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SUDAN INFRASTRUCTURE SERVICES PROJECT

TASK ORDER 2: ROADS AND BRIDGES FY 2007 – 2008 WORK PLAN

January 2008

This document was produced for review by the United States Agency for International Development (USAID). It was prepared by The Louis Berger Group, Inc.

Contract No. 650-I-00-06-00010-00

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ROADS AND BRIDGES (TASK ORDER 2)

During the latter stages of FY 2006 – 2007, USAID issued a task order and two subsequent modifications that would govern development of roads and bridges over the life of the Sudan Infrastructure Services Project (SISP). The total value of Task Order 2 (TO2) is \$250 million. Of this, slightly more than \$30 million has been obligated. The initial obligation and subsequent modifications during FY 2006 – 2007 provide for road and bridge program management, design and construction of initial construction works on the Juba Nimule Road, provision of interim road and bridge maintenance on that road, planning, design and construction of three bridges, and an assessment of farm to market roads in the Three Areas.

INTRODUCTION

With an initial obligation of about \$17.8 million, USAID initiated infrastructure projects to support improved transportation in Southern Sudan. Building upon the feasibility study, conducted earlier in FY 2006 – 2007, USAID has designated the design and construction of the initial construction works of the Juba Nimule Road as its first priority for implementation under the SISP. In collaboration with the Ministry of Transport and Roads, USAID also identified three additional bridge projects that are seen as key projects for the current fiscal year. During the initial award of the task order, the Wunrock Bridge in Warrup (Lakes) State was identified as requiring design and construction, and two other bridges, the Raad and the Pochalla Bridge, both in Eastern Equatoria State and bordering on neighboring Ethiopia were designated for study and design. The initial obligation also included the establishment of a management structure to carry out road and bridge task orders. Finally it included an assessment of the farm to market roads in the Three Areas.

Subsequent modifications totaling more than \$12 million were intended to provide various additional works. Realizing that the Juba Nimule Road currently suffers from lack of an effective maintenance program, USAID instructed the Louis Berger Group (Berger) to undertake on an interim basis the maintenance of the existing roadway and bridges of the Juba Nimule Road. Also in acknowledgement that the demining initiatives underway by the World Food Program (WFP) would not complete demining and battlefield ordinance removal required of the Juba Nimule Road construction project, USAID provided additional funding to support that activity. USAID intends that the funds provided by the two modifications would also allow additional construction of the Juba Nimule.

More recently, it was decided that funding for the Raad and Pochalla Bridge studies would be diverted towards the rehabilitation of a failed bridge over the Kimbi River in Yei.

ROAD AND BRIDGE MANAGEMENT

USAID established a key position with Task Order 2—that of Senior Roads Engineer/Task Order Manager (TOM). The responsibilities of the TOM include managing all aspects of the projects initiated and implemented under TO 2, representing the road and bridge program with a variety of stakeholders and ensuring scope, schedule and budget project objectives are

achieved. The TOM will develop work plans, project implementation plans and oversee the development of a variety of deliverables including:

- Sub-contractor evaluation criteria
- Contractor's Construction Manual
- Construction Risk Management Plan
- Health and Safety Plan
- Environmental Management Plan
- HIV/AIDS/Gender/Vulnerable Groups Plan
- Community Participation Plan
- Security Plan
- QA/QC Plan
- Design Submittals at various stages
- Resource loaded Project Schedule

Task Order 2 is integrated into the overall management of the SISP in several ways. First, the TOM reports to the Chief of Party (COP) of the SISP and becomes one of the key members of his staff. Program Controls developed under TO 1 will be used for the management of projects under TO 2. Periodic standard reporting will be provided through TO 1 reporting mechanisms. Design for TO 2 projects will follow guidelines and be under the quality assurance programs of the SISP Chief Engineer and Berger's Corporate Quality Assurance Manager. Under Task Order 2, the Senior Road Engineer has three key individuals reporting to him—the Design Manager, the Construction Manager and the Maintenance Manager.

Berger will organize the implementation of infrastructure projects under TO 2 in general conformance with project phases. In particular, planning and design related activities will be managed by the Design Manager and once construction begins on a project, the Construction Manager will assume responsibility for construction, commissioning, hand over and close out. In addition to his oversight role during construction of individual projects, the Construction Manager will be instrumental in developing construction subcontractor tendering documents, conducting pre bid meetings and chairing the evaluation of subcontractor bids.

The Design Manager will supervise various long and short-term technical experts in the planning and developing of projects up to the start of construction. Berger will undertake studies, surveys and evaluations that are incorporated into project design under the overall responsibility of the Design Manager. He will also be responsible for overseeing the development of construction plans either by design subcontractors or Berger's in-house staff; however, only limited design capability is planned within Southern Sudan in order to manage costs and schedule.

The Maintenance Manager will develop tenders, training plans and maintenance plans for both interim maintenance, liability maintenance, and maintenance after construction. The Maintenance Manager will supervise a staff of field maintenance supervisors who will have day to day responsibility for the execution of mechanized maintenance (road grading), labor-based maintenance works and bridge maintenance and repair.

Staffing for the road and bridge management activities will continue through the first and second quarter of the fiscal year. Critical positions will be in place by early January, and other positions will be added as necessary to support the works.

JUBA NIMULE ROAD INITIAL WORKS

Berger will undertake a fast track approach to developing and implementing the initial construction works on the Juba Nimule Road. The first significant construction activities are centered on replacing bridges that are in various states of disrepair. In addition to the critical bridges, Berger will start construction of the roadway by replacing failed drainage structures with new structures and culverts, removing and replacing areas where soils are not suitable to sustain current or future traffic demands, and shaping and embankment that will support the future pavement structure in those areas where drainage is replaced or soil conditions improved.

To expedite construction during subsequent quarters, Berger has initiated efforts to resolve demining requirements, tender for topographic surveys and geotechnical investigations, procure security services and establish design requirements. Each of these activities is closely coordinated in order to ensure that construction can be started at the earliest possible date. Presently, tendering for design – build construction subcontracts is planned to be initiated during the second quarter, with actual award and mobilization of subcontractors following soon afterwards.

During the first quarter, Berger will conduct the initial community development assessment for the Juba Nimule corridor. Berger will mobilize the community development specialist to identify and meet with key stakeholders, decision makers and others affected by the construction project. The result of this first intervention will be the development of a Community and Stakeholder Involvement Plan. The Plan will guide the involvement activities throughout the development of the Juba Nimule Road and it will ensure that appropriate and adequate information and opportunities to influence the project are provided to government, social and community leaders as well as individuals affected by the project.

A detailed Project Implementation Plan that identifies the schedule for various activities and the specifics of the fast track approach can be found in Appendix A.

CRITICAL BRIDGE PROGRAM

USAID and MTR have collaborated on the selection of the Juba Nimule Road as the highest priority construction project for the SISP. Both have confirmed that due to the condition of the existing bridges and the essential service that the Road provides, the seven bridges north of the Border with Uganda are extremely urgent, requiring replacement before the end of the third quarter of FY 2007 – 2008.

Berger has established an approach that will combine design build, procurement and rapid mobilization of construction subcontractors in order to respond to the bridge requirement.

INITIAL ROADWAY WORKS

As noted above the initial roadway works include new drainage, improved soils and widened embankments as the first stage of construction on the project. Berger will award two design – build construction subcontracts during the second quarter of the fiscal year. Following a rapid mobilization, each of the contractors will initially focus on initial construction roadworks and the development of quarry sites, borrow pits, casting yards, bore holes and other items that will facilitate the development of the initial works will be accelerated to the extent possible.

Berger currently anticipates that the initial roadway works will be substantially complete prior to the end of the current fiscal year.

INTERIM MAINTENANCE JUBA NIMULE ROAD

Berger will implement an interim maintenance program for the Juba Nimule Road during the third quarter of the fiscal year. This interim maintenance program will include three discrete components, road surface maintenance and repair, bridge repair, and labor intensive maintenance works.

Initial tenders for road surface maintenance and repairs will be issued during the first quarter with award such that work will start in January. Additionally the grading contract will include the provision of additional material (murrum) for those locations where the mechanical grading is unable to reestablish adequately the road section.

The existing bridges along the roadway are in a state of serious disrepair and as is discussed above, the first seven bridges are included in a critical bridge program for replacement at the earliest opportunity. Berger, upon mobilization of maintenance managers and supervisors during the second quarter, will develop a detailed maintenance and repair plan for each bridge. This maintenance and repair plan will provide critical repairs needed to keep the bridges passable, including construction of temporary bypasses if needed, until construction can be completed on the new bridges.

Berger will initiate a labor intensive maintenance works program during the second and third quarters of the fiscal year. Generally following the model that is being used by the Capacity Building Contract (CBC) on the Juba Yei Road, maintenance activities, such as road side management, clearing and repair of drainage structures, sign maintenance and repair will be promoted through the development of community based organization or other small scale contracting entities.

WUNROCK BRIDGE

The Wunrock Bridge is located in Warrup (Lakes) State and is a key route that currently supports humanitarian assistance programs and is expected to play a central role in future developmental activity undertaken by USAID. The project was initially included in the UNOPS road and bridge program, but it has subsequently been placed under the SISP. It is funded for planning, design and construction with the current obligation.

Berger will initiate preliminary planning activities of the Wunrock Bridge during the second quarter of the fiscal year. No full blown feasibility study is envisioned to be a requirement of this activity, and as such after the initial site assessment and determination of type, size and location study, Berger will initiate topographic survey, geotechnical analysis and design of the bridge. The topographic survey and geotechnical analysis could possibly be performed under a modification to the topographic and geotechnical contract for the Juba-Nimule Road. Design will be based upon the type of bridge structure selected, with a construction subcontract tendered as soon as sufficient information is developed to support reasonable bids.

