site aspects, and materials testing.

7.1

CONSIDERATIONS FOR ROUTE SELECTION

The investigation for route selection commenced with an environmental screening exercise which concluded that the project will result in moderate environmental risk. Other factors considered included:

- The influence of the route on the economic and social development of the area, and the mitigation of anticipated social challenges.
- The technical sufficiency of the existing track based on the available natural materials.
- Identification of marshlands (at km 18 and km 20) and the proposed route alignment to cross them.
- The availability of water sources for construction purposes, including both existing boreholes that may not be used for construction purposes, and new boreholes to be sunk by the contractor for construction purposes.
- Ease of access to the existing markets for people residing in the surrounding Villages, Counties, Payams and Bomas.

7.2

GEOTECHNICAL INVESTIGATIONS AND TESTING**SITE INVESTIGATION**

There are no murrum deposits along the proposed route alignment. Murrum is to be imported from the nearest known source at Kuajok, which is approximately 85 km south of the project.

The proposed route alignment follows the existing track for most of the route, with minor adjustments to avoid low-lying areas and/ or social cultural sites.

GENERAL AND SPECIAL CONSIDERATIONS

The comprehensive testing regime specified in the South Sudan Low Volume Roads Design Manual was not followed due to the lack of time, the budget, weather (rain) and accessibility constraints. For these reasons, the type and frequency of testing was considered carefully.

TESTING REGIME

Based on the above testing constraints, the following material tests were carried out:

- Dynamic cone penetrometer (DCP) (**Figure 7.3.1**) testing, every 200 m over the length of the road;
- 4 test pits on the project road (**Figure 7.3.2** shows test pit digging) divided evenly along the length at km 2.0, km 10.0, km 20.0 and km 34.0
- 2 test pits were excavated in each of the two identified borrow areas.

The tests that were carried out and results thereof are discussed, summarised and analysed in Chapter 9.2.

7.3

INVESTIGATIONS OF SMALL STRUCTURES

There were no small structures on this project road.



Figure 7.3.1 Dynamic cone penetrometer (DCP)



Figure 7.3.2 Digging of test pits

8

GEOMETRIC DESIGN

8.1

ROUTE ALIGNMENT

Assessment findings and recommendations from the UNOPS feasibility study provided the base for the Achol Pagong - Ayien Market route alignment design. The proposed alignment is 35.3 kilometres in length. It begins at an intersection with the main road through the village of Achol Pagong which provides the link to Road B38. From the intersection the route continues in a northerly direction and ends at Ayien Market.

(Road B38 passes Achol Pagong on the western side of the village in a north-south direction. It connects Achol Pagong with Gogrial village and Wau to the south and the villages of Turalei and Agok to the north.)

The population density is fairly consistent along the full length of the proposed route. Agriculture is the major livelihood for communities along the route, with local households relying primarily on agriculture and livestock.

Limited social services are available in the area and along this route. Very few clinics have been built in the area therefore medical treatment is mainly traditional.

This road will connect local communities to the main trunk road (B38) and the surrounding social services, villages and markets. Its area of influence is focused mainly on providing access and reducing travel time for the local communities.

8.2

DESIGN PHILOSOPHY

The new road will provide local residents and farmers with access to local, regional and cross border markets. An existing track connecting communities between Achol Pagong and Ayien Market provides the base to the designed alignment. Further consideration has been given to information obtained from a detailed site inspection and liaison with local community leaders. This information included the location of:

- areas to be avoided,
- existing roads,
- local markets,
- schools,
- drainage features, and
- community points of importance.

See [Appendix B](#) for a list of this data received.

The final geometric design is based on the guidelines provided in the South Sudan Low Volume Roads Design Manual, Volume 1 (Design Manual (Volume 1)).

8.3

ROAD CLASSIFICATION

The Average Annual Daily Traffic (AADT) less than 300 therefore this road has been classified as a Low Volume Road (LVR) of design class DC4 with an intended level of service C. This road category provides for a DV4 design vehicle which is equivalent to a truck and semi-trailer.

8.4

TOPOGRAPHY

Topography along the alignment and surrounding terrain is extremely flat. All vertical grades along the final alignment are below 2%. This is also true for the intersecting crossfall of the natural ground and along the natural watercourses.

Due to the topographical limitations presented by the flat terrain, and the requirement for sufficient drainage to ensure integrity of the road formation, the road alignment has been designed in a continuous fill state.

8.5

GEOMETRIC DESIGN STANDARDS

Table 8.5.1 lists the geometric design standards for roads categorised as unpaved DC4.

Table 8.5.1: Geometric design standards for unpaved DC4 roads (AADT 150-300)

Design Element	Unit	Flat	Rolling	Mountain	Escarp-ment	Populated areas
Design Speed	km/hr	70	60	50	25	50
Road width	m	7.0 ⁽³⁾	7.0 ⁽³⁾	7.0	7.0	7.0 ^(2,3)
Min. stopping sight distance	m	125	105	75	28	70
Min. horizontal radius	m	245	175	110	23 ⁽⁴⁾	110
Maximum desirable gradient	%	4	6	6	6	4
Maximum gradient	%	6	9	9	9	6
Maximum super elevation	%	6	6	6	6	6
Minimum crest vertical curve	K	34	19	11	6	11
Minimum sag vertical curve	K	4.8	3.5	2.2	1.3	2.2
Normal cross-fall ⁽⁵⁾	%	6	6	6	6	6

The design standards applied for the horizontal alignment of the road adhere to those recommended for flat terrain with a design speed of 70km/h. However, a reduced design speed of 50 km/h has been adopted as:

- The vertical alignment must cater for the road to be lifted above the stormwater culvert structures, whilst maintaining an acceptable road formation height above the existing ground; and
- For the majority of the alignment, local residents, farmers, and businesses are in close proximity to the road. Speeds should be such that the accesses can be safely negotiated.

The design standards applied to this road are:

- Design speed: 50 km/h
- Road width: 7.0 m
- Minimum stopping site distance: 125 m
- Horizontal radius: 250 m
- Gradient: < 2%
- Super elevation: 4%
- Camber: 4%

8.6

HORIZONTAL AND VERTICAL ALIGNMENTS

The horizontal alignment is dictated by community needs and physical features located along the alignment corridor. A standard super elevation of 4% has been applied across all the horizontal curves.

Vertical curves are applied in areas where the road needs to be raised above the relief culverts to achieve a minimum cover of 300 mm at the edge of road. The vertical alignment allows for a maximum grade change of 4% and follows the vertical design elements for a design speed of 50 km/h as shown in [Table 8.5.1](#) and [Figure 8.6.1](#). The resultant vertical profile has gently rolling vertical curves.

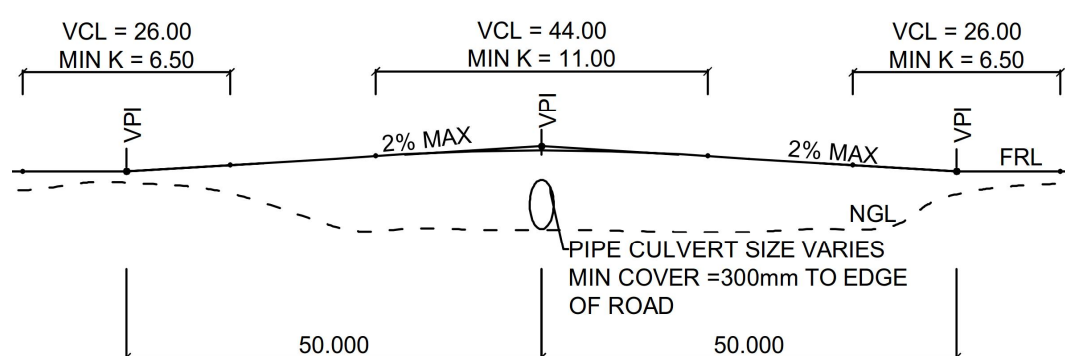
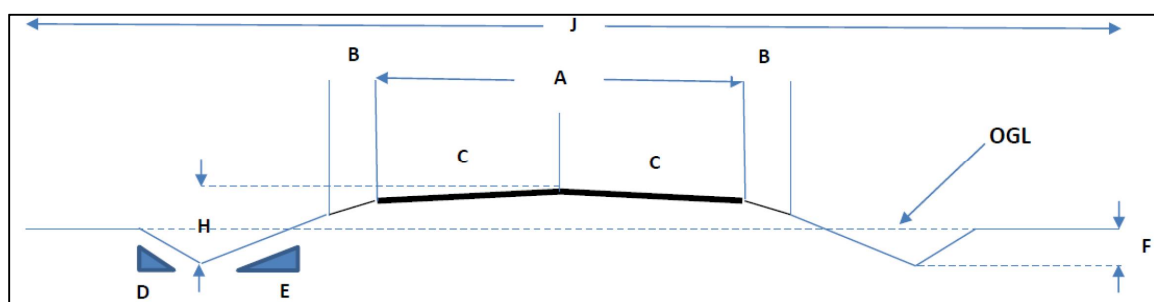


Figure 8.6.1 Vertical road alignment at relief culverts

8.7

CROSS SECTION

According to the Design Manual (Volume 1) the road width (carriageway plus shoulder) for an unpaved DC4 road is 7.0m. However, it has been agreed to construct an unpaved road with a 7m carriageway and 0.5m shoulders on either side. See [Figure 8.7.1](#) for comparison of design criteria.



Label Design	Criteria	Design Class	Design Cross Section
		DC4	
A	Carriageway width (m)	6.0	7.0
B	Shoulder width (m)	0.75	0.5
C	Min Crossfall/Camber (%)	4	4
D	Backslope of ditch (v:h ratio)	NA	NA
E	Side slope of ditch (v:h ratio)	NA	NA
F	Depth of Side ditch (m)	Varies	Varies
H	Crown height (m)	0.5	0.5
J	Cleared width (m)	20	Varies

Figure 8.7.1 Typical cross section for unpaved roads in flat terrain

8.8

EARTHWORKS

Due to the flat terrain and sparse natural vegetation, no alignment related safety conditions require special attention.

The 30 m wide road corridor is to be cleared of bushes and small trees. This corridor will require ongoing maintenance in the form of grass cutting and shrub removal to provide road users with a sufficient line of sight to respond to people or animals that may cross the road.

The operating speed of 50km/h will be sign-posted at 2.0 km intervals in the more populated areas.

8.9

SIGNAGE

Signage along this road is limited to destination, speed limitation, and road hazard signage. The position of signage will be determined on site.

9

PAVEMENT DESIGN

This chapter discusses the investigation into road traffic and existing materials between Achol Pagong and Ayien Market (26.992 km).

The engineering design of the road is based on a combination of the requirements of the South Sudan Low Volume Roads Design Manual Volume 1. 2013 (SSLVRDM) and good industry practices. The design methods applied for the design are:

- South Sudan Low Volume Roads Design Manual Volume 1. 2013. Republic of South Sudan Ministry of Roads and Bridges

- TRH4. 1996 (Draft). Structural Design of Flexible Pavements for Interurban and Rural Roads. Committee of State Road Authorities. Pretoria, South Africa. (Technical Recommendations for Highways Series, TRH4)
- TRH14. 1985. Guidelines for Road Construction Materials. Committee of State Road Authorities. Pretoria, South Africa. (Technical Recommendations for Highways Series, TRH 14).Traffic
- TRH20. 1990. The Structural Design, Construction and Maintenance of Unpaved Roads. Committee of State Road Authorities. Pretoria, South Africa. (Technical Recommendations for Highways Series, TRH 20).Traffic
- Thompson, J and Visser, A. An Integrated Haul Road Design System to Reduce Cost per Tonne Hauled, Paper presented at World Mining Equipment Haulage 2002 Conference, Tucson, Arizona, 2002

The following design inputs were received and considered:

- Traffic information contained in the ZEAT BEAD Feeder Road Feasibility Study
- Dynamic Cone Penetration (DCP) investigation conducted on-site
- Test pit investigations of the route and borrow pits conducted on-site

9.1

TRAFFIC

During the ZEAT BEAD Feeder Road Feasibility Study, UNOPS conducted a traffic study on the South Sudan feeder road from Achol Pagong to Ayien Market. **Table 9.1.1** shows anticipated normal traffic during the opening year (2017). It considered traffic counts, seasonal correction factors and growth factors.

Table 9.1.1 Opening year AADT based on O-D Survey and UNOPS assumptions

TYPE OF TRAFFIC	CAR	UTILITY	S.BUS	M. BUS	L. BUS	S. TRUCK	M. TRUCK	H. TRUCK	TRUCK TRAILER	TOTAL
Normal traffic	5	26	0	0	2	7	7	12	3	63
Generated traffic	1	5	22	17	10	19	12	11	8	105
Diverted traffic	0	0	0	0	0	0	0	0	0	0
AADT	6	31	22	17	12	26	19	23	12	168

In this feeder road, a growth factor was based on an origin destination study conducted and discussed in the ZEAT BEAD Feeder Road Feasibility Study. **Table 9.1.2** shows the assumed traffic growth rates over potential life of the project road.

Table 9.1.2 Traffic growth rates

PERIOD	CAR	UTILITY	S.BUS	M. BUS	L. BUS	S. TRUCK	M. TRUCK	H. TRUCK	TRUCK TRAILER
2015-2025	6.0%	6.0%	6.0%	6.0%	4.0%	4.0%	3.9%	3.9%	3.9%
2026-2030	4.0%	4.0%	4.0%	4.0%	3.0%	3.0%	2.9%	2.9%	2.9%
2031-2035	4.0%	4.0%	4.0%	4.0%	2.0%	2.0%	1.9%	1.9%	1.9%
2036-2040	4.0%	4.0%	4.0%	4.0%	2.0%	2.0%	1.9%	1.9%	1.9%

Annual average daily traffic growth (AADT) is shown in **Figure 9.1.1** (below).

Using the values assumed in **Table 9.1.1**, the daily E80 loading over a twenty year period has been calculated as shown in **Table 9.1.3**.

A graph depicting the annual average daily traffic (AADT) growth is plotted in **Figure 9.1.1** below.

Table 9.1.3 Daily E80 Loading

YEAR No.	YEAR	E80 PER DAY									
		Car	Utility	S.Bus	M. Bus	L. Bus	S. Truck	M. Truck	H. Truck	Truck Trailer	Total
0.000	2017.000	0.000	0.870	4.400	12.410	33.360	9.906	25.061	35.535	75.000	196.542
1.000	2018.000	0.000	0.922	4.664	13.155	34.694	10.302	26.038	36.921	77.925	204.622
2.000	2019.000	0.000	0.978	4.944	13.944	36.082	10.714	27.054	38.361	80.964	213.041
3.000	2020.000	0.000	1.036	5.240	14.781	37.525	11.143	28.109	39.857	84.122	221.813
4.000	2021.000	0.000	1.098	5.555	15.667	39.026	11.589	29.205	41.411	87.402	230.955
5.000	2022.000	0.000	1.164	5.888	16.607	40.588	12.052	30.344	43.026	90.811	240.481
6.000	2023.000	0.000	1.234	6.241	17.604	42.211	12.534	31.528	44.704	94.353	250.410
7.000	2024.000	0.000	1.308	6.616	18.660	43.899	13.036	32.757	46.448	98.033	260.757
8.000	2025.000	0.000	1.387	7.013	19.780	45.655	13.557	34.035	48.259	101.856	271.542
9.000	2026.000	0.000	1.442	7.293	20.571	47.025	13.964	35.022	49.659	104.810	279.786
10.000	2027.000	0.000	1.500	7.585	21.394	48.436	14.383	36.037	51.099	107.849	288.283
11.000	2028.000	0.000	1.560	7.889	22.249	49.889	14.814	37.082	52.581	110.977	297.041
12.000	2029.000	0.000	1.622	8.204	23.139	51.386	15.259	38.158	54.106	114.195	306.069
13.000	2030.000	0.000	1.687	8.532	24.065	52.927	15.716	39.264	55.675	117.507	315.374
14.000	2031.000	0.000	1.755	8.874	25.028	53.986	16.031	40.010	56.732	119.739	322.155
15.000	2032.000	0.000	1.825	9.229	26.029	55.065	16.351	40.771	57.810	122.014	329.094
16.000	2033.000	0.000	1.898	9.598	27.070	56.167	16.678	41.545	58.909	124.333	336.197
17.000	2034.000	0.000	1.974	9.982	28.153	57.290	17.012	42.335	60.028	126.695	343.468
18.000	2035.000	0.000	2.053	10.381	29.279	58.436	17.352	43.139	61.169	129.102	350.910
19.000	2036.000	0.000	2.135	10.796	30.450	59.605	17.699	43.959	62.331	131.555	358.529
20.000	2037.000	0.000	2.220	11.228	31.668	60.797	18.053	44.794	63.515	134.055	366.330

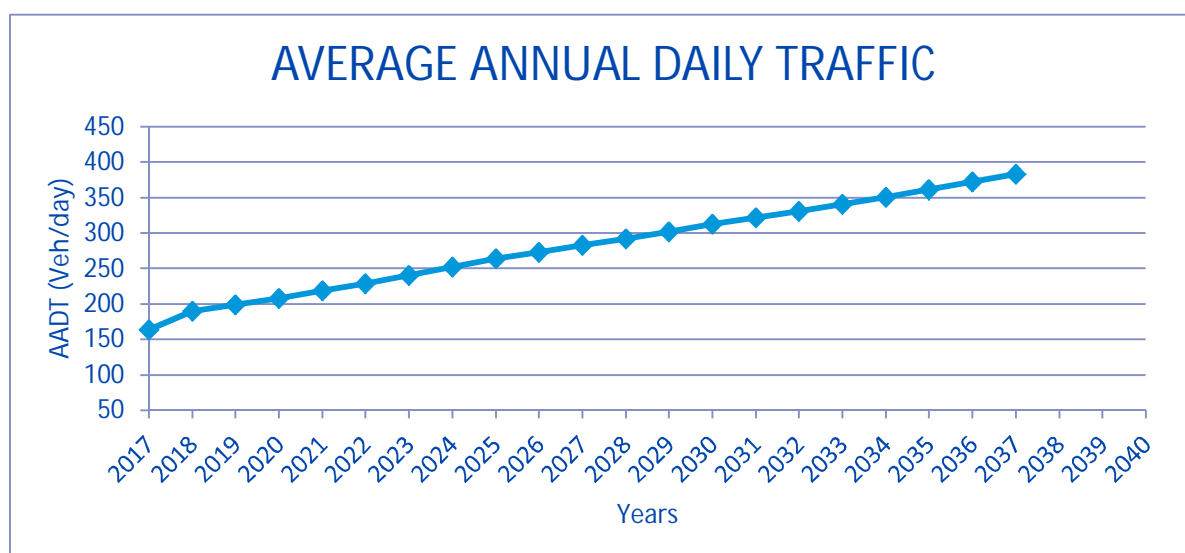


Figure 9.1.1 Average Annual Daily Traffic Growth

The pavement design life for this all-weather gravel surfaced road is 10 years, as recommended in the South Sudan Low Volume Roads Design Manual. At year ten, the AADT is 283 vehicles per day. At year fifteen, the AADT is 332 vehicles per day. Based on the 10 year AADT, the road is categorised as DC4.

9.2

SUBGRADE

The subgrade was tested with Dynamic Cone Penetration (DCP) apparatus and soil samples were obtained from four test pits along the existing track.



Figure 9.2.1 DCP tests in progress

The DCPs were taken at 200m intervals on the existing track. Using a digital elevation model, the DCP data was extrapolated to the proposed route alignment to provide an indication of the existing soil horizons.

The DCP results were analysed by plotting the DCP structural number (number of blows to 800 mm depth) (DSN_{800}) values. A graph of the cumulative sum of DSN_{800} values plotted, as shown in [Figure 9.2.3](#).

The DCP data was then used to determine horizons for each DCP test. The California Bearing Ratio (CBR) value for each horizon was calculated and the CBR value for each horizon was averaged over uniform sections. The DCP tests were done in dry conditions therefore the calculated CBR values have been classified as unsoaked (see [Table 9.2.1](#)).

Uniform sections of subgrade were identified from the graph of the unsoaked CBR values and DCP horizons shown in [Figure 9.2.3](#). The identified uniform sections are listed in [Table 9.2.2](#).

Four test pits were excavated along the existing track. Tests carried out on the excavated material included the calculation of the plasticity index (PI), and the bearing capacity of the soaked material to obtain the soaked CBR value. These test results are provided in [Table 9.2.3](#).

To obtain an indication of the soaked CBR subgrade values from the DCP tests, the unsoaked CBR values were adjusted by a factor derived from the laboratory test results. These theoretical soaked CBR values, shown in [Table 9.2.4](#), differ considerably from the unsoaked CBR values however the subgrade bearing capacity is, in general, very good.

Table 9.2.1 Mean CBR values for subgrade

UNIFORM SECTION	KM FROM	KM TO	MEAN CBR		
			HORIZON 1	HORIZON 2	HORIZON 3
1	0	2.8	124	29	41.3
2	2.8	4.6	71.7	49.8	
3	4.6	10.2	72.9	29.8	23
4	10.2	12.4			
5	12.4	15.8	39.4	54.2	37.4
6	15.8	23	32.3	38.8	34
7	23	24	22.8	25	22
8	24	40			

Table 9.2.2 Uniform sections

UNIFORM SECTION	KM FROM	KM TO
1	0	2.8
2	2.8	4.6
3	4.6	10.2
4	10.2	12.4
5	12.4	15.8
6	15.8	23
7	23	24
8	24	40

Table 9.2.3 Test pit laboratory results

TEST PIT NUMBER	CHAINAGE (KM)	PI (%)	SOAKED CBR (%)
TP1	0.2	8.8	6
TP2	10	0.0	18
TP3	20	11.5	44.0
TP4	30	13.7	4

Table 9.2.4 Soaked CBR to unsoaked CBR conversion

KM FROM	KM TO	UNSOAKED DSN800	SOAKED DSN800	SOAKED CBR (CONVERTED FROM DSN800, FACTOR APPLIED)	SUBGRADE CLASS
0	2.8	243	143	47.4	S6
2.8	4.6	160	94	27.6	S5
4.6	10.2	122	71	19.2	S5
10.2	12.4				
12.4	15.8	139	84	24.1	S5
15.8	23	114	69	18.5	S5
23	24	84.4	50	12.2	S4
24	40				

The subgrade class shown in **Table 9.2.4** was derived from **Table 7.20** in the South Sudan Low Volume Roads Design Manual. These figures are shown in **Figure 9.2.2** below.

The subgrade classes under soaked conditions range from a S4 class to a S6 class. The strip map set out in **Figure 9.2.3** summarises the DSN800 values, Horizons and CBR values, over uniform sections shown in **Table 9.2.2**.

Design CBR	S2	S3	S4	S5	S6
Range %	3 - 4	5 - 8	9 - 14	15 - 29	30+

Figure 9.2.2 Subgrade classes (South Sudan Low Volume Roads Design Manual, 2013)

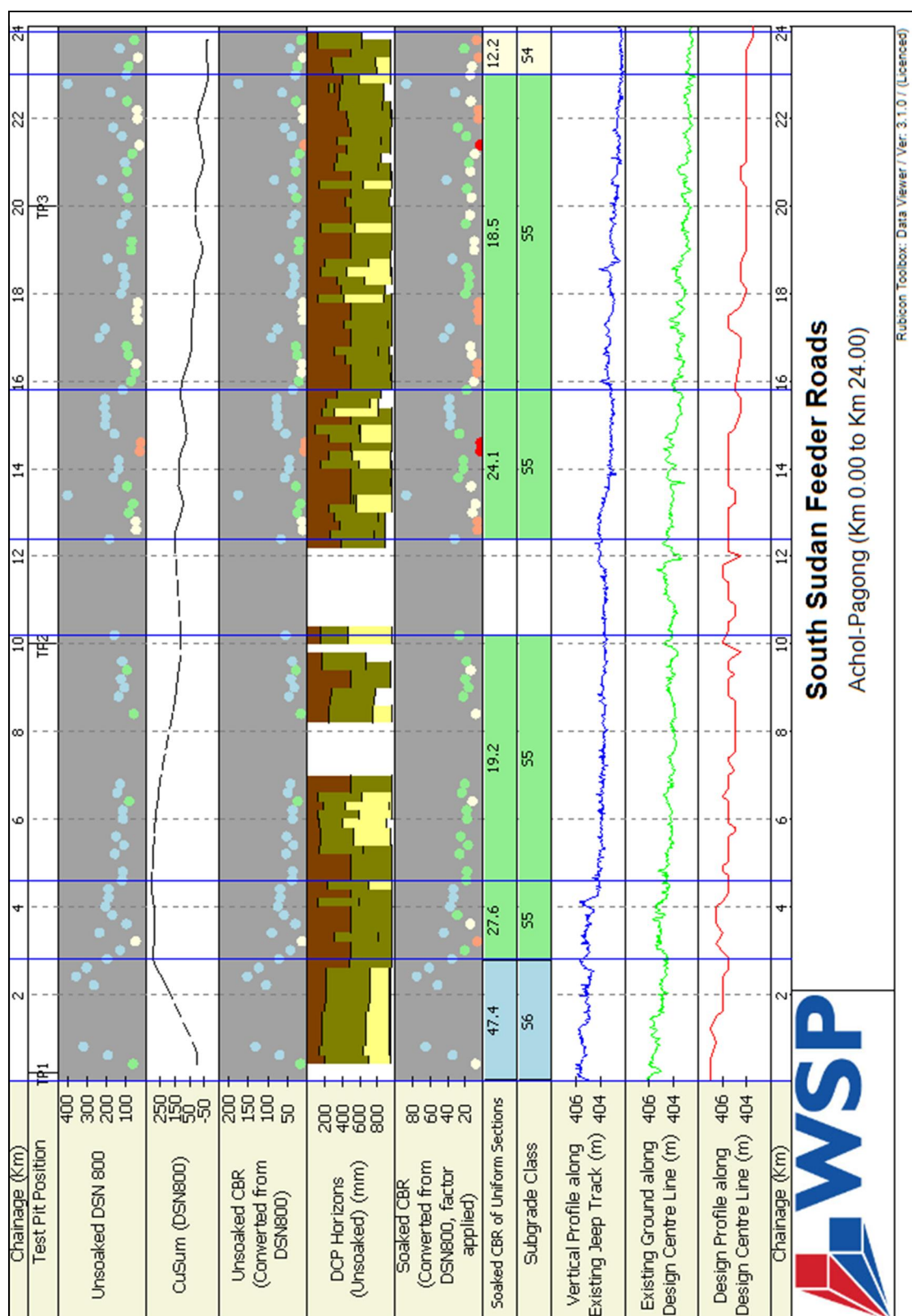


Figure 9.2.3 Strip map of subgrade test results from Achol Pagong to Ayien Market

9.3

MATERIALS AND NATURAL GRAVEL FOR GRAVEL WEARING COURSE

Material investigations included the excavation of four test pits along the existing track to determine type and quality of the subgrade in situ material. The position and results of these tests are summarised in **Table 9.3.1**.

Table 9.3.1 Summary of material test results from the test pits excavated on the existing track

CHAINAGE (KM)	SAMPLING DATE	TESTING DATE	ATTERBERG LIMITS			PROCTOR		CBR (%)	SUBGRADE CLASS
			LL (%)	PL (%)	PI (%)	MDD (gm/cc)	OMC (%)		
0.200	14-Nov-15	17-Jan-16	21.9	13.1	8.8	2.050	12.0	6	SG3
10.000	14-Nov-15	17-Jan-16	0.0	0.0	0.0	2.060	7.5	18	SG5
20.000	14-Nov-15	17-Jan-16	23.0	11.6	11.5	2.076	11.6	44.0	SG6
30.000	14-Nov-15	17-Jan-16	27.2	13.5	13.7	2.040	13.0	4	SG2

The test pit investigation results differ somewhat from DCP findings. The CBR values indicate material falls between S2 and S6 class. On average, the plasticity index (PI) falls within the slightly plastic range (3-15). This shows the material has cohesion, and is workable.

This borrow area was identified as a suitable source for gravel wearing course material. Borrow area test results are summarised in **Table 9.3.2** below. During construction, borrow areas adjacent to the road will be identified for sand fill.

Table 9.3.2 Borrow area test pit result summary

CHAINAGE (KM)	SAMPLING DATE	TESTING DATE	OFFSET FROM ROAD CL (M)	ATTERBERG LIMITS			PROCTOR		CBR (%)
				LL (%)	PL (%)	PI (%)	MDD (gm/cc)	OMC (%)	
85Km Kuajok away from Achol Pagong road	17-Nov-15	17-Jan-16		24.7	14.5	10.2	2.330	8.4	48

Test results indicate material is ideal for a gravel wearing course. The CBR value shows it has good bearing capacity characteristics. As the plasticity index (PI) is within the slightly plastic range (3-15), the material is both cohesive and workable.

Note: The contractor is not limited to this borrow area. If required, further investigations can be done, on order, to identify other borrow areas.

9.4

DESIGN METHOD

The primary consideration of the proposed pavement design is to provide an economical all-weather gravel surfaced road.

The bearing capacity of the subgrade material is, in general, strong enough to support the specified a 200 mm gravel wearing course. The concern is that the nearest known source of suitable gravel is located some 85 km's from the road. The cost to transport this gravel to site is considered to render this road financially unviable.

Considering the strength of the in situ subgrade material, the design proposes using this material for the riding course. The subgrade material has a grading similar to that of sand therefore to provide stability to the pavement, mechanical stabilisation in the form of Geocells has been proposed.

This proposed alternative pavement design is not provided for in the South Sudan Low Volume Roads Manual therefore the Thompson & Visser design method for gravel haul roads has been used.

Roadbed or subgrade

The pavement design standard in the South Sudan Low Volume Roads Manual (SSLVRM) specifies that this area is classified as a dry area as the average rainfall is less than 1000 mm per annum.

As shown in **Table 9.2.4**, the CBR of the soaked subgrade material varies between 12.2% and 47.4% at 97% AASHTO T180 density which is classified in the SSLVRM as S5 subgrade.

Isolated marshlands listed in **Table 9.4.1** are to be bridged with a Geocell layer, as shown in **Figure 9.4.1**. The cells are filled with locally procured sand or gravel by back-tipping, and compacted to form a bridging layer over the subgrade.



Figure 9.4.1 Geocell layer installation

The sections of subgrade identified for mechanical stabilisation are listed in **Table 9.4.1**.

