Annex 9

ENVIRONMENTAL MANAGEMENT PLAN/ENVIRONMENTAL MONITORING PLAN

Table-1 Environmental and Social Mitigation Measures during Construction (Integrated Mitigation Measures for 2016, 2018 and 2024 ESIAs)

Area	No.	Item	ESIA version	Negative Impacts Or Purpose	Draft Mitigation Measures	Responsibility	
					During Construction	Implementation Body/Agency	Responsible Agency
Pollution	1	Air pollution	2024	Dust from construction activities	1) Water sprinkling and/or surface treatment shall be carried out on earth construction road and construction yard near the residential area. Additionally, surface treatment of the earth road should be considered, if required. 2) Periodical cleaning shall be done on paved road used as construction road.	Contractor (Construction Company)	UNRA
			2016		3) Watering the project site to reduce the dust 4) Cover construction materials (sand, gravel, cement, etc) on transit and on site.		
			2018		5) The speed limit should not exceed 40km/hr during construction for not to cause dusts. 6) Cover trucks transporting construction materials for not to cause dusts. 7) Avoid open stock piling		
	2	Water pollution	2024	Turbid water and polluted water from construction site, construction machines and related facilities	8) Turbid water from unpaved construction area shall be treated in sedimentation pond and discharged into the river, if required. 9) Waste oil of construction machines shall be stored and disposed through a licensed agent. 10) Construction machines shall be maintained so as not to leak oil in the base camp site and construction site. 11) Provision of sanitation facilities at the basecamps and construction site. Also, the location of camps should avoid water sources such as springs and wells. 12) Domestic effluent from base camps is discharged into the nearby river after treatment at wastewater treatment plants, thus, water quality is monitored before discharge into the river. Night soil is collected by a licensed contractor and disposed of at a sludge disposal facility. 13) Use portable toilet in the construction area and disposed the night soil at the designated dumping site.	Contractor	UNRA
			2016		14) Install oil trapping equipment in areas when there a likelihood of oil spillage such as during the maintenance of construction equipment. 15) After completing the bridge, cleaning up whole temporary constructions on shore as well as under the river, including steel, redundant concrete, surrounding frame and equipment such as excavators, bucket, crane, etc. 16) Minimize of effects to surface water and deposit.	Contractor	UNRA
			2018		17) Enforce buffer distance regulations from surface water sources. 18) Design vehicle wash areas so as not to contaminate the environment.	Contractor	UNRA

Area	No.	Item	ESIA version	Negative Impacts Or Purpose	Draft Mitigation Measures	Responsibility	
					During Construction	Implementation Body/Agency	Responsible Agency
	3	Waste	2024	Construction waste (Waste soil, cut trees, waste oil and hazardous materials) and Domestic waste including night soil from base camp and offices	19) Waste soil from the cutting section is reused for embankment material for road section. However, Waste soil shall be disposed at the designated site, if such waste soil is generated from the construction area. 20) Cut trees are used as manure, building materials and for other purposes. 21) Waste oil of the construction machines is collected and disposed through a licensed agent. 22) Waste chemical and hazardous material are stored at the base camp site and disposed through a licensed agent. 23) Domestic solid waste from base camp shall be collected and disposed at the designated disposal site. 24) Domestic effluent from base camps is discharged into the nearby river after treatment at wastewater treatment plants, so water quality is monitored before discharge into the river. Night soil is collected by a licensed contractor and disposed of at a sludge disposal facility.	Contractor	UNRA
			2016		25) Ensure promptly cleaning of construction wastes. 26) Reusable construction wastes should be piled up in the scope of site clearance for collection and the transportation to designated re-use site. 27) Non-reusable construction wastes should not be kept in the construction area and to be transported to designated site. 28) Strictly forbidding all actions of burning at project site. 29) To provide regulation on solid waste management at construction site, specifying strict prohibition of discharging solid wastes in uncontrolled manner to the surrounding environment and to the river flows. 30) Provide camp site with portable toilets, collect sludge from septic tank and remove toilets after finishing construction. 31) Collecting waste into proper storage yard, keeping temporarily and transporting the waste to designated sites – dump sites or waste treatment points. 32) Ensure efficient use of construction materials to avoid unnecessary waste.	Contractor	UNRA
			2018		33) Locate worker's camps and equipment yards away from communities. 34) Transportation and disposal of hazardous waste will be undertaken by licensed transporters to facilities licensed for storage and disposal of hazardous waste. 35) Develop onsite sewage management systems 36) Hazardous waste should be stored in facilities designed and licensed for storage of hazardous waste by NEMA 37) Wherever feasible, waste recovery and reuse will be undertaken.	Contractor	UNRA
	4	Soil contamination and Sediment	2024	Polluted soil and quarry from or to out of project site	38) Excavated soil shall be analyzed, and it shall be confirmed if the quality is below standard values. Polluted soil shall be used as construction material after treatment or disposed/ or stored at the designated site if excavated soil is polluted. 39) Borrow soil from outside of project area shall be inspected not polluted before carrying into the project area. 40) Construction machines shall be maintained so as not to leak oil in the base camp site. 41) Waste oil of the construction machines is collected and disposed through a licensed agent. 42) Waste chemical and hazardous material shall be stored at the base camp site and disposed through a licensed agent.	Contractor UWA (inspection of borrow soil quality from out of protected area)	UNRA UWA (inspection of borrow soil quality from out of protected area)
			2016		43) Install oil trapping equipment in areas when there a likelihood of oil spillage such as during the maintenance of construction equipment.	Contractor	UNRA
	5	Noise and vibration	2024	Construction noise and vibration from construction machines and activities	44) Construction activities and operation of construction machines shall be limited in the daytime. 45) Construction machines shall be well-maintained and checked every day. 46) Information disclosures, such as construction schedule and activities, shall be carried out in advance to the surrounding community, if the residential area is located near construction area.	Contractor	UNRA
			2016		47) Ensure regular servicing of construction equipment.	Contractor	UNRA

Area	No.	Item	ESIA version	Negative Impacts Or Purpose	Draft Mitigation Measures During Construction	Responsibility Implementation Body/Agency	Responsible Agency
					48) Use low noise generating equipment		
			2018		49) Ensure vehicle and equipment maintenance schedules are followed. 50) Vehicles and equipment generating excessive noise shall not be operated on the project.	Contractor	UNRA
	6	Ground subsidence	2024	-	No mitigation measures are necessary because ground subsidence is not expected	-	-
	7	Odor	2024	Bad odor from domestic waste, night soil and chemicals in the construction site, base-camp site and other related facilities.	51) Domestic waste from basecamp and accommodation shall be stored properly by separated garbage boxes. 52) Domestic solid waste is collected and disposed at the nearest designated disposal site. 53) Domestic wastewater and night soil shall be treated though septic tank or/and portable toilet and discharged into the natural stream or/and collected and disposed through a licensed agent. 54) Waste oil of the construction machines is collected and disposed through a licensed agent. 55) Waste chemical and hazardous material are stored at the base camp site and disposed through a licensed agent.	Contractor	UNRA
	8	Sediment	2024	-	See No4. Soil contamination	Contractor	UNRA
Natural Environment	9, 10	Protected area and ecosystem	2024	Deterioration of habitat of the fauna and flora species in the project area and surrounding area	56) Affected area shall be marked and all relevant construction workers and communities shall be informed not to conduct development outside of the project area. 57) Waste oil shall be stored and disposed to the designated site or disposed by the licensed agent so as not to leak into the water body and on land. 58) Domestic waste in the construction area shall be stored properly for not to attract wild animals and disposed at the designated site. 59) Tree replantation shall be carried out. (*1) 60) Borrow soil from out of project area shall be inspected not included alien plant species before carrying into the protected area. 61) Prohibition of blasting and adoption of lower noise and vibration construction methods 62) Construction area shall be restored as the original condition after construction. 63) Lighting in the nighttime shall be minimized at night-time so as not to cause adverse impacts on the wild animals such as Hippopotamus and Elephant. 64) Avoid to park construction machines in the protected area for not to disturb crossing animals. 65) Obstacles such as tall fences shall not be installed in the vicinity of project site and the road embankment shall provide for gentle slopes as possible in order not prevent animals from crossing the road. 66) Relocate and/or induce valuable species to escape out of the construction area before construction activities begin with assistance of UWA rangers. (*1)	Contractor (*1) Implemented with coordination of UWA	UNRA
				Increasing of poaching and conflicts with wild animals	67) Poaching by construction workers shall be prohibited. Policy and regulations regarding natural environmental protection shall be instructed. 68) UWA rangers shall be deployed near the project site for emergency case such as encountering with wild animals.		
				Increasing of roadkill	69) Construction machines shall maintain speed limit of less than 40km/h not to cause roadkill in the construction area 70) Limit construction to as short a time as possible and it should take place during the daytime when the visual range is substantial.		
			2016	Deterioration of habitat of the fauna and flora species in the project area and surrounding area	71) Clearing should not exceed areas not used for construction specifications. 72) Construction workers should not clear vegetation for use as fuel wood as it will exacerbate more clearing. 73) Re-vegetate/planting of trees	Contractor	UNRA

Area	No.	Item	ESIA version	Negative Impacts Or Purpose	Draft Mitigation Measures		Responsibility	
						During Construction	Implementation Body/Agency	Responsible Agency
				Increasing of poaching and conflicts with wild animals	74)	Illegal hunting of wildlife by construction workers as a source of food should be strictly prohibited.		
				Increasing of roadkill	75)	Limit vehicle speeds during delivery of construction materials to the site. Speeds should be controlled within prescribed KWR sections.		
			2018	Deterioration of habitat of the fauna and flora species in the project area and surrounding area	76)	Construction related facilities such as Base-camps, borrow pits, quarry site and wells should not be constructed in the construction area and protected area	Contractor	UNRA
					77)	Do not stockpile near sensitive environments along the river.		
					78)	Restore all ecologically sensitive sites after construction phase using spoil.		
					79)	Manage the existing invasive plant species spread through sensitizations.		
					80)	Ensure no foreign plant species are introduced in the Wildlife Reserve by Quarantine and treating equipment before introducing them into the conservation area.		
					81)	Efforts through mechanical elimination of invasive plants within the project areas should be made.		
					82)	Ensure no foreign plant species are introduced in the Wildlife Reserve by Quarantine and treating equipment before introducing them into the conservation area.		
					83)	Solid waste disposal sites will be located away from watercourses and have restricted access.		
					84)	Use low noise and vibration equipment.		
					85)	No night works		
				Increasing of poaching and conflicts with wild animals	86)	Sensitization of workers on dangers of poaching		
					87)	Code of conduct to ensure workers do not engage in poaching, trading, and consumption of game meat.		
					88)	Maintain a realistic buffer distance from the animals.		
					89)	Locate worker's camps and equipment yards away from KWR and sensitive ecosystems.		
				Increasing of roadkill	90)	Install speed humps at interval of 0.2-0.5 km along the approaching routes.		
					91)	Install appropriate road signage on speed limits and animal crossing corridors.		
					92)	Mark off all identified animal crossing points		
	11	Hydrology	2024	Securing of irrigation channel and stream in the construction area	93)	Diversion of streams shall be set up if the project activities give impacts on such streams	Contractor	UNRA
	12	Topography and geology	2024	Slope failure	94)	The slope gradient for earthwork section is designed in accordance with the applicable design manual.	Contractor	UNRA
			2018	Slope failure	95)	Implementation of slope protection methods such as turf work, seed spraying treatment, shotcrete, etc.		
	13	Involuntary Resettlement	2024	Not required because no land acquisition nor resettlement are planned.	96)	Protect road embankments and slopes with stone walls, Gabions, erosion control mats.	Contractor	UNRA
					-		-	-
Social Environment	14	Poverty Group	2024	Worsening poverty in the local community	97)	Provide equal job opportunities for the local people as construction workers.	Contractor	UNRA
					98)	Announce the schedule, conditions, requirements, duration, etc. for recruiting all skilled, semi-skilled, and unskilled labors in places where the local people can easily observe, such as the town centre, local council office, and meeting places.		
					99)	Priority will be given to employ the local people wherever possible and minimize the influx of construction workers from other areas.		
	15	Ethnic group	2024	Discrimination of the basis of the ethnicity in recruitment related to the Project	100)	Ensure a clear principle of no discrimination based on the ethnicity in the selection process of construction workers.	Contractor	UNRA
					101)	Provide equal job opportunities for the local people as construction workers.		
					102)	Announce the schedule, conditions, requirements, duration, etc. of all skilled, semi-skilled, and unskilled labors in places where the local people can easily observe, such as town center, local council office, and meeting places, so		

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Area	No.	Item	ESIA version	Negative Impacts Or Purpose	Draft Mitigation Measures	Responsibility	
					During Construction	Implementation Body/Agency	Responsible Agency
					that employment is carried out in accordance with the individual abilities of local people. 103) Priority will be given to employing the local people wherever possible and minimizing the influx of construction workers from other areas.		
	16	Local economy such as employment and livelihood	2024	Disruption of local economic activities	104) Information on the detailed construction plan, including schedule, location construction area and related facilities, and traffic control area, should be disseminated in advance. 105) Ensure access to the entrances of shops, restaurants, etc. in the vicinity of construction area, related facilities, and traffic control area. 106) Provide equal job opportunities for the local people as construction workers. 107) Establish a GRM to resolve complaints received from the local people.	104) to 106) Contractor 107) UNRA	UNRA
			2016	Increase of positive impact on the local economy	108) Ensure people from local community are given priority where appropriate. 109) Provide information about the availability of employment opportunities and qualifications needed. 110) Provide on-the-job training to construction workers recruited from the local community. 111) Encourage and motivate contractors to buy locally available construction materials.	108) to 110) Contractor, 111) UNRA	UNRA
	17	Land use and utilization of local resources	2024	Disruption of the access to land and local resources	112) Information on the detailed construction plan, including schedule, location of construction area and related facilities, and traffic control area should be disseminated in advance. 113) In order to avoid traffic disruption due to the complete closure, the existing Karuma Bridge will be maintained, and traffic will be kept on the existing Karuma Bridge during construction of the new bridge. 114) Provision of detour to the river, as necessary. 115) Construction workers should not use local resources such as fish and firewood. 116) Establish a GRM to resolve complaints received from the local people.	112) to 115) Contractor 116) UNRA	UNRA
	18	Water usage	2024	Disruption of water access	117) Priority will be given to employing the local people wherever possible and minimizing the influx of construction workers from other areas. 118) The contractor should prepare water supply plan for construction including drinking water and obtain the Water Abstract Permit from Directorate of Water Resource Management. 119) Establish a GRM to resolve complaints received from the local people.	117) to 118) Contractor 119) UNRA	UNRA
			2018	Disruption of the water access	120) The contractor should develop a water supply plan and consult with the local authority (Local Council) prior to using existing water sources.	Contractor	UNRA
	19	Existing social infrastructures and services	2024	Disruption of the access to the existing infrastructures	121) Information on the detailed construction plan, including schedule, location of construction area and related facilities, and traffic control area, should be disseminated in advance. 122) In order to avoid traffic disruption due to the complete closure, the existing Karuma Bridge will be maintained, and traffic will be kept on the existing Karuma Bridge during the construction of new bridge. 123) Traffic guides will be deployed in the vicinity of construction area, related facilities, and traffic control area. 124) Provide detour to the existing social infrastructures and services, as necessary. 125) Establish a GRM to resolve complaints received from the local people.	121) to 124) Contractor 125) UNRA	UNRA
	20	Social institutions such as local decision-making institutions	2024	No negative impacts	Not required.	-	-

Area	No.	Item	ESIA version	Negative Impacts Or Purpose	Draft Mitigation Measures During Construction	Responsibility: Implementation Body/Agency	Responsibility: Responsible Agency
	21	Unequal distribution of positive and negative impacts	2024	Appropriate provision of positive impact to the local people by the Project	126) Establish a GRM for the Project by harmonizing the existing similar system. 127) Explain the GRM for the Project to the local people in continuous public consultations. 128) Provide equal job opportunities to the local people as construction workers. 129) Priority will be given to employing the local people wherever possible and minimizing the influx of construction workers from other areas.	126) UNRA 127) UNRA and Contractor 128) to 130) Contractor	UNRA
			2018	Appropriate provision of positive impact to the local people by the Project	130) Provide guidance to construction workers hired from other areas to avoid conflict with the local people. 131) The contractor will encourage potential workers to get recommendation from local leaders (LC) to be eligible in the hiring of construction workers to ensure that those hired do not have criminal records. 132) Ensure fair wages of construction workers hired for the Project. 133) Information on the Project will be disseminated transparently to the local community. 134) Continue to communicate with the local community from the survey period to ensure that all concerns are addressed.	Contractor	UNRA
	22	Local conflict of interests	2024	Appropriate provision of positive impact to the local people by the Project	See No.21 Unequal distribution of positive and negative impacts	See No.21 Unequal distribution of positive and negative impacts of the project	See No.21 Unequal distribution of positive and negative impacts of the project
	23	Cultural heritage	2024	Loss/ damage/ disruption of the cultural/ historical resources	135) Consult with cultural leaders in advance to minimize disruption and concern to the local people, and to avoid unanticipated damage to symbolic trees and rocks, and other important resources that are objects of worship or those used in rituals. 136) Develop and follow a "*Chance Finds Procedure*" to prevent damage to archaeological and historical resources. 137) Conduct continuous monitoring by the Contractor during earthworks. 138) Provide training on cultural site and archaeological and historical resources to the construction workers. 139) Install signage to the signboard of the Sir Samuel and Lady Florence historical trail.	Contractor	UNRA
			2016	Loss/ damage/ disruption of the cultural/ historical resources	140) Project activities involving earthworks must include an approved "Chance Finds Procedure" in construction contracts, to cover the possibility of discovering physical cultural heritage in the course of excavation.	Contractor	UNRA
	24	Landscape	2024	Change in landscape	141) Adoption of colour of the bridge harmonized with the surrounding current landscape	Contractor	UNRA
			2018	Change in landscape	142) Landscaping along the road in the Karuma Wildlife Reserve.	Contractor	UNRA
	25	Gender	2024	Discrimination of the basis of gender	143) Development of the Code of Conduct for Contractors in conformity with gender policy and Employment Act, Cap 219. 144) Provide equal job opportunities and fair salary regardless of gender (including positive segregation mechanism to ring fence some jobs for women) 145) Install sanitary facilities in considering gender at construction area and related facilities (including basecamp). 146) Provide the educational training on gender issues to the construction workers. 147) Sensitize the local people on gender issues. 148) Ensure a certain distance between the local community and basecamp 149) Establish a GRM to resolve complaints received from the local people with several options for submitting complaints (including the option that the local people can access to the local NGOs). 150) Ensure anonymity to protect privacy when submitting complaints, if requested by the complainant.	143) to 145) Contractor 146) to 150) UNRA	UNRA
			2018	Discrimination of the basis	151) Female workers will be sensitized on their sexual rights.	UNRA,	UNRA

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Area	No.	Item	ESIA version	Negative Impacts Or Purpose	Draft Mitigation Measures	Responsibility	
					During Construction	Implementation Body/Agency	Responsible Agency
				of gender	152) Have policies to promote non-discrimination and equal opportunities. 153) Establish zero tolerance policies and codes of conduct related to violence against women and girls. 154) Explain and educate construction workers about laws prohibiting sex work. 155) Consider the gender for facilities for construction workers such as restrooms and bathrooms. 156) Pay equal wages for work of equal value by women and men.	Contractor	
	26	Rights of children	2024	Threats to children's right	157) Follow relevant national legal frameworks on children's right such as the Children Act, Cap 59 and international standards such as the following IFC's Performance Standard 2 (Labor and Working Conditions). 158) Include a strict "no child labor" rule in contractors' contract. 159) When selecting construction workers, identification card, etc. will be checked to verify age. 160) Provide educational training to construction workers not to buy goods from children, not to have inappropriate relationship with boys and girls, not to use school facilities such as toilets and water systems, and encourage children to go to school when children are gathered at the construction site to see the work, etc. 161) Sensitize the local people and schools. 162) Install security facilities such as signboard in the vicinity of construction area and related facilities.	UNRA, Contractor	UNRA
			2018	Threats to children's right	163) The contractor will develop a child protection plan and provide it to the local stakeholders. 164) Prevent contractors from hiring children as construction workers. 165) Ensure that the local community has access to and know of and report abuse using the national child abuse hotline 116. 166) Keep children off construction area to ensure controlled interaction between children and construction workers. 167) Ensure close monitoring of construction workers' behavior and conduct. 168) Parents/ guardians should be sensitized and held accountable for children leaving and arriving home before dark.	UNRA, Contractor	UNRA
	27	Infectious diseases	2024	Threats to the health and safety of workers and the local communities	169) Follow relevant national legal frameworks on infectious diseases such as the Occupational Safety and Health Act No.9 (2006) and international standards such as IFC's Performance Standard 2. 170) Prevent the creation of vector mosquito habitats by installing adequate drainage facilities in the construction area and related facilities (including basecamp). 171) Take appropriate precautionary measures such as mosquito nets and provision of purified water to construction workers. 172) Provide adequate sanitation facilities, as well as trash boxes. 173) Enforce medical screening and periodical medical check for construction workers. 174) Not to discriminate against HIV/ AIDS infected persons in hiring construction workers. 175) Provide the educational training on prevention of infectious disease to the construction workers. 176) Sensitize the local people about the infectious diseases. 177) Provide condoms in sanitary facilities in the construction area and related facilities (including basecamp).	UNRA, Contractor	UNRA
			2018	Threats to the health and safety of workers and the local communities	178) Maintain a strict "no socializing" policy to prevent basecamps from becoming hotspots for prostitution or illicit sexual relations. 179) HIV/AIDS sensitization programs shall be conducted at the basecamps.	Contractor	UNRA
	28	Labor Environment and Safety	2024	Threats to the health and safety of workers	180) Follow the relevant legal and institutional frameworks on work environment such as the Occupational Safety and Health Act No.9 (2006) and international standards such as the following IFC's Performance Standard 2 (Labor and Working Conditions) 181) Establish a response system in the event of an accident due to construction, patient transportation, or other emergencies. 182) Implement countermeasures against "Tsetse fly."	Contractor	UNRA
			2016	Threats to the health and	183) Use of Person Protection Equipment (PPE) such as earplugs and masks to those working in the vicinity of	Contractor	UNRA

Area	No.	Item	ESIA version	Negative Impacts Or Purpose	Draft Mitigation Measures During Construction		Responsibility Implementation Body/Agency	Responsibility Responsible Agency
				safety of workers	construction area and related facilities.			
					184) Establish safety regulations in the construction area and related facilities.			
					185) Install first aid kit.			
					186) Provide adequate training on safety measures for construction workers.			
					187) Prepare emergency rescue plans.			
			2018	Threats to the health and safety of workers	188) Develop and implement a health and safety plan.	Contractor	UNRA	
					189) Provide construction workers with appropriate ear protection.			
					190) Implement health and safety training programs for construction workers.			
					191) Develop and implement a security management plan that includes clear measures to protect construction workers.			
					192) Develop and implement an occupational health and safety plan in line with the "Occupational Safety and Health Act (2016)."			
					193) Hire and assign a professional safety manager.			
					194) Assign an occupational safety committee for the Project.			
					195) Develop an emergency and contingency plan.			
					196) Develop and communicate policies to construction workers, supervisors and supervisory personnel to promote non-discrimination and to promote equal treatment.			
					197) No decisions regarding employment, working conditions, pay, benefits, or termination will be based on discriminatory grounds.			
	29	Accident	2024	Potential accident risks related to the local people/ community	198) Traffic guides will be assigned to construction area, related facilities, and traffic control area.	Contractor	UNRA	
					199) Install safety signs including speed limits, in the construction area, related facilities, and traffic control area.			
					200) Install night lighting facilities in the vicinity of construction area, related facilities, and traffic control area.			
					201) Limit traffic speed to less than 40km/h in the vicinity of construction area, related facilities, and traffic control area.			
					202) Provide the safety training to construction workers.			
					203) Establish a response system in the event of an accident due to construction, patient transportation, or other emergencies.			
			2016	Potential accident risks related to the local people/ community	204) Sensitize to the local people and schools.			
					205) Install signs and warnings in the hazardous areas of construction area and related facilities.	Contractor	UNRA	
			2018	Potential accident risks related to the local people/ community	206) Screen offsite to prevent intrusion from the local community.	Contractor	UNRA	
					207) Install storage for fuels.			
					208) Install fire suppression systems.			
					209) Install necessary road signs along the constructed roads.			
					210) Install humps and speed control measures.			
Others			2024	According to quantitative forecast on CO_2, the project gives positive impact compared with the without project case. However, implementation of mitigation measures can minimize adverse impacts.	211) Prohibition of unnecessary idling/operation of construction machines	Contractor	UNRA	
	30	Cross Boundary Impacts and Climate Change (Green House Gases (CO2))	2018		212) Periodical (daily, weekly and monthly) checking, and maintenance of construction machines shall be done.			
					213) All combustion equipment on site including operational machinery and generators should be serviced regularly.			
					214) All on site burning should be done and controlled properly.	Contractor	UNRA	
					215) Avoid cutting trees as much as possible			

Source: JICA Survey Team

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Table-2 Environmental and Social Mitigation Measures Post Construction Phase (At the end of construction completion/Decommissioning Phase)

Area	No.	Item	ESIA version	Negative Impacts Or Purpose	Draft Mitigation Measures	Responsibility	
					At the end of Construction Period	Implementation Body/Agency	Responsible Agency
Natural Environment	1	Waste	2024	Remaining Construction Wastes may give negative impacts	1) All construction wastes such as waste soil, chemicals, domestic waste and night soil from construction yard/offices shall be removed from the project site.	Contractor (Construction Company)	UNRA
	2	Ecosystem	2024	Deterioration of habitat for fauna, flora species and ecosystem	2) Cut and developed area by the project shall maintain as natural grass and trees can grow.	Contractor	UNRA
Social Environment	3	Cultural Heritage	2024	Construction may cause lack of attention to the signboard of the Sir Samuel and Lady Florence historical trail	3) The signage to the signboard should be installed, if the project gives negative impacts to the board.	Contractor	UNRA
	4	Accident	2024	Excavated holes may cause accidents for inhabitants and wild animals	4) Developed and excavated holes and sharp slopes shall be backfilled or made flat not to cause accidents	Contractor	UNRA
Other	5	-	2024	Generation of construction wastes and alternation of land may give adverse impacts on humans and wildlife	5) A decommissioning and restoration plan shall be prepared and implemented in accordance with the National Environmental Regulations 2020. The decommissioning plan shall include the mitigation measures above.	Contractor	UNRA

Source: JICA Survey Team

Table-3 Environmental and Social Mitigation Measures after Construction (Integrated Mitigation Measures for 2016, 2018 and 2024 ESIAs)

Area	No.	Item	ESIA version	Negative Impact Or Purpose	Draft Mitigation Measures After Construction		Responsibility Implementation Body/Agency	Responsible Agency
Pollution	1	Air pollution	2024	No negative impacts are expected.	Not required. -			
	2	Water pollution	2024	Deterioration of water quality due to increase of traffic volume	1)	Patrol and monitoring of illegal dumping in the rivers	UNRA, Uganda Police Force (UPF) and UPDF (Uganda People's Defense Force)	UNRA and Local Governments (Kiryandongo and Oyam District)
			2016		2)	Install oil trap in the connected drainage.	UNRA	
	3	Waste	2024	Illegal dumping	3)	Patrol and monitoring of illegal dumping in the rivers.	UNRA, UPF and UPDF (Uganda People's Defense Force)	UNRA and Local Governments (Kiryandongo and Oyam District)
	4	Soil contamination and Sediment	2024	Soil contamination by borrow from the out of protected area	4)	Borrow soil from outside of the project area for maintenance shall be inspected not polluted before carrying into the project area.	UNRA, UWA	UNRA, UWA
	5	Noise and vibration	2024	Deterioration of noise and vibration level by increase in traffic number and traveling speed	5)	Uganda government shall control the driving speed on the road (UNRA requests to police department regarding strict speed control).	UNRA and UPF	UNRA and UPF
	6	Ground subsidence	2024	Not required	-		-	-
	7	Odor	2024	Increase waste volume due to increase in the number of tourist	6)	Appropriate waste management and periodical monitoring is recommended by local government.	UNRA and Local Governments (Kiryandongo and Oyam District), UPF	UNRA and Local Governments (Kiryandongo and Oyam District)
	8	Sediment	2024	See No4. Soil contamination	-		-	-
Natural Environment	9, 10	Protected area and ecosystem	2024	Deterioration of habitat of the fauna and flora species in the project area and surrounding area	7)	Monitoring of movement of wild animals and management of individuals which intrude to the residential area	UNRA	UNRA
				Increasing of poaching and conflicts with wild animals	8)	Setting up sign board of speed limit 40km/h and no-horn at the crossing points of wild animals such as monkeys and African Elephant		

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Area	No.	Item	ESIA version	Negative Impact Or Purpose	Draft Mitigation Measures	Responsibility	
					After Construction	Implementation Body/Agency	Responsible Agency
				Increasing of roadkill	9) Installation of speed limit board and humps for prevention of roadkill and mitigate noise impacts to the wild animals. 10) Installation of animal corridor under embankment of the approach road for crossing small mammal, reptile, amphibian species. 11) Setting up of LED light in the bridge section so as not to attract insects. 12) Setting up of light with cover so as not to irradiate the river surface and outside of the road in keeping with sound lifecycle of fishes. 13) Setting up sign board of speed limit 40km/h and no-horn at the crossing points of wild animals such as monkeys and African Elephant		
	11	Hydrology	2024	Securing of irrigation channel and stream in the construction area	14) Implementation of appropriate maintenance of drainage along the approach road.	UNRA	UNRA Local Government
	12	Topography and geology	2024	Slope failure	15) Implementation of appropriate maintenance of slope protection.	UNRA	UNRA
			2018		16) Protect road embankments and slopes with stone walls, Gabions, erosion control mats.		
Social Environment	13	Involuntary Resettlement	2024	Not required	-	-	-
	14	Poverty Group	2024	Not required	-	-	-
	15	Ethnic group	2024	No negative impacts are expected.	Not required.	-	-
	16	Local economy such as employment and livelihood	2024	No negative impacts are expected.	Not required.	-	-
	17	Land use and utilization of local resources	2024	No negative impacts are expected.	Not required.	-	-
	18	Water usage	2024	No negative impacts are expected.	Not required.	-	-
	19	Existing social infrastructures and services	2024	No negative impacts are expected.	Not required.	-	-
	20	Social institutions such as local decision-making institutions	2024	No negative impacts are expected.	Not required.	-	-
	21	Unequal distribution of positive and negative impacts of the project	2024	No negative impacts are expected.	Not required.	-	-
	22	Local conflict of interests	2024	No negative impacts are expected.	Not required.	-	-
	23	Cultural heritage	2024	No negative impacts are expected.	Not required.	-	-

Area	No.	Item	ESIA version	Negative Impact Or Purpose	Draft Mitigation Measures	Responsibility	
					After Construction	Implementation Body/Agency	Responsible Agency
	24	Landscape	2024	No negative impacts are expected.	Not required.	-	-
	25	Gender	2024	No negative impacts are expected.	Not required.	-	-
	26	Rights of children	2024	No negative impacts are expected.	Not required.	-	-
	27	Infectious diseases such as HIV/AIDS	2024	Increase of infectious diseases such as Malaria and dengue fever	17) Provide adequate drainage facilities to avoid mosquito habitat. 18) Implement periodical maintenance of drainage facilities.	UNRA	UNRA
	28	Labor Environment and Safety	2024	Not required	-	-	-
Others	29	Accident	2024	Traffic safety	19) Install 40km/h speed limit and humps. 20) Install LED lights along approach road and bridge.	UNRA	UNRA
			2016		21) Install signs and signals at appropriate distances and locations, if necessary. 22) Use properly installed guardrails.		
			2018		23) Install road signs and speed limit signs.		
	30	Cross Boundary Impacts and Climate Change (Green House Gases (CO2))	2024	According to quantitative forecast on CO2, the project gives positive impact compared with the without project case. However, implementation of mitigation measures can minimize adverse impacts.	24) Strengthening of speed control by the police department 25) Strengthening of car inspection mechanisms to restrict vehicles from discharging high emissions	Ministry of Works and Transport, UPF	Ministry of Works and Transport, UPF

Source: JICA Survey Team

Table-4 Mitigation Measures Monitoring Plan during Construction (Integrated Mitigation Measures for 2016, 2018 and 2024 ESIAs)

Area	No.	Item	ESIA version	Draft Mitigation Measures During Construction	Monitoring Item	Standard Value in Ugandan or International	Monitoring Point / Area	Monitoring Frequency	Implementation Agency	Monitoring Cost (USD)
Pollution	1	Air pollution	2024	1) Water sprinkling and/or surface treatment shall be carried out on earth construction road and construction yard near the residential area. Additionally, surface treatment of the earth road should be considered, if required.	Implemented or Not	N/A	Construction area, haul roads and facility sites	Monthly	Contractor / UNRA	0*1 *1: Included in the construction cost
				2) Periodical cleaning shall be done on paved road used as construction road.	Implemented or Not	N/A	Construction area, haul roads and facility sites	Monthly	Contractor / UNRA	0
			2016	3) Watering the project site to reduce the dust	Implemented or Not	N/A	Construction area, haul roads and facility sites	Monthly	Contractor / UNRA	0
				4) Cover construction materials (sand, gravel, cement, etc.) on transit and on site.	Implemented or Not	N/A	Construction area, facility sites and dump trucks	Monthly	Contractor / UNRA	0
			2018	5) The speed limit should not exceed 40km/hr during construction for not to cause dusts.	Implemented or Not	N/A	Construction area, haul roads and facility sites	Monthly	Contractor / UNRA	0
				6) Cover trucks transporting construction materials for not to cause dusts.	Implemented or Not	N/A	Construction area, facility sites and dump trucks	Monthly	Contractor / UNRA	0
				7) Avoid open stock piling	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
	2	Water pollution	2024	8) Turbid water from unpaved construction area shall be treated in sedimentation pond and discharged into the river, if required.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				9) Waste oil of construction machines shall be stored and disposed through a licensed agent.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				10) Construction machines shall be maintained so as not to leak oil in the base camp site and construction site.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				11) Provision of sanitation facilities at the basecamps and construction site. Also, the location of camps should avoid water sources such as springs and wells.	Installed or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				12) Domestic effluent from base camps is discharged into the nearby river after treatment at wastewater treatment plants, thus, water quality is monitored before discharge into the river. Night soil is	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0

Area	No.	Item	ESIA version	Draft Mitigation Measures During Construction	Monitoring Item	Standard Value in Ugandan or International	Monitoring Point / Area	Monitoring Frequency	Implementation Agency	Monitoring Cost (USD)
				collected by a licensed contractor and disposed of at a sludge disposal facility.						
				13) Use portable toilet in the construction area and disposed the night soil at the designated dumping site.	Installed or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
			2016	14) Install oil trapping equipment in areas when there a likelihood of oil spillage such as during the maintenance of construction equipment.	Installed or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				15) After completing the bridge, cleaning up whole temporary constructions on shore as well as under the river, including steel, redundant concrete, surrounding frame and equipment such as excavators, bucket, crane, etc.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				16) Minimize of effects to surface water and deposit.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
			2018	17) Enforce buffer distance regulations from surface water sources.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				18) Design vehicle wash areas so as not to contaminate the environment.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
	3	Waste	2024	19) Waste soil from the cutting section is reused for embankment material for road section. However, Waste soil shall be disposed at the designated site, if such waste soil is generated from the construction area.	Implemented or Not	N/A	Construction area (cutting section)	Monthly	Contractor / UNRA	0
				20) Cut trees are used as manure, building materials and for other purposes.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				21) Waste oil of the construction machines is collected and disposed through a licensed agent.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				22) Waste chemical and hazardous material are stored at the base camp site and disposed through a licensed agent.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				23) Domestic solid waste from base camp shall be collected and disposed at the designated disposal site.	Implemented or Not	N/A	Base-camp site (including relevant offices)	Monthly	Contractor / UNRA	0

Area	No.	Item	ESIA version	Draft Mitigation Measures During Construction	Monitoring Item	Standard Value in Ugandan or International	Monitoring Point / Area	Monitoring Frequency	Implementation Agency	Monitoring Cost (USD)
				24) Domestic effluent from base camps is discharged into the nearby river after treatment at wastewater treatment plants, thus, water quality is monitored before discharge into the river. Night soil is collected by a licensed contractor and disposed of at a sludge disposal facility.	Implemented or Not	N/A	Base-camp site (including relevant offices)	Monthly	Contractor / UNRA	0
			2016	25) Ensure promptly cleaning of construction wastes.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				26) Reusable construction wastes should be piled up in the scope of site clearance for collection and the transportation to designated re-use site.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				27) Non-reusable construction wastes should not be kept in the construction area and to be transported to designated site.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				28) Strictly forbidding all actions of burning at project site.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				29) To provide regulation on solid waste management at construction site, specifying strict prohibition of discharging solid wastes in uncontrolled manner to the surrounding environment and to the river flows.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				30) Provide camp site with portable toilets, collect sludge from septic tank and remove toilets after finishing construction.	Installed or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				31) Collecting waste into proper storage yard, keeping temporarily and transporting the waste to designated sites – dump sites or waste treatment points.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				32) Ensure efficient use of construction materials to avoid unnecessary waste.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
			2018	33) Locate worker's camps and equipment yards away from communities.	Implemented or Not	N/A	Base-camp and accommodation	Monthly	Contractor / UNRA	0
				34) Transportation and disposal of hazardous waste will be undertaken by licensed transporters to facilities licensed for storage and disposal of hazardous waste.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				35) Develop onsite sewage management systems	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0

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Area	No.	Item	ESIA version	Draft Mitigation Measures During Construction	Monitoring Item	Standard Value in Ugandan or International	Monitoring Point / Area	Monitoring Frequency	Implementation Agency	Monitoring Cost (USD)
				36) Hazardous waste should be stored in facilities designed and licensed for storage of hazardous waste by NEMA	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				37) Wherever feasible, waste recovery and reuse will be undertaken.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
	4		2024	38) Excavated soil shall be analyzed, and it shall be confirmed if the quality is below standard values. Polluted soil shall be used as construction material after treatment or disposed/ or stored at the designated site if excavated soil is polluted.	Implemented or Not (analyzed item is shown in soil contamination monitoring)	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				39) Borrow soil from outside of project area shall be inspected not polluted before carrying into the project area.	Implemented or Not (analyzed item is shown in soil contamination monitoring)	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				40) Construction machines shall be maintained so as not to leak oil in the base camp site.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				41) Waste oil of the construction machines is collected and disposed through a licensed agent.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				42) Waste chemical and hazardous material shall be stored at the base camp site and disposed through a licensed agent.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
		Soil contamination and Sediment	2016	43) Install oil trapping equipment in areas when there a likelihood of oil spillage such as during the maintenance of construction equipment.	Installed or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
	5		2024	44) Construction activities and operation of construction machines shall be limited in the daytime.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				45) Construction machines shall be well-maintained and checked every day.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
		Noise and vibration		46) Information disclosures, such as construction schedule and activities, shall be carried out in advance to the surrounding community, if the residential area is located near construction area.	Implemented or Not	N/A	Surrounding communities	Monthly	Contractor / UNRA	0
			2016	47) Ensure regular servicing of construction equipment	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0

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Area	No.	Item	ESIA version	Draft Mitigation Measures During Construction	Monitoring Item	Standard Value in Ugandan or International	Monitoring Point / Area	Monitoring Frequency	Implementation Agency	Monitoring Cost (USD)
				48) Use low noise generating equipment	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
			2018	49) Ensure vehicle and equipment maintenance schedules are followed.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				50) Vehicles and equipment generating excessive noise shall not be operated on the project.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
	6	Odor	2024	51) Domestic waste from basecamp and accommodation shall be stored properly by separated garbage boxes.	Implemented or Not	N/A	Base-camp site and accommodation	Monthly	Contractor / UNRA	0
				52) Domestic solid waste is collected and disposed at the nearest designated disposal site.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				53) Domestic wastewater and night soil shall be treated though septic tank or/and portable toilet and discharged into the natural stream or/and collected and disposed through a licensed agent.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				54) Waste oil of the construction machines is collected and disposed through a licensed agent.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				55) Waste chemical and hazardous material are stored at the base camp site and disposed through a licensed agent.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
Natural Environment	7	Protected area and ecosystem	2024	56) Affected area shall be marked and all relevant construction workers and communities shall be informed not to conduct development outside of the project area.	Implemented or Not	N/A	Boundary of the Construction area	Monthly	Contractor / UNRA	0
				57) Waste oil shall be stored and disposed to the designated site or disposed by the licensed agent so as not to leak into the water body and on land.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				58) Domestic waste in the construction area shall be stored properly for not to attract wild animals and disposed at the designated site.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				59) Tree replantation shall be carried out.	Implemented or Not	N/A	Construction area and surrounding area	Monthly	Contractor / UNRA	0
				60) Borrow soil from out of project area shall be inspected not included alien plant species before carrying into the protected area.	Implemented or Not	N/A	Construction area	Monthly	Contractor / UNRA	0

Area	No.	Item	ESIA version	Draft Mitigation Measures During Construction	Monitoring Item	Standard Value in Ugandan or International	Monitoring Point / Area	Monitoring Frequency	Implementation Agency	Monitoring Cost (USD)
				61) Prohibition of blasting and adoption of lower noise and vibration construction methods	Implemented or Not	N/A	Construction area	Monthly	Contractor / UNRA	0
				62) Construction area shall be restored as the original condition after construction.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				63) Lighting in the nighttime shall be minimized at night-time so as not to cause adverse impacts on the wild animals such as Hippopotamus and Elephant.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				64) Avoid to park construction machines in the protected area for not to disturb crossing animals.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				65) Obstacles such as tall fences shall not be installed in the vicinity of project site and the road embankment shall provide for gentle slopes as possible in order not prevent animals from crossing the road.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				66) Relocate and/or induce valuable species to escape out of the construction area before construction activities begin with assistance of UWA rangers	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				67) Poaching by construction workers shall be prohibited. Policy and regulations regarding natural environmental protection shall be instructed.	Implemented or Not	N/A	Workers of the construction area and facility sites	Monthly	Contractor / UNRA	0
				68) UWA rangers shall be deployed near the project site for emergency case such as encountering with wild animals.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				69) Construction machines shall maintain speed limit of less than 40km/h not to cause roadkill in the construction area.	Implemented or Not Number of road-kill	N/A	Construction area, facility sites and haul roads	Monthly	Contractor / UNRA	0
				70) Limit construction to as short a time as possible and it should take place during the daytime when the visual range is substantial.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
			2016	71) Clearing should not exceed areas not used for construction specifications.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				72) Construction workers should not clear vegetation for use as fuel wood as it will exacerbate more clearing.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				73) Re-vegetate/planting of trees	Implemented or Not	N/A	Construction area and surrounding area	Monthly	Contractor / UNRA	0
				74) Illegal hunting of wildlife by construction workers as a source of food should be strictly	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0

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Area	No.	Item	ESIA version	Draft Mitigation Measures During Construction	Monitoring Item	Standard Value in Ugandan or International	Monitoring Point / Area	Monitoring Frequency	Implementation Agency	Monitoring Cost (USD)
				prohibited.						
				75) Limit vehicle speeds during delivery of construction materials to the site. Speeds should be controlled within prescribed KWR sections.	Implemented or Not	N/A	Construction area, facility sites and haul roads	Monthly	Contractor / UNRA	0
			2018	76) Construction related facilities such as Base camps, borrow pits, quarry site and wells should not be constructed in the construction area and protected area	Implemented or Not	N/A	Base-camp site and facility sites	Monthly	Contractor / UNRA	0
				77) Do not stockpile near sensitive environments along the river.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				78) Restore all ecologically sensitive sites after construction phase using spoil.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				79) Manage the existing invasive plant species spread through sensitizations.	Implemented or Not	N/A	Construction area	Monthly	Contractor / UNRA	0
				80) Ensure no foreign plant species are introduced in the Wildlife Reserve by Quarantine and treating equipment before introducing them into the conservation area.	Implemented or Not	N/A	Construction area	Monthly	Contractor / UNRA	0
				81) Efforts through mechanical elimination of invasive plants within the project areas should be made.	Implemented or Not	N/A	Construction area	Monthly	Contractor / UNRA	0
				82) Develop and implement a waste management plan not to attract wild animals.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				83) Solid waste disposal sites will be located away from watercourses and have restricted access.	Implemented or Not	N/A	Base-camp site and facility site	Monthly	Contractor / UNRA	0
				84) Use low noise and vibration equipment.	Installed or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				85) No night works	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				86) Sensitization of workers on dangers of poaching	Implemented or Not	N/A	Workers in the Construction area and facility sites	Monthly	Contractor / UNRA	0
				87) Code of conduct to ensure workers do not engage in poaching, trading, and consumption of game meat.	Implemented or Not	N/A	Workers in the Construction area and facility sites	Monthly	Contractor / UNRA	0
				88) Maintain a realistic buffer distance from the animals.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
				89) Locate worker's camps and equipment yards away from KWR and sensitive ecosystems.	Implemented or Not	N/A	Base-camp site, accommodation and relevant offices	Monthly	Contractor / UNRA	0

Area	No.	Item	ESIA version	Draft Mitigation Measures During Construction	Monitoring Item	Standard Value in Ugandan or International	Monitoring Point / Area	Monitoring Frequency	Implementation Agency	Monitoring Cost (USD)
				90) Install speed humps at interval of 0.2-0.5 km along the approaching routes.	Installed or Not Number of road-kill	N/A	Construction area, facility sites and haul roads	Monthly	Contractor / UNRA	0
				91) Install appropriate road signage on speed limits and animal crossing corridors.	Installed or Not Number of road-kill	N/A	Construction area, facility sites and haul roads	Monthly	Contractor / UNRA	0
				92) Mark off all identified animal crossing points	Installed or Not Number of road-kill	N/A	Construction area, facility sites and haul roads	Monthly	Contractor / UNRA	0
	8	Hydrology	2024	93) Diversion of irrigation channels and/or streams shall be set up if the project activities give impacts on such streams and irrigation.	Implemented or Not	N/A	Construction area and facility sites	Monthly	Contractor / UNRA	0
	9	Topography and geology	2024	94) The slope gradient for earthwork section is designed in accordance with the applicable design manuals.	Implemented or Not	N/A	Embankment and slope in the construction area	Monthly	Contractor / UNRA	0
				95) Implementation of slope protection methods such as turf work, seed spraying treatment, shotcrete, etc.	Implemented or Not	N/A	Embankment and slope in the construction area	Monthly	Contractor / UNRA	0
			2018	96) Protect road embankments and slopes with stone walls, Gabions, erosion control mats.	Implemented or Not	N/A	Embankment and slope in the construction area	Monthly	Contractor / UNRA	0
Social Environment	10	Poverty Group	2024	97) Provide equal job opportunities for the local people as construction workers.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				98) Announce the schedule, conditions, requirements, duration, etc. of all skilled, semi-skilled, and unskilled labors in places where the local people can easily observe, such as the town center, local council office, and meeting places, so that employment is carried out in accordance with the individual abilities of local people.	Implemented or Not	N/A	Local community in the vicinity of construction area (Diima SC, Karuma TC, and Kamdini SC)	Monthly	Contractor/ UNRA	0
				99) Priority will be given to employing the local people wherever possible and minimizing the influx of construction workers from other areas.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
	11	Ethnic group	2024	100) Ensure a clear principle of no discrimination based on the ethnicity in the selection process of construction workers.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				101) Provide equal job opportunities for the local people as construction workers.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0