POCHALLA BRIDGE

The Pochalla Bridge is located on the Ethiopian Border in the northern part of Jonglei State. As befits a border crossing bridge, USAID and Berger anticipate that there will considerable coordination between the Government of Southern Sudan (GOSS), the Government of Ethiopia and the Government of Sudan (GOS) during the development and implementation of this bridge.

Berger will await guidance from USAID before initiating planning studies which will include an analysis of existing river crossing, availability of raw materials for construction, planned routes in Ethiopia and other factors. Although a full blown feasibility study is not contemplated, the level of assessment and study will be significantly increased due to the complexity, caused by the different governments involved and affected by the project.

RAAD BRIDGE

The Raad Bridge is also located on the Ethiopian Border in the central part of Jonglei State. It too is a border crossing bridge, where the same level of collaboration among the GOSS, GOE and GOS will be required.

Berger will await guidance from USAID before initiating planning studies which will include an analysis of existing river crossing, availability of raw materials for construction, planned routes in Ethiopia and other factors. Although a full blown feasibility study is not contemplated, the level of assessment and study will be significantly increased due to the complexity, caused by the different governments involved and affected by the project.

KIMBI BRIDGE, YEI

The Kimbi Bridge is located 2km from the Yei airport on the Yei-Juba Road in Central Equatoria State. The 8m bridge has suffered severe structural damage and can carry nothing more than pedestrian traffic. An earth embankment with 1m culvert pipes has been constructed as a temporary detour, but this is unlikely to withstand the rainy season. Berger will begin work on demolishing the current deck in February and will cast a new concrete replacement that will be ready for traffic in May.

THREE AREAS ASSESSMENT

Berger was assigned the responsibility to undertake an assessment of the road and bridge system of the Three Areas under Task Order 2 (TO 2). This assessment was intended to identify critical road and bridge projects needed to support development and humanitarian activities in the Three Areas. The assessment also requires an assessment of government and social institutions within the Three Areas in order to provide USAID information on stakeholders and decision makers regarding project selection and implementation.

Recent discussions with USAID have tentatively expanded the scope of the assessment to be more inclusive of all components of public infrastructure and to include a partnership with other USAID implementing partners and other USAID program areas. A January assessment to Blue Nile State is currently being planned from which a program of various infrastructure projects will be identified. The assessment will include USAID EGAT team members, Berger and possibly other implementing partners. It is anticipated that mobilization of the program will begin in February of March.

CAPITAL PROGRAM PLAN

A critical non-construction activity for FY 2007 – 2008 is the development of a Capital Program Plan for the Road and Bridge Sector. With a ceiling of \$250 million and obligations of slightly more than \$30 million, it is appropriate to identify future projects that will be initiated as additional funds are obligated to the task order.

The Chief of Party and the Senior Road Engineer (TOM) will collaborate on the development of this plan. Berger will use a structured process that will initially involve consultation with the Ministry of Transport and Roads (MTR) in the identification of potential priority projects. Following the initial identification, Berger will engage state and local officials as appropriate. Sufficient assessments of potential projects will be undertaken in order to establish basic project parameters, such as length, typical section, pavement type, cost, duration, etc. This will lead to a master list of potential projects.

Once the master list of potential projects is developed, Berger will consult with USAID and MTR to prioritize the projects. Berger will construct a master schedule for project implementation following the priorities that MTR and USAID establish. The master schedule will provide planning estimates for various phases of each project and a tentative timeline for completion. This will then be submitted to USAID for final approval.

Berger will initiate the planning process for the Capital Program Plan during the second quarter of FY 2007 -2008. Final approval from USAID is anticipated during the fourth quarter.

PERFORMANCE EVALUATION AND MEASUREMENT

The strategic level metrics that have currently been established to measure the performance of TO 1 require expansion to increase their relevance to outcomes deriving from projects undertaken under this task order. More specific and discrete measures will benefit USAID in evaluating the affects of the infrastructure projects it funds. The current metrics established for

TO 2 are 192km of road constructed or repaired, and 500,000 people benefiting from transportation infrastructure projects. It is anticipated that during FY2008, 135 km of road and 8 bridges will be repaired and 3 bridges will be constructed. As a result, a significant percentage of the beneficiaries will be reached.

During the second quarter of FY 2007 -2008 Berger will mobilize a performance evaluation and measurement team to do a systematic review of all performance metrics for the entire SISP. This effort, which will be conducted under Task Order 1, will lead to the expansion of metrics for Task Order 2.

The M&E team will be developing a system to properly monitor the F framework standard element indicators as well as the outcome performance indicators. The standard element indicators which will be reported on a monthly/quarterly basis are:

- Jobs created
- KM of transportation infrastructure constructed or repaired through USG assistance
- Infrastructure rehabilitated/constructed by type - bridges
- Number of private local contractors in business as a result of USG assistance
- Number of people receiving USG supported training in transportation technical fields

The standard element indicators provide a means for measuring project effectiveness and implementation. LBG and its subcontractors will report consistently on progress regarding KM of road constructed and rehabilitated, infrastructure rehabilitated as well as number of jobs created as a result of progress implementation. However to determine other impacts, such as how people are benefiting from USG sponsored transportation infrastructure projects and how many businesses have been created, the M&E team will examine the outcome performance indicators.

Baseline survey will be conducted prior to commencement of construction work to evaluate the outcome performance indicators. This will enable the team assess the future impacts of the Juba-Nimule road on the Zones of Influence (ZOI). The ZOI established includes Juba, Nimule and all the villages located along the road. Subsequent surveys will be conducted on an annual basis to determine changes in social and economic indicators resulting from the project's implementation. The surveys will include households, businesses, vehicle operators, passengers as well as structured interviews with freight companies. The following are some of the outcome performance indicators will be employed to measure these benefits to households, drivers and passengers, and small businesses:

- Average Total Monthly Household Expenditure for Food Staples
- Average Total Monthly Household Expenditures for Transportation
- Travel times to Health Clinics
- Frequency of visits to Health Clinics
- Cost to travel to Health Clinics
- Monthly Vehicle Operator Costs
- Freight Costs for Commercial Trucks
- Monthly Sales for businesses
- Cost of major products for sale

Examining these indicators is necessary to properly assess the overall impact that the road rehabilitation and construction has had on the South Sudanese Population.

CONSOLIDATED COMPREHENSIVE REPORTING

Each of the issued task orders requires specific reports that will be submitted on a periodic basis. There is considerable redundancy in the reporting requirements. In order to promote a more efficient reporting process, Berger will consolidate standard monthly, quarterly and annual reports into a single document.

Much of the data to support reporting for individual task orders and projects within task orders will be obtained through the Program Controls System. Although automation of this data collection will not occur until the second quarter of the year, Berger will begin consolidating monthly reports immediately.

STAFFING

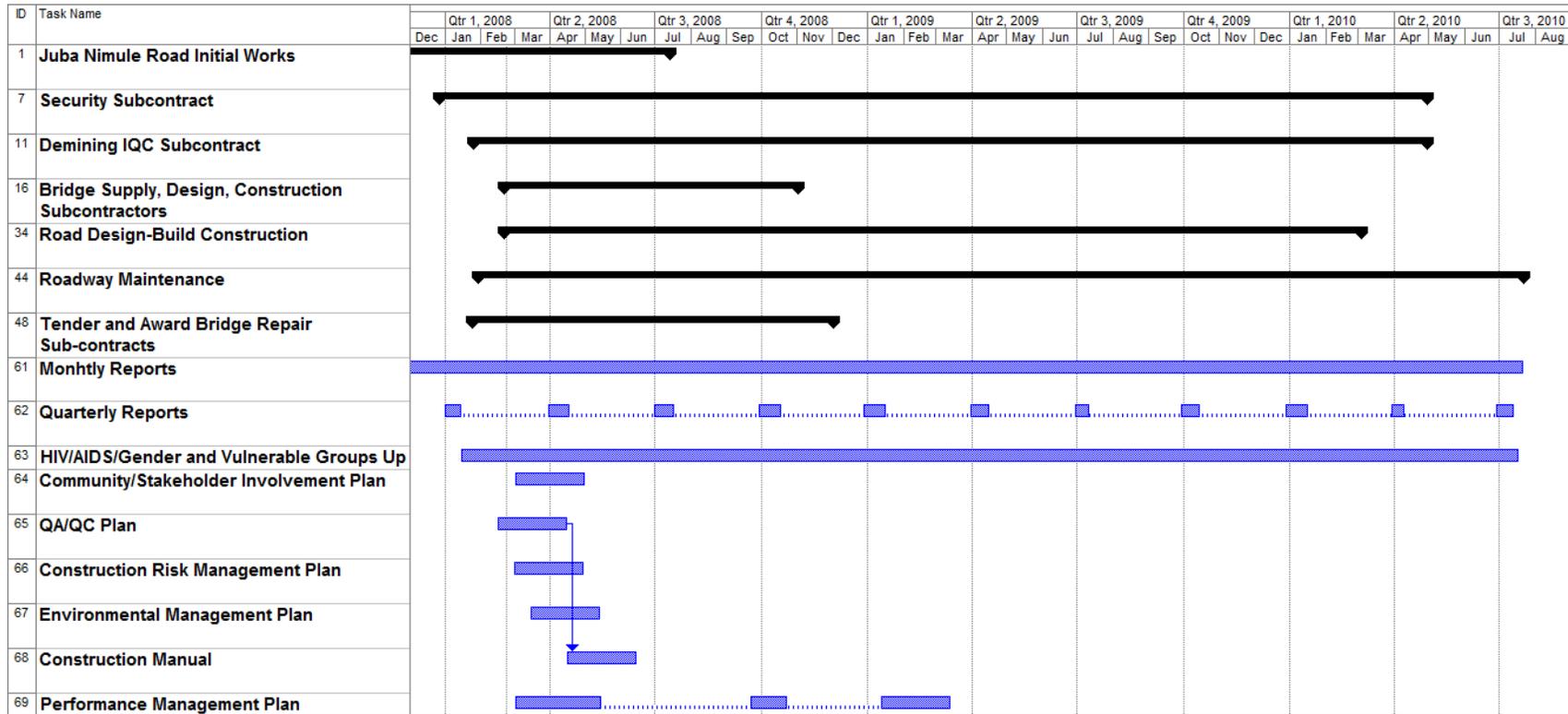
At its peak, Berger has projected that at least twenty-four long-term employees will be at work on various projects under Task Order 2. The majority of these positions is related to the construction of works and will be filled on an as-needed basis. However, certain key position, including the three identified as part of the management structure (Design Manager, the Construction Manager and the Maintenance Manager) will be mobilized during the first quarter of the fiscal year. In addition to three positions noted above, a Structure and Bridge Engineer to oversee the design and development of bridges will be mobilized prior to the end of the first quarter.