Table 9.4.1 Sections of subgrade identified for Geocell improvements

KM FROM:	KM TO:	LENGTH (M)	REASON
2.2	2.6	400	Localised low point
11.8	12.2	400	Localised low point
14.8	17	2200	Localised low point
17.8	18.1	300	Localised low point
21.8	22.1	300	Localised low point

Fill and selected layers

The pavement design standard in the South Sudan Low Volume Roads Manual (SSLVRM) specifies that this area is classified as dry as the average rainfall is less than 1000 mm per annum.

The SSLVRM specifies that no fill and selected layers are required in a dry area with a S5 subgrade.

Owing to cost to import the specified gravel wearing course, this design proposes that a fill layer, generally 350 mm thick is constructed from locally obtained material with a CBR exceeding 7% at 95% of AASHTO T180 density.

Gravel wearing course and alternative designs

As discussed in chapter 9.3, the nearest known source of suitable gravel is located some 85 km's from the road. The cost to transport this gravel to site is considered to render this road financially unviable.

Considering the strength of the in situ subgrade material, the design proposes using the subgrade material for the riding course. The subgrade material has a grading similar to that of sand therefore to provide stability to the pavement, mechanical stabilisation in the form of Geocells has been proposed.

This alternative pavement design is not provided for in the South Sudan Low Volume Roads Manual and is further discussed after the paragraph on the wearing course gravel therefore the Thompson & Visser design method for gravel haul roads has been used.

The Thompson & Visser design method adopts a mechanistic design method that uses vertical strain criterion as a limiting factor for each pavement layer. (i.e. this design method assesses the maximum horizontal strain that the underlying materials can contain under a vertical load.) Vertical strain is calculated from the equivalent 80kN axle loads (E80) over the ten year pavement design life. The equivalent 80kN axle loads (E80) over the ten year pavement design life is provided in **Table 9.4.4**.

Following the Thompson and Visser mechanistic design method, **Table 9.4.2** summarises the parameters assumed or calculated.

Table 9.4.2 Design parameters for pavement layers (Thompson & Visser mechanistic design method)

DESIGN DESCRIPTION		
Number of E80s per day	288	E80s
Traffic Volume	0.0294	Kt/day
Road Category	3	
Performance Index	4	
Performance Index * Traffic Volume	0.12	
Limiting micro-strain	2994	Micro-strain

From **Table 9.4.2**, the maximum vertical strain in the pavement layers beneath the wearing course should not exceed 2994 microstrain.

The parameters assumed or calculated consist of limiting the vertical strains in-depth in terms of the pavement category and its performance index. The limiting microstrain for the layers beneath the wearing course is 2994 micro strain. By limiting the vertical strains to 2994 microstrain, we have assumed a design period of 10 years. During the design period of 10 years the client will be required to periodically re-shape, and eventually re-gravel, the wearing course. There is little or no damage in the form of shear failure and excessive plastic deformation expected in the pavement layers beneath the wearing course. However, it is important that, as far as possible, the thickness of the wearing course provides adequate protection against heavy vehicle loading and the environment. The above design life is attainable provided ongoing routine maintenance and adequate drainage is provided. and **Figure 9.4.3** illustrate the strains within the pavement layers of a conventional pavement design in Uniform Section 1, with the required wearing course thickness of 210 mm to limit strain to 2994 microstrain. **Figure 9.4.2** shows vertical strains in a profile plot. Figure 9.4.3 shows vertical strains in a contour plot.

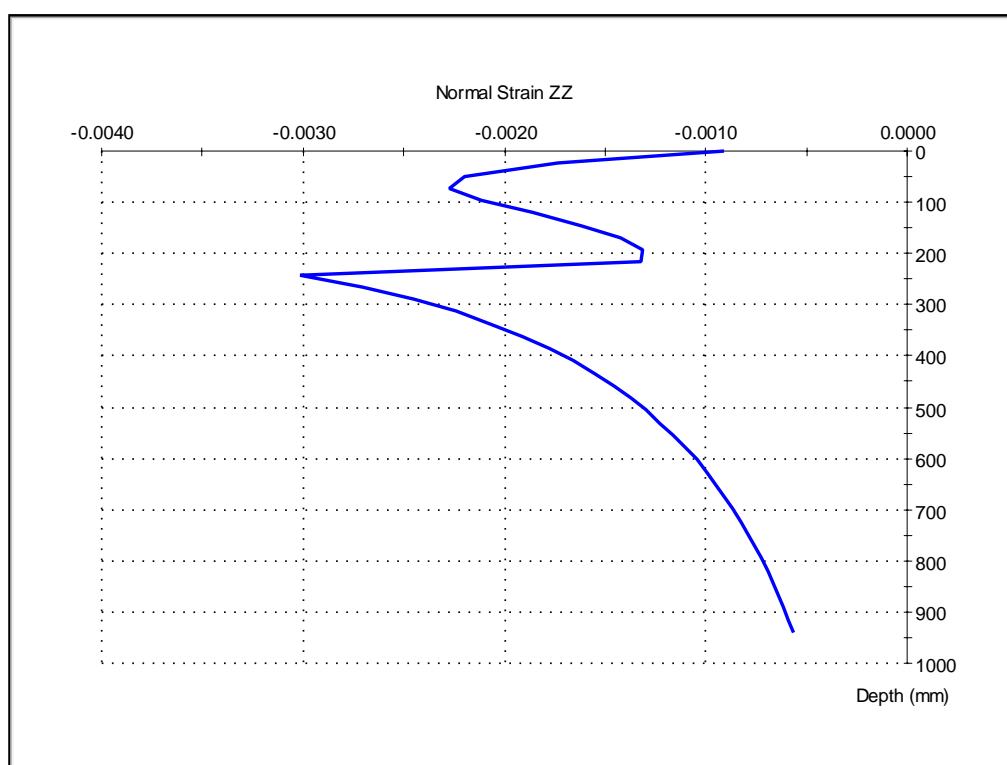


Figure 9.4.2 Graph of normal strains in pavement layers (conventional pavement design)

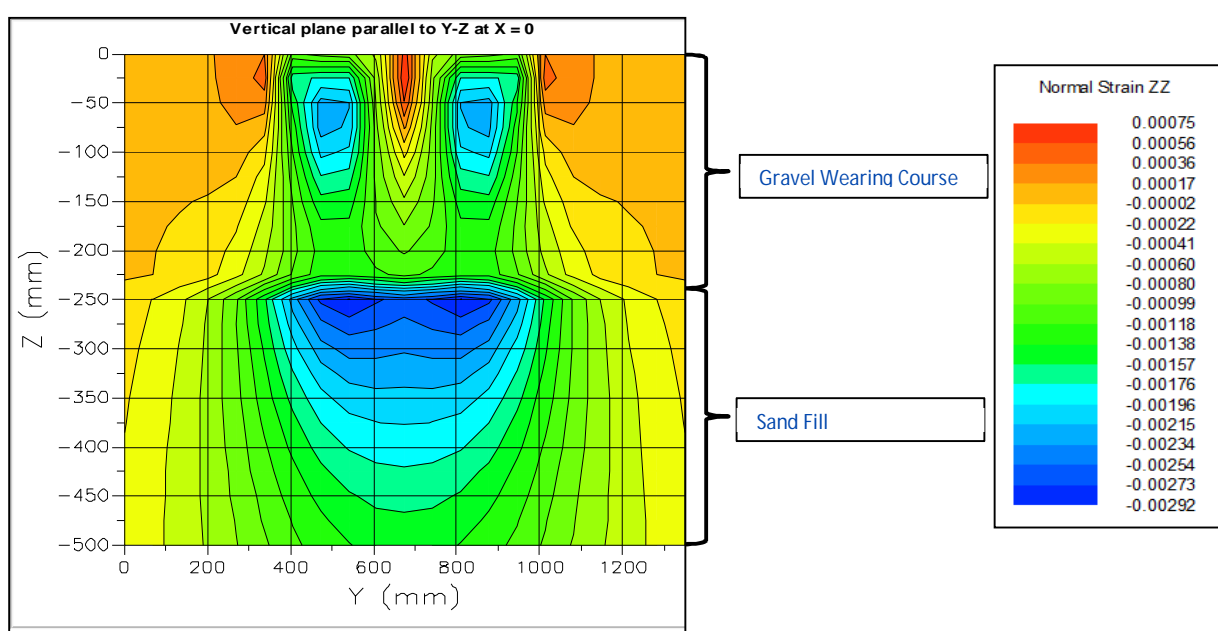


Figure 9.4.3 Contour plot of strain in pavement layers (conventional pavement design)

Using the soaked in-situ CBR values calculated in Paragraph 9.2, the E modulus was calculated to determine the strain in each layer. Three pavement design options were considered:

- The pavement design suggested in the South Sudan Low Volume Roads Design Manual. This is a conventional pavement design with a 200mm gravel wearing course above the fill material
- The other two designs incorporate Geocells to stabilise the available material mechanically.

The three pavement design options are summarised in **Table 9.4.3** below.

Table 9.4.3 Pavement design options

	WEARING COURSE	SUBBASE	FILL MATERIAL
Conventional design	200 mm gravel wearing course	N/A	Selected fill material (CBR>7%)
Pavement design - option 1	80 mm gravel wearing course	130 mm sand fill (CBR>7%) mechanically stabilised with 100mm Neoloy Geocell	Selected fill material (CBR>7%)
Pavement design - option 2	170 mm sand wearing course (CBR>7%) mechanically stabilised with 120 mm Neoloy Geocell	N/A	Selected fill material (CBR>7%)

Conventional pavement design was not feasible due to the considerable distance between the borrow area for the gravel wearing course borrow area and the project road. This distance, coupled with large haulage fees, makes this design option unfeasible.

In order to reduce the amount of gravel required for the wearing course, only the two Geocell pavement design options were analysed further. **Figure 9.4.4** and **Figure 9.4.5** below illustrate how Geocells confine the in-situ material and improve compressive strength.

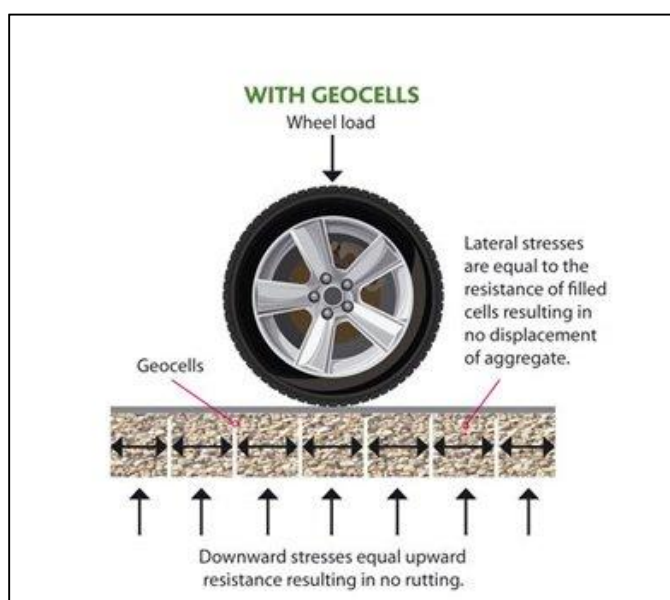


Figure 9.4.4 Geocell load transfer

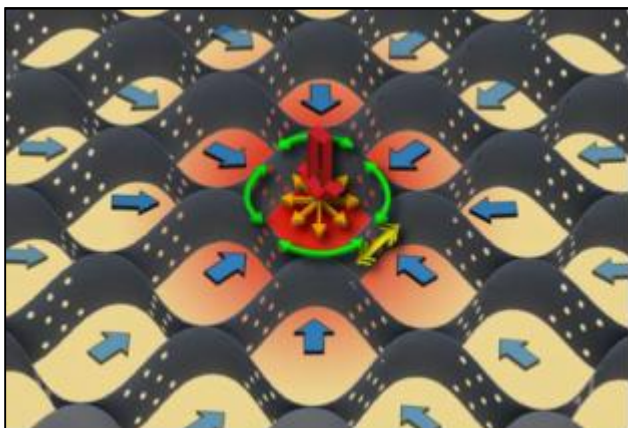


Figure 9.4.5 Geocell stress confinement

Not only does Geocell improve layer strength, it confines the material. This assists in protection against erosion protection.

It is easy and fast to install, as no special equipment is required. It makes construction in wet conditions easier as it creates a stable base.

Geocells will improve the subgrade elastic modulus between 1.5 and 5 times. Conservatively, it was assumed the subgrade elastic modulus would improve by a factor of 2. A soaked CBR value of 25% was considered, as this is the average in-situ CBR of the subgrade (see [Table 9.2.4](#)).

[Figure 9.4.6](#) and [Figure 9.4.7](#) illustrate the strains within the pavement layers of pavement design Option 1. [Figure 9.4.6](#) shows the vertical strains in a profile plot while [Figure 9.4.7](#) shows the vertical strains in a contour plot.

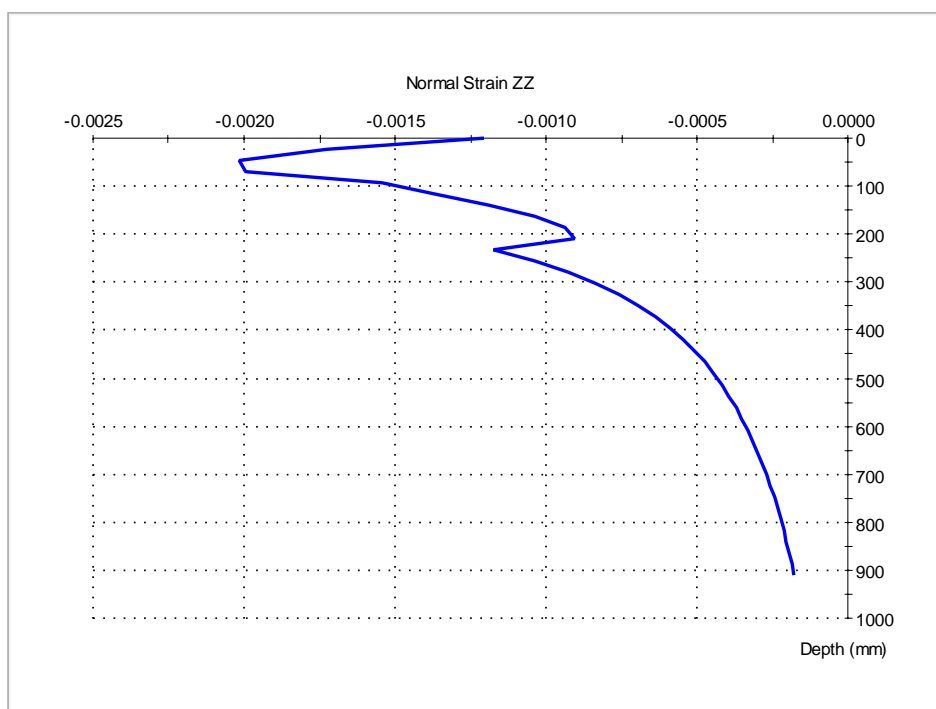


Figure 9.4.6 Graph of normal strains in pavement layers (pavement design option 1)

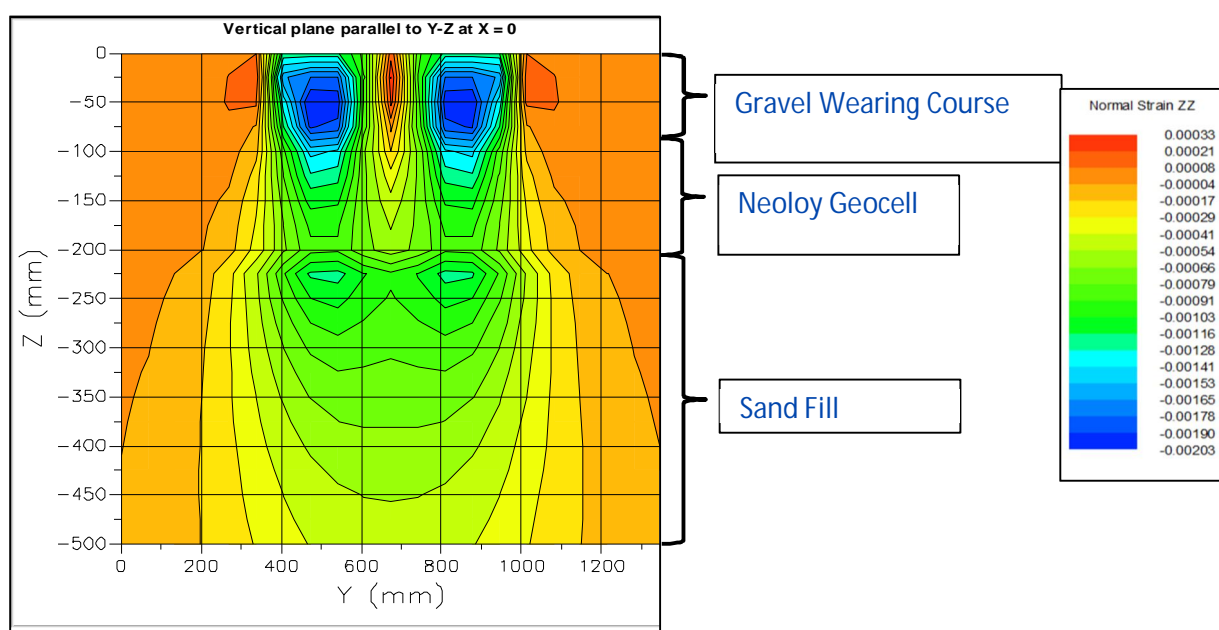


Figure 9.4.7 Contour plot of strain in pavement layers (pavement design option 1)

The design of strong upper pavement layers (wearing course and subbase), as well as a 700 mm selected fill layer with a soaked CBR of 25%, help to keep vertical strains at bay. The peak vertical strains for this design are 2030 micro-strain, well below the limiting 2994 micro-strain.

Figure 9.4.8 and **Figure 9.4.9** display the strains within the pavement layers of pavement design option 2. **Figure 9.4.8** shows the vertical strains in a profile plot while **Figure 9.4.9** shows the vertical strains in a contour plot.

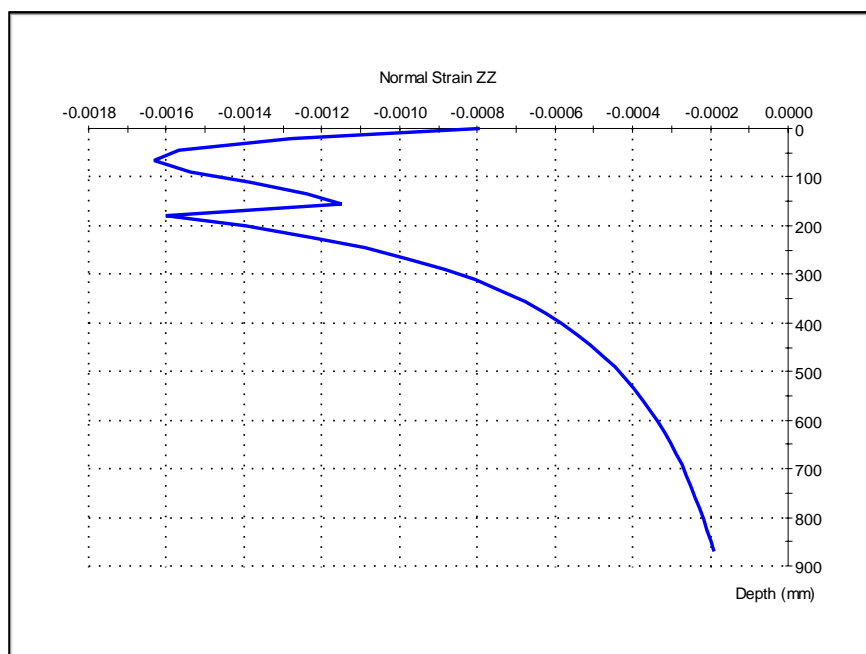


Figure 9.4.8 Graph of normal strains in pavement layers (pavement design option 2)

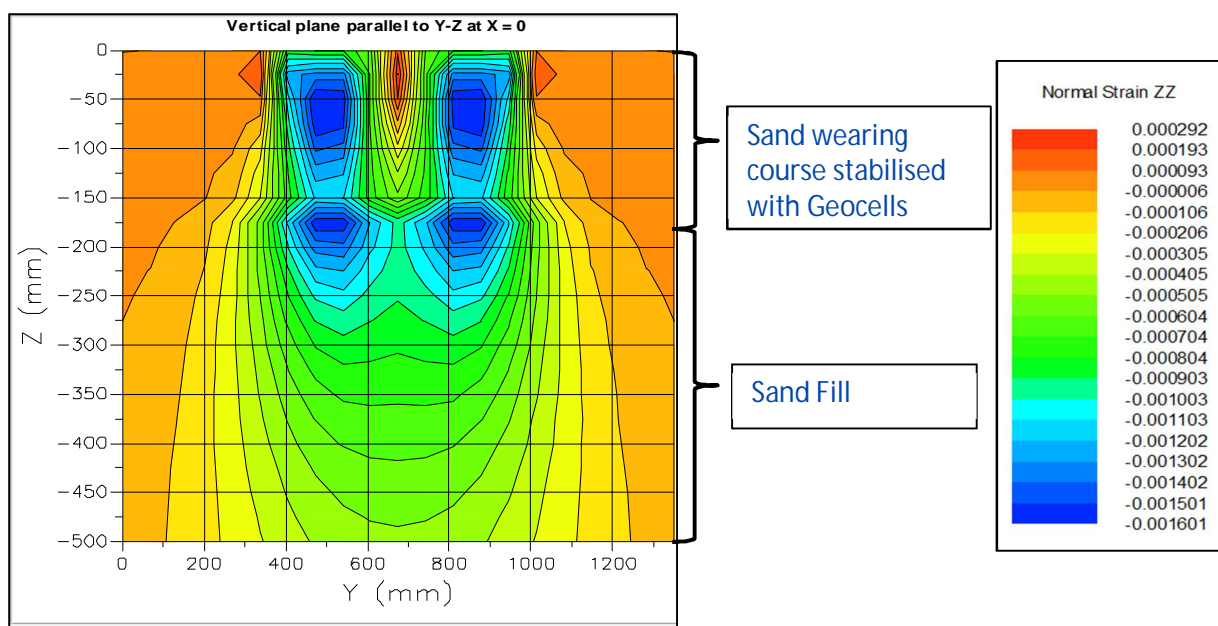


Figure 9.4.9 Contour plot of strain in pavement layers (pavement design option 2)

The design of strong upper pavement layers (wearing course and subbase), as well as a 700mm selected fill layer with a soaked CBR of 25%, help to keep the vertical strains at bay. The peak vertical strains for this design are 1601 micro-strain, well below the limiting 2994 micro-strain.

Due to high traffic loading, poor subgrade conditions, shortage of wearing course material and high rainfall (1092 mm per year), it was decided a combination of pavement design option 1 (Figure 9.4.10) option 2 (Figure 9.4.11) should be used for the project road. The designs will be used along the length of the road as specified in Table 9.4.4.

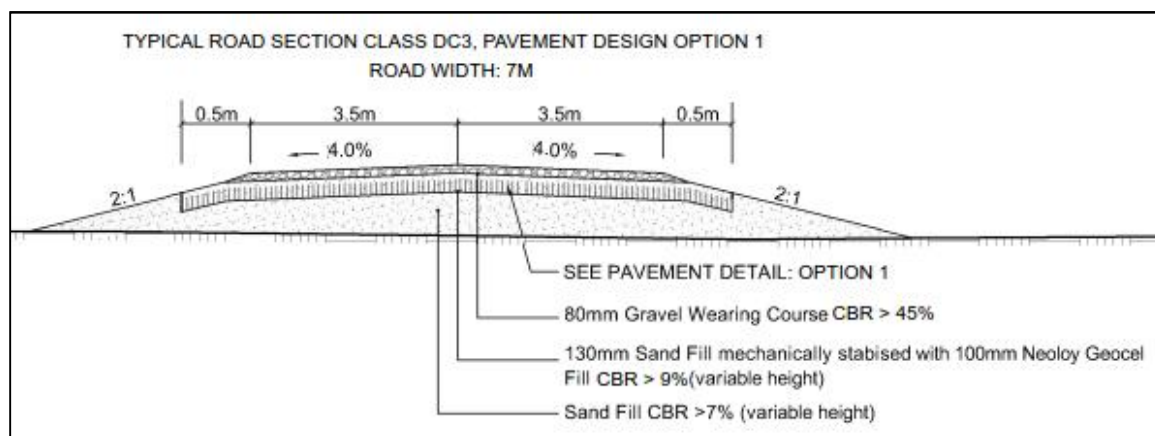


Figure 9.4.10 Typical cross-section pavement design option 1

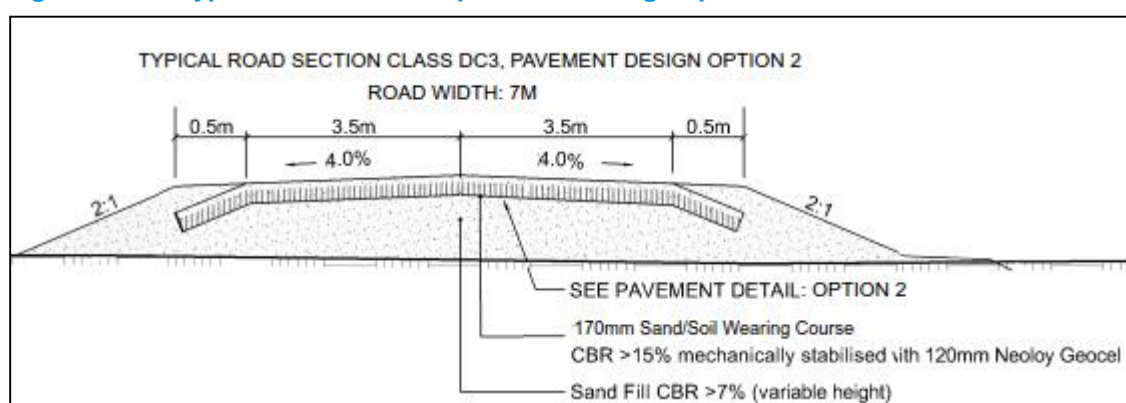


Figure 9.4.11 Typical cross-section pavement design option 2

Table 9.4.4 - Uniform section pavement design

UNIFORM SECTION	FROM (KM)	TO (KM)	LENGTH (M)	PAVEMENT STRUCTURE
1	0	2.8	2800	Pavement design option 1
2	2.8	4.6	1800	Pavement design option 1
3	4.6	10.2	5600	Pavement design option 1
4	10.2	12.4	2200	Pavement design option 1
5	12.4	15.8	3400	Pavement design option 1
6	15.8	23	7200	Pavement design option 2
7	23	24	1000	Pavement design option 2
8	24	26.992	2992	Pavement design option 2

10 ROAD DRAINAGE

The following chapter discusses the hydrological and drainage design for to the proposed feeder road between Achol Pagong and Ayien Market (26.992 km). The UNOPS feasibility report identified the expected climatic, topographic, and soil conditions that would be relevant to the hydrologic estimations and drainage designs.

10.1

DESIGN STANDARDS

See **Table 10.1.1** for the design storm return period, as provided in the Design Manual (Volume 2). The road is categorised as unpaved DC4 and all cross drainage culverts will be less than 2 m Ø. The design return period applied to the road is for 1 in 10 years.

Table 10.1.1: Design storm return period

Structure type	Geometric design standard	
	DC3-4	DC1-2
Gutters and inlets	2	2
Side ditches	5	5
Ford	5	5
Drift	5	5
Culvert diameter <2m	10	10
Large culvert diameter >2m	15	10
Gabion abutment bridge	20	15
Short span bridge (<10m)	25	15
Masonry arch bridge	25	25
Medium span bridge (15 – 50m)	50	25
Long span bridge >50m	100	50

10.2

HYDROLOGY

The climate is considered to be tropical and classified as Aw by the Koppen climate classification (tropical wet and dry or savannah climate), having a pronounced dry season. The annual average precipitation considered for this area is 898mm, with the driest months being December, January, and February with no precipitation and the wet season, between May and October, peaks in August with an average of 206 mm.

The above data was obtained from the Climate-Data.Org weather website for Alek Village which is situated 19km south west of Achol Pagong. Raw station data is not currently available and as such graphical representations of the past rainfall and temperature conditions have been extracted from the Climate-Data.Org weather website. See **Figure 10.2.1** and **Figure 10.2.2**.

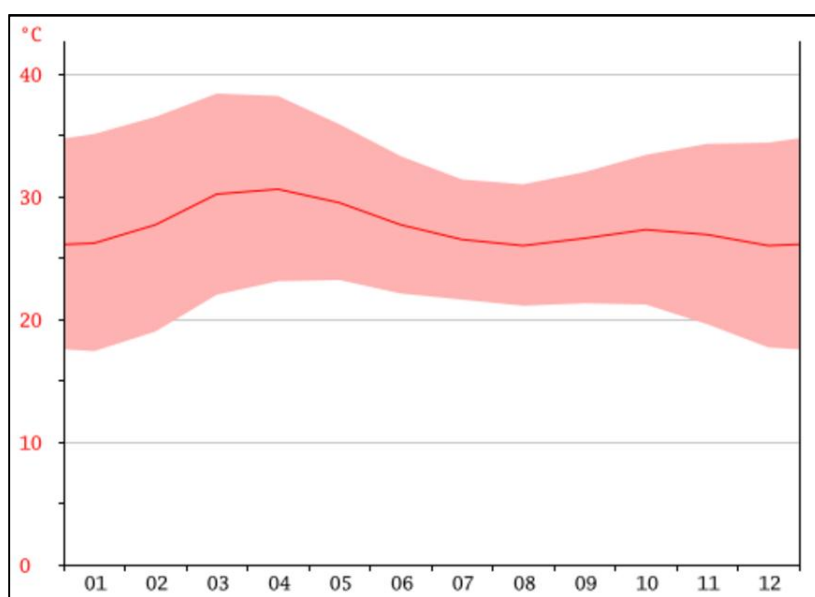


Figure 10.2.1: Alek annual temperature graph

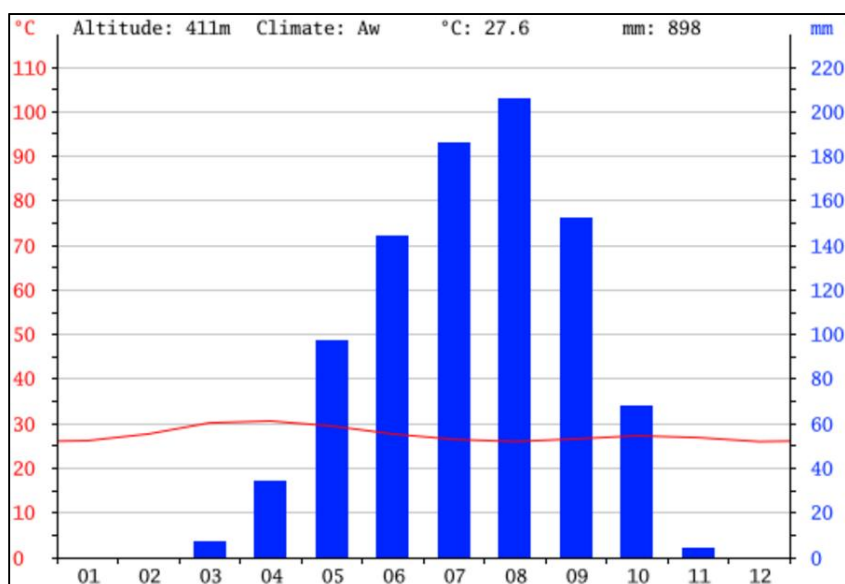


Figure 10.2.2: Alek annual rainfall graph

The road is not directly adjacent to a water source and is not subject to any low level or major culvert crossings. The surrounding terrain is extremely flat, with an averages slope and cross falls below 2%. At km 20 a pan has been observed that could potentially form a watercourse during the peak of the wet season.