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Area	No.	Item	ESIA version	Draft Mitigation Measures During Construction	Monitoring Item	Standard Value in Ugandan or International	Monitoring Point / Area	Monitoring Frequency	Implementation Agency	Monitoring Cost (USD)
				102) Announce the schedule, conditions, requirements, duration, etc. of all skilled, semi-skilled, and unskilled labors in places where the local people can easily observe, such as town center, local council office, and meeting places, so that employment is carried out in accordance with the individual abilities of local people.	Implemented or Not	N/A	Local community in the vicinity of construction area (Diima SC, Karuma TC, and Kamdini SC)	Monthly	Contractor/ UNRA	0
				103) Priority will be given to employing the local people wherever possible and minimizing the influx of construction workers from other areas.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
	12	Local economy such as employment and livelihood	2024	104) Information on the detailed construction plan, including schedule, location construction area and related facilities, and traffic control area, should be disseminated in advance.	Implemented or Not	N/A	Local community in the vicinity of construction area (Diima SC, Karuma TC, and Kamdini SC)	Monthly	Contractor/ UNRA	0
				105) Ensure access to the entrances of shops, restaurants, etc. in the vicinity of construction area, related facilities, and traffic control area.	Implemented or Not	N/A	In the vicinity of construction area, related facilities, and traffic control area	Monthly	Contractor/ UNRA	0
				106) Provide equal job opportunities for the local people as construction workers.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				107) Establish a GRM to resolve complaints received from the local people.	Implemented or Not	N/A	Local community in the vicinity of construction area (Diima SC, Karuma TC, and Kamdini SC)	Monthly	Contractor/ UNRA	0
			2016	108) Ensure people from local community are given priority where appropriate.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				109) Provide information about the availability of employment opportunities and qualifications needed.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				110) Provide on-the-job training to construction workers recruited from the local community.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				111) Encourage and motivate contractors to buy locally available construction materials.	Implemented or Not	N/A	Local community in the vicinity of construction area (Diima SC, Karuma TC, and Kamdini SC)	Monthly	Contractor/ UNRA	0

Area	No.	Item	ESIA version	Draft Mitigation Measures During Construction	Monitoring Item	Standard Value in Ugandan or International	Monitoring Point / Area	Monitoring Frequency	Implementation Agency	Monitoring Cost (USD)
	13	Land use and utilization of local resources	2024	112) Information on the detailed construction plan, including schedule, location of construction area and related facilities, traffic control area should be disseminated in advance.	Implemented or Not	N/A	Local community in the vicinity of construction area (Diima SC, Karuma TC, and Kamdini SC)	Monthly	Contractor/ UNRA	0
				113) In order to avoid traffic disruption due to the complete closure, the existing Karuma Bridge will be maintained, and traffic will be kept on the existing Karuma Bridge during construction of the new bridge.	Implemented or Not	N/A	Existing Karuma Bridge	Monthly	Contractor/ UNRA	0
				114) Provide detour to the river, as necessary.	Implemented or Not	N/A	Construction area and related facilities	Monthly	Contractor/ UNRA	0
				115) Construction workers should not use local resources such as fish and firewood.	Implemented or Not	N/A	Construction area and related facilities	Monthly	Contractor/ UNRA	0
				116) Establish a GRM to resolve complaints received from the local people.	Implemented or Not	N/A	Local community in the vicinity of construction area (Diima SC, Karuma TC, and Kamdini SC)	Monthly	Contractor/ UNRA	0
	14		2024	117) Priority will be given to employing the local people wherever possible and minimizing the influx of construction workers from other areas.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				118) The contractor should prepare water supply plan for construction including drinking water and obtain the Water Abstract Permit from Directorate of Water Resource Management.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				119) Establish a GRM to resolve complaints received from the local people.	Implemented or Not	N/A	Local community in the vicinity of construction area (Diima SC, Karuma TC, and Kamdini SC)	Monthly	Contractor/ UNRA	0
	15	Water usage	2018	120) The contractor should develop a water supply plan and consult with the local authority (Local Council) prior to using existing water sources.	Implemented or Not	N/A	Local community in the vicinity of construction area (Diima SC, Karuma TC, and Kamdini SC)	Monthly	Contractor/ UNRA	0
			2024	121) Information on the detailed construction plan, including schedule, location of construction area and related facilities, and traffic control area, should be disseminated in advance.	Implemented or Not	N/A	Local community in the vicinity of construction area (Diima SC, Karuma TC, and Kamdini SC)	Monthly	Contractor/ UNRA	0
		Existing social infrastructures and services		122) In order to avoid traffic disruption due to the complete closure, the existing Karuma Bridge will be maintained, and traffic will be kept on the existing Karuma Bridge during the construction of new bridge.	Implemented or Not	N/A	Existing Karuma Bridge	Monthly	Contractor/ UNRA	0

Annex-9 Environmental Management Plan/ Environmental Monitoring Plan (22 / 48)

Area	No.	Item	ESIA version	Draft Mitigation Measures During Construction	Monitoring Item	Standard Value in Ugandan or International	Monitoring Point / Area	Monitoring Frequency	Implementation Agency	Monitoring Cost (USD)
				123) Traffic guides will be deployed in the vicinity of construction area, related facilities, and traffic control area.	Implemented or Not	N/A	Construction area and related facilities	Monthly	Contractor/ UNRA	0
				124) Provision of detour to the existing social infrastructures and services, as necessary.	Implemented or Not	N/A	Construction area and related facilities	Monthly	Contractor/ UNRA	0
				125) Establish a GRM to resolve complaints from the local people.	Implemented or Not	N/A	Local community in the vicinity of construction area (Diima SC, Karuma TC, and Kamdini SC)	Monthly	Contractor/ UNRA	0
	16	Unequal distribution of positive and negative impacts	2024	126) Establish a GRM for the Project by harmonizing the existing similar system.	Implemented or Not	N/A	Local community in the vicinity of construction area (Diima SC, Karuma TC, and Kamdini SC)	Monthly	Contractor/ UNRA	0
				127) Explain the GRM for the Project to the local people in continuous public consultations.	Implemented or Not	N/A	Local community in the vicinity of construction area (Diima SC, Karuma TC, and Kamdini SC)	Monthly	Contractor/ UNRA	0
				128) Provide the equal job opportunities to the local people as construction workers.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				129) Priority will be given to employing the local people wherever possible and minimizing the influx of construction workers from other areas.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				130) Provide guidance to construction workers hired from other areas to avoid conflicts with the local people.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
			2018	131) The contractor will encourage potential workers to get recommendation from local leaders (LC) to be eligible in the hiring of construction workers to ensure that those hired do not have criminal records.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				132) Ensure fair wages of construction workers hired for the Project.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				133) Information on the Project will be disseminated transparently to the local community.	Implemented or Not	N/A	Local community in the vicinity of construction area (Diima SC, Karuma TC, and Kamdini SC)	Monthly	Contractor/ UNRA	0
				134) Continue to communicate with the local community from the survey period to ensure that all concerns are addressed.	Implemented or Not	N/A	Local community in the vicinity of construction area (Diima SC, Karuma TC, and Kamdini SC)	Monthly	Contractor/ UNRA	0

Area	No.	Item	ESIA version	Draft Mitigation Measures	Monitoring Item	Standard Value in Ugandan or International	Monitoring Point / Area	Monitoring Frequency	Implementation Agency	Monitoring Cost (USD)
				During Construction						
	17	Cultural heritage	2024	135) Consult with cultural leaders in advance to minimize disruption and concern to the local people, and to avoid unanticipated damage to symbolic trees and rocks, and other important resources that are objects of worship or those used in rituals.	Implemented or Not	N/A	Local community in the vicinity of construction area (Djima SC, Karuma TC, and Kamdini SC)	Monthly	Contractor/ UNRA	0
				136) Develop and follow a "*Chance Finds Procedure*" to prevent damage to archaeological and historical resources.	Implemented or Not	N/A	Construction area and related facilities	Monthly	Contractor/ UNRA	0
				137) Conduct continuous monitoring by Contractor during earthworks.	Implemented or Not	N/A	Construction area and related facilities	Monthly	Contractor/ UNRA	0
				138) Provide training on cultural site and archaeological and historical resources to the construction workers.	Implemented or Not	N/A	Construction area and related facilities	Monthly	Contractor/ UNRA	0
				139) Install signage to the signboard of the Sir Samuel and Lady Florence historical trails.	Implemented or Not	N/A	Where the signboard will be improved	Monthly	Contractor/ UNRA	0
			2016	140) Project activities involving earthworks must include an approved "Chance Finds Procedure" in construction contracts, to cover the possibility of discovering physical cultural heritage in the course of excavation.	Implemented or Not	N/A	Construction area and related facilities	Monthly	Contractor/ UNRA	0
	18		2024	141) Adoption of color of the bridge harmonized with the surrounding current landscape	Implemented or Not	N/A	Bridge designing and color in the Construction area	Monthly	Contractor/ UNRA	0
		Landscape	2018	142) Landscaping along the road in the Karuma Wildlife Reserve.	Implemented or Not	N/A	Construction area	Monthly	Contractor/ UNRA	0
	19	Gender	2024	143) Development of the Code of Conduct for Contractors in conformity with gender policy and Employment Act, Cap 219.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				144) Provide equal job opportunities and fair salary regardless of gender (including positive segregation mechanism to ring fence some jobs for women).	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				145) Install the sanitary facilities in considering gender at construction are and related facilities (including basecamp).	Installed or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				146) Provie the educational training on gender to construction workers.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				147) Sensitize the local people on gender issues.	Implemented or Not	N/A	Local community in the vicinity of construction area (Djima SC, Karuma TC, and Kamdini SC)	Monthly	Contractor/ UNRA	0

Area	No.	Item	ESIA version	Draft Mitigation Measures During Construction	Monitoring Item	Standard Value in Ugandan or International	Monitoring Point / Area	Monitoring Frequency	Implementation Agency	Monitoring Cost (USD)
				148) Ensure a certain distance between the local community and the basecamp.	Implemented or Not	N/A	Basecamp	Monthly	Contractor/ UNRA	0
				149) Establish a GRM to resolve complaints received from the local people with several options for submitting complaints (including the option that the local people can access to the local NGOs).	Implemented or Not	N/A	Local community in the vicinity of construction area (Diima SC, Karuma TC, and Kamdini SC)	Monthly	Contractor/ UNRA	0
				150) Ensure anonymity to protect privacy when submitting complaints, if requested by the complainant.	Implemented or Not	N/A	Local community in the vicinity of construction area (Diima SC, Karuma TC, and Kamdini SC)	Monthly	Contractor/ UNRA	0
			2018	151) Female workers will be sensitized on their sexual rights.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				152) Have policies to promote non-discrimination and equal opportunities.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				153) Establish zero tolerance policies and codes of conduct related to violence against women and girls.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				154) Explain and educate construction workers about laws prohibiting sex work.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				155) Consider the gender for facilities for construction workers such as restrooms and bathrooms.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				156) Pay equal wages for work of equal value by women and men.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
	20	Rights of children	2024	157) Follow relevant national legal frameworks on children's right such as the Children Act, Cap 59 and international standards such as the following IFC's Performance Standard 2 (Labor and Working Conditions)	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				158) Include a strict "no child labor" rule in the contractor's contract.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				159) When selecting construction workers, identification cards, etc. will be checked to verify age.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				160) Provide educational training to construction workers not to buy goods from children, not to have inappropriate relationship with boys	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0

Area	No.	Item	ESIA version	Draft Mitigation Measures During Construction	Monitoring Item	Standard Value in Ugandan or International	Monitoring Point / Area	Monitoring Frequency	Implementation Agency	Monitoring Cost (USD)
				and girls, not to use school facilities such as toilets and water systems, and encourage children to go to school when children are gathered at the construction site to see the work, etc.						
				161) Sensitize the local people and schools.	Implemented or Not	N/A	Local community in the vicinity of construction area (Diima SC, Karuma TC, and Kamdini SC)	Monthly	Contractor/ UNRA	0
				162) Install security facilities such as signboard in the vicinity of construction area and related facilities.	Implemented or Not	N/A	Construction area and related facilities	Monthly	Contractor/ UNRA	0
			2018	163) The contractor will develop a child protection plan and provide it to the local stakeholders.	Implemented or Not	N/A	Construction area and related facilities (including bascamps)	Monthly	Contractor/ UNRA	0
				164) Prevent contractors from hiring children as construction workers.	Implemented or Not	N/A	Construction area and related facilities (including bascamps)	Monthly	Contractor/ UNRA	0
				165) Ensure that the local community has access to and know of and report abuse using the national child abuse hotline 116.	Implemented or Not	N/A	Local community in the vicinity of construction area (Diima SC, Karuma TC, and Kamdini SC)	Monthly	Contractor/ UNRA	0
				166) Keep children off construction area to ensure controlled interaction between children and construction workers.	Implemented or Not	N/A	Construction area and related facilities (including bascamps)	Monthly	Contractor/ UNRA	0
				167) Ensure close monitoring of construction workers' behavior and conduct.	Implemented or Not	N/A	Construction area and related facilities (including bascamps)	Monthly	Contractor/ UNRA	0
				168) Parents/ guardians should be sensitized and held accountable for children leaving and arriving home before dark.	Implemented or Not	N/A	Local community in the vicinity of construction area (Diima SC, Karuma TC, and Kamdini SC)	Monthly	Contractor/ UNRA	0
	21	Infectious diseases	2024	169) Follow relevant national legal frameworks on infectious diseases such as the Occupational Safety and Health Act No.9 (2006) and international standards such as IFC's Performance Standard 2.	Implemented or Not	N/A	Construction area and related facilities (including bascamps)	Monthly	Contractor/ UNRA	0
				170) Prevent the creation of vector mosquito habitats by installing appropriate drainage facilities in the construction area and related facilities.	Implemented or Not	N/A	Construction area and related facilities (including bascamps)	Monthly	Contractor/ UNRA	0

Area	No.	Item	ESIA version	Draft Mitigation Measures During Construction	Monitoring Item	Standard Value in Ugandan or International	Monitoring Point / Area	Monitoring Frequency	Implementation Agency	Monitoring Cost (USD)
				171) Take appropriate precautionary measures such as providing mosquito nets and purified water to construction workers.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				172) Provide adequate sanitation facilities, as well as trash boxes.	Installed or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				173) Enforce medical screening and periodical medical check for workers.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				174) No to discriminate against HIV/ AIDS infected persons in hiring construction workers.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				175) Provide educational training on prevention of infectious diseases to construction workers.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				176) Sensitize the local people about infectious diseases.	Implemented or Not	N/A	Local community in the vicinity of construction area (Diima SC, Karuma TC, and Kamdini SC)	Monthly	Contractor/ UNRA	0
				177) Provide condoms in sanitary facilities in the construction area and related facilities (including basecamps).	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
			2018	178) Maintain a strict "no socializing" policy to prevent basecamps from becoming hotspots for prostitution or illicit sexual relations.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				179) HIV/AIDS sensitization programs shall be conducted at the basecamps.	Implemented or Not	N/A	In the vicinity of basecamps	Monthly	Contractor/ UNRA	0
	22	Labor Environment and Safety	2024	180) Follow the relevant legal and institutional frameworks on work environment such as the Occupational Safety and Health Act No.9 (2006) and international standards such as the following IFC's Performance Standard 2 (Labor and Working Conditions).	Implemented or Not	N/A	In the vicinity of basecamps	Monthly	Contractor/ UNRA	0
				181) Establish a response system in the event of an accident due to construction, patient transport, or other emergencies.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				182) Implement countermeasures against "Tsetse fly."	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
			2016	183) Use of Person Protection Equipment (PPE) such as earplugs and masks to those working in the vicinity of construction area and related facilities.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0

Annex-9 Environmental Management Plan/ Environmental Monitoring Plan (**27** / **48**)

Area	No.	Item	ESIA version	Draft Mitigation Measures During Construction	Monitoring Item	Standard Value in Ugandan or International	Monitoring Point / Area	Monitoring Frequency	Implementation Agency	Monitoring Cost (USD)
				184) Establish safety regulations in the construction area and related facilities.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				185) Install first aid kit.	Installed or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				186) Provide adequate training on safety measures for construction workers.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				187) Prepare emergency rescue plans.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
			2018	188) Develop and implement a health and safety plan.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				189) Provide construction workers with appropriate ear protection.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				190) Implement health and safety training programs for construction workers.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				191) Develop and implement a security management plan that includes clear measures to protect construction workers.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				192) Develop and implement an occupational health and safety plan in line with the "Occupational Safety and Health Act (2016)."	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				193) Hire and assign a professional safety manager.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				194) Assign an occupational safety committee for the Project.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				195) Develop an emergency and contingency plan.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
				196) Develop and communicate policies to construction workers, supervisors and supervisory personnel to promote non-discrimination and to promote equal treatment.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0

Area	No.	Item	ESIA version	Draft Mitigation Measures During Construction	Monitoring Item	Standard Value in Ugandan or International	Monitoring Point / Area	Monitoring Frequency	Implementation Agency	Monitoring Cost (USD)
Others				197) No decisions regarding employment, working conditions, pay, benefits, or termination will be based on discriminatory grounds.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor/ UNRA	0
	23	Accident	2024	198) Traffic guides will be assigned to construction area and related facilities, and traffic control area.	Installed or Not	N/A	Construction area and related facilities	Monthly	Contractor / UNRA	0
				199) Install safety signs, including speed limits, in the construction area and related facilities, and traffic control area.	Installed or Not	N/A	Construction area and related facilities	Monthly	Contractor / UNRA	0
				200) Install nighttime lighting facilities in the construction area and related facilities, and traffic control area.	Installed or Not	N/A	Construction area and related facilities	Monthly	Contractor / UNRA	0
				201) Limit traffic speed to 40 km/h in the vicinity of construction area, related facilities, and traffic control area.	Implemented or Not	N/A	Construction area and related facilities	Monthly	Contractor / UNRA	0
				202) Provide safety training for construction workers.	Implemented or Not	N/A	Construction area and related facilities	Monthly	Contractor / UNRA	0
				203) Establish a response system in the event of an accident due to construction, patient transport, or other emergencies.	Implemented or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor / UNRA	0
				204) Sensitize the local people and schools.	Implemented or Not	N/A	Local community in the vicinity of construction area (Diima SC, Karuma TC, and Kamdini SC)	Monthly	Contractor / UNRA	0
			2016	205) Install signs and warnings in the hazardous areas of construction area and related facilities.	Installed or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor / UNRA	0
			2018	206) Screen offsite to prevent intrusion from the local community.	Installed or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor / UNRA	0
				207) Install storage for fuels.	Installed or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor / UNRA	0
				208) Install fire suppression systems.	Installed or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor / UNRA	0
				209) Install necessary road signs along the constructed roads.	Installed or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor / UNRA	0

Area	No.	Item	ESIA version	Draft Mitigation Measures During Construction	Monitoring Item	Standard Value in Ugandan or International	Monitoring Point / Area	Monitoring Frequency	Implementation Agency	Monitoring Cost (USD)
				210) Install humps and speed control measures.	Installed or Not	N/A	Construction area and related facilities (including basecamps)	Monthly	Contractor / UNRA	0
	24	Cross Boundary Impacts and Climate Change (Green House Gases (CO2))	2024	211) Prohibition of unnecessary idling/operation of construction machines	Installed or Not	N/A	Construction area, facility site and haul roads	Monthly	Contractor / UNRA	0
				212) Periodical (daily, weekly and monthly) checking, and maintenance of construction machines shall be done.	Installed or Not	N/A	Construction area and facility site	Monthly	Contractor / UNRA	0
			2018	213) All combustion equipment on site including operational machinery and generators should be serviced regularly.	Implemented or Not	N/A	Construction area and facility site	Monthly	Contractor / UNRA	0
				214) All on site burning should be done and controlled properly.	Implemented or Not	N/A	Construction area and facility site	Monthly	Contractor / UNRA	0
				215) Avoid cutting trees as much as possible	Implemented or Not	N/A	Construction area and facility site	Monthly	Contractor / UNRA	0

Source: JICA Survey Team

Table-5 Environmental Monitoring Plan Pre- and During Construction Phase (3years)

Area	No.	Item	Parameter	Method	a) Number of Location / Survey Area	b) Frequency per Year	c) Construction Period (year)	d) Total Number (a) x b) x c))	e) Unit Cost (USD)	Direct Cost (USD) (d) x e))	Conservation Target*3
Natural Environment	1	Air pollution	1) TSP, 2) PM10, 3) PM2.5, 4) Carbon dioxide (CO_2), 5) Carbon monoxide (CO), 6) Hydrocarbons, 7) Nitrogen oxides (NOx), 8) Nitrogen dioxide (NO_2), 9) Sulphur dioxide (SO_2), 10) Sulphur trioxide (SO_3), 11) Smoke, 12) Soot	Based on the National Environment (Air Quality Standards) Regulations, 2024 and / or the same methodology of baseline surveys	**4 Locations** Where baseline monitoring was carried out (Air-02, 03, 04, Noise-07) (Note1) *Coordinate Air-2 : 36N 414980.01 m E、247690.21 m N Air-3 : 36N 413217.40 m E、246128.63 m N Air-4 : 36N 417499.59 m E、247407.36 m N Noise-07 : 36N 417469.93 m E, 247383.99 m N Note1: For the monitoring of baseline survey location Air-01, it will be conducted at the same location as the baseline survey location for Noise-7	1) Baseline Survey before Construction activities 2) Once / year (dry season)	**3.0**	**16** (4 points x 4 times)	**1,000** **(All parameter)**	**16,000**	***1:Uganda draft National air quality standard 2024** ***2: Environmental, Health, and Safety General Guidelines (IFC, April 30th, 2007)** ***3: Environmental Quality Standards in Japan - Air Quality 1973** **[Air Emissions]** **Maximum limit values of ambient air quality parameters** 1. PM_{10} (Ø< 10μm) · 24hrs : 60 $\mu g/m^3$*1 2. $PM_{2.5}$ (Ø< 2.5μm) · 24hrs : 35 $\mu g/m^3$*1 3. CO · 24hrs : 7mg /m^3(6ppm)*1 4. NO_2 · 24hrs : 50μg /m^3(0.026ppm)*1 5. SO_2 24hrs : 20$\mu g/m^3$(0.0008ppm) *1
	2	Water quality	1)BOD, 2)Temperature, 3)E-coliform, 4)Total dissolved solids, 5)Total hardness(as CaCO3), 6)Aluminum (Al), 7)Chloride (Cl), 8)Total Iron (Fe), 9)Sodium (Na), 10)Sulphate (SO4), 11)Zinc (Zn), 12)Magnesium (Mg), 13)Calcium (as Ca), 14)Potassium (K), 15)Colour (TCUa max), 16)Turbidity (NTU), 17)pH, 18)Conductivity	Based on the Draft Portable waters standards as per the Uganda draft standard for portable water 2014 (Untreated/Natural portable Water Limits) and/or same methodology of baseline surveys	**3 Locations** Where baseline monitoring was carried out (WQ01, 02, 03) *Coordinates WQ-01: 36N 418784.00 m E, 248320.00 m N WQ-02: 36N 415458.00 m E, 247889.00 m N WQ-03: 36N 410255.00 m E, 245207.00 m N	1) Baseline Survey before Construction activities 2) 2 times / year (Dry and Rainy Season)	**3.0**	**21** (3 points x 7 times)	**1,000**	**21,000**	***1: Draft Portable waters standards as per the Uganda draft standard for portable water 2014 (Untreated/Natural portable Water Limits)** ***2: Ministry of Environment in Japan (River Water Quality / Category D River)** **[Site Runoff and Wastewater Discharges (Construction Phase)]** 1. BOD : 8 mg/l*2 2. Total Dissolved Solids: 1,500 mg/l 3.Turbidity:25 NTU*1 4.pH:5.5-9.5*1 5. Conductivity: 2,500 μS/cm*1

Area	No.	Item	Parameter	Method	a) Number of Location / Survey Area	b) Frequency per Year	c) Construction Period (year)	d) Total Number (a) x b) x c))	e) Unit Cost (USD)	Direct Cost (USD) (d) x e))	Conservation Target*3
			(µS/cm), 19) Dissolved Oxygen, 20) Oil and Grease								6. Dissolved Oxygen: >=2 mg/l *2
	3	Waste	Volume of waste soil, cut trees and domestic garbage	Record volume of generated waste in the project area	**Base-Camp site and Construction site**	**12 times (Monthly)**	**3.0**	**36**	**- (including construction cost)**	**0**	Generated construction waste and domestic shall be reused or disposed of at designated site properly.
	4	Soil contamination and sedimentation quality	1) Cadmium, 2) Hexavalent chromium, 3) Mercury, 4) Lead, 5) Arsenic, 6) Cyanide, 7) Selenium, 8) Fluorine, 9) Boron	Same methodology of baseline surveys	**2 Locations in the project area (Excavated area) 2 Locations (Borrow pits out of project area)**	**1 time (during construction period) (before excavation and transporting borrow soil)**	**3.0**	**12** (4 points x 3 times)	**1,000**	**12,000**	There are no law-based criteria nor international guidelines to be followed, thus the following is established as conservation target Japanese Standard: Environmental Quality Standards for Soil Pollution, Ministry of Environment/ 1991) 1. Cadmium: 150 ppm (mg/kg) 2. Hexavalent Chromium: 250 ppm (mg/kg) 3. Mercury: 15 ppm (mg/kg) 4. Lead: 150 ppm (mg/kg) 5. Arsenic: 150 ppm (mg/kg) 6. Cyanide: 50 ppm (mg/kg) 7. Selenium: 150 ppm (mg/kg) 8. Fluorine: 4000 ppm (mg/kg) 9. Boron: 4000 ppm (mg/kg)
	5	Noise	Construction noise ($dB(A)L_{Aeq}$)	Noise: 24hrs of continuous measurement (at least 10min in an hour x 24hours)	**5 Locations** Noise-02, 04, 06, 07 and KWR office	Baseline Survey before Construction activities 2) 2 times / year (every 6 month)	**3.0**	**35** (5 points x 7 times)	**500**	**17,500**	Uganda: The National Environment (Noise and Vibrations Standards and Control) Regulations (2003) -Residential (6:00-22:00): 60 dB(A) -Commercial (6:00-22:00): 75 dB(A) -Industrial (6:00-22:00): 85 dB(A) Reference standard in Japan Japan: Ministry of Environment (1998) Environmental Standards for Noise 07:00-19:00: 85 dB(A) *Conservation target for Noise-07 shall refer to the adopted standard in the impact forecast.

Area	No.	Item	Parameter	Method	a) Number of Location / Survey Area	b) Frequency per Year	c) Construction Period (year)	d) Total Number (a) x b) x c))	e) Unit Cost (USD)	Direct Cost (USD) (d) x e))	Conservation Target*3
Natural Environment	6	Odor	Oil, chemicals and garbage odor	Sensory evaluation	**Base-Camp site and Construction site**	**12 times (Monthly)**	**3.0**	**36**	**- (including construction cost)**	**0**	There are no law-based criteria nor international guidelines to be followed, thus the following is established as conservation target
	7	Protected area and ecosystem	a) Fauna Survey: mammals, birds, reptiles, amphibians, fish, insects b) Flora Survey: Land plants and aquatic plants c) Valuable Fauna species listed up from IUCN Red list shall be surveyed on their habitats such as feeding area, roosting area, breeding area and migration routes for 1)African Savanna Elephant, 2)Hippopotamus, 3)African Buffalo, 4)Patas monkey 、 5) Crowned Eagle, 6)Bateleur, 7) Martial Eagle 8) Central Africa Rock Python d) Valuable Flora species listed up from IUCN shall be surveyed on their identified location and growth status as well as the replanting status as necessary 1) Iroko (Milicia excelsa), 2)African Mahogany (Khaya senegalensis)	Fauna: Transect Survey, Point Census, interview Flora: Transect Survey	Transect Survey Area: 500m each alongside of the bridge and approach road Point Census for Birds: 1-2 km by binoculars	Baseline Survey before Construction activities 2) 2 times / year (dry and rainy season)	3.0	7	**2,000**	**14,000**	No significant impact There are no law-based criteria nor international guidelines to be followed, thus the following is established as conservation target Observed species are not changed before and during construction

Annex-9 Environmental Management Plan/ Environmental Monitoring Plan (**33** / **48**)

Area	No.	Item	Parameter	Method	a) Number of Location / Survey Area	b) Frequency per Year	c) Construction Period (year)	d) Total Number (a) x b) x c))	e) Unit Cost (USD)	Direct Cost (USD) (d) x e))	Conservation Target*3
	8	Hydrology, Topography and geology	Condition of embankment and soil erosion from the project area	Visual survey (taking picture)	Project Area (approach road, embankment and streams between the project area and Nile River)	**12 times (Monthly)**	3.0	36	- **(including construction cost)**	0	There are no law-based criteria nor international guidelines to be followed, thus the following is established as conservation target Whether Soil erosion, slope failure and landslide are not observed.
Social Environment	9	Poverty Group	1) Number of places posting the announcement of the information about employment 2) Number of hired local people	1) Confirming the list of announcements 2) Confirming the list of construction workers	1) Karuma TC, Diima SC, and Kamdini SC 2) Construction area and related facilities	**12 times** (Monthly)	3.0	36	- **(including construction cost)**	0	There are no law-based criteria nor international guidelines to be followed, thus the following is established as target. • Employment opportunity should be equally provided to the local people.
	10	Ethnic groups	1) Contract content of the contractor 2) Number of places posting the announcement of the information about the employment 3) Number of hired local people	1) Confirming the contract 2) Confirming the list of announcements 3) Confirming the list of construction workers	1) and 3) Construction area and related facilities 2) Karuma TC, Diima SC, and Kamdini SC	**12 times** (Monthly)	3.0	36	- **(including construction cost)**	0	There are no law-based criteria nor international guidelines to be followed, thus the following is established as target. • Employment opportunity should be equally provided to the local people.
	11	Local economy such as employment and livelihood	1) Number of meetings organized, and participants per meeting 2) Access status to the entrance of shops, restaurants, etc. in the vicinity of construction area, related facilities, and traffic controlled area 3) Number of hired local people 4) Number of grievances on the access to the entrance of shops, restaurants, etc.	1) Confirming the records of discussions 2) Visual survey (taking pictures) 3) Confirming the list of construction workers 4) Confirming the list of grievance received	1) and 4) Karuma TC, Diima SC, and Kamdini SC 2) Construction area and related facilities 3) Construction area, related facilities, and traffic control area	**12 times** (Monthly)	3.0	36	- **(including construction cost)**	0	There are no law-based criteria nor international guidelines to be followed, thus the following is established as target. • Public consultation meetings prior to the commencement of construction works will be organized at least 2 times, namely, bidding and mobilizing stages of contractors. • Impacts on access to the shops, restaurants, etc. should be minimized and/or detour should be secured. • Employment opportunity should

Annex-9 Environmental Management Plan/ Environmental Monitoring Plan (**34** / **48**)

Area	No.	Item	Parameter	Method	a) Number of Location / Survey Area	b) Frequency per Year	c) Construction Period (year)	d) Total Number (a) x b) x c))	e) Unit Cost (USD)	Direct Cost (USD) (d) x e))	Conservation Target*3
											be equally provided to the local people. • A GRM that is accessible to local people should be established.
	12	Land use and utilization of local resources	1) Number of meetings organized, and participants per meeting 2) Maintenance status of the existing Karuma Bridge 3) Number of grievances on the status of detour and access road, and status of grievance 4) Number of hired workers who received the training (instruction)	1) Confirming the records of discussions 2) Visual survey (taking pictures) 3) Confirming the list of grievances received 4) Confirming the list of construction workers	1) and 3) Karuma TC, Diima SC, and Kamdini SC 2) and 4) Construction area and related facilities	**12 times** (Monthly)	**3.0**	**36**	**- (including construction cost)**	**0**	There are no law-based criteria nor international guidelines to be followed, thus the following is established as target. • Impacts on access to the local resources should be minimized and/or detour should be secured. • Employment opportunity should be equally provided to the local people.
	13	Water usage	1) Number of hired local people 2) Number of grievances on the water use	1) Confirming the list of construction workers 2) Confirming the list of grievance received	1) Construction area and related facilities 2) Karuma TC, Diima SC, Kamdini SC	**12 times** (Monthly)	**3.0**	**36**	**- (including construction cost)**	**0**	There are no law-based criteria nor international guidelines to be followed, thus the following is established as target. • Impacts on access to the water use should be minimized.
	14	Existing social infrastructures and services	1) Number of meetings organized, and participants per meeting 2) Maintenance status of the existing Karuma Bridge 3) Number of assigned traffic guides at construction area, related facilities, and traffic controlled area 4) Number of grievances on the status of detour and access road, and status of grievance	1) Confirming the records of discussions 2) and 3) Visual survey (taking pictures) 4) Confirming the list of grievances received	1) and 4) Karuma TC, Diima SC, and Kamdini SC 2) Existing Karuma Bridge 3) Construction area, related facilities, and traffic control area	**12 times** (Monthly)	**3.0**	**36**	**- (including construction cost)**	**0**	There are no law-based criteria nor international guidelines to be followed, thus the following is established as target. • Impacts on access to the existing social infrastructures and services should be minimized.

Area	No.	Item	Parameter	Method	a) Number of Location / Survey Area	b) Frequency per Year	c) Construction Period (year)	d) Total Number (a) x b) x c))	e) Unit Cost (USD)	Direct Cost (USD) (d) x e))	Conservation Target*3
	15	Unequal distribution of positive and negative impacts	1) Function status of GRM 2) Number of hired local people 3) Number of hired workers who received the training (instruction)	1) Interview with local councils and confirming the list of grievances received 2) Confirming the list of construction workers 3) Confirming the records of the training	1) Karuma TC, Diima SC, and Kamdini SC 2) and 3) Construction area and related facilities	**12 times** (Monthly)	**3.0**	**36**	**- (including construction cost)**	**0**	There are no law-based criteria nor international guidelines to be followed, thus the following is established as target. • Employment opportunity should be equally provided to the local people.
	16	Local conflict of interests	See No. 15 Unequal distribution of positive and negative impacts of the project	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto
	17	Cultural heritage	1) Number and content of meetings organized, and participants per meeting 2) Content of "Chance Finds Procedure" 3) Monitoring status of the Contractor 4) Number of found historical/ archaeological resources 5) Number of hired workers who received the training 6) Improvement status of historical signboard	1) Confirming the records of discussions 2) Confirming the developed procedure 3) and 4) Confirming the record of found historical/ archaeological resources 5) Confirming the records of the training 6) Visual survey (taking pictures)	1) Karuma TC, Diima SC, and Kamdini SC 2) to 6) Construction area and related facilities	**1) to 5) 12 times** (Monthly) **6) Once when the implement is completed**	**2.0 (during earthwork only)**	**1) to5) 24 times** **6) 1 time**	**- (including construction and mitigation costs)**	**0 (the cost is including in the mitigation cost)**	The following laws and guidelines shall be followed. 1. The Uganda National Culture Policy reviewed 2019 2. Museums and Monuments Policy (2015) 3. WB Operational Policy 4.11 (Physical Cultural Resources) 4. IFC Performance Standard 8 (Cultural Heritage)
	18	Gender	1) Number of hired local people 2) Payment status for the construction workers 3) Number of installed sanitary facilities 4) Number of trained construction workers	1) Confirming the list of construction workers by gender 2) Confirming the list of	1), 2), 3), 4), and 6) Construction area and related facilities (base camp site) 5) Karuma TC, Diima SC, and Kamdini SC	**12 times** (Monthly)	**3.0**	**36**	**- (including construction cost)**	**0**	The following laws and guidelines should be followed. 1. FIDIC 2010 (General Condition) 2. The Uganda Gender Policy (2007) 3. Guidelines for Mainstreaming gender into the road sub-sector (2008) 4. Employment Act, Cap 219

Area	No.	Item	Parameter	Method	a) Number of Location / Survey Area	b) Frequency per Year	c) Construction Period (year)	d) Total Number (a) x b) x c))	e) Unit Cost (USD)	Direct Cost (USD) (d) x e))	Conservation Target*3
			5) Number of sensitized local people 6) Location of basecamps	construction workers 3) Visual survey (taking photo) 4) Confirming the records of the training 5) Confirming the records of discussions 6) Visual survey (taking photo, and recording coordinates)							
	19	Rights of children	1) Contract content of the contractor 2) Age of Construction workers 3) Number of trained construction workers 4) Number of sensitized local people	1) Confirming the contract 2) Confirming the list of construction workers from contractor, and visual survey on site 3) Confirming the records of the training 4) Confirming the records of discussions	1) to 3) Construction area and related facilities 4) Karuma TC, Diima SC, and Kamdini SC	**12 times (Monthly)**	**3.0**	**36**	**- (including construction cost)**	**0**	The following laws and guidelines should be followed. 1. FIDIC 2010 (General Condition) 2. Children Act, Cap 59 3. Employment Act, Cap 219
	20	Infectious diseases	Number of infected patients among construction workers	Confirmation of health check list from the contractor	Construction area and related facilities	**12 times** (Monthly)	**3.0**	**36**	**- (including construction cost)**	**0**	The following laws and guidelines shall be followed. 1. The Occupational Safety and Health Act No.9 2006 2. Employment Act, Cap 219 3. IFC's Performance Standard 2 Labor and Working Conditions 4.FIDIC 2010
	21	Labor environment	Health condition of construction workers	Confirming the installed safety facilities and	Construction area and related facilities	**12 times** (Monthly)	**3.0**	**36**	**- (including**	**0**	The following laws and guidelines should be followed.

Area	No.	Item	Parameter	Method	a) Number of Location / Survey Area	b) Frequency per Year	c) Construction Period (year)	d) Total Number (a) x b) x c))	e) Unit Cost (USD)	Direct Cost (USD) (d) x e))	Conservation Target*3
				conditions via interviews					**construction cost)**		1. The Occupational Safety and Health Act No.9 2006 2. Employment Act, Cap 219 3. IFC's Performance Standard 2 Labor and Working Conditions 4.FIDIC 2010
Other	22	Accident	Number of accidents	Confirming the list of accidents from local government/ police department	Construction area, related facilities, and traffic control area	**12 times** (Monthly)	**3.0**	**36**	**- (including construction cost)**	**0**	There are no law-based criteria nor international guidelines to be followed, thus the following is established as conservation target. No accident is caused by construction activities.
										Total Cost During Construction: *80,500 (USD)*3 for 3 years (During Construction)	

Remarks
*1: The cost indicates direct cost, not including consultant fee, overhead and personal expense
*2: Conservation Target: If quantitative values exist such values prioritized as target based on Ugandan Laws/regulations, International Guidelines and other references. If quantitative values do not exist, qualitative target is established as project base.
*3: The cost for mobile equipment such as sound level meter and SS meter necessary for the daily/weekly monitoring is estimated at 6,000 USD and it is included in total cost during construction.

Source: JICA Survey Team

Table-6 Environmental Monitoring Plan Post Construction Phase (at the end of construction completion/Decommissioning Phase)

Area	No.	Item	Parameter	Method	a) Number of Location / Survey Area	b) Frequency per Year	c) Construction Period (year)	d) Total Number (a) x b) x c))	e) Unit Cost (USD)	Direct Cost (USD) (d) x e))	Conservation Target*3
Natural Environment	1	Waste	Weigh and volume of construction waste such as waste soil, domestic waste, and night soil	Visual Survey	**All construction area and related facilities such as base camp site**	Once at the completion of construction / demobilization timing of the contractor	-	**1**	**0**	**0**	All construction wastes such as waste soil, domestic waste and night soil from construction yard/offices shall be removed from the project site.
	2	Ecosystem	Condition of developed and cleared area by the project	Visual Survey	**All construction area and related facilities such as base camp site**	Once at the completion of construction / demobilization timing of the contractor	-	**1**	**0**	**0**	Cut and developed area by the project shall maintain as natural glass and trees can grow.
Social Environment	3	Cultural Heritage	Condition of improved signboard on the Sir Samuel and Lady Florence historical trail	Visual Survey	**Where the signboard is improved**	Once at the completion of construction / demobilization timing of the contractor	-	**1**	**0**	**0**	The original signboard should be improved so that the people easily can find it.
	4	Accident	Developed and excavated holes and sharp slopes in the project area and related facilities	Visual Survey	**All construction area and related facilities such as base camp site**	Once at the completion of construction / demobilization timing of the contractor	-	**1**	**0**	**0**	Developed and excavated holes and sharp slopes shall be backfilled or made flat not to cause accidents

Source: JICA Survey Team

Table-7 Environmental Monitoring Plan Post Construction Phase (at the end of construction completion/Decommissioning Phase)

Area	No.	Item	Parameter	Method	a) Number of Location / Survey Area	b) Frequency per Year	c) Construction Period (year)	d) Total Number (a) x b) x c))	e) Unit Cost (USD)	Direct Cost (USD) (d) x e))	Conservation Target*3
Natural Environment	1	Waste	Weigh and volume of construction waste such as waste soil, domestic waste, and night soil	Visual Survey	**All construction area and related facilities such as base camp site**	Once at the completion of construction / demobilization timing of the contractor	-	**1**	**0**	**0**	All construction wastes such as waste soil, domestic waste and night soil from construction yard/offices shall be removed from the project site.
	2	Ecosystem	Condition of developed and cleared area by the project	Visual Survey	**All construction area and related facilities such as base camp site**	Once at the completion of construction / demobilization timing of the contractor	-	**1**	**0**	**0**	Cut and developed area by the project shall maintain as natural glass and trees can grow.
Social Environment	3	Cultural Heritage	Condition of improved signboard on the Sir Samuel and Lady Florence historical trail	Visual Survey	**Where the signboard is improved**	Once at the completion of construction / demobilization timing of the contractor	-	**1**	**0**	**0**	The original signboard should be improved so that the people easily can find it.
	4	Accident	Developed and excavated holes and sharp slopes in the project area and related facilities	Visual Survey	**All construction area and related facilities such as base camp site**	Once at the completion of construction / demobilization timing of the contractor	-	**1**	**0**	**0**	Developed and excavated holes and sharp slopes shall be backfilled or made flat not to cause accidents

Source: JICA Survey Team

Table-8 Mitigation Measures Monitoring Plan after Construction (Integrated Mitigation Measures for 2016, 2018 and 2024 ESIAs)

Area	No.	Item	ESIA version	Draft Mitigation Measures After Construction	Monitoring Item	Standard Value in Ugandan or International	Monitoring Point / Area	Frequency	Implementation Agency	Monitoring Cost (USD)
Pollution	1	Water pollution	2024	1) Patrol and monitoring of illegal dumping in the rivers	Implemented or Not	N/A	Project site (bridge and approach road) and surrounding area	Every 6 months	UNRA	0 (*1: Conducted by UNRA personnel)
			2016	2) Install oil trap in the connected drainage.	Implemented or Not	N/A	Project site (bridge and approach road)	Every 6 months	UNRA	0
	2	Waste	2024	3) Patrol and monitoring of illegal dumping in the rivers.	Implemented or Not	N/A	Project site (bridge and approach road) and surrounding area	Every 6 months	UNRA	0
	3	Soil contamination and Sediment	2024	4) Borrow soil from outside of the project area for maintenance shall be inspected not polluted before carrying into the project area.	Implemented or Not	N/A	Project site (bridge and approach road)	When borrow soil is transported into the project area	UNRA	0
	4	Noise and vibration	2024	5) Uganda government shall control the driving speed on the road (UNRA requests to police department regarding strict speed control).	Implemented or Not	N/A	Project site (bridge and approach road) and surrounding area	Every 6 months	UNRA	0
	5	Odor	2024	6) Appropriate waste management and periodical monitoring is recommended by local government.	Implemented or Not	N/A	Project site (bridge and approach road) and surrounding area	Every 6 months	UNRA	0
Natural Environment	6	Protected area and ecosystem	2024	7) Monitoring of movement of wild animals and management of individuals which intrude to the residential area	Implemented or Not	N/A	Project site (bridge and approach road) and surrounding area	Every 6 months	UNRA/UWA	0
				8) Installation of anti-poaching signs and reinforcement of anti-poaching patrols	Implemented or Not	N/A	Project site (bridge and approach road) and surrounding area	Every 6 months	UNRA	0
				9) Installation of speed limit board and humps for prevention of roadkill and mitigate noise impacts to the wild animals.	Implemented or Not Number of roadkill	N/A	Project site (bridge and approach road) and surrounding area	Every 6 months	UNRA	0
				10) Installation of animal corridor under embankment of the approach road for crossing small mammal, reptile, amphibian species.	Installed or Not Confirmation of passing animals	N/A	Animal corridor under embankment	Every 6 months	UNRA	0

Area	No.	Item	ESIA version	Draft Mitigation Measures After Construction	Monitoring Item	Standard Value in Ugandan or International	Monitoring Point / Area	Frequency	Implementation Agency	Monitoring Cost (USD)
				11) Setting up of LED light in the bridge section so as not to attract insects.	Installed or Not	N/A	Project site (bridge and approach road)	Every 6 months	UNRA	0
				12) Setting up of light with cover so as not to irradiate the river surface and outside of the road in keeping with sound lifecycle of fishes.	Installed or Not	N/A	Project site (bridge and approach road)	Every 6 months	UNRA	0
				13) Setting up sign board of speed limit 40km/h and no-horn at the crossing points of wild animals such as monkeys and African Elephant	Installed or Not	N/A	Project site (bridge and approach road)	Once a year	UNRA	0
	7	Hydrology	2024	14) Implementation of drainage along the approach road.	Implemented or Not	N/A	Project site (bridge and approach road) and surrounding area	Every 6 months	UNRA	0
	8	Topography and geology	2024	15) Implementation of appropriate maintenance of slope protection.	Implemented or Not	N/A	Embankment and slope in the project area	Every 6 months	UNRA	0
			2018	16) Protect road embankments and slopes with stone walls, Gabions, erosion control mats.	Implemented or Not	N/A	Embankment and slope in the project area	Every 6 months	UNRA	0
	9	Infectious diseases	2024	17) Provide adequate drainage facilities to avoid mosquito habitat.	Implemented or Not	N/A	Project site (bridge and approach road)	Every 6 months	UNRA	0
				18) Implement periodical maintenance on drainage.	Implemented or Not	N/A	Project site (bridge and approach road)	Every 6 months	UNRA	0
Social Environment	10	Accident	2024	19) Install 40km/h speed limit signs and humps.	Installed or Not	N/A	Project site (bridge and approach road)	Once a year	UNRA	0
				20) Install LED lights along approach road and bridge.	Installed or Not	N/A	Project site (bridge and approach road)	Once a year	UNRA	0
			2016	21) Install signs and signals at appropriate distances and locations, if necessary.	Installed or Not	N/A	Project site (bridge and approach road)	Once a year	UNRA	0
				22) Use properly installed guardrails.	Installed or Not	N/A	Project site (bridge and approach road)	Once a year	UNRA	0
			2018	23) Install road signs and speed limit signs.	Installed or Not	N/A	Project site (bridge and approach road)	Once a year	UNRA	0
	11	Accident	2024	24) Strengthening of speed control by the police department	Implemented or Not	N/A	Project site (bridge and approach road) and surrounding area	Once a year	UNRA	0
Others		Cross Boundary Impacts and Climate Change		25) Strengthening of car inspection mechanisms to restrict vehicles from discharging high emissions	Implemented or Not	N/A	Project site (bridge and approach road) and surrounding area	Once a year	UNRA	0

Source: JICA Survey Team

Annex-9 Environmental Management Plan/ Environmental Monitoring Plan (**42** / **48**)

Table-9 Environmental Monitoring Plan After Construction Phase (3 Years)

Area	No.	Item	Parameter	Method	a) Number of Location / Survey Area	b) Frequency per Year	c) Monitoring Duration after Construction (year)	d) Total Number (a) x b) x c))	e) Unit Cost (USD)	Direct Cost (USD) (d) x e))	Conservation Target*3
Natural Environment	1	Air pollution	1) TSP, 2) PM10, 3) PM2.5, 4) Carbon dioxide (CO_2), 5) Carbon monoxide (CO), 6) Hydrocarbons, 7) Nitrogen oxides (NOx), 8) Nitrogen dioxide (NO_2), 9) Sulphur dioxide (SO_2), 10) Sulphur trioxide (SO_3), 11) Smoke, 12) Soot	Based on the National Environment (Air Quality Standards) Regulations, 2024 and / or the same methodology of baseline surveys	**4 Locations** Where baseline monitoring was carried out (Air-02, 03, 04, Noise-07) (Note1) *Coordinate Air-2 : 36N 414980.01 m E、 247690.21 m N Air-3 : 36N 413217.40 m E、 246128.63 m N Air-4 : 36N 417499.59 m E、 247407.36 m N Noise-07 : 36N 417469.93 m E、 247383.99 m N Note1: For the monitoring of baseline survey location Air-01, it will be conducted at the same location as the baseline survey location for Noise-7	1) Once / year (dry season)	**3.0**	**12** (4 points x 3 times)	**1,000** (all parameter)	**12,000**	***1: The National Environment (Air Quality Standards) Regulations, 2024** ***2: Environmental, Health, and Safety General Guidelines (IFC, April 30th, 2007)** ***3: Environmental Quality Standards in Japan - Air Quality 1973** **[Air Emissions]** **Maximum limit values of ambient air quality parameters** 1. PM_{10} (Ø< 10μm) · 24hrs : 60 $\mu g/m^3$*1 2. $PM_{2.5}$ (Ø< 2.5μm) · 24hrs : 35 $\mu g/m^3$*1 3. CO · 24hrs : 7mg /m^3(6ppm)*1 4. NO_2 · 24hrs : 50μg /m^3(0.026ppm)*1 5. SO_2 24hrs : 20$\mu g/m^3$(0.0008ppm) *1
	2	Noise	Traffic noise ($dB(A)L_{Aeq}$)	Noise: 24hrs of continuous measurement (at least 10min in an hour x 24hours)	**4 Locations** Noise-02, 04, 07 and KWR office	Once / year (dry season)	**3.0**	**12** (4 points x 3 times	**500**	**6,000**	**Uganda: The National Environment (Noise and Vibrations Standards and Control) Regulations (2003)** Any building used as hospital, convalescence home, home for the aged, sanitorium and institutions of higher learning, conference rooms, public library, environmental or recreational sites. -Daytime 6:00-22:00: 45 dB(A) -Nighttime 22:00-6:00: 35 dB(A) Residential buildings -Daytime 6:00-22:00: 50 dB(A) -Nighttime 22:00-6:00: 35 dB(A)

Annex-9 Environmental Management Plan/ Environmental Monitoring Plan (**44** / **48**)

Area	No.	Item	Parameter	Method	a) Number of Location / Survey Area	b) Frequency per Year	c) Monitoring Duration after Construction (year)	d) Total Number (a) x b) x c))	e) Unit Cost (USD)	Direct Cost (USD) (d) x e))	Conservation Target*1
											Mixed residential (with some commercial and entertainment) -Daytime 6:00-22:00: 55 dB(A) -Nightime 22:00-6:00: 45 dB(A) Residential + industry or small scale production+ Commercial) -Daytime 6:00-22:00: 60 dB(A) -Nightime 22:00-6:00: 50 dB(A) Industrial -Daytime 6:00-22:00: 70 dB(A) -Nightime 22:00-6:00: 60 dB(A) **IFC Standard: Environmental, Health, and Safety (EHS) Guidelines Noise Management (April 2007)** Residential Area -Daytime 7:00-22:00: 55 dB(A) -Nightime 22:00-7:00: 45 dB(A) Commercial Area -Daytime 7:00-22:00: 70 dB(A) -Nightime 22:00-7:00: 70 dB(A) *Noise impacts should not exceed the levels presented above, or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site **Japan: Ministry of Environment (1998) Environmental Standards for Noise** Along the trunk road -Daytime 6:00-22:00: 70 dB(A) -Nightime 22:00-6:00: 65 dB(A) *Conservation target for Noise-07 shall refer to the adopted standard in the impact forecast.