Construction site specific positions will be required in conjunction with construction subcontractor mobilization during the second quarter. By the end of the second quarter, dependent upon the various factors, these staff positions may be fully mobilized.

Staffing for the short term positions will be provided from Berger's existing world-wide staff, the named subcontractors and resource partners in the initial SISP proposal and from existing in-country resources that may be obtained from NGOs and other USAID implementing partners. Berger will provide staff necessary to achieve the items in this work plan in accordance with the projected schedule identified above.

SCHEDULE

Berger has developed the following schedule for activities described in this work plan.

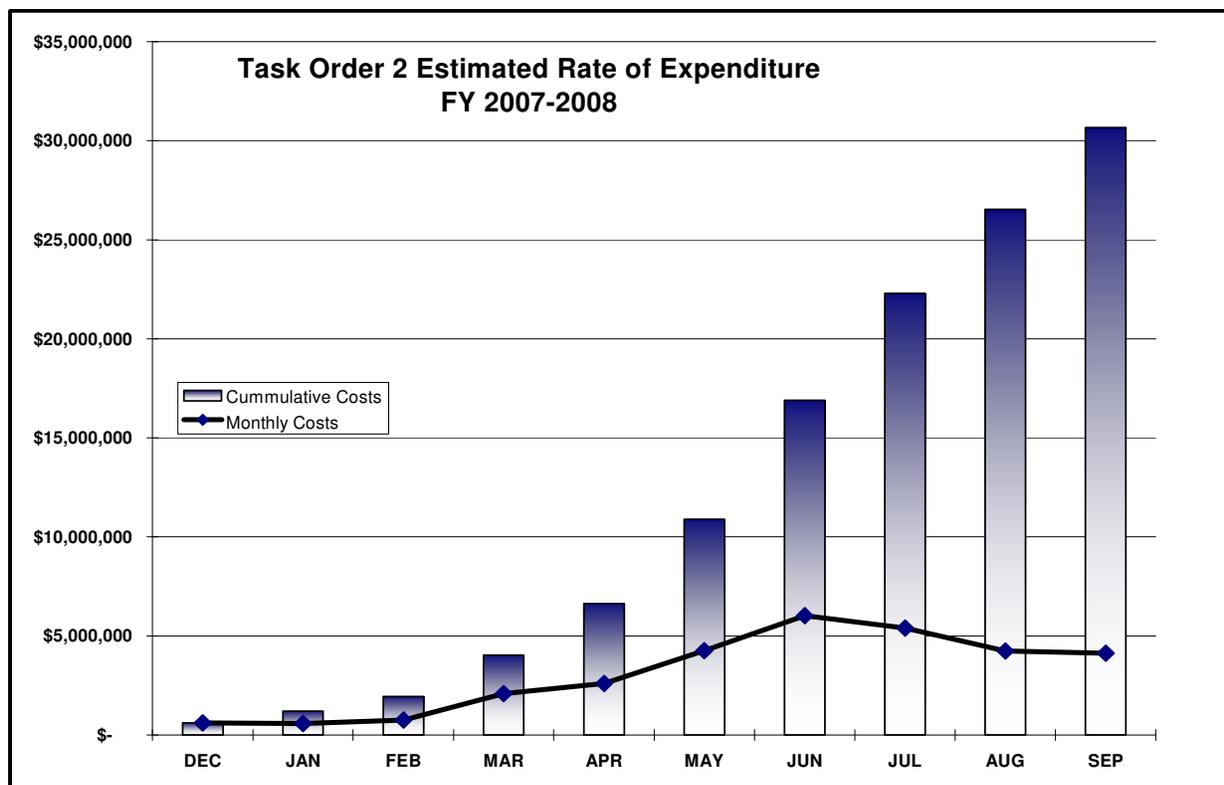


BUDGET

The total projected expenditures through the end of FY 2008 are \$30,628,596. The chart below indicates expenditures by project for the fiscal year 2007 – 2008. The majority of efforts as would be expected is expended toward the improvement of the Juba Nimule Road Phase I, for a detailed implementation plan is included as Appendix A.

Item	Estimated Expenditure	
Juba Nimule Road Phase I	\$	28,000,000
Wunrock Bridge	\$	1,975,000
Pachalla Bridge	\$	250,000
Raad Bridge	\$	250,000
Three Areas Assessment	\$	166,580
Kimbi Bridge	\$	25,000
Total	\$	30,666,580

The projected monthly expenditures for this budget are presented in the chart below. The jump in expenditures during the third quarter of the fiscal year is indicative of the mobilization of the design build construction subcontracts.



The following table provides a more detailed estimate of monthly expenditure by activity.

Activity	Obligated Month	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	Fiscal Year Total
MGMT/Staff/ODC		\$ 46,937	\$ 129,049	\$ 351,507	\$ 351,507	\$ 360,000	\$ 481,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 3,720,000
Critical Bridge Demining	Nov-07	\$ 565,000	\$ 452,000	\$ 113,000								\$ 1,130,000
Security Services	Jan-08				\$ 245,000	\$ 180,000	\$ 200,000	\$ 200,000	\$ 225,000	\$ 225,000	\$ 225,000	\$ 1,500,000
Demining IQC	Feb-08					\$ 400,000	\$ 400,000	\$ 375,000	\$ 125,000			\$ 1,300,000
Topo/Geotech Survey	Jan-08				\$ 300,000	\$ 400,000	\$ 300,000	\$ 300,000				\$ 1,300,000
Regrading	Feb-08		\$ 217,500	\$ 362,500	\$ 290,000	\$ 145,000	\$ 145,000	\$ 145,000	\$ 72,500	\$ 72,500		\$ 1,450,000
Bridge Maintenance	Feb-08		\$ 50,000	\$ 250,000								\$ 300,000
Critical Bridges	Mar-08			\$ 400,000	\$ 800,000	\$ 2,300,000	\$ 1,100,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 7,600,000
Design Build Subcon	May-08						\$ 3,000,000	\$ 2,500,000	\$ 2,000,000	\$ 2,000,000	\$ 2,000,000	\$ 9,500,000
Design				\$ 100,000	\$ 100,000							\$ 200,000
3 Areas			\$ 20,000	\$ 73,290	\$ 73,290							\$ 166,580
Yei Bridge Deck	Apr-08					\$ 25,000						\$ 25,000
Wunrock Bridge	May-08					\$ 300,000		300000	\$ 800,000	\$ 350,000	\$ 225,000	\$ 1,975,000
Pachalla Bridge						\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 250,000
Raad Bridge						\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 250,000
TOTAL		\$ 611,937	\$ 581,049	\$ 752,007	\$ 2,082,297	\$ 2,603,290	\$ 4,251,000	\$ 6,020,000	\$ 5,395,000	\$ 4,247,500	\$ 4,122,500	\$ 30,666,580

Appendix 1: Juba-Nimule Road Implementation Plan for the Initial Works

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INTRODUCTION

The Juba Nimule Road travels about 200km on the east side of the River Nile connecting Juba to Uganda. It is expected to provide a much more efficient corridor for commercial transportation between Uganda and Southern Sudan and support the return of displaced persons. The road will be a 7 meter carriageway with two one and one-half meter wide shoulders. The roadway will be paved with a double bituminous surface treatment. The road includes eight bridges, one of which serves as a border crossing with Uganda. USAID, in consultation and coordination with the Ministry of Transport and Roads (MTR) has designated this road as the most urgent priority for reconstruction.

USAID has provided an initial obligation of funds that are intended to support the following activities:

- Design of the road and bridges between the east bank of the River Nile at Juba and the border crossing bridge touchdown point in Uganda, including the potential relocation of the road to the west of Gordon Hill;
- Rehabilitation or replacement of the most critical bridges North of Gordon Hill and the Merlin Bridge in Nimule;
- Interim maintenance of the road and bridges; and
- Construction of initial roadway works including replacement of failed drainage structures and improvement of subgrade at locations of unsuitable soils.

It is anticipated that funding will be made available in the current fiscal year to complete the construction of the project.