The majority of the roads alignment follows the surrounding watershed which implies that the water runoff is expected to flow away from the road towards the adjacent rivers, Jur and Pogo, on either side of the route. However, due to the flat terrain, runoff will drain slowly leaving vast areas submerged for prolonged periods.

10.3

CULVERT DRAINAGE FEATURES

In accordance with current roads projects in South Sudan, corrugated steel pipes (CSP) are recommended for all the cross drainage structures. CSP have a long history of usage as culverts and much research has gone into their development. The Canadian Handbook of

Steel Drainage and Highway Construction is a reliable reference manual. The manual has been used to give consideration to the CSP structural strength, durability and constructability.

Standard specifications have been given for the manufacture and construction of the culverts. It should be noted that soilcrete is not recommended for backfilling CSP because they reduce the flexibility of the pipe.

Side drains have not been specified in any locations since they will only be used where deemed necessary by the project engineer. A typical detail has been provided should side drains require construction.

10.3.1

Relief drainage

Due to the extremely flat topography, relief drainage comprising of 600 mm Ø single CSP is required at a recommended spacing of 250 m (Design Manual (Volume 2)). Depending on the route alignment and surrounding topography this spacing is used as a guide and may be varied as required. When traversing a watershed, the culverts will be removed.

All culverts will all have stone masonry (or similar) inlet or outlet structures.

11

MAINTENANCE

11.1

INTRODUCTION

The following chapter describes the maintenance actions envisaged over the design life of the road between Achol Pagong and Ayien Market after the construction of the road is completed.

11.2

MAINTENANCE ACTION

The South Sudan Low Volume Roads Design Manual (Maintenance Booklet Volume 3), specifies regular maintenance of ENS (Engineering Natural Surfaces), gravel surface and drainage as weather and traffic cause road surface deterioration as soon as construction is completed.

11.3

GRAVEL LOSS

Surface material that will be lost due to rainfall and traffic can be determined in terms of an annual amount, using the following formula taken from the South Sudan Low Volume Roads Design Manual (Road Design Volume 1.):

$$G_L = f \times (4.2 + 0.092T + 3.50R^2 + 1.88V) \times \frac{T^2}{(T^2 + 50)}$$

Where

GL = the annual gravel loss measured in mm

T = the total traffic volume in the first year in both directions, measured in thousands of vehicles

R = the average annual rainfall measured in m

V = the total (rise + fall) as a percentage of the length of the road

f = 0.94 to 1.29 for lateritic gravels

= 1.1 to 1.51 for quarzitic gravels

= 0.7 to 0.96 for volcanic gravels (weathered lava or tuff)

= 1.5 for coral gravels

= 1.38 for sandstone gravels

Table 11.3.1 Gravel loss for pavement design option 1

FACTOR	SCENARIO 1	SCENARIO 2	SCENARIO 3
V	0.1010%	0.1010%	0.1010%
T	59.86	59.86	59.86
R	1.092	1.092	1.092
f	0.94	1.115	1.29
GL	12.87009586	15.26612	17.66215

The material to be used in the gravel wearing course for pavement design option 1 will be lateritic. **Table 11.3.1** considers three scenarios, where three different *f* values selected throughout the range suggested for lateritic material. According to the annual gravel loss, this project road will lose between 12.9 mm per year and 17.66 mm per year. Considering that regular maintenance is likely to be carried out each year and includes shoulder blading, it has been decided that re-gravelling of the surface should be carried out every 4.5 to 6 years

For pavement design option 2 a sandstone material will be used. Using the same inputs as above, but using an *f* value of 1.38 this gives a gravel loss of 18.9 mm per year, this will require re-gravelling every 4 to 5 years

More frequent re-gravelling may be required at isolated culverts to protect the corrugated iron pipes.

It is suggested that signage be erected in both English and Dinka stating that ripping of this road surface should be done with care as to not damage the Geocell layer.

11.4

ROUTINE MAINTENANCE

Routine maintenance of roadside structures includes cleaning of culverts, relief drains, vented fords, and shoulder rehabilitation. These elements require regular maintenance as specified in the South Sudan Low Volume Roads Design Manual (Maintenance Booklet Volume 3). Frequency of blading can be calculated.

To provide road users with a sufficient line of sight to respond to people or animals that may cross the road, the 30 m wide road corridor requires regular clearing of shrubs and the cutting of grass.

12 CONSTRUCTION DATA

12.1 DESCRIPTION OF WORKS

Note that quantities stated in this description are approximate and for demonstration of order size purposes only.

12.1.1 Project objectives

The objectives of the project are to;

- à Provide a rural feeder road that enables rural communities to transport their agricultural produce to local markets, and allows rural communities access to clinics and schools.
- à Implement a maintenance and capacity building program with the State Ministries of Physical Infrastructure and local contractors.
- à Provide temporary employment for local communities through labour intensive construction methods.

12.1.2 General Description of the Project Route

The Achol Pagong to Ayien Market route alignment is 26.992km in length. It begins at an intersection with the main road through the village of Achol Pagong which provides the link to Road B38. From the intersection the route continues in a northerly direction between the local communities until Ayien Market.

Road B38 passes Achol Pagong on the western side of the village in a north-south direction. It connects Achol Pagong with Gogrial village and Wau to the south and the villages of Turalei and Agok to the north.

Population density is consistent along the entire route with evidence agricultural activity. Agriculture is the major livelihood for communities along the route, with local households relying primarily on agriculture and livestock.

The annual average precipitation considered for this area is 898mm, with the driest months being December, January, and February with no precipitation and the wet season, between May and October, peaks in August with an average of 206 mm.

The State is characterised by high rainfall with tropical to woodland savannah vegetation.

The topography is relatively flat therefore in the rainy season the landscape is transformed into a floodplain.

The route crosses no streams.

The geology pertaining to the route consists of sand, loam and clay with no rock outcrops observed. There are no ferricrete deposits in the area which poses a challenge to the design and contractor teams. The general area soil type is 'sandy clayey loam'. This is consistent throughout the route alignment with little variation. Black clayey loam and sedimentary material occupy swampy areas.

No significant surface water bodies are evident within proximity of the proposed route.

12.1.3 Extent of Works

12.1.3.1 The extent of the works includes;

- à The establishment of the contractor's camps, equipment, personnel, material testing laboratory, accommodation and construction plant on the site. The provision of

generators, security for works and camps, and the drilling of boreholes or building of retaining structures to provide water for construction of the works.

- à The construction a site office, a site laboratory and provision of accommodation for the Employer's Representatives, including the provision of furniture, office equipment, power and water.
- à The location of borrow areas, the testing of materials and drawing-up of borrow pit plans that indicate the results of site investigations, and the proposed use of the borrow materials.
- à The removal of topsoil and stripping of overburden from borrow areas, and, where required, the temporary stockpile of materials.
- à Clearing and grubbing of the road reserve to a width not exceeding 15 m.
- à The blading of topsoil to windrow on both sides of the road reserve.
- à The compaction of the roadbed.
- à The installation of corrugated steel pipes and construction of earth banks from imported material where required. The skew ends are to be cut to the same angle as the side slopes for several pipes.
- à Construction of the fill layers and the gravel wearing course.
- à The placing of road signs and kilometre posts.
- à Topsoiling of the side slopes with material bladed back from the temporary stockpiles adjacent to the road.
- à Finishing off of the borrow areas.

12.1.4

Temporary Works

The temporary works include;

- à Construction of a secured site camp and
- à The establishment and reinstatement of borrow areas
- à The diversion of non-perennial streams during the installation of the corrugated steel pipes.

12.1.5

General Information

12.1.5.1 Accommodation of Traffic

Further to the provisions for accommodation of traffic specified in Division 1500 in the South Sudan Ministry of Roads and Transport, Technical Specifications for Road and Bridgeworks, 2006 (Standard Technical Specifications) provision has been made in the Bill of Quantities to provide training on road safety to local communities.

12.1.5.2 Services

No services were encountered during the initial survey of the road however it is possible that existing Public Utilities may be encountered in Achol Pagong and at Ayien Market. In terms of paragraph 1207 in the Standard Technical Specifications, the Contractor is to locate existing Public Utilities.

12.1.5.3 Borrow material

It is desirable that the majority of materials required for the project are sourced from South Sudan. Gravel materials shall be sourced from borrow areas adjacent to the road. Potential borrow areas have been indicated on the drawings however the quality and volume of material is to be ascertained by the Contractor. Prior to commencing with the Works, the Contractor shall test samples from the borrow areas. Based on the material test results, the Contractor shall submit borrow pit plans indicating the proposed use of the borrow materials.

12.1.5.4 Drawings

All drawings necessary to complete the works are bound in Volume 2: Book of Drawings. The drawings indicating the extent of the works along the road are for tendering purpose only. The final extent of the work will be as instructed by the Engineer.

12.1.5.5 Contractor's Camp Site

In terms of paragraph 1302 in the Standard Technical Specifications, the Contractor shall make his own arrangements regarding the establishment of a camp site and housing for his construction personnel. The choice of all sites for the establishment of camps is subject to the approval of the Engineer.

12.1.5.6 Programme of the Work

The Contractor shall take note of various factors contained in these specifications which will have a significant influence on the compilation of the programme of work, particularly the influence of the rainy season and the obtaining of imported materials.

It shall be noted that the specified contract period is eighteen months (18) months.

12.1.5.7 Environmental Requirements

Add the following to paragraph 1602 (a) in the Standard Technical Specifications;

"The Contractor shall limit the environmental impact of the project on the surrounding land by;

- à Restricting the construction footprint to a width of 15 m along the length of the road.
- à Planning the use of materials in borrow areas prior to opening up the borrow area, and on completion of the project, finishing off the borrow area so that it is safe.

12.1.5.8 Training and use of local labour

It is a requirement of the State that the Contractor implement a maintenance and capacity building program with the State Ministries of Physical Infrastructure and local contractors, as well as community engagement and labour intensive support activities.

12.2

ENGINEERING

12.2.1

Design

- à The Employer is responsible for the design of the permanent Works as reflected in these Contract Documents unless otherwise stated.
- à The Contractor is responsible for the design of the temporary Works and their compatibility with the permanent Works.
- à The Contractor shall supply all details necessary to assist the engineer in the compilation of the as-built drawings.

12.2.2

Employer's Design

12.2.2.1 Detail description of Works

SEQUENCE OF CONSTRUCTION		Pay item
1	Provision of the Contractors and Engineers laboratories with the required equipment, water and electricity Identification of suitable borrow pits, sampling borrow pits, testing materials and the compilation of borrow pit plans.	B17.07(a)

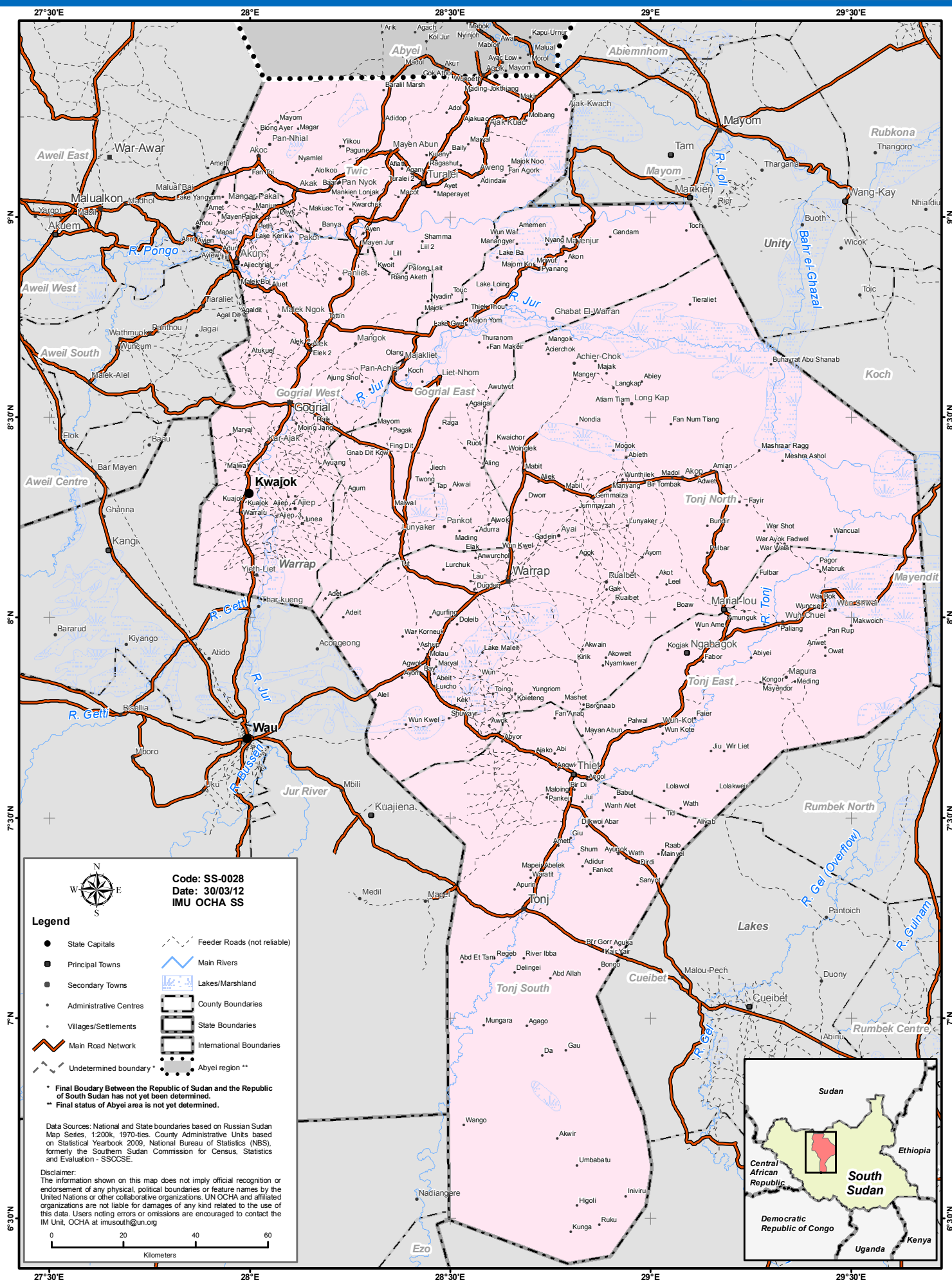
SEQUENCE OF CONSTRUCTION		Pay item
2	Clearing and grubbing, topsoil stripping and compaction of roadbed.	21.01
	Removal and grubbing of large trees and stumps	21.02
3	Installation of steel culvert pipes, generally on natural ground level. The Bill of Quantities is based on an assumption that the contractor will construct the fill layer and then install the isolated culverts by trenching.	
	Excavation through the fill layer to a depth of 250 mm below the natural ground level, in accordance with paragraph 3205 of the General technical Specifications	32.01
	Installation of Geo-cell Neoweb PRS 330-200-76 PS B or similar. Back-tip sand / laterite material onto Geo-cell (do not drive directly on to Geo-cell).	32.05(ii)
	In unsuitable founding conditions (inundated soils), place a Bidem A5 separation layer or similar approved Synthetic-fibre Filler Fabric (Nonwoven, Continuous Filament, Needle Punched) by Engineer	32.05(iii)
	The bedding, laying of the 900 mm and 1200 mm diameter corrugated steel pipes and backfill shall be done in accordance with paragraph 3209 of the General technical Specifications.	32.10; 32.11; 32.02
3	Construction of fill from borrow. The tendered rate includes finishing of slopes.	43.01
4	Construction of gravel wearing course. The tendered rate includes finishing of slopes.	54.01
5	Installation of ancillary works: kilometre markers and road signs	9200 and 9300

Appendix A

GOGRIAL WEST COUNTY

- LOCALITY**
- STRUCTURE**

Warrap State Map



Warrap State Structure

WARRAP

State Level

Gogrial West

Twic

County Level

Myom

Torale

Payam Level

Achol Pagong

Makwec Pagong

Majok

Ayen

Boma Level

Villages

Villages

Villages

Villages

Village Level

Appendix B

POINTS

- ACHOL_AVOIDANCE POINTS**
- ACHOL-DWELLINGS**
- ACHOL-PREFERED POINTS**
- ACHOL-WAY POINTS**

ACHOL PAGONG AYIEN MARKET - Warrap State

DESCRIPTION	LONGITUDE
Achol Pagong MARKET	28.30944444° E
Achol Pagong BOREHOLE	28.31027778° E
Achol Pagong GRAVE YARD	28.31027778° E
Adhet BOREHOLE	28.34055556° E
Adhet BOMA OFFICE	28.34166667° E
Adhet BOREHOLE	28.38638889° E
Makuac Pagong SCHOOL	28.39527778° E
Makuac Pagong BOREHOLE	28.39555556° E
Makuac Pagong BOMA OFFICE	28.39638889° E
Makuac Pagong MARKET	28.39638889° E
Makuac Pagong CULTURAL CENTER	28.39666667° E
Makuac Pagong BOREHOLE	28.40222222° E
Majok Akotkuac GRAVEYARD	28.39777778° E
Majok Akotkuac MARKET	28.39833333° E
Majok Akotkuac BOMA OFFICE	28.39861111° E
Majok Akotkuac BOREHOLE	28.39888889° E
Majok Akotkuac CULTURAL SHRINE	28.39888889° E
Magak CULTURAL SHRINE	28.40611111° E
Magak BOMA OFFICE	28.40611111° E
Ayen Amuol BOMA OFFICE	28.40000000° E
Ayen Amuol HEALTH UNIT	28.40000000° E
Ayen Amuol SCHOOL	28.39833333° E
Ayen Amuol BOREHOLE	28.39750000° E
Ayen Amuol MARKET	28.39777778° E

DWELLING COORDINATES FOR ACHOL PAGONG AYIEN MARKET - WARRAP STATE

POINT No.	LATITUDE	LONGITUDE
Point 1	8.72626050° N	28.31101010° E
Point 2	8.72555880° N	28.31313500° E
Point 3	8.72737290° N	28.31051210° E
Point 4	8.72709430° N	28.30942450° E
Point 5	8.72792800° N	28.31028720° E
Point 6	8.72850310° N	28.31284730° E
Point 7	8.72702130° N	28.31428550° E
Point 8	8.72802050° N	28.31424850° E
Point 9	8.72246270° N	28.31051030° E
Point 10	8.72281070° N	28.31413370° E
Point 11	8.72423690° N	28.31421870° E
Point 12	8.72510290° N	28.31437800° E
Point 13	8.72474830° N	28.31598360° E
Point 14	8.72515420° N	28.31556450° E
Point 15	8.72528580° N	28.31686310° E
Point 16	8.72698420° N	28.30851660° E
Point 17	8.72743860° N	28.30877920° E
Point 18	8.72799330° N	28.30878660° E
Point 19	8.72720630° N	28.30754730° E
Point 20	8.72631040° N	28.30803820° E
Point 21	8.72721890° N	28.30983380° E
Point 22	8.72606120° N	28.31024300° E
Point 23	8.72931830° N	28.31531830° E
Point 24	8.73010080° N	28.31433420° E
Point 25	8.72959090° N	28.31384590° E
Point 26	8.73028570° N	28.31302460° E
Point 27	8.73057930° N	28.31631220° E
Point 28	8.73108270° N	28.31482870° E
Point 29	8.73225910° N	28.31466200° E
Point 30	8.73227190° N	28.31539080° E
Point 31	8.73320030° N	28.31560910° E
Point 32	8.73321220° N	28.31284400° E
Point 33	8.73178280° N	28.31270140° E
Point 34	8.73402070° N	28.31211690° E
Point 35	8.73291690° N	28.31118460° E
Point 36	8.73394680° N	28.31075010° E
Point 37	8.73229230° N	28.30863570° E
Point 38	8.73174380° N	28.30837990° E
Point 39	8.73149520° N	28.31065290° E
Point 40	8.73001420° N	28.31042430° E
Point 41	8.73087850° N	28.31090890° E
Point 42	8.73105030° N	28.31168220° E
Point 43	8.73083820° N	28.31251460° E
Point 44	8.72924320° N	28.30766390° E
Point 45	8.72974050° N	28.30607910° E
Point 46	8.72695330° N	28.31352440° E
Point 47	8.73367130° N	28.30707750° E
Point 48	8.73369780° N	28.30923400° E

POINT No.	LATITUDE	LONGITUDE
Point 49	8.73441620° N	28.31165870° E
Point 50	8.73541570° N	28.31275540° E
Point 51	8.73580280° N	28.31499850° E
Point 52	8.73614210° N	28.31589090° E
Point 53	8.73701430° N	28.31570310° E
Point 54	8.73764790° N	28.31048700° E
Point 55	8.73866060° N	28.31214460° E
Point 56	8.73460450° N	28.30666220° E
Point 57	8.73883560° N	28.31547980° E
Point 58	8.73854400° N	28.31657410° E
Point 59	8.73993310° N	28.31531350° E
Point 60	8.74036260° N	28.31348960° E
Point 61	8.74011870° N	28.31203040° E
Point 62	8.74037850° N	28.31252400° E
Point 63	8.74142300° N	28.31458390° E
Point 64	8.74142300° N	28.31156370° E
Point 65	8.73928630° N	28.31139210° E
Point 66	8.74054290° N	28.31733580° E
Point 67	8.74058530° N	28.31862870° E
Point 68	8.74086630° N	28.31984640° E
Point 69	8.74206990° N	28.31362370° E
Point 70	8.74241980° N	28.31710520° E
Point 71	8.74282280° N	28.31394550° E
Point 72	8.74210700° N	28.31072690° E
Point 73	8.74184720° N	28.30976670° E
Point 74	8.74451940° N	28.31190170° E
Point 75	8.74467320° N	28.30905850° E
Point 76	8.74273260° N	28.30874740° E
Point 77	8.74144950° N	28.30813050° E
Point 78	8.74640170° N	28.31270100° E
Point 79	8.74515040° N	28.31291020° E
Point 80	8.74567000° N	28.31386770° E
Point 81	8.74364200° N	28.31634070° E
Point 82	8.74703790° N	28.31292630° E
Point 83	8.74388320° N	28.31815120° E
Point 84	8.74439220° N	28.31723930° E
Point 85	8.74730300° N	28.31833360° E
Point 86	8.74517160° N	28.32464750° E
Point 87	8.74792340° N	28.32436320° E
Point 88	8.74557990° N	28.31977130° E
Point 89	8.74680990° N	28.33105800° E
Point 90	8.74889360° N	28.33046260° E
Point 91	8.75037820° N	28.33019440° E
Point 92	8.74980820° N	28.32539860° E
Point 93	8.74754430° N	28.32879420° E
Point 94	8.74852780° N	28.32462610° E
Point 95	8.74868420° N	28.33159980° E
Point 96	8.75148630° N	28.33347200° E

DWELLING COORDINATES FOR ACHOL PAGONG AYIEN MARKET - WARRAP STATE

POINT No.	LATITUDE	LONGITUDE
Point 97	8.74948740° N	28.33550510° E
Point 98	8.75145980° N	28.33659950° E
Point 99	8.75198470° N	28.33799960° E
Point 100	8.75031990° N	28.34010780° E
Point 101	8.75062740° N	28.33815520° E
Point 102	8.75156580° N	28.33902960° E
Point 103	8.75352750° N	28.33933530° E
Point 104	8.75464090° N	28.33569820° E
Point 105	8.75544150° N	28.33549980° E
Point 106	8.75440770° N	28.33706620° E
Point 107	8.75547330° N	28.33872380° E
Point 108	8.75334200° N	28.33857360° E
Point 109	8.75254670° N	28.33985570° E
Point 110	8.75278000° N	28.34106270° E
Point 111	8.75422210° N	28.34287050° E
Point 112	8.75357530° N	28.34268810° E
Point 113	8.75475230° N	28.34328350° E
Point 114	8.75601940° N	28.34349270° E
Point 115	8.75669810° N	28.34221070° E
Point 116	8.75691550° N	28.34109490° E
Point 117	8.75375020° N	28.34366440° E
Point 118	8.75535670° N	28.34140060° E
Point 119	8.75855900° N	28.34468900° E
Point 120	8.75888780° N	28.34094460° E
Point 121	8.75840530° N	28.34241990° E
Point 122	8.75855370° N	28.34395410° E
Point 123	8.75722830° N	28.34461930° E
Point 124	8.75938610° N	28.34472660° E
Point 125	8.75993750° N	28.33892230° E
Point 126	8.75997990° N	28.34075150° E
Point 127	8.76017080° N	28.34347670° E
Point 128	8.75841590° N	28.34579410° E
Point 129	8.76052600° N	28.34636270° E
Point 130	8.76090250° N	28.34658800° E
Point 131	8.75955050° N	28.34761260° E
Point 132	8.76203170° N	28.34994080° E
Point 133	8.76278990° N	28.34901270° E
Point 134	8.76205830° N	28.35150720° E
Point 135	8.75893550° N	28.35219380° E
Point 136	8.76102970° N	28.35561630° E
Point 137	8.76255130° N	28.35541250° E
Point 138	8.76240820° N	28.35504770° E
Point 139	8.76152280° N	28.35005880° E
Point 140	8.76290650° N	28.35725250° E
Point 141	8.76319810° N	28.35769240° E
Point 142	8.76115690° N	28.35569680° E
Point 143	8.76218020° N	28.35912470° E
Point 144	8.75148630° N	28.35937140° E

POINT No.	LATITUDE	LONGITUDE
Point 145	8.76154930° N	28.35983810° E
Point 146	8.76125240° N	28.36171570° E
Point 147	8.76031400° N	28.36130260° E
Point 148	8.75980500° N	28.36006880° E
Point 149	8.75892490° N	28.36536350° E
Point 150	8.76144850° N	28.36666170° E
Point 151	8.76055780° N	28.36900590° E
Point 152	8.75909450° N	28.36918290° E
Point 153	8.76018140° N	28.36997150° E
Point 154	8.75865980° N	28.37220850° E
Point 155	8.75802890° N	28.37264840° E
Point 156	8.75827270° N	28.36969790° E
Point 157	8.76056840° N	28.36752000° E
Point 158	8.76345790° N	28.36882350° E
Point 159	8.76182500° N	28.37363540° E
Point 160	8.75930660° N	28.37511600° E
Point 161	8.75972550° N	28.37589380° E
Point 162	8.76048890° N	28.37633370° E
Point 163	8.75880820° N	28.37314720° E
Point 164	8.76199990° N	28.37210660° E
Point 165	8.76353220° N	28.37393580° E
Point 166	8.76317690° N	28.37330820° E
Point 167	8.76299140° N	28.37653220° E
Point 168	8.76293840° N	28.37712230° E
Point 169	8.76252480° N	28.37878530° E
Point 170	8.76479930° N	28.37929490° E
Point 171	8.76545140° N	28.37674680° E
Point 172	8.76578010° N	28.38080760° E
Point 173	8.76727520° N	28.37552910° E
Point 174	8.76640040° N	28.37515350° E
Point 175	8.76699950° N	28.37897300° E
Point 176	8.76772050° N	28.37423620° E
Point 177	8.76660720° N	28.37363000° E
Point 178	8.77123560° N	28.38382240° E
Point 179	8.76808110° N	28.38346300° E
Point 180	8.76819770° N	28.38510450° E
Point 181	8.76943830° N	28.38682120° E
Point 182	8.77028130° N	28.38609700° E
Point 183	8.77135750° N	28.38543710° E
Point 184	8.77251330° N	28.38501870° E
Point 185	8.77020710° N	28.38267450° E
Point 186	8.77010100° N	28.38360790° E
Point 187	8.77213160° N	28.38792620° E
Point 188	8.77300630° N	28.38627400° E
Point 189	8.76726990° N	28.38989500° E
Point 190	8.76590210° N	28.39001830° E
Point 191	8.76532950° N	28.39049580° E
Point 192	8.76266270° N	28.39287760° E