Area	No.	Item	Parameter	Method	a) Number of Location / Survey Area	b) Frequency per Year	c) Monitoring Duration after Construction (year)	d) Total Number (a) x b) x c))	e) Unit Cost (USD)	Direct Cost (USD) (d) x e))	Conservation Target*1
Natural Environment	3	Protected area and ecosystem	a) Fauna Survey: mammals, birds, reptiles, amphibians, fish, insects b) Flora Survey : Land plants and aquatic plants c) Valuable species listed up from IUCN Red list shall be surveyed on their habitats such as feeding area, roosting area, breeding area and migration routes for 1)African Savanna Elephant, 2)Hippopotamus, 3)African Buffalo, 4)Patas monkey、5) Crowned Eagle, 6)Bateleur, 7) Martial Eagle 8) Central Africa Rock Python d) Valuable species listed up from IUCN shall be surveyed on their identified location and growth status as well as the replanting status as necessary 1) Iroko (Milicia excelsa), 2)African Mahogany (Khaya senegalensis)	Fauna: Transect Survey, Point Census, interview Flora: Transect Survey	Transect Survey Area: 500m each alongside of the bridge and approach road Point Census for Birds: 1-2 km by binoculars	2 times / year (dry and rainy season)	3.0	6	2,000	12,000	There are no law-based criteria nor international guidelines to be followed, thus the following is established as conservation target Observed species do not change after construction

Area	No.	Item	Parameter	Method	a) Number of Location / Survey Area	b) Frequency per Year	c) Monitoring Duration after Construction (year)	d) Total Number (a) x b) x c))	e) Unit Cost (USD)	Direct Cost (USD) (d) x e))	Conservation Target*3
Social Environment	4	Infectious diseases	Number of cases of infectious diseases (HIV/AIDS, etc.)	Interviews with local government	In the vicinity of the Project site	**Twice / year**	**3.0**	**6**	**2,000**	**12,000**	The laws and guidelines below to be followed. The Occupational Safety and Health Act No.9 2006 2. Employment Act, Cap 219 3. IFC's Performance Standard 2 Labor and Working Conditions 4.FIDIC 2010
Other	4	Accident	Number of accidents	Confirmation of accidents list from local government/ police department	Project area	**Once / year**	**3.0**	**3**	**1,000**	**3,000**	There are not law-based criteria nor international guidelines to be followed, thus following is established as conservation target There is no significant occurrence of traffic accidents.
										Total Cost After Construction : *45,000 (USD)* for 3 years (After Construction)	

Remarks
*1: The cost indicates direct cost, not including consultant fee, overhead and personal expense
*2: Conservation Target: If quantitative values exist such values prioritized as target based on Ugandan Laws/regulations, International Guidelines and other references. If quantitative values do not exist, qualitative target is established as project base.

Source: JICA Survey Team

Table 10 Cost of EMP and EMOP

EMP/EMOP Cost	Category	Total Cost (USD)	Securing Budget (USD)		Remarks
			UNRA side	JICA side	
EMP	Major cost of migration measures	510,200	**319,200**	**191,000**	See Table 11
EMOP	1. Monitoring Cost during Construction (3 years) including monitoring at the end of construction period	80,500		80,500	See Table 6, Table 7
	2. Monitoring Cost after Construction (3 years)	45,000	45,000		See Table 9
	Total	635,700	364,200	271,500	

Source: JICA Survey Team

Table 11 Major Costs of Mitigation Measures (Except General Mitigation Measures) and Cost Demarcation

Area	Phase	Mitigation Measures *Note1	Product/ Methodology	Unit	Unit Cost (USD)	Quantity	Cost (USD)	
							Secured by UNRA	Secured by donor
9,10. Protected area and ecosystem	Detailed Design and Construction	59) Tree replantation shall be carried out.	1) Herb /Shrub planting cost in ROW during const. a. Planting herb/shrub on the embankment/slope b. Planting trees in the buffer zone edge of embankment/slope (flat area with app. 5m)	Set	190,000	1		190,000
			2)Planting trees out of ROW but in the other protected area (cutting are in the ROW (2.9ha) x 3 times: 8.7 ha) (*Note2)	Set	40,000	1	40,000	
	Construction	68) UWA rangers shall be deployed near the project site for emergency case such as encountering with wild animals.	Allowance (*Note3) (4persons/day x 36 months)	Person*Year	5,000	12	60,000	
23. Cultural Heritage	Construction	137) Conduct continuous monitoring by Contractor during earthworks.	Allowance (2persons/day x 8 days/month x 24 months (earthwork period))	Person*day	50	384	19,200	
	Construction	139) Install signage to the signboard of the Sir Samuel and Lady Florence historical trail.	2 Signboards	Set	500	2		1,000
25. Gender	Construction	146) Provide the educational training on gender issues to the construction workers 147) Sensitize the local people about gender issues.	Training by service provider	Lump-sum	200,000	1	200,000	
26. Rights of children	Construction	160) Provide educational training to construction workers not to buy goods from children, not to have inappropriate relationship with boys and girls, not to use school facilities such as toilets and water systems, and encourage children to go to school when children are gathered at the construction site to see the work, etc. 161) Sensitize the local people and schools.	Training by service provider (See, No. 25)	(Included in No.25.)			-	
27. Infectious diseases	Construction	171) Take appropriate precautionary measures such as providing mosquito nets and purified water to construction workers.	Training by service provider (See, No. 25)	(Included in No.25.)			-	

		172) Provide adequate sanitation facilities, as well as trash boxes. 173) Enforce medical screening and periodical medical check for workers. 175) Provide educational training on prevention of infectious diseases to construction workers. 176) Sensitize the local people about infectious diseases. 177) Provide condoms in sanitary facilities in the construction area and related facilities (including basecamps).				
				Sub Total (USD)	**319,200**	**191,000**
				Total (USD)		**510,200**

Note 1: other general mitigation costs are including a part of construction costs

Note 2: Planting trees cost in other protected area: Planting trees out of ROW but in the other protected area: Based on the meeting between UNRA and UWA, planting cost including maintenance cost 5 years is app. 4,600 USD/ha. Planting area 8.7 ha (affected cutting area in the project area 2.9 ha x 3 = 8.7ha) x 4,600 USD = app. 40,000 USD/5 years

Note 3: UWA staffing: based on UNRA-UWA meetings, taking into account various costs (1)Salary, 2)Medical, 3)Uniform, 4)Insurance, 5)Gratuity, 6)Workman's compensation, 7)Group life insurance) (1) Salary, (2) Medical, (3) Uniform, (4) Insurance, (5) Gratuity, (6) Workman's compensation, (7) Group life insurance) is app. 5,000 USD/ranger/year.

Note 4: In Uganda, measures to mitigate the potential impacts of issues such as gender, children's rights and infectious diseases are usually implemented by hiring registered NGOs, etc., as "service providers." In the Project, too, in order to ensure that all the workers involved in the construction (including supervisors and managers) do not cause issues related to gender, children's rights, infectious diseases, etc., the service provider will implement mitigation measures such as training for construction workers and local communities, and the Environmental and Social Consultant (ESC) will monitor with UNRA to ensure that this is being done.

Annex 10

ENVIRONMENTAL MONITORING FORM

Environmental Monitoring Form during construction
for the Project for Construction of the New Karuma Bridge
(JICA Guidelines for Environmental and Social Considerations 2010)

I. Communication with local government and inhabitants

Item	Contents to be monitored
Meeting with local stakeholders	Date, time, agenda, minutes of meeting(s) with attendance list and photo, Number of female and male

II. Natural Environment

1. Pollution Item (Air Quality, Water Quality, Soil Quality and Noise)

Item	Parameter	Data							Ugandan Standard		Reference Standard			Monitoring Frequency and timing in the Environmental Monitoring Plan		
		Measured Date		Location				Unit	Value	Unit	Ref.	Value	Unit	Baseline Survey before Construction	Times/Year	Period (Years)
Air Quality				Air-01	Air-02	Air-03	Air-04									
	PM10	2024 Feb		26	23	25	25	μm/m3	60	μm/m3(24hrs)	IFC	150	μm/m3(24hrs)	1	1	3
	PM2.5	2024 Feb		21	19	20	22	μm/m3	35	μm/m3(24hrs)	IFC	75	μm/m3(24hrs)	1	1	3
	CO	2024 Feb		1.1	1.08	1.04	1.06	ppm	6	ppm(24hrs)	IFC	None	-	1	1	3
	NO2	2024 Feb		0.0025	<0.01	<0.01	<0.01	ppm	0.026	ppm(24hrs)	IFC	200	μm/m3(1hr)	1	1	3
	SO2	2024 Feb		<0.001	<0.001	<0.001	<0.001	ppm	0.008	ppm(24hrs)	IFC	125	μm/m3(24hrs)	1	1	3
Water Quality				WQ-01	WQ-02	WQ-03										
	pH	2023 Nov	rainy	6.5	6.9	6.7		-	5.5-9.5	-	JPN	6.5-8.5	-	1	1	3
		2024 Feb	dry	7.4	7.5	7		-	5.5-9.5	-	JPN	6.5-8.5	-	1	1	3
	Turbidity (NTU)	2023 Nov	rainy	4.2	5.1	4.8		NTU	25	NTU	JPN	NA	-	1	1	3
		2024 Feb	dry	3.1	4.3	4.7		NTU	25	NTU	JPN	NA	-	1	1	3
	TDS	2023 Nov	rainy	75	72	73		mg/l	1,500	mg/l	JPN	NA	-	1	1	3
		2024 Feb	dry	86	85	86		mg/l	1,500	mg/l	JPN	NA	-	1	1	3
	SS	2023 Nov	rainy	13	9	12		mg/l	NA	mg/l	JPN	100	mg/l	1	1	3
		2024 Feb	dry	17	10	15		mg/l	NA	mg/l	JPN	100	mg/l	1	1	3
	BOD	2023 Nov	rainy	3	3.8	5		mg/l	NA	mg/l	JPN	8	mg/l	1	1	3
		2024 Feb	dry	2	3	3		mg/l	NA	mg/l	JPN	8	mg/l	1	1	3
	Conductivity	2023 Nov	rainy	107	103	104		μS/cm	2,500	μS/cm	JPN	NA	-	1	1	3
		2024 Feb	dry	123	122	123		μS/cm	2,500	μS/cm	JPN	NA	-	1	1	3
	DO	2023 Nov	rainy	5.5	1.8	2.8		mg/l	NA	mg/l	JPN	>=2	mg/l	1	1	3
		2024 Feb	dry	7	4.8	4		mg/l	NA	mg/l	JPN	>=2	mg/l	1	1	3
	E-Coliform	2023 Nov	rainy	210	340	45		CFU/100ml	NA	CFU/100ml	JPN	NA	-	1	1	3
		2024 Feb	dry	310	133	21		CFU/100ml	NA	CFU/100ml	JPN	NA	-	1	1	3
Soil Quality				SQ-01	SQ-02											
	Arsenic	2023 Nov		<0.001	<0.001			mg/kg	NA	-	JPN	150	mg/kg	1	-	-
	Selenium	2023 Nov		<0.001	<0.001			mg/kg	NA	-	JPN	150	mg/kg	1	-	-
	Cyanide	2023 Nov		0	0			mg/kg	NA	-	JPN	50	mg/kg	1	-	-
	Hexavalent chromium	2023 Nov		3.66	5.12			mg/kg	NA	-	JPN	250	mg/kg	1	-	-
	Mercury	2023 Nov		<0.001	<0.001			mg/kg	NA	-	JPN	15	mg/kg	1	-	-
	Fluorine	2023 Nov		1.2	2.2			mg/kg	NA	-	JPN	4000	mg/kg	1	-	-
	Boron	2023 Nov		0.23	1.66			mg/kg	NA	-	JPN	4000	mg/kg	1	-	-
	Lead	2023 Nov		0	0			mg/kg	NA	-	JPN	150	mg/kg	1	-	-
	Cadmium	2023 Nov		0	0			mg/kg	NA	-	JPN	150	mg/kg	1	-	-
Noise				N-02	N-04	N-06	N-07									
		2024 Feb	Day	33	56	56	76	dB(A)6-22hr	60	dB(A)6-22hr	IFC	70	dB(A)7-22hr	1	2	3
			Night	not measusred	47	42	69	dB(A)22-6hr	50	dB(A)22-6hr	IFC	70	dB(A)22-7hr	1	2	3

2. Waste

Item	Area	Volume/month
Waste Soil	Project site	
Cutting Tree	Project site	
Domestic Waste	Project site and other facilities	
Night Soil	Project site and other facilities	
Waste Oil	Project site and other facilities	
Other Construction Waste	Project site and other facilities	

Other facilities: Base-camp, offices, borrow pit quarry, batching plant, accommodation (including sub-contractor's facilities)

3. Odor

Item	Area	Result of Monitoring
Bad odor	Project site and other facilities	

Other facilities: Base-camp, offices, borrow pit quarry, batching plant, accommodation (including sub-contractor's facilities)

4. Ecosystem

Item	Area	Results of Monitoring
Valuable Species and habitat	Project site and surrounding area	
Number of Road-kill	Surrounding roads used for construction	
Number of conflicts with wild animals	Project site and other facilities	

5. Hydrology, Topography and geology

Item	Area	Results of Monitoring
Condition of embankment and soil erosion from the project area	Project site and surrounding area (Approach road, embankment and streams between the project area and Nile River)	

II. Social Environment

6. Poverty Group

Item	Results of Monitoring
Number of places posting the announcement of the information about employment	
Number of hired local people	

7. Ethnic groups

Item	Results of Monitoring
Contract content of the contractor	
Number of hired local people	
Number of places posting the announcement of the information about the employment	

8. Local economy

Item	Results of Monitoring
Number of meetings organized, and participants per meeting	
Maintenance status of the existing Karuma Bridge	
Access status to the entrance of shops, restaurants, etc. in the traffic-controlled area	
Number of hired local people	
Number of grievances on the access to the entrance of shops, restaurants, etc.	

9. Land use and utilization of local resources

Item	Results of Monitoring
Number of meetings organized, and participants per meeting	
Maintenance status of the existing Karuma Bridge	
Number of grievances on the status of detour and access road, and status of grievance	
Number of hired workers who received the training (instruction)	

10. Water usage

Item	Results of Monitoring
Number of hired local people	
Content of water supply plan of contractor	
Number of grievances on the water use, and status of grievance	

11. Existing social infrastructures and services

Item	Results of Monitoring
Number of meetings organized, and participants per meeting	
Maintenance status of the existing Karuma Bridge	
Number of assigned traffic guides at construction site and traffic-controlled area	
Number of grievances on the status of detour and access road, and status of grievance	

12. Unequal distribution of positive and negative impact/Local Conflicts of Interests

Item	Results of Monitoring
Function status of GRM	
Number of hired local people	
Number of hired workers who received the training (instruction)	

13. Cultural heritage

Item	Results of Monitoring
Number and content of meetings organized, and participants per meeting	
Number and termination period of hired archaeological experts	
Number of hired workers who received the training	
Number of found historical/ archaeological resources	
Improvement status of historical signboard	

Annex-10 Environmental Monitoring Form (**3** / **5**)

14. Gender

Item	Results of Monitoring
Number of hired local people	
Number of installed sanitary facilities	
Number of trained construction workers	
Number of sensitized local people	

15. Rights of children

Item	Results of Monitoring
Contract content of the contractor	
Age of Construction workers	
Number of trained construction workers	
Number of sensitized local people	

16. Infectious diseases

Item	Results of Monitoring
Number of infected patients among construction workers	

17. Labor Environment

Item	Results of Monitoring
Health condition of construction workers	

18. Accident

Item	Results of Monitoring
Number of accidents and reason	

19. Others (unforeseen impacts)

Item	Results of Monitoring	Additional Mitigation Measure (if any)
(Added if unforeseen adverse impacts is observed)		

Environmental Monitoring Form after Construction

for the Project for Construction of the New Karuma Bridge

(JICA Guidelines for Environmental and Social Considerations)

I. Natural Environment

1. Pollution Item (Air Quality and Noise)

Item	Parameter	Data							Ugandan Standard		Reference Standard			Monitoring Frequency and timing	
		Measured Date		Location				Unit	Value	Unit	Ref.	Value	Unit	Times/Year	Period (Years)
				Air-01	Air-02	Air-03	Air-04								
Air Quality	PM10	2024 Feb		28	23	25	25	μm/m3	NA	-	IFC	150	μm/m3(24hrs)	1	2
	PM2.5	2024 Feb		21	19	20	22	μm/m3	NA	-	IFC	75	μm/m3(24hrs)	1	2
	CO	2024 Feb		1.1	1.08	1.04	1.06	ppm	9	ppm(8hrs)	IFC	None	-	1	2
	CO2	2024 Feb		4.18	4.21	4.21	4.2	ppm	9	ppm(8hrs)	IFC	None	-	1	2
	NO2	2024 Feb		0.0025	<0.01	<0.01	<0.01	ppm	0.1	ppm(24hrs)	IFC	200	μm/m3(1hr)	1	2
	SO2	2024 Feb		<0.01	<0.01	<0.01	<0.01	ppm	0.15	ppm(24hrs)	IFC	125	μm/m3(24hrs)	1	2
Noise				N-02	N-04	N-06	N-07								2
		2024 Feb	Day	33	56	56	76	dB(A)6-22hr	60	dB(A)6-22hr	IFC	70	dB(A)7-22hr	1	2
			Night	not measusred	47	42	69	dB(A)22-6hr	50	dB(A)22-6hr	IFC	70	dB(A)22-7hr	1	2

2. Ecosystem

Item	Area	Results of Monitoring
Valuable Species and habitat	Project site and surrounding area	
Number of Road-kill	Surrounding roads used for construction	
Number of conflicts with wild animals	Project site and other facilities	

3. Accident

Item	Results of Monitoring	
Number of accidents and reason		

4. Others (unforeseen impacts)

Item	Results of Monitoring	Additional Mitigation Measure (if any)
(Added if unforeseen adverse impacts is observed)		

Annex-10 Environmental Monitoring Form (**5** / **5**)

別添資料5. ソフトコンポーネント計画書

ウガンダ共和国

カルマ橋架け替え計画

ソフトコンポーネント計画書

2024 年 10 月

株式会社オリエンタルコンサルタンツグローバル

（ソフトコンポーネント基礎情報）

案件名	ウガンダ共和国カルマ橋架け替え計画 The Project for Reconstruction of Karuma Bridge
E/N 期間	
限度額	
所要経費	¥ 33,985,000
実施形態	マネージメント支援／エンジニアリング支援／相手国負担事業促進
現地要員	有／無
実施期間	2026 年 9 月～2029 年 8 月（施工監理期間）
業務完了時期	2029 年 8 月
支払	前払い　有／無

ウガンダ共和国
カルマ橋架け替え計画
ソフトコンポーネント計画書

目次

1. ソフトコンポーネントを計画する背景

1.1 本体事業の概要

カルマ橋は、ウガンダ共和国（以下、「ウガンダ」という。）の首都カンパラから北部の中核都市であるグルに向かう途中でナイル川を渡河する橋梁であり、ケニアのモンバサ港から始まり、南スーダン共和国を繋ぐ、国際幹線網である東アフリカ北部回廊上の物流・交通の要となっている。また、現在北部地域（アチョリ地域、西ナイル地域）には南スーダンやコンゴ民等から 80 万人以上の難民が流入しており（UNHCR, 2020 年 12 月）、カンパラ等から多くの支援物資がカルマ橋を通り、難民居住地域に運搬されており、カルマ橋は政治・経済的な面での重要性に加え、難民支援の観点からも重要な役割を有している。

一方で、現行の橋は 1964 年に建設されており、コンクリート部材の亀裂や鉄筋露出などの損傷や漏水による腐食等の老朽化がみられる。また車道幅が 7.3m と狭いため大型トラック同士のすれ違いが容易ではなく、両岸道路は勾配と曲線が急なため、交通容量が制限されるとともに、車両が川に転落することによる死亡事故や交通が遮断されるような橋梁上の事故が発生している。2024 年 9 月末から老朽化に伴う改修が行われており、ウガンダ国北部に向かう交通は200km以上迂回を行っている状況であり、橋梁整備の緊急性が高い。

かかる状況のもと、カルマ橋建設計画（以下「本事業」という。）は、老朽化した橋梁を架け替え、両岸アプローチ道路の線形を改良することにより、対象区間の交通円滑化と安全の確保を図り、もって北部回廊の物流・交通の円滑化に寄与するものである。

1.2 ソフトコンポーネント導入の必要性と効果

本準備調査において、ウガンダ国の法令及び JICA 環境社会配慮ガイドライン(2010 年)に基づき環境アセスメント報告書(以降「ESIA」という)が作成され、ウガンダ国では 2024 年 10 月に承認(endorsement)が行われた。JICA 側では 2024 年 9 月に環境社会配慮助言委員会ワーキンググループが開催され 10 月の全体会合で助言が確定している状況である。

承認された ESIA の内容は、主に①現地調査に基づく現状分析、②住民会議の結果等、③将来影響の予測・評価、④環境緩和策の策定、⑤環境モニタリングの立案等となっており、計画された④の緩和策の実施状況のモニタリング、⑤環境モニタリングの確実な実施は ESIA の成果として必要不可欠である。さらに本事業は、ウガンダ国のマーチソン・フォールズ国立公園(以降「MFNP」という)及びカルマ野生生物保護区(以降「KWR」という)という法令で定められた保護区内に立地しており、これらの環境モニタリングを継続し、その結果の蓄積・分析を行う事は、今後のウガンダ国のインフラ整備と野生生物保全の両立の観点から重要な活動となる。

環境緩和策の確認を含む「環境モニタリング」は、工事期間約 3 年間は施工請負業者が実施し、施工監理コンサルタントにより検査・分析され、その結果は UNRA 及び JICA 側に報告される事となっている。また工事終了後 3 年間は、UNRA がウガンダ国内の環境コンサルタントに委託を行い計画された環境モニタリングを実施する事となっている。しかしながら、供用後 3 年のみならず、その後も環境モニタリングを継続し、先に示したようにデータ蓄積・分析を行い、関係者の意識啓発を行った上でウガンダ国内のその他事業に活かしていく事が必要である。このため、本事業では、供用後以降の環境モ

ニタリングの実施において、UNRA のみならず、保護区の管理者である UWA(ウガンダ野生生物庁)や保護区の自然の恩恵を受けている漁民等を含めた実施体制を検討する。

本ソフコン計画では、UNRA（主に地方事務所職員）、UWA（MFNP 及び KWR 職員）周辺住民の代表者（カルマ町、カムディニ町）、保護区内を利用している漁民を対象に ESIA 全体の説明を通じて意識啓発を行った上で協力体制を得るとともに、供用時以降、特に 4 年目以降のサステイナブルな環境モニタリングの実施者・情報提供者として直接的に関わる「環境モニタリング・メンバー」として UNRA（主に地方事務所職員）、UWA（MFNP 及び KWR 職員）及び保護区内を利用している漁民を対象に具体的な簡易機材を用いた測定方法、データの記録・収集方法や報告書作成等について技術移転を行う。

また、工事終了時には UNRA と UWA（漁民含む）が実施する環境モニタリング計画内容を確認するとともに、供用時の環境モニタリング(3 年間)が終了した後の UNRA と UWA(漁民含む)の協業により行うべき環境管理プログラムについてコンサルタント側より策定・提言を行い、UNRA-UWA 間で合意され、承認 ESIA に基づいた適切かつ継続的な環境社会面に配慮した道路管理が可能になるものである。

なお、本 ESIA 内の環境モニタリングは、大きく分けると①「環境緩和策」（自然、生活環境項目、社会環境項目を対象に工事中 215 項目、供用時 25 項目）の実施状況のモニタリングと②大気、水質、騒音、土壌汚染等の生活環境項目、動植物・生態系の自然環境項目、地域経済、ジェンダー等の社会環境項目を対象とした「定期的な測定・調査」の 2 つに分けられる。これらの緩和策や測定項目全体について環境モニタリング・メンバーに説明を行うとともに、この中の項目で保護区の継続的な保全を考慮し、特に留意すべき項目（例：動植物、大気、騒音、水質、地域経済（漁民への影響がないことの確認））を抽出し、工事中や供用時以降の UNRA-UWA(漁民含む)の協働による環境モニタリングの対象項目として絞り込む事を想定している。

また、本事業は、自然・社会に影響を及ぼしやすい事業として分類されており、JICA 環境社会配慮ガイドライン 2010 年（JICA ガイドライン）に基づき環境カテゴリ A に分類されている。さらに対象の橋梁・道路はウガンダ国の法令に指定された保護区（カルマ野生生物保護区、マーチソン・フォールズ国立公園）内に位置しており、JICA ガイドラインの原則(法令で定められた保護区外で事業を行うという原則)に準じていないため、別途 5 つの例外規定条件を満足する事や外部専門家で構成された環境社会配慮助言委員会のコメントや助言を踏まえて条件付き（継続的かつ厳格な環境モニタリングの実施）の事業実施が認められている。

特に、JICA 環境社会配慮助言委員会の助言(第 1 回 WG／2023 年 10 月 27 日開催、助言確定 12 月 8 日)において、UWA の環境保護・保全能力向上に関する取り組みの実施について提言を受けており、この提言を受け、環境アセスメントに関する能力向上にも資する活動である。

助言(2023 年 12 月 8 日) 環境配慮 6. 実施機関（UNRA）を通じて、UWA（Uganda Wildlife Authority）の能力強化なども含めた、数年間にわたる当該自然保護区の保護管理能力の向上に向けたプログラムの策定を働きかけ、その結果を DFR に記載すること。

2. ソフトコンポーネントの目標

ソフトコンポーネントの目標を以下の通り設定する。

上位目標

カルマ橋建設を通して、首都カンパラと同国北部地域の安全で円滑な接続を維持し、ウガンダ国北部地域の経済成長に寄与する。

プロジェクト目標

カルマ橋の安全かつ安定的な交通が確保される。

ソフトコンポーネント目標

関連する現地ステークホルダー(UNRA、UWA、現地住民等)が本事業の環境社会配慮(環境アセスメント全体、環境緩和策、環境モニタリング)に関する理解を行う。また、UNRA 及び UWA 職員が特に保護区内の事業である事を踏まえた JICA 環境社会配慮ガイドラインの環境カテゴリ A で求められる定量的な数値の把握ができるレベルの環境モニタリングの一部を道路供用後も継続して自力で行う事が出来る。

3. ソフトコンポーネントの成果

前述した目標を達成するためには、以下の成果を達成する事が必要である。

① 環境アセスメントの概要を理解する(UNRA、UWA、住民代表、漁民等)
関係者全体対象：UNRA3 名(地方事務所職員)、UWA 職員 5 名(MFNP 職員・KWR 職員)、住民 10 人(カルマ町、カムディニ町)、漁民 10 名

② 環境緩和策と環境モニタリングの内容を理解する(UNRA、UWA、漁民)
環境モニタリング・メンバー対象：UNRA2 名(地方事務所職員)、UWA 職員 3 名(MFNP 職員・KWR 職員)、漁民 5 名

③ 供用後 4 年目以降の環境モニタリング（動植物調査、生活環境項目等）を自力で行う事が出来る
環境モニタリング・メンバー対象：UNRA2 名(地方事務所職員)、UWA 職員 3 名(MFNP 職員・KWR 職員)、漁民 5 名

④ 供用時モニタリング（3 年間）の後に、UNRA と UWA が共同で行うべき環境管理プログラムが策定され、ウガンダ側により継続してそのプログラムが実施されるような知識及び活動手順を習得する。
環境モニタリング・メンバー対象：UNRA2 名(地方事務所職員)、UWA 職員 3 名(MFNP 職員・KWR 職員)、漁民 5 名

4. 成果達成度の確認方法

3.で定めた成果が達成される度合を確認する方法を以下に設定する。

表-1 成果達成度の確認内容

成果	達成度確認方法
① 環境アセスメントの概要を理解する (UNRA、UWA、住民代表、漁民等)	一般的な環境アセスメントの目的、手法、内容について理解できるかについて口頭で確認を行う。
② 環境緩和策と環境モニタリングの内容を理解する (UNRA、UWA、漁民等)	本事業の環境緩和策について理解が出来るかについて簡易なテストを行い理解度の確認を行う
	本事業の環境モニタリング計画について理解が出来るかについて簡易なテストを行い理解度の確認を行う
③ 供用後 4 年目以降の環境モニタリング（動植物調査、生活環境項目等）を自力で行う事が出来る (UNRA、UWA、漁民等*注1)	環境モニタリングの実施方法について理解が出来るかについて簡易なテストを行い理解度の確認を行う
	動植物調査、簡易計測（粉じん、騒音、水質）について実測ができるか、個別に確認を行う
④ 供用時モニタリング（3 年間）の後に、UNRA と UWA が共同で行うべき環境管理プログラムが策定され、ウガンダ側により継続してそのプログラムが実施されるような知識及び活動手順を習得する。 (UNRA、UWA、漁民等)	JICA－UNRA 間で合意された供用時 3 年間の環境モニタリングの後に行うべき、環境管理プログラム（継続して行うモニタリング項目、内容、体制等）について策定し、UNRA-UWA 間において合意を行う。

注 1：登録漁民が国立公園内で報告する釣果を環境モニタリングのデータとして今後活用する計画がある。また、かつ漁民は国立公園内で漁業活動を行っているため主要な現地ステークホルダーとして認識されており、継続的な協働モニタリングのメンバーとして想定されるためソフコン対象者として取り込んでいる。

5. ソフトコンポーネントの活動（投入計画）

上記成果を達成するために必要な活動内容（投入計画）は以下の通りである。

(1) 1 回目：**環境アセスメント概要、緩和策、モニタリング全体の説明**

成果①　：環境アセスメントの概要を理解する

成果②　：環境緩和策と環境モニタリングの内容を理解する

成果③　：供用後 4 年目以降の環境モニタリング（動植物調査、生活環境項目等）を自力で行う事が出来る

活動内容：環境アセスメントの概要、緩和策・モニタリング内容、モニタリング実施方法について座学及びワークショップを実施する。環境モニタリングの一部（モバイル測定機材の使い方等）OJT も実施する。

実施時期：施工監理期間 2026 年 10 月（現地 0.5 ヶ月／専門家、国内 0.2 ヶ月／専門家）

対象者　：成果①：UNRA(5 名程度)、UWA(10 名程度)、住民代表 10 名程度、漁民等(10 名程度)

成果②③：UNRA(2 名程度)、UWA(3 名程度)、漁民等(5 名程度)

日本側　：生活環境担当 1 名、自然環境担当 1 名、社会環境担当 1 名、野生生物担当 1 名(合計 4 名：対応分野毎にプレゼンテーションと意見交換実施)

表-2 活動計画スケジュール案（1 回目）

日目	活動内容
国内 4 日間	承認 ESIA に基づく環境モニタリング計画、緩和策計画に関する説明・協議資料作成、プレゼンテーション資料作成
1.（土）	移動（日本－ウガンダ）
2.（日）	移動（日本－ウガンダ）
3.（月）	UNRA 本部、UWA 本部、JICA 事務所への本計画の説明・協議
4.（火）	移動（カンパラ－カルマ現地）
5.（水）	UNRA 地方事務所、UWA(KWR オフィス)及び施工請負業者への計画の事前説明及び協議
6.（木）	カルマ町、カムディニ町の代表者及び漁民等への事前計画説明・協議(必要に応じて女性グループ等へのフォーカスグループへの説明・協議も含む)
7.（金）	全体説明会：環境アセスメント、緩和策、モニタリング計画概要説明(成果①②対応) ※モバイル機材(粉じん、水質等)を使用した OJT も実施 工事中の施工請負業者が行う環境モニタリング測定結果と比較を行う事でモバイル機材の数値検証を行う。
8.（土）	現地確認(モニタリング地点)
9.（日）	資料整理
10.(月)	承認 ESIA に基づき施工請負業者により実施中の環境モニタリングの実施方法、実施場所等、機材使用方法に関する説明(成果③対応)
11.(火)	個別現地ステークホルダーからの情報収集・意見交換(UWA、漁民、カルマ町、カムディニ町、その他) ※必要に応じて説明会で理解不足の点を補う説明の実施
12.(水)	移動（カルマ－カンパラ）
13.(木)	UNRA 本部、UWA 本部、JICA 事務所への結果概要報告
14.(土)	移動（ウガンダ－日本）
15.(日)	移動（ウガンダ－日本）

(2) 2 回目：モニタリング OJT 実施

成果②　：環境緩和策と環境モニタリングの内容を理解する

成果③　：供用後 4 年目以降の環境モニタリング（動植物調査、生活環境項目等）を自力で行う事が出来る

活動内容：環境モニタリングが前年度2026年から実施され、1年間の環境モニタリングの結果蓄積・分析と円滑なモニタリング体制が構築されることを基に OJT を行う。

実施時期：施工監理期間 2027 年 9 月（現地 0.5 ヶ月／専門家、国内 0.2 ヶ月／専門家）

対象者　：UNRA(2 名程度)、UWA(3 名程度)、漁民(5 名程度)等

日本側　：生活環境担当 1 名、自然環境担当 1 名、社会環境担当 1 名

（合計 3 名：対応分野毎にプレゼンテーションと意見交換実施）

表-3 活動計画スケジュール案（2 回目）

日目	活動内容
国内 4 日間	承認 ESIA に基づき施工請負業者により実施中の環境モニタリングの最新の結果の確認及び課題の抽出・整理及び説明・協議資料作成、プレゼンテーション資料作成
1. （土）	移動（日本－ウガンダ）
2. （日）	移動（日本－ウガンダ）
3. （月）	UNRA 本部、UWA 本部、JICA 事務所への今回のスケジュールや実施内容の説明・協議
4. （火）	移動（カンパラ－カルマ現地）
5. （水）	UNRA 地方事務所、UWA(KWR オフィス)及び施工請負業者への今回のスケジュール説明、ヒアリングに基づく工事時の課題等の抽出
6. （木）	承認 ESIA に基づき施工請負業者により実施中の環境モニタリング結果の現地状況確認（生活環境データ、動植物データ、社会系データ）
7. （金）	カルマ町及びカムディニ町の代表者、漁民への今回スケジュールの説明とヒアリングに基づく工事中の課題等の抽出
8. （土）	現地確認(モニタリング地点)
9. （日）	プレゼン資料等の作成
10.（月）	環境モニタリング OJT 実施(UNRA、UWA、漁民(河川生物、水質))（成果②③対応） ※工事中の施工請負業者が行う環境モニタリング測定結果と比較を行う事でモバイル機材の数値検証を行う。
11.（火）	個別現地ステークホルダーからの情報収集・意見交換 （UWA、漁民、カルマ町、カムディニ町、その他）による課題や教訓の抽出 ※必要に応じて説明会で理解不足の点を補う説明の実施
12.（水）	移動（カルマーカンパラ）
13.（木）	UNRA 本部、UWA 本部、JICA 事務所への結果概要報告
14.（土）	移動（ウガンダー日本）
15.（日）	移動（ウガンダー日本）

(3) 3 回目：モニタリング評価及び教訓の共有

成果②　：環境緩和策と環境モニタリングの内容を理解する

成果③　：供用後 4 年日以降の環境モニタリング（動植物調査、生活環境項目等）を自力で行う事が出来る

成果④　：供用時モニタリング（3 年間）の後に、UNRA と UWA が共同で行うべき環境管理プログラムが策定され、ウガンダ側により継続してそのプログラムが実施されるような知識及び活動手順を習得する

活動内容：環境モニタリング結果の評価についてワークショップを行う

実施時期：施工監理期間 2029 年 7 月（現地 0.5 ヶ月／専門家、国内 0.2 ヶ月／専門家）

対象者　：UNRA(2 名程度)、UWA(3 名程度)、漁民等(5 名程度)

日本側　：生活環境担当 1 名、自然環境担当 1 名、社会環境担当 1 名

（合計 3 名：対応分野毎にモニリング結果のプレゼンテーションと意見交換実施）

表-4 活動計画スケジュール案（3 回目(最終)）

日目	活動内容
国内 4 日間	工事期間全体の環境モニタリング結果のまとめ、今後行うべき UNRA—UWA の環境協働管理プログラムの検討、プレゼンテーション資料作成
1. （土）	移動（日本ーウガンダ）
2. （日）	移動（日本ーウガンダ）
3. （月）	UNRA 本部、UWA 本部及び JICA 事務所協議への今回スケジュールや実施内容の説明・協議
4. （火）	移動（カンパラーカルマ現地）
5. （水）	UNRA 地方事務所、UWA(KWR オフィス)及び施工請負業者への今回スケジュールの説明や協議による工事中の課題や教訓の抽出
6. （木）	カルマ町及びカムディニ町の代表者、漁民への今回スケジュールの説明とヒアリングに基づく工事中の課題や教訓等の抽出
7. （金）	・全体説明会：モニタリング工事中の結果報告、理解度の確認(成果②③対応) ・供用時モニタリング（3 年間）の後に行われるべき UNRA-UWA 共同環境管理プログラムに関する説明・意見交換、合意形成
8. （土）	道路整備後の現地状況確認(供用状況の確認)
9. （日）	資料整理
10.（月）	今後の保護区の保全や UWA との協働に関する管理プログラム内容等に関する協議(UNRA 地方事務所及び UWA)
11.（火）	移動（カルマーカンパラ）
12.（水）	今後の URNA-UWA の共同環境管理プログラム実施に関する確認・合意形成(UNRA 及び UWA)
13.（木）	資料整理、JICA 事務所協議
14.（土）	移動（ウガンダ―日本）
15.（日）	移動（ウガンダー日本）

6. ソフトコンポーネントの実施リソースの調達方法

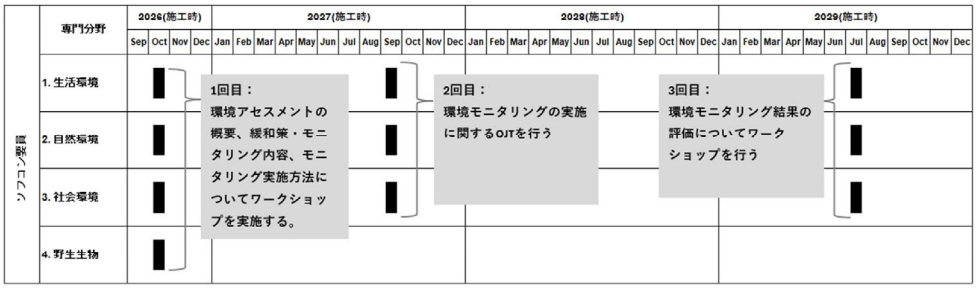
本ソフトコンポーネント業務は、無償資金協力によって実施されるカルマ橋の工事期間中に、コンサルタントから日本人専門家(①生活環境専門家、②自然環境専門家、③社会環境専門家、④野生生物専門家)を派遣する。

7. ソフトコンポーネントの実施工程

本ソフトコンポーネント業務の実施工程を表－5 に示す。

なお、本ソフトコンポーネントの各回の派遣で議論された内容について、別途、定期的に派遣される施工監理の日本人環境要員（自然環境専門家、社会環境専門家）やローカル環境要員により継続的にフォローアップがなされる予定である。

表－5　ソフトコンポーネント工程



注）野生生物担当：村田浩一氏(日大教授／ズーラシア園長)

8. ソフトコンポーネントの成果品

本ソフトコンポーネント業務の成果品は以下の通りとする。

- ワークショップ研修報告書
- OJT 報告書
- ソフトコンポーネント実施報告書

9. ソフトコンポーネントの概略事業費

本ソフトコンポーネント業務の概略事業費を表－6 に示す。

表－6　ソフトコンポーネント概略事業費

費目	規格／仕様	数量	単位	単価		金額		備考
				米ドル (USD)	日本円 (JPY)	米ドル (USD)	日本円 (JPY)	
1. 直接人件費(その他原価率、一般管理費含む)							***8,089,200***	
1)アセス全般・生活環境専門家	3号級	2.10	人月(MM)		1,140,000		2,394,000	現地1.5MM、国内0.6MM
2)自然環境専門家	3号級	2.10	人月(MM)		1,140,000		2,394,000	現地1.5MM、国内0.6MM
3)社会環境専門家	3号級	2.10	人月(MM)		1,140,000		2,394,000	現地1.5MM、国内0.6MM
4)野生生物専門家	2号級	0.70	人月(MM)		1,296,000		907,200	現地0.5MM、国内0.2MM
2. 間接経費							***16,825,536***	
1)諸経費(人件費の120%) (1)～4)の人件費合計x120%)							9,707,040	1、合計x120%
2) 一般管理費((人件費＋諸経費)x40%)							7,118,496	(1.合計+2.1)諸経費)x40%
3. 直接経費							***9,070,759***	
1) 航空運賃（生活、自然、社会専門家）	エコノミー	9.0	往復		445,001		4,005,009	
2)航空運賃（野生生物専門家）	ビジネス	1.0	往復		1,337,393		1,337,393	
3) 日当(アセス全般・生活環境専門家)	3号級	45.0	日		3,800		171,000	
4) 宿泊費(アセス全般・生活環境専門家)	3号級	36.0	泊		11,600		417,600	
5) 日当(自然環境専門家)	3号級	45.0	日		3,800		171,000	
6) 宿泊費(自然環境専門家)	3号級	36.0	泊		11,600		417,600	
7) 日当(社会環境専門家)	3号級	45.0	日		3,800		171,000	
8) 宿泊費(社会環境専門家)	3号級	36.0	泊		11,600		417,600	
9) 日当(野生生物専門家)	2号級	15.0	日		4,500		67,500	
10) 宿泊費(野生生物専門家)	2号級	12.0	泊		13,500		162,000	
11) 国内旅費(全体)		10.0	往復		5,468		54,680	
11) 車両費及び燃料費		1.0	式	9,335	1,378,377		1,378,377	
12) ワークショップ会議費（会場費用）		3	回		100,000		300,000	
合計							**33,985,495**	

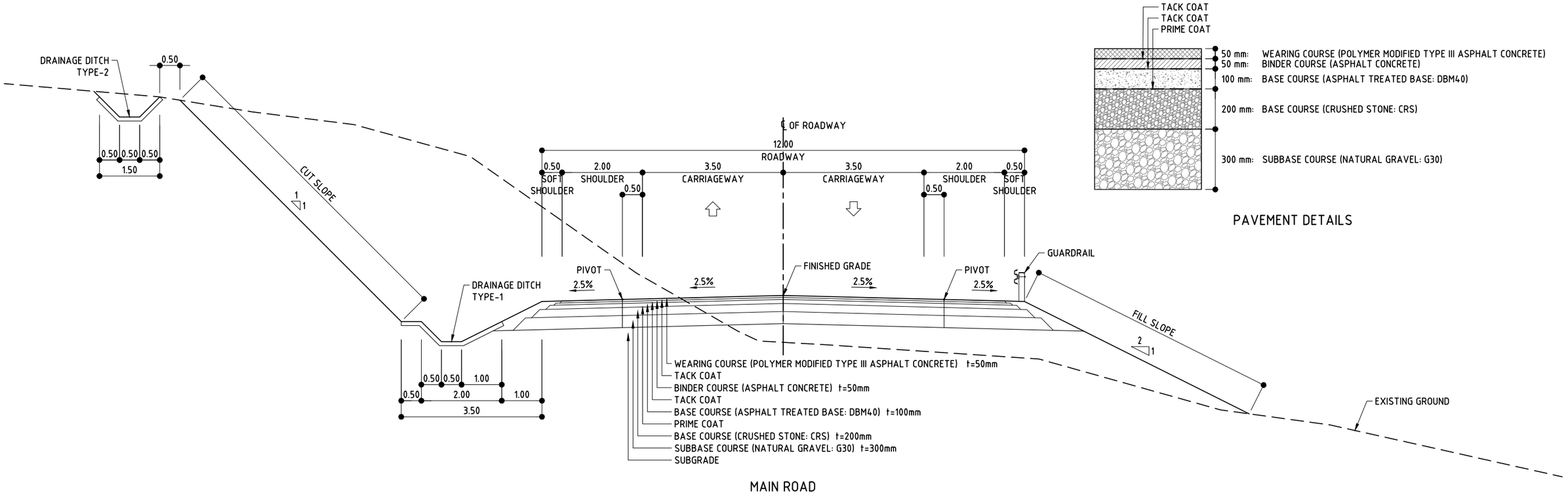
10. 相手国側の責務

本ソフトコンポーネント業務実施における、ウガンダ側による責務は、以下を予定する。

- 適切なカウンターパートの配置
- 本共同モニタリング参加者への参加要請(UNRA 地方事務所、UWA、住民代表、漁民等)