Recognizing the critical importance of this roadway to the economic development of Southern Sudan and the return of many displaced persons, the Contractor has developed this implantation plan in order to achieve the following critical objectives:

1. Ensure that the roadway remains a viable corridor during construction.
2. Replace critical failing bridges to required standards within the earliest possible time.
3. Involve affected communities in the development and implementation of the project and employ local Sudanese workers and businesses to the greatest extent possible.
4. Promote USAID's initiatives on HIV/AIDS awareness and prevention.
5. Complete the construction as quickly as possible while ensuring cost-effective methods and technologies are employed.
6. Construct the roadway to appropriate national and international standards, achieving quality requirements and incorporating sustainable practices for construction and maintenance.
7. Build local capacity.

The Contractor will use a combination of tactics and approaches to complete the project, such as self-performance, procurement, subcontracting and where appropriate application of sub-

grants. These tactics will be informed by the Contractor's knowledge and understanding of the capacity of the local, regional and international markets. They will be bounded by the project specific objectives noted above. They will be informed by experience in the field and modified where appropriate.

The parameters of the Juba Nimule Road (JN Road) project were developed during the feasibility study conducted February and March 2007.

The Implementation Plan that follows provides the critical elements for delivering the project successfully. It is broken into several discrete components, such as methodology, approach, schedule, etc. The plan also includes the framework for the key deliverables required during the implementation of the project.

METHOD AND APPROACH

The Contractor will implement the Juba Nimule Road (JN Road) as a fast track project involving procurement, design-build construction and maintenance activities. The Contractor will employ a staged, design-build approach to complete the JN Road in the most expeditious manner. The methodology presented below is intended to result in a sustainable, cost-effective roadway that meets requisite design and construction standards and specifications.

SECURITY

Security in Southern Sudan is a significant consideration that must be integrated into all activities. Although the Comprehensive Peace Agreement appears to have achieved a cessation of hostilities between the previously warring parties, various areas of Southern Sudan remain prone to violence and danger. In order to incorporate security aspects into the JN Road, the contractor is soliciting the service of a security services provider. The security services provider will support movement security, site security and security coordination for various task orders and the JN Road.

DEMINEING

Demining of the corridor is an essential component of the overall project. There were several large scale battles fought along the roadway during the civil war, and Nimule was one of the larger towns which had a perimeter of defensive mines. Mines were also placed at key bridge locations. At various locations along the road, there is clear evidence of major battles, such as disabled tanks, bomb components and armaments. As such demining and unexploded ordinance clearance are critical components that will allow the improvement project to proceed.

During its emergency road repair works, the World Food Program (WFP) provided some level of demining along the entire road. From Nimule to Juba, an eight meter wide corridor has been cleared. This corridor generally lies in the footprint of the road, however, this boundary cannot be considered a precise boundary. Traffic during the rainy season, in maneuvering around potholes and washouts, has effectively created a road bed that in many places is substantially wider than eight meters. In other places, the road may even be offset from the area where demining previously occurred.

The WFP in addition to the eight meter clearance of the roadway, has cleared a corridor of twenty-six meters from Nimule to about fifty kilometers north. This clearance area, thirteen meters from what was the road centerline at the time of clearance may not be clearly delineated from the center of the road due to the widening that has occurred with the rainy season.

Furthermore the WFP provided clearance did not incorporate the stream valley beneath and beside the bridges nor the approaches adjacent to the bridges. On some bridges there is an indication of a significant number of mines to be cleared. On others, based on talking with members of the military and adjacent villagers, there may be no mine risk. Nevertheless, these

locations will require sufficient investigation to determine if they are clear of mines and other ordinance.

These factors will require additional demining to be undertaken in conjunction with the reconstruction of the roadway. Demining and clearance support will be required during all stages of the work—design, construction and maintenance. The demining support for the stages will require different levels of support.

Design Stage

During the design stage, demining must precede the actual topographic survey and the geotechnical evaluation. Due to the nature of these two activities, the areas to be surveyed or analyzed will require certification that mines, unexploded ordinance and battlefield remnants have been removed. For most efficient operations and to ensure that migration of ordinance, which can result during heavy rains and flooding, is avoided, the approach will incorporate demining as a critical element of the topographic and geotechnical surveys.

This is particularly important for several reasons. Since most existing bridges must remain in service during construction of new spans, the road must be relocated. In addition to extended areas to accommodate streambed analysis, there is significant amount of new alignment that will be necessary. The road, due to traffic in rainy seasons has become more curving than necessary; the road should be straightened. There preexist several areas along the corridor with substandard curves, which should be reduced or flattened. Finally, the Feasibility Study called for an evaluation of the proposal to realign the road to the west of Gordon Hill to avoid the steep and winding crossing of the mount. Each of these factors will require topographic survey and geotechnical analysis, which will necessitate demining activities beyond that which has already been completed or is currently anticipated to result from the WFP efforts.

Construction and Maintenance Stages

Because demining certification is time sensitive and since mines and other unexploded ordinance may shift from point to point during rainy weather or due to human action, it will be necessary that a small demining contingent be available during the construction (and maintenance) activities should ordinance be encountered. Also at the construction stage, subcontractors will establish base camps, lay-down yards, casting yards, borrow pits and quarries. Each of these may potentially require demining and ordinance clearance.

Demining Approach

Although the WFP has been directed by the Ministry of Transport and Roads (MTR) to accelerate its efforts to complete the demining of the JN Road, there will remain significant demining requirements throughout design and construction that is beyond the scope or schedule of their contract. We intend to use RONCO, our demining subcontractor (and also the demining subcontractor for WFP) to provide the additional services needed to support design. We will issue a separate demining subcontract to support activities during construction and maintenance. The tender for this subcontract was issued during December with award expected in January.

In addition to awarding a demining contract, we acknowledge that equipment availability is now one of the key obstacles to timely demining in Southern Sudan. We are investigating opportunities to procure long lead time equipment in order to provide additional demining capacity that will be available to meet our accelerated schedule. This equipment while initially dedicated to the JN Road will ultimately be available for demining activities on other road and bridge projects, such as the Wunrock, Raad or Pochalla bridges.

DESIGN STAGE

The design stage includes various activities that are required to develop plans and to identify special provisions and specifications for the work. Under the proposed approach, the Contractor will expedite the replacement of existing critical bridges as the first priority. The Contractor will use a design-design approach to these structures. For the remainder of the roadway and the border crossing bridge, the contractor also will utilize a design-build approach, however funding availability may result in complete design being finished independent of the final construction.

The activities of the design stage include the following activities:

- Community Participation and Involvement
- Geotechnical Studies
- Topographic Survey
- Hydrologic Analysis
- Environmental Management Plan
- Right of Way and Land Use
- Road and Bridge Design

COMMUNITY PARTICIPATION AND INVOLVEMENT

The Contractor will develop a Community Participation and Involvement Plan that will guide the manner in which the Contractor and its subcontractors engage the public, affected populations, and social and government leadership in the development and implementation of the project. The preliminary plan will be completed in January, and all future maintenance and construction activities will incorporate its findings and approved recommendations.

GEOTECHNICAL STUDIES

A Geotechnical study, investigations and testing shall be conducted to establish the surface and subsurface conditions existing along and adjacent to the road section and provide geotechnical data and information for roadway, bridge foundation and culvert design and construction. In addition, construction material surveys shall be conducted to identify and test possible borrow areas and quarries in and near the vicinity of the project that can provide sufficient quantities of materials for construction operations. A preliminary and final report shall be provided detailing findings and recommendations based on data and information gathered.

The Contractor will tender (jointly with topographic survey) for these services. The subcontractor will initially focus on providing geotechnical analysis of the critical bridges in an accelerated fashion. Once the bridges are completed, the Contractor will direct the subcontractor to begin mainline investigations with one or more crews if necessary to expedite the work.

TOPOGRAPHIC SURVEY

The Contractor requires data on existing landforms that will provide a complete detailed DTM (digital terrain modeling) topographical survey and mapping of the Nimule to Juba roadway and adjacent areas. Topographic survey is required in order to properly record existing topography, to identify key features of the terrain, to provide detailed geo positioning information relating to the existing and proposed roadway. Survey data will be provided to the design team in conjunction with geotechnical information to facilitate the identification of the centerline of the ultimate roadway and preliminary and final plan development.

The Contractor will tender (jointly with geotechnical investigations) for these services. The subcontractor will initially focus on providing topographic survey of the critical bridges in an accelerated fashion. Once the bridges are completed, the Contractor will direct the subcontractor to begin mainline investigations with one or more crews if necessary to expedite the work.

HYDROLOGIC ANALYSIS

Hydrologic and hydraulics analysis (H/H analysis) is necessary in order to properly site and size bridges and other drainage structures. While some of the work associated with this may be performed elsewhere there are specific activities that can only be performed in the field. The Contractor envisions that the H/H analysis will be phased such that time in the field can be minimized to the greatest extent possible. This will allow the acceleration of the work and reduce costs that occur with mobilization to the Sudan.

The initial H/H analysis will begin with a desk study where various data will be assembled and studied. These data include the drainage area, the slope of the stream, the maximum rainfall intensity during the design period, the general shape of the river bed and the ground cover. This will allow an estimate of the cubic meters per second of flow and an estimate of flood flow. These are important factors in determining the length and height of each bridge.

Field review will be required to identify any physical evidence of high water and other assumptions on stream characteristics, which can be used to check earlier calculations. The remainder of the H/H analysis will be performed in the field and as soon as reasonable after the topographic and geotechnical surveys are completed so that the depth of scour, if any, and foundations conditions can be identified and incorporated into the final determination of new bridge location, size and height and foundation design, all of which take into consideration the findings of the H/H analysis.