DWELLING COORDINATES FOR ACHOL PAGONG AYIEN MARKET - WARRAP STATE

POINT No.	LATITUDE	LONGITUDE
Point 193	8.76412600° N	28.39299020° E
Point 194	8.76115690° N	28.39316730° E
Point 195	8.75989510° N	28.39280780° E
Point 196	8.75772130° N	28.39362320° E
Point 197	8.76608230° N	28.39526470° E
Point 198	8.76500080° N	28.39553300° E
Point 199	8.76816590° N	28.39545250° E
Point 200	8.76816060° N	28.39366610° E
Point 201	8.76690410° N	28.39414360° E
Point 202	8.76774180° N	28.39461570° E
Point 203	8.76898240° N	28.39203540° E
Point 204	8.76936410° N	28.39469610° E
Point 205	8.77076900° N	28.39537200° E
Point 206	8.77154840° N	28.39367150° E
Point 207	8.77155370° N	28.39608010° E
Point 208	8.77207850° N	28.39543640° E
Point 209	8.77084330° N	28.38953550° E
Point 210	8.77205200° N	28.38964280° E
Point 211	8.77276780° N	28.39039390° E
Point 212	8.77377510° N	28.38807110° E
Point 213	8.77314950° N	28.38708400° E
Point 214	8.77091750° N	28.38756680° E
Point 215	8.77545570° N	28.38719130° E
Point 216	8.77533380° N	28.39090880° E
Point 217	8.77393410° N	28.39543640° E
Point 218	8.77516940° N	28.39395050° E
Point 219	8.77494670° N	28.39322090° E
Point 220	8.77532320° N	28.39444400° E
Point 221	8.77568900° N	28.39523260° E
Point 222	8.77577380° N	28.39593530° E
Point 223	8.77718400° N	28.39614450° E
Point 224	8.77669630° N	28.39385930° E
Point 225	8.77809590° N	28.39589240° E
Point 226	8.77783610° N	28.39786650° E
Point 227	8.77911380° N	28.39267370° E
Point 228	8.77907670° N	28.39813470° E
Point 229	8.77917210° N	28.39598360° E
Point 230	8.78011580° N	28.39348910° E
Point 231	8.77946370° N	28.38991110° E
Point 232	8.78230530° N	28.41516140° E
Point 233	8.78161080° N	28.41355740° E
Point 234	8.78115490° N	28.41271520° E
Point 235	8.77944250° N	28.41292440° E
Point 236	8.77973410° N	28.41048900° E
Point 237	8.78102240° N	28.41028510° E
Point 238	8.77979240° N	28.40723280° E
Point 239	8.78384280° N	28.39184220° E
Point 240	8.78394880° N	28.39354280° E

POINT No.	LATITUDE	LONGITUDE
Point 241	8.78422450° N	28.39289900° E
Point 242	8.78618070° N	28.39365540° E
Point 243	8.79149810° N	28.39237870° E
Point 244	8.79001900° N	28.39268980° E
Point 245	8.79308850° N	28.39105900° E
Point 246	8.79245230° N	28.39242700° E
Point 247	8.79356030° N	28.39404170° E
Point 248	8.79575500° N	28.39672920° E
Point 249	8.79549000° N	28.39405240° E
Point 250	8.79702210° N	28.39755540° E
Point 251	8.79786500° N	28.39934710° E
Point 252	8.79924860° N	28.40061840° E
Point 253	8.80010740° N	28.39924510° E
Point 254	8.80042550° N	28.39613910° E
Point 255	8.79934930° N	28.39652540° E
Point 256	8.79954550° N	28.39751240° E
Point 257	8.79941820° N	28.40201850° E
Point 258	8.80072240° N	28.40048430° E
Point 259	8.79652640° N	28.41171210° E
Point 260	8.79679940° N	28.41223780° E
Point 261	8.79756810° N	28.40893330° E
Point 262	8.79841100° N	28.41008130° E
Point 263	8.79829440° N	28.40896010° E
Point 264	8.79776420° N	28.40794620° E
Point 265	8.79713870° N	28.40800520° E
Point 266	8.79674640° N	28.40834860° E
Point 267	8.79668280° N	28.40889570° E
Point 268	8.79634350° N	28.40716300° E
Point 269	8.79677290° N	28.40279640° E
Point 270	8.80152290° N	28.40032880° E
Point 271	8.80306550° N	28.39795770° E
Point 272	8.80312380° N	28.39683120° E
Point 273	8.80281110° N	28.39714770° E
Point 274	8.80422120° N	28.39805960° E
Point 275	8.80471420° N	28.39750710° E
Point 276	8.80562070° N	28.39760360° E
Point 277	8.80630450° N	28.39858000° E
Point 278	8.80526550° N	28.39912710° E
Point 279	8.80524430° N	28.39834390° E
Point 280	8.80666500° N	28.40080080° E
Point 281	8.80721100° N	28.39978160° E
Point 282	8.80711030° N	28.40029660° E
Point 283	8.80770940° N	28.40177710° E
Point 284	8.80710500° N	28.40178250° E
Point 285	8.80779950° N	28.39870870° E
Point 286	8.80884380° N	28.40021070° E
Point 287	8.80800090° N	28.39947580° E
Point 288	8.80663320° N	28.39829560° E

DWELLING COORDINATES FOR ACHOL PAGONG AYIEN MARKET - WARRAP STATE

POINT No.	LATITUDE	LONGITUDE
Point 289	8.80970260° N	28.40363320° E
Point 290	8.81121340° N	28.40001760° E
Point 291	8.81091120° N	28.39906280° E
Point 292	8.80988280° N	28.39834930° E
Point 293	8.80896570° N	28.39982990° E
Point 294	8.81129820° N	28.40449690° E
Point 295	8.81116570° N	28.40374050° E
Point 296	8.81204040° N	28.40514600° E
Point 297	8.81155270° N	28.40572000° E
Point 298	8.81459550° N	28.40105300° E
Point 299	8.81491890° N	28.40098320° E
Point 300	8.81500900° N	28.40137480° E
Point 301	8.81368900° N	28.40138550° E
Point 302	8.81430390° N	28.40213660° E
Point 303	8.81347700° N	28.40087590° E
Point 304	8.81267650° N	28.40225460° E
Point 305	8.81218880° N	28.40174500° E
Point 306	8.81223650° N	28.40317730° E
Point 307	8.81290450° N	28.40449690° E
Point 308	8.81314830° N	28.40522650° E
Point 309	8.80949050° N	28.40187370° E
Point 310	8.81642440° N	28.40133190° E
Point 311	8.81750050° N	28.40192740° E
Point 312	8.81748990° N	28.40335430° E
Point 313	8.81836980° N	28.40352060° E
Point 314	8.81912790° N	28.40402480° E
Point 315	8.81920740° N	28.40529080° E
Point 316	8.82002900° N	28.40145530° E
Point 317	8.81666290° N	28.40309140° E
Point 318	8.81639520° N	28.40239140° E
Point 319	8.82257880° N	28.40306460° E
Point 320	8.82218650° N	28.40406780° E
Point 321	8.82138610° N	28.40420720° E
Point 322	8.82176250° N	28.40740440° E
Point 323	8.82113160° N	28.40331140° E
Point 324	8.82078710° N	28.40842370° E
Point 325	8.82101500° N	28.40102080° E
Point 326	8.82197450° N	28.40106370° E
Point 327	8.82294990° N	28.39946510° E
Point 328	8.82325200° N	28.40017860° E
Point 329	8.82292340° N	28.40106900° E
Point 330	8.81861900° N	28.41689410° E
Point 331	8.81989650° N	28.41726420° E
Point 332	8.82004490° N	28.41854100° E
Point 333	8.81877800° N	28.41856780° E
Point 334	8.81513090° N	28.41646490° E
Point 335	8.81462200° N	28.41663120° E
Point 336	8.81226300° N	28.41632540° E

POINT No.	LATITUDE	LONGITUDE
Point 337	8.81417670° N	28.41607870° E
Point 338	8.80999940° N	28.41510770° E
Point 339	8.81045530° N	28.41368620° E
Point 340	8.80757680° N	28.41266160° E
Point 341	8.79264850° N	28.42177570° E
Point 342	8.79412220° N	28.41822450° E
Point 343	8.82801220° N	28.40339720° E
Point 344	8.82756700° N	28.40495290° E
Point 345	8.82901940° N	28.39884820° E
Point 346	8.82538300° N	28.40329530° E
Point 347	8.83021210° N	28.39372520° E
Point 348	8.82949120° N	28.39381100° E
Point 349	8.82783200° N	28.39418110° E
Point 350	8.82825080° N	28.39778070° E
Point 351	8.83103900° N	28.39508240° E
Point 352	8.83063620° N	28.39627860° E
Point 353	8.82962900° N	28.39852090° E
Point 354	8.83295790° N	28.39589770° E
Point 355	8.83359400° N	28.39618740° E
Point 356	8.83323890° N	28.39488920° E
Point 357	8.83474960° N	28.39582260° E
Point 358	8.83456410° N	28.39708330° E
Point 359	8.83280420° N	28.40190050° E
Point 360	8.83182350° N	28.40190050° E
Point 361	8.83125640° N	28.40282320° E
Point 362	8.83108670° N	28.40229210° E
Point 363	8.83027570° N	28.40304320° E
Point 364	8.82845750° N	28.40231360° E
Point 365	8.83862440° N	28.39542570° E
Point 366	8.84025170° N	28.39213190° E
Point 367	8.84249390° N	28.39544180° E
Point 368	8.84408940° N	28.39683650° E
Point 369	8.84564780° N	28.39631080° E
Point 370	8.84545700° N	28.39687410° E
Point 371	8.84386150° N	28.39543640° E
Point 372	8.84567430° N	28.39794700° E
Point 373	8.84680330° N	28.39722810° E
Point 374	8.84962850° N	28.40089200° E
Point 375	8.85081590° N	28.39861210° E
Point 376	8.85018510° N	28.39671310° E
Point 377	8.85283010° N	28.39583870° E
Point 378	8.85322760° N	28.39622500° E
Point 379	8.85323820° N	28.39751240° E
Point 380	8.85264990° N	28.40326310° E
Point 381	8.85391140° N	28.40157330° E
Point 382	8.85313750° N	28.40270520° E
Point 383	8.85863410° N	28.40693240° E
Point 384	8.85967830° N	28.40612230° E

DWELLING COORDINATES FOR ACHOL PAGONG AYIEN MARKET - WARRAP STATE

POINT No.	LATITUDE	LONGITUDE
Point 385	8.85955640° N	28.40737220° E
Point 386	8.86084970° N	28.40557520° E
Point 387	8.86028250° N	28.40423940° E
Point 388	8.86080200° N	28.40685190° E
Point 389	8.86048920° N	28.40799450° E
Point 390	8.86138500° N	28.40789790° E
Point 391	8.86244510° N	28.40782820° E
Point 392	8.86148040° N	28.40586480° E
Point 393	8.86207930° N	28.40708790° E
Point 394	8.86195740° N	28.40863820° E
Point 395	8.86394510° N	28.40929810° E
Point 396	8.86504220° N	28.40940540° E
Point 397	8.86344680° N	28.40671780° E
Point 398	8.86571540° N	28.40879380° E
Point 399	8.86646800° N	28.40967890° E
Point 400	8.86430020° N	28.41341260° E
Point 401	8.85398030° N	28.39456740° E
Point 402	8.85480190° N	28.39540420° E
Point 403	8.85555980° N	28.39599430° E
Point 404	8.85595210° N	28.39686330° E
Point 405	8.85502450° N	28.39679360° E
Point 406	8.85486550° N	28.39220170° E
Point 407	8.85750510° N	28.38943900° E
Point 408	8.85856520° N	28.38763120° E
Point 409	8.85869770° N	28.38837150° E
Point 410	8.85640790° N	28.39155260° E
Point 411	8.85600510° N	28.40477590° E
Point 412	8.85790790° N	28.40506550° E
Point 413	8.85743620° N	28.40847190° E
Point 414	8.86426840° N	28.40415360° E
Point 415	8.86524370° N	28.40339720° E
Point 416	8.86340440° N	28.40186830° E
Point 417	8.86230200° N	28.39997470° E
Point 418	8.86069060° N	28.39826880° E
Point 419	8.86061640° N	28.39674530° E
Point 420	8.86109880° N	28.39506630° E
Point 421	8.85958290° N	28.39876230° E
Point 422	8.85579830° N	28.41714080° E
Point 423	8.85834790° N	28.41718910° E
Point 424	8.85885670° N	28.41637370° E
Point 425	8.85909520° N	28.41706570° E
Point 426	8.85942380° N	28.41815470° E
Point 427	8.85988500° N	28.41695850° E
Point 428	8.86031170° N	28.41776310° E
Point 429	8.86028780° N	28.41880650° E
Point 430	8.86226490° N	28.42053120° E
Point 431	8.86202630° N	28.41750560° E
Point 432	8.86331960° N	28.41819230° E

POINT No.	LATITUDE	LONGITUDE
Point 433	8.86633550° N	28.41491460° E
Point 434	8.86746980° N	28.41634150° E
Point 435	8.86650510° N	28.41609480° E
Point 436	8.86741150° N	28.41566560° E
Point 437	8.86947330° N	28.41876090° E
Point 438	8.87097330° N	28.41697990° E
Point 439	8.87335840° N	28.40634230° E
Point 440	8.87221880° N	28.40644960° E
Point 441	8.87130190° N	28.40639590° E
Point 443	8.85286720° N	28.41591240° E
Point 444	8.84977170° N	28.41164230° E
Point 445	8.84994130° N	28.40971110° E
Point 446	8.85066220° N	28.41429230° E
Point 447	8.85105440° N	28.41719990° E
Point 448	8.84824510° N	28.41589090° E
Point 449	8.84679270° N	28.41638980° E
Point 500	8.87350150° N	28.41912030° E
Point 501	8.87361810° N	28.42040240° E
Point 502	8.87433890° N	28.41748950° E
Point 503	8.87340080° N	28.42181860° E
Point 504	8.87249970° N	28.42197420° E
Point 505	8.87391490° N	28.42245160° E
Point 506	8.87283900° N	28.42385710° E
Point 507	8.87462510° N	28.42697920° E
Point 508	8.87317820° N	28.42770870° E
Point 509	8.87347500° N	28.42612090° E
Point 510	8.87279130° N	28.42581510° E
Point 511	8.87589720° N	28.42697380° E
Point 512	8.87400500° N	28.42988130° E
Point 513	8.87530350° N	28.43047140° E
Point 514	8.87561100° N	28.43204860° E
Point 515	8.87467810° N	28.42878160° E
Point 516	8.87610390° N	28.43401730° E
Point 517	8.87758260° N	28.43066990° E
Point 518	8.87692540° N	28.43544420° E
Point 519	8.87802250° N	28.43667270° E
Point 520	8.87884410° N	28.43650100° E
Point 521	8.87958080° N	28.43448940° E
Point 522	8.87869040° N	28.43975720° E
Point 523	8.88002600° N	28.44004150° E
Point 524	8.87856310° N	28.44209610° E
Point 525	8.87770980° N	28.43971970° E
Point 526	8.87842530° N	28.44079260° E
Point 527	8.87935290° N	28.44411310° E
Point 528	8.87941120° N	28.44571710° E
Point 529	8.88034930° N	28.44766970° E
Point 530	8.88112310° N	28.44282030° E
Point 531	8.88158420° N	28.44558300° E

DWELLING COORDINATES FOR ACHOL PAGONG AYIEN MARKET - WARRAP STATE

POINT No.	LATITUDE	LONGITUDE
Point 532	8.88249580° N	28.44364640° E
Point 533	8.88245340° N	28.44185470° E
Point 534	8.88240570° N	28.44591560° E
Point 535	8.88241100° N	28.44655390° E
Point 536	8.88207710° N	28.44887140° E
Point 536	8.89194050° N	28.45439670° E
Point 537	8.89014910° N	28.45804450° E
Point 538	8.89544900° N	28.45988450° E
Point 539	8.89748420° N	28.46087690° E
Point 540	8.89894160° N	28.45999180° E
Point 541	8.88988410° N	28.45683220° E
Point 542	8.88849020° N	28.45617770° E
Point 543	8.89053070° N	28.45325410° E
Point 544	8.88656630° N	28.45316290° E
Point 545	8.88648680° N	28.45436990° E
Point 546	8.88594090° N	28.45402120° E
Point 547	8.88642850° N	28.45218660° E
Point 548	8.88651860° N	28.45109760° E
Point 549	8.88565470° N	28.45190230° E
Point 550	8.88491270° N	28.45056650° E
Point 551	8.88604690° N	28.44865140° E
Point 552	8.88572890° N	28.44784140° E
Point 553	8.88359290° N	28.45067380° E
Point 554	8.88270250° N	28.45138730° E
Point 555	8.88246400° N	28.44967070° E
Point 556	8.88162660° N	28.45082940° E
Point 557	8.88165840° N	28.45180570° E
Point 558	8.88049770° N	28.44860850° E
Point 559	8.88367770° N	28.44699110° E
Point 560	8.88477750° N	28.44683830° E
Point 561	8.87912500° N	28.44824910° E
Point 562	8.88223080° N	28.43992890° E
Point 563	8.88250110° N	28.44062090° E
Point 564	8.88040230° N	28.44434380° E
Point 565	8.87950130° N	28.44027220° E
Point 566	8.88201350° N	28.43798160° E
Point 567	8.88269720° N	28.43830350° E
Point 568	8.87992000° N	28.43825520° E
Point 569	8.88064080° N	28.43357210° E
Point 570	8.88147820° N	28.43463420° E
Point 571	8.87960730° N	28.43045530° E
Point 572	8.87704730° N	28.43678000° E
Point 573	8.87679290° N	28.42842220° E
Point 574	8.87958080° N	28.42931810° E
Point 575	8.87913560° N	28.42864750° E
Point 576	8.87970270° N	28.42729570° E
Point 577	8.87904550° N	28.42717770° E
Point 578	8.87742360° N	28.42551470° E

POINT No.	LATITUDE	LONGITUDE
Point 579	8.87711620° N	28.42722330° E
Point 580	8.87326830° N	28.42951660° E
Point 581	8.87681940° N	28.42108910° E
Point 582	8.87702610° N	28.42037560° E
Point 583	8.87781580° N	28.41828350° E
Point 584	8.87717980° N	28.41867510° E
Point 585	8.87659680° N	28.41990350° E
Point 586	8.87583890° N	28.41847660° E
Point 587	8.87567460° N	28.41985520° E
Point 588	8.87570110° N	28.42076720° E
Point 589	8.87586010° N	28.42179720° E
Point 590	8.87529820° N	28.42086910° E
Point 591	8.88144640° N	28.41778990° E
Point 592	8.88092700° N	28.42040240° E
Point 593	8.88427670° N	28.42004300° E
Point 594	8.88489150° N	28.42090670° E
Point 595	8.88557520° N	28.42203860° E
Point 596	8.88638610° N	28.42222630° E
Point 597	8.88667760° N	28.42026290° E
Point 598	8.88772700° N	28.41927590° E
Point 599	8.88801320° N	28.42053650° E
Point 600	8.88720230° N	28.42097100° E
Point 601	8.88750440° N	28.42175420° E
Point 602	8.88664050° N	28.42335820° E
Point 603	8.88633840° N	28.42359420° E
Point 604	8.88706450° N	28.42628180° E
Point 605	8.88835770° N	28.42811640° E
Point 606	8.88922690° N	28.42550930° E
Point 607	8.88778000° N	28.42738690° E
Point 608	8.88691610° N	28.42827740° E
Point 609	8.88572890° N	28.42794480° E
Point 610	8.88928520° N	28.42993500° E
Point 611	8.89018090° N	28.43075570° E
Point 612	8.89053070° N	28.43141560° E
Point 613	8.89156420° N	28.43087910° E
Point 614	8.89230620° N	28.42801990° E
Point 615	8.89216310° N	28.42722060° E
Point 616	8.89328660° N	28.42893720° E
Point 617	8.89162780° N	28.42635690° E
Point 618	8.89333960° N	28.43348620° E
Point 619	8.88979930° N	28.43179640° E
Point 620	8.88475900° N	28.42266620° E
Point 621	8.88342860° N	28.42003760° E
Point 622	8.89054660° N	28.42369620° E
Point 623	8.88944420° N	28.41790260° E
Point 624	8.89022860° N	28.41707650° E
Point 625	8.88974100° N	28.41897010° E
Point 626	8.89057840° N	28.41798840° E

DWELLING COORDINATES FOR ACHOL PAGONG AYIEN MARKET - WARRAP STATE

POINT No.	LATITUDE	LONGITUDE
Point 627	8.89140520° N	28.41783290° E
Point 628	8.89286260° N	28.43289080° E
Point 629	8.87692540° N	28.42680220° E
Point 630	8.87914620° N	28.41881990° E
Point 631	8.87574880° N	28.41584800° E
Point 632	8.87476820° N	28.41500580° E
Point 633	8.87954900° N	28.41707110° E
Point 634	8.88348160° N	28.41496290° E
Point 635	8.88343920° N	28.41266160° E
Point 636	8.88466360° N	28.40765120° E
Point 637	8.88444100° N	28.40986670° E
Point 638	8.88362470° N	28.41170130° E
Point 639	8.88544800° N	28.40696450° E
Point 640	8.88386330° N	28.40658370° E
Point 641	8.88180680° N	28.40631010° E
Point 642	8.87713740° N	28.40610620° E
Point 643	8.86797070° N	28.39037780° E
Point 644	8.86716500° N	28.38962410° E
Point 645	8.87362070° N	28.39514670° E
Point 646	8.87386450° N	28.39550080° E
Point 647	8.87626820° N	28.39403630° E
Point 648	8.88127150° N	28.40120850° E
Point 649	8.88267070° N	28.39925050° E
Point 650	8.88340210° N	28.40029660° E
Point 651	8.88416010° N	28.40012490° E
Point 652	8.88347100° N	28.40208830° E
Point 653	8.88374130° N	28.40107980° E
Point 654	8.88217780° N	28.40143380° E
Point 655	8.88246400° N	28.39702430° E
Point 656	8.88178030° N	28.40009270° E
Point 657	8.88124500° N	28.39876230° E
Point 658	8.88288270° N	28.39639660° E
Point 659	8.88202410° N	28.39504480° E
Point 660	8.88090580° N	28.39458350° E
Point 661	8.87954370° N	28.39812400° E
Point 662	8.87862150° N	28.39857460° E
Point 663	8.87923630° N	28.39556520° E
Point 664	8.88688960° N	28.40383170° E
Point 665	8.88778530° N	28.40327920° E
Point 666	8.88955550° N	28.40411070° E
Point 667	8.89023390° N	28.40524260° E
Point 668	8.89086460° N	28.40272130° E
Point 669	8.88880290° N	28.40489920° E
Point 670	8.88943890° N	28.40511920° E
Point 671	8.89018090° N	28.40119780° E
Point 672	8.89138930° N	28.39991030° E
Point 673	8.88852200° N	28.39671850° E
Point 674	8.88882410° N	28.39772700° E

POINT No.	LATITUDE	LONGITUDE
Point 675	8.88799200° N	28.39539890° E
Point 676	8.89000600° N	28.39564560° E
Point 677	8.88750970° N	28.39891790° E
Point 678	8.88548510° N	28.39251280° E
Point 679	8.88653450° N	28.39686870° E
Point 680	8.88872870° N	28.39199780° E
Point 681	8.88711220° N	28.41436740° E
Point 682	8.89591540° N	28.41312290° E
Point 683	8.89671040° N	28.41138480° E
Point 684	8.89603200° N	28.41059090° E
Point 685	8.89353570° N	28.40090810° E
Point 686	8.89256060° N	28.40266230° E
Point 687	8.89279900° N	28.40363860° E
Point 688	8.89335550° N	28.40382100° E
Point 689	8.89494550° N	28.40435210° E
Point 690	8.89562390° N	28.40588630° E
Point 691	8.89655140° N	28.40376730° E
Point 692	8.89675810° N	28.40662660° E
Point 693	8.89743650° N	28.40464710° E
Point 694	8.89862890° N	28.40803210° E
Point 695	8.89963060° N	28.40464170° E
Point 696	8.89840100° N	28.40467390° E
Point 697	8.89743650° N	28.40701280° E
Point 698	8.89777040° N	28.40770480° E
Point 699	8.90071710° N	28.40347770° E
Point 700	8.89787370° N	28.40707450° E
Point 701	8.89735430° N	28.40772090° E
Point 702	8.89752130° N	28.41152430° E
Point 703	8.89936030° N	28.41064450° E
Point 704	8.90123110° N	28.40973790° E
Point 705	8.90185120° N	28.41062310° E
Point 706	8.90224870° N	28.41026370° E
Point 707	8.90299070° N	28.41007050° E
Point 708	8.90310730° N	28.41103610° E
Point 709	8.90372730° N	28.40973260° E
Point 710	8.90265680° N	28.41144380° E
Point 711	8.90319210° N	28.41274740° E
Point 712	8.90449580° N	28.41302100° E
Point 713	8.90539680° N	28.41145460° E
Point 714	8.90536500° N	28.41243090° E
Point 715	8.90602210° N	28.41170130° E
Point 716	8.90667400° N	28.41243620° E
Point 717	8.90788760° N	28.41365400° E
Point 718	8.90821620° N	28.41083230° E
Point 719	8.90535440° N	28.41431380° E
Point 720	8.90758560° N	28.41679220° E
Point 721	8.90835400° N	28.41500580° E
Point 722	8.90906950° N	28.41413680° E

DWELLING COORDINATES FOR ACHOL PAGONG AYIEN MARKET - WARRAP STATE

POINT No.	LATITUDE	LONGITUDE
Point 723	8.90974780° N	28.41613230° E
Point 724	8.90943520° N	28.41497360° E
Point 725	8.91025660° N	28.41793480° E
Point 726	8.91122120° N	28.41477510° E
Point 727	8.91091910° N	28.41628790° E
Point 728	8.90955180° N	28.41811720° E
Point 729	8.90815790° N	28.41755390° E
Point 730	8.90812080° N	28.41601430° E
Point 731	8.90880450° N	28.41672240° E
Point 732	8.90686480° N	28.41772020° E
Point 733	8.90657860° N	28.41535990° E
Point 734	8.90648320° N	28.41485560° E
Point 735	8.90700790° N	28.41445330° E
Point 736	8.90549220° N	28.41592850° E
Point 737	8.90645140° N	28.41625570° E
Point 738	8.90588970° N	28.41706040° E
Point 739	8.90531730° N	28.41356280° E
Point 740	8.90517950° N	28.41056940° E
Point 742	8.90410890° N	28.41369150° E
Point 741	8.90429970° N	28.41860000° E
Point 742	8.90372730° N	28.41916860° E
Point 743	8.90387040° N	28.41685650° E
Point 744	8.90311260° N	28.41626110° E
Point 745	8.90331930° N	28.41858390° E
Point 746	8.90235470° N	28.41583730° E
Point 747	8.90163920° N	28.41670630° E
Point 748	8.90371150° N	28.42039170° E
Point 749	8.90516890° N	28.41923830° E
Point 750	8.90338820° N	28.42226390° E
Point 751	8.90262500° N	28.42292370° E
Point 752	8.90155440° N	28.41555300° E
Point 753	8.89923840° N	28.41324090° E
Point 754	8.89928080° N	28.41415290° E
Point 755	8.89884090° N	28.41495220° E
Point 756	8.89845930° N	28.41641660° E
Point 757	8.89775450° N	28.41620740° E
Point 758	8.90027190° N	28.41355740° E
Point 759	8.89749480° N	28.41555300° E
Point 760	8.89708670° N	28.41796700° E
Point 761	8.89745240° N	28.41750560° E
Point 762	8.89637650° N	28.41856780° E
Point 763	8.89720860° N	28.42017710° E
Point 764	8.89723510° N	28.41907200° E
Point 765	8.89815190° N	28.42048820° E
Point 766	8.89802470° N	28.41972650° E
Point 767	8.89877730° N	28.41879310° E
Point 768	8.89486070° N	28.44446180° E
Point 769	8.89425650° N	28.44086230° E

POINT No.	LATITUDE	LONGITUDE
Point 770	8.89315940° N	28.44032050° E
Point 771	8.89385370° N	28.43573930° E
Point 772	8.89319650° N	28.43716080° E
Point 773	8.89346150° N	28.43815860° E
Point 774	8.89455330° N	28.43446250° E
Point 775	8.89362580° N	28.43479510° E
Point 776	8.89243870° N	28.43518670° E
Point 777	8.89430420° N	28.43404410° E
Point 778	8.89692770° N	28.43581440° E
Point 779	8.89813070° N	28.43061630° E
Point 780	8.89880380° N	28.43004760° E
Point 781	8.89799290° N	28.42946830° E
Point 782	8.89795050° N	28.43158720° E
Point 783	8.89748950° N	28.43073960° E
Point 784	8.89678460° N	28.43194660° E
Point 785	8.89706550° N	28.43334140° E
Point 786	8.89769620° N	28.43506870° E
Point 787	8.89610090° N	28.43293370° E
Point 788	8.89566630° N	28.42782680° E
Point 789	8.89647190° N	28.42984380° E
Point 790	8.89763260° N	28.42632470° E
Point 791	8.89791870° N	28.42720450° E
Point 792	8.89857590° N	28.42835250° E
Point 793	8.89918540° N	28.42660900° E
Point 794	8.89749480° N	28.42525720° E
Point 795	8.89867660° N	28.42457060° E
Point 796	8.89801940° N	28.42247310° E
Point 797	8.89954580° N	28.42342260° E
Point 798	8.89939740° N	28.42178640° E
Point 799	8.89992740° N	28.42500510° E
Point 800	8.89678460° N	28.42249990° E
Point 801	8.89602670° N	28.42130360° E
Point 802	8.89564510° N	28.42200100° E
Point 803	8.89559740° N	28.42324550° E
Point 804	8.89514690° N	28.41915790° E
Point 805	8.89574050° N	28.41686730° E
Point 806	8.89566100° N	28.41766660° E
Point 807	8.89371590° N	28.42408240° E
Point 808	8.89885150° N	28.42065990° E
Point 809	8.89653550° N	28.41622890° E
Point 810	8.89836390° N	28.41458200° E
Point 811	8.89984260° N	28.41118630° E
Point 812	8.90007050° N	28.41016710° E
Point 813	8.90410890° N	28.41369690° E
Point 814	8.90396580° N	28.41461960° E
Point 815	8.90598500° N	28.41233970° E
Point 816	8.90370620° N	28.41208760° E
Point 817	8.90078070° N	28.40493140° E