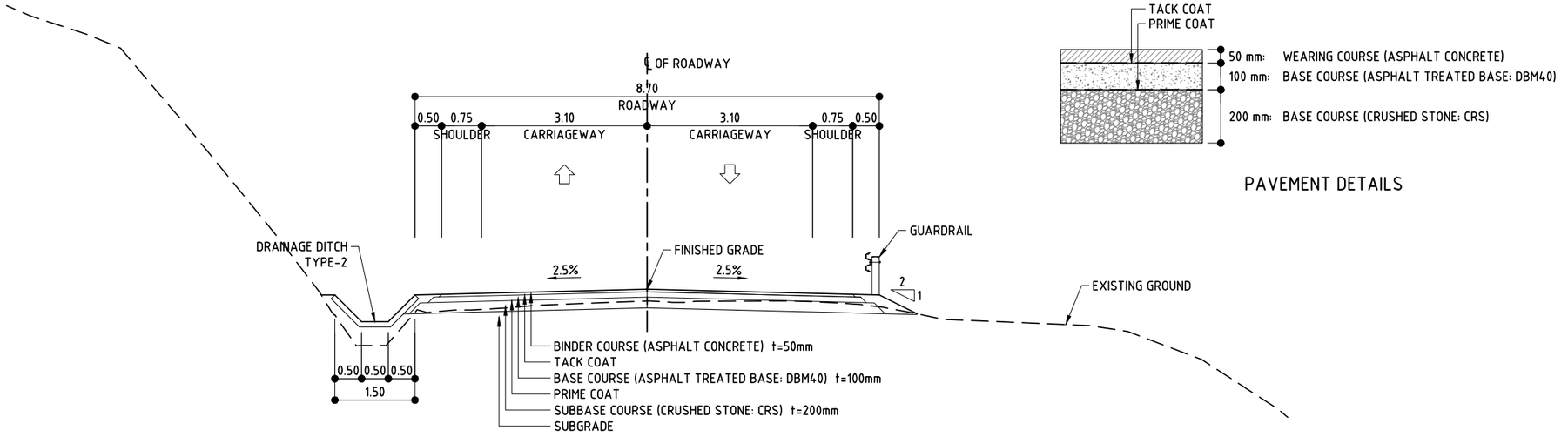
別添資料6. 概略設計図面

番号	図面タイトル
1	TYPICAL CROSS SECTIONS
2-4	PLAN
5-7	PROFILE
8-20	CROSS SECTIONS
21-27	MISCELLANEOUS
28-29	BRIDGE GENERAL VIEW
30	P1 PIER STRUCTURAL DRAWING
31	P2 PIER STRUCTURAL DRAWING
32	A1 ABUTMENT STRUCTURAL DRAWING
33	P1 PIER FOUNDATION STRUCTURAL DRAWING
34	P2 PIER FOUNDATION STRUCTURAL DRAWING
35	A2 ABUTMENT STRUCTURAL DRAWING



MAIN ROAD

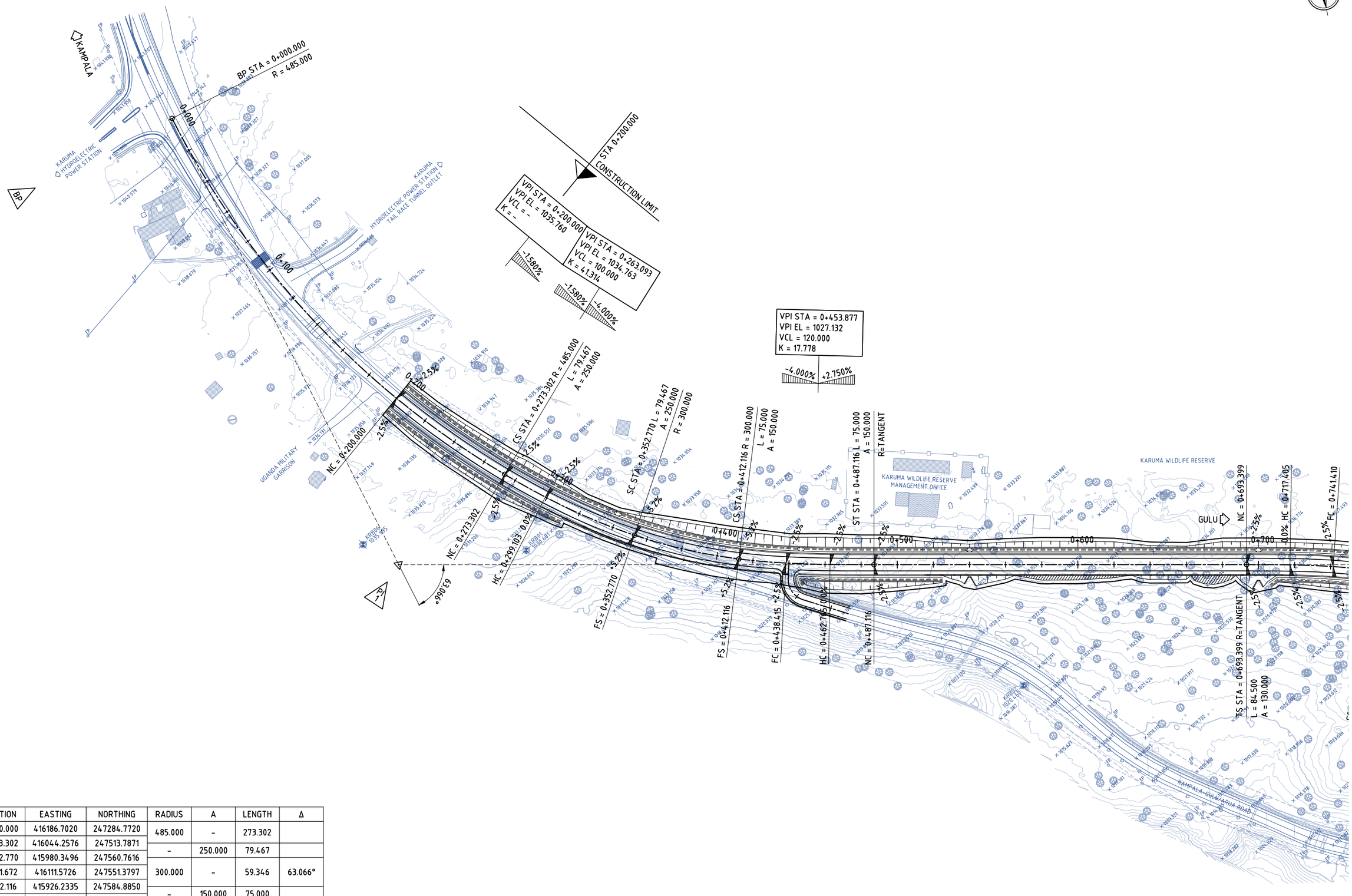
PAVEMENT DETAILS



BRANCHED OFF INTO THE EXISTING ROAD

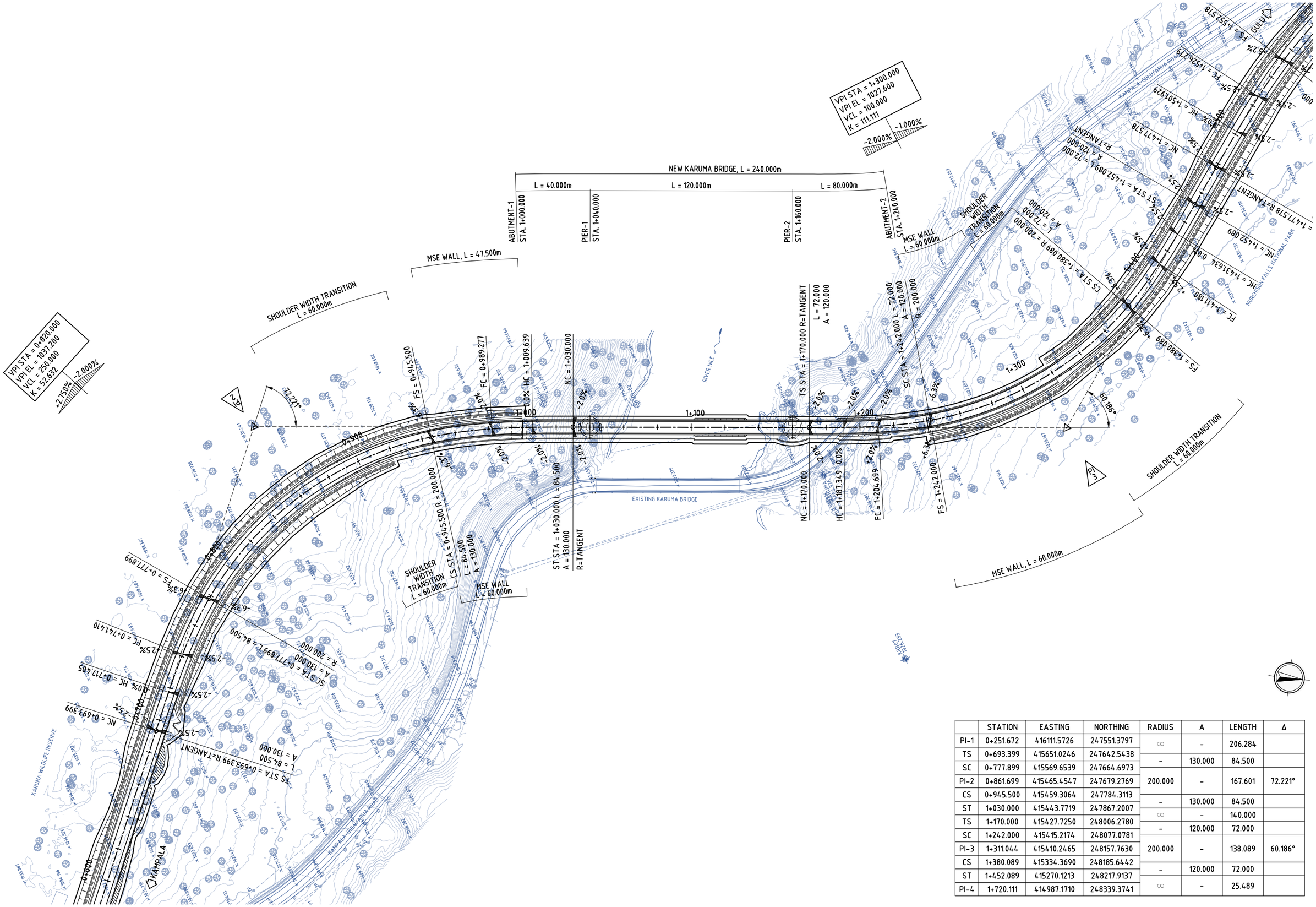
PAVEMENT DETAILS

PROJECT:	DRAWING TITLE:	SCALE:	DRAWING No.:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA			



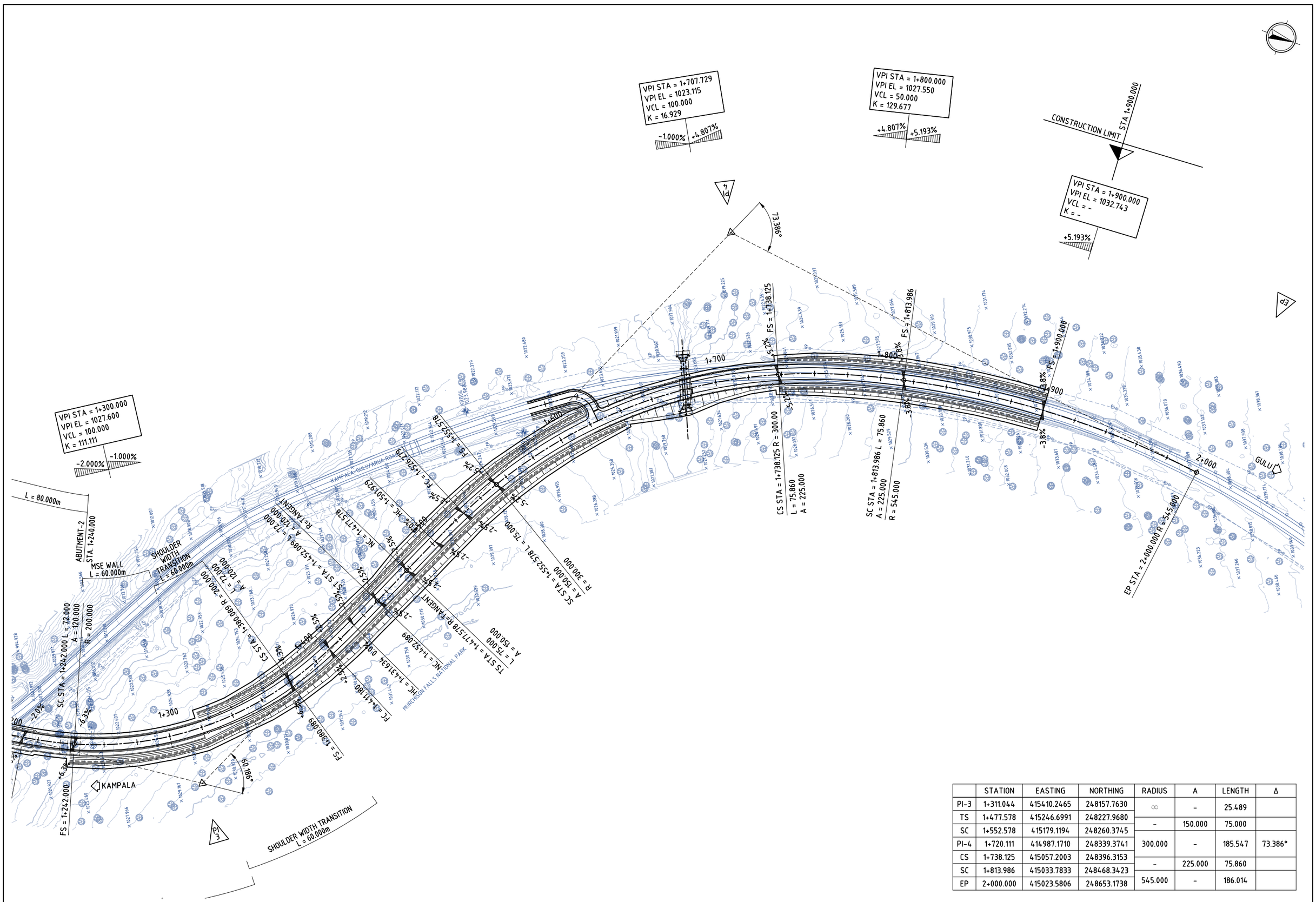
	STATION	EASTING	NORTHING	RADIUS	A	LENGTH	Δ
BP	0+000.000	416186.7020	247284.7720	485.000	-	273.302	
CS	0+273.302	416044.2576	247513.7871				
SC	0+352.770	415980.3496	247560.7616	-	250.000	79.467	
PI-1	0+251.672	416111.5726	247551.3797	300.000	-	59.346	63.066°
CS	0+412.116	415926.2335	247584.8850				
ST	0+487.116	415853.3820	247602.4878	-	150.000	75.000	
PI-2	0+861.699	415465.4547	247679.2769	∞	-	206.284	

PROJECT:	DRAWING TITLE:	SCALE:	DRAWING No.:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA	PLAN (1/3)	1 : 2000	



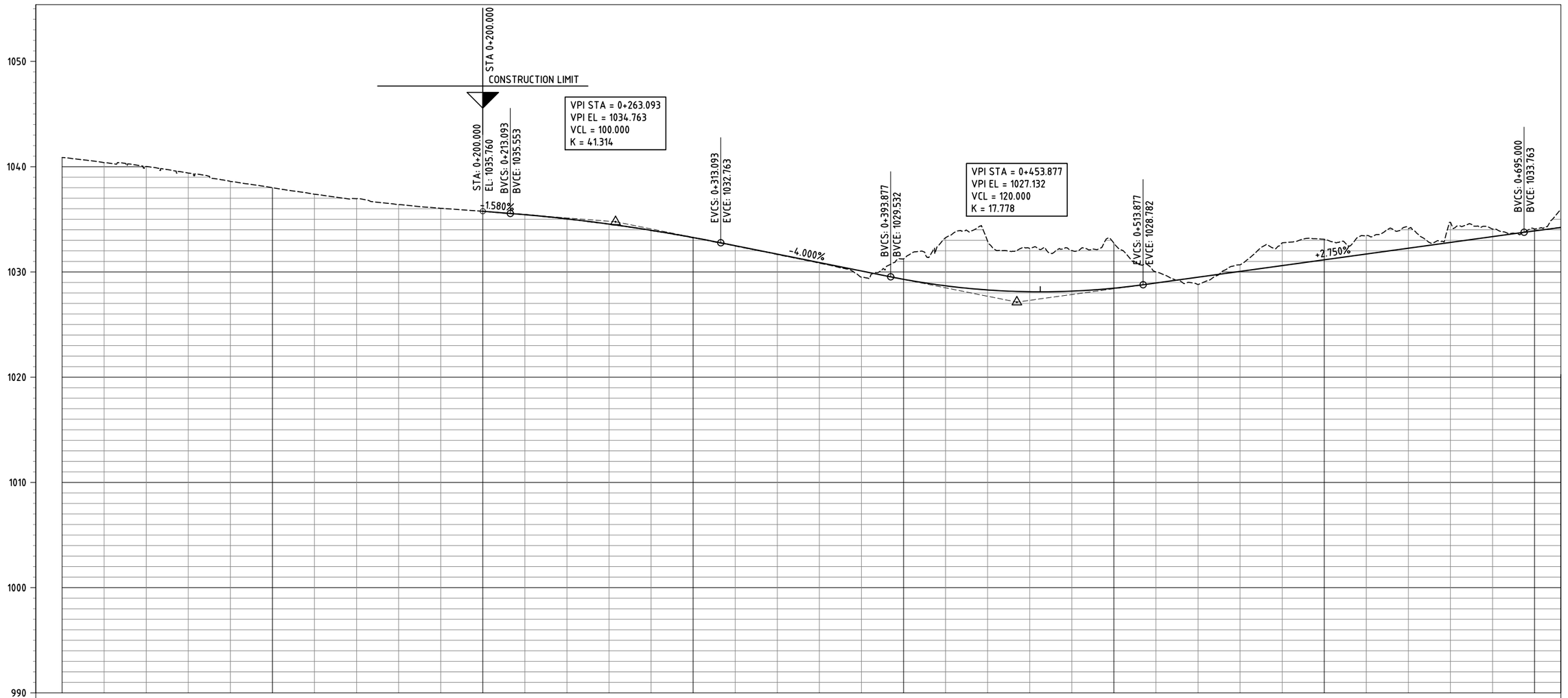
	STATION	EASTING	NORTHING	RADIUS	A	LENGTH	Δ
PI-1	0+251.672	416111.5726	247551.3797	∞	-	206.284	
TS	0+693.399	415651.0246	247642.5438	-	130.000	84.500	
SC	0+777.899	415569.6539	247664.6973	200.000	-	167.601	72.221°
PI-2	0+861.699	415465.4547	247679.2769	-	130.000	84.500	
CS	0+945.500	415459.3064	247784.3113	∞	-	140.000	
ST	1+030.000	415443.7719	247867.2007	-	120.000	72.000	
TS	1+170.000	415427.7250	248006.2780	200.000	-	138.089	60.186°
SC	1+242.000	415415.2174	248077.0781	-	120.000	72.000	
PI-3	1+311.044	415410.2465	248157.7630	∞	-	25.489	
CS	1+380.089	415334.3690	248185.6442				
ST	1+452.089	415270.1213	248217.9137				
PI-4	1+720.111	414987.1710	248339.3741				

PROJECT:	DRAWING TITLE:	SCALE:	DRAWING No.:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA	PLAN (2/3)	1 : 2000	



	STATION	EASTING	NORTHING	RADIUS	A	LENGTH	Δ
PI-3	1+311.044	415410.2465	248157.7630	∞	-	25.489	
TS	1+477.578	415246.6991	248227.9680	-	150.000	75.000	
SC	1+552.578	415179.1194	248260.3745	300.000	-	185.547	73.386°
PI-4	1+720.111	414987.1710	248339.3741	-	225.000	75.860	
CS	1+738.125	415057.2003	248396.3153	545.000	-	186.014	
SC	1+813.986	415033.7833	248468.3423				
EP	2+000.000	415023.5806	248653.1738				

PROJECT:	DRAWING TITLE:	SCALE:	DRAWING No.:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA	PLAN (3/3)	1 : 2000	

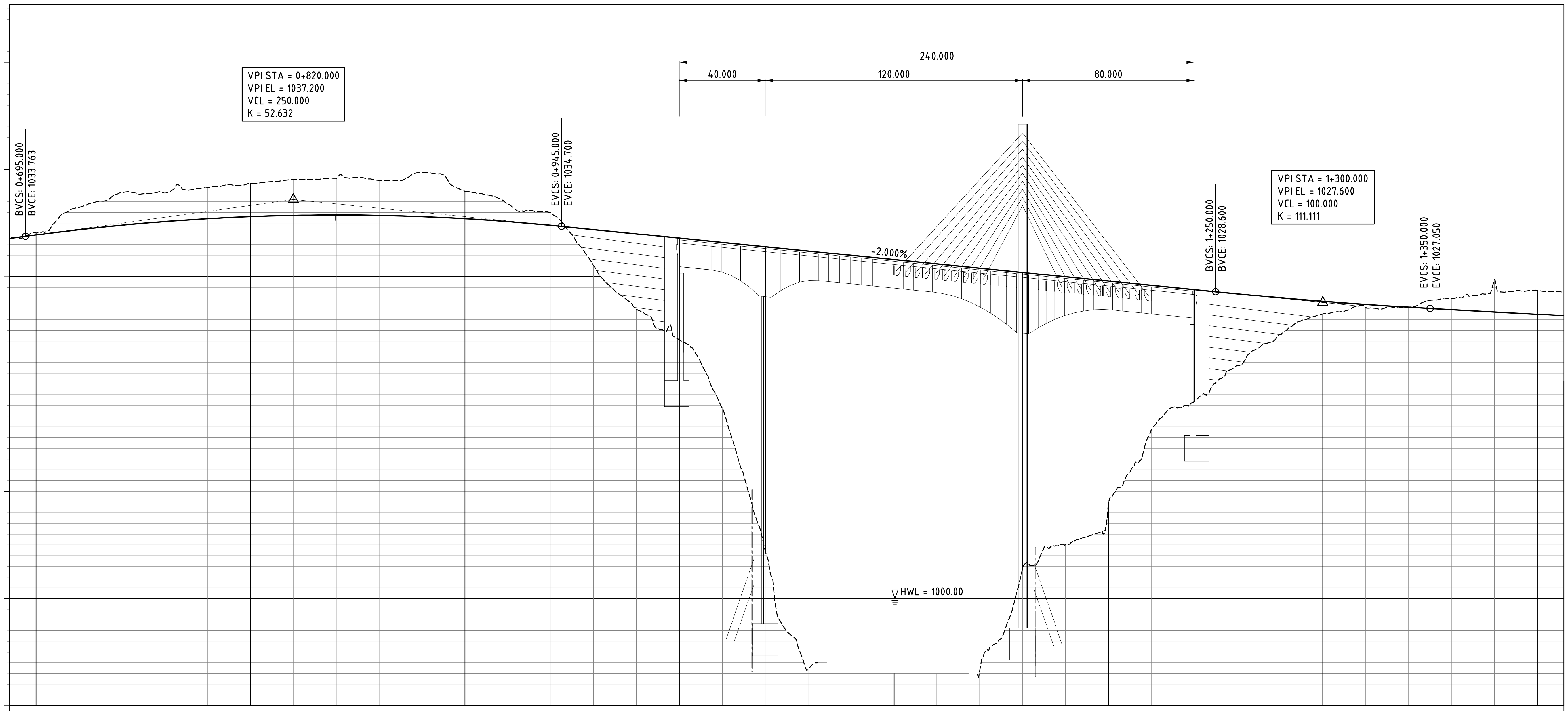


PROJECT:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA

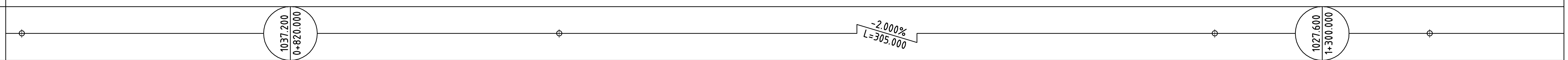
DRAWING TITLE:
PROFILE (1 OF 3)

SCALE:
H = 1 : 2000 (A3)
V = 1 : 400 (A3)

DRAWING No.:



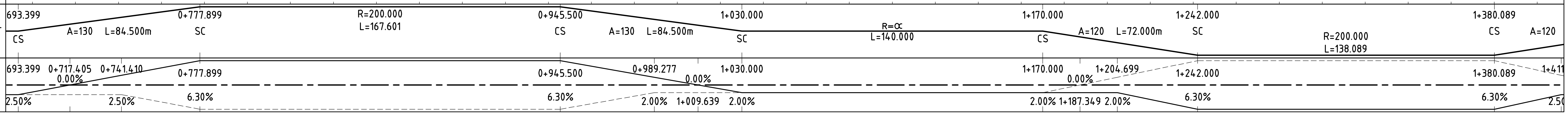
VERTICAL ALIGNMENT



STATION	DISTANCE	EXISTING GROUND	FINISHED GROUND	CUT HEIGHT	FILL HEIGHT
0+700.000	20.000	1034.081	1033.898	0.183	
+20.000	20.000	1036.473	1034.391	2.083	
+40.000	20.000	1037.876	1034.808	3.069	
+60.000	20.000	1037.794	1035.149	2.646	
+80.000	20.000	1038.314	1035.414	2.900	
0+800.000	20.000	1038.720	1035.603	3.117	
+20.000	20.000	1039.039	1035.716	3.324	
+40.000	20.000	1039.173	1035.753	3.421	
+60.000	20.000	1038.976	1035.714	3.263	
+80.000	20.000	1039.732	1035.599	4.133	
0+900.000	20.000	1037.980	1035.408	2.572	
+20.000	20.000	1036.792	1035.141	1.651	
+40.000	20.000	1035.963	1034.798	1.165	
+60.000	20.000	1031.040	1034.400		3.360
+80.000	20.000	1026.969	1034.000		7.031
1+000.000	20.000	1024.133	1033.600		9.467
+20.000	20.000	1017.717	1033.200		
+40.000	20.000	1004.408	1032.800		
+60.000	20.000	993.408	1032.400		
+80.000	20.000		1032.000		
1+100.000	20.000		1031.600		
+20.000	20.000		1031.200		
+40.000	20.000	993.177	1030.800		
+60.000	20.000	1002.813	1030.400		
+80.000	20.000	1005.014	1030.000		
1+200.000	20.000	1008.982	1029.600		
+20.000	20.000	1015.730	1029.200		
+40.000	20.000	1018.359	1028.800		10.441
+60.000	20.000	1021.703	1028.405		6.702
+80.000	20.000	1024.623	1028.041		3.418
1+300.000	20.000	1026.544	1027.713		1.169
+20.000	20.000	1027.157	1027.421		0.264
+40.000	20.000	1027.165	1027.165	0.001	
+60.000	20.000	1027.949	1026.940	1.009	
+80.000	20.000	1029.720	1026.720	3.000	
1+400.000	20.000	1028.732	1026.500	2.232	

HORIZONTAL ALIGNMENT

SUPERELEVATION

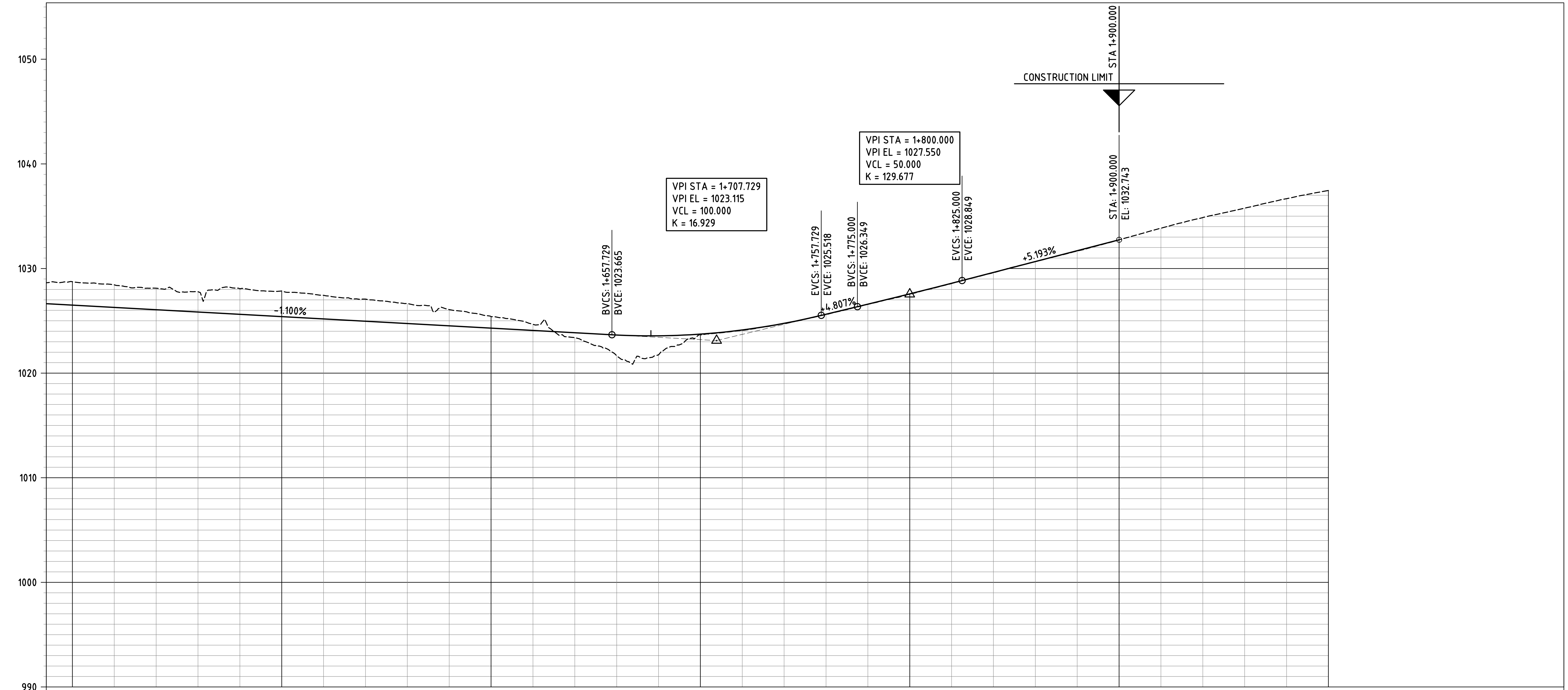


PROJECT:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA

DRAWING TITLE:
PROFILE (2 OF 3)

SCALE:
H = 1 : 2000 (A3)
V = 1 : 400 (A3)

DRAWING No.:



VERTICAL ALIGNMENT: -1.100% L=307.729 | 1023.115 1+707.729 | +4.807% L=17.271 | 1027.550 1+800.000 | +5.193% L=75.000

STATION	1+400.000	+20.000	+40.000	+60.000	+80.000	1+500.000	+20.000	+40.000	+60.000	+80.000	1+600.000	+20.000	+40.000	+60.000	+80.000	1+700.000	+20.000	+40.000
FILL HEIGHT													0.463	1.980	1.817	0.053	0.036	0.004
CUT HEIGHT	2.232	2.160	2.060	1.940	2.443	2.456	2.263	2.115	1.915	1.549	1.102	0.591						
FINISHED GROUND	1026.500	1026.280	1026.060	1025.840	1025.620	1025.400	1025.180	1024.960	1024.740	1024.520	1024.300	1024.080	1023.860	1023.642	1023.566	1023.728	1024.125	1024.759
EXISTING GROUND	1028.732	1028.440	1028.120	1027.780	1028.063	1027.856	1027.443	1027.075	1026.655	1026.069	1025.402	1024.671	1023.397	1021.661	1021.750	1023.675	1024.089	1024.755
DISTANCE	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000

STATION	+60.000	+80.000	1+800.000	+20.000	+40.000	+60.000	+80.000	1+900.000	+20.000	+40.000	+60.000	+80.000	2+000.000	+20.000	+40.000	+60.000	+80.000	2+100.000
FILL HEIGHT	0.020	0.012	0.024	0.021	0.031	0.004	0.034	0.000										
CUT HEIGHT																		
FINISHED GROUND	1025.628	1026.590	1027.575	1028.590	1029.627	1030.666	1031.704	1032.743										
EXISTING GROUND	1025.608	1026.578	1027.550	1028.569	1029.596	1030.662	1031.670	1032.743	1033.852	1034.870	1035.767	1036.675	1037.453					
DISTANCE	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000	20.000

HORIZONTAL ALIGNMENT: 9 | A=120 L=72.000m | 1+452.089 SC | R=∝ L=25.489 | 1+477.578 CS | A=150 L=75.000m | 1+552.578 SC | R=300.000 L=185.547 | 1+738.125 CS | A=225 L=75.860m | 1+813.986 SC | R=545.000 L=186.014 | 2+000.000

SUPERELEVATION: 9 | 1+411.180 | 2.50% | 0.00% | 1+431.634 | 1+452.089 2.50% | 1+477.578 2.50% | 0.00% | 1+501.929 | 1+526.279 2.50% | 1+552.578 5.20% | 1+738.125 5.20% | 1+813.986 3.60% | 1+900.000 3.60%

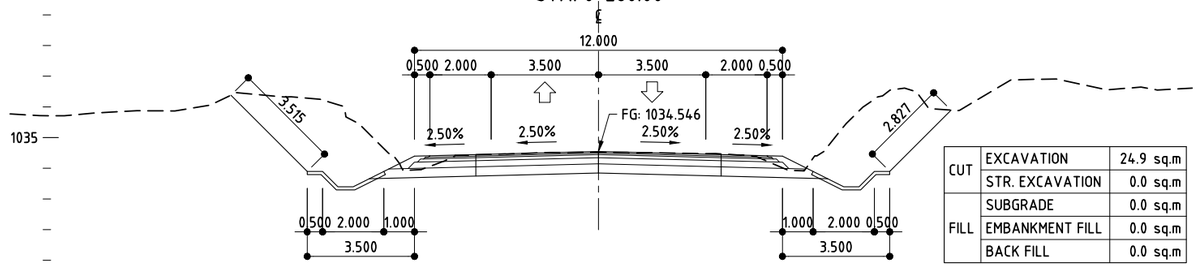
PROJECT:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA

DRAWING TITLE: **PROFILE (3 OF 3)**

SCALE: **H = 1 : 2000 (A3) V = 1 : 400 (A3)**

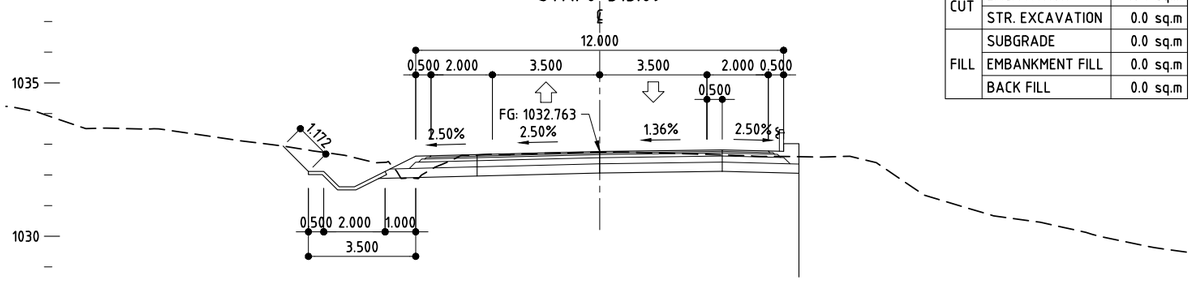
DRAWING No.:

STA. 0+260.00



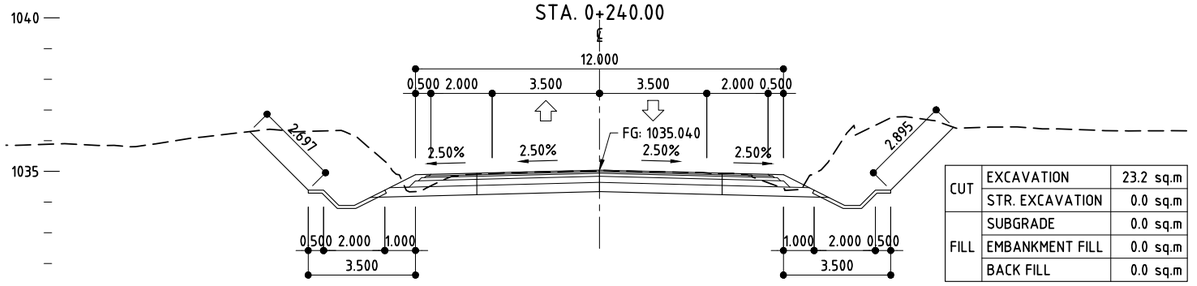
CUT	EXCAVATION	24.9 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+313.09



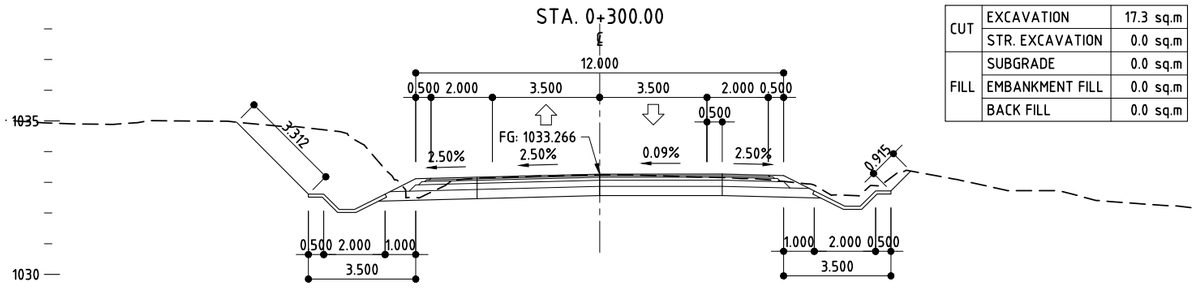
CUT	EXCAVATION	10.1 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+240.00



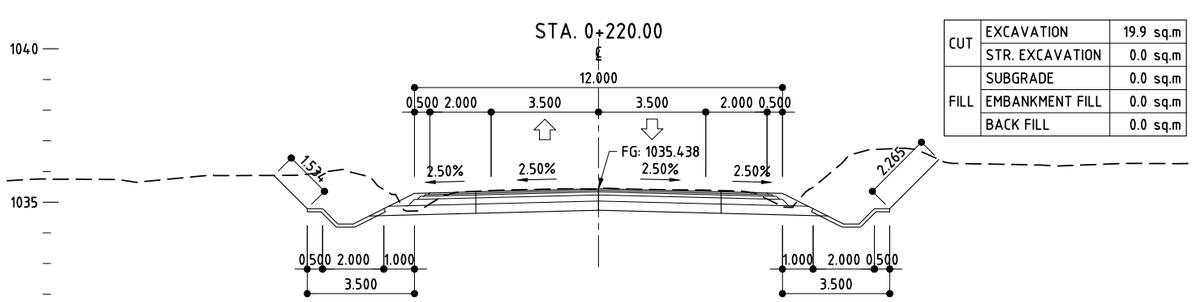
CUT	EXCAVATION	23.2 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+300.00



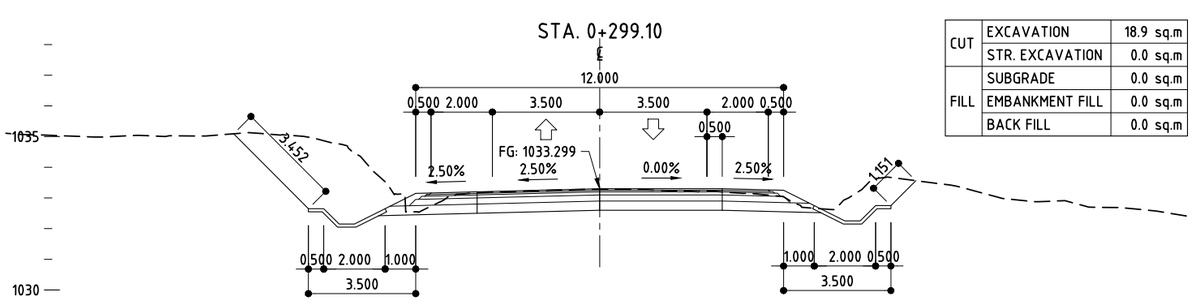
CUT	EXCAVATION	17.3 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+220.00



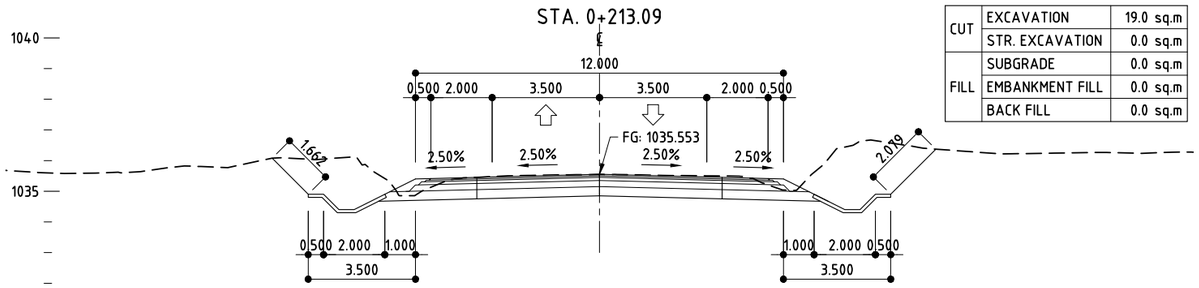
CUT	EXCAVATION	19.9 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+299.10



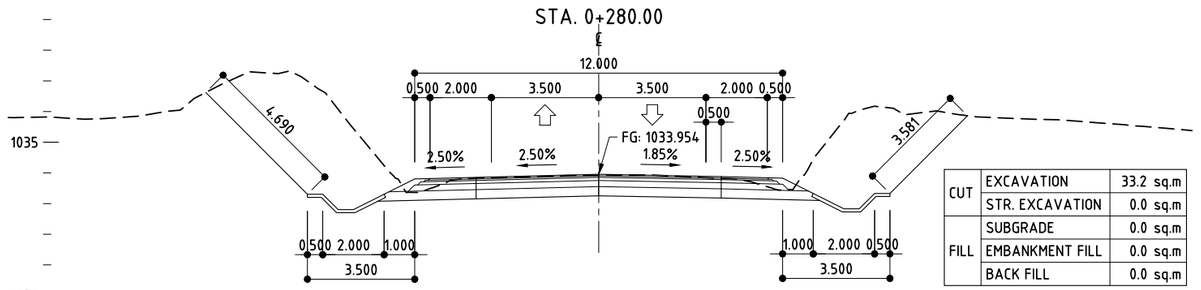
CUT	EXCAVATION	18.9 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+213.09



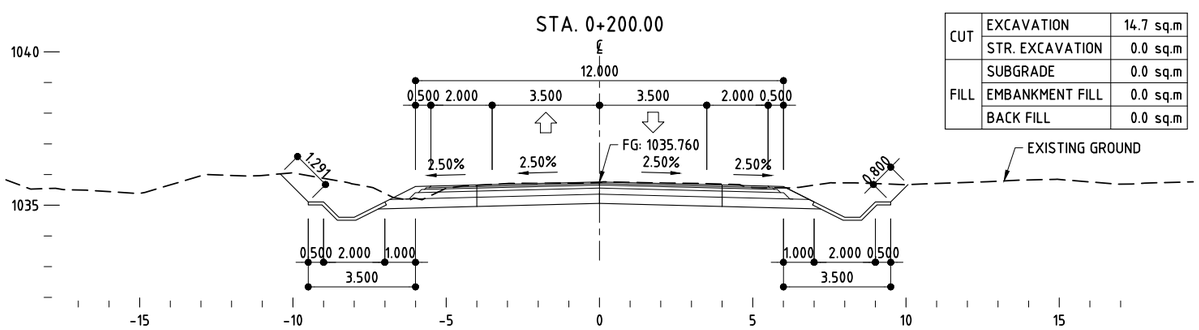
CUT	EXCAVATION	19.0 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+280.00



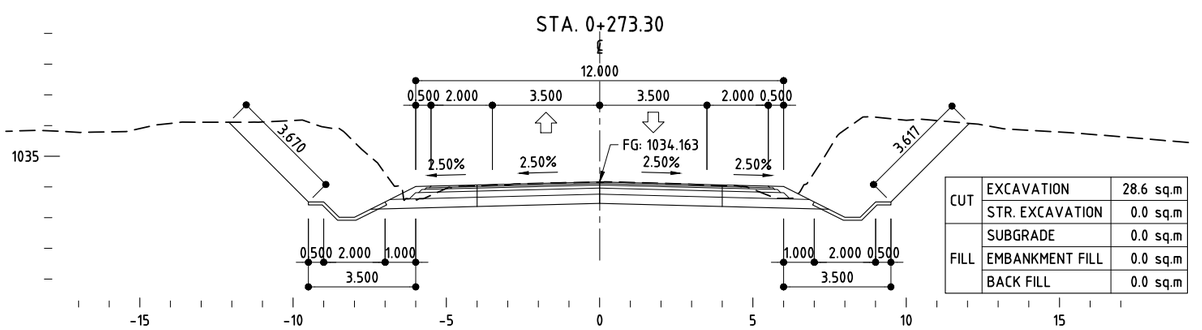
CUT	EXCAVATION	33.2 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+200.00



CUT	EXCAVATION	14.7 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+273.30



CUT	EXCAVATION	28.6 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

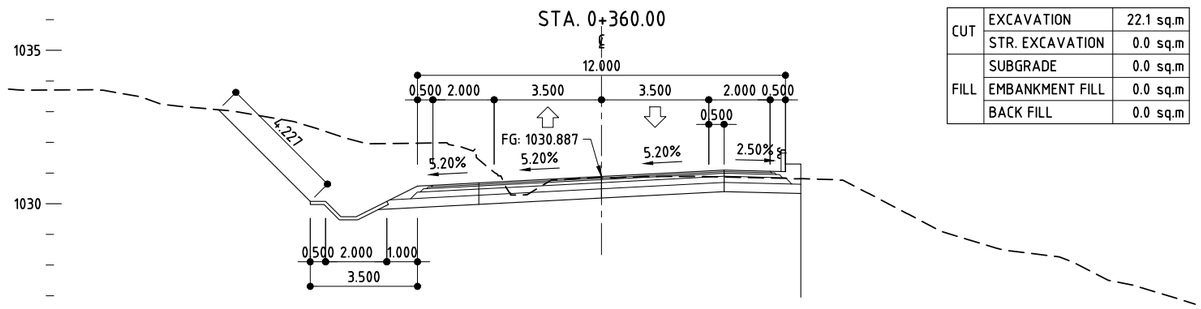
PROJECT:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA

DRAWING TITLE:
CROSS SECTIONS (1)

SCALE:
1 : 200

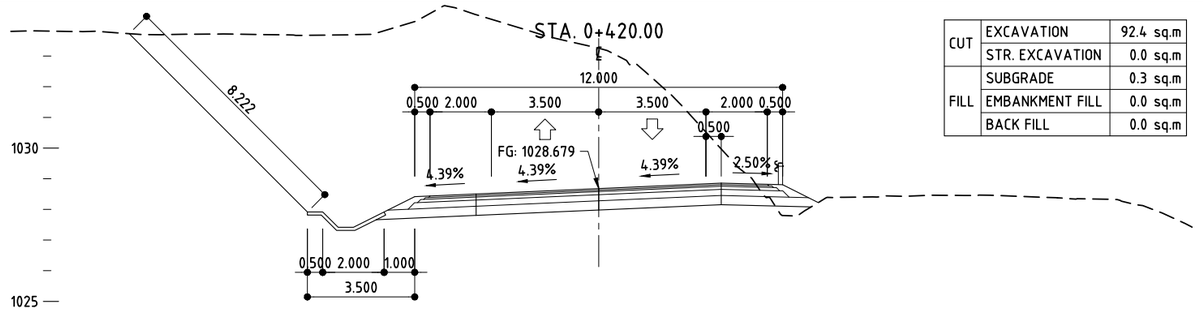
DRAWING No.:

STA. 0+360.00



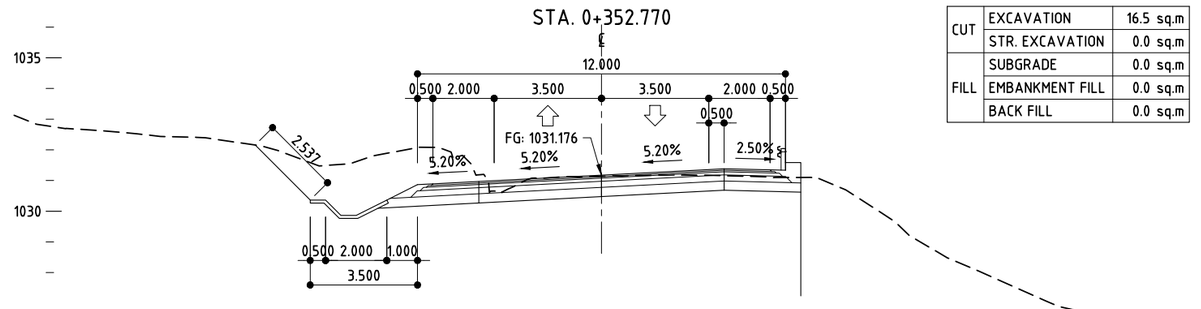
CUT	EXCAVATION	22.1 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+420.00



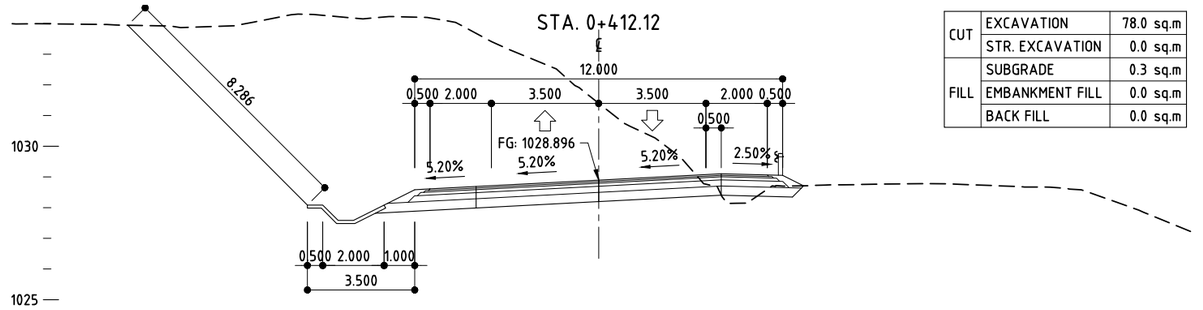
CUT	EXCAVATION	92.4 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.3 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+352.770



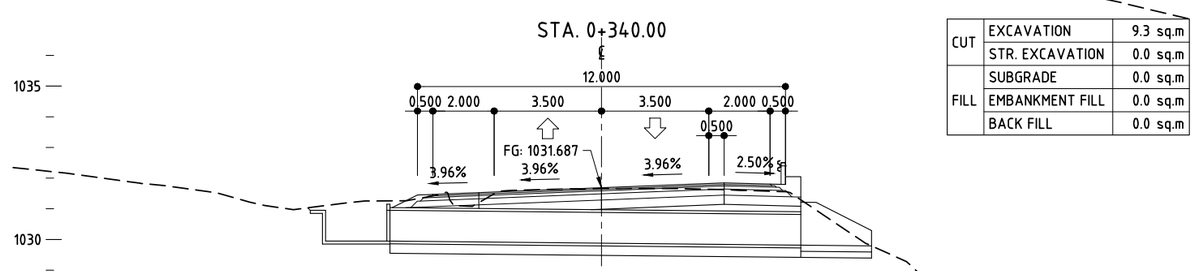
CUT	EXCAVATION	16.5 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+412.12



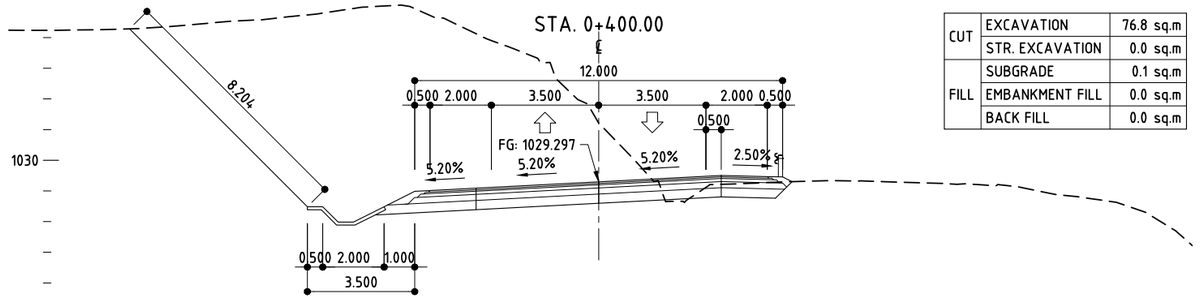
CUT	EXCAVATION	78.0 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.3 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+340.00



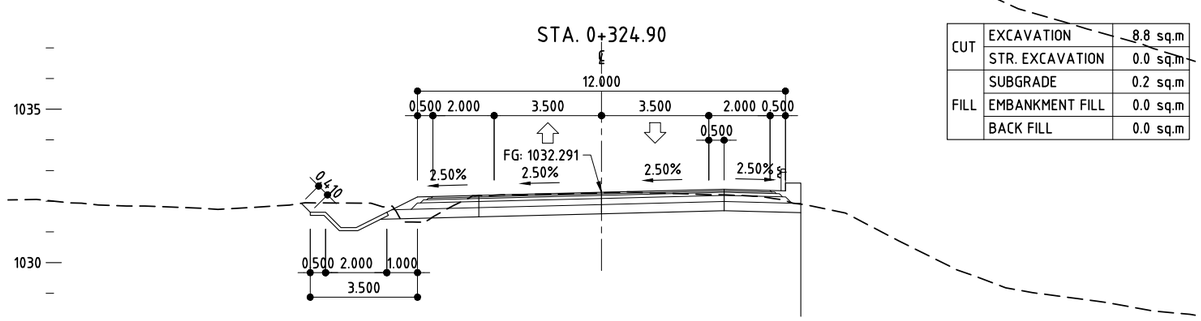
CUT	EXCAVATION	9.3 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+400.00



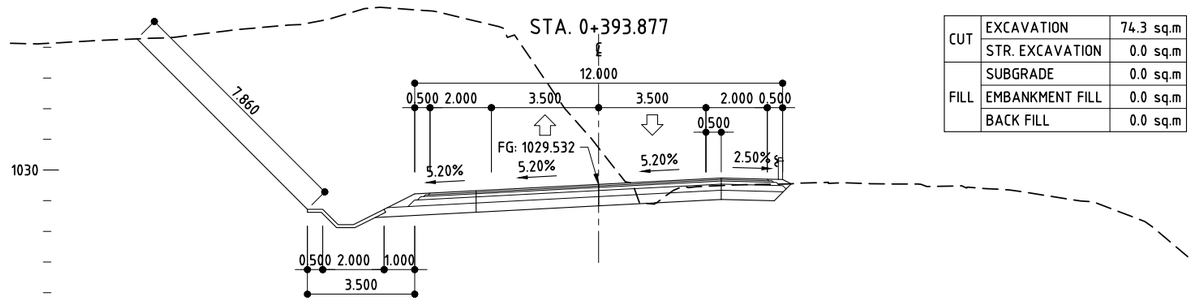
CUT	EXCAVATION	76.8 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.1 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+324.90



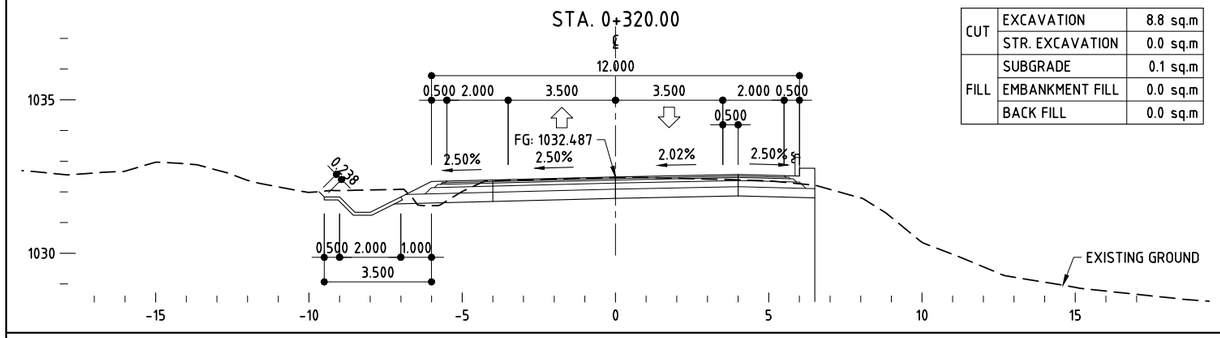
CUT	EXCAVATION	8.8 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.2 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+393.877



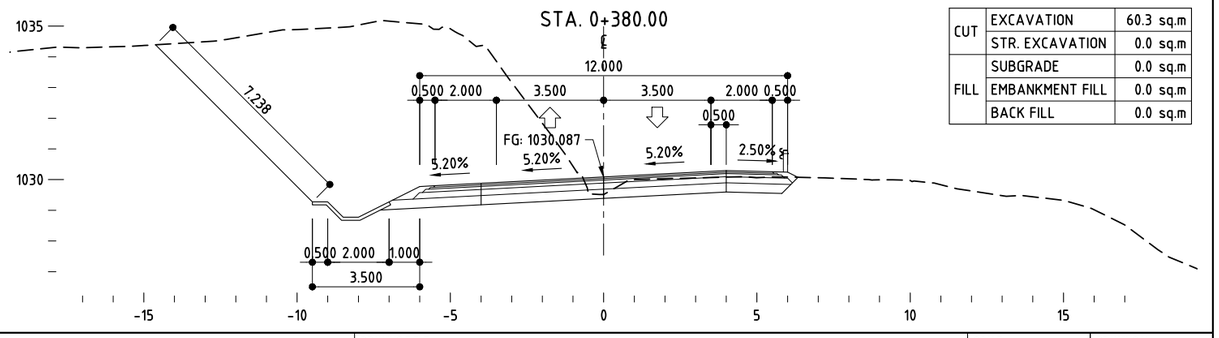
CUT	EXCAVATION	74.3 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+320.00



CUT	EXCAVATION	8.8 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.1 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+380.00



CUT	EXCAVATION	60.3 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

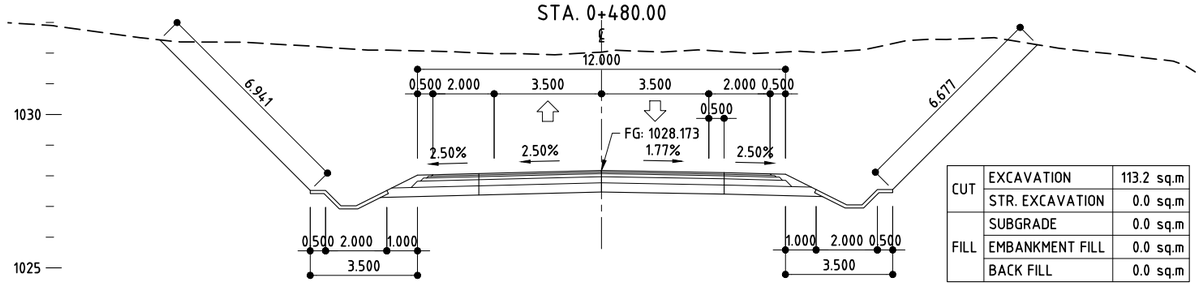
PROJECT:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA

DRAWING TITLE:
CROSS SECTIONS (1)

SCALE:
1 : 200

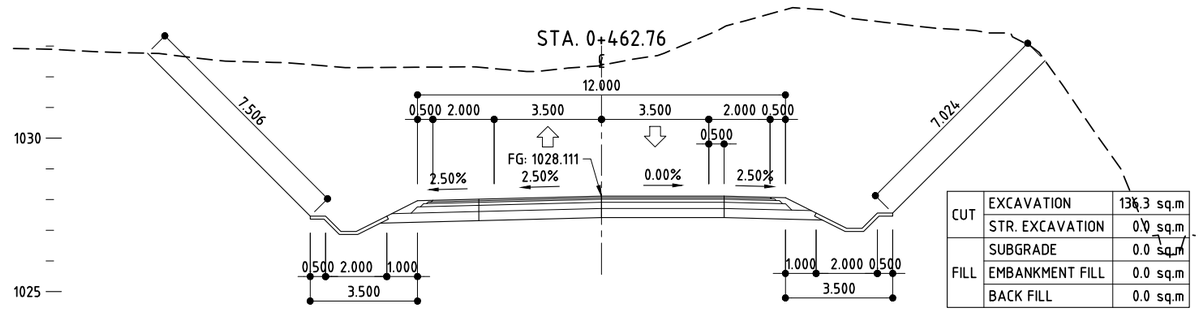
DRAWING No.:

STA. 0+480.00



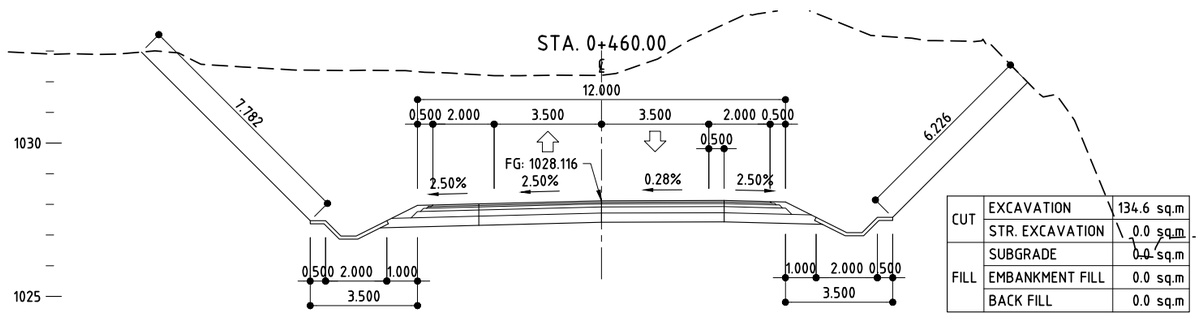
CUT	EXCAVATION	113.2 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+462.76



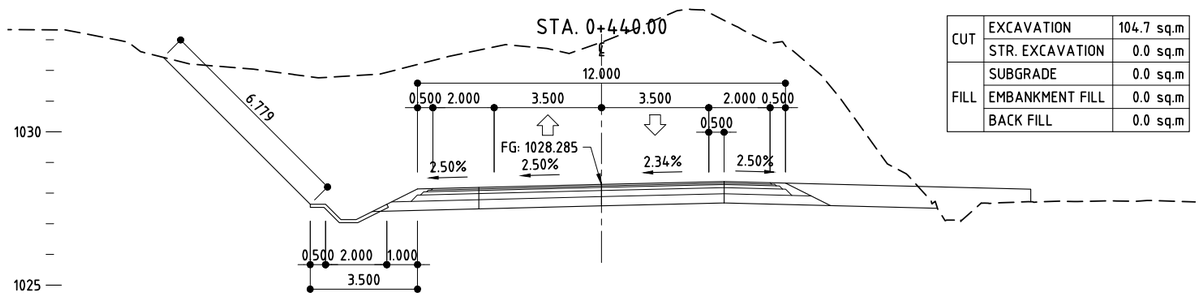
CUT	EXCAVATION	136.3 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+460.00



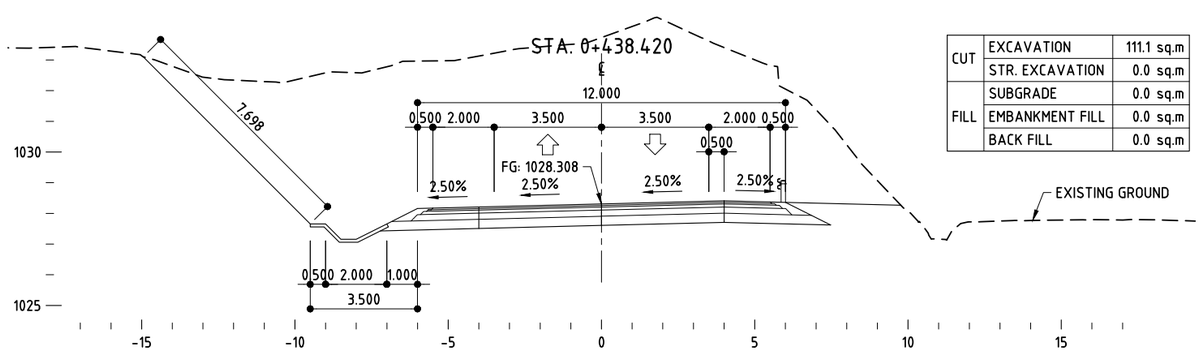
CUT	EXCAVATION	134.6 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+440.00



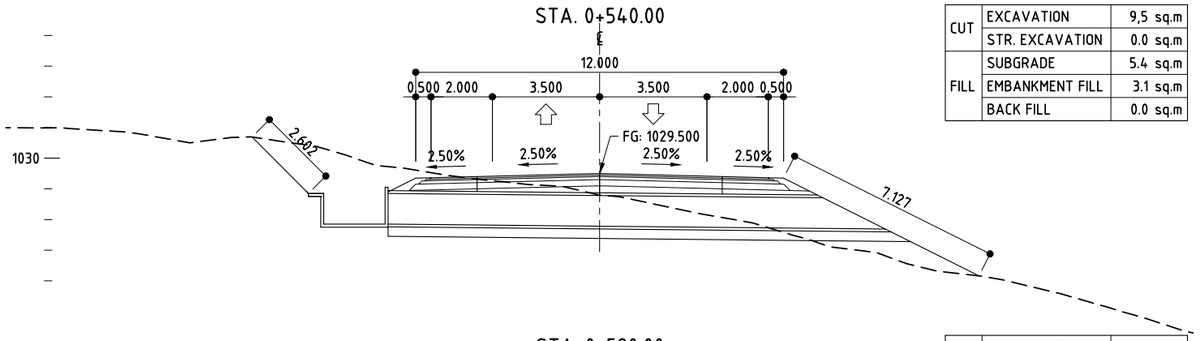
CUT	EXCAVATION	104.7 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+438.420



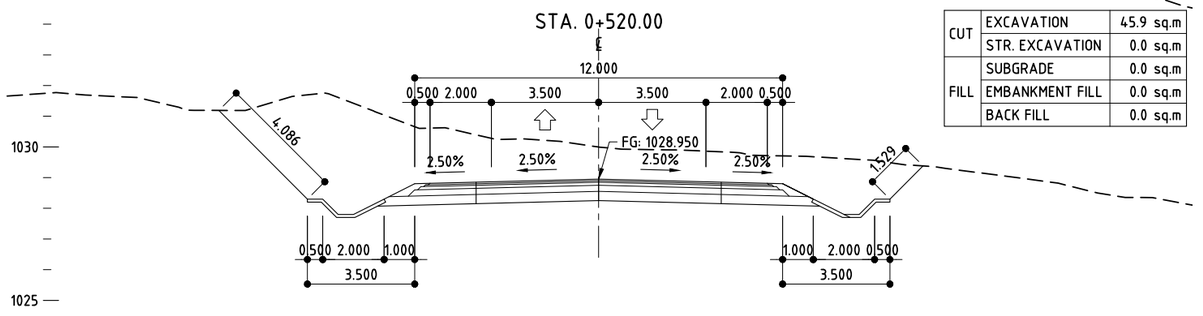
CUT	EXCAVATION	111.1 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+540.00



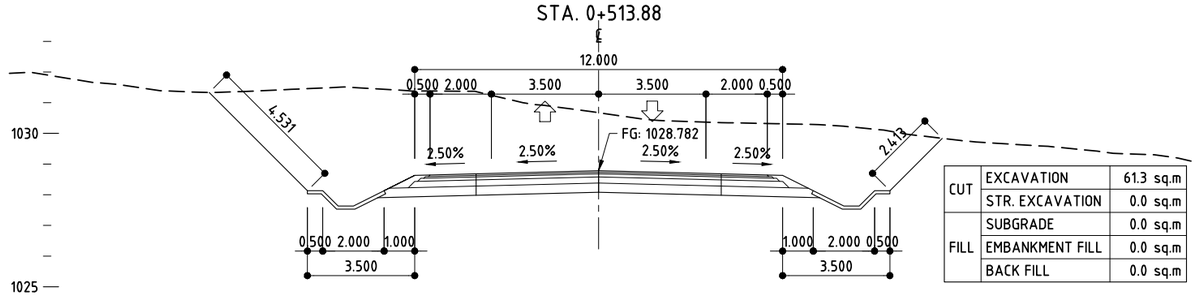
CUT	EXCAVATION	9.5 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	5.4 sq.m
	EMBANKMENT FILL	3.1 sq.m
	BACK FILL	0.0 sq.m

STA. 0+520.00



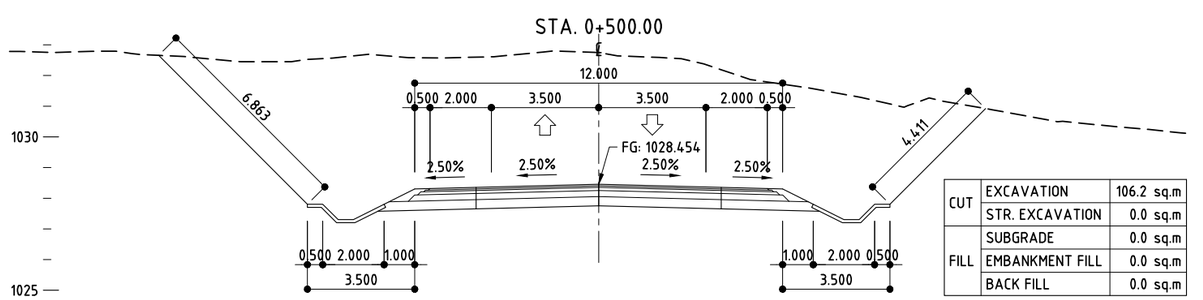
CUT	EXCAVATION	45.9 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+513.88



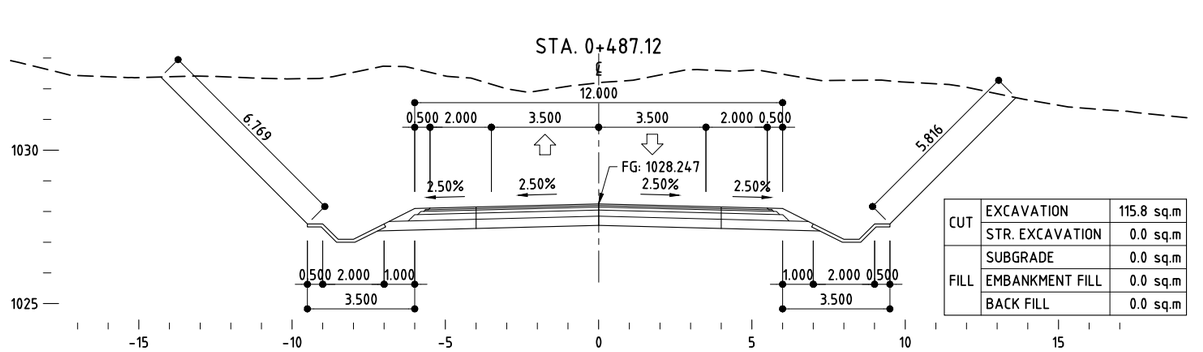
CUT	EXCAVATION	61.3 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+500.00



CUT	EXCAVATION	106.2 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+487.12



CUT	EXCAVATION	115.8 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

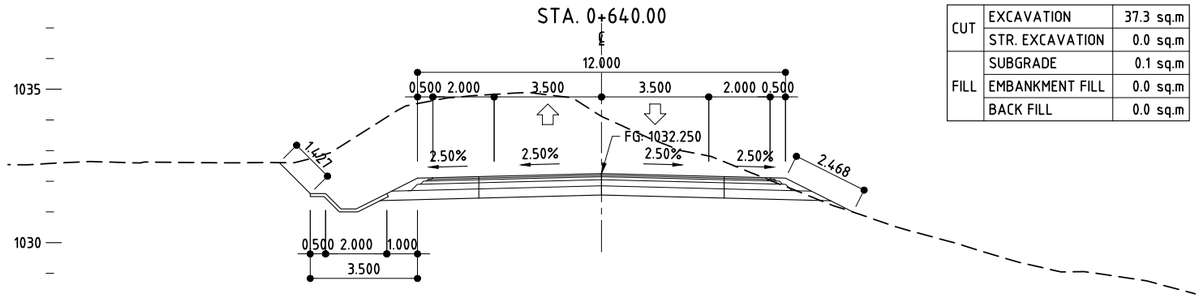
PROJECT:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA

DRAWING TITLE:
CROSS SECTIONS (1)

SCALE:
1 : 200

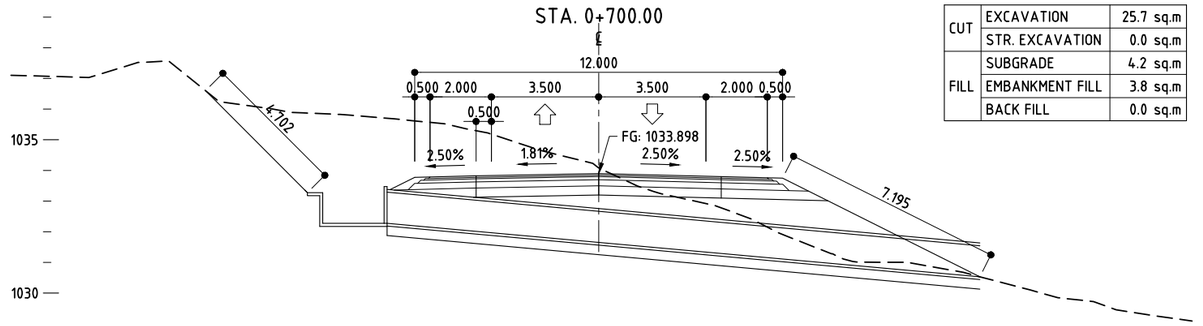
DRAWING No.:

STA. 0+640.00



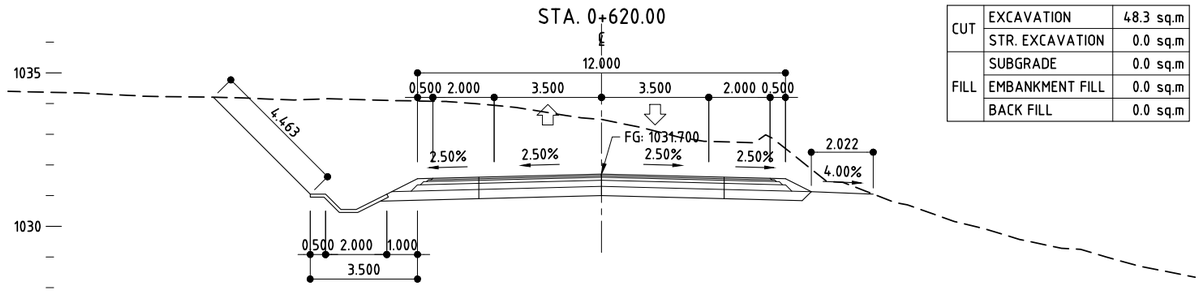
CUT	EXCAVATION	37.3 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.1 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+700.00



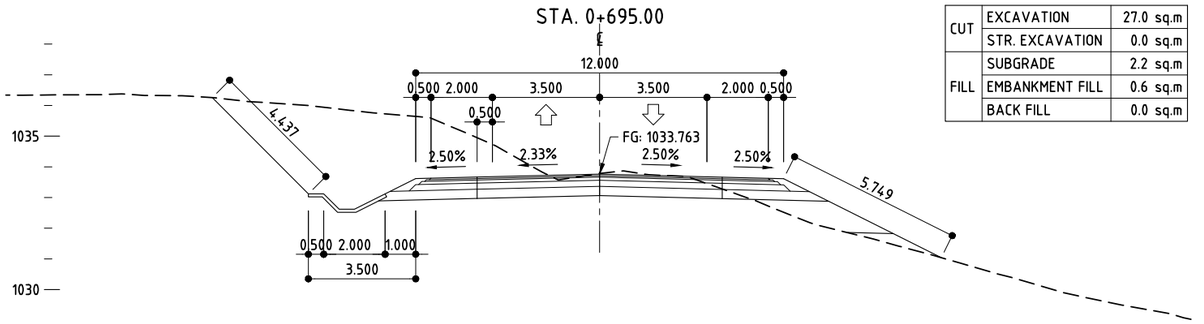
CUT	EXCAVATION	25.7 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	4.2 sq.m
	EMBANKMENT FILL	3.8 sq.m
	BACK FILL	0.0 sq.m

STA. 0+620.00



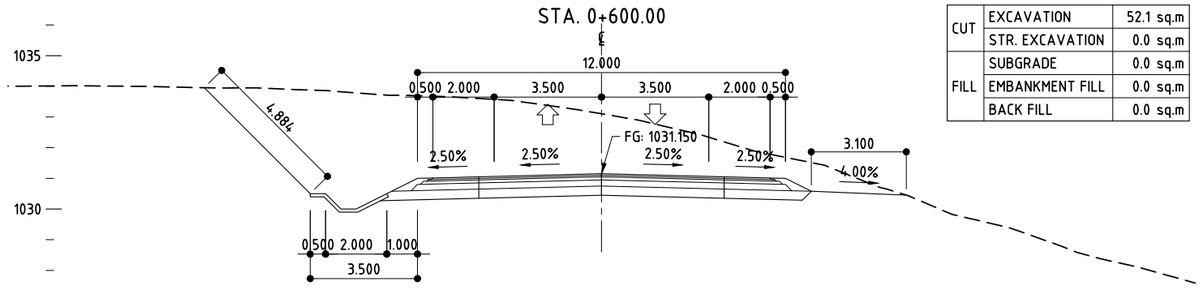
CUT	EXCAVATION	48.3 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+695.00



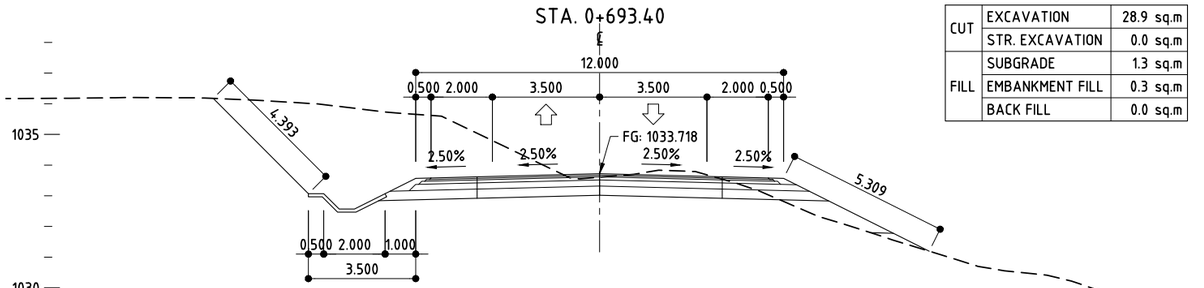
CUT	EXCAVATION	27.0 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	2.2 sq.m
	EMBANKMENT FILL	0.6 sq.m
	BACK FILL	0.0 sq.m

STA. 0+600.00



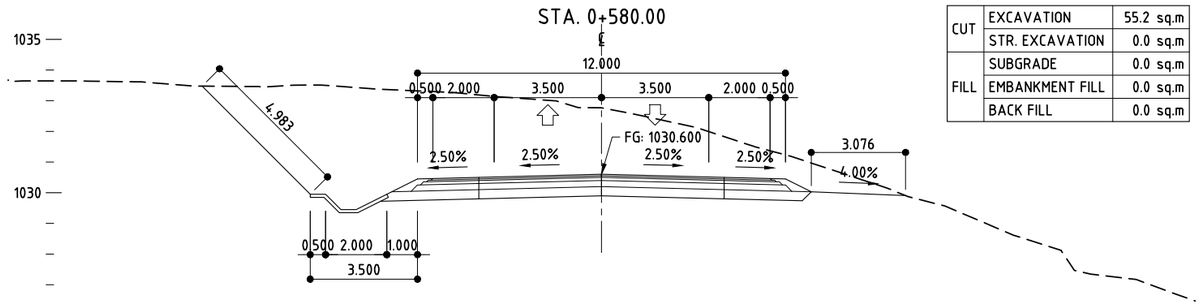
CUT	EXCAVATION	52.1 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+693.40



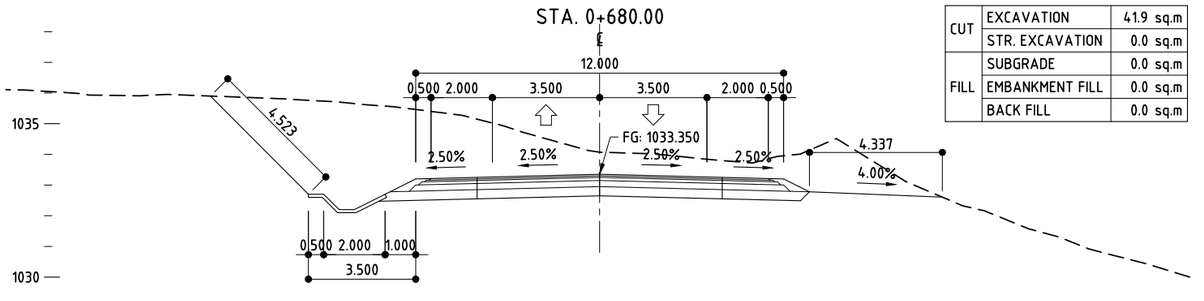
CUT	EXCAVATION	28.9 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	1.3 sq.m
	EMBANKMENT FILL	0.3 sq.m
	BACK FILL	0.0 sq.m

STA. 0+580.00



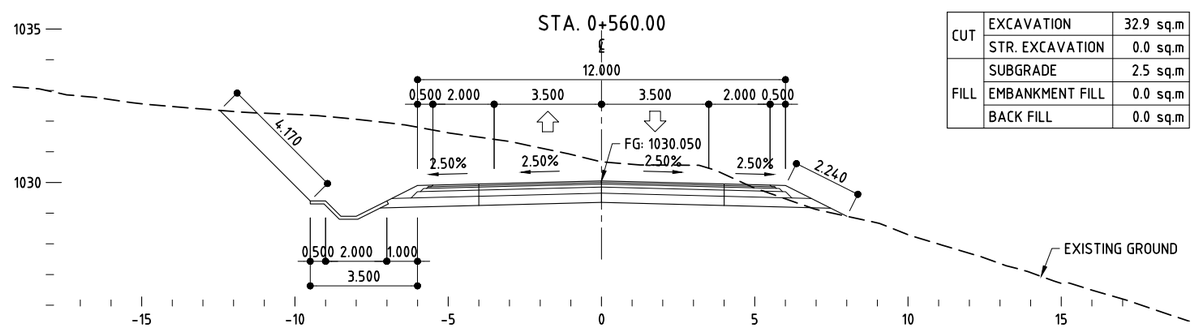
CUT	EXCAVATION	55.2 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+680.00



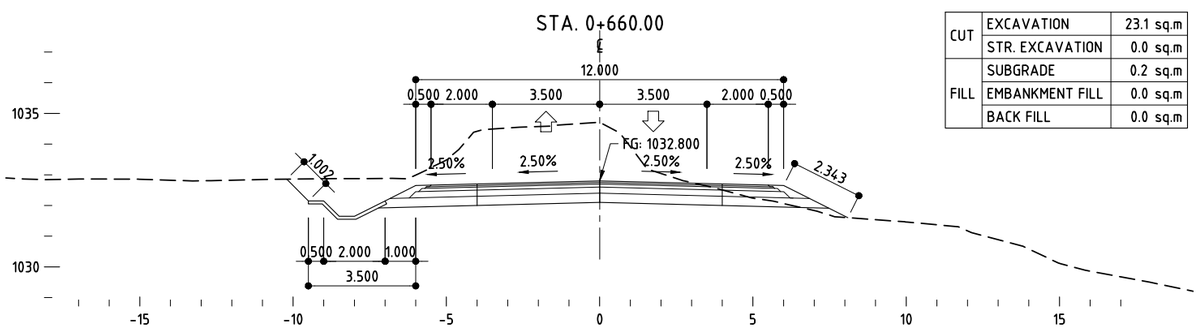
CUT	EXCAVATION	41.9 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+560.00



CUT	EXCAVATION	32.9 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	2.5 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+660.00



CUT	EXCAVATION	23.1 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.2 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

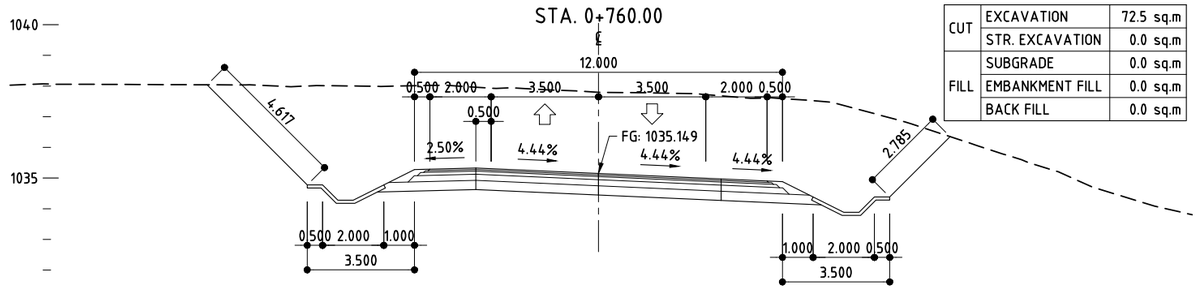
PROJECT:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA

DRAWING TITLE:
CROSS SECTIONS (1)

SCALE:
1 : 200

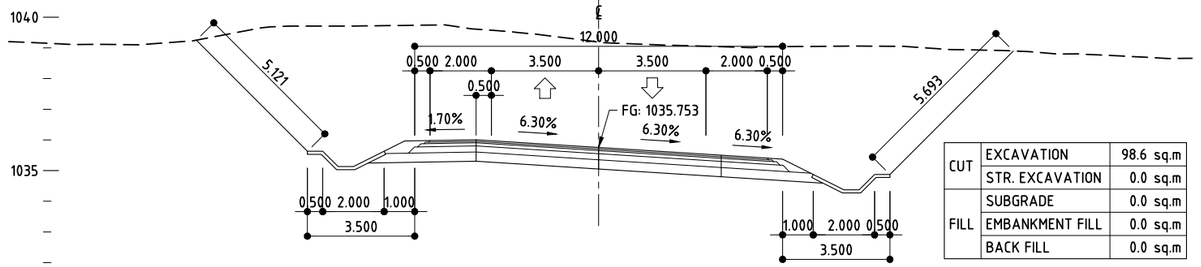
DRAWING No.:

STA. 0+760.00



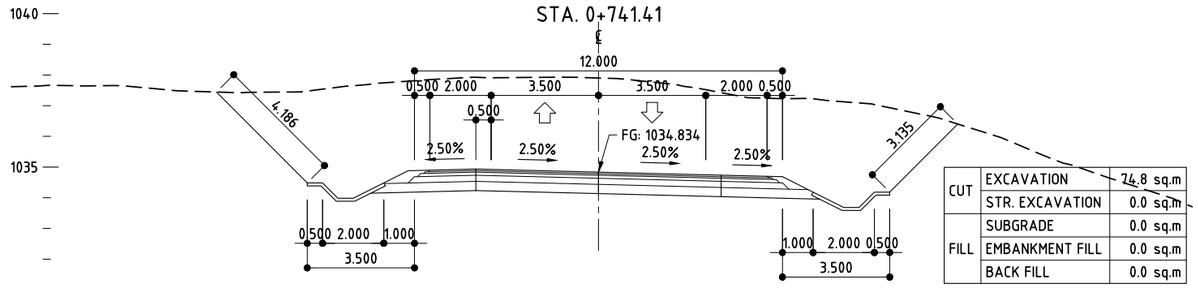
CUT	EXCAVATION	72.5 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+840.00



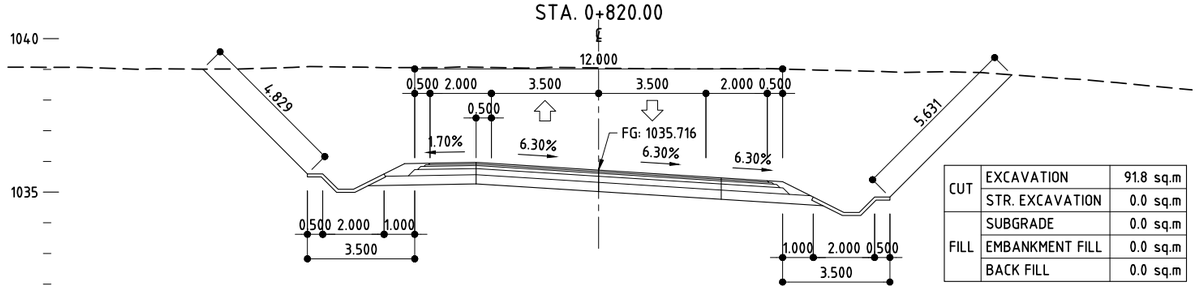
CUT	EXCAVATION	98.6 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+741.41



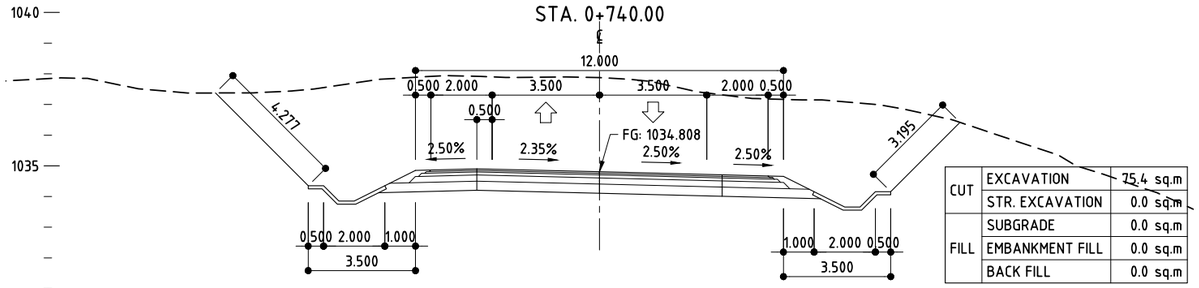
CUT	EXCAVATION	74.8 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+820.00



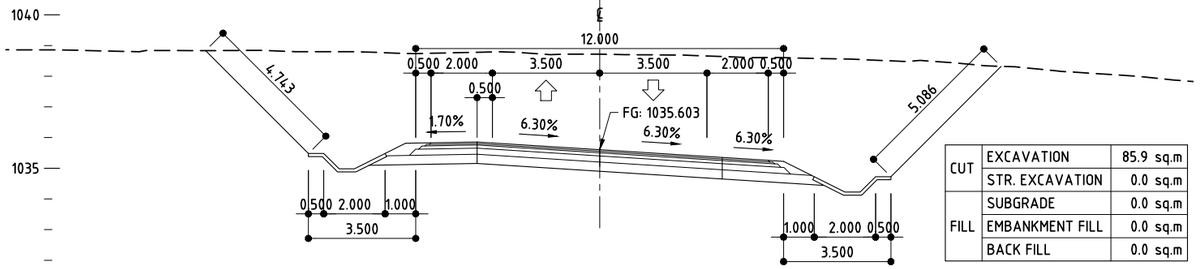
CUT	EXCAVATION	91.8 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+740.00



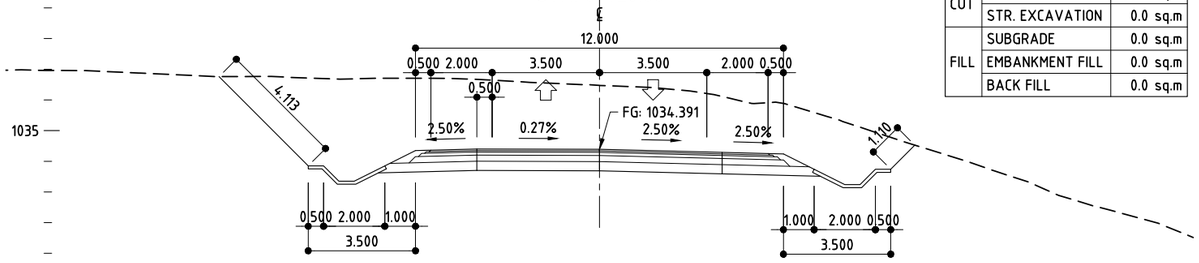
CUT	EXCAVATION	75.4 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+800.00



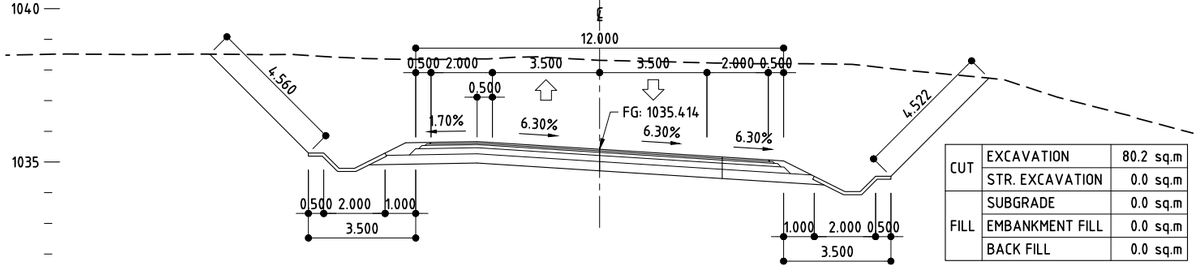
CUT	EXCAVATION	85.9 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+720.00



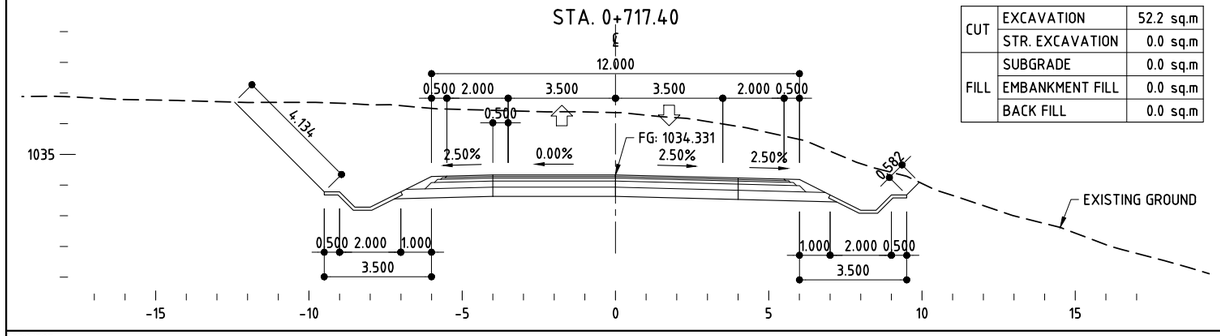
CUT	EXCAVATION	55.7 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+780.00