In addition to the H/H analysis necessary for proper sizing of bridges and drainage structures, an investigation of the existing boreholes along the road needs to be conducted. The number of boreholes, depth to the water table, and the capacity of the boreholes needs to be determined.

This information will be used to help determine the quantity and spacing of new boreholes to be drilled in order to supply adequate water for road construction activities.

ENVIRONMENTAL MANAGEMENT PLAN

The Contractor will develop an Environmental Management Plan (EMP) framework that will guide design, construction and maintenance activities to ensure that environmental factors are adequately and appropriately considered during various phases of the project. The actual EMP, will be developed by the design-build contractor(s) and will be based upon initial work done during the Feasibility Study, the Contractor's own best practices and Southern Sudan environmental initiatives. The Environmental Management Plan will be completed during early 2008.

RIGHT OF WAY AND LAND USE

Right-of-ways, or road reserves, are provided in order to accommodate road width and to enhance the safety, operation and appearance of the roads. The width of right-of-way depends on the cross section elements of the highway, topography and other physical controls together with economic considerations. In keeping with national priorities established by the Government of Southern Sudan, Ministry of Transport and Road (MTR), the right of way width for the Juba Nimule Road has been established as typically twenty-six (26) meters in width. As the right of ways will be equidistant from the centerline of the road to the left and to the right of the carriageway this means that the right of way will extend thirteen (13) meters on either side of the roadway centerline. Ultimate right of way limits will be shown on the final design plans of road projects.

In some locations additional right of way may be required in order to address topographic features or the increased width of the road through some urban areas. In these situations, the right of way may be increased as needed. Additional area for drainage outfalls or extension of structures may be required to protect the future integrity of the drainage facility but every effort will be made to ensure that adjoining land owners will not face undue restrictions on the use of this land after completion of the road.

Reduced widths may be considered only when these are found necessary for economic, financial, health and social or environmental reasons. In such cases, it is recommended that the right-of-way should extend a minimum of a nominal three (3) meters from the edges of the road works. However, where this occurs, it is advisable that GOSS, in conjunction with local authorities act to restrict building activity along the road to prevent overcrowding, to preserve space for future improvements, and to provide for sight distances at curves.

Since land rights within Southern Sudan are tenuous at this time, the Contractor intends to hold as closely as possible to the existing roadway except as subsequently discussed. The Contractor will coordinate all land use issues closely with MTR project representatives in order to resolve issues of rights of way in a timely manner. Wherever additional rights of way are required, the acquisition should be the responsibility of the GOSS.

ROAD AND BRIDGE DESIGN

Road Design

The project road is the shortest route between the City of Juba, the neighboring country of Uganda and the region's major port, Mombasa; as such, it is likely to be the most heavily traveled road in Southern Sudan. For this reason, it is recommended that the road be designed to ultimately become an all weather asphalt highway.

The following geometric design criteria are based on A Policy on Geometric Design of Highways and Streets, 2001 fourth edition by the American Association of Transport and Highway Officials (AASHTO).

Horizontal Alignment

Maximum Speed	100kph
Minimum Speed, mountainous	30kph
Minimum Radius without superelevation at 100kph	5,000m

Vertical Alignment

Minimum K value, Crest Curve, 100kph	52
Minimum K value, Sag Curve, 100kph	45
Minimum Longitudinal Gradient	0.50%
Maximum Longitudinal Gradient	6.0%

Values may be adapted to reduce cost on earthworks and other related items of work. Values may also be adjusted to reduce the effect on environmental issues such as ROW acquisition and removal of trees.

Cross Section Elements

Road Lane Width	2 x 3.5m
Bridge Lane Width	2 x 3.7m
Bridge Sidewalk Width	2 x 1.0m
Shoulder Width, Flat Areas	2 x 1.5m
Mountainous	2 x 1.0m
Built-up areas	2 x 3.0 m (paved)
Normal crossfall	2.0%
Shoulder Slope	4.0%
Side Slope Ratio, Fill	2H: 1V up to 3.0m 1.5H: 1V over 3.0m
Cut	1.5H: 1.0V <2.0m Common Exc. 1.0H: 1.0V >2.0m Common Exc. 1.0H: 3.0V-4.0V >2.0m Rock Exc.

Sight Distances

Stopping Sight Distance	130m
Driver's Eye Height	1.08m
Height of Object for Stopping	0.60m

Widening

Based on traffic counts, the adopted design vehicle will be a single unit truck. Widening on substandard curves (50m radius) will be based on the largest vehicle recorded on the traffic survey for safety reasons. This widening is essentially required in mountainous areas (Gordon Hill).

Bridge Design

The designs of bridges and culvert structures on the project road are based on Standard Specifications for Highway Bridges 16th Edition (1996) with 1997-2001 Interims adopted by American Association of State Highway and Transportation Officials (AASHTO). Additional references such as ACI and AISC specifications shall be adopted as necessary.

Design Loads

Dead Loads

- Reinforced Concrete Unit Weight = 24kN/m³
- Structural Steel Unit Weight = 78.5 kN/m³

Vehicle Loads: The Greater of

- 130% of HS20-44 Truck Plus Impact
- Military Vehicle with Two 24,000-lb Axles

Wind Load: Based on 120mph Wind Speed

Thermal Forces: Based on 70°C Temperature Difference

Stream Current Forces: Pending Hydrologic/Hydraulic Studies

Earthquake: Based on Seismic Coefficient of Acceleration for road zone

CONSTRUCTION STAGE

The construction stage consists of a variety of activities that lead to the completion of useful facilities. Since the initial obligation of funding for the Juba Nimule Road is not sufficient to complete the road to the desired standard, initial works, based on priorities agreed with USAID and MTR, will be completed first, and should additional funding be made available for the project, future construction will be added. Although the following section is focused on the initial works, many of the activities identified below will be applicable to future construction as well.

The specific activities included as part of the construction stage include the following:

- Construction Subcontracting;
- Contractor Mobilization;
- Initiation of Initial Works;
- Critical Bridges; and
- Initial Roadway Works.

Each of these is described below.

CONSTRUCTION SUBCONTRACTING

The Contractor intends to award design-build construction subcontracts to at least two, and most likely three, capable firms to undertake fast track construction of the Juba Nimule Road. The subcontracts will allow for incremental notices to proceed based upon funding availability. For example, the initial works contemplates replacement of critical bridges and additional roadway related works, but not final construction.

By using incremental notices to proceed, the Contractor will be able to react quickly to increased funding for the project by issuing a notice to proceed to construction subcontractor(s) that are already mobilized and on the project. This approach will ensure that funded works can be completed in the shortest possible time and equally as important, it will avoid additional costs related to mobilization, demobilization, and idle claims as would be the case were construction subcontracts limited to initially available funds. Of course, it is important to understand that any project undertaken with incremental funding will result in a fully functioning roadway that may never achieve final construction.

Design-build construction subcontracts will be tendered and implemented in accordance with the requirements of the Federal Acquisition Regulations (FAR) and the *Federation Internationale des Ingenieurs-Conseils* (FIDIC), consistent with the requirements of the SISP basic contract. In order to expedite the construction subcontract procurement process, the Contractor will combine subcontractor qualification with the tendering documents. Subcontractor qualifications will address minimum levels of company experience, financial and managerial capacity and equipment and labor. This will allow the Contractor to award the construction subcontracts on the basis of best value among responsive bidders.

Contract Modality

The Contractor intends to award two or three separate construction contracts for the JN Road. Two contracts will be based upon approximately one-half of the length of the roadway and a third for the critical bridges, although the final distribution will be determined immediately prior to the tendering of the work. We intend to award the initial contract as a fixed unit contract, converted subsequently to a fixed price contract once detailed design is completed. In order to fast track the construction of the project, construction subcontracts will be tendered and awarded and construction subcontractors mobilized prior to 100% design being completed.

Fixed Unit Price

Since demining of the entire route has not been completed, thus preventing the immediate start of topographic and geotechnical surveys and subsequently design, the Contractor will prepare a Bill of Quantities (BOQ) based upon the work that was done during the Feasibility Study. The BOQ will be comprehensive enough to include all items reasonably expected to be encountered during the construction of the road. We will issue a solicitation, which will include qualification for bidding as well. Although the construction subcontractor will not know final quantities, the estimates that are provided for bidding purpose should provide a reasonable estimate of required quantities and therefore, a reasonable price.

The Contractor will require that potential design-build construction subcontractors fix the unit cost for the BOQ items for a period of three years from contract award. Due to the existing

volatility and the inflationary pressures of the cost of fuel, oil and lubricants, liquid bitumen, steel reinforcement, metal corrugated pipes and cement, each construction subcontract will include, in the bidding documents, basic prices for these components. The Rise and Fall accounting system will allow the construction subcontractor to receive additional reimbursement when the costs of these components exceed a predetermined percentage. The escalation would be based upon actual quantities of the items used and the actual prices paid, once the prices had increased by more than a set percentage.

The Contractor may also decide to provide certain materials, such as aggregates or bitumen for the construction subcontractor's use. When provided, these will be supplied at no cost to the contractor. When it is contemplated that a material may be provided to the construction subcontractor, the solicitation will ask that the handling and placement of it be bid as a separate option.