DWELLING COORDINATES FOR ACHOL PAGONG AYIEN MARKET - WARRAP STATE

POINT No.	LATITUDE	LONGITUDE
Point 818	8.90127350° N	28.40611160° E
Point 819	8.90219040° N	28.40418040° E
Point 820	8.90211620° N	28.40519960° E
Point 821	8.90237060° N	28.40262470° E
Point 822	8.90318150° N	28.40506020° E
Point 823	8.90399760° N	28.40640660° E
Point 824	8.90435270° N	28.40740980° E
Point 825	8.90294300° N	28.40606330° E
Point 826	8.90522190° N	28.40762970° E
Point 827	8.90440570° N	28.40556440° E
Point 828	8.90427320° N	28.40264620° E
Point 829	8.90414070° N	28.40474370° E
Point 830	8.90378030° N	28.40384240° E
Point 831	8.89879320° N	28.40092420° E
Point 832	8.89748420° N	28.40135340° E
Point 833	8.89852820° N	28.39741050° E
Point 834	8.89990090° N	28.39653610° E
Point 835	8.89934440° N	28.40003370° E
Point 836	8.89878790° N	28.39993180° E
Point 837	8.90075950° N	28.39932020° E
Point 838	8.90144310° N	28.39969040° E
Point 839	8.90193070° N	28.40057020° E
Point 840	8.90000160° N	28.40223850° E
Point 841	8.89491900° N	28.40663730° E
Point 842	8.89387490° N	28.40582730° E
Point 843	8.89526880° N	28.40017860° E
Point 844	8.89427770° N	28.39861750° E
Point 845	8.89380600° N	28.39746950° E
Point 846	8.89383250° N	28.39987810° E
Point 847	8.89406570° N	28.40056480° E
Point 848	8.89511510° N	28.39922900° E
Point 849	8.89363640° N	28.39636450° E
Point 850	8.89370000° N	28.39429910° E
Point 851	8.89665210° N	28.39683120° E
Point 852	8.89630230° N	28.39565630° E
Point 853	8.89693830° N	28.39883210° E
Point 854	8.89586240° N	28.40175570° E
Point 855	8.89410810° N	28.39917000° E
Point 856	8.89193520° N	28.39869260° E
Point 857	8.89198820° N	28.39701350° E
Point 858	8.89176030° N	28.39442250° E
Point 859	8.89155890° N	28.39549540° E
Point 860	8.89127270° N	28.39771630° E
Point 861	8.89028160° N	28.39347840° E
Point 862	8.88956080° N	28.39291510° E
Point 863	8.89282550° N	28.39336040° E
Point 864	8.89358340° N	28.39270060° E
Point 865	8.89361520° N	28.39367150° E

POINT No.	LATITUDE	LONGITUDE
Point 866	8.89264540° N	28.39424010° E
Point 867	8.89486600° N	28.39539350° E
Point 868	8.89536950° N	28.39354280° E
Point 869	8.89606910° N	28.39411140° E
Point 870	8.89421940° N	28.39601040° E
Point 871	8.89402860° N	28.39829560° E
Point 872	8.89477590° N	28.39790940° E
Point 873	8.90418840° N	28.39858000° E
Point 876	8.90606450° N	28.39815080° E
Point 877	8.90630300° N	28.39939530° E
Point 896	8.90015530° N	28.39334960° E
Point 897	8.90008110° N	28.39412210° E
Point 898	8.89879850° N	28.39396660° E
Point 899	8.89768030° N	28.39236800° E
Point 901	8.89819960° N	28.39565630° E
Point 902	8.89878790° N	28.39228750° E
Point 903	8.89754250° N	28.39306000° E
Point 904	8.89724570° N	28.39387540° E
Point 905	8.89780750° N	28.39412210° E
Point 906	8.90085490° N	28.39521650° E
Point 907	8.90100860° N	28.39319410° E
Point 908	8.90311790° N	28.40078470° E
Point 910	8.90891050° N	28.41240410° E
Point 911	8.90743720° N	28.41542960° E
Point 912	8.91210620° N	28.41849270° E
Point 913	8.91007910° N	28.41252740° E
Point 914	8.90970810° N	28.41326240° E
Point 915	8.91015860° N	28.41466250° E
Point 916	8.90692310° N	28.41312290° E
Point 917	8.89911390° N	28.39720670° E
Point 918	8.88826230° N	28.38431600° E
Point 919	8.88715460° N	28.38577510° E
Point 920	8.88911560° N	28.38586090° E
Point 921	8.88886120° N	28.38524400° E
Point 922	8.88862800° N	28.38593600° E
Point 923	8.88803440° N	28.38846800° E
Point 924	8.89027630° N	28.38549080° E
Point 925	8.88792310° N	28.38893470° E
Point 926	8.88696910° N	28.38765800° E
Point 927	8.88889830° N	28.39104830° E
Point 928	8.88562820° N	28.39177250° E
Point 929	8.89046710° N	28.38475050° E
Point 930	8.89084340° N	28.38576970° E
Point 931	8.89128860° N	28.38979840° E
Point 932	8.89180800° N	28.38779210° E
Point 933	8.89294210° N	28.38919760° E
Point 934	8.89262950° N	28.38667630° E
Point 935	8.89260300° N	28.39064060° E

**DWELLING COORDINATES FOR ACHOL PAGONG AYIEN MARKET -
WARRAP STATE**

POINT No.	LATITUDE	LONGITUDE
Point 936	8.89496140° N	28.39039920° E
Point 937	8.89448970° N	28.38975010° E
Point 938	8.89464340° N	28.38825350° E
Point 939	8.89407630° N	28.38686410° E
Point 940	8.89349330° N	28.38563020° E
Point 941	8.89258710° N	28.38504020° E
Point 942	8.89224260° N	28.38417650° E
Point 943	8.89280430° N	28.38310360° E

PREFERED POINTS FOR ACHOL PAGONG AYIEN MARKET

VILLAGE	LONGITUDE	LATITUDE
ACHOL PANGONG	28.310038	8.726338
20	28.310211	8.727054
21	28.311186	8.728945
22	28.314122	8.73272
23	28.315335	8.734449
24	28.316851	8.737122
25	28.317872	8.738702
26	28.319141	8.740458
27	28.320909	8.742231
28	28.323372	8.743757
29	28.325523	8.744378
30	28.328389	8.746615
31	28.334305	8.749539
32	28.337668	8.751878
33	28.339896	8.75419
34	28.340471	8.755003
35	28.342175	8.755206
36	28.344711	8.756374
37	28.349574	8.757812
38	28.355477	8.760126
39	28.35754	8.761071
40	28.367573	8.76362
41	28.371424	8.765194
42	28.3748	8.765622
43	28.38036	8.767056
44	28.381349	8.767456
45	28.385252	8.770201
46	28.386844	8.771748
47	28.39168	8.775879
48	28.394439	8.778564
49	28.393554	8.78089
Water Crossing Point	28.393467	8.781086
51	28.393855	8.785461
52	28.393957	8.787903
53	28.394872	8.791588
MAKUAC MKT	28.396725	8.794378
55	28.397341	8.795489
56	28.399241	8.798123
57	28.400094	8.799184
58	28.399515	8.803231
59	28.401985	8.806075
60	28.402912	8.807664
61	28.402708	8.810952
62	28.402063	8.812162
63	28.401799	8.815217
LOW SECTION	28.40189	8.819718
65	28.401763	8.823321
OLD CATTLE CAMP	28.39944	8.827344

PREFERED POINTS FOR ACHOL PAGONG AYIEN MARKET

VILLAGE	LONGITUDE	LATITUDE
67	28.397634	8.82979
68	28.396552	8.833091
SETTLEMENT	28.39603	8.834962
70	28.395037	8.837448
71	28.395717	8.838731
OLD CATTLE CAMP	28.398068	8.846486
73	28.397702	8.850661
Water Crossing Point	28.397391	8.851831
MAJOK MKT	28.398306	8.854065
76	28.398802	8.856524
77	28.401546	8.862675
78	28.405708	8.86402
79	28.410565	8.866881
80	28.413459	8.87069
81	28.414646	8.873608
LOW SECTION	28.414868	8.878487
LOW SECTION	28.415754	8.880114
84	28.413777	8.881672
85	28.410911	8.884161
86	28.408918	8.885053
87	28.405949	8.887227
88	28.40431	8.888113
89	28.400622	8.890958
AYEIN MKT	28.397884	8.895396

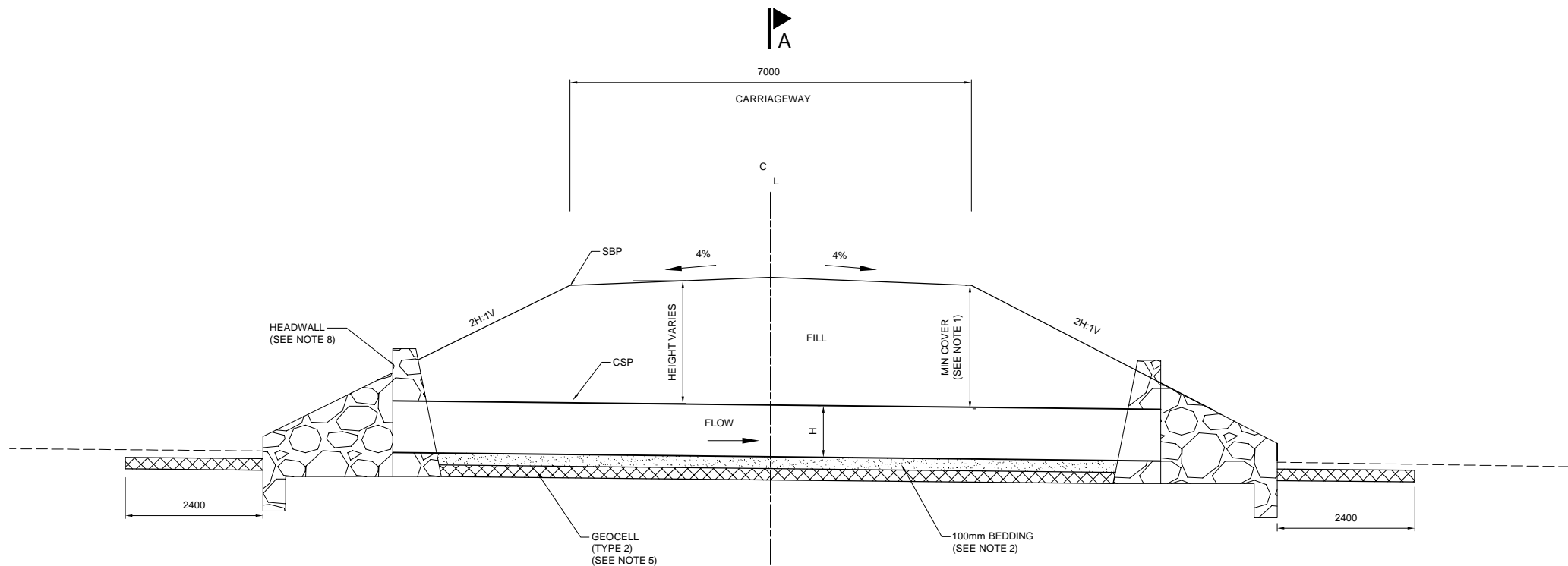
ACHOL PAGONG AYIEN MARKET - Warrap State

LONGITUDE	LATITUDE	POINT No.
28.28906863° E	8.72618557° N	99
28.30931671° E	8.72440710° N	100
28.31021869° E	8.72610879° N	101
28.34049530° E	8.75490323° N	102
28.34059278° E	8.75492427° N	103
28.38625026° E	8.77171582° N	104
28.39485412° E	8.79145092° N	105
28.39486216° E	8.79153382° N	106
28.39556197° E	8.79190883° N	107
28.39560748° E	8.79307651° N	108
28.39643955° E	8.79425953° N	109
28.39667090° E	8.79440404° N	110
28.40015148° E	8.80304259° N	111
28.40190288° E	8.80603854° N	112
28.40181990° E	8.82117340° N	113
28.40175251° E	8.82149317° N	114
28.39666075° E	8.84455481° N	115
28.39834091° E	8.85424362° N	116
28.39844853° E	8.89426134° N	117

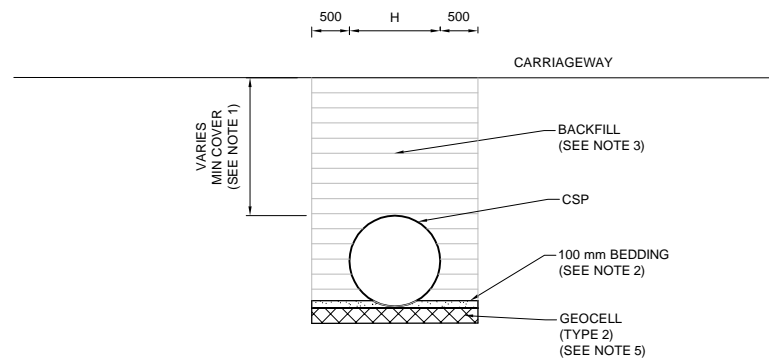
Appendix C

DRAINAGE

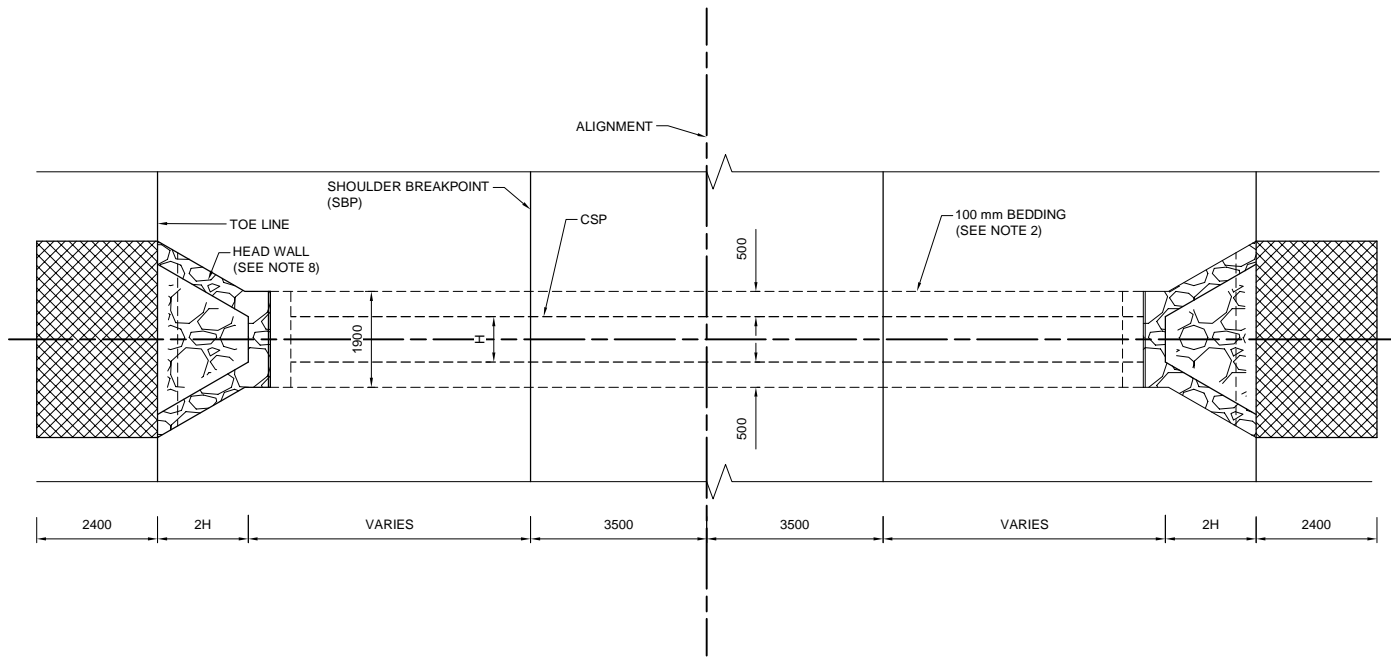
- TYPICAL RELIEF CULVERT DETAIL**
- TYPICAL HEADWALL DETAIL**



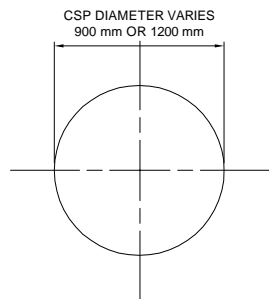
PROFILE VIEW
SCALE 1:50



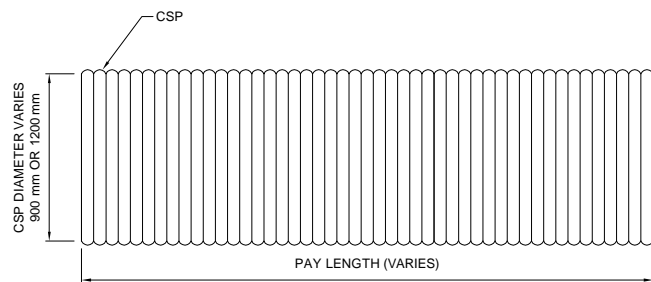
SECTION A-A
SCALE 1:50



PLAN VIEW
SCALE 1:75



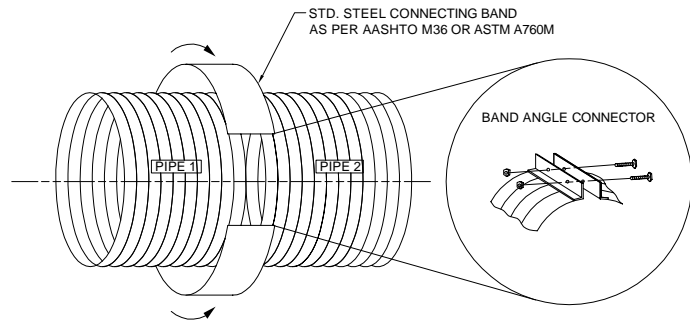
PIPE CROSS SECTION
N.T.S



LONGITUDINAL SECTION
N.T.S

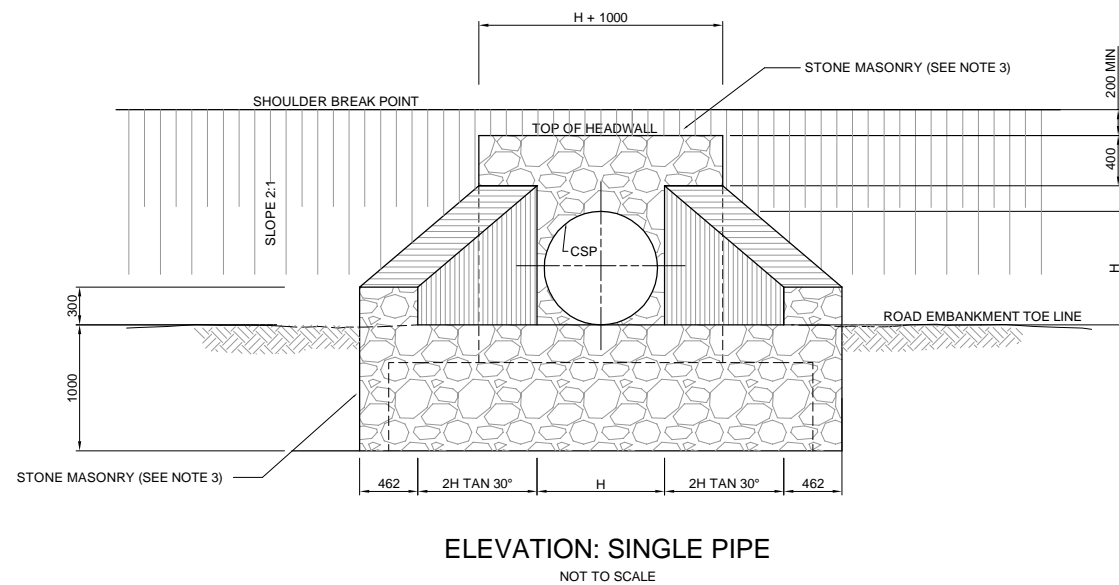
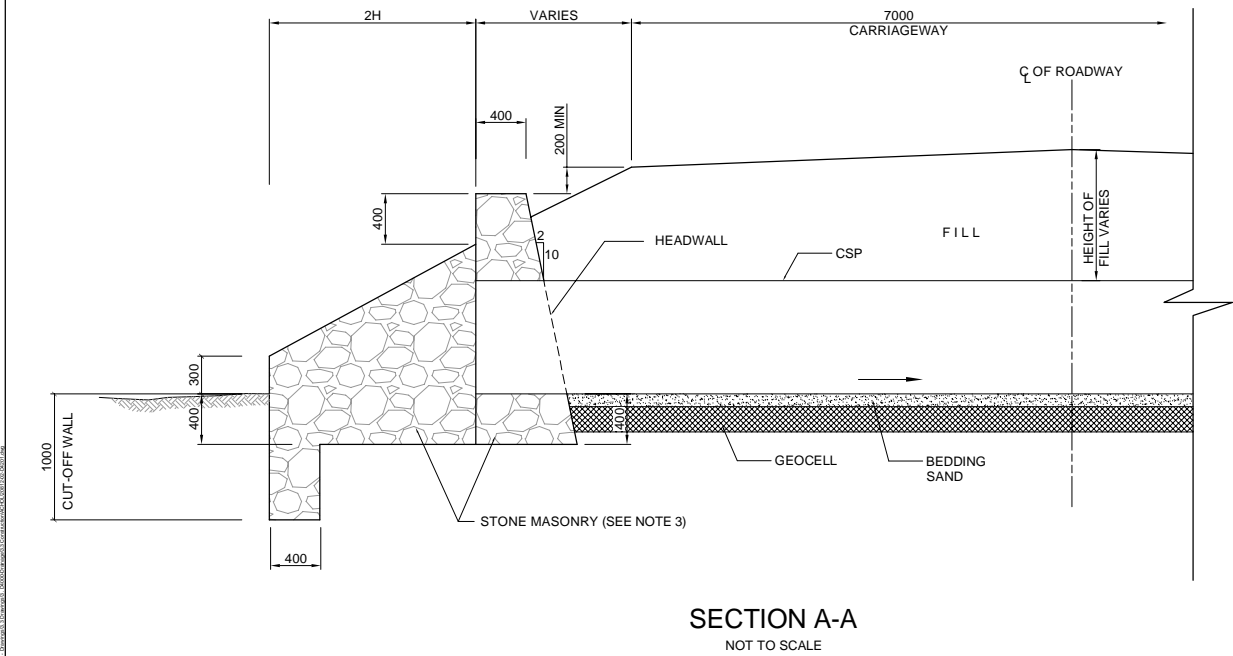
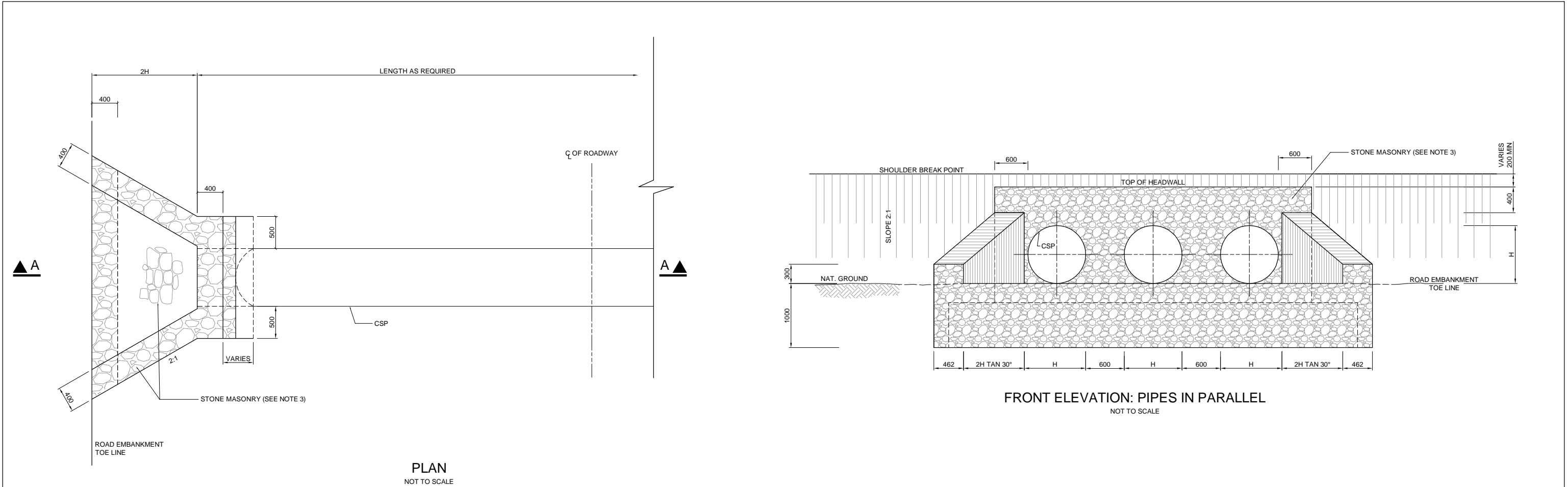
NOTES:

1. MINIMUM COVER TO PIPE AFTER COMPACTION = 300mm
2. BEDDING BLANKET OF LOOSE GRANULAR FILL (ACCORDING TO AASHTO M145 OR AS APPROVED BY THE ENGINEER) SHAPED TO FIT BOTTOM OF PIPE. MINIMUM THICKNESS BEFORE PLACING PIPE = 100mm
3. BACKFILL TO BE COMPACTED IN LAYERS OF 200mm TO DENSITY OF ADJACENT EMBANKMENT BUT NOT LESS THAN 93% MOD AASHTO DENSITY (AASHTO T99)
4. TYPE 1: NEOLOY PRS 330-100-76 PS B BACKFILLED WITH SOILCRETE AS APPROVED BY THE ENGINEER. GEOCELL CONNECTORS AS PER SUPPLIER SPECIFICATIONS OR AS APPROVED BY THE ENGINEER
5. TYPE 2: NEOWEB PRS 330-200-76 PS B. GEOCELL CONNECTORS AS PER SUPPLIER SPECIFICATIONS OR AS APPROVED BY THE ENGINEER
6. CSP = CORRUGATED STEEL PIPE (68x13x2.7mm) ZINC COATED (GALVANIZED) AS PER AASHTO M36 OR ASTM A760M OR AS APPROVED BY THE ENGINEER
7. H = DIAMETER OF PIPE (900 mm OR 1200 mm)
8. SEE PLAN 20812-02-D4201 FOR HEADWALL DETAILS



DETAIL OF CONNECTING BAND
N.T.S

														PROJECT: ZEAT BEAD FEEDER ROAD PROJECT				SCALE @ A1: AS SHOWN		CHECKED: B WHITE		APPROVED: RN MATCHETT	
														TITLE: LOT 2: ACHOL PAGONG AYIEN MARKET ROAD TYPICAL RELIEF PIPE CULVERT DETAIL				DESIGN: H.SINGH		DRAWN: H.SINGH		DATE: 2016/02/29	
																PROJECT No: 020812		DRAWING No: 20812-02-D4200		REV: 0			
																		DO NOT SCALE FROM THIS DRAWING					



- NOTES:
1. CSP = CORRUGATED STEEL PIPE
 2. H = DIAMETER OF PIPE
 3. STONE MASONRY OR CONCRETE WILL BE USED TO CONSTRUCT THE HEADWALLS DEPENDING ON AVAILABILITY OF MATERIAL
 4. REFER TO PLAN 20812-02-D4200 FOR DETAILS OF PIPE CULVERTS

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Appendix D

CONSTRUCTION DATA

- **ACHOL_ DRAINAGE SCHEDULE**
- **ACHOL_SETTING OUT POINTS**
- **ACHOL_VERTICAL PROFILE**

DRAINAGE SCHEDULE FOR ACHOL PAGONG AYIEN MARKET - Warrap State

Chainage (km)	Size
0.250	600 mm
0.500	600 mm
0.750	600 mm
1.000	600 mm
1.250	600 mm
1.500	600 mm
1.750	600 mm
2.000	600 mm
2.250	600 mm
2.500	600 mm
2.750	600 mm
3.000	600 mm
3.250	600 mm
3.500	600 mm
3.750	600 mm
4.000	600 mm
4.250	600 mm
4.500	600 mm
4.750	600 mm
5.000	600 mm
5.250	600 mm
5.500	600 mm
5.750	600 mm
6.000	600 mm
6.250	600 mm
6.500	600 mm
6.750	600 mm
7.000	600 mm
7.250	600 mm
7.500	600 mm
7.750	600 mm
8.000	600 mm
8.250	600 mm
8.500	600 mm
8.750	600 mm
9.000	600 mm
9.250	600 mm
9.500	600 mm
9.750	600 mm
10.000	600 mm
10.250	600 mm
10.500	600 mm
10.750	600 mm
11.000	600 mm

Chainage (km)	Size
11.250	600 mm
11.500	600 mm
11.750	600 mm
12.000	600 mm
12.250	600 mm
12.500	600 mm
12.750	600 mm
13.000	600 mm
13.250	600 mm
13.500	600 mm
13.750	600 mm
14.000	600 mm
14.250	600 mm
14.500	600 mm
14.750	600 mm
15.000	600 mm
15.250	600 mm
15.500	600 mm
15.750	600 mm
16.000	600 mm
16.250	600 mm
16.500	600 mm
16.750	600 mm
17.000	600 mm
17.250	600 mm
17.500	600 mm
17.750	600 mm
18.000	600 mm
18.250	600 mm
18.500	600 mm
18.750	600 mm
19.000	600 mm
19.250	600 mm
19.500	600 mm
19.750	600 mm
20.000	600 mm
20.250	600 mm
20.500	600 mm
20.750	600 mm
21.000	600 mm
21.250	600 mm
21.500	600 mm
21.750	600 mm
22.000	600 mm

Chainage (km)	Size
22.250	600 mm
22.500	600 mm
22.750	600 mm
23.000	600 mm
23.250	600 mm
23.500	600 mm
23.750	600 mm
24.000	600 mm
24.250	600 mm
24.500	600 mm
24.750	600 mm
25.000	600 mm
25.250	600 mm
25.500	600 mm
25.750	600 mm
26.000	600 mm
26.250	600 mm
26.500	600 mm
26.750	600 mm