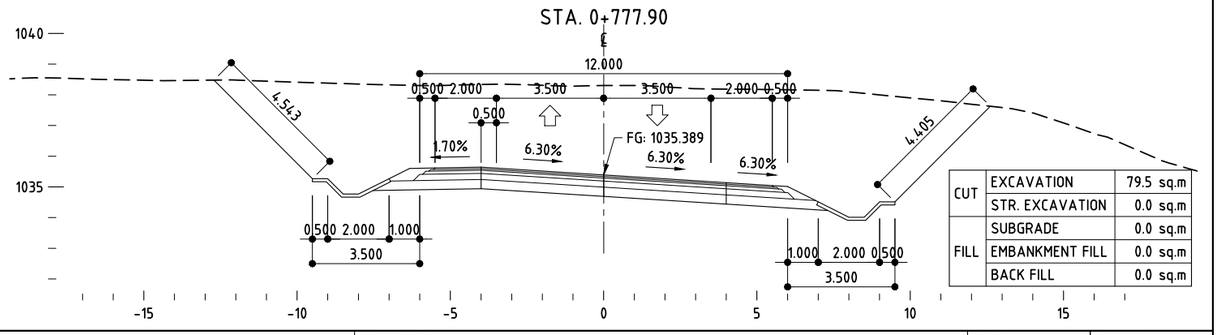
CUT	EXCAVATION	80.2 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+717.40



CUT	EXCAVATION	52.2 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+777.90



CUT	EXCAVATION	79.5 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

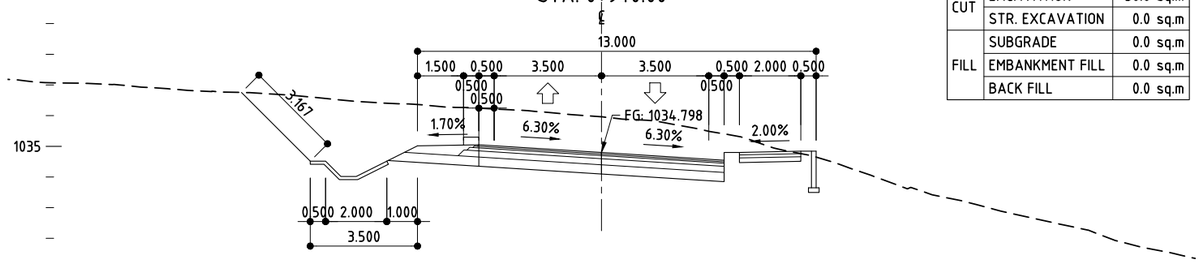
PROJECT:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA

DRAWING TITLE:
CROSS SECTIONS (1)

SCALE:
1 : 200

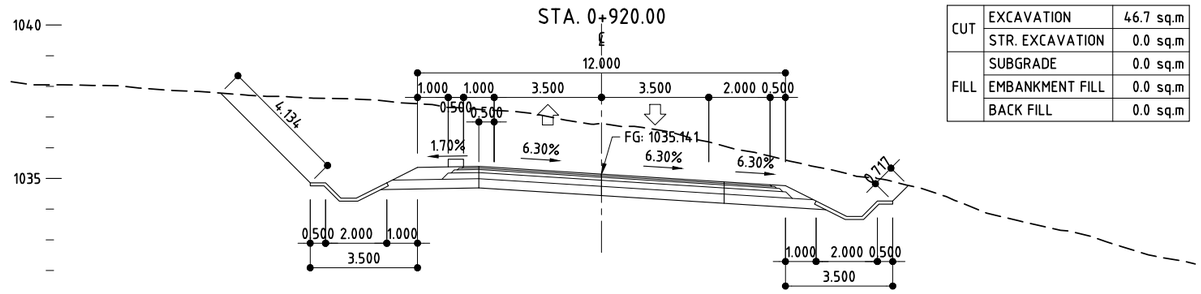
DRAWING No.:

STA. 0+940.00



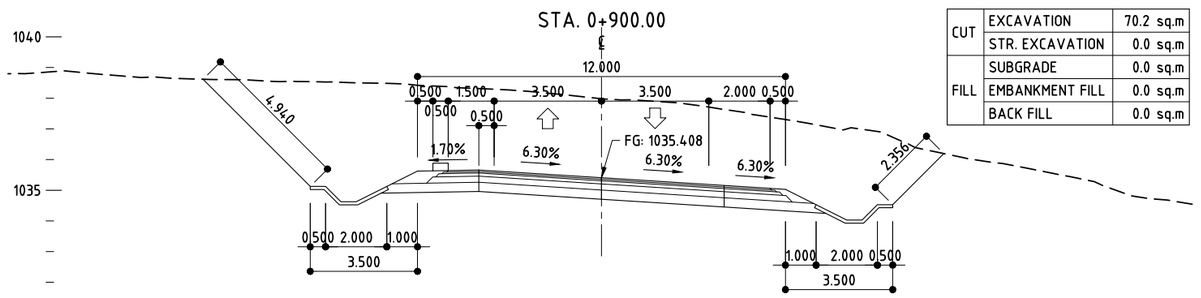
CUT	EXCAVATION	30.0 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+920.00



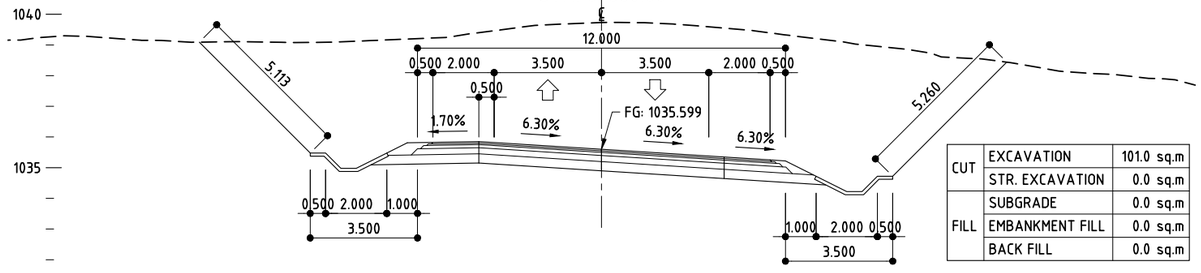
CUT	EXCAVATION	46.7 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+900.00



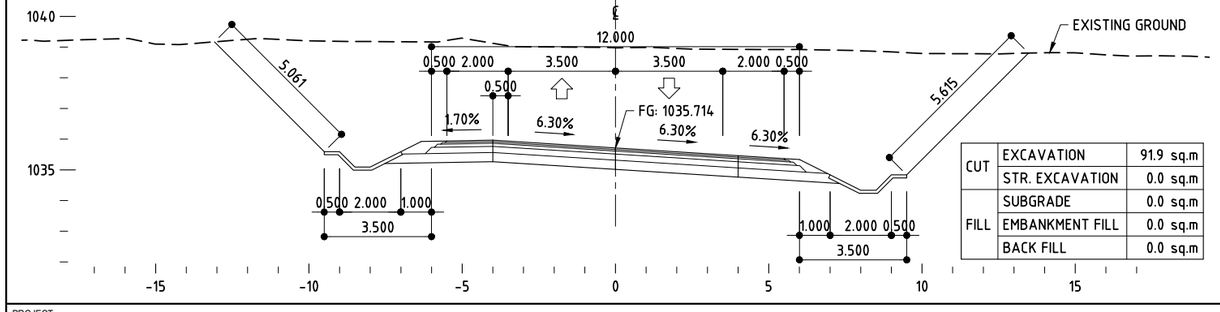
CUT	EXCAVATION	70.2 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+880.00



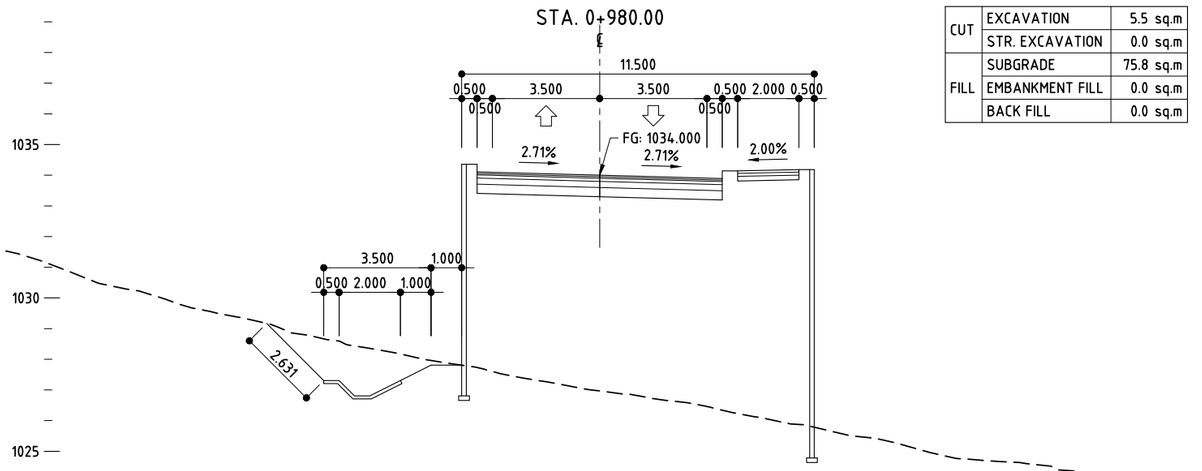
CUT	EXCAVATION	101.0 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+860.00



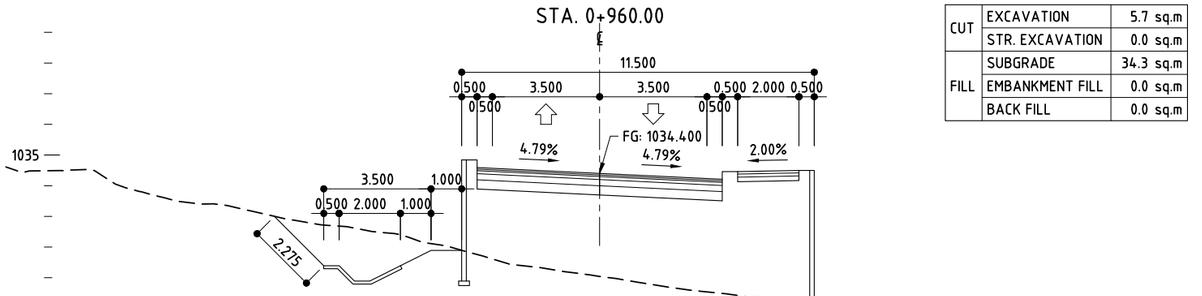
CUT	EXCAVATION	91.9 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+980.00



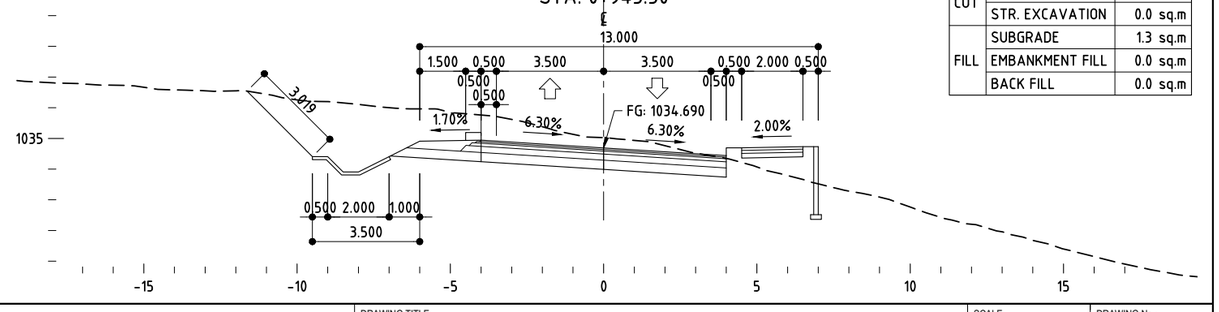
CUT	EXCAVATION	5.5 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	75.8 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+960.00



CUT	EXCAVATION	5.7 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	34.3 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+945.50



CUT	EXCAVATION	20.9 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	1.3 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

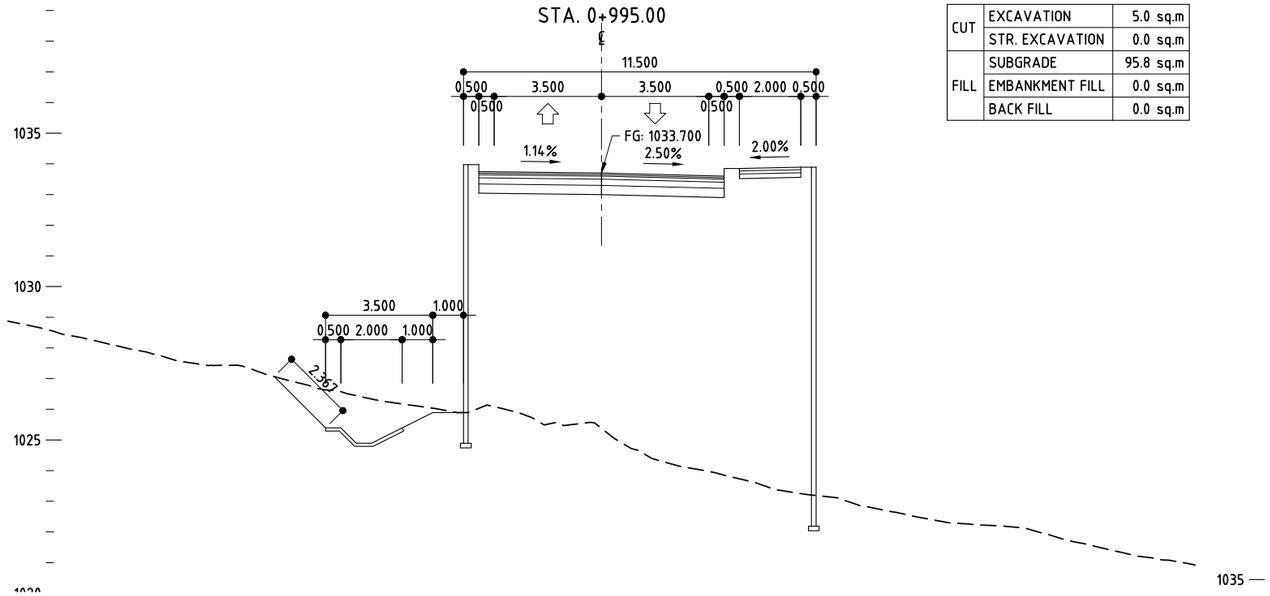
PROJECT:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA

DRAWING TITLE:
CROSS SECTIONS (1)

SCALE:
1 : 200

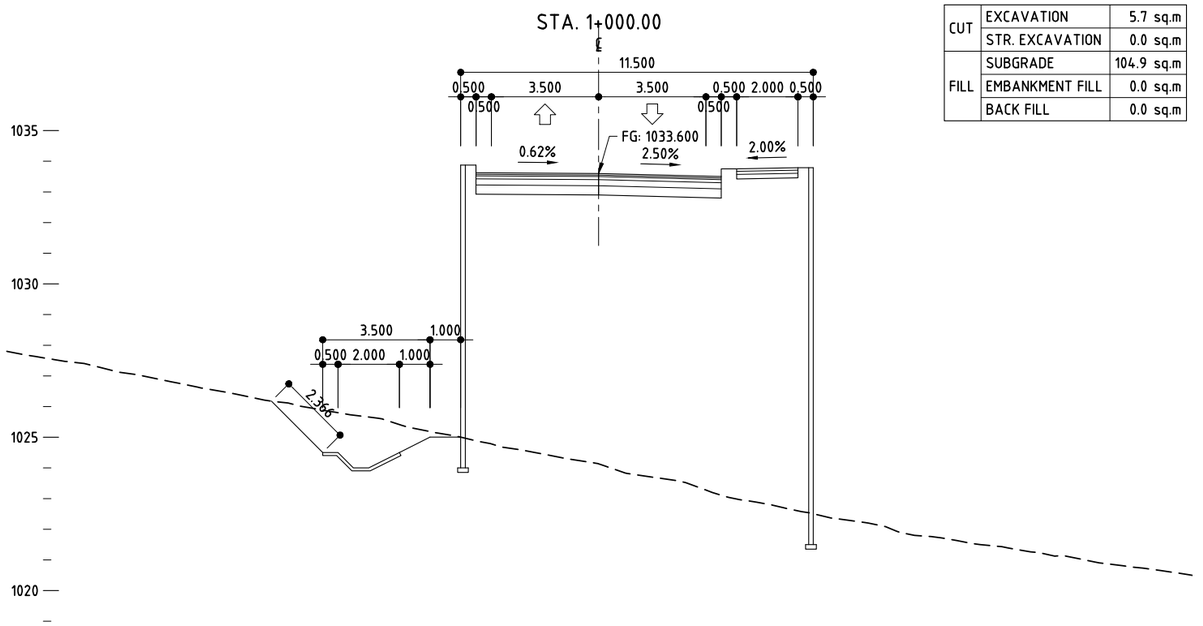
DRAWING No.:

STA. 0+995.00



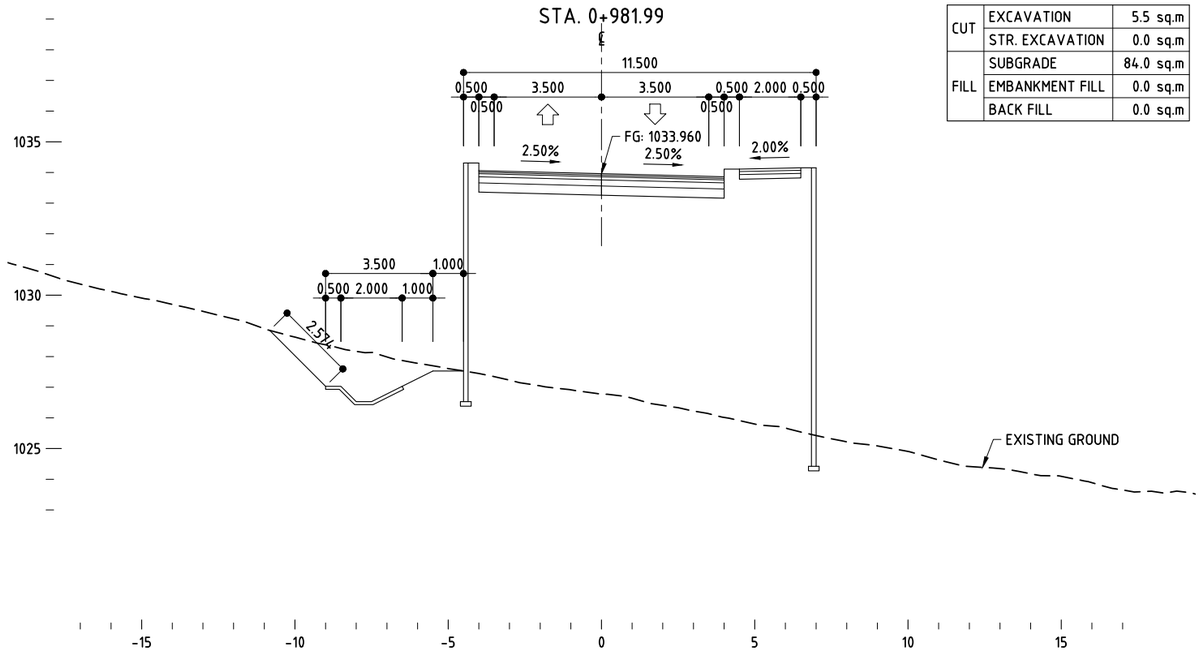
CUT	EXCAVATION	5.0 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	95.8 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+000.00



CUT	EXCAVATION	5.7 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	104.9 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 0+981.99



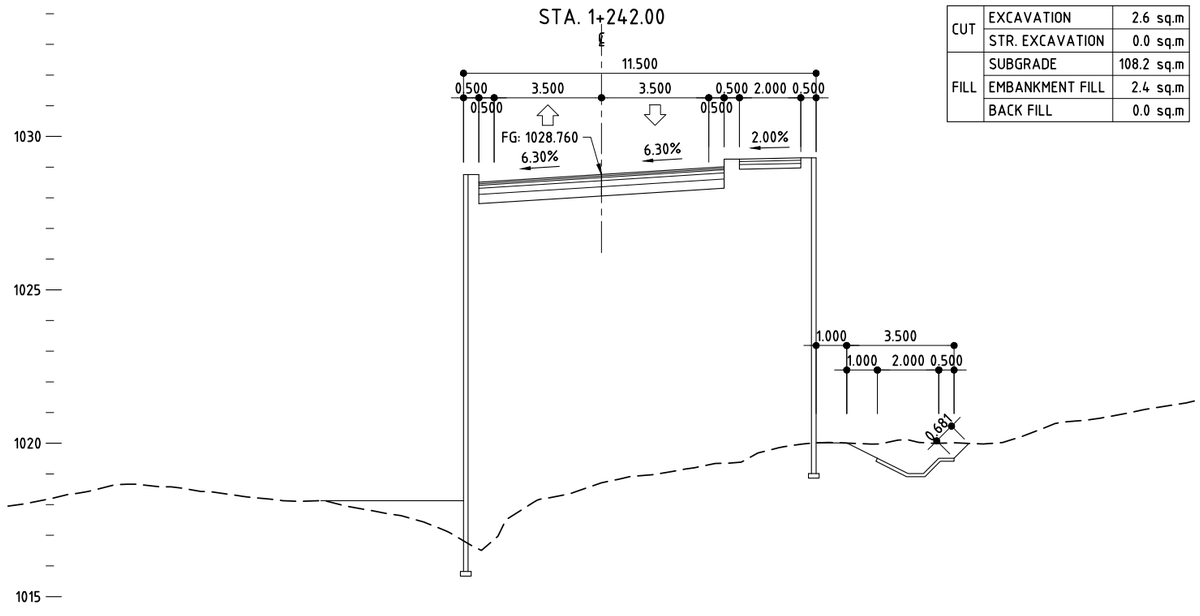
CUT	EXCAVATION	5.5 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	84.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

PROJECT:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA

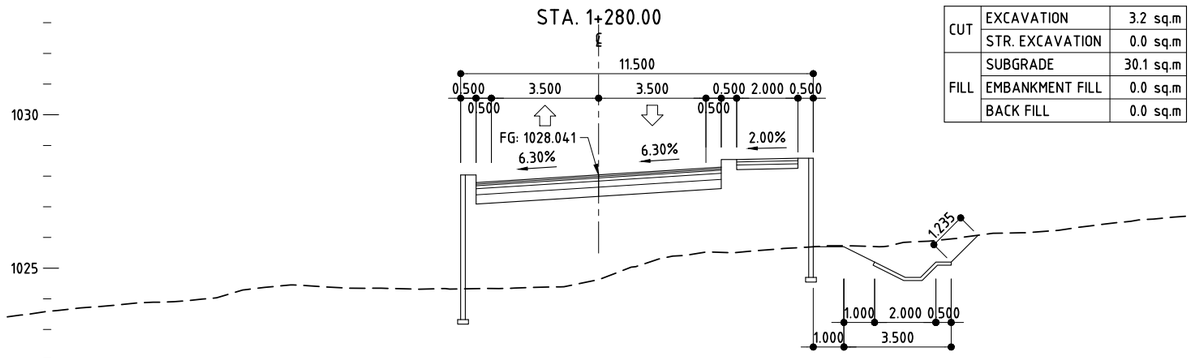
DRAWING TITLE:
CROSS SECTIONS (1)

SCALE:
1 : 200

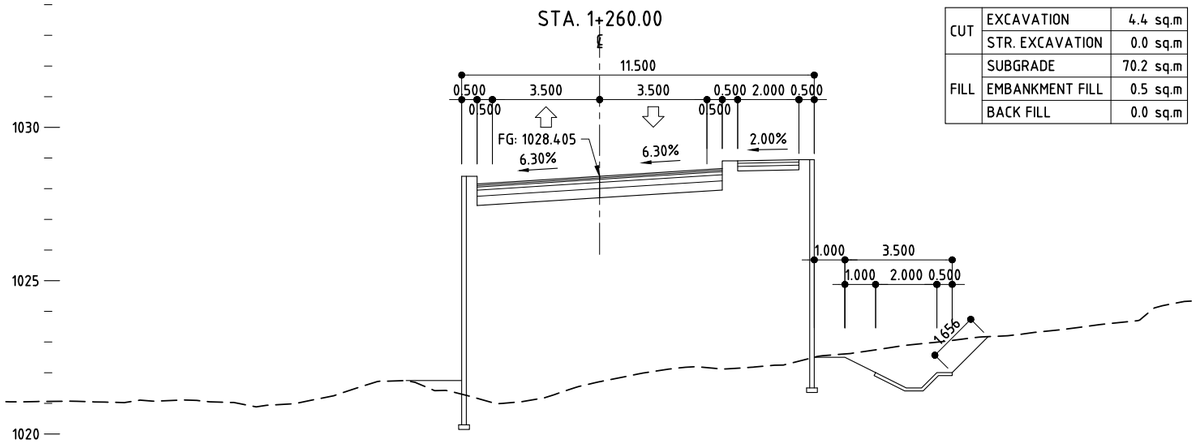
DRAWING No.:



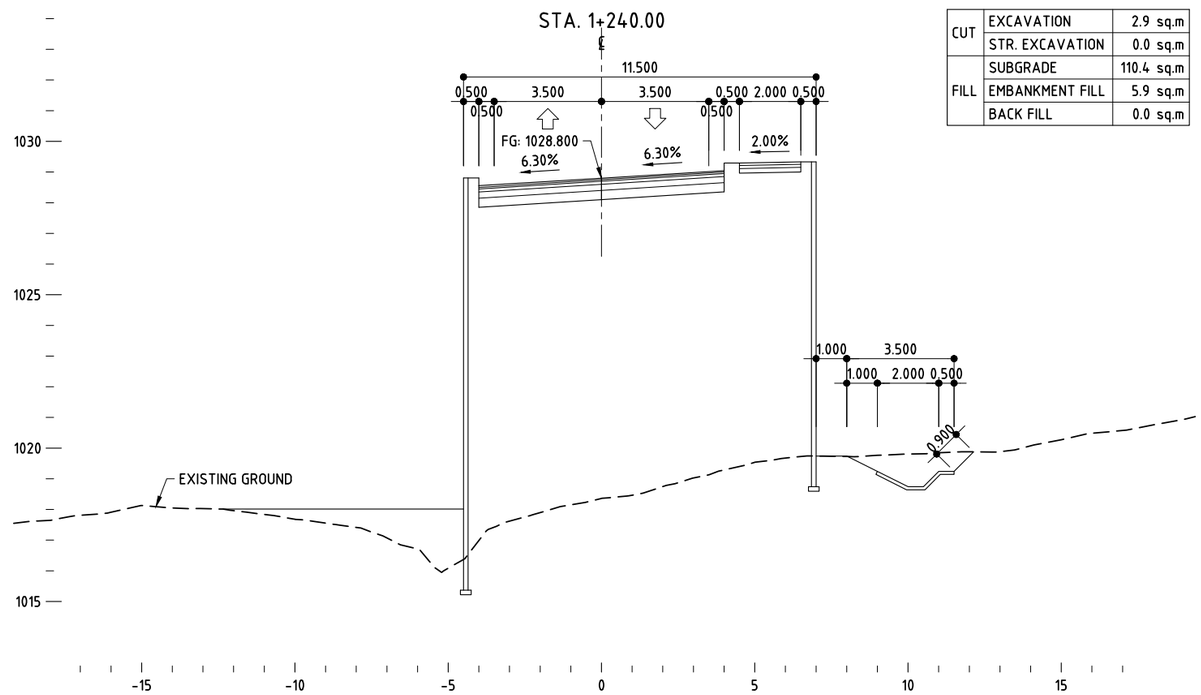
CUT	EXCAVATION	2.6 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	108.2 sq.m
	EMBANKMENT FILL	2.4 sq.m
	BACK FILL	0.0 sq.m



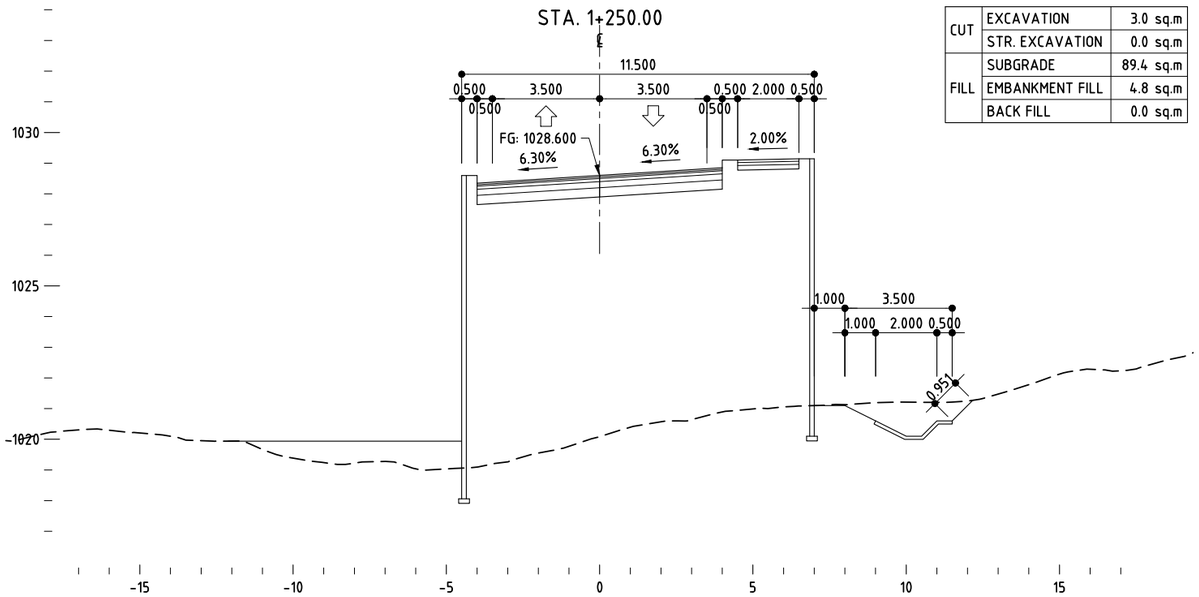
CUT	EXCAVATION	3.2 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	30.1 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m



CUT	EXCAVATION	4.4 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	70.2 sq.m
	EMBANKMENT FILL	0.5 sq.m
	BACK FILL	0.0 sq.m



CUT	EXCAVATION	2.9 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	110.4 sq.m
	EMBANKMENT FILL	5.9 sq.m
	BACK FILL	0.0 sq.m



CUT	EXCAVATION	3.0 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	89.4 sq.m
	EMBANKMENT FILL	4.8 sq.m
	BACK FILL	0.0 sq.m

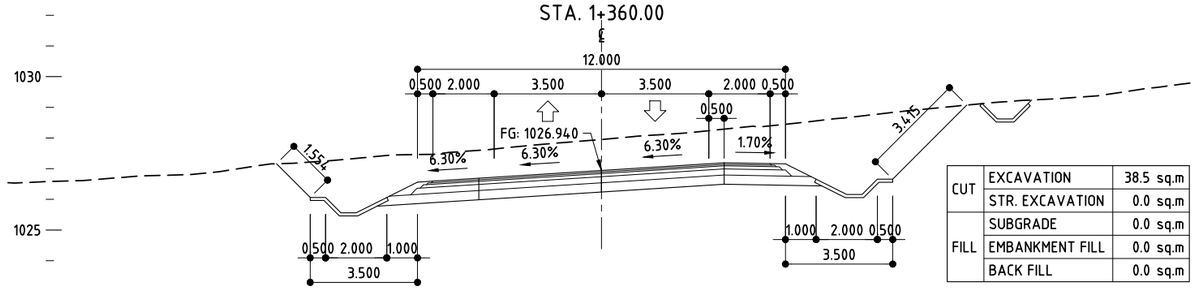
PROJECT:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA

DRAWING TITLE:
CROSS SECTIONS (1)

SCALE:
1 : 200

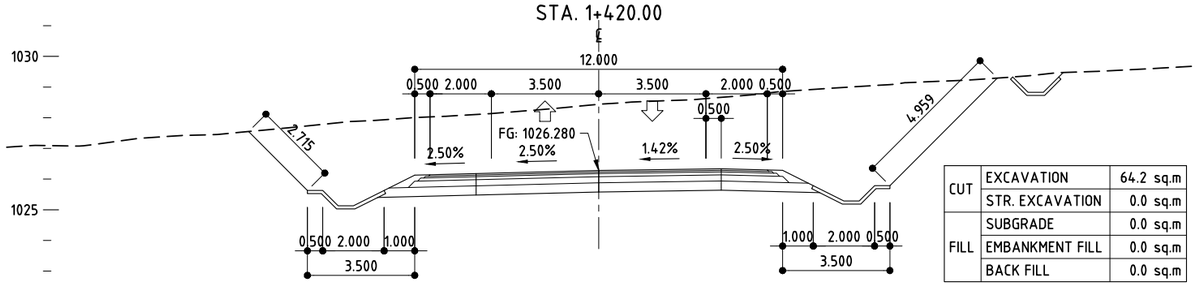
DRAWING No.:

STA. 1+360.00



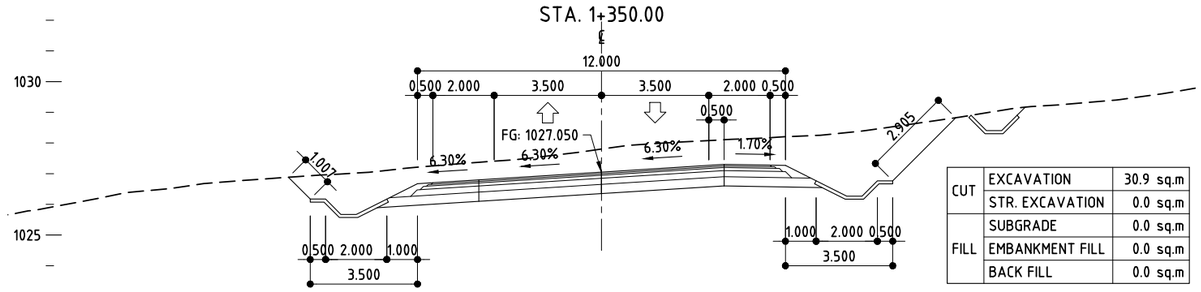
CUT	EXCAVATION	38.5 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+420.00



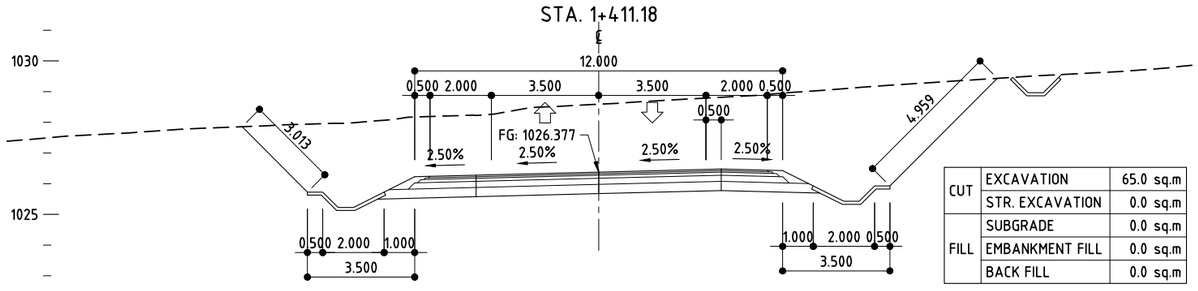
CUT	EXCAVATION	64.2 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+350.00



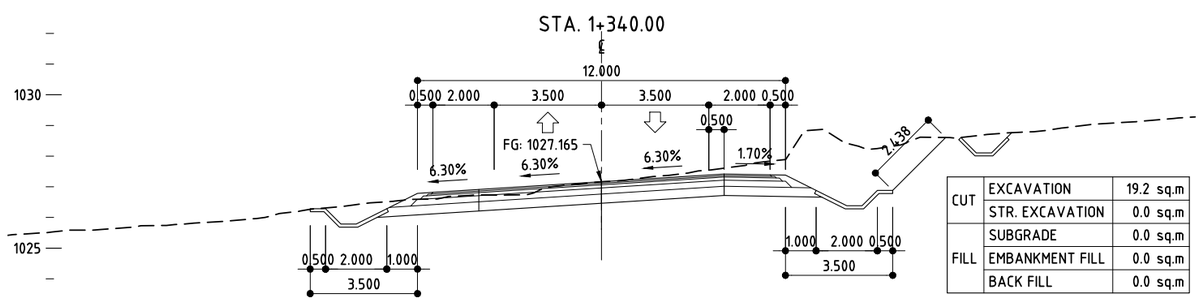
CUT	EXCAVATION	30.9 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+411.18



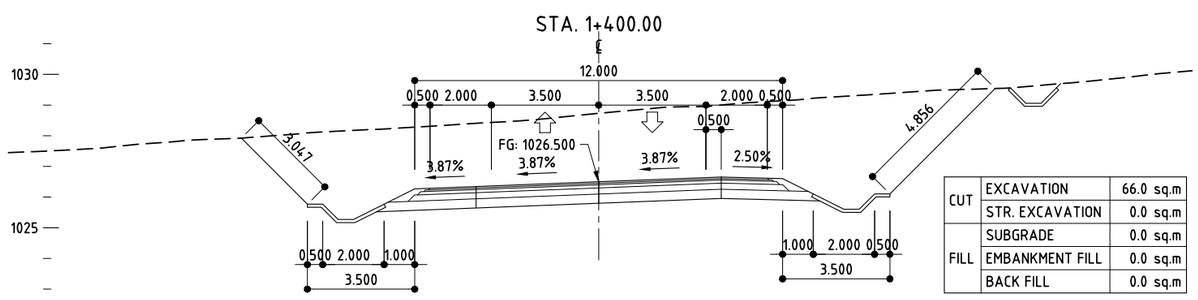
CUT	EXCAVATION	65.0 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+340.00



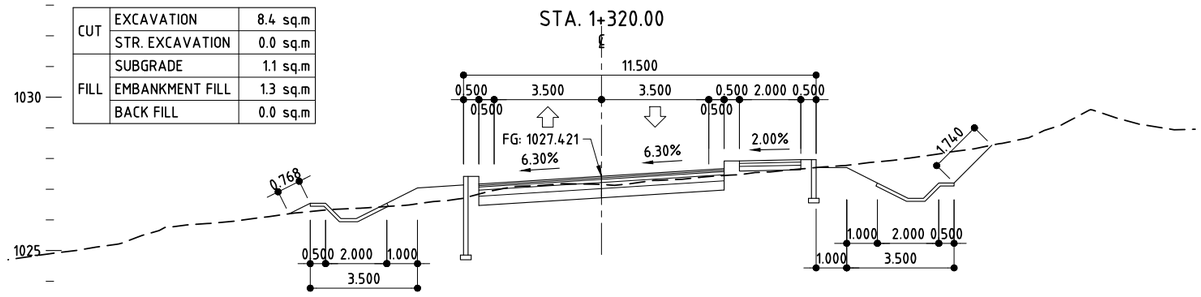
CUT	EXCAVATION	19.2 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+400.00



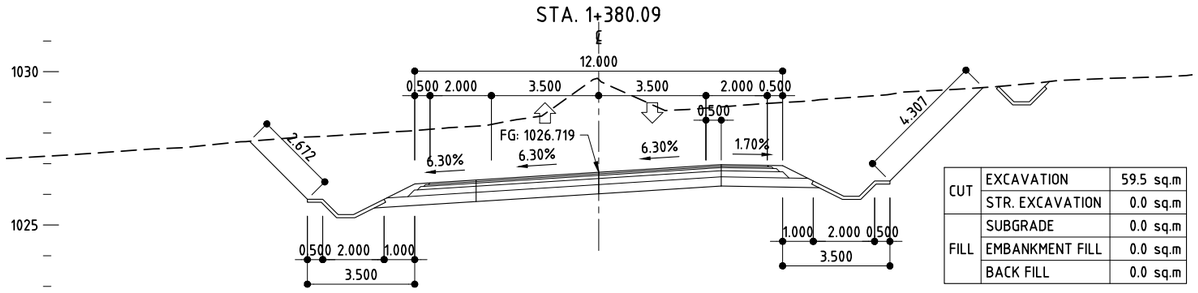
CUT	EXCAVATION	66.0 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+320.00



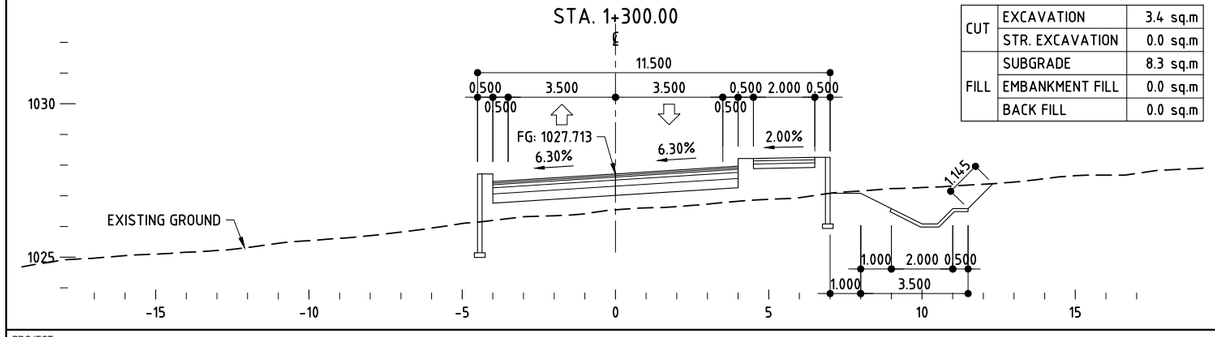
CUT	EXCAVATION	8.4 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	1.1 sq.m
	EMBANKMENT FILL	1.3 sq.m
	BACK FILL	0.0 sq.m

STA. 1+380.09



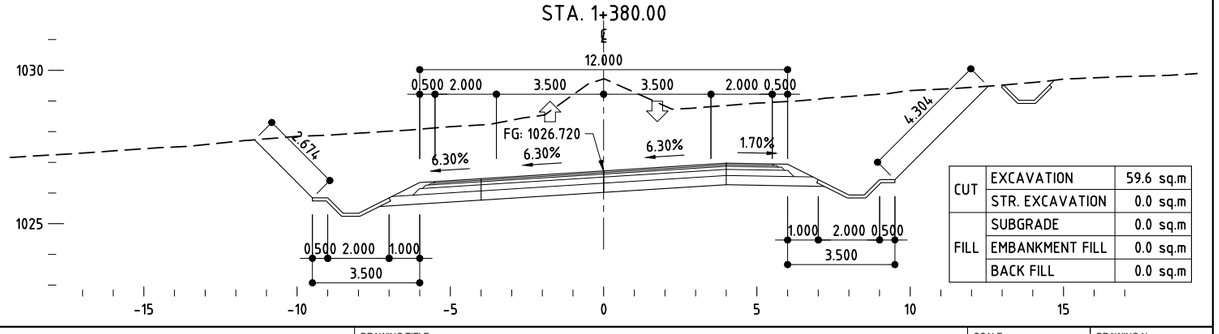
CUT	EXCAVATION	59.5 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+300.00



CUT	EXCAVATION	3.4 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	8.3 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+380.00



CUT	EXCAVATION	59.6 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

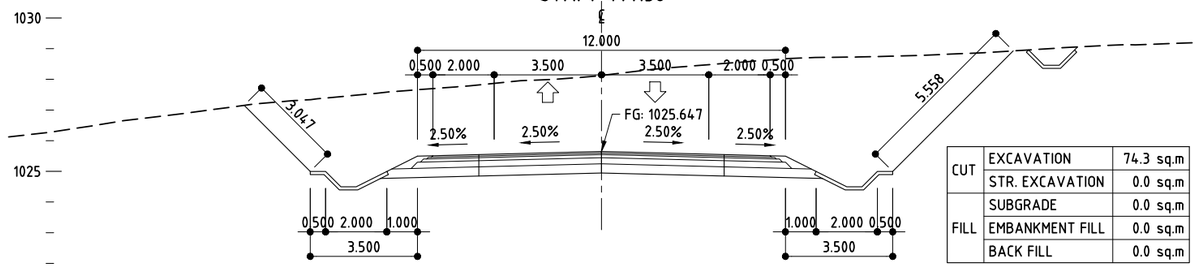
PROJECT:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA

DRAWING TITLE:
CROSS SECTIONS (1)

SCALE:
1 : 200

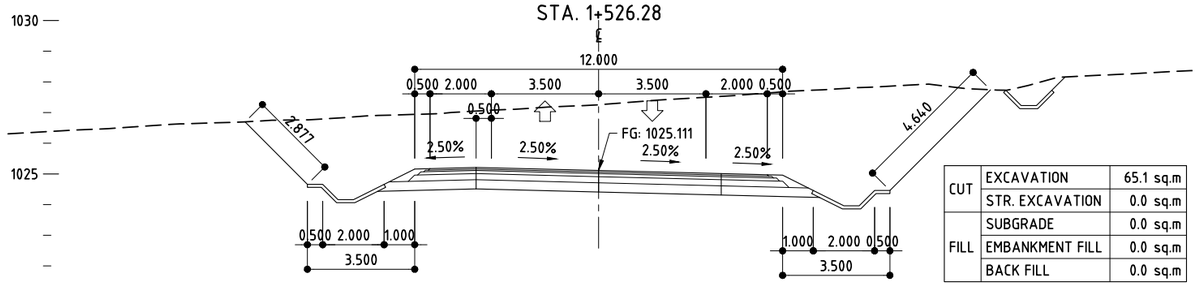
DRAWING No.:

STA. 1+477.58



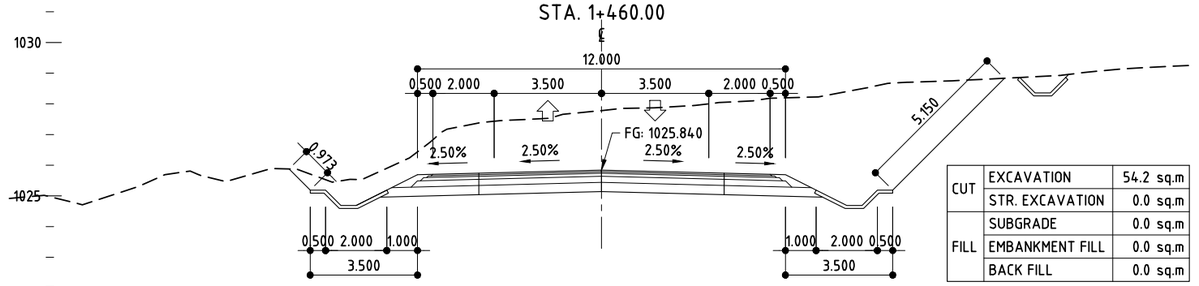
CUT	EXCAVATION	74.3 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+526.28



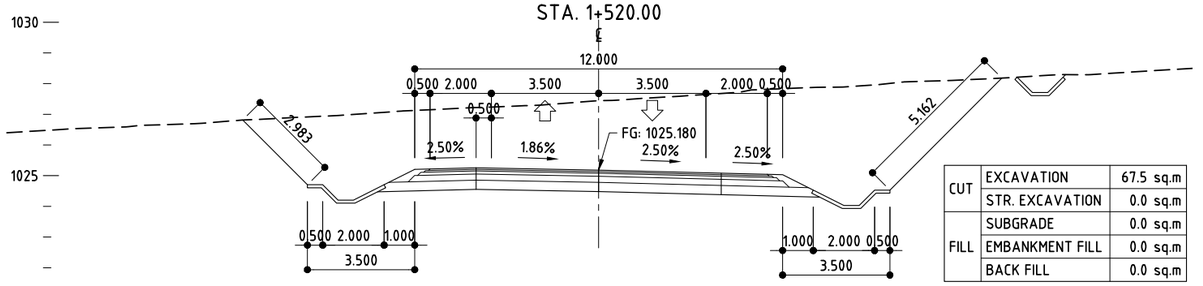
CUT	EXCAVATION	65.1 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+460.00