The Contractor believes that this is the most appropriate approach to conducting a tender before design data is available, as it will most closely replicate standard road construction contracts, which are generally contracted under unit rate basis. To this end, the Contractor's approach will include the following elements:

- The tendering documents shall provide a bill of estimated quantities given to provide a common basis for bidding. The bill of quantities will be read in conjunction with the instructions to bidders;
- Payment under the construction subcontract will be based upon the actual quantities of work ordered and carried out by the contractors and verified by the engineer;
- The unit rates will be fixed with the terms of the contracts for the duration of the initial works plus the estimated duration for final completion of the entire project;
- In order to reduce risk, obviate higher unit proposals and eliminate the need for contingencies, the Contract alternatively may include a price escalation formula with adjustment factors to address items significantly affected by fluctuations in price, such as cement, fuel, liquid bitumen, etc. The unit adjustment factors will allow incremental increases in unit rates for these specific items. The unit adjustment factors will be tied to commonly accepted price indices, which could be the ones adopted in one of the neighboring countries such as Kenya or Uganda;
- The rates shall include the necessary costs for all work, equipment, supervision, materials, maintenance, erection, bonds, insurance, profit taxes, duties, transportation and field and home office conditions and requirements set out or included in the subcontract; and
- Proposers will be required to calculate and propose a rate for each item in the bill of quantities.
- Proposers will be required to produce rate breakdown analysis for no less than 75% of the contract value.

Fixed unit price contracts are consistent with FAR Section 36.207 for the following reasons:

- Quantities of work, such as excavation, cannot be estimated with sufficient confidence to permit a lump-sum offer without a substantial contingency;

- Estimated quantities of work required may change during construction; and
- Proposers will have a common bill of quantities on which to submit bids, thus allowing an adequate evaluation of tenders and their costs.

With minimal design being available at the time of construction tendering, and with future plans to study the potential rerouting of the roadway around Gordon Hill, precisely calculating quantities is not feasible. However as design is completed and construction finalized the Contractor will convert fixed unit cost subcontracts to fixed cost.

Fixed Cost

Once detailed plans are completed, final quantities will be clearly established. Prior to completion of the design, the construction subcontractor will participate in constructability reviews of the plans. During the constructability review, questions or concerns relating to the final BOQ will be addressed and resolved. This will establish the final BOQ for each construction subcontract. At this point, the subcontract will be converted from a Fixed Unit Cost to a Firm Fixed Price Contract.

Mobilization

Upon notice to proceed, each design-build construction subcontractor will be expected to quickly mobilize and initiate project related activities including:

- Location and Construction of camp including potable water, waste disposal, power and communications, laboratory, housing, offices, warehousing, etc.;
- Mobilization of bridge and roadway construction equipment;
- Establishment of lay down yards or temporary camps at remote locations;
- Development of casting yards and prefabrication facilities;
- Installation of bore holes and establishment of other water sources at various locations throughout the project corridor;
- Initiation of borrow pits and quarry operations;
- Initial design, first focused on the critical bridges and then upon the roadway;
- Preparation and construction related to the critical bridges;
- Commencement of the initial roadwork relating to replacement of unsuitable materials and the replacement of failed drainage structures; and
- Routine maintenance of the improved roadway.

INITIAL ROAD WORKS

The initial stage of construction includes two primary features—the replacement of the most critical bridges and initial roadway works. These are described below, but it is important to note that the initial works may be completed as early as September 2008, when a fast track construction approach is used. The critical bridges are planned for replacement by next summer, and much of the initial roadwork will be completed shortly thereafter.

Critical Bridges

There are seven bridges that will be replaced during the initial works. The current deteriorated condition of these bridges dictates that they should be replaced as soon as possible, to promote safe travel that will support economic development and facilitate the return of displaced persons. Furthermore, having new bridges, capable of sustaining reasonably loaded vehicles will make future construction of the JN Road more cost effective and enhance opportunities for rapid construction.

The Contractor intends to procure steel bridges for installation on substructures built by the construction subcontractor. This procurement will coincide with the advertisement and award of construction subcontracts to allow the maximum possible lead time for fabrication and delivery of the bridges to the project. The construction subcontractor will construct approaches to bridge, abutments, piers and other required substructure elements to properly accommodate the bridges. Assembly and erection of the superstructure will be conducted by the bridge supplier. This approach will require that the construction subcontractor properly coordinates the construction of bridge support members so that they closely match the steel superstructure design and require minimum adjustment during assembly of the bridge. Roadway approaches will be built in accordance with the final design of the pavement structure; however bituminous treatments will not be completed until paving of the roadway during subsequent phases.

The Contractor believes that this strategy for the critical bridges that will reduce the time required to replace the bridges that are at greatest risk of failure. Furthermore, since most bridges are simple spans and at right angles to the stream, a procurement and install approach poses a significantly reduced risk related to location and size.

Roadway

Initial roadway construction will include the production of necessary materials to support construction, with aggregate being the most significant component. Initial construction will also include drainage structure replacement and the removal and replacement of unsuitable soils and construction of embankments. These are described below.

Water for Road Construction

During the construction activities the Contractor will require a considerable amount of water for the compaction of the murrum material for the embankments and for reducing the dust pollution generated by the traffic. There are 8 river/streams that dot the road corridor which during the dry season, or the prolonged dry spells, have little or no water at all so, as a result of that, a consistent number of boreholes needs to be drilled at various strategic locations to extract ground water. The intensity and the final required number of boreholes will be determined upon the productivity of the drilled ones.

Aggregate Production

The construction of the JN Road will require 0.75 million metric tons of aggregate. The original assessment during the feasibility study was that there would be locations along the corridor which would support quarry operations. Thus, we believe that the primary issue related to aggregate production will be quarry capacity.

The 0.75 million metric tons of aggregates would involve substantial cost if crushed aggregate is utilized. Considering this, it is recommended that natural gravel (aggregates), is to be used instead but must be cement-stabilized in order to attain the required design density. Cement treatment of about 4% by weight is initially specified to satisfy the strength requirement. Type 1 & Type 1A (Air entraining cement) is extensively used. The main objective is to attain the required CBR value necessary to withstand the volume of traffic that would last the design life of 7 to 10 years as specified in Annex 2 of Feasibility Study. It is not always necessary to attain 100% CBR in Base Course because oftentimes lower CBR value is adopted but compensated with structural layers thicknesses, e.g. Improve Subgrade, Sub-base, Base and Wearing Course.

Method of Stabilizing Road Base using Portland Cement

Several Codes and Manuals have been written as guide to stabilize Road Bases using Portland cement. Two options are hereby presented as options.

Option 1:

Granular Base Stabilization by CTB method in accordance to PCA (Portland Cement Association) in conjunction with FPO3 Standard Specification, Federal Highway Administration.

CTB is an intimate mixture of natural aggregate material and/or granular soils combined with measured amounts of Portland cement and water that hardens after compaction and curing to form a durable paving material. A bituminous or Portland cement concrete wearing course is placed on the CTB to complete the pavement structure. CTB is widely used as a pavement base for highways, roads, streets, parking areas, airports, and materials handling and storage areas.

In CTB construction the objective is to obtain a thorough mixture of an aggregate/granular material with the correct quantity of Portland cement and enough water to permit maximum compaction. The completed CTB must be adequately cured to both let the cement hydrate and to harden the cement-aggregate mixture. The fundamental control factors for quality CTB are:

1. Proper cement content
2. Adequate moisture content
3. Thorough mixing
4. Adequate compaction
5. Proper curing

The aggregate/granular material, cement, and water are to be mixed in a central mixing plant. Central plants can either be continuous-flow or batch-type pugmill mixers. CTB can also be mixed-in-place using transverse-shaft pulvermixers or traveling mixing machines.

CTB thicknesses are less than those required for granular bases carrying the same traffic because CTB is a cemented, rigid material that distributes the load over a large area. Its slab-like characteristics and beam strength are unmatched by granular bases that can fail when

interlock is lost. This happens when wet subgrade soil is forced up into the base by traffic loads. Hard, rigid CTB is practically impervious. It resists cyclic freezing, rain, and spring-weather damage. CTB continues to gain strength with age even under traffic. This reserve strength accounts in part for CTB's excellent performance.

The cement content is a function of aggregate gradation and Plasticity Index of soil-cement mixture. Initial estimate of required cement content is about 4% for the type of soil along JN road section. Thus, further tests with Geotechnical Investigation by way of soil classifications, will determine the cement content relative to the type of materials from approved source (quarry). Determining Cement Content would follow the procedure in accordance to ASTM procedure D423 & D424.

Aggregate gradation requirement is based on FP03 Table 703-2, which allows 100% passing maximum size of 50mm sieve.

Option 2:

Adopting Stabilization of Base in accordance to Chapter 3 of US Army Road Construction Manual TM 5-822-14/AFJMAN.

The similarity of the approach as with FP03 is hereby noted. The only difference is the approach with regards to determination of cement content and the gradation requirements of aggregates of both Base and Sub-base. Cement Content in Soil-Cement Mixture shall be determined by the formula $A=100BC$,

Where:

A = design cement content in percent total of weight of soil

B= percent passing No. 40 sieve size, expressed as a decimal.

C= percent of cement required to obtain the desired PI of minus 40 material, expressed as a decimal.

US Army manual allows maximum size of aggregates with 100% passing 1 1/2 in. (38mm) and plasticity index determination in accordance to ASTM D423 and ASTM D424.

During the initial works, the subcontractor will be responsible for obtaining sufficient aggregate to build the realigned approaches to the critical bridges and all structural and incidental concrete related to the bridges and to provide concrete to precast reinforced concrete pipe and drainage structures. In addition, the contractor will be encouraged, or possibly required, to create initial stockpiles of aggregate to support accelerated construction when additional obligation authority is provided.