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

Station	Northing	Easting
0.000	964,626.929975m	644,121.459726m
0.025	964,651.822889m	644,119.148260m
0.050	964,676.715802m	644,116.836795m
0.075	964,701.608715m	644,114.525330m
0.100	964,726.501628m	644,112.213864m
0.125	964,751.394541m	644,109.902399m
0.150	964,776.287455m	644,107.590934m
0.175	964,801.231678m	644,106.051491m
0.200	964,826.204989m	644,106.953201m
0.225	964,850.963516m	644,110.343576m
0.250	964,875.259882m	644,116.188742m
0.275	964,898.851324m	644,124.430296m
0.300	964,921.855186m	644,134.218665m
0.325	964,944.843709m	644,144.043520m
0.350	964,967.832233m	644,153.868375m
0.375	964,990.820757m	644,163.693230m
0.400	965,013.809281m	644,173.518085m
0.425	965,036.797804m	644,183.342940m
0.450	965,059.786328m	644,193.167795m
0.475	965,082.774852m	644,202.992650m
0.500	965,105.516586m	644,213.369718m
0.525	965,127.711334m	644,224.870282m
0.550	965,149.303555m	644,237.465749m
0.575	965,170.239281m	644,251.124636m
0.600	965,190.466182m	644,265.812803m
0.625	965,209.933703m	644,281.493537m
0.650	965,228.593185m	644,298.127645m
0.675	965,246.397988m	644,315.673550m
0.700	965,263.575520m	644,333.837445m
0.725	965,280.728825m	644,352.024367m
0.750	965,297.882130m	644,370.211289m
0.775	965,315.035435m	644,388.398211m
0.800	965,332.188740m	644,406.585133m
0.825	965,349.342044m	644,424.772055m
0.850	965,366.495349m	644,442.958977m
0.875	965,383.926852m	644,460.873557m
0.900	965,402.897090m	644,477.140376m
0.925	965,423.396528m	644,491.432066m
0.950	965,445.029396m	644,503.958212m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

0.975	965,466.781117m	644,516.281468m
1.000	965,488.532837m	644,528.604724m
1.025	965,510.284558m	644,540.927980m
1.050	965,532.036279m	644,553.251236m
1.075	965,553.788000m	644,565.574493m
1.100	965,575.539721m	644,577.897749m
1.125	965,597.291442m	644,590.221005m
1.150	965,619.043162m	644,602.544261m
1.175	965,640.794883m	644,614.867517m
1.200	965,662.546604m	644,627.190773m
1.225	965,684.298325m	644,639.514029m
1.250	965,706.050046m	644,651.837285m
1.275	965,727.801767m	644,664.160541m
1.300	965,749.553487m	644,676.483797m
1.325	965,771.305208m	644,688.807054m
1.350	965,793.056929m	644,701.130310m
1.375	965,814.808650m	644,713.453566m
1.400	965,836.560371m	644,725.776822m
1.425	965,858.312092m	644,738.100078m
1.450	965,880.063812m	644,750.423334m
1.475	965,901.815533m	644,762.746590m
1.500	965,923.567254m	644,775.069846m
1.525	965,945.318975m	644,787.393102m
1.550	965,967.070696m	644,799.716358m
1.575	965,988.822417m	644,812.039615m
1.600	966,010.574137m	644,824.362871m
1.625	966,032.325858m	644,836.686127m
1.650	966,054.077579m	644,849.009383m
1.675	966,075.829300m	644,861.332639m
1.700	966,097.581021m	644,873.655895m
1.725	966,119.332742m	644,885.979151m
1.750	966,141.040097m	644,898.380113m
1.775	966,162.580089m	644,911.069427m
1.800	966,183.941769m	644,924.056674m
1.825	966,205.121016m	644,937.339350m
1.850	966,226.113744m	644,950.914890m
1.875	966,246.915905m	644,964.780678m
1.900	966,267.523485m	644,978.934038m
1.925	966,287.932509m	644,993.372240m
1.950	966,308.139041m	645,008.092499m
1.975	966,328.139182m	645,023.091975m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

2.000	966,347.929075m	645,038.367776m
2.025	966,367.504903m	645,053.916954m
2.050	966,386.862888m	645,069.736510m
2.075	966,405.999297m	645,085.823393m
2.100	966,424.910439m	645,102.174499m
2.125	966,443.592666m	645,118.786674m
2.150	966,462.042373m	645,135.656714m
2.175	966,480.256002m	645,152.781365m
2.200	966,498.230040m	645,170.157323m
2.225	966,515.961020m	645,187.781236m
2.250	966,533.445520m	645,205.649706m
2.275	966,550.680169m	645,223.759284m
2.300	966,567.661642m	645,242.106478m
2.325	966,584.386663m	645,260.687749m
2.350	966,600.852006m	645,279.499512m
2.375	966,617.054495m	645,298.538139m
2.400	966,632.991004m	645,317.799957m
2.425	966,648.658460m	645,337.281250m
2.450	966,664.109756m	645,356.934648m
2.475	966,679.543288m	645,376.602035m
2.500	966,694.976820m	645,396.269421m
2.525	966,710.410351m	645,415.936808m
2.550	966,725.645628m	645,435.755597m
2.575	966,739.484792m	645,456.568087m
2.600	966,751.657422m	645,478.397179m
2.625	966,762.089260m	645,501.109707m
2.650	966,770.716666m	645,524.567116m
2.675	966,777.496039m	645,548.624093m
2.700	966,783.508263m	645,572.890390m
2.725	966,789.520487m	645,597.156687m
2.750	966,795.532711m	645,621.422983m
2.775	966,801.544935m	645,645.689280m
2.800	966,807.557160m	645,669.955577m
2.825	966,813.569384m	645,694.221874m
2.850	966,819.588709m	645,718.486390m
2.875	966,827.303555m	645,742.249129m
2.900	966,837.920820m	645,764.864617m
2.925	966,851.274826m	645,785.979946m
2.950	966,867.157188m	645,805.265620m
2.975	966,885.320066m	645,822.420691m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

3.000	966,905.422403m	645,837.263386m
3.025	966,926.034075m	645,851.411142m
3.050	966,946.645746m	645,865.558897m
3.075	966,967.257418m	645,879.706653m
3.100	966,987.857863m	645,893.870602m
3.125	967,007.314745m	645,909.542755m
3.150	967,024.665896m	645,927.518409m
3.175	967,039.640558m	645,947.517062m
3.200	967,052.005056m	645,969.226641m
3.225	967,061.566446m	645,992.308375m
3.250	967,068.925970m	646,016.199223m
3.275	967,076.156202m	646,040.130870m
3.300	967,083.386434m	646,064.062517m
3.325	967,090.616667m	646,087.994164m
3.350	967,097.846899m	646,111.925812m
3.375	967,105.077131m	646,135.857459m
3.400	967,112.307363m	646,159.789106m
3.425	967,119.539335m	646,183.720226m
3.450	967,127.583876m	646,207.386276m
3.475	967,137.090875m	646,230.503663m
3.500	967,148.023209m	646,252.982112m
3.525	967,159.693605m	646,275.090975m
3.550	967,171.364572m	646,297.199537m
3.575	967,183.035539m	646,319.308099m
3.600	967,194.706506m	646,341.416662m
3.625	967,206.377473m	646,363.525224m
3.650	967,218.048440m	646,385.633786m
3.675	967,229.719407m	646,407.742349m
3.700	967,241.390375m	646,429.850911m
3.725	967,253.061342m	646,451.959473m
3.750	967,264.732309m	646,474.068035m
3.775	967,276.403276m	646,496.176598m
3.800	967,288.074243m	646,518.285160m
3.825	967,299.745210m	646,540.393722m
3.850	967,311.416178m	646,562.502284m
3.875	967,323.087145m	646,584.610847m
3.900	967,334.758112m	646,606.719409m
3.925	967,346.429079m	646,628.827971m
3.950	967,358.100046m	646,650.936533m
3.975	967,369.771013m	646,673.045096m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

4.000	967,381.441980m	646,695.153658m
4.025	967,393.331609m	646,717.144706m
4.050	967,405.764016m	646,738.833474m
4.075	967,418.734702m	646,760.204688m
4.100	967,432.235559m	646,781.244990m
4.125	967,446.258150m	646,801.941231m
4.150	967,460.793711m	646,822.280476m
4.175	967,475.629548m	646,842.402550m
4.200	967,490.467787m	646,862.522855m
4.225	967,505.306026m	646,882.643159m
4.250	967,520.144265m	646,902.763464m
4.275	967,534.982504m	646,922.883768m
4.300	967,549.820743m	646,943.004073m
4.325	967,564.658983m	646,963.124378m
4.350	967,579.497222m	646,983.244682m
4.375	967,594.335461m	647,003.364987m
4.400	967,609.173700m	647,023.485292m
4.425	967,624.011939m	647,043.605596m
4.450	967,638.850178m	647,063.725901m
4.475	967,653.688418m	647,083.846206m
4.500	967,668.526657m	647,103.966510m
4.525	967,683.364896m	647,124.086815m
4.550	967,698.203135m	647,144.207119m
4.575	967,713.054780m	647,164.317465m
4.600	967,728.918371m	647,183.630281m
4.625	967,746.334452m	647,201.555640m
4.650	967,765.159069m	647,217.997372m
4.675	967,784.433854m	647,233.918511m
4.700	967,803.708639m	647,249.839649m
4.725	967,822.983424m	647,265.760788m
4.750	967,842.258209m	647,281.681927m
4.775	967,861.532994m	647,297.603066m
4.800	967,880.807779m	647,313.524205m
4.825	967,900.082564m	647,329.445344m
4.850	967,919.357349m	647,345.366483m
4.875	967,938.632134m	647,361.287621m
4.900	967,957.875775m	647,377.245964m
4.925	967,975.987381m	647,394.463661m
4.950	967,992.289601m	647,413.403485m
4.975	968,006.619552m	647,433.876195m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

5.000	968,018.834051m	647,455.677235m
5.025	968,028.811057m	647,478.588776m
5.050	968,036.450882m	647,502.381893m
5.075	968,041.677192m	647,526.818853m
5.100	968,044.722084m	647,551.629099m
5.125	968,047.429041m	647,576.482115m
5.150	968,050.135998m	647,601.335130m
5.175	968,052.933645m	647,626.177440m
5.200	968,057.543165m	647,650.738215m
5.225	968,064.581643m	647,674.716104m
5.250	968,073.978753m	647,697.871529m
5.275	968,085.515142m	647,720.043781m
5.300	968,097.535430m	647,741.964380m
5.325	968,109.555719m	647,763.884979m
5.350	968,121.576007m	647,785.805578m
5.375	968,133.596296m	647,807.726177m
5.400	968,145.616584m	647,829.646776m
5.425	968,157.636873m	647,851.567375m
5.450	968,169.657161m	647,873.487974m
5.475	968,181.677450m	647,895.408574m
5.500	968,193.697738m	647,917.329173m
5.525	968,205.718027m	647,939.249772m
5.550	968,217.738315m	647,961.170371m
5.575	968,229.758604m	647,983.090970m
5.600	968,241.692833m	648,005.058024m
5.625	968,252.718680m	648,027.492385m
5.650	968,262.609496m	648,050.449770m
5.675	968,271.340560m	648,073.872800m
5.700	968,278.890049m	648,097.702928m
5.725	968,285.239093m	648,121.880592m
5.750	968,290.714983m	648,146.273377m
5.775	968,296.152482m	648,170.674886m
5.800	968,301.589980m	648,195.076394m
5.825	968,307.027479m	648,219.477902m
5.850	968,312.464977m	648,243.879411m
5.875	968,317.902476m	648,268.280919m
5.900	968,323.339974m	648,292.682427m
5.925	968,328.777473m	648,317.083936m
5.950	968,334.214971m	648,341.485444m
5.975	968,339.652470m	648,365.886952m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

6.000	968,345.089968m	648,390.288461m
6.025	968,350.623362m	648,414.668314m
6.050	968,356.381563m	648,438.996048m
6.075	968,362.364770m	648,463.269424m
6.100	968,368.572471m	648,487.486360m
6.125	968,375.004134m	648,511.644779m
6.150	968,381.659207m	648,535.742612m
6.175	968,388.537119m	648,559.777792m
6.200	968,395.637282m	648,583.748257m
6.225	968,402.959086m	648,607.651954m
6.250	968,410.501903m	648,631.486833m
6.275	968,418.265087m	648,655.250850m
6.300	968,426.247972m	648,678.941968m
6.325	968,434.449874m	648,702.558156m
6.350	968,442.870090m	648,726.097389m
6.375	968,451.507898m	648,749.557650m
6.400	968,460.362556m	648,772.936926m
6.425	968,469.433307m	648,796.233213m
6.450	968,478.719373m	648,819.444515m
6.475	968,488.219957m	648,842.568841m
6.500	968,497.934244m	648,865.604208m
6.525	968,507.861403m	648,888.548642m
6.550	968,518.000581m	648,911.400176m
6.575	968,528.350910m	648,934.156850m
6.600	968,538.911503m	648,956.816714m
6.625	968,549.681453m	648,979.377825m
6.650	968,560.659837m	649,001.838248m
6.675	968,571.845715m	649,024.196058m
6.700	968,583.238128m	649,046.449338m
6.725	968,594.813778m	649,068.607919m
6.750	968,606.418600m	649,090.751272m
6.775	968,618.023423m	649,112.894625m
6.800	968,629.628245m	649,135.037978m
6.825	968,641.233068m	649,157.181332m
6.850	968,652.837890m	649,179.324685m
6.875	968,664.442713m	649,201.468038m
6.900	968,676.047535m	649,223.611392m
6.925	968,687.652358m	649,245.754745m
6.950	968,699.257180m	649,267.898098m
6.975	968,710.862003m	649,290.041451m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

7.000	968,722.466825m	649,312.184805m
7.025	968,734.071648m	649,334.328158m
7.050	968,745.676470m	649,356.471511m
7.075	968,756.712653m	649,378.898466m
7.100	968,766.140101m	649,402.047063m
7.125	968,773.891444m	649,425.809449m
7.150	968,779.942617m	649,450.061070m
7.175	968,785.341897m	649,474.471063m
7.200	968,790.741177m	649,498.881057m
7.225	968,796.140456m	649,523.291050m
7.250	968,801.539736m	649,547.701043m
7.275	968,806.939016m	649,572.111037m
7.300	968,812.338296m	649,596.521030m
7.325	968,817.737576m	649,620.931024m
7.350	968,823.136855m	649,645.341017m
7.375	968,828.536135m	649,669.751010m
7.400	968,833.935415m	649,694.161004m
7.425	968,839.334695m	649,718.570997m
7.450	968,844.733974m	649,742.980991m
7.475	968,850.133254m	649,767.390984m
7.500	968,855.532534m	649,791.800977m
7.525	968,860.931814m	649,816.210971m
7.550	968,866.331093m	649,840.620964m
7.575	968,871.730373m	649,865.030958m
7.600	968,877.129653m	649,889.440951m
7.625	968,882.528933m	649,913.850944m
7.650	968,887.928213m	649,938.260938m
7.675	968,893.327492m	649,962.670931m
7.700	968,898.726772m	649,987.080925m
7.725	968,904.126052m	650,011.490918m
7.750	968,909.525332m	650,035.900911m
7.775	968,914.924611m	650,060.310905m
7.800	968,920.323891m	650,084.720898m
7.825	968,925.723171m	650,109.130892m
7.850	968,931.122451m	650,133.540885m
7.875	968,936.521731m	650,157.950878m
7.900	968,941.921010m	650,182.360872m
7.925	968,947.320290m	650,206.770865m
7.950	968,952.719570m	650,231.180859m
7.975	968,958.118850m	650,255.590852m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

8.000	968,963.518129m	650,280.000845m
8.025	968,968.917409m	650,304.410839m
8.050	968,974.316689m	650,328.820832m
8.075	968,979.715969m	650,353.230826m
8.100	968,985.115249m	650,377.640819m
8.125	968,990.514528m	650,402.050812m
8.150	968,995.913808m	650,426.460806m
8.175	969,001.313088m	650,450.870799m
8.200	969,006.712368m	650,475.280793m
8.225	969,012.111647m	650,499.690786m
8.250	969,017.510927m	650,524.100779m
8.275	969,022.910207m	650,548.510773m
8.300	969,028.309487m	650,572.920766m
8.325	969,034.383547m	650,597.165363m
8.350	969,042.421108m	650,620.830443m
8.375	969,052.400586m	650,643.744378m
8.400	969,064.252718m	650,665.748135m
8.425	969,077.679789m	650,686.833683m
8.450	969,091.327735m	650,707.779650m
8.475	969,104.975681m	650,728.725618m
8.500	969,118.623627m	650,749.671586m
8.525	969,132.179965m	650,770.676247m
8.550	969,144.685822m	650,792.319026m
8.575	969,155.849575m	650,814.683664m
8.600	969,165.629727m	650,837.687033m
8.625	969,173.989929m	650,861.243633m
8.650	969,180.899105m	650,885.265907m
8.675	969,186.331576m	650,909.664568m
8.700	969,190.267149m	650,934.348928m
8.725	969,193.142822m	650,959.182834m
8.750	969,195.979025m	650,984.021432m
8.775	969,198.815229m	651,008.860030m
8.800	969,201.651432m	651,033.698628m
8.825	969,204.487635m	651,058.537226m
8.850	969,207.323839m	651,083.375824m
8.875	969,210.160042m	651,108.214422m
8.900	969,212.996245m	651,133.053020m
8.925	969,215.832449m	651,157.891618m
8.950	969,218.668652m	651,182.730216m
8.975	969,221.563899m	651,207.561791m
9.000	969,225.265088m	651,232.284468m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

9.025	969,229.992878m	651,256.831517m
9.050	969,235.739062m	651,281.160326m
9.075	969,242.256928m	651,305.295548m
9.100	969,248.823999m	651,329.417604m
9.125	969,255.391070m	651,353.539660m
9.150	969,261.958141m	651,377.661716m
9.175	969,268.525212m	651,401.783772m
9.200	969,275.092283m	651,425.905827m
9.225	969,281.659354m	651,450.027883m
9.250	969,288.226425m	651,474.149939m
9.275	969,294.793496m	651,498.271995m
9.300	969,301.360567m	651,522.394051m
9.325	969,307.927638m	651,546.516107m
9.350	969,314.494709m	651,570.638162m
9.375	969,321.061780m	651,594.760218m
9.400	969,327.628851m	651,618.882274m
9.425	969,334.195922m	651,643.004330m
9.450	969,340.762993m	651,667.126386m
9.475	969,347.330064m	651,691.248442m
9.500	969,353.897135m	651,715.370497m
9.525	969,360.464206m	651,739.492553m
9.550	969,367.125214m	651,763.588623m
9.575	969,374.217889m	651,787.560997m
9.600	969,381.770231m	651,811.392549m
9.625	969,389.779447m	651,835.074466m
9.650	969,398.242575m	651,858.597990m
9.675	969,407.156487m	651,881.954422m
9.700	969,416.517884m	651,905.135125m
9.725	969,426.323306m	651,928.131526m
9.750	969,436.569126m	651,950.935120m
9.775	969,447.251555m	651,973.537475m
9.800	969,458.366643m	651,995.930232m
9.825	969,469.910279m	652,018.105110m
9.850	969,481.878194m	652,040.053908m
9.875	969,494.265963m	652,061.768510m
9.900	969,507.069003m	652,083.240885m
9.925	969,520.282581m	652,104.463092m
9.950	969,533.901810m	652,125.427284m
9.975	969,547.921654m	652,146.125707m
10.000	969,562.336927m	652,166.550708m
10.025	969,577.142299m	652,186.694732m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

10.050	969,592.332295m	652,206.550330m
10.075	969,607.897974m	652,226.112846m
10.100	969,623.604755m	652,245.562706m
10.125	969,639.311536m	652,265.012565m
10.150	969,655.018317m	652,284.462425m
10.175	969,670.725098m	652,303.912285m
10.200	969,686.431878m	652,323.362144m
10.225	969,702.138659m	652,342.812004m
10.250	969,717.845440m	652,362.261863m
10.275	969,733.552221m	652,381.711723m
10.300	969,749.276833m	652,401.147048m
10.325	969,766.180365m	652,419.552210m
10.350	969,784.618208m	652,436.431088m
10.375	969,803.253591m	652,453.096097m
10.400	969,821.888973m	652,469.761105m
10.425	969,840.524356m	652,486.426114m
10.450	969,859.159739m	652,503.091123m
10.475	969,877.795121m	652,519.756131m
10.500	969,896.430504m	652,536.421140m
10.525	969,915.065887m	652,553.086149m
10.550	969,933.701269m	652,569.751157m
10.575	969,952.336652m	652,586.416166m
10.600	969,970.972035m	652,603.081175m
10.625	969,989.607417m	652,619.746183m
10.650	970,008.242800m	652,636.411192m
10.675	970,026.878182m	652,653.076201m
10.700	970,045.498179m	652,669.758331m
10.725	970,063.771436m	652,686.818403m
10.750	970,081.552724m	652,704.390647m
10.775	970,098.827692m	652,722.460883m
10.800	970,115.582400m	652,741.014528m
10.825	970,131.803326m	652,760.036608m
10.850	970,147.477379m	652,779.511772m
10.875	970,162.591910m	652,799.424304m
10.900	970,177.134722m	652,819.758133m
10.925	970,191.094077m	652,840.496849m
10.950	970,204.458711m	652,861.623717m
10.975	970,217.217838m	652,883.121685m
11.000	970,229.361160m	652,904.973406m
11.025	970,240.878879m	652,927.161243m
11.050	970,251.761698m	652,949.667291m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

11.075	970,262.054911m	652,972.449529m
11.100	970,272.234728m	652,995.283086m
11.125	970,282.414546m	653,018.116643m
11.150	970,292.594363m	653,040.950200m
11.175	970,302.774181m	653,063.783757m
11.200	970,313.008852m	653,086.592517m
11.225	970,324.104067m	653,108.992651m
11.250	970,336.304956m	653,130.810261m
11.275	970,349.581023m	653,151.990815m
11.300	970,363.899085m	653,172.481372m
11.325	970,379.223354m	653,192.230715m
11.350	970,395.515527m	653,211.189484m
11.375	970,412.734883m	653,229.310289m
11.400	970,430.838382m	653,246.547839m
11.425	970,449.780775m	653,262.859048m
11.450	970,469.514715m	653,278.203148m
11.475	970,489.990879m	653,292.541786m
11.500	970,511.158085m	653,305.839123m
11.525	970,532.963428m	653,318.061921m
11.550	970,555.352406m	653,329.179632m
11.575	970,578.269057m	653,339.164466m
11.600	970,601.656102m	653,347.991466m
11.625	970,625.455085m	653,355.638570m
11.650	970,649.606522m	653,362.086664m
11.675	970,674.050046m	653,367.319630m
11.700	970,698.724561m	653,371.324389m
11.725	970,723.568394m	653,374.090932m
11.750	970,748.519448m	653,375.612343m
11.775	970,773.515359m	653,375.884820m
11.800	970,798.493650m	653,374.907682m
11.825	970,823.391888m	653,372.683370m
11.850	970,848.147840m	653,369.217445m
11.875	970,872.714296m	653,364.589923m
11.900	970,897.230605m	653,359.695990m
11.925	970,921.746914m	653,354.802057m
11.950	970,946.263223m	653,349.908124m
11.975	970,970.779533m	653,345.014191m
12.000	970,995.295842m	653,340.120258m
12.025	971,019.812151m	653,335.226325m
12.050	971,044.328460m	653,330.332392m
12.075	971,068.844770m	653,325.438459m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

12.100	971,093.361079m	653,320.544526m
12.125	971,117.877388m	653,315.650593m
12.150	971,142.393697m	653,310.756660m
12.175	971,166.910007m	653,305.862727m
12.200	971,191.426316m	653,300.968794m
12.225	971,215.942625m	653,296.074861m
12.250	971,240.484304m	653,291.310979m
12.275	971,265.098730m	653,286.938759m
12.300	971,289.780887m	653,282.966682m
12.325	971,314.524271m	653,279.395795m
12.350	971,339.322361m	653,276.227040m
12.375	971,364.168622m	653,273.461251m
12.400	971,389.056506m	653,271.099156m
12.425	971,413.979455m	653,269.141380m
12.450	971,438.930901m	653,267.588437m
12.475	971,463.904268m	653,266.440737m
12.500	971,488.892975m	653,265.698582m
12.525	971,513.890437m	653,265.362167m
12.550	971,538.890066m	653,265.431583m
12.575	971,563.885274m	653,265.906809m
12.600	971,588.869475m	653,266.787721m
12.625	971,613.836083m	653,268.074087m
12.650	971,638.778520m	653,269.765568m
12.675	971,663.690213m	653,271.861718m
12.700	971,688.564596m	653,274.361985m
12.725	971,713.395115m	653,277.265709m
12.750	971,738.175225m	653,280.572126m
12.775	971,762.898398m	653,284.280364m
12.800	971,787.558116m	653,288.389446m
12.825	971,812.147883m	653,292.898289m
12.850	971,836.661217m	653,297.805705m
12.875	971,861.091658m	653,303.110400m
12.900	971,885.432769m	653,308.810978m
12.925	971,909.678135m	653,314.905934m
12.950	971,933.821367m	653,321.393664m
12.975	971,957.856102m	653,328.272458m
13.000	971,981.776006m	653,335.540502m
13.025	972,005.574776m	653,343.195881m
13.050	972,029.246139m	653,351.236579m
13.075	972,052.783859m	653,359.660475m
13.100	972,076.181731m	653,368.465351m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

13.125	972,099.433591m	653,377.648885m
13.150	972,122.533310m	653,387.208658m
13.175	972,145.474801m	653,397.142151m
13.200	972,168.252018m	653,407.446744m
13.225	972,190.858959m	653,418.119724m
13.250	972,213.289666m	653,429.158278m
13.275	972,235.538228m	653,440.559495m
13.300	972,257.598782m	653,452.320373m
13.325	972,279.465514m	653,464.437810m
13.350	972,301.132662m	653,476.908615m
13.375	972,322.594515m	653,489.729501m
13.400	972,343.845419m	653,502.897089m
13.425	972,364.879772m	653,516.407909m
13.450	972,385.692032m	653,530.258401m
13.475	972,406.276714m	653,544.444913m
13.500	972,426.628393m	653,558.963709m
13.525	972,446.741706m	653,573.810962m
13.550	972,466.611352m	653,588.982759m
13.575	972,486.232096m	653,604.475102m
13.600	972,505.598767m	653,620.283908m
13.625	972,524.706260m	653,636.405011m
13.650	972,543.645547m	653,652.723812m
13.675	972,562.581815m	653,669.046120m
13.700	972,581.518084m	653,685.368428m
13.725	972,600.454352m	653,701.690736m
13.750	972,619.390621m	653,718.013044m
13.775	972,638.326889m	653,734.335351m
13.800	972,657.263158m	653,750.657659m
13.825	972,676.199426m	653,766.979967m
13.850	972,695.135695m	653,783.302275m
13.875	972,714.071963m	653,799.624583m
13.900	972,733.008232m	653,815.946891m
13.925	972,751.944500m	653,832.269199m
13.950	972,770.880769m	653,848.591507m
13.975	972,789.817037m	653,864.913814m
14.000	972,808.753306m	653,881.236122m
14.025	972,827.689574m	653,897.558430m
14.050	972,846.625843m	653,913.880738m
14.075	972,865.562113m	653,930.203044m
14.100	972,885.284339m	653,945.549481m
14.125	972,906.440124m	653,958.850312m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

14.150	972,928.818086m	653,969.972640m
14.175	972,952.194631m	653,978.805335m
14.200	972,976.336188m	653,985.260142m
14.225	973,001.001544m	653,989.272568m
14.250	973,025.944250m	653,990.802522m
14.275	973,050.915087m	653,989.834717m
14.300	973,075.664554m	653,986.378823m
14.325	973,099.945364m	653,980.469370m
14.350	973,123.828001m	653,973.079087m
14.375	973,147.705296m	653,965.671334m
14.400	973,171.582590m	653,958.263582m
14.425	973,195.459885m	653,950.855829m
14.450	973,219.339932m	653,943.457032m
14.475	973,243.547943m	653,937.243287m
14.500	973,268.189159m	653,933.066104m
14.525	973,293.092561m	653,930.954476m
14.550	973,318.085308m	653,930.923058m
14.575	973,342.993940m	653,932.972069m
14.600	973,367.645580m	653,937.087286m
14.625	973,391.869136m	653,943.240150m
14.650	973,415.496486m	653,951.387955m
14.675	973,438.363646m	653,961.474154m
14.700	973,460.311907m	653,973.428744m
14.725	973,481.188940m	653,987.168754m
14.750	973,500.909589m	654,002.526501m
14.775	973,520.316343m	654,018.286511m
14.800	973,539.723097m	654,034.046520m
14.825	973,559.129851m	654,049.806529m
14.850	973,578.536606m	654,065.566538m
14.875	973,597.943360m	654,081.326547m
14.900	973,617.350114m	654,097.086556m
14.925	973,636.756868m	654,112.846566m
14.950	973,656.163623m	654,128.606575m
14.975	973,675.570377m	654,144.366584m
15.000	973,694.977131m	654,160.126593m
15.025	973,714.383885m	654,175.886602m
15.050	973,733.790640m	654,191.646612m
15.075	973,753.198786m	654,207.404902m
15.100	973,773.075991m	654,222.562063m
15.125	973,793.755591m	654,236.604744m
15.150	973,815.175172m	654,249.490564m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

15.175	973,837.270084m	654,261.180630m
15.200	973,859.973641m	654,271.639659m
15.225	973,883.217318m	654,280.836084m
15.250	973,906.930963m	654,288.742148m
15.275	973,931.043001m	654,295.333988m
15.300	973,955.480660m	654,300.591711m
15.325	973,980.170179m	654,304.499445m
15.350	974,005.037043m	654,307.045399m
15.375	974,030.006197m	654,308.221886m
15.400	974,055.002280m	654,308.025356m
15.425	974,079.949848m	654,306.456403m
15.450	974,104.773605m	654,303.519761m
15.475	974,129.398628m	654,299.224295m
15.500	974,153.750593m	654,293.582969m
15.525	974,177.756002m	654,286.612808m
15.550	974,201.342401m	654,278.334852m
15.575	974,224.438694m	654,268.774291m
15.600	974,247.276591m	654,258.604213m
15.625	974,270.114487m	654,248.434135m
15.650	974,292.952384m	654,238.264057m
15.675	974,315.790280m	654,228.093980m
15.700	974,338.628177m	654,217.923902m
15.725	974,361.466073m	654,207.753824m
15.750	974,384.303970m	654,197.583746m
15.775	974,407.335125m	654,187.864629m
15.800	974,430.783077m	654,179.199417m
15.825	974,454.600549m	654,171.608603m
15.850	974,478.738338m	654,165.107869m
15.875	974,503.146581m	654,159.710644m
15.900	974,527.774858m	654,155.428077m
15.925	974,552.572292m	654,152.269016m
15.950	974,577.487657m	654,150.239985m
15.975	974,602.469485m	654,149.345177m
16.000	974,627.466169m	654,149.586440m
16.025	974,652.445884m	654,150.592051m
16.050	974,677.424807m	654,151.618399m
16.075	974,702.403731m	654,152.644746m
16.100	974,727.382654m	654,153.671094m
16.125	974,752.361577m	654,154.697441m
16.150	974,777.340501m	654,155.723789m
16.175	974,802.319424m	654,156.750136m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