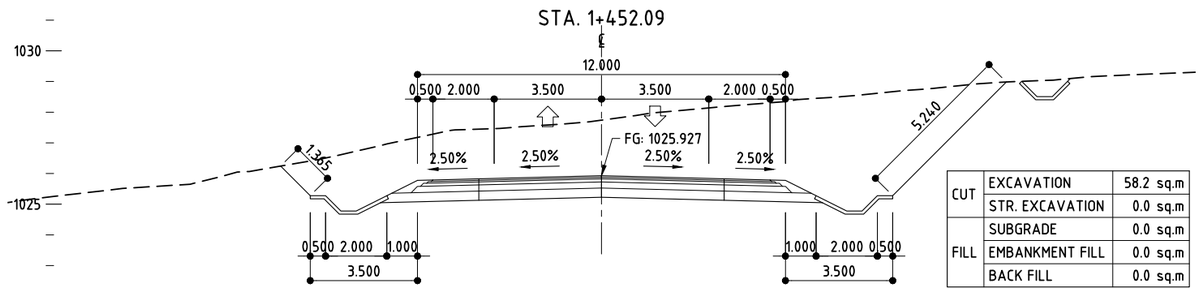
CUT	EXCAVATION	54.2 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+520.00



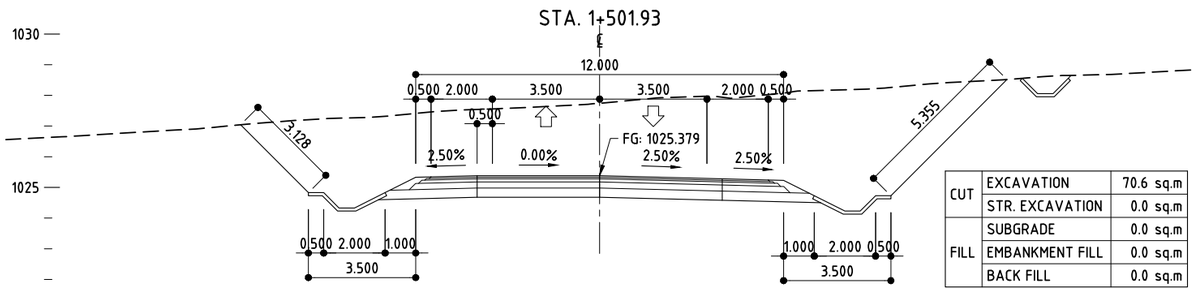
CUT	EXCAVATION	67.5 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+452.09



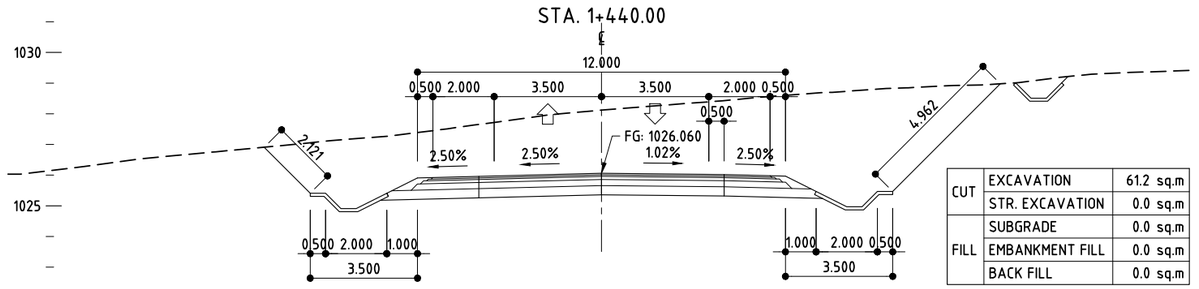
CUT	EXCAVATION	58.2 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+501.93



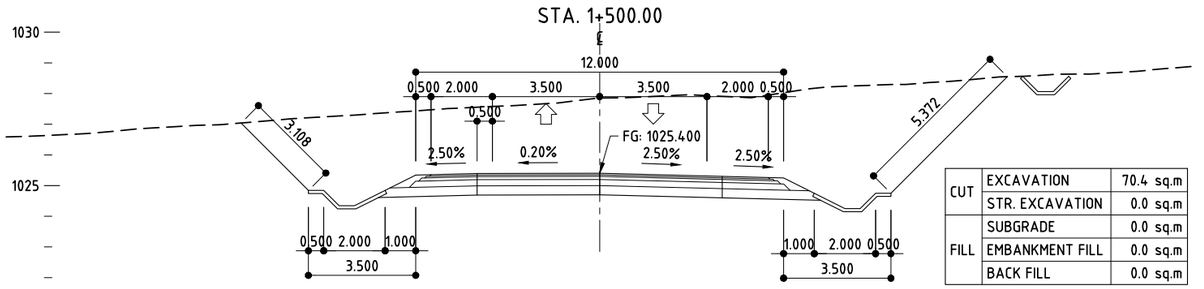
CUT	EXCAVATION	70.6 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+440.00



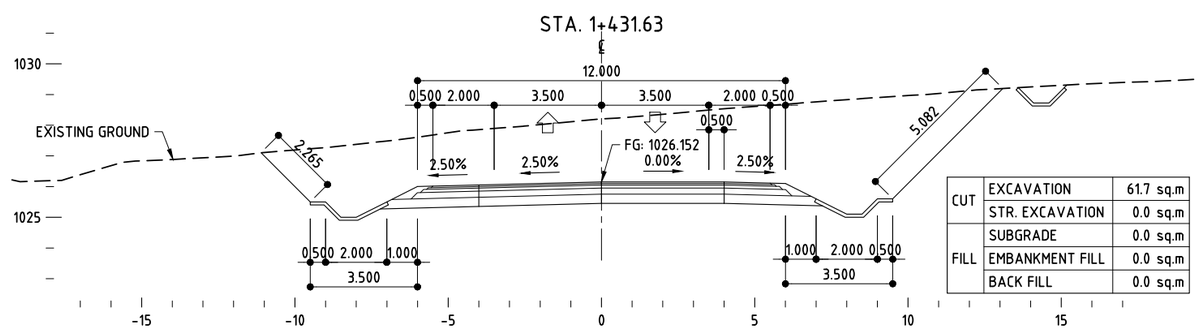
CUT	EXCAVATION	61.2 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+500.00



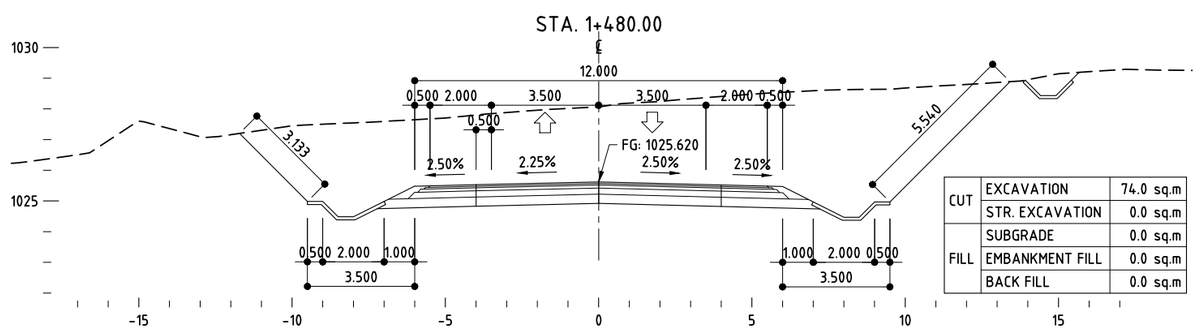
CUT	EXCAVATION	70.4 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+431.63



CUT	EXCAVATION	61.7 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+480.00



CUT	EXCAVATION	74.0 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

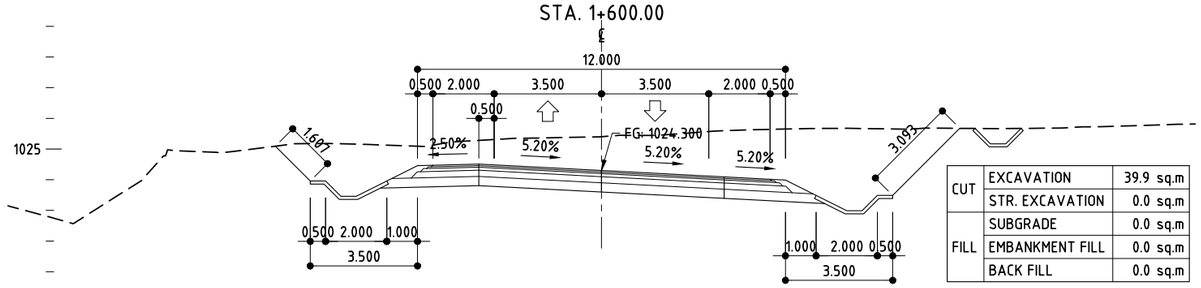
PROJECT:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA

DRAWING TITLE:
CROSS SECTIONS (1)

SCALE:
1 : 200

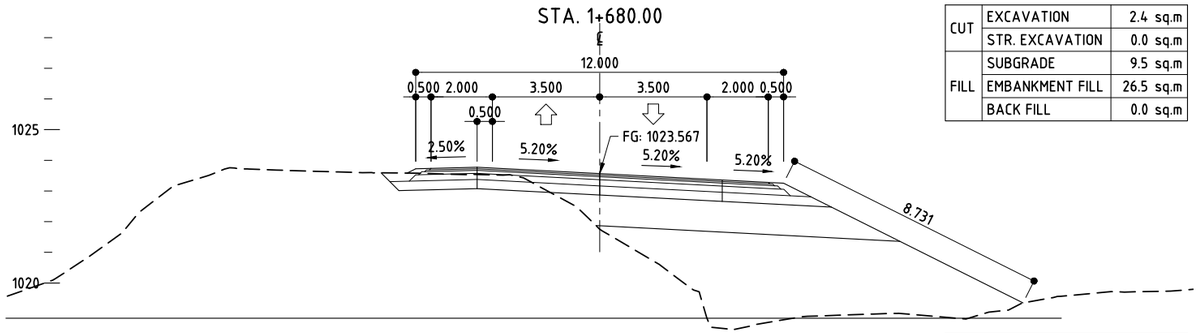
DRAWING No.:

STA. 1+600.00



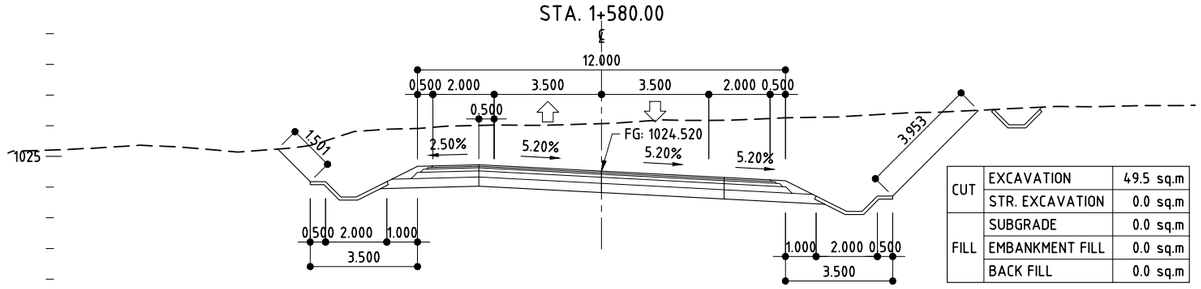
CUT	EXCAVATION	39.9 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+680.00



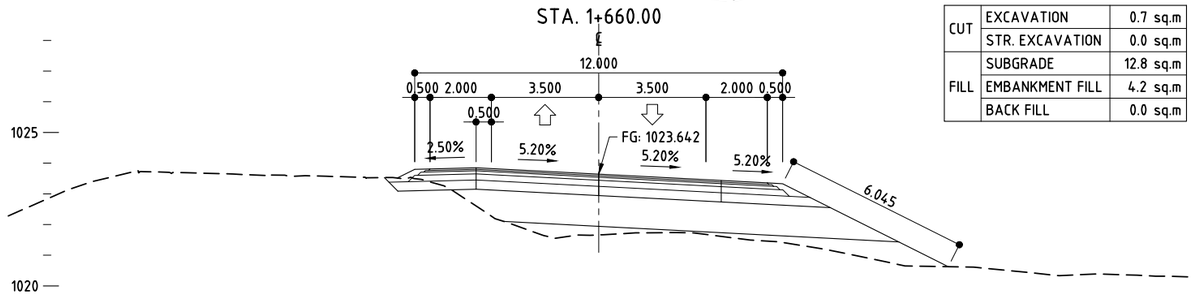
CUT	EXCAVATION	2.4 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	9.5 sq.m
	EMBANKMENT FILL	26.5 sq.m
	BACK FILL	0.0 sq.m

STA. 1+580.00



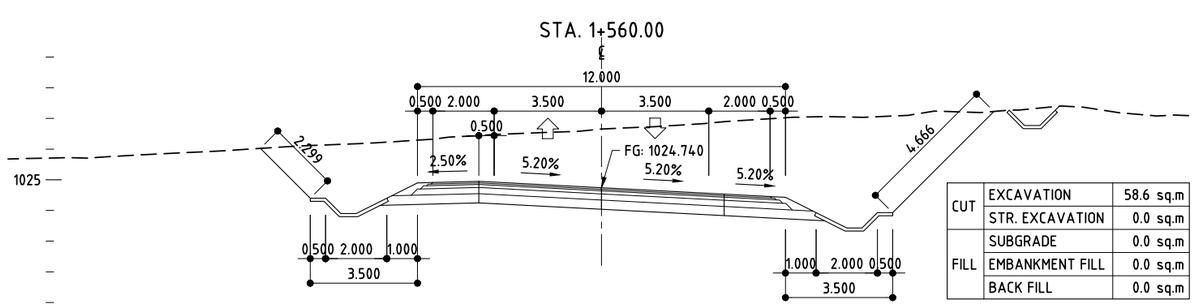
CUT	EXCAVATION	49.5 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+660.00



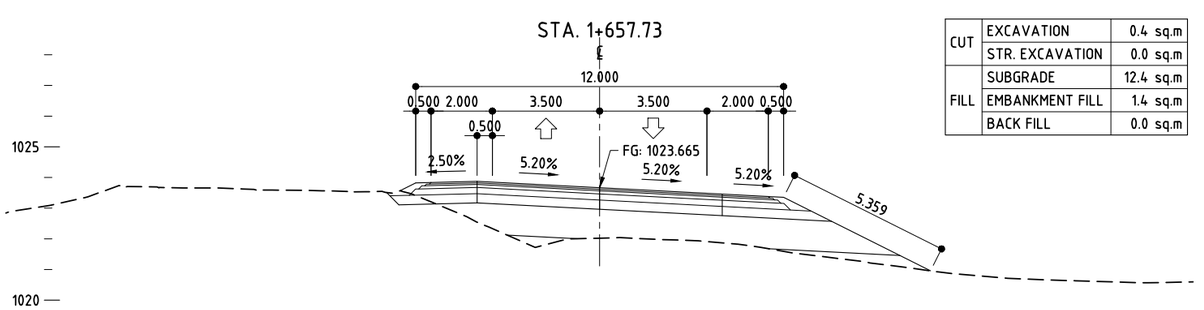
CUT	EXCAVATION	0.7 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	12.8 sq.m
	EMBANKMENT FILL	4.2 sq.m
	BACK FILL	0.0 sq.m

STA. 1+560.00



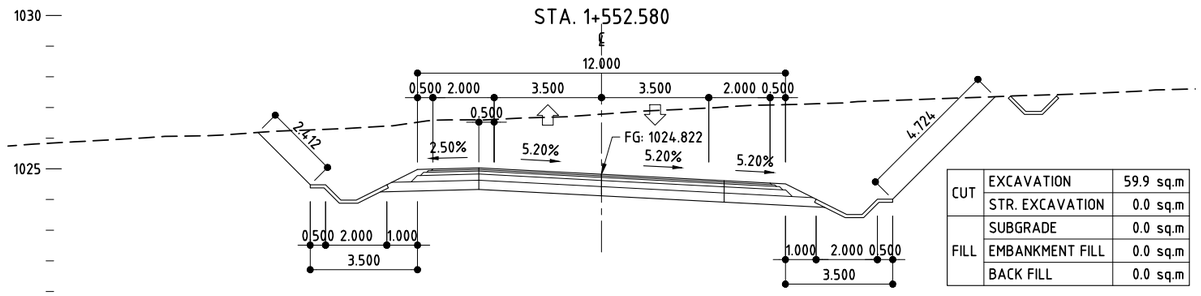
CUT	EXCAVATION	58.6 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+657.73



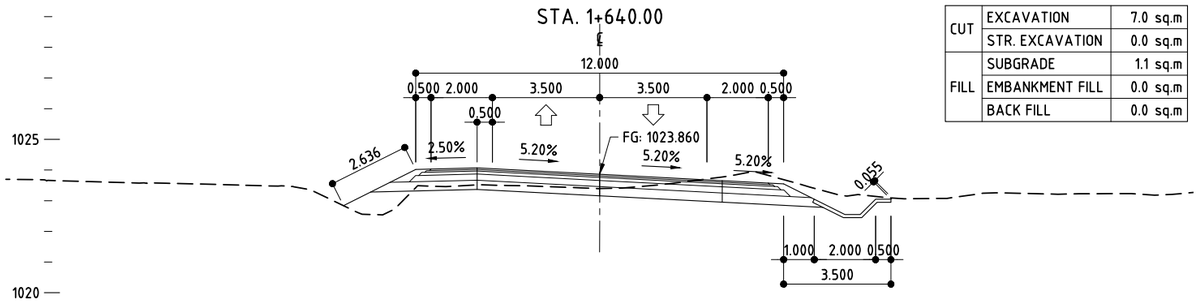
CUT	EXCAVATION	0.4 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	12.4 sq.m
	EMBANKMENT FILL	1.4 sq.m
	BACK FILL	0.0 sq.m

STA. 1+552.580



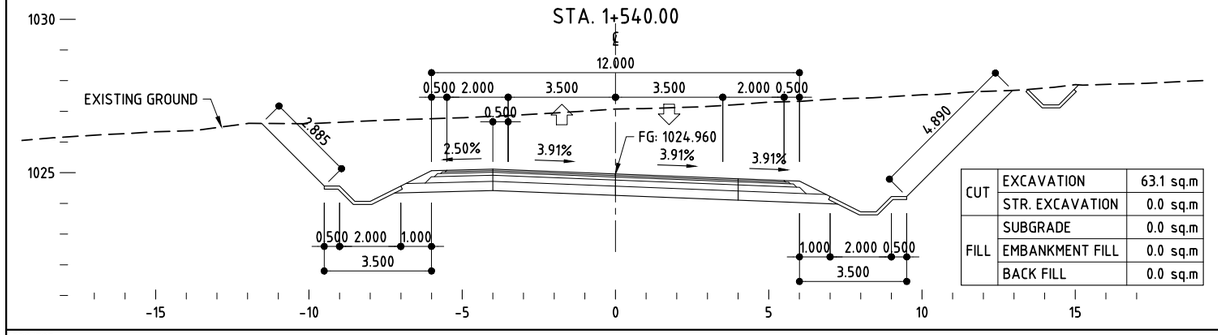
CUT	EXCAVATION	59.9 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+640.00



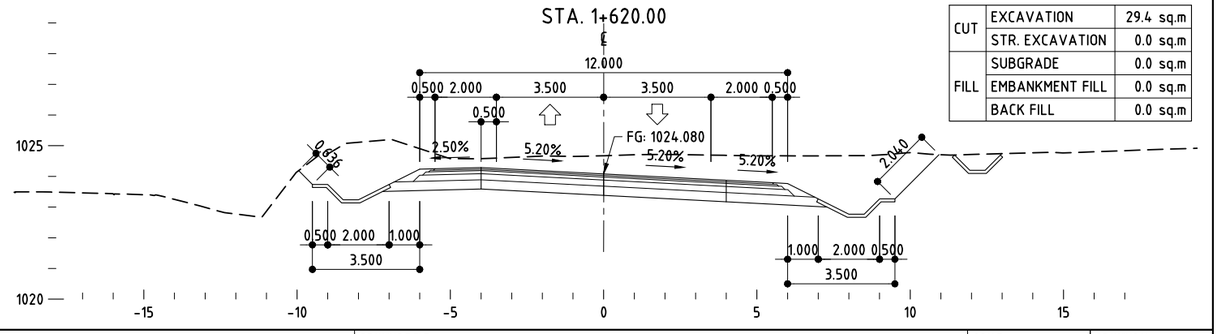
CUT	EXCAVATION	7.0 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	1.1 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+540.00



CUT	EXCAVATION	63.1 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+620.00



CUT	EXCAVATION	29.4 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

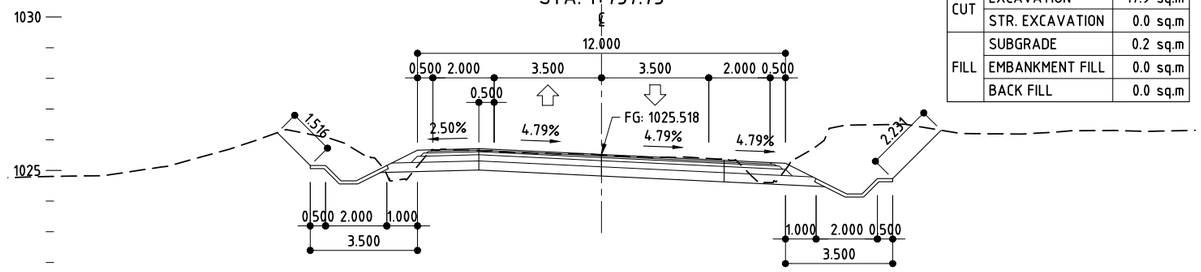
PROJECT:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA

DRAWING TITLE:
CROSS SECTIONS (1)

SCALE:
1 : 200

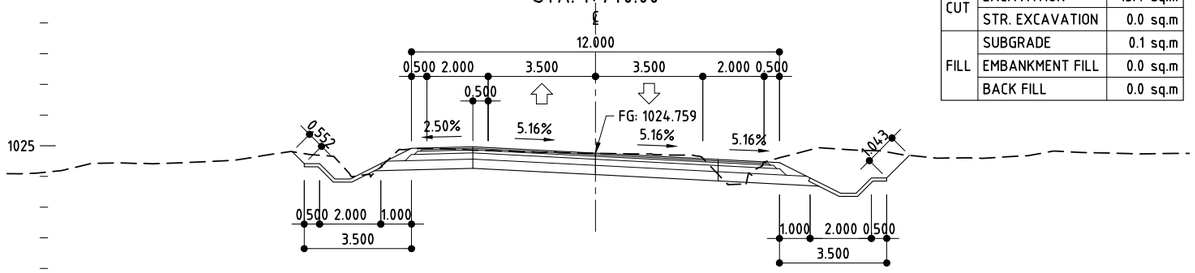
DRAWING No.:

STA. 1+757.73



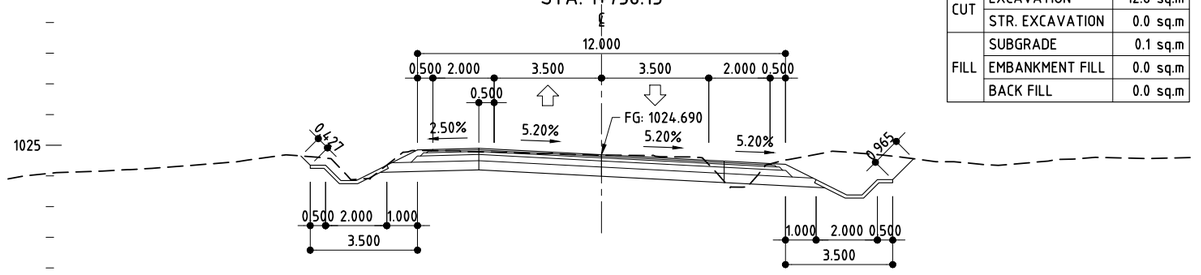
CUT	EXCAVATION	17.9 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.2 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+740.00



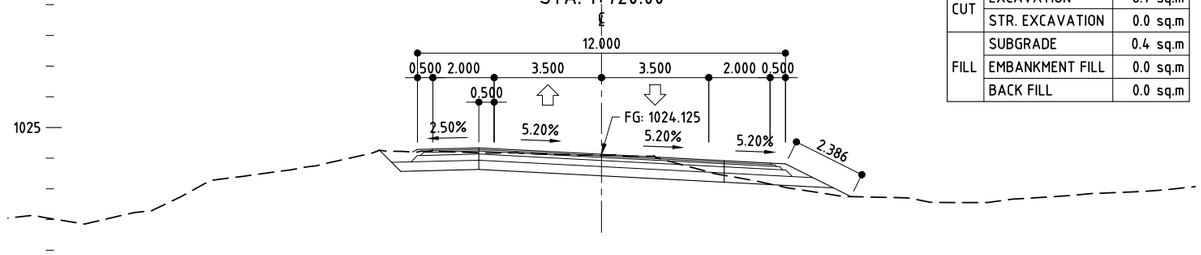
CUT	EXCAVATION	13.4 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.1 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+738.13



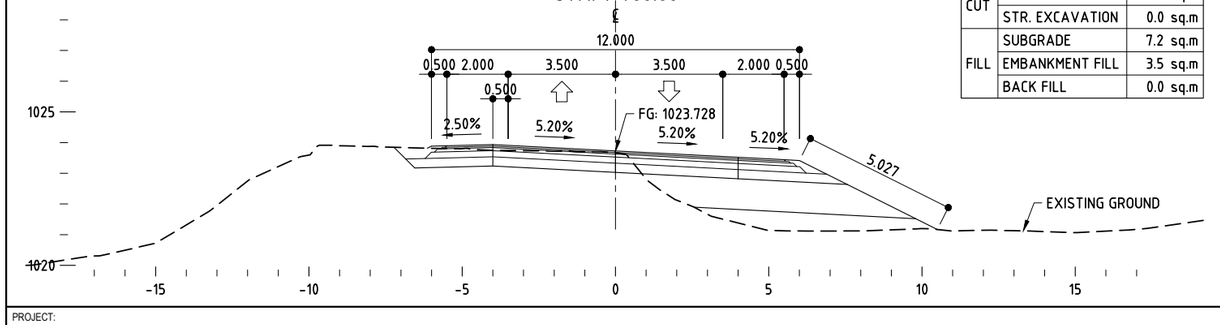
CUT	EXCAVATION	12.8 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.1 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+720.00



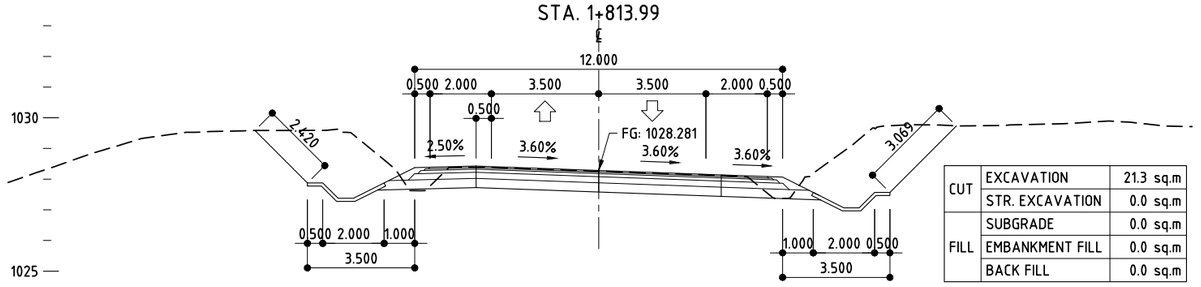
CUT	EXCAVATION	6.7 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.4 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+700.00



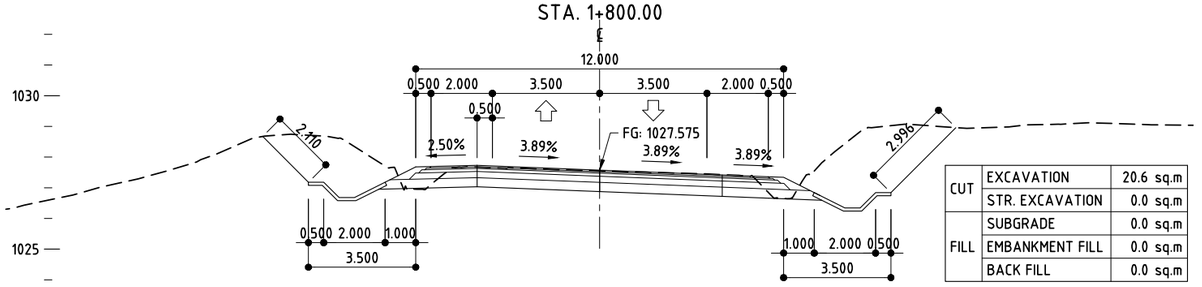
CUT	EXCAVATION	4.5 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	7.2 sq.m
	EMBANKMENT FILL	3.5 sq.m
	BACK FILL	0.0 sq.m

STA. 1+813.99



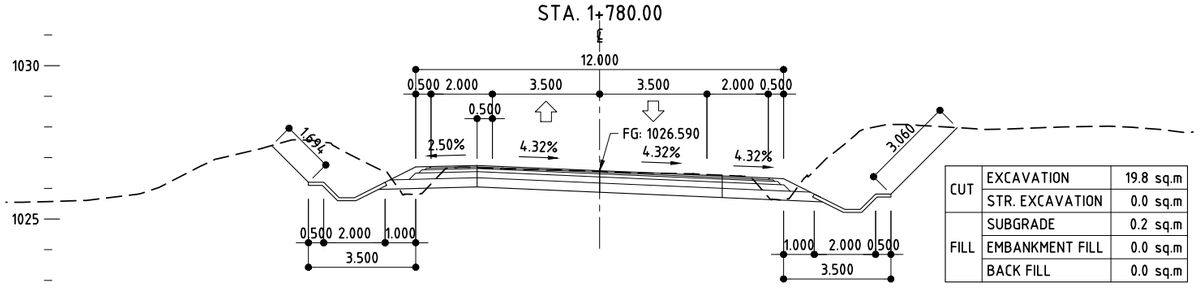
CUT	EXCAVATION	21.3 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+800.00



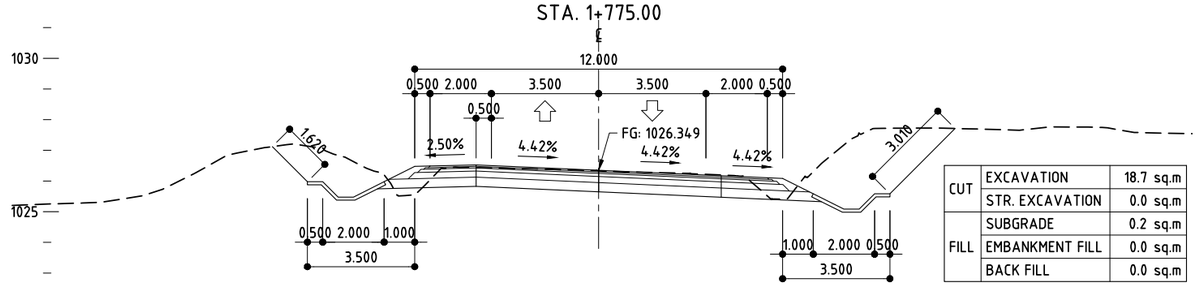
CUT	EXCAVATION	20.6 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+780.00



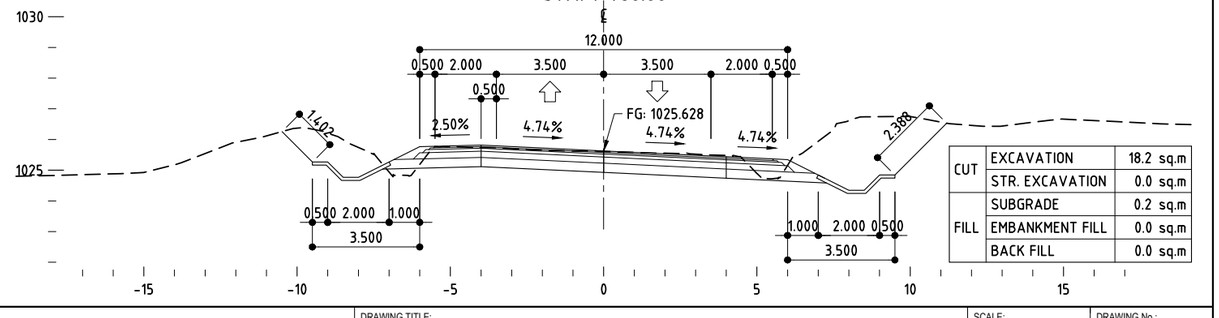
CUT	EXCAVATION	19.8 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.2 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+775.00



CUT	EXCAVATION	18.7 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.2 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+760.00



CUT	EXCAVATION	18.2 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.2 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

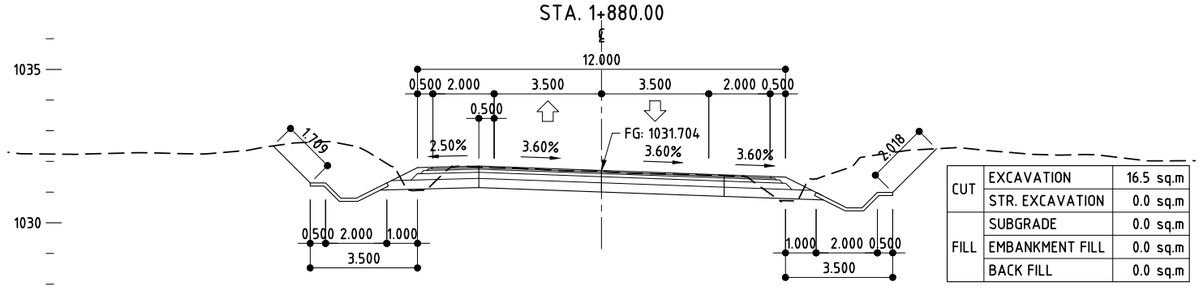
PROJECT:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA

DRAWING TITLE:
CROSS SECTIONS (1)

SCALE:
1 : 200

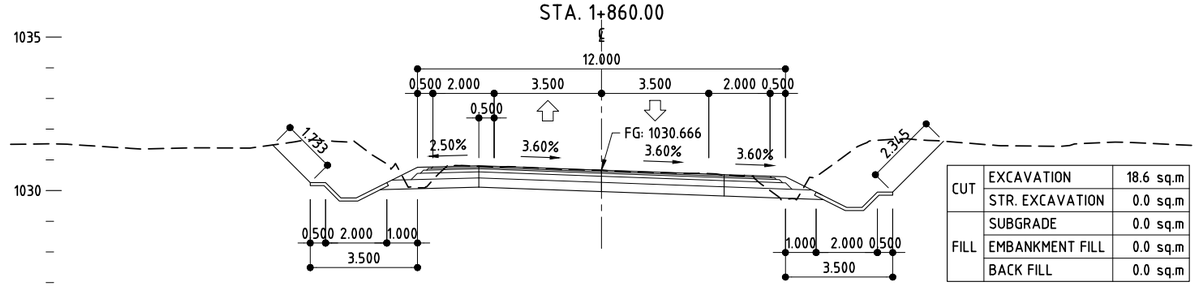
DRAWING No.:

STA. 1+880.00



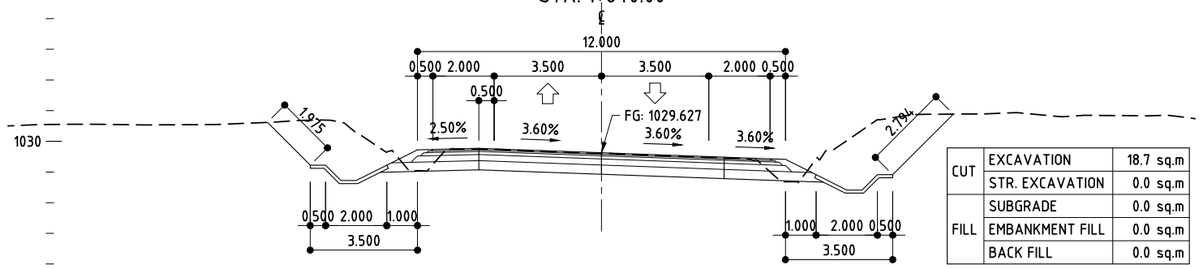
CUT	EXCAVATION	16.5 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+860.00



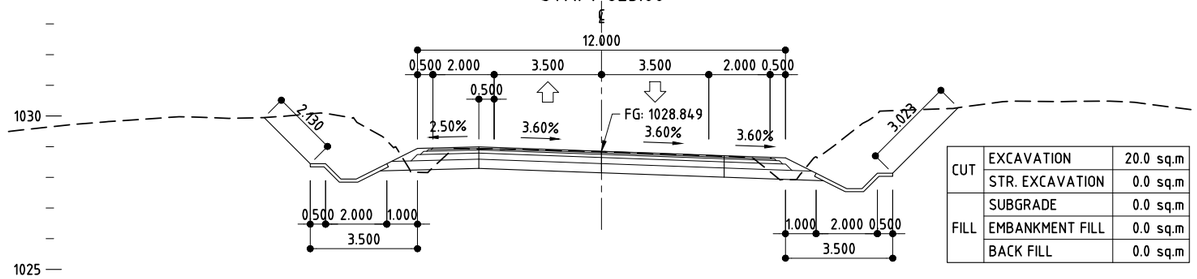
CUT	EXCAVATION	18.6 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+840.00



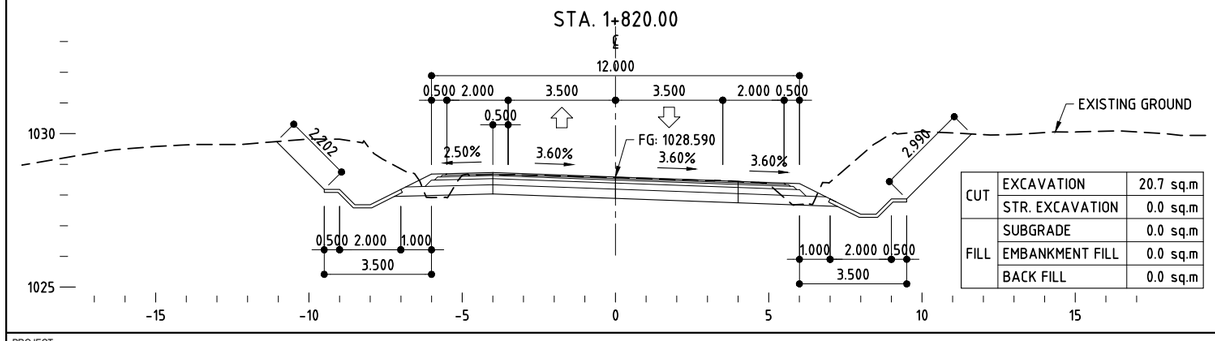
CUT	EXCAVATION	18.7 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+825.00



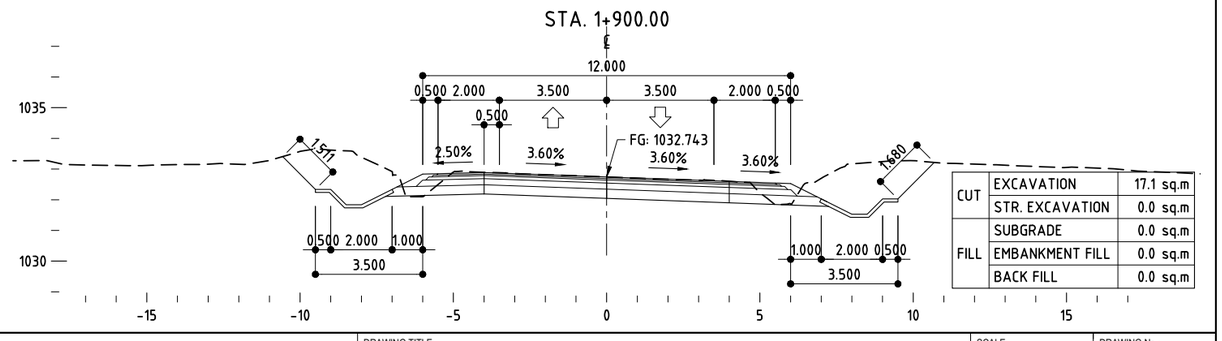
CUT	EXCAVATION	20.0 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+820.00



CUT	EXCAVATION	20.7 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

STA. 1+900.00



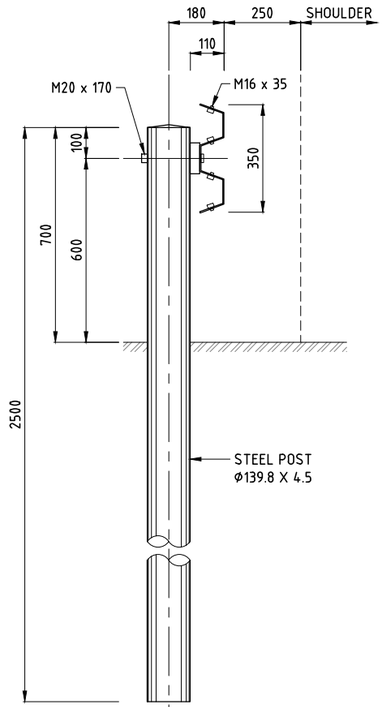
CUT	EXCAVATION	17.1 sq.m
	STR. EXCAVATION	0.0 sq.m
FILL	SUBGRADE	0.0 sq.m
	EMBANKMENT FILL	0.0 sq.m
	BACK FILL	0.0 sq.m

PROJECT:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA

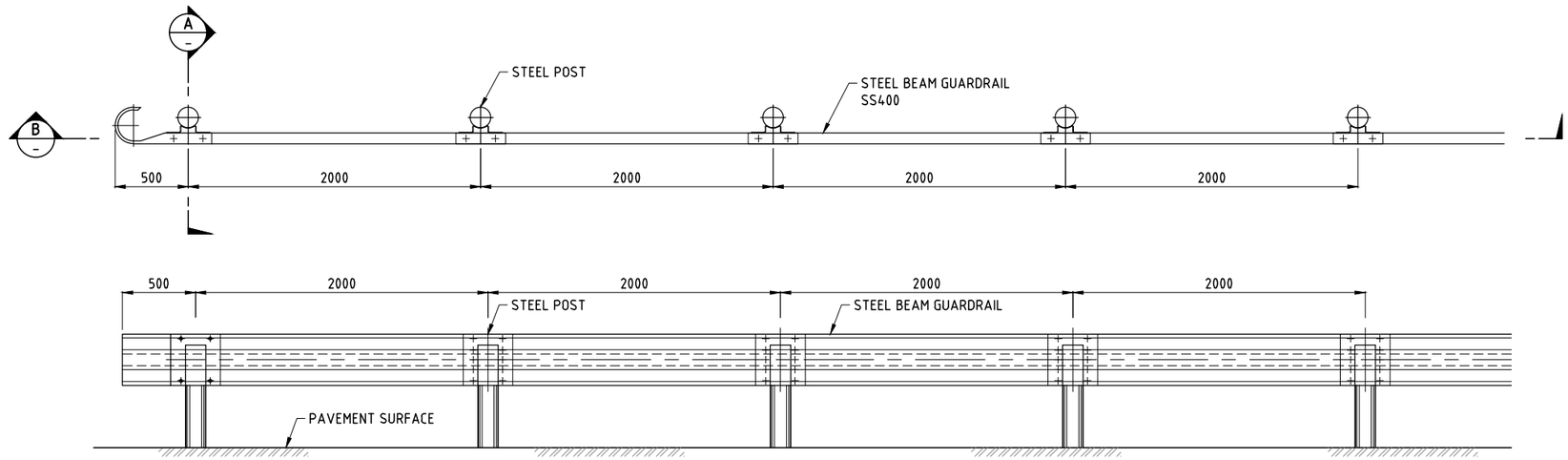
DRAWING TITLE:
CROSS SECTIONS (1)

SCALE:
1 : 200

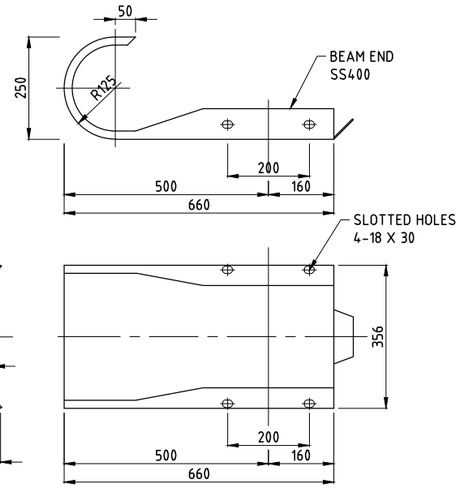
DRAWING No.:



