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CONSTRUCTION OF SIPHAFENI ACCESS ROAD TECHNICAL REPORT

PREPARED FOR:

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Appendix A – Appointment Letter

1 INTRODUCTION

Beacon Consulting Engineers JV Gatyeni Consulting (Beacon) was appointed by the Sakhisizwe Local Municipality (“the Municipality”) for the appointment of five (5) consultants for all infrastructure related projects on an instructed basis for a period of 36 months. Subsequent to the appointment, Beacon has been requested to prepare a Technical Report and Business Plan including cost estimate for the construction of Siphafeni Access Road. The request was accepted on conditions that if the business plan is approved then Beacon would be appointed as the consulting engineers for the project.

The site was visited to undertake a visual assessment to ascertain locality, site terrain, existing services, borrow pit location and so as to conceptualise appropriate design under the prevailing conditions as well as cost estimates.

2 PROJECT DESCRIPTION

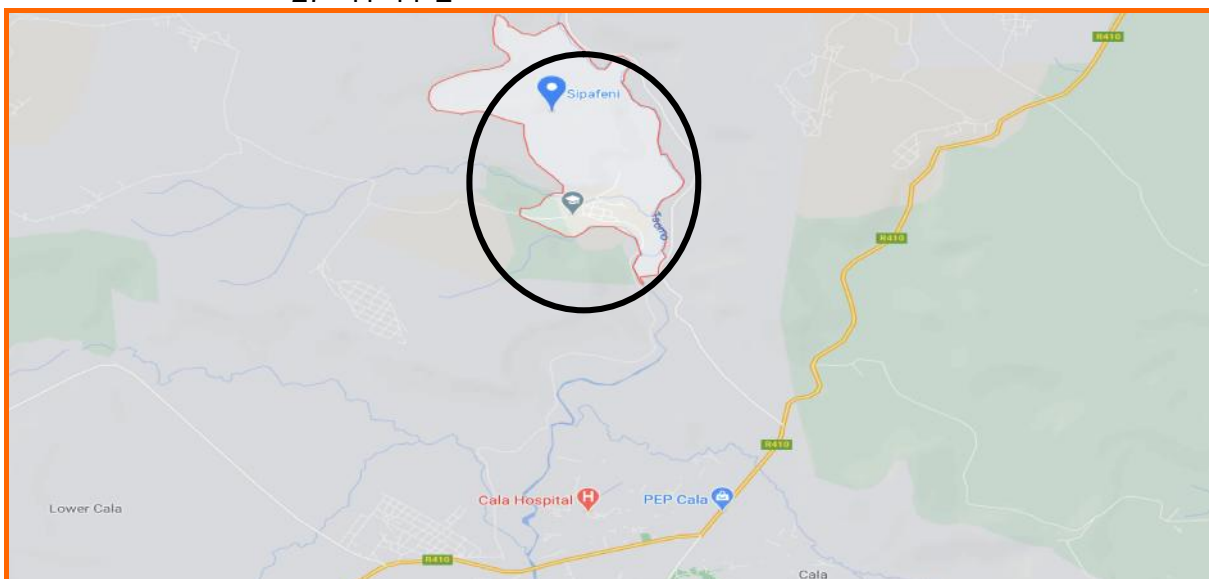
2.1 Location and demographics

The project area is in Roma and Siphafeni villages of Sakhisizwe Local Municipality which falls under the jurisdiction of Chris Hani District Municipality, and the nearest town is Cala. The site can be accessed via R410 from Cala Town to Queenstown, approximately 3.5 km from Cala CBD towards Queenstown, then take **DR08449** to Roma village and the start of the proposed road is 10 km from R410 and DR08449 Tee Junction.

Project co-ordinates:

31° 28' 24"S

27° 41' 11"E





A layout map showing the locality of the road is appended in **Appendix B**.

2.2 Project beneficiaries

The residents of Siphafeni village and Roma village will be the beneficiaries of this project. These communities have a population of approximately 630. Residents from these two rural villages will be fully involved in the implementation of the project. Also, some of community members will be part of Project Steering Committee (PSC) that will meet at regular intervals to check progress of work and discuss issues related to the project during its implementation.

According to the 2011 Statistics South Africa Community Survey results, the majority of the households earn less than R 2 000.00 per month, their main source of income is the government's social services grant. The majority of population is categorised as "African".