Drainage Structure Replacement

During the initial works phase, the contractor will replace an estimated ten percent of existing cross pipes and other drainage structures that are believed to have failed. The contractor will require the construction subcontractor to install reinforced concrete pipes, boxes and culverts. The construction subcontractor will construct masonry headwalls, channels and lined ditches as required. It is anticipated that this will be an area where extensive training and development of a local workforce will be achieved.

Unsuitable Soils Replacement

The assessment done during the feasibility study estimated unsuitable soils will be encountered in less than ten percent of the project area. Where unsuitable soils are identified during the geotechnical investigation, the primary solution is expected to be removal and replacement with suitable material. However, depending upon geotechnical requirements, an alternative approach may be required. Regardless of whether the approach is removal and replacement, capping or other technique, the construction subcontractor will be required to construct the subgrade and embankment to the final roadway prism during this operation. Since naturally occurring murrum (lateritic soil) appears readily available along the corridor and since this is the predominant road surface on the JN Road, this will serve as the riding surface until the pavement is constructed.

Embankment Construction

A moderate amount of embankment is anticipated to be completed during the initial works phase of construction. Most of the embankment will be constructed in conjunction with construction of the critical bridges and their approaches, with the installation of new drainage pipes and structures and with the replacement of unsuitable soils. It is believed that the construction subcontractors will be able to obtain adequate embankment materials reasonably close to the existing road track.

FUTURE ROAD WORKS

Future construction phases will provide a seven meter, paved carriageway with one and one-half meter shoulders and adequate drainage throughout. In urban or settled areas, the roadway may be widened and curbing installed. The entire length of the road will be paved with a double bituminous surface treatment to provide a durable, easily maintenance and smooth riding surface. The border crossing bridge between Southern Sudan and Uganda will be replaced during future construction.

Roadway Construction

Future construction of the roadway will include the completion of all drainage structures, all grading and the placement of the pavement structure, including final pavement. Future construction will include the possible relocation of the road to the west of Gordon Hill and modest realignments that may be required to avoid unstable soils, houses, schools and other buildings and area where mines or other battlefield debris may be present. Realignments may also be provided to improve horizontal and vertical geometry of the road in order to enhance safety for road users or those living and working adjacent to the road.

The pace of future construction will be determined by the funding available to the project. Should full funding be provided during the initial stage of construction, it is feasible to complete the entire project within fifteen to twenty months of construction subcontractor mobilization. The final schedule is dependent upon the availability of funds as well as the timing of when those funds will be provided.

Border Crossing Bridge

In addition to the construction of the roadway, the border crossing bridge will be replaced during future phases of construction. The existing bridge has been maintained in a serviceable condition to this point. This fact, combined with the complexity of planning, designing and constructing a border crossing, requires that it be treated as a stand alone project. Detailed design of the bridge is anticipated to be initiated at the time that initial construction works are started.

MAINTENANCE

USAID and MTR have agreed that it is appropriate for the Contractor to assume interim maintenance of the Juba Nimule Road at the earliest opportunity. The interim maintenance requirement is in addition to the year of maintenance responsibility following construction. The Contractor will assume maintenance responsibility for the roadway shortly after the first of the year. The roadway maintenance will be divided into two primary approaches—surface maintenance and roadside maintenance. Bridge maintenance is divided into emergency repairs and routine maintenance. These are described below.

ROAD MAINTENANCE

The Contractor will solicit grading a subcontract for surface maintenance. The purpose of the surface maintenance will be to re-work the travelway in order to promote a more consistent grade, to fill voids and potholes, to ensure proper drainage away from the road surface and the replace lost or displaced materials. The Contractor will award the grading subcontract prior to the end of the current calendar year for mobilization after the first of the year. This subcontract will be responsible for the entire length of the roadway. In addition to the regrading, the subcontract will include provisions for additional material to be placed to correct extreme situations. If needed, additional subcontracts will be issued to maintain the road until significant construction activities cause them to be ineffective.

The contractor will approach the provision of maintenance of roadside features, such as drainage structures and outfalls, signs, natural areas adjacent to travelways, traffic operations, etc. through labor intensive community-based initiatives. This work program will be developed after the grading program has been launched and will involve extensive training and development activities. The development of the community-based work programs will provide an opportunity for future long-term maintenance under the construction subcontractors.

BRIDGE MAINTENANCE

There are two aspects of bridge maintenance—emergency repairs and routine maintenance. Several of the bridges are suspected to be in such condition that their potential risk of failure is quite high. Emergency repairs may be required at these bridges in order to keep them open until they are replaced by next summer. Emergency repairs may include re-decking, replacement of structural members or other activities that will be undertaken urgently. The Contractor, after performing an independent assessment of the bridges will identify any required emergency repairs. Subcontracts will be tendered for these repairs.

Routine maintenance includes such activities as cleaning decks of mud and debris, removing vegetation from bridge components, and managing bridge approaches. Managing bridge approaches will require that gates be placed on approaches to bridges to stop all vehicles before entering upon the bridge. This will eliminate the braking and acceleration that currently are contributing factors to displaced decks. Routine maintenance will be performed by the labor intensive, community-based firms or organization.

QUALITY ASSURANCE

The Contractor will provide quality assurance of all activities on the project. Quality assurance will be conducted in accordance with the Contractor's Quality Assurance Plan. Individual subcontractors will be responsible for quality control of their activities under the oversight of the contractor and consistent with the Quality Assurance Plan as described subsequently.

The Contractor has identified staff positions that will be involved in assuring quality of construction and maintenance activities. Field based staff, assigned to oversee and inspect construction subcontracts will monitor construction works to ensure that the work adheres to contract requirements and specifications and to ensure that the work achieves its intended results.

The Contractor will assign qualified staff to oversee the maintenance subcontracts and to work with communities on labor intensive works.

DELIVERABLES

The Contractor will provide deliverables and submittals in accordance with the requirements of the task order and consistent with the approach to project execution. In addition to the deliverables associated with construction works described above, we will provide additional items as necessary. These additional items include the following:

COMMUNITY PARTICIPATION PLAN

The purpose of the Community / Stakeholder Participation Plan is to provide a framework that will guide the contractor and subcontractors in working with stakeholders affected by the project. The Contractor will develop and implement a Community / Stakeholder Participation program, to include consultations with GoSS Ministries (Ministry of Transport and Roads (MTR), Ministry of Housing, Land and Public Utilities (MHLPU), Ministry of the Environment, Ministry of Gender and others as appropriate), State authorities (Governor's office, and associated State Ministries as appropriate), local authorities as may be available and local communities. Effort will be extended to include participation from women, vulnerable groups and local residents affected by the project. The Contractor will conduct town hall meetings in each community through which the project passes prior to the start of construction in that community. The town hall meetings will address concerns of the community and explain the project to the community members. Particular attention will be emphasized to assure that women and vulnerable group members are adequately represented at these meetings.

GENDER/HIV PLAN

The contractor developed the framework for a Gender/HIV Plan during this past summer. This framework will be used to guide the project specific Gender/HIV plan that will be developed during the project development. The Gender/HIV plan will also incorporate elements of the Community/Stakeholder Participation Plan that is currently under development.

In addition the Contractor will require design-build construction and maintenance subcontractors to incorporate a variety of HIV/AIDS prevention activities for their workforce. Special opportunities for women and other disadvantaged people will be provided through the labor intensive community based maintenance initiatives.

ENVIRONMENTAL MANAGEMENT PLAN

As noted previously, the Contractor will provide an EMP framework that will guide subcontract specific EMP that will be prepared by the design-build construction subcontractors.

QUALITY ASSURANCE PLAN

The Contractor has both a Design Quality Management Plan and a Manual of Project Management Guidelines for Supervision of International Construction Contracts as part of its corporate QC/QA program. Both of these manuals will be used, and adapted as necessary, for the Juba Nimule Road. These will be finalized in conjunction with the design-build subcontractors' individual project quality control plan.

In addition to the use of these manuals by the design and construction management teams, LBG corporate maintains an active QA Board of review to monitor designs and construction progress and overall quality.

HEALTH AND SAFETY PLAN

Each individual design-build construction subcontract will require the development of a project specific health and safety plan. Upon award of the construction subcontracts and prior to the preconstruction conference, construction subcontracts will submit their Health and Safety Plan to the Contractor and to USAID for review.

RESOURCE LOADED SCHEDULE (CONSTRUCTION)

Once construction subcontracts have been awarded, the Contractor will direct the subcontractor in the development of resource loaded project schedules. These schedules will be developed on the Contractor's Program Controls System which will be initiated in conjunction with the start of the construction subcontracts. The resource loaded schedule will provide an initial baseline plan for implementing the construction works.

The schedules will be updated on a minimum of a weekly basis or more frequently as the situation may require. The Program Controls System will allow the generation of specific reports that will be used by the Contractor and by USAID in monitoring progress, identify critical deliverables and anticipating and resolving problems.

CONSTRUCTION RISK MANAGEMENT PLAN

The Contractor will update and submit a revised construction risk management plan to USAID for review in conjunction with the tendering of design-build construction subcontracts.

CONSTRUCTION MANUAL

Each design-build construction subcontractor will be required to submit a construction manual upon award of the construction subcontract. This manual will be submitted to USAID for review and approval.

REPORTS

The Contractor will submit standard reports on a monthly and quarterly basis. These reports will detail project activities, provide an analysis of project status and progress toward meeting key objectives and deliverables, financial information, including burn rate and cost to complete and, where appropriate, data and information relating to performance metrics.