16.200	974,827.298347m	654,157.776484m
16.225	974,852.277271m	654,158.802831m
16.250	974,877.256194m	654,159.829179m
16.275	974,902.235117m	654,160.855526m
16.300	974,927.214041m	654,161.881874m
16.325	974,952.192964m	654,162.908221m
16.350	974,977.171887m	654,163.934569m
16.375	975,002.150811m	654,164.960916m
16.400	975,027.129734m	654,165.987264m
16.425	975,052.108657m	654,167.013611m
16.450	975,077.087581m	654,168.039959m
16.475	975,102.066504m	654,169.066306m
16.500	975,127.045427m	654,170.092654m
16.525	975,152.024351m	654,171.119001m
16.550	975,177.003274m	654,172.145349m
16.575	975,201.982197m	654,173.171696m
16.600	975,226.961120m	654,174.198044m
16.625	975,251.940044m	654,175.224391m
16.650	975,276.918967m	654,176.250739m
16.675	975,301.897890m	654,177.277086m
16.700	975,326.876814m	654,178.303434m
16.725	975,351.855737m	654,179.329781m
16.750	975,376.834660m	654,180.356129m
16.775	975,401.813584m	654,181.382476m
16.800	975,426.799563m	654,182.200740m
16.825	975,451.798358m	654,182.342399m
16.850	975,476.791443m	654,181.789682m
16.875	975,501.759536m	654,180.543015m
16.900	975,526.683371m	654,178.603359m
16.925	975,551.543718m	654,175.972213m
16.950	975,576.321397m	654,172.651605m
16.975	975,600.997290m	654,168.644097m
17.000	975,625.552358m	654,163.952782m
17.025	975,649.967656m	654,158.581280m
17.050	975,674.224346m	654,152.533734m
17.075	975,698.303713m	654,145.814811m
17.100	975,722.187177m	654,138.429695m
17.125	975,745.856312m	654,130.384083m
17.150	975,769.292855m	654,121.684184m
17.175	975,792.478725m	654,112.336710m
17.200	975,815.396031m	654,102.348873m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

17.225	975,838.027092m	654,091.728378m
17.250	975,860.354446m	654,080.483421m
17.275	975,882.360868m	654,068.622678m
17.300	975,904.029377m	654,056.155300m
17.325	975,925.343255m	654,043.090905m
17.350	975,946.286058m	654,029.439574m
17.375	975,966.841626m	654,015.211840m
17.400	975,986.994101m	654,000.418681m
17.425	976,006.727933m	653,985.071509m
17.450	976,026.027896m	653,969.182166m
17.475	976,044.879101m	653,952.762911m
17.500	976,063.314168m	653,935.877049m
17.525	976,081.677433m	653,918.912660m
17.550	976,100.040699m	653,901.948271m
17.575	976,118.403964m	653,884.983883m
17.600	976,136.767229m	653,868.019494m
17.625	976,155.130495m	653,851.055105m
17.650	976,173.493760m	653,834.090717m
17.675	976,191.857026m	653,817.126328m
17.700	976,210.220291m	653,800.161939m
17.725	976,228.583556m	653,783.197551m
17.750	976,246.983110m	653,766.272830m
17.775	976,266.002661m	653,750.051656m
17.800	976,285.809163m	653,734.801335m
17.825	976,306.353111m	653,720.559986m
17.850	976,327.583154m	653,707.363204m
17.875	976,349.446230m	653,695.243975m
17.900	976,371.887692m	653,684.232590m
17.925	976,394.851447m	653,674.356572m
17.950	976,418.280099m	653,665.640606m
17.975	976,441.924664m	653,657.520596m
18.000	976,465.569239m	653,649.400617m
18.025	976,489.213814m	653,641.280638m
18.050	976,512.858390m	653,633.160658m
18.075	976,536.502965m	653,625.040679m
18.100	976,560.147540m	653,616.920700m
18.125	976,583.792115m	653,608.800721m
18.150	976,607.436691m	653,600.680741m
18.175	976,631.081266m	653,592.560762m
18.200	976,654.725841m	653,584.440783m
18.225	976,678.370416m	653,576.320803m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

18.250	976,702.014991m	653,568.200824m
18.275	976,725.659567m	653,560.080845m
18.300	976,749.304142m	653,551.960866m
18.325	976,772.948717m	653,543.840886m
18.350	976,796.593292m	653,535.720907m
18.375	976,820.237867m	653,527.600928m
18.400	976,843.882443m	653,519.480949m
18.425	976,867.527018m	653,511.360969m
18.450	976,891.171593m	653,503.240990m
18.475	976,914.816168m	653,495.121011m
18.500	976,938.460743m	653,487.001031m
18.525	976,962.105319m	653,478.881052m
18.550	976,985.749894m	653,470.761073m
18.575	977,009.394469m	653,462.641094m
18.600	977,033.039044m	653,454.521114m
18.625	977,056.683619m	653,446.401135m
18.650	977,080.328195m	653,438.281156m
18.675	977,103.972770m	653,430.161177m
18.700	977,127.659702m	653,422.168661m
18.725	977,151.817541m	653,415.762632m
18.750	977,176.424765m	653,411.389656m
18.775	977,201.310590m	653,409.080085m
18.800	977,226.302297m	653,408.849949m
18.825	977,251.226434m	653,410.700843m
18.850	977,275.914214m	653,414.598211m
18.875	977,300.478453m	653,419.245595m
18.900	977,325.042691m	653,423.892979m
18.925	977,349.606930m	653,428.540364m
18.950	977,374.171169m	653,433.187748m
18.975	977,398.735407m	653,437.835132m
19.000	977,423.299646m	653,442.482517m
19.025	977,447.863885m	653,447.129901m
19.050	977,472.428123m	653,451.777285m
19.075	977,496.992362m	653,456.424669m
19.100	977,521.556600m	653,461.072054m
19.125	977,546.120839m	653,465.719438m
19.150	977,570.685078m	653,470.366822m
19.175	977,595.249316m	653,475.014207m
19.200	977,619.813555m	653,479.661591m
19.225	977,644.377793m	653,484.308975m
19.250	977,668.942032m	653,488.956360m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

19.275	977,693.506271m	653,493.603744m
19.300	977,718.070509m	653,498.251128m
19.325	977,742.634748m	653,502.898512m
19.350	977,767.198987m	653,507.545897m
19.375	977,791.763225m	653,512.193281m
19.400	977,816.327464m	653,516.840665m
19.425	977,840.891702m	653,521.488050m
19.450	977,865.455941m	653,526.135434m
19.475	977,890.020180m	653,530.782818m
19.500	977,914.584418m	653,535.430203m
19.525	977,939.148657m	653,540.077587m
19.550	977,963.712896m	653,544.724971m
19.575	977,988.277134m	653,549.372356m
19.600	978,012.841373m	653,554.019740m
19.625	978,037.405611m	653,558.667124m
19.650	978,061.969850m	653,563.314508m
19.675	978,086.534089m	653,567.961893m
19.700	978,111.098327m	653,572.609277m
19.725	978,135.662566m	653,577.256661m
19.750	978,160.226805m	653,581.904046m
19.775	978,184.791043m	653,586.551430m
19.800	978,209.355282m	653,591.198814m
19.825	978,233.919520m	653,595.846199m
19.850	978,258.483759m	653,600.493583m
19.875	978,283.047998m	653,605.140967m
19.900	978,307.612236m	653,609.788351m
19.925	978,332.176475m	653,614.435736m
19.950	978,356.740714m	653,619.083120m
19.975	978,381.304952m	653,623.730504m
20.000	978,405.869191m	653,628.377889m
20.025	978,430.433429m	653,633.025273m
20.050	978,454.997668m	653,637.672657m
20.075	978,479.561907m	653,642.320042m
20.100	978,504.126145m	653,646.967426m
20.125	978,528.690384m	653,651.614810m
20.150	978,553.254623m	653,656.262195m
20.175	978,577.818861m	653,660.909579m
20.200	978,602.383100m	653,665.556963m
20.225	978,626.947338m	653,670.204347m
20.250	978,651.511577m	653,674.851732m
20.275	978,676.075816m	653,679.499116m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

20.300	978,700.640054m	653,684.146500m
20.325	978,725.204293m	653,688.793885m
20.350	978,749.729651m	653,693.634883m
20.375	978,773.907935m	653,699.970882m
20.400	978,797.750981m	653,707.487593m
20.425	978,821.582384m	653,715.041680m
20.450	978,845.413786m	653,722.595768m
20.475	978,869.245189m	653,730.149855m
20.500	978,893.076592m	653,737.703943m
20.525	978,916.907995m	653,745.258030m
20.550	978,940.739398m	653,752.812118m
20.575	978,964.570801m	653,760.366206m
20.600	978,988.402203m	653,767.920293m
20.625	979,012.233606m	653,775.474381m
20.650	979,036.065009m	653,783.028468m
20.675	979,059.896412m	653,790.582556m
20.700	979,083.727815m	653,798.136644m
20.725	979,107.559218m	653,805.690731m
20.750	979,131.390620m	653,813.244819m
20.775	979,155.222023m	653,820.798906m
20.800	979,179.053426m	653,828.352994m
20.825	979,202.884829m	653,835.907081m
20.850	979,226.716232m	653,843.461169m
20.875	979,250.547635m	653,851.015257m
20.900	979,274.379037m	653,858.569344m
20.925	979,298.210440m	653,866.123432m
20.950	979,322.041843m	653,873.677519m
20.975	979,345.873246m	653,881.231607m
21.000	979,369.704649m	653,888.785695m
21.025	979,393.536051m	653,896.339782m
21.050	979,417.367454m	653,903.893870m
21.075	979,441.198857m	653,911.447957m
21.100	979,465.030260m	653,919.002045m
21.125	979,488.861663m	653,926.556132m
21.150	979,512.693066m	653,934.110220m
21.175	979,536.524468m	653,941.664308m
21.200	979,560.355871m	653,949.218395m
21.225	979,584.187274m	653,956.772483m
21.250	979,608.018677m	653,964.326570m
21.275	979,631.850080m	653,971.880658m
21.300	979,655.681483m	653,979.434745m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

21.325	979,679.512885m	653,986.988833m
21.350	979,703.344288m	653,994.542921m
21.375	979,727.175691m	654,002.097008m
21.400	979,751.007094m	654,009.651096m
21.425	979,774.838497m	654,017.205183m
21.450	979,798.669900m	654,024.759271m
21.475	979,822.501302m	654,032.313359m
21.500	979,846.332705m	654,039.867446m
21.525	979,870.164108m	654,047.421534m
21.550	979,893.501539m	654,056.341002m
21.575	979,915.545687m	654,068.098643m
21.600	979,935.951959m	654,082.512896m
21.625	979,954.401921m	654,099.358831m
21.650	979,970.607668m	654,118.373572m
21.675	979,984.316315m	654,139.260402m
21.700	979,995.313942m	654,161.693387m
21.725	980,003.428936m	654,185.322468m
21.750	980,008.990658m	654,209.691822m
21.775	980,014.237638m	654,234.135005m
21.800	980,019.484619m	654,258.578188m
21.825	980,024.731600m	654,283.021371m
21.850	980,029.978580m	654,307.464554m
21.875	980,035.225561m	654,331.907737m
21.900	980,040.472541m	654,356.350920m
21.925	980,045.719522m	654,380.794103m
21.950	980,050.966503m	654,405.237286m
21.975	980,056.213483m	654,429.680469m
22.000	980,061.460464m	654,454.123652m
22.025	980,066.707444m	654,478.566835m
22.050	980,071.954425m	654,503.010018m
22.075	980,077.201405m	654,527.453201m
22.100	980,082.448386m	654,551.896384m
22.125	980,087.695367m	654,576.339567m
22.150	980,092.942347m	654,600.782750m
22.175	980,098.189328m	654,625.225933m
22.200	980,103.436308m	654,649.669116m
22.225	980,108.683289m	654,674.112299m
22.250	980,113.930270m	654,698.555482m
22.275	980,119.177250m	654,722.998665m
22.300	980,124.424231m	654,747.441848m
22.325	980,129.677841m	654,771.883592m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

22.350	980,136.099212m	654,796.037358m
22.375	980,144.508784m	654,819.572810m
22.400	980,154.848191m	654,842.326602m
22.425	980,167.045674m	654,864.140813m
22.450	980,181.016577m	654,884.864043m
22.475	980,196.663935m	654,904.352464m
22.500	980,213.879150m	654,922.470819m
22.525	980,232.149678m	654,939.534526m
22.550	980,250.463715m	654,956.552048m
22.575	980,268.777751m	654,973.569570m
22.600	980,287.091788m	654,990.587092m
22.625	980,305.405825m	655,007.604614m
22.650	980,323.719862m	655,024.622136m
22.675	980,342.033899m	655,041.639658m
22.700	980,360.347935m	655,058.657180m
22.725	980,378.661972m	655,075.674702m
22.750	980,396.976009m	655,092.692224m
22.775	980,415.424294m	655,109.561698m
22.800	980,435.005622m	655,125.092634m
22.825	980,455.374233m	655,139.588033m
22.850	980,475.753646m	655,154.068348m
22.875	980,496.133059m	655,168.548663m
22.900	980,516.512472m	655,183.028979m
22.925	980,536.891885m	655,197.509294m
22.950	980,557.271298m	655,211.989609m
22.975	980,577.650710m	655,226.469925m
23.000	980,598.030123m	655,240.950240m
23.025	980,618.409536m	655,255.430555m
23.050	980,638.788949m	655,269.910871m
23.075	980,659.168362m	655,284.391186m
23.100	980,679.547775m	655,298.871501m
23.125	980,699.927187m	655,313.351817m
23.150	980,720.306600m	655,327.832132m
23.175	980,740.686013m	655,342.312447m
23.200	980,761.065426m	655,356.792763m
23.225	980,781.444839m	655,371.273078m
23.250	980,801.824252m	655,385.753393m
23.275	980,822.203665m	655,400.233709m
23.300	980,842.583077m	655,414.714024m
23.325	980,862.962490m	655,429.194339m
23.350	980,883.341903m	655,443.674655m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

23.375	980,903.721316m	655,458.154970m
23.400	980,924.564352m	655,471.950532m
23.425	980,946.314147m	655,484.266996m
23.450	980,968.866142m	655,495.044585m
23.475	980,992.111621m	655,504.231344m
23.500	981,015.938529m	655,511.782989m
23.525	981,040.232005m	655,517.663115m
23.550	981,064.873892m	655,521.850948m
23.575	981,089.629891m	655,525.335269m
23.600	981,114.385891m	655,528.819590m
23.625	981,139.141890m	655,532.303911m
23.650	981,163.897890m	655,535.788232m
23.675	981,188.653889m	655,539.272553m
23.700	981,213.409888m	655,542.756874m
23.725	981,238.165888m	655,546.241196m
23.750	981,262.921887m	655,549.725517m
23.775	981,287.677887m	655,553.209838m
23.800	981,312.433886m	655,556.694159m
23.825	981,337.189885m	655,560.178480m
23.850	981,361.945885m	655,563.662801m
23.875	981,386.701884m	655,567.147122m
23.900	981,411.457884m	655,570.631443m
23.925	981,436.213883m	655,574.115765m
23.950	981,460.969882m	655,577.600086m
23.975	981,485.725882m	655,581.084407m
24.000	981,510.481881m	655,584.568728m
24.025	981,535.237881m	655,588.053049m
24.050	981,559.993880m	655,591.537370m
24.075	981,584.749879m	655,595.021691m
24.100	981,609.505879m	655,598.506012m
24.125	981,634.261878m	655,601.990334m
24.150	981,659.017878m	655,605.474655m
24.175	981,683.773877m	655,608.958976m
24.200	981,708.529876m	655,612.443297m
24.225	981,733.285876m	655,615.927618m
24.250	981,758.041875m	655,619.411939m
24.275	981,782.797875m	655,622.896260m
24.300	981,807.553874m	655,626.380581m
24.325	981,832.411957m	655,628.932443m
24.350	981,857.397417m	655,628.698926m
24.375	981,882.195250m	655,625.633765m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

24.400	981,906.485580m	655,619.776498m
24.425	981,929.955079m	655,611.202681m
24.450	981,952.301006m	655,600.022910m
24.475	981,973.235113m	655,586.381397m
24.500	981,992.487364m	655,570.454107m
24.525	982,009.809418m	655,552.446493m
24.550	982,024.977832m	655,532.590841m
24.575	982,037.812831m	655,511.151757m
24.600	982,049.682039m	655,489.148987m
24.625	982,061.551247m	655,467.146216m
24.650	982,073.420455m	655,445.143446m
24.675	982,085.289662m	655,423.140675m
24.700	982,097.158870m	655,401.137905m
24.725	982,109.028078m	655,379.135134m
24.750	982,120.897285m	655,357.132364m
24.775	982,133.202305m	655,335.377509m
24.800	982,147.700778m	655,315.027521m
24.825	982,164.413266m	655,296.452794m
24.850	982,183.124189m	655,279.892930m
24.875	982,203.026578m	655,264.764040m
24.900	982,222.954041m	655,249.667808m
24.925	982,242.881504m	655,234.571576m
24.950	982,262.576518m	655,219.178174m
24.975	982,281.194101m	655,202.501247m
25.000	982,298.574014m	655,184.538148m
25.025	982,314.627622m	655,165.380486m
25.050	982,329.273053m	655,145.125964m
25.075	982,342.435617m	655,123.877877m
25.100	982,354.048188m	655,101.744587m
25.125	982,364.447117m	655,079.010494m
25.150	982,374.770619m	655,056.241539m
25.175	982,385.094121m	655,033.472584m
25.200	982,395.417624m	655,010.703629m
25.225	982,405.741126m	654,987.934675m
25.250	982,416.064628m	654,965.165720m
25.275	982,426.564819m	654,942.479887m
25.300	982,439.080433m	654,920.853812m
25.325	982,453.967548m	654,900.786387m
25.350	982,470.878626m	654,882.382940m
25.375	982,488.176714m	654,864.333670m
25.400	982,505.474803m	654,846.284401m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

25.425	982,522.772891m	654,828.235131m
25.450	982,539.886838m	654,810.014592m
25.475	982,555.391213m	654,790.416283m
25.500	982,569.564827m	654,769.822645m
25.525	982,583.704648m	654,749.205529m
25.550	982,597.844469m	654,728.588413m
25.575	982,611.984290m	654,707.971298m
25.600	982,626.124111m	654,687.354182m
25.625	982,640.263932m	654,666.737066m
25.650	982,654.403753m	654,646.119951m
25.675	982,668.543575m	654,625.502835m
25.700	982,682.683396m	654,604.885719m
25.725	982,696.823217m	654,584.268604m
25.750	982,710.963038m	654,563.651488m
25.775	982,725.102859m	654,543.034372m
25.800	982,739.242680m	654,522.417257m
25.825	982,753.382501m	654,501.800141m
25.850	982,767.522322m	654,481.183025m
25.875	982,781.662143m	654,460.565910m
25.900	982,795.801965m	654,439.948794m
25.925	982,809.941786m	654,419.331678m
25.950	982,824.081607m	654,398.714563m
25.975	982,838.221428m	654,378.097447m
26.000	982,852.361249m	654,357.480331m
26.025	982,866.501070m	654,336.863216m
26.050	982,880.640891m	654,316.246100m
26.075	982,894.780712m	654,295.628984m
26.100	982,908.920534m	654,275.011869m
26.125	982,923.060355m	654,254.394753m
26.150	982,937.200176m	654,233.777637m
26.175	982,951.339997m	654,213.160522m
26.200	982,965.479818m	654,192.543406m
26.225	982,979.619639m	654,171.926290m
26.250	982,993.759460m	654,151.309175m
26.275	983,007.899281m	654,130.692059m
26.300	983,022.039103m	654,110.074943m
26.325	983,036.178924m	654,089.457828m
26.350	983,050.374042m	654,068.879082m
26.375	983,065.353652m	654,048.867059m
26.400	983,081.314726m	654,029.628714m
26.425	983,098.217370m	654,011.212134m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Setting out points

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

26.450	983,116.019335m	653,993.663349m
26.475	983,134.676125m	653,977.026223m
26.500	983,154.141110m	653,961.342340m
26.525	983,174.365636m	653,946.650902m
26.550	983,195.299152m	653,932.988629m
26.575	983,216.850664m	653,920.321346m
26.600	983,238.534239m	653,907.878574m
26.625	983,260.217814m	653,895.435803m
26.650	983,281.901390m	653,882.993032m
26.675	983,303.584965m	653,870.550260m
26.700	983,325.268541m	653,858.107489m
26.725	983,346.952116m	653,845.664718m
26.750	983,368.635691m	653,833.221946m
26.775	983,390.319267m	653,820.779175m
26.800	983,412.002842m	653,808.336404m
26.825	983,433.686417m	653,795.893632m
26.850	983,455.369993m	653,783.450861m
26.875	983,477.053568m	653,771.008090m
26.900	983,498.737144m	653,758.565318m
26.925	983,520.420719m	653,746.122547m
26.950	983,542.104294m	653,733.679776m
26.975	983,563.787870m	653,721.237004m
26.992	983,578.705715m	653,712.676639m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Vertical profile

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

Station	Elevation
0.000	406.190m
0.025	406.198m
0.050	406.207m
0.075	406.215m
0.100	406.224m
0.125	406.232m
0.150	406.241m
0.175	406.249m
0.200	406.257m
0.225	406.266m
0.250	406.274m
0.275	406.283m
0.300	406.291m
0.325	406.300m
0.350	406.308m
0.353	406.309m
0.375	406.308m
0.397	406.291m
0.400	406.287m
0.425	406.258m
0.450	406.229m
0.475	406.199m
0.500	406.170m
0.525	406.141m
0.550	406.112m
0.575	406.082m
0.600	406.053m
0.625	406.024m
0.650	405.994m
0.675	405.965m
0.687	405.951m
0.700	405.988m
0.713	406.129m
0.725	406.308m
0.728	406.353m
0.750	406.499m
0.772	406.284m
0.775	406.230m
0.787	406.014m
0.800	405.837m
0.813	405.776m

Station	Elevation
0.825	405.773m
0.850	405.767m
0.875	405.761m
0.900	405.755m
0.925	405.749m
0.937	405.746m
0.950	405.805m
0.963	405.987m
0.975	406.212m
0.978	406.268m
1.000	406.503m
1.022	406.381m
1.025	406.341m
1.037	406.177m
1.050	406.040m
1.063	405.984m
1.075	405.970m
1.100	405.940m
1.125	405.910m
1.150	405.880m
1.175	405.851m
1.187	405.836m
1.200	405.855m
1.213	405.942m
1.225	406.055m
1.250	406.289m
1.269	406.463m
1.275	406.513m
1.291	406.556m
1.300	406.526m
1.313	406.421m
1.325	406.282m
1.337	406.146m
1.350	406.040m
1.363	406.012m
1.375	406.023m
1.400	406.047m
1.425	406.070m
1.437	406.082m
1.450	406.111m
1.463	406.174m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Vertical profile

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

Station	Elevation
1.475	406.248m
1.478	406.266m
1.500	406.272m
1.522	406.020m
1.525	405.967m
1.537	405.759m
1.550	405.587m
1.563	405.520m
1.575	405.508m
1.600	405.482m
1.625	405.456m
1.650	405.430m
1.675	405.404m
1.687	405.392m
1.700	405.434m
1.713	405.585m
1.725	405.776m
1.728	405.824m
1.750	406.003m
1.772	405.842m
1.775	405.797m
1.787	405.615m
1.800	405.468m
1.813	405.418m
1.825	405.417m
1.850	405.414m
1.875	405.412m
1.900	405.409m
1.925	405.407m
1.950	405.404m
1.962	405.403m
1.975	405.441m
1.988	405.557m
2.000	405.701m
2.003	405.737m
2.025	405.879m
2.047	405.780m
2.050	405.750m
2.062	405.630m
2.075	405.533m
2.088	405.500m

Station	Elevation
2.100	405.500m
2.125	405.500m
2.150	405.500m
2.175	405.500m
2.187	405.500m
2.200	405.546m
2.213	405.684m
2.225	405.855m
2.228	405.897m
2.250	406.036m
2.272	405.829m
2.275	405.777m
2.287	405.569m
2.300	405.393m
2.313	405.315m
2.325	405.287m
2.350	405.230m
2.375	405.172m
2.400	405.115m
2.425	405.057m
2.437	405.030m
2.450	405.064m
2.463	405.228m
2.475	405.438m
2.478	405.490m
2.500	405.688m
2.522	405.512m
2.525	405.463m
2.537	405.265m
2.550	405.104m
2.563	405.050m
2.575	405.050m
2.600	405.050m
2.625	405.050m
2.650	405.050m
2.675	405.050m
2.687	405.050m
2.700	405.090m
2.700	405.090m
2.713	405.209m
2.725	405.355m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Vertical profile

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

Station	Elevation
2.728	405.392m
2.750	405.516m
2.772	405.351m
2.775	405.309m
2.787	405.141m
2.800	405.011m
2.813	404.987m
2.825	405.014m
2.850	405.070m
2.875	405.126m
2.900	405.182m
2.925	405.238m
2.937	405.265m
2.950	405.335m
2.963	405.488m
2.975	405.668m
2.978	405.713m
3.000	405.927m
3.022	405.912m
3.025	405.894m
3.037	405.823m
3.050	405.759m
3.063	405.722m
3.075	405.699m
3.100	405.651m
3.125	405.604m
3.150	405.556m
3.162	405.533m
3.175	405.557m
3.188	405.678m
3.200	405.834m
3.225	406.159m
3.228	406.198m
3.250	406.324m
3.250	406.324m
3.272	406.130m
3.275	406.082m
3.287	405.889m
3.300	405.729m
3.313	405.669m
3.325	405.659m

Station	Elevation
3.350	405.639m
3.375	405.619m
3.400	405.598m
3.425	405.578m
3.437	405.568m
3.450	405.601m
3.463	405.721m
3.475	405.872m
3.478	405.910m
3.500	406.059m
3.522	405.956m
3.525	405.924m
3.537	405.799m
3.550	405.707m
3.563	405.701m
3.575	405.737m
3.600	405.811m
3.625	405.885m
3.650	405.959m
3.675	406.033m
3.687	406.068m
3.700	406.105m
3.700	406.105m
3.713	406.139m
3.725	406.169m
3.728	406.177m
3.750	406.121m
3.772	405.843m
3.775	405.790m
3.787	405.577m
3.800	405.422m
3.813	405.417m
3.825	405.481m
3.850	405.614m
3.875	405.748m
3.900	405.881m
3.925	406.014m
3.950	406.148m
3.975	406.281m
3.978	406.297m
4.000	406.306m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Vertical profile

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

Station	Elevation
4.000	406.306m
4.022	406.098m
4.025	406.055m
4.037	405.882m
4.050	405.727m
4.063	405.635m
4.075	405.580m
4.100	405.464m
4.125	405.348m
4.150	405.232m
4.175	405.116m
4.187	405.060m
4.200	405.067m
4.200	405.067m
4.213	405.206m
4.225	405.396m
4.228	405.444m
4.250	405.645m
4.250	405.645m
4.272	405.551m
4.275	405.518m
4.287	405.386m
4.300	405.269m
4.313	405.204m
4.325	405.167m
4.350	405.090m
4.375	405.014m
4.400	404.937m
4.425	404.860m
4.437	404.823m
4.450	404.837m
4.463	404.957m
4.475	405.117m
4.478	405.157m
4.500	405.359m
4.522	405.379m
4.525	405.369m
4.537	405.330m
4.550	405.296m
4.563	405.276m
4.575	405.265m

Station	Elevation
4.600	405.242m
4.625	405.218m
4.650	405.195m
4.675	405.171m
4.687	405.160m
4.700	405.181m
4.713	405.270m
4.725	405.383m
4.728	405.411m
4.750	405.563m
4.772	405.606m
4.775	405.604m
4.800	405.590m
4.825	405.575m
4.850	405.561m
4.875	405.546m
4.900	405.532m
4.925	405.518m
4.950	405.503m
4.975	405.489m
4.978	405.487m
5.000	405.426m
5.022	405.266m
5.025	405.237m
5.037	405.123m
5.050	405.032m
5.063	405.003m
5.075	405.006m
5.100	405.011m
5.125	405.017m
5.150	405.023m
5.175	405.028m
5.187	405.031m
5.200	405.066m
5.213	405.166m
5.225	405.288m
5.228	405.319m
5.250	405.413m
5.272	405.247m
5.275	405.207m
5.287	405.046m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Vertical profile

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

Station	Elevation
5.300	404.906m
5.313	404.839m
5.325	404.809m
5.350	404.747m
5.375	404.685m
5.400	404.624m
5.425	404.562m
5.437	404.532m
5.450	404.558m
5.463	404.699m
5.475	404.882m
5.478	404.928m
5.500	405.130m
5.522	405.065m
5.525	405.037m
5.537	404.929m
5.550	404.834m
5.563	404.784m
5.575	404.760m
5.600	404.708m
5.625	404.656m
5.650	404.604m
5.675	404.552m
5.687	404.527m
5.700	404.550m
5.713	404.674m
5.725	404.835m
5.728	404.875m
5.750	405.045m
5.772	404.968m
5.775	404.940m
5.787	404.830m
5.800	404.739m
5.813	404.705m
5.825	404.699m
5.850	404.687m
5.875	404.676m
5.900	404.664m
5.925	404.653m
5.937	404.647m
5.950	404.687m

Station	Elevation
5.963	404.819m
5.975	404.984m
5.978	405.025m
6.000	405.206m
6.022	405.144m
6.025	405.119m
6.037	405.019m
6.050	404.929m
6.063	404.876m
6.075	404.844m
6.100	404.779m
6.125	404.713m
6.150	404.647m
6.175	404.581m
6.187	404.550m
6.200	404.578m
6.213	404.731m
6.225	404.930m
6.228	404.980m
6.250	405.193m
6.272	405.103m
6.275	405.070m
6.287	404.937m
6.300	404.835m
6.313	404.812m
6.325	404.829m
6.350	404.863m
6.375	404.897m
6.400	404.931m
6.425	404.966m
6.437	404.982m
6.450	405.045m
6.463	405.199m
6.475	405.383m
6.478	405.429m
6.500	405.622m
6.500	405.622m
6.522	405.528m
6.525	405.495m
6.537	405.365m
6.550	405.253m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Vertical profile