3 PRESENT SITUATION

-) The current status of the road is very poor as the road appeared to be only bladed to open tracks for the villagers;
-) There is no proper road for the rest of the area, but a track founded on partly flat and steep terrain;
-) The road starts on the tee junction next to Roma Church and traverses through bushy areas, passes the village, cross perennial streams and ends at the end of the village;
-) Boulders and rock outcrops exist almost throughout the road;
-) A very steep section was observed, this section will need extra precautions, for example concrete strips to allow the vehicle to have enough grip when pulling up the hill, and guard rails encased in concrete placed for approximately 250m around the bend to prevent vehicles from falling of the carriageway.
-) When it is wet the tracks are very slippery making it difficult for vehicles and people to travel;
-) Delivery of goods and services is very difficult due to the current state of the access route;
-) Water for construction purposes is also available within the area;
-) Potential borrow pits were identified, which were previously used for the upgrading of a local and district roads. There appears to be sufficient quantities of gravel material from these borrow pits to cater for the proposed roads. However, a permit from the Department of Mineral and Energy will be required. This will be obtained as part of the Environmental Impact Assessment (EIA) process. The geotechnical investigation will be undertaken by professional Geotechnical Engineers to ascertain the quality and quantity of the materials;

-) The roads crosses perennial stream or potential watercourse, major and minor crossings will have to be provided to convey accumulated quantities of water across the road in strategic locations; and
-) During dry season, vehicles can cross the stream but during rainy days no vehicles can cross the stream.

4 SCOPE OF WORKS

4.1 Level of service

This project will be MIG funded and is aimed at providing basic infrastructure through the construction of the road. Therefore, this project will be managed to ensure that safety and trafficable conditions at all times are maximised, and that employment creation and development of skills to the community are maximised.

A basic level of services will be provided. 30% of the construction amount will be spent on local labour putting particular focus on women and youth.

4.2 Infrastructure and Scope of Work to Achieve a Basic Level of Service

The proposed road is 5.4 km in length. The road is in a very poor condition predominantly tracks. The existing tracks as identified and follows a reasonable alignment, and it is envisaged that this alignment will remain mostly unchanged. However, the alignment may change slightly to improve road geometrics and drainage.

Specific attention will be given to the vertical alignment, which may include lifting or having huge cut to the finished road level in some places. The above will allow for the road prism to drain adequately, allow for the installation of pipe culverts, side drains, and mitre drains where required. Specific attention will be given to storm water management. On steep sections, velocity breakers or lined drains will be used.

Transverse drainage to the actual road surface will be achieved by means of a chamber or cross fall, 3% being minimum grade.

One borrows pit was identified along in the vicinity of the road, and it is anticipated that the availability of gravel will not be a problem. However, tests will be conducted to ascertain the quality and quantity that will be available for the successful completion of the project.

The proposed construction work consists of the following:

-) Earthworks;

-) Shaping of the road formation to the required standards as detailed in the specifications;
-) Construction of longitudinal V-drains, mitre drains, and berm drains;
-) Installation of 600mm Ø pipe culverts;
-) Preparation of the road bed to 93% Mod AASHTO density;
-) Construction of gravel wearing course 5m width, 150mm thickness and 95% Mod AASHTO density;
-) Construction of inlet structures and headwalls;
-) Installation of Low-Level Bridges;
-) Construction of lined drains;
-) Gabions and pitching;
-) Sign posting; and
-) Finishing works.

5 DESIGN STRATEGY

5.1 Design Standards

The design strategy would be firstly to finalize the route by investigating alternative routes of linking the desired destinations. The mapping for this will be 1:50 000 topographical maps, and reconnaissance inspections on site. This will be done in consultation with the project steering committee, and the Sakhisizwe Local Municipality Engineer's representative.

The route would then be designed using a desired design speed of 60 km/hr, subject to the economic viability according to the terrain. In difficult terrain, the design speed can be further reduced. Aerial survey (or orthophotos) will be sourced to aid the design process.

The width of the road shall be limited to 7m formation and 5.0m wide gravel wearing course. All drainage structures will be designed for a 1:5-year flood, with an overtopping stability design criteria for 1:10-year flood. All these aspects will be included in the preliminary design, after which a detailed bill of quantities would be compiled, and the cost of the works estimated in detail.

In particular, drainage and erosion control structures will be constructed utilizing labour and material from the area. The construction specifications will comply with COLTO Standard Specifications for Road and Bridge Works for State Road Authorities. The design will also be such that most of the emerging contractors can easily complete the job without problems.

5.2 Pavement Structures

The following layer works are proposed in order to achieve required all weather road:

-) 150mmx7m insitu roadbed preparation compacted to 90% Mod AASHTO
-) 150mm selected subgrade compacted to 93% Mod AASHTO (at selected places)
-) 150mmx5.0m Gravel Wearing Course compacted at 95% Mod AASHTO

5.3 Stormwater Drainage

Crossing pipes will be considered where watercourses cross the road.

The side drains will have a minimum depth of 450mm to prevent penetration into layers and will have minimum grades of 1:100. Where the grades are more than 10% and the insitu subgrade is of a dispersive nature, the side drains will be lined with cement grouted stone pitching.

Transverse drainage to the actual road surface will be achieved by means of a camber or cross fall, 3% being minimum grade.

5.4 Environmental Conditions

The design and implementation of the project shall be undertaken so as to avoid a negative impact on the environment. There will be a need for an Environmental Impact Assessment (EIA) since more than 80% of the project entails construction of almost a new access road.