DESIGN

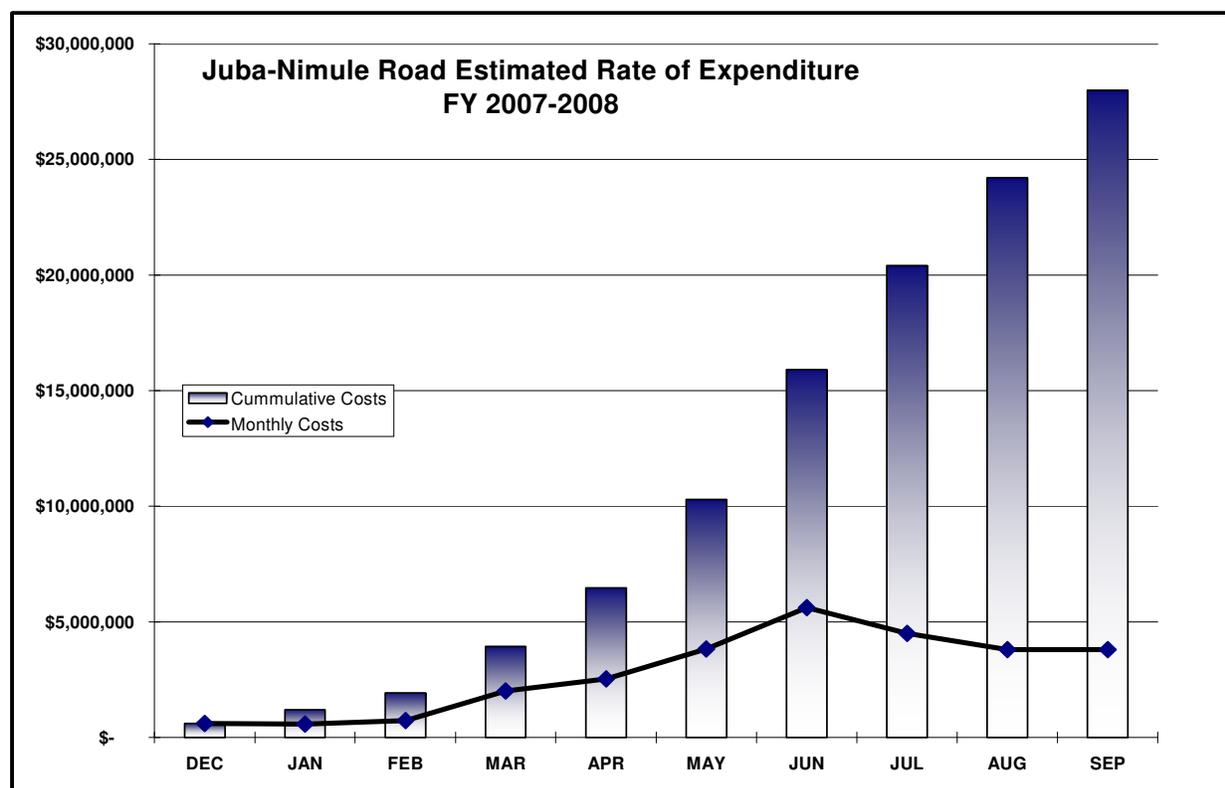
A schedule for the submittal of various stages of design will be determined upon award of the design-build construction subcontracts. In using a design-build approach, it may be appropriate to reconsider the percent stage for USAID review and approval. This will be further discussed during the preconstruction conference.

BUDGET

The initial works of the Juba Nimule Road are projected to cost approximately \$28 million through September 2008. These costs are broken into categories relating to various components of the work. The total estimated expenditures through the end of Fiscal Year 2008 are depicted for each of the general categories or activities in the table below. The first budget category captures a range of costs associated with the Contractor's management and construction supervision. Included also in this are general and administrative costs, overhead, other direct costs to the project and fee through the entire period.

Budget Category	Estimated FY Expenditure
Management/ODC/FF/et al.	\$ 3,720,000
Demining 1 (RONCO)	\$ 1,130,000
Security	\$ 1,500,000
Demining 2	\$ 1,300,000
Topographic & Geotechnical	\$ 1,300,000
Design (Bridges)	\$ 200,000
D/B Contractor Mobilization	\$ 5,000,000
Initial Road Works	\$ 4,500,000
Critical Bridges Construction	\$ 7,600,000
Interim/Emergency Maintenance	\$ 1,750,000
Total	\$ 28,000,000

In addition to this, the Contractor has projected the cost incurred by month through the fiscal year. The following graphic displays the cumulative costs by month in columns with the monthly costs plotted across them. The rapid growth from February through June is indicative of the mobilization of both the Contractor's workforce as well as that of the majority of the subcontractors—grading, security, demining, construction, geotechnical and topographic, et al. After peaking in June, costs level out through the end of the dry season and the early part of the rainy season as the work on the critical bridges will drive costs. After June, costs will gradually decrease on a monthly basis as the construction subcontractor's complete the initial works and demobilize from the project (assuming that no further funding is forthcoming to support the future construction works).



STAFFING

The Contractor has developed a staffing plan to implement the various activities associated with the development of the initial construction works on the Juba Nimule Road. The Contractor's workforce is made up of expatriate and third country national professionals and technicians and local Sudanese technicians and professional. Staffing includes long-term technical assistance (LTTA) positions that will be responsible for the execution of the construction program. The majority of LTTA staff positions will be located in the field at various construction camps and construction offices. This deployed staff will have responsibility for managing and supervising the day-to-day activities of the engineering, specialty and construction subcontractors.

The Contractor requires various short-term technical assistance (STAA) staff. The intent of STTA is to provide periodic and temporary augmentation of the Contractor's LTTA staff. For example, the Contractor requires the services of a hydrologic engineer during the initial design of the bridges, and proposes a short-term assignment for this activity. Unlike the hydrologic engineer, who may be required only for a short period, individuals such as the Community Development Specialist may be required not only for a brief initial assignment, but also for period visits to the project throughout its life.

The Contractor intends to provide a significant number of jobs to local Sudanese professionals and technicians. However, in recognition of the current shortages of professional and technical Sudanese worker, the Contractor will undertake an on the job training program. In this training

program, the Contractor will employ marginally qualified individuals for various office and field related assignments in a certain jobs, such as inspector trainee, materials technician, etc. Should there be fully qualified and capable local Sudanese applicants for specific positions, designated as an expatriate or third country national position, the position will be filled by the local applicant.

Levels of effort (LOE) tables are included on the following pages. The LOE is based upon the anticipated workload and the methodology planned for the implementation of the initial works of the Juba Nimule Road. This LOE will be adjusted depending upon specific requirements which will be constantly reassessed during project implementation.



Task Order 2
Roads and Bridges
Juba-Nimule Road
Personnel Organizational Chart

THE Louis Berger Group, INC.
 Contractor for USAID



Personnel Chart as of Jan 2018 - V1.0 2/18

LEVEL of EFFORT JUBA NIMULE ROAD INITIAL CONSTRUCTION WORKS

Position (EXPAT/TCN)	Year 2007/2008											
	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	LOE (lilo)	
Task Order Manager											10	
Construction Manager - Roads											9	
Design Manager											8	
Structure and Bridge Engineer											9	
Maintenance Manager											7	
Maintenance Supervisor											7	
Maintenance Supervisor											7.5	
Controls Manager											5	
Construction Site Lead #2											8.25	
Quantity Surveyor # 2											7	
Land Surveyor											7	
Materials Engineer #1											7	
Materials Engineer #2											6	
Materials Engineer #3											4	
Office Engineer											8	
Construction Inspector											7	
Construction Inspector											7	
Construction Site Lead #1											8.25	
AutoCAD Operator											7	
Quantity Surveyor # 1											4	
Road Surveyor											7	
Office Engineer											4	
Construction Inspector											7	
Construction Inspector											4	
Construction Site Lead #3											4	
Quantity Surveyor											4	
Land Surveyor											4	
Office Engineer											4	
Construction Inspector											4	
Construction Inspector											4	
Environmental Scientist											3	
Hydrologic Engineer											1.50	
Community Development Spec.											4	
Community Development Asst.											5	
PMP Team Leader											2.5	
Economist											4	
Economist											4	
HIV/AIDS Gender Specialist											3	
Total											220	

Year 2007/2008	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Position (HCN)										
Quantity Surveyor Assistant	7									
Quantity Surveyor Assistant	4									
Quantity Surveyor Assistant	4									
Land Surveyor Assistant	7									
Land Surveyor Assistant	7									
Land Surveyor Assistant	4									
Construction Inspector	4									
Construction Inspector	4									
Construction Inspector	4									
Construction Inspector	4									
Construction Inspector	4									
Construction Inspector	4									
Materials Technician Assistant	7									
Materials Technician Assistant	4									
Materials Technician Assistant	4									
Office Engineer Assistant	4									
Office Engineer Assistant	4									
Office Engineer Assistant	4									
Project Controls Assistant	4									
Project Controls Assistant	4									
Project Controls Assistant	4									
Maintenance Supervisor	6									
Maintenance Supervisor	6									
Office Administrative Assistant	4									
Office Administrative Assistant	7									
Office Administrative Assistant	4									
Community Development Asst.	4									
Community Development Asst.	4									
Total	131									
Legend:										
Continuous deployment										
Intermittent inputs										

IMPLEMENTATION SCHEDULE

The Contractor, recognizing the sense of urgency that USAID and MTR have placed on addressing the critical bridges, has developed the following implementation schedule that will achieve replacement of the most critically failing bridges at the earliest possible time. The Contractor is