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

Station	Elevation
6.563	405.197m
6.575	405.172m
6.600	405.119m
6.625	405.067m
6.650	405.014m
6.675	404.962m
6.687	404.937m
6.700	404.934m
6.713	404.979m
6.725	405.044m
6.728	405.060m
6.750	405.074m
6.772	404.880m
6.775	404.839m
6.787	404.676m
6.800	404.549m
6.813	404.518m
6.825	404.535m
6.850	404.570m
6.875	404.605m
6.900	404.640m
6.925	404.675m
6.937	404.692m
6.950	404.745m
6.963	404.866m
6.975	405.010m
6.978	405.046m
7.000	405.145m
7.000	405.145m
7.022	404.915m
7.025	404.862m
7.037	404.647m
7.050	404.473m
7.063	404.416m
7.075	404.417m
7.100	404.420m
7.125	404.424m
7.150	404.427m
7.175	404.430m
7.187	404.431m
7.200	404.486m

Station	Elevation
7.213	404.648m
7.225	404.847m
7.228	404.897m
7.250	405.110m
7.250	405.110m
7.272	405.023m
7.275	404.990m
7.287	404.860m
7.300	404.760m
7.313	404.739m
7.325	404.758m
7.350	404.797m
7.375	404.835m
7.400	404.874m
7.425	404.913m
7.437	404.931m
7.450	404.965m
7.450	404.965m
7.463	405.028m
7.475	405.099m
7.478	405.117m
7.500	405.122m
7.500	405.122m
7.522	404.875m
7.525	404.825m
7.537	404.622m
7.550	404.453m
7.563	404.388m
7.575	404.376m
7.600	404.350m
7.625	404.324m
7.650	404.298m
7.675	404.272m
7.687	404.259m
7.700	404.290m
7.713	404.411m
7.725	404.563m
7.728	404.601m
7.750	404.752m
7.772	404.646m
7.775	404.614m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Vertical profile

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

Station	Elevation
7.787	404.487m
7.800	404.381m
7.813	404.342m
7.825	404.337m
7.850	404.325m
7.875	404.314m
7.900	404.302m
7.925	404.291m
7.937	404.285m
7.950	404.340m
7.963	404.514m
7.975	404.730m
7.978	404.784m
8.000	405.007m
8.022	404.881m
8.025	404.841m
8.037	404.677m
8.050	404.549m
8.063	404.521m
8.075	404.540m
8.100	404.580m
8.125	404.620m
8.150	404.660m
8.175	404.700m
8.187	404.720m
8.200	404.776m
8.213	404.905m
8.225	405.056m
8.228	405.094m
8.250	405.185m
8.272	404.901m
8.275	404.836m
8.287	404.579m
8.300	404.373m
8.313	404.309m
8.325	404.317m
8.350	404.333m
8.375	404.349m
8.400	404.365m
8.425	404.381m
8.437	404.389m

Station	Elevation
8.450	404.436m
8.463	404.560m
8.475	404.709m
8.478	404.747m
8.500	404.875m
8.522	404.709m
8.525	404.666m
8.537	404.496m
8.550	404.363m
8.550	404.363m
8.563	404.333m
8.575	404.353m
8.600	404.394m
8.625	404.436m
8.650	404.478m
8.675	404.519m
8.687	404.539m
8.700	404.607m
8.700	404.607m
8.713	404.764m
8.725	404.952m
8.728	404.999m
8.750	405.152m
8.750	405.152m
8.772	404.922m
8.775	404.865m
8.787	404.635m
8.800	404.461m
8.813	404.436m
8.825	404.481m
8.850	404.575m
8.875	404.669m
8.900	404.763m
8.925	404.857m
8.937	404.902m
8.950	404.966m
8.963	405.057m
8.975	405.155m
8.978	405.180m
9.000	405.272m
9.022	405.190m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Vertical profile

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

Station	Elevation
9.025	405.167m
9.037	405.075m
9.050	404.994m
9.063	404.951m
9.075	404.929m
9.100	404.884m
9.125	404.838m
9.150	404.792m
9.175	404.747m
9.187	404.725m
9.200	404.747m
9.213	404.862m
9.225	405.010m
9.228	405.047m
9.250	405.143m
9.250	405.143m
9.272	404.886m
9.275	404.827m
9.287	404.592m
9.300	404.404m
9.313	404.353m
9.325	404.369m
9.350	404.402m
9.375	404.434m
9.400	404.467m
9.412	404.483m
9.425	404.567m
9.425	404.567m
9.438	404.784m
9.450	405.046m
9.453	405.111m
9.475	405.373m
9.497	405.197m
9.500	405.143m
9.512	404.928m
9.525	404.753m
9.525	404.753m
9.538	404.692m
9.550	404.688m
9.575	404.681m
9.600	404.674m

Station	Elevation
9.625	404.666m
9.650	404.659m
9.675	404.652m
9.700	404.645m
9.725	404.638m
9.728	404.637m
9.750	404.573m
9.772	404.393m
9.775	404.361m
9.787	404.232m
9.800	404.137m
9.813	404.131m
9.825	404.167m
9.850	404.243m
9.875	404.319m
9.887	404.355m
9.900	404.450m
9.900	404.450m
9.913	404.654m
9.925	404.893m
9.928	404.953m
9.950	405.265m
9.950	405.265m
9.972	405.323m
9.975	405.314m
10.000	405.236m
10.025	405.159m
10.050	405.081m
10.075	405.003m
10.100	404.926m
10.125	404.848m
10.150	404.771m
10.175	404.693m
10.187	404.656m
10.200	404.667m
10.213	404.782m
10.225	404.936m
10.228	404.975m
10.250	405.143m
10.250	405.143m
10.272	405.085m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Vertical profile

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

Station	Elevation
10.275	405.062m
10.287	404.968m
10.300	404.885m
10.313	404.841m
10.325	404.818m
10.350	404.770m
10.375	404.722m
10.400	404.674m
10.425	404.626m
10.437	404.603m
10.450	404.631m
10.463	404.765m
10.475	404.937m
10.478	404.980m
10.500	405.140m
10.500	405.140m
10.522	404.988m
10.525	404.946m
10.537	404.777m
10.550	404.641m
10.563	404.597m
10.575	404.598m
10.600	404.602m
10.625	404.605m
10.650	404.608m
10.675	404.612m
10.687	404.613m
10.700	404.650m
10.713	404.757m
10.725	404.888m
10.728	404.921m
10.750	405.028m
10.772	404.870m
10.775	404.831m
10.787	404.672m
10.800	404.547m
10.813	404.515m
10.825	404.529m
10.850	404.559m
10.875	404.588m
10.900	404.618m

Station	Elevation
10.925	404.647m
10.937	404.662m
10.950	404.734m
10.963	404.921m
10.975	405.147m
10.978	405.203m
11.000	405.436m
11.000	405.436m
11.022	405.305m
11.025	405.262m
11.037	405.092m
11.050	404.955m
11.063	404.915m
11.075	404.923m
11.100	404.938m
11.125	404.954m
11.150	404.969m
11.175	404.985m
11.187	404.992m
11.200	405.051m
11.213	405.214m
11.225	405.412m
11.228	405.461m
11.250	405.642m
11.272	405.461m
11.275	405.412m
11.300	405.000m
11.325	405.017m
11.350	405.033m
11.375	405.050m
11.400	405.066m
11.412	405.074m
11.425	405.107m
11.438	405.187m
11.450	405.283m
11.458	405.345m
11.475	405.434m
11.480	405.442m
11.500	405.390m
11.502	405.379m
11.512	405.313m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Vertical profile

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

Station	Elevation
11.525	405.265m
11.538	405.290m
11.550	405.346m
11.575	405.464m
11.600	405.581m
11.625	405.699m
11.650	405.816m
11.675	405.933m
11.700	406.051m
11.703	406.065m
11.725	406.102m
11.747	406.005m
11.750	405.983m
11.775	405.798m
11.800	405.612m
11.825	405.427m
11.850	405.241m
11.875	405.056m
11.900	404.871m
11.925	404.685m
11.937	404.596m
11.950	404.538m
11.950	404.538m
11.963	404.555m
11.975	404.606m
12.000	404.713m
12.025	404.819m
12.050	404.925m
12.075	405.031m
12.100	405.138m
12.125	405.244m
12.150	405.350m
12.175	405.457m
12.200	405.563m
12.225	405.669m
12.228	405.682m
12.250	405.716m
12.272	405.629m
12.275	405.610m
12.300	405.444m
12.325	405.278m

Station	Elevation
12.350	405.112m
12.362	405.032m
12.375	404.987m
12.388	405.024m
12.400	405.096m
12.425	405.245m
12.450	405.395m
12.475	405.544m
12.478	405.562m
12.500	405.640m
12.522	405.609m
12.525	405.597m
12.550	405.500m
12.575	405.333m
12.600	405.167m
12.625	405.000m
12.650	404.833m
12.675	404.667m
12.687	404.587m
12.700	404.583m
12.713	404.744m
12.725	404.969m
12.728	405.026m
12.750	405.238m
12.772	405.049m
12.775	404.996m
12.787	404.783m
12.800	404.610m
12.813	404.552m
12.825	404.552m
12.850	404.551m
12.875	404.550m
12.900	404.550m
12.925	404.549m
12.937	404.548m
12.950	404.610m
12.963	404.796m
12.975	405.024m
12.978	405.081m
13.000	405.311m
13.022	405.163m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Vertical profile

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

Station	Elevation
13.025	405.117m
13.037	404.933m
13.050	404.783m
13.063	404.729m
13.075	404.725m
13.100	404.717m
13.125	404.708m
13.150	404.700m
13.175	404.691m
13.187	404.687m
13.200	404.727m
13.213	404.857m
13.225	405.019m
13.228	405.060m
13.250	405.179m
13.272	404.944m
13.275	404.888m
13.287	404.664m
13.300	404.483m
13.313	404.428m
13.325	404.434m
13.350	404.447m
13.375	404.460m
13.400	404.474m
13.425	404.487m
13.437	404.493m
13.450	404.545m
13.463	404.688m
13.475	404.861m
13.478	404.904m
13.500	405.087m
13.500	405.087m
13.522	404.999m
13.525	404.969m
13.537	404.848m
13.550	404.748m
13.563	404.712m
13.575	404.709m
13.600	404.702m
13.625	404.696m
13.637	404.692m

Station	Elevation
13.650	404.710m
13.663	404.770m
13.675	404.844m
13.678	404.863m
13.700	404.959m
13.722	404.975m
13.725	404.971m
13.750	404.943m
13.775	404.914m
13.787	404.900m
13.800	404.892m
13.813	404.896m
13.825	404.906m
13.850	404.928m
13.875	404.949m
13.900	404.970m
13.925	404.991m
13.937	405.001m
13.950	405.030m
13.963	405.096m
13.975	405.173m
13.978	405.192m
14.000	405.206m
14.000	405.206m
14.022	404.967m
14.025	404.917m
14.037	404.717m
14.050	404.564m
14.063	404.541m
14.075	404.578m
14.100	404.656m
14.123	404.726m
14.125	404.734m
14.136	404.783m
14.149	404.872m
14.150	404.883m
14.175	405.086m
14.200	405.288m
14.225	405.490m
14.228	405.514m
14.250	405.577m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Vertical profile

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

Station	Elevation
14.272	405.408m
14.275	405.370m
14.300	405.047m
14.315	404.853m
14.325	404.754m
14.328	404.735m
14.341	404.719m
14.350	404.742m
14.375	404.806m
14.400	404.871m
14.425	404.935m
14.438	404.968m
14.450	405.006m
14.463	405.057m
14.475	405.113m
14.478	405.127m
14.500	405.122m
14.522	404.907m
14.525	404.863m
14.537	404.689m
14.550	404.552m
14.563	404.521m
14.575	404.540m
14.600	404.579m
14.625	404.619m
14.650	404.659m
14.675	404.698m
14.687	404.717m
14.700	404.801m
14.713	405.013m
14.725	405.267m
14.728	405.330m
14.750	405.558m
14.772	405.312m
14.775	405.246m
14.787	404.982m
14.800	404.755m
14.813	404.647m
14.825	404.601m
14.850	404.506m
14.875	404.411m

Station	Elevation
14.900	404.316m
14.925	404.222m
14.937	404.176m
14.950	404.185m
14.950	404.185m
14.963	404.311m
14.975	404.482m
14.978	404.524m
15.000	404.685m
15.022	404.544m
15.025	404.505m
15.037	404.345m
15.050	404.215m
15.063	404.169m
15.075	404.166m
15.100	404.159m
15.125	404.153m
15.150	404.146m
15.175	404.140m
15.187	404.137m
15.200	404.156m
15.213	404.221m
15.225	404.302m
15.228	404.322m
15.250	404.381m
15.272	404.263m
15.275	404.235m
15.287	404.122m
15.300	404.028m
15.300	404.028m
15.313	403.991m
15.325	403.983m
15.350	403.967m
15.375	403.950m
15.400	403.934m
15.425	403.917m
15.437	403.909m
15.450	403.951m
15.463	404.094m
15.475	404.273m
15.478	404.318m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Vertical profile

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

Station	Elevation
15.500	404.490m
15.522	404.351m
15.525	404.311m
15.537	404.150m
15.550	404.013m
15.563	403.950m
15.575	403.925m
15.600	403.873m
15.625	403.821m
15.650	403.770m
15.675	403.718m
15.687	403.693m
15.700	403.731m
15.713	403.900m
15.725	404.116m
15.728	404.170m
15.750	404.474m
15.772	404.597m
15.775	404.601m
15.800	404.637m
15.825	404.672m
15.850	404.708m
15.875	404.744m
15.900	404.779m
15.925	404.815m
15.950	404.850m
15.975	404.886m
15.978	404.890m
16.000	404.867m
16.022	404.736m
16.025	404.711m
16.050	404.500m
16.075	404.403m
16.100	404.306m
16.112	404.259m
16.125	404.212m
16.138	404.172m
16.150	404.139m
16.175	404.069m
16.187	404.036m
16.200	404.061m

Station	Elevation
16.213	404.208m
16.225	404.399m
16.228	404.447m
16.250	404.617m
16.272	404.422m
16.275	404.371m
16.287	404.165m
16.300	403.991m
16.313	403.915m
16.325	403.889m
16.350	403.835m
16.375	403.781m
16.400	403.727m
16.414	403.697m
16.425	403.739m
16.427	403.757m
16.440	403.992m
16.447	404.180m
16.450	404.246m
16.469	404.549m
16.475	404.586m
16.491	404.561m
16.500	404.494m
16.510	404.422m
16.523	404.345m
16.525	404.335m
16.536	404.309m
16.550	404.292m
16.575	404.264m
16.600	404.235m
16.625	404.207m
16.650	404.178m
16.675	404.149m
16.687	404.136m
16.700	404.169m
16.700	404.169m
16.713	404.300m
16.725	404.465m
16.728	404.507m
16.750	404.645m
16.772	404.454m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Vertical profile

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

Station	Elevation
16.775	404.405m
16.787	404.211m
16.800	404.049m
16.813	403.987m
16.825	403.975m
16.850	403.950m
16.875	403.925m
16.900	403.899m
16.925	403.874m
16.937	403.862m
16.950	403.908m
16.963	404.073m
16.975	404.279m
16.978	404.330m
17.000	404.481m
17.000	404.481m
17.022	404.177m
17.025	404.104m
17.037	403.814m
17.050	403.597m
17.063	403.575m
17.075	403.644m
17.100	403.788m
17.125	403.932m
17.150	404.075m
17.162	404.145m
17.175	404.259m
17.188	404.453m
17.200	404.668m
17.203	404.722m
17.225	404.939m
17.247	404.803m
17.250	404.760m
17.264	404.566m
17.275	404.443m
17.277	404.431m
17.290	404.397m
17.300	404.409m
17.325	404.440m
17.350	404.470m
17.375	404.500m

Station	Elevation
17.400	404.531m
17.425	404.561m
17.450	404.591m
17.450	404.592m
17.463	404.630m
17.475	404.710m
17.476	404.716m
17.478	404.735m
17.500	404.772m
17.522	404.515m
17.525	404.460m
17.537	404.239m
17.550	404.057m
17.563	403.989m
17.575	403.979m
17.600	403.957m
17.625	403.936m
17.650	403.915m
17.675	403.894m
17.687	403.884m
17.700	403.936m
17.713	404.114m
17.725	404.337m
17.728	404.393m
17.750	404.616m
17.772	404.468m
17.775	404.422m
17.787	404.240m
17.800	404.080m
17.813	403.995m
17.825	403.952m
17.850	403.862m
17.875	403.771m
17.900	403.681m
17.925	403.590m
17.937	403.547m
17.950	403.554m
17.963	403.670m
17.975	403.826m
17.978	403.865m
18.000	404.009m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Vertical profile

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

Station	Elevation
18.022	403.865m
18.025	403.826m
18.037	403.670m
18.050	403.546m
18.063	403.515m
18.075	403.529m
18.100	403.558m
18.125	403.586m
18.150	403.615m
18.175	403.644m
18.187	403.658m
18.200	403.730m
18.213	403.917m
18.225	404.142m
18.228	404.198m
18.250	404.463m
18.250	404.463m
18.272	404.433m
18.275	404.408m
18.287	404.311m
18.300	404.232m
18.313	404.206m
18.325	404.207m
18.350	404.208m
18.375	404.210m
18.400	404.211m
18.425	404.213m
18.437	404.214m
18.450	404.265m
18.463	404.419m
18.475	404.607m
18.478	404.654m
18.500	404.825m
18.522	404.646m
18.525	404.597m
18.537	404.404m
18.550	404.243m
18.563	404.178m
18.575	404.162m
18.600	404.130m
18.625	404.097m

Station	Elevation
18.650	404.065m
18.675	404.032m
18.687	404.017m
18.700	404.044m
18.713	404.158m
18.725	404.304m
18.728	404.340m
18.750	404.433m
18.750	404.433m
18.772	404.176m
18.775	404.117m
18.787	403.881m
18.800	403.692m
18.813	403.635m
18.825	403.644m
18.850	403.662m
18.875	403.680m
18.900	403.698m
18.925	403.716m
18.950	403.733m
18.975	403.751m
18.978	403.754m
19.000	403.749m
19.000	403.749m
19.022	403.705m
19.025	403.696m
19.050	403.622m
19.075	403.549m
19.100	403.475m
19.125	403.402m
19.150	403.328m
19.175	403.254m
19.187	403.219m
19.200	403.245m
19.213	403.400m
19.225	403.602m
19.228	403.653m
19.250	403.854m
19.272	403.717m
19.275	403.675m
19.287	403.507m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Vertical profile

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

Station	Elevation
19.300	403.381m
19.313	403.366m
19.325	403.403m
19.350	403.482m
19.375	403.560m
19.400	403.638m
19.425	403.716m
19.437	403.754m
19.450	403.822m
19.463	403.945m
19.475	404.085m
19.478	404.120m
19.500	404.239m
19.522	404.085m
19.525	404.045m
19.537	403.886m
19.550	403.755m
19.563	403.703m
19.575	403.692m
19.600	403.670m
19.625	403.647m
19.650	403.625m
19.675	403.603m
19.687	403.592m
19.700	403.620m
19.713	403.728m
19.725	403.865m
19.728	403.899m
19.750	404.015m
19.772	403.863m
19.775	403.824m
19.787	403.669m
19.800	403.534m
19.813	403.468m
19.825	403.439m
19.850	403.377m
19.875	403.316m
19.900	403.254m
19.925	403.193m
19.940	403.157m
19.950	403.177m

Station	Elevation
19.953	403.197m
19.966	403.382m
19.975	403.565m
19.978	403.624m
20.000	403.838m
20.022	403.610m
20.025	403.549m
20.037	403.304m
20.050	403.118m
20.063	403.090m
20.075	403.137m
20.100	403.236m
20.125	403.335m
20.150	403.434m
20.175	403.533m
20.187	403.580m
20.200	403.685m
20.200	403.686m
20.213	403.895m
20.225	404.141m
20.228	404.201m
20.250	404.437m
20.272	404.253m
20.275	404.200m
20.287	403.985m
20.300	403.805m
20.313	403.731m
20.325	403.711m
20.350	403.669m
20.375	403.626m
20.400	403.584m
20.425	403.542m
20.437	403.522m
20.450	403.554m
20.463	403.696m
20.475	403.876m
20.478	403.921m
20.500	404.093m
20.522	403.944m
20.525	403.901m
20.537	403.733m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Vertical profile

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

Station	Elevation
20.550	403.595m
20.563	403.545m
20.575	403.540m
20.600	403.530m
20.625	403.520m
20.650	403.510m
20.662	403.505m
20.675	403.558m
20.675	403.558m
20.688	403.725m
20.700	403.934m
20.703	403.986m
20.725	404.231m
20.747	404.205m
20.750	404.183m
20.762	404.095m
20.775	404.018m
20.788	403.981m
20.800	403.965m
20.825	403.931m
20.850	403.898m
20.875	403.864m
20.900	403.830m
20.925	403.797m
20.937	403.780m
20.950	403.797m
20.950	403.797m
20.963	403.882m
20.975	403.993m
20.978	404.020m
21.000	404.056m
21.000	404.056m
21.022	403.759m
21.025	403.695m
21.037	403.442m
21.050	403.243m
21.063	403.193m
21.075	403.217m
21.100	403.266m
21.125	403.314m
21.150	403.363m

Station	Elevation
21.175	403.412m
21.187	403.436m
21.200	403.478m
21.213	403.555m
21.225	403.641m
21.228	403.662m
21.250	403.691m
21.272	403.460m
21.275	403.410m
21.287	403.213m
21.300	403.061m
21.313	403.029m
21.325	403.056m
21.350	403.113m
21.375	403.169m
21.400	403.226m
21.425	403.282m
21.437	403.309m
21.450	403.367m
21.463	403.481m
21.475	403.612m
21.478	403.645m
21.500	403.760m
21.522	403.624m
21.525	403.589m
21.537	403.446m
21.550	403.335m
21.563	403.309m
21.575	403.326m
21.600	403.361m
21.625	403.396m
21.650	403.430m
21.675	403.465m
21.687	403.482m
21.700	403.525m
21.713	403.616m
21.725	403.724m
21.728	403.750m
21.750	403.817m
21.772	403.622m
21.775	403.577m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Vertical profile

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

Station	Elevation
21.787	403.400m
21.800	403.251m
21.813	403.189m
21.825	403.173m
21.850	403.138m
21.875	403.104m
21.900	403.069m
21.925	403.035m
21.937	403.018m
21.950	403.068m
21.963	403.252m
21.975	403.485m
21.978	403.543m
22.000	403.754m
22.022	403.533m
22.025	403.473m
22.037	403.234m
22.050	403.043m
22.063	402.987m
22.075	402.998m
22.100	403.020m
22.125	403.042m
22.150	403.064m
22.175	403.086m
22.187	403.097m
22.200	403.159m
22.213	403.322m
22.225	403.519m
22.228	403.569m
22.250	403.754m
22.272	403.586m
22.275	403.539m
22.287	403.352m
22.300	403.207m
22.313	403.179m
22.325	403.207m
22.350	403.266m
22.375	403.324m
22.400	403.383m
22.425	403.441m
22.437	403.470m

Station	Elevation
22.450	403.540m
22.463	403.691m
22.475	403.867m
22.478	403.911m
22.500	404.091m
22.522	403.983m
22.525	403.949m
22.550	403.663m
22.562	403.526m
22.575	403.406m
22.588	403.343m
22.600	403.310m
22.625	403.243m
22.650	403.175m
22.662	403.143m
22.675	403.151m
22.688	403.247m
22.700	403.375m
22.725	403.642m
22.728	403.674m
22.750	403.763m
22.772	403.559m
22.775	403.512m
22.787	403.321m
22.800	403.166m
22.813	403.116m
22.825	403.118m
22.850	403.122m
22.875	403.127m
22.900	403.131m
22.925	403.135m
22.937	403.137m
22.950	403.177m
22.963	403.291m
22.975	403.431m
22.978	403.466m
23.000	403.626m
23.022	403.592m
23.025	403.574m
23.037	403.503m
23.050	403.442m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Vertical profile

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

Station	Elevation
23.063	403.413m
23.075	403.402m
23.100	403.379m
23.125	403.356m
23.150	403.333m
23.175	403.310m
23.187	403.299m
23.200	403.329m
23.213	403.442m
23.225	403.585m
23.228	403.621m
23.250	403.759m
23.272	403.652m
23.275	403.620m
23.287	403.495m
23.300	403.393m
23.313	403.359m
23.325	403.360m
23.350	403.361m
23.375	403.362m
23.400	403.363m
23.425	403.365m
23.437	403.365m
23.450	403.394m
23.463	403.479m
23.475	403.582m
23.478	403.608m
23.500	403.676m
23.522	403.497m
23.525	403.456m
23.537	403.291m
23.550	403.154m
23.563	403.098m
23.575	403.084m
23.600	403.054m
23.625	403.024m
23.650	402.994m
23.675	402.965m
23.687	402.950m
23.700	402.985m
23.713	403.121m

Station	Elevation
23.725	403.293m
23.728	403.336m
23.750	403.490m
23.772	403.323m
23.775	403.278m
23.787	403.099m
23.800	402.957m
23.813	402.919m
23.825	402.931m
23.850	402.956m
23.875	402.982m
23.900	403.007m
23.925	403.032m
23.937	403.045m
23.950	403.096m
23.950	403.096m
23.963	403.223m
23.975	403.376m
23.978	403.414m
24.000	403.547m
24.022	403.388m
24.025	403.347m
24.037	403.180m
24.050	403.045m
24.063	403.000m
24.075	403.000m
24.100	403.000m
24.125	403.000m
24.150	403.000m
24.175	403.000m
24.187	403.000m
24.200	403.025m
24.213	403.101m
24.225	403.195m
24.228	403.218m
24.250	403.325m
24.272	403.304m
24.275	403.292m
24.300	403.195m
24.325	403.097m
24.337	403.051m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Vertical profile

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

Station	Elevation
24.350	403.012m
24.363	402.996m
24.375	402.991m
24.400	402.983m
24.425	402.974m
24.437	402.970m
24.450	402.999m
24.463	403.096m
24.475	403.216m
24.478	403.246m
24.500	403.360m
24.522	403.261m
24.525	403.233m
24.537	403.121m
24.550	403.026m
24.563	402.983m
24.575	402.967m
24.600	402.934m
24.625	402.901m
24.650	402.868m
24.675	402.835m
24.687	402.819m
24.700	402.859m
24.713	403.011m
24.725	403.203m
24.728	403.252m
24.750	403.434m
24.772	403.276m
24.775	403.231m
24.787	403.051m
24.800	402.907m
24.813	402.862m
24.825	402.867m
24.850	402.876m
24.875	402.886m
24.900	402.896m
24.925	402.906m
24.937	402.911m
24.950	402.965m
24.963	403.117m
24.975	403.303m

Station	Elevation
24.978	403.350m
25.000	403.526m
25.022	403.373m
25.025	403.329m
25.037	403.156m
25.050	403.013m
25.063	402.961m
25.075	402.955m
25.100	402.943m
25.125	402.931m
25.150	402.918m
25.175	402.906m
25.187	402.900m
25.200	402.948m
25.213	403.106m
25.225	403.302m
25.228	403.351m
25.250	403.504m
25.272	403.246m
25.275	403.183m
25.287	402.931m
25.300	402.731m
25.313	402.678m
25.325	402.698m
25.350	402.739m
25.375	402.779m
25.400	402.820m
25.425	402.861m
25.437	402.881m
25.450	402.938m
25.463	403.068m
25.475	403.222m
25.478	403.260m
25.500	403.398m
25.522	403.248m
25.525	403.208m
25.537	403.049m
25.550	402.915m
25.563	402.861m
25.575	402.848m
25.600	402.821m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Vertical profile

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

Station	Elevation
25.625	402.794m
25.650	402.766m
25.675	402.739m
25.687	402.726m
25.700	402.759m
25.713	402.887m
25.725	403.049m
25.728	403.090m
25.750	403.236m
25.772	403.081m
25.775	403.039m
25.787	402.872m
25.800	402.743m
25.813	402.718m
25.825	402.743m
25.850	402.794m
25.875	402.846m
25.900	402.897m
25.925	402.949m
25.937	402.973m
25.950	403.036m
25.963	403.170m
25.975	403.326m
25.978	403.365m
26.000	403.507m
26.022	403.356m
26.025	403.316m
26.037	403.154m
26.050	403.020m
26.063	402.969m
26.075	402.959m
26.100	402.938m
26.125	402.917m
26.150	402.896m
26.175	402.876m
26.187	402.866m
26.200	402.910m
26.213	403.063m
26.225	403.254m
26.228	403.302m
26.250	403.515m

Station	Elevation
26.272	403.450m
26.275	403.422m
26.287	403.312m
26.300	403.217m
26.313	403.175m
26.325	403.160m
26.350	403.128m
26.375	403.096m
26.400	403.064m
26.425	403.032m
26.437	403.017m
26.450	403.040m
26.463	403.145m
26.475	403.279m
26.478	403.313m
26.500	403.436m
26.522	403.313m
26.525	403.279m
26.537	403.145m
26.550	403.034m
26.563	402.992m
26.575	402.985m
26.600	402.971m
26.625	402.956m
26.650	402.941m
26.675	402.927m
26.687	402.920m
26.700	402.971m
26.700	402.971m
26.713	403.139m
26.725	403.349m
26.728	403.402m
26.750	403.684m
26.750	403.684m
26.772	403.763m
26.775	403.760m
26.800	403.734m
26.825	403.708m
26.850	403.682m
26.850	403.681m
26.875	403.499m

Project: Zeat Bead Feeder Roads Project

Project Number: 20812

Lot 2

Date: 2016/04/12

Alignment Name: Achol Pagong

Description: Vertical profile

Station Range: Start: 0.000000, End: 26.992

Station Increment: 25.00

Station	Elevation
26.900	403.316m
26.925	403.134m
26.950	402.952m
26.975	402.770m
26.992	402.644m