6 DESIGN STANDARDS

The following guidelines will be used for the design of the proposed works:

-) TRH 20 - Structural Design, Construction and Maintenance of Unpaved Roads;
-) TRH 17 Geometric Design of Rural Roads;
-) TRH 14 Guidelines for Roads Construction Materials;
-) Roads Drainage Manual; and
-) Colto or SANS Standardized.

7 ENVIRONMENTAL

The activities envisaged in this project are listed activity in terms of Activity 19 of Regulation No. R 33306 issued in terms of the National Environmental Management Act.

The environmental impact assessment (EIA) process will be conducted.

8 OCCUPATIONAL HEALTH AND SAFETY (OHS)

The following will apply with respect to this project:

- J The Occupational Health and Safety Act, No. 85 of 1993, as amended;
- J The Construction Regulations with respect to the above act, Regulation GN No R1010, 18 July 2003; and
- J COVID-19 Occupational Health And Safety Measures in Workplace 2020

In terms of the Construction Regulations, the client is required to compile an occupational health and safety specification for any intended project and to provide the specification to tenderers. The Occupational Health and Safety Specification will be compiled and incorporated to the tender document.

Any contractor submitting a tender will be required to include in his tender documentation, a draft Health and Safety Plan based on the Occupational Health and Safety Act and the Occupational Health and Safety specifications. The appointed contractor will also be responsible for implementing and maintaining his Occupational Health and Safety Plan as approved by the client.

9 COMMUNITY PARTICIPATION

A Community Liaison Officer will be appointed during the construction phase of the project to negotiate with the local community to appoint local labour on the project. Local emerging contractors will be given the opportunity to carry out activities not associated with heavy construction plant.

10 COST ESTIMATE

A breakdown has been prepared based on the preliminary design philosophy stated in this report. A summary of the project cost estimate is given in Table 1 below. The rates used to derive these estimates are based on recent similar contracts handled by Beacon.

SUMMARY OF BILL OF QUANTITIES		
SECTION	DESCRIPTION	AMOUNT
1200	General Requirements and Provisions	R 1 444 680.00
1300	Contractor's Establishment on Site and General Obligations	R 747 500.00
1500	Accommodation of Traffic	R 30 600.00
1600	Overhaul	R 634 218.75
1700	Clearing and Grubbing	R 66 000.00
2100	Drains	R 54 450.00
2200	Prefabricated Culverts	R 1 427 039.73
2300	Concrete Kerbing, Channelling, Chutes & Down Pipes and Concrete Lining for Open Drains	R 74 250.00



3100	Borrow Material	R 27 375.00
3200	Selection & Stockpiling	R 26 550.00
3300	Mass Earthworks	R 4 614 733.33
3400	Pavement Layers of Gravel Material	R 587 812.50
5100	Pitching, Stonework & Protection Against Erosion	R 272 500.00
5200	Gabions	R 479 250.00
5600	Road Signs	R 33 832.50
5900	Finishing	R 82 500.00
8100	Testing Material & Workmanship	R 50 000.00
Sub-Total A		R 10 653 291.81
Contingencies at 10%		R 1 065 329.18
Sub-Total B		R 11 718 621.00
VAT at 15%		R 1 757 793.15
Total Construction Cost		R 13 476 414.14
<u>PROFESSIONAL FEES</u>		
Planning Costs		R 200 000.00
Normal Services		R 562 493.81
Sub-Total Professional Fees		R 762 493.81
VAT at 15%		R 114 374.07
TOTAL PROFESSIONAL FEES (INCL. VAT)		R 876 867.88
TOTAL ESTIMATED COSTS (INCL. VAT)		R 14 353 282.02

As can be seen from Table 1, the required total construction budget is R 11 718 621.00 (excluding VAT and contingencies).

11 MOTIVATION FOR AN ESTIMATED COST

- J We have allowed provisions for other services like Surveying, Geotechnical Investigation, EIA, OH&S plan and Institution Social Development;
- J The road traverses' hilly areas that will need excessive cuts;
- J The allowance for portal culvert for the stream crossings;
- J The hauling of the wearing course material from borrow pits that are above 5km from the project area:
- J Cost per km of the road might be above the required allowable cost for MIG because of the above and for better quality it is necessary to allow for the allowable.

12 CONCLUSION AND RECOMMENDATIONS

This report outlines the recommendations to provide an all-weather access to the communities of Siphafeni and Mceula village. The project will improve accessibility of the rural communities in the area and open doors for more developmental activities. Improved access will also enhance the delivery of other services like health facilities, water and sanitation services.



The proposed also ensures that most of the local emerging contractors can also execute the work without difficulties. The proposed project will therefore meet the needs of the community, which is an all-weather access gravel road as well as empowering them economically, we therefore request that the project be approved for a total budget of **R 14 353 282.02, VAT, Contingencies and Professional Fees Inclusive.**

We trust the details provided in this report are sufficient to enable the approval of this report.



APPENDIX A:

Appointment Letter