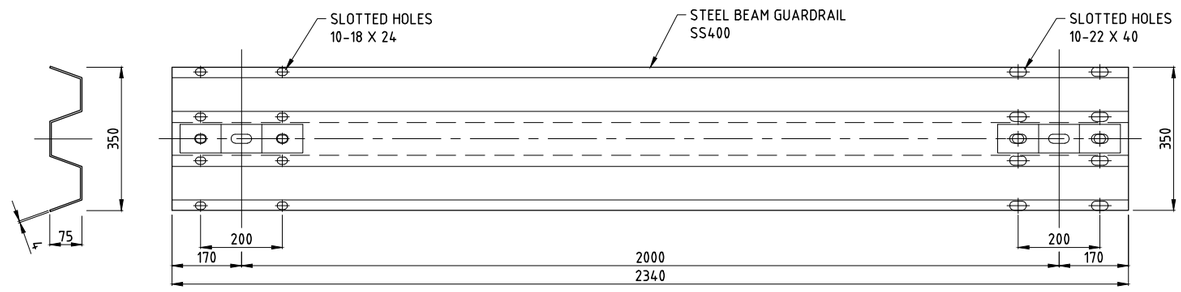
A — STEEL POST
SCALE 1:20



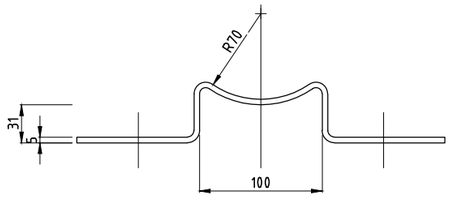
B — ELEVATION
SCALE 1:40

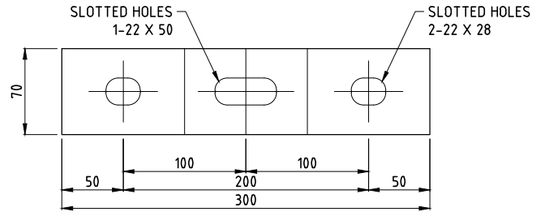


B1 — BEAM END DETAIL
SCALE 1:15

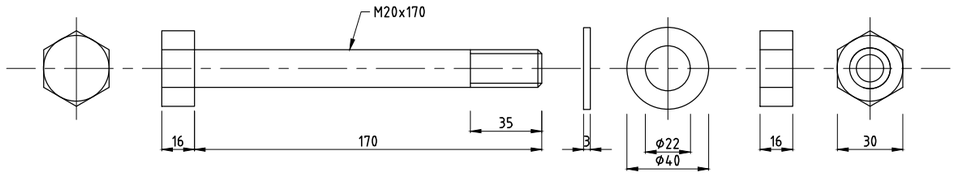


B2 — BEAM DETAIL
SCALE 1:15

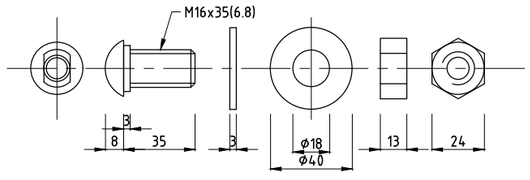




C — BRACKET DETAIL
SCALE 1:5

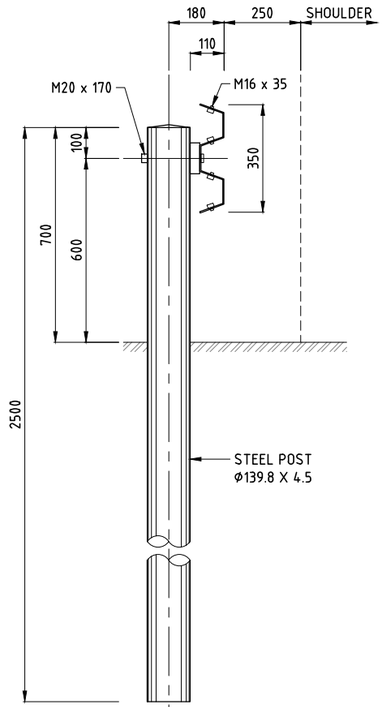


D1 — BOLT FOR BRACKET M20x170
SCALE 1:3

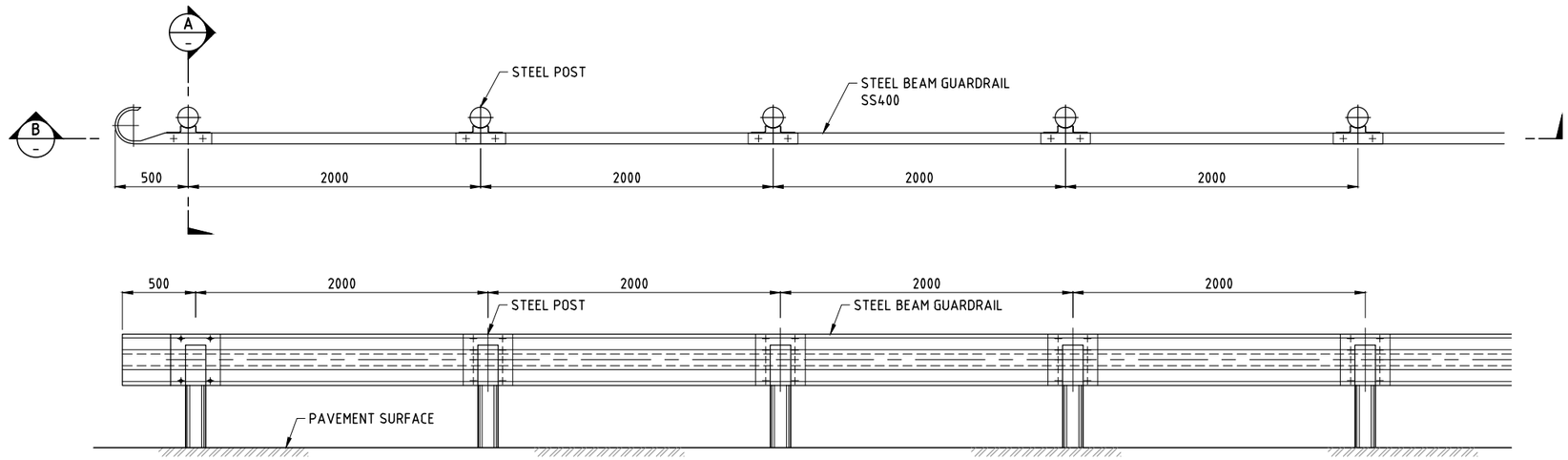


D2 — LONGITUDINAL SECTION M16x35(6.8)
SCALE 1:3

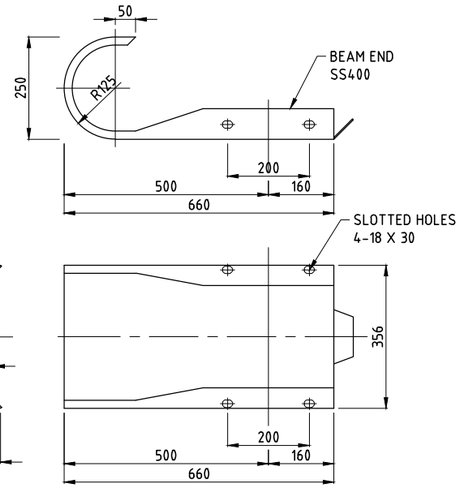
PROJECT:	DRAWING TITLE:	SCALE:	DRAWING No.:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA	GUARDRAIL DETAILS	AS SHOWN	E-01



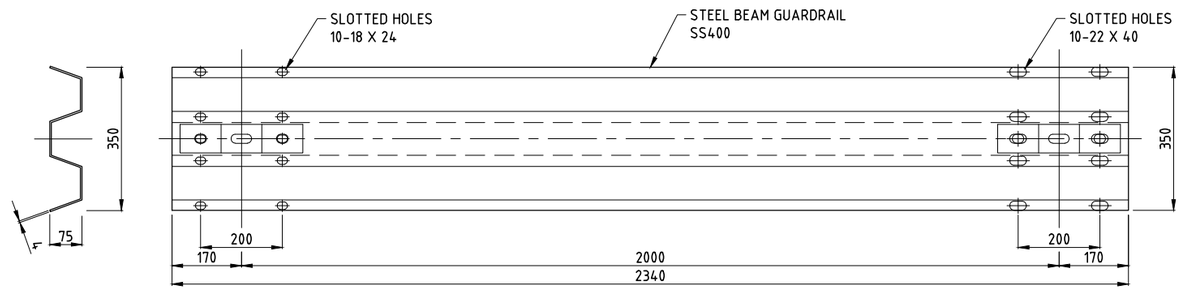
A — STEEL POST
SCALE 1:20



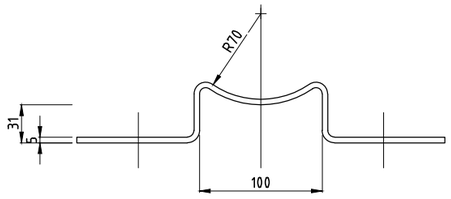
B — ELEVATION
SCALE 1:40

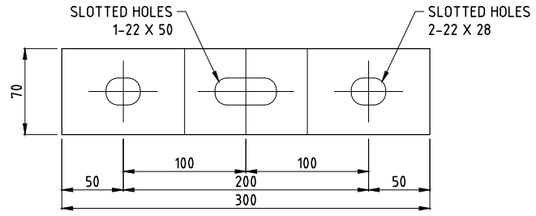


B1 — BEAM END DETAIL
SCALE 1:15

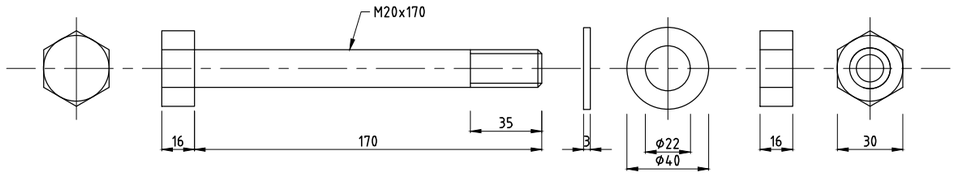


B2 — BEAM DETAIL
SCALE 1:15

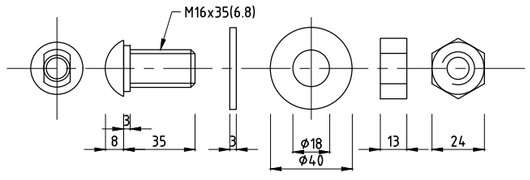




C — BRACKET DETAIL
SCALE 1:5

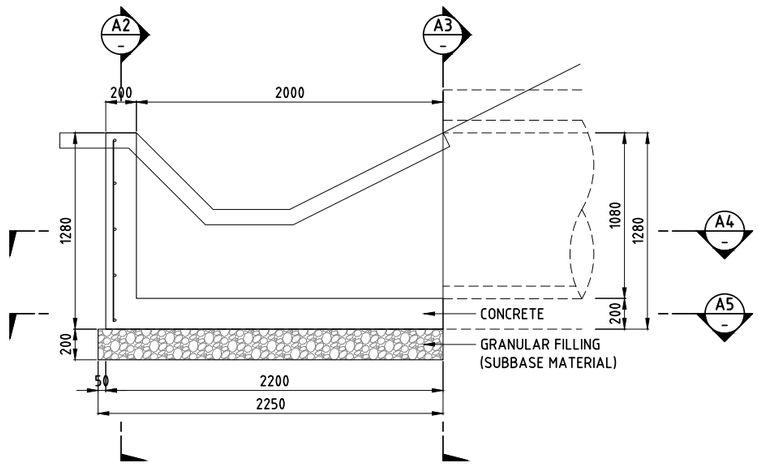


D1 — BOLT FOR BRACKET M20x170
SCALE 1:3

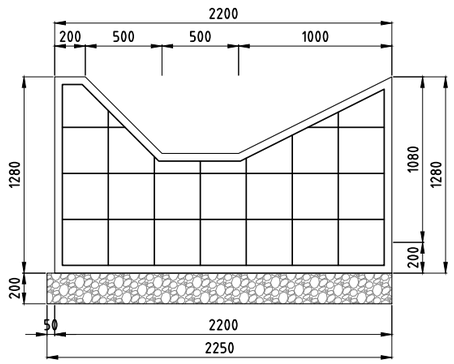


D2 — LONGITUDINAL SECTION M16x35(6.8)
SCALE 1:3

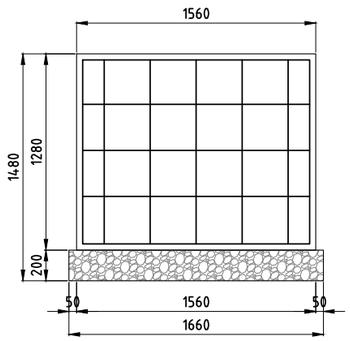
PROJECT:	DRAWING TITLE:	SCALE:	DRAWING No.:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA	GUARDRAIL DETAILS	AS SHOWN	E-01



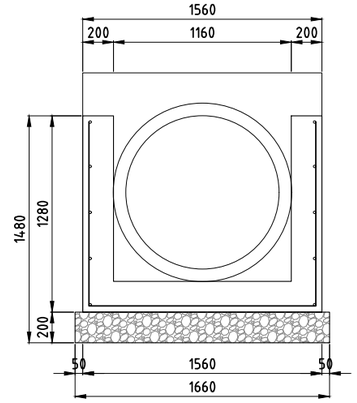
A PIPE CULVERT INLET
SCALE 1:20



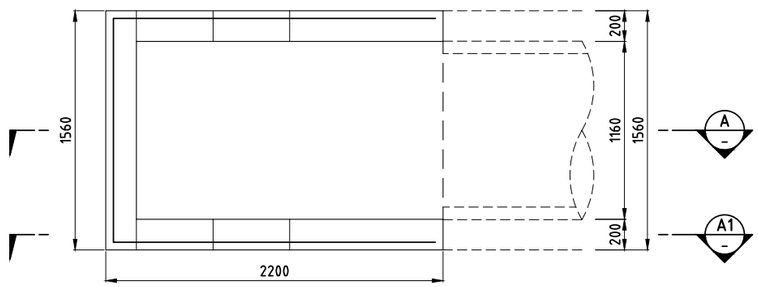
A1 SECTION
SCALE 1:20



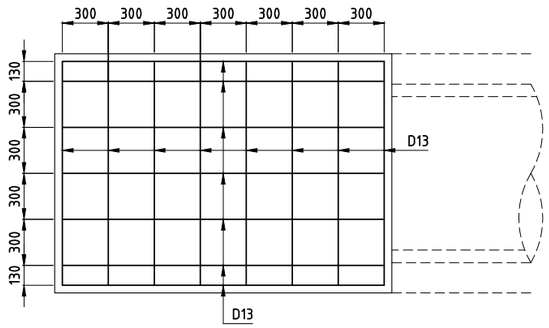
A2 SECTION
SCALE 1:20



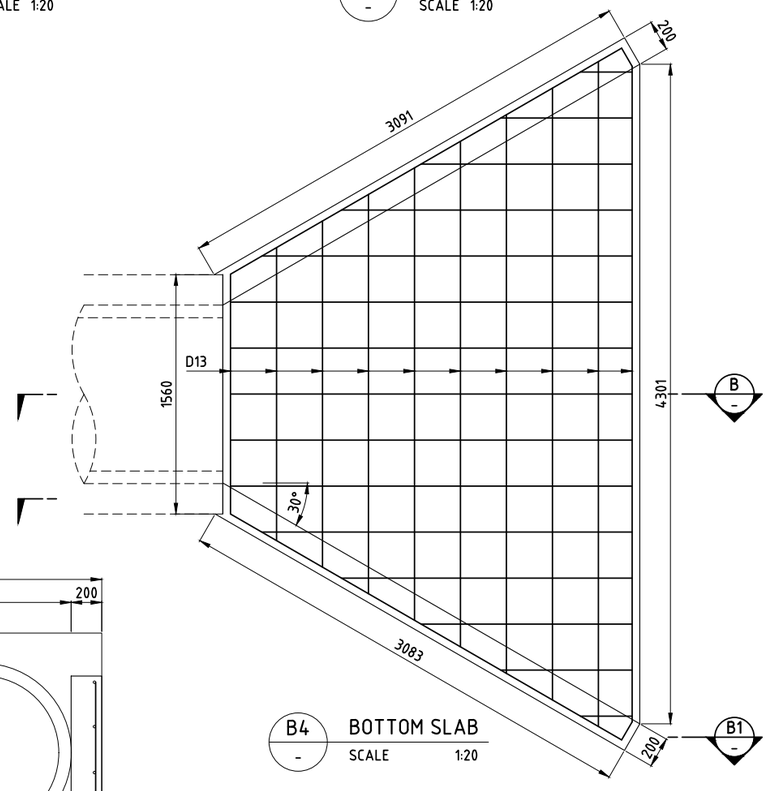
A3 SECTION
SCALE 1:20



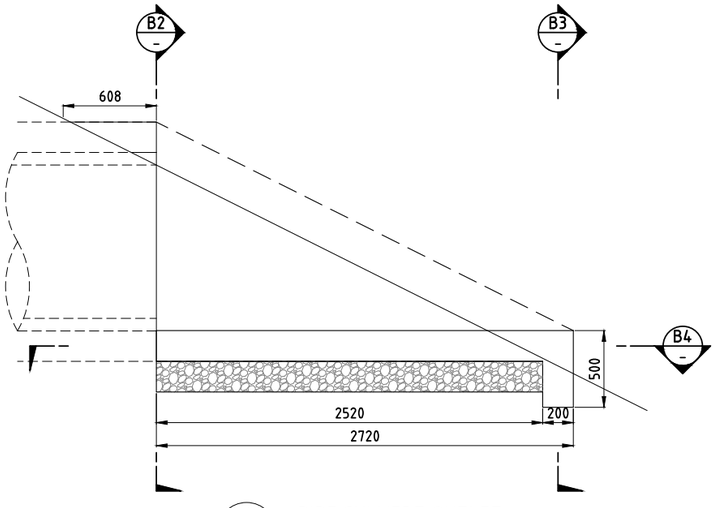
A4 PLAN
SCALE 1:20



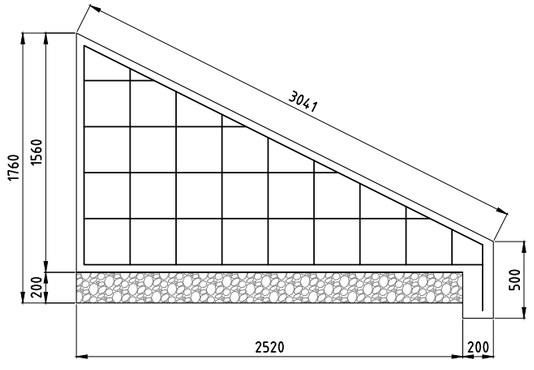
A5 BOTTOM SLAB
SCALE 1:20



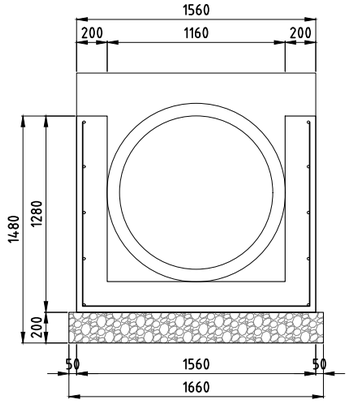
B4 BOTTOM SLAB
SCALE 1:20



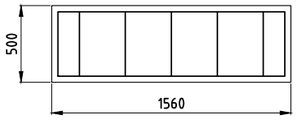
B PIPE CULVERT OUTLET
SCALE 1:20



B1 SECTION
SCALE 1:20

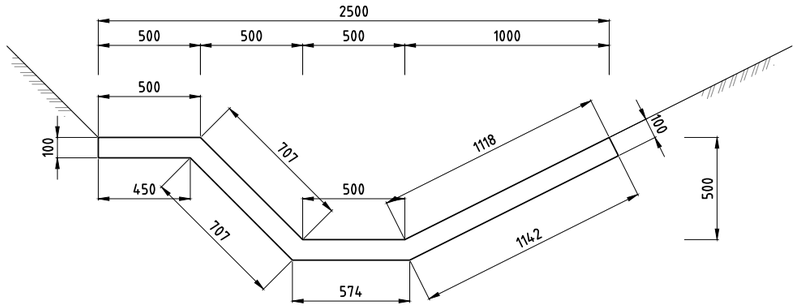


B2 SECTION
SCALE 1:20



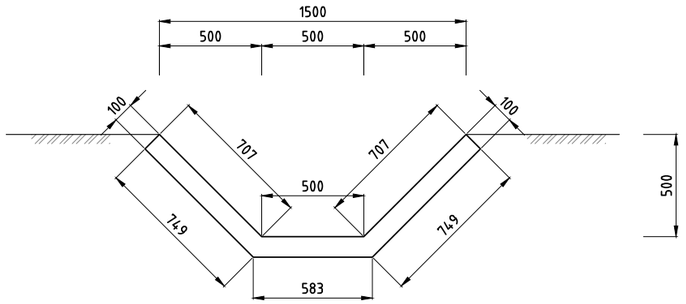
B3 SECTION
SCALE 1:20

PROJECT:	DRAWING TITLE:	SCALE:	DRAWING No.:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA	DRAINAGE DETAILS	AS SHOWN	E-03



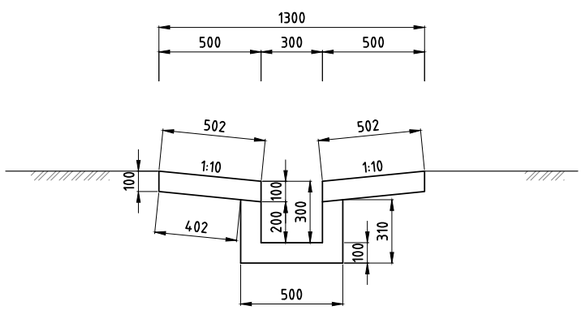
DRAINAGE DITCH TYPE-1

SCALE 1:30



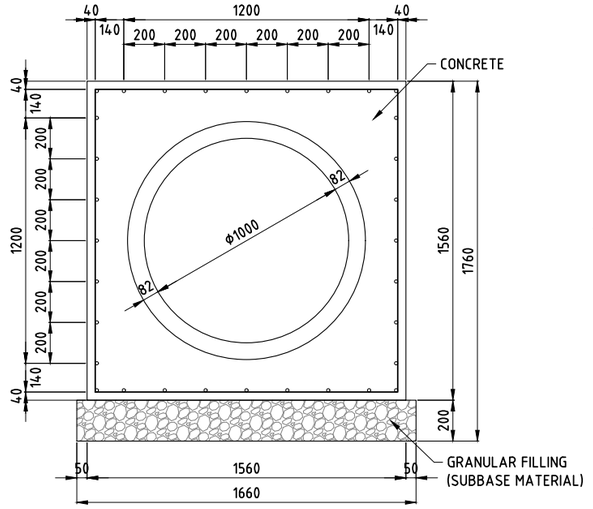
DRAINAGE DITCH TYPE-2

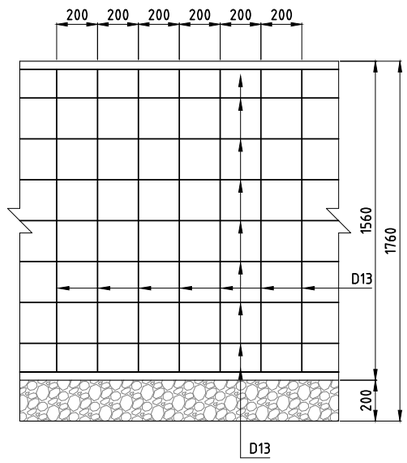
SCALE 1:30

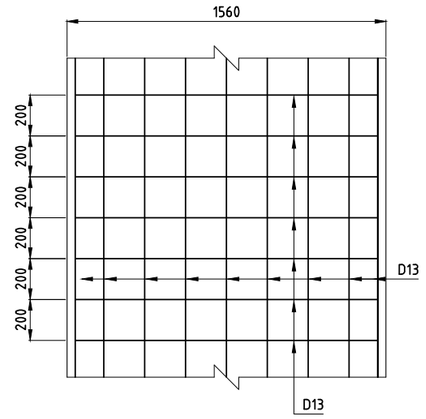


DRAINAGE DITCH TYPE-3

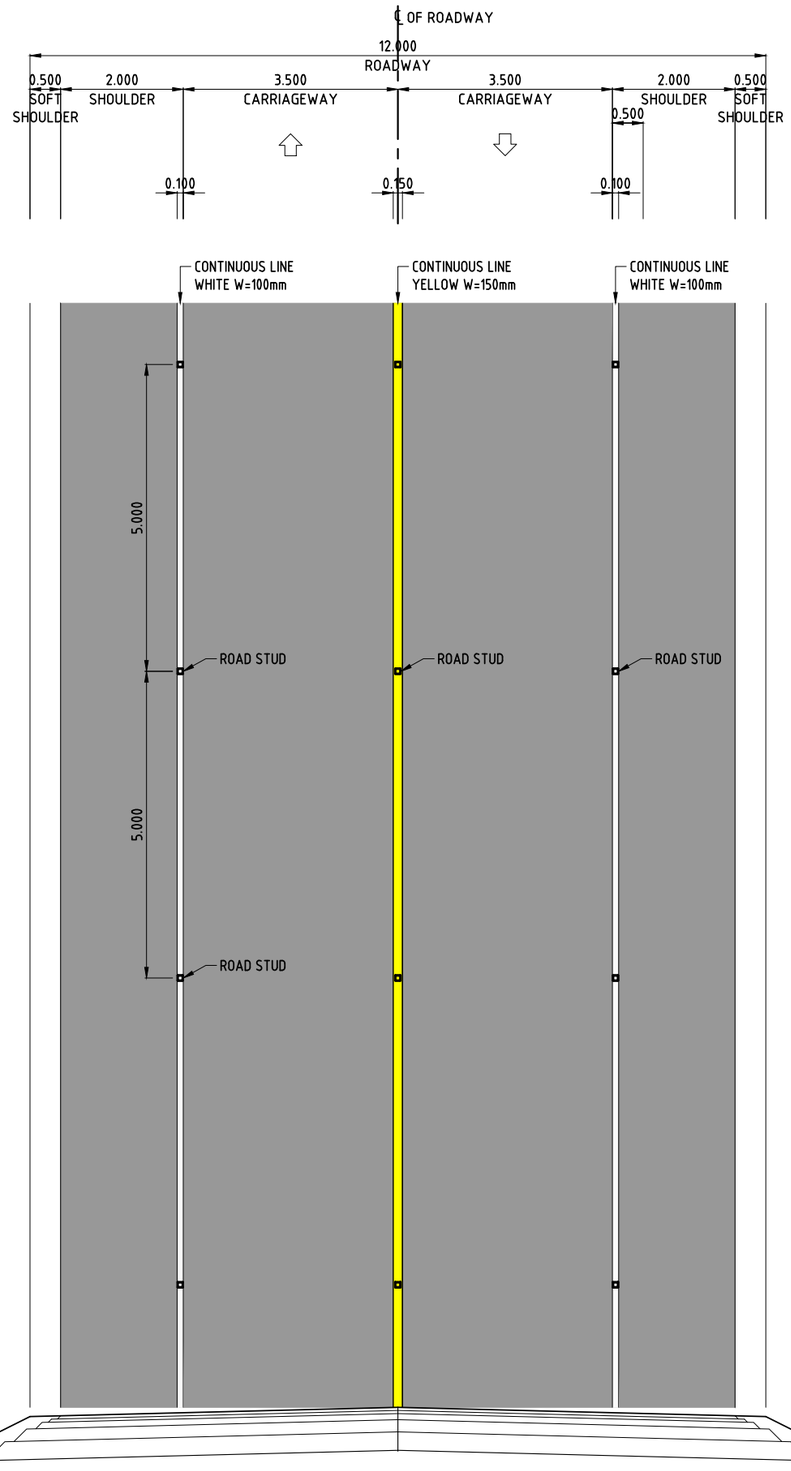
SCALE 1:30



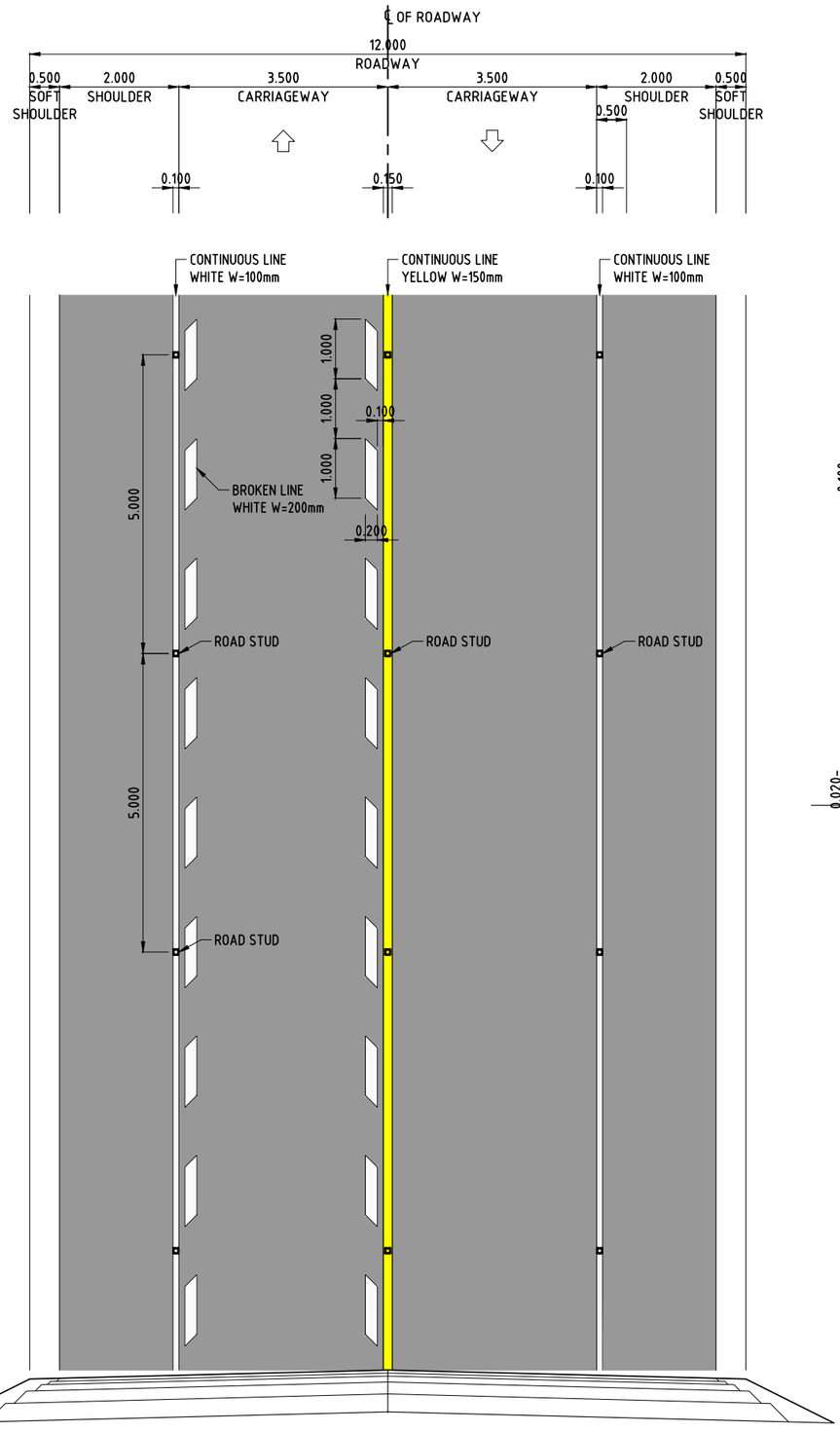




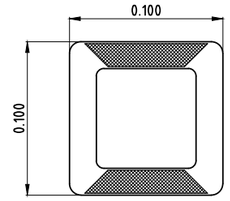
PROJECT:	DRAWING TITLE:	SCALE:	DRAWING No.:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA	DRAINAGE DETAILS	AS SHOWN	E-02



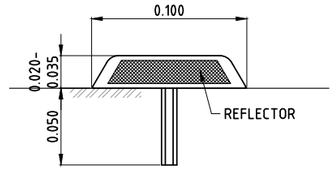
A1 SECTION W/O BROKEN LINE
- SCALE 1:100



A2 SECTION W/ BROKEN LINE
- SCALE 1:100

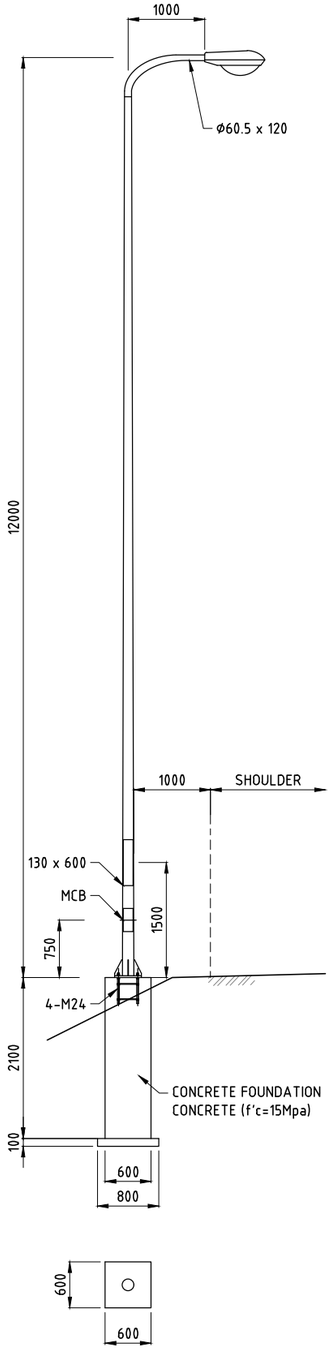


B ROAD STUD
- SCALE 1:40

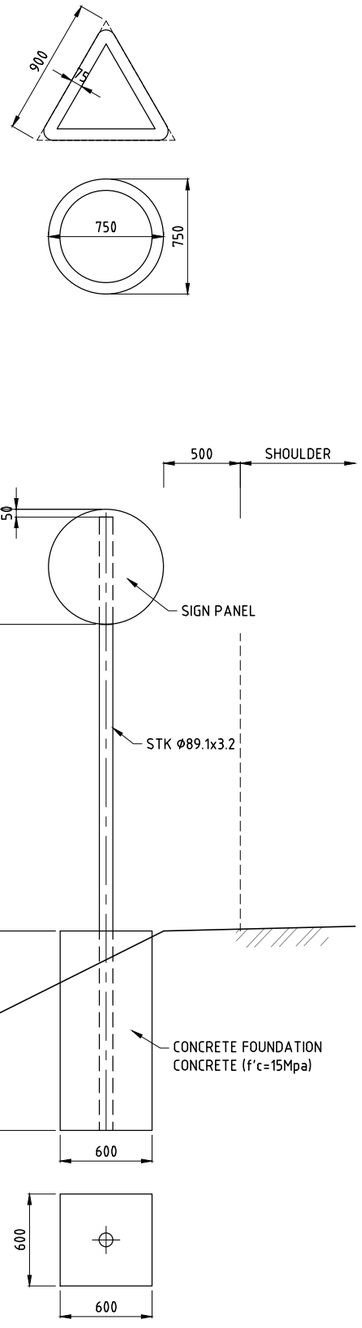


B1 SIDE VIEW
- SCALE 1:40

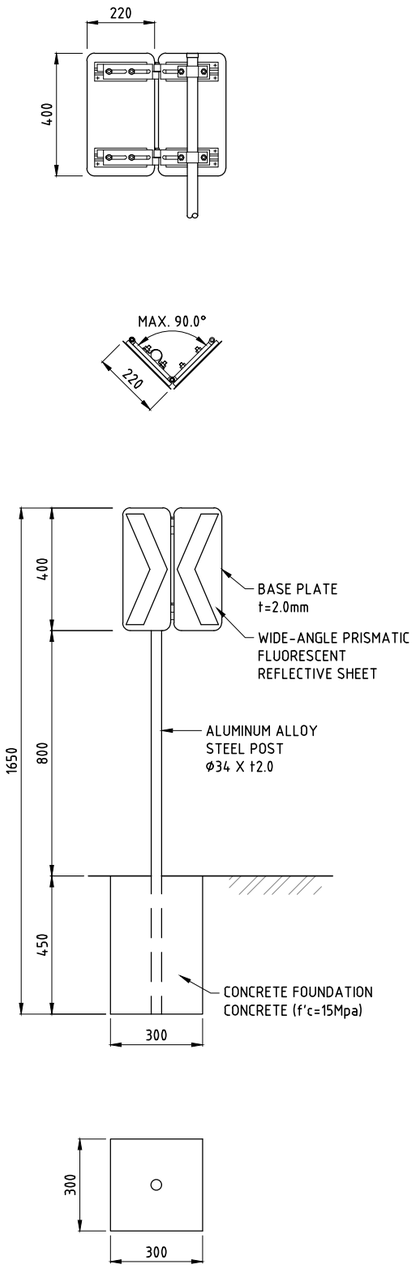
PROJECT:	DRAWING TITLE:	SCALE:	DRAWING No.:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA	MARKING DETAILS	AS SHOWN	E-04



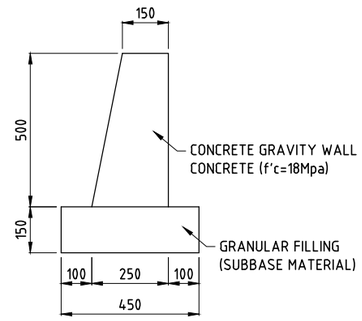
A SINGLE ARM STREET LIGHTING
- SCALE 1:80



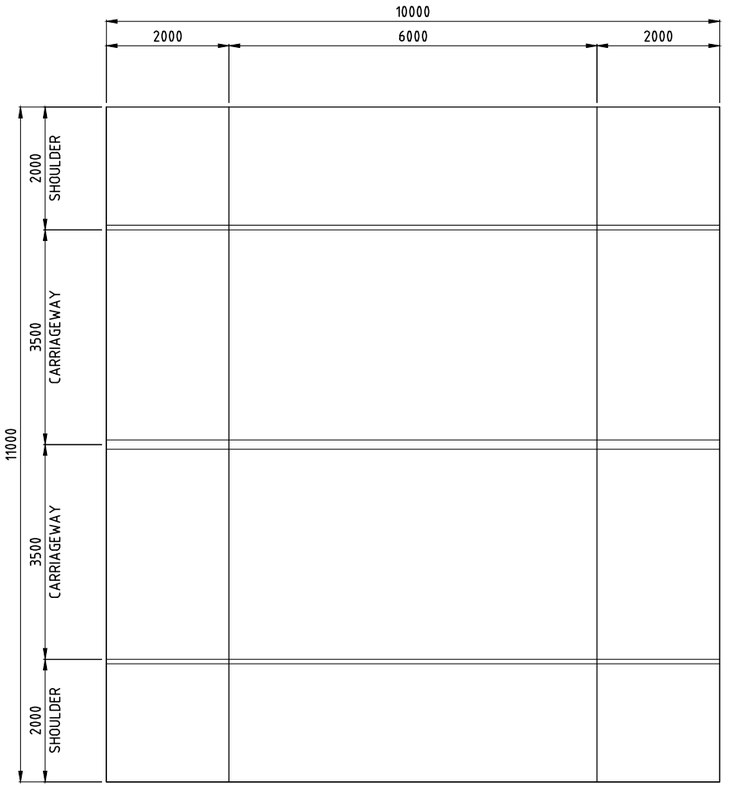
B SIGN POLE
- SCALE 1:40

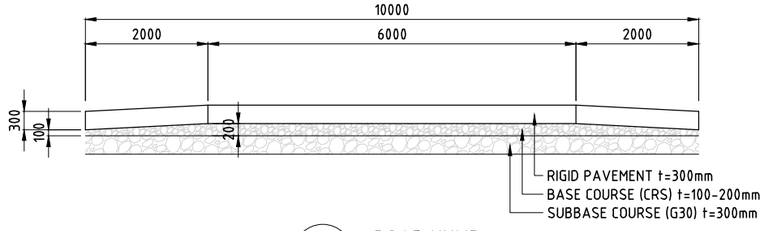


C CURVE CHEVRON SIGN
- SCALE 1:20



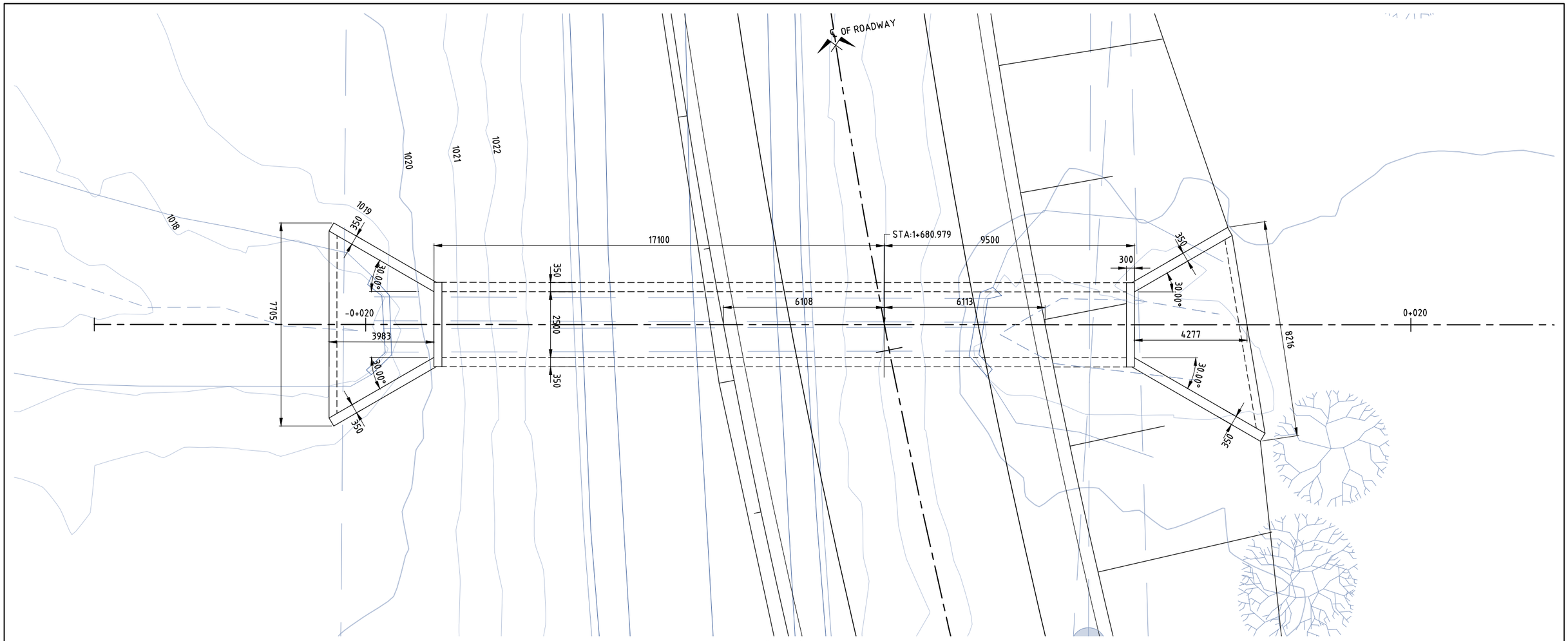
E GRAVITY WALL
- SCALE 1:20

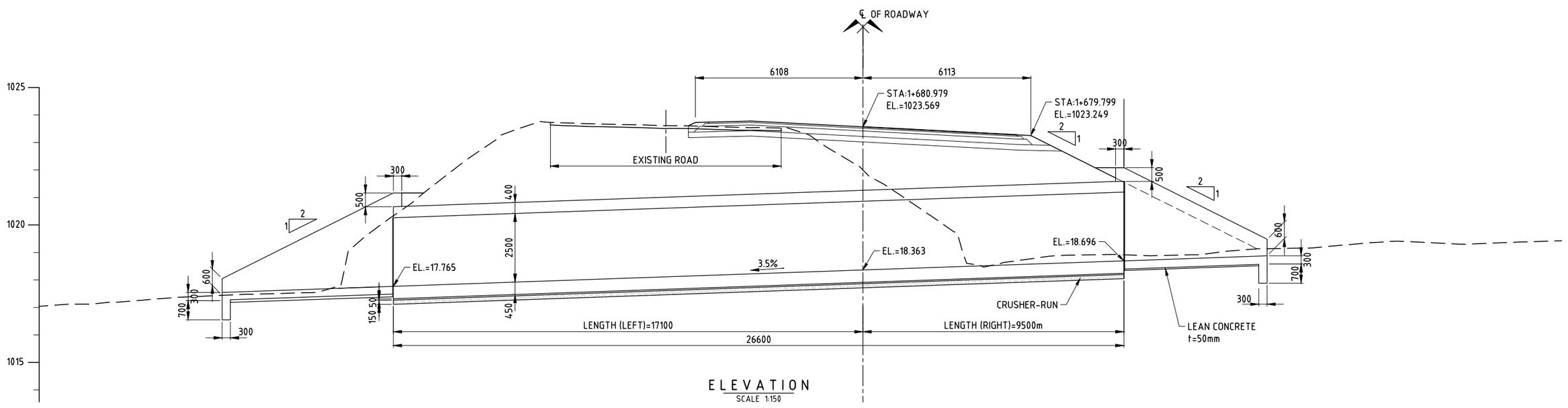




D ROAD HUMP
- SCALE 1:50

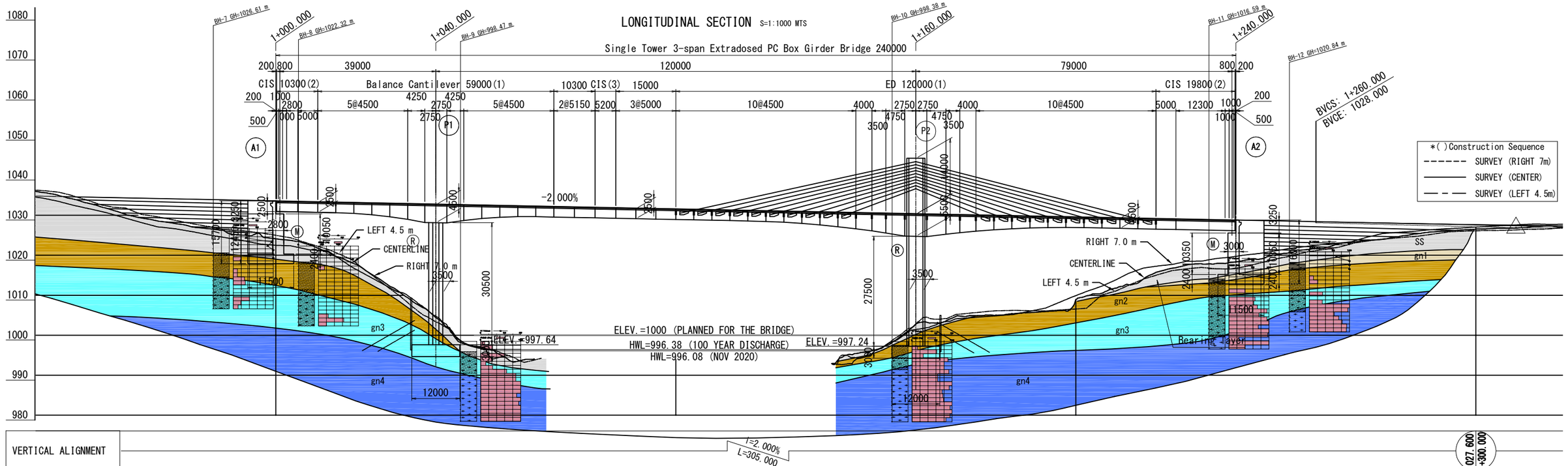
PROJECT:	DRAWING TITLE:	SCALE:	DRAWING No.:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA	MISCELLANEOUS DETAILS	AS SHOWN	E-05





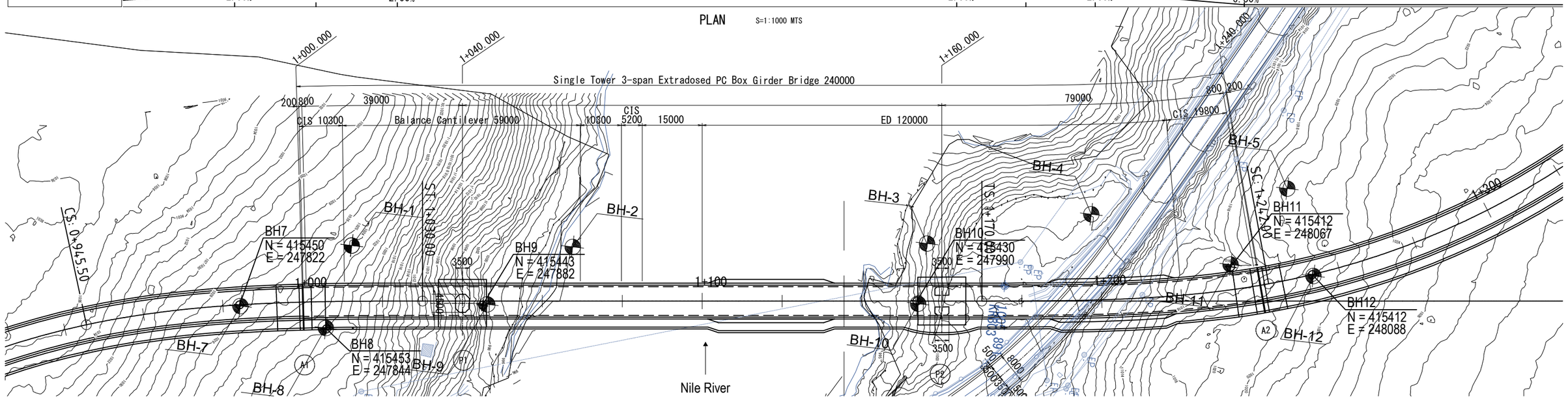
PROJECT:	DRAWING TITLE:	SCALE:	DRAWING No.:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA	BOX CULVERT DETAILS (1+680.979)	1 : 150	E-06

LONGITUDINAL SECTION S=1:1000 MTS



VERTICAL ALIGNMENT																	1027.600 1+300.000
FUTURE HEIGHT	1034.000	1033.600	1033.200	1032.800	1032.400	1032.000	1031.600	1031.200	1030.800	1030.400	1030.000	1029.600	1029.200	1028.800	1028.405	1028.041	1027.713
EXISTING GROUND		1024.135		1009.440						995.164				1018.096			
CHAINAGE	0+980	1+000	1+020	1+040	1+060	1+080	1+100	1+120	1+140	1+160	1+180	1+200	1+220	1+240	1+260	1+280	1+300
HORIZONTAL ALIGNMENT	A=130 L=84.500m SC				R= ∝ L=140.000					CS		A=120 L=72.000m		SC 1+242.000			R=200.000 L=138.089
SUPERELEVATION	0+989.277 2.00%		1+009.639 0.00%	1+030.000						1+170.000		1+187.349 0.00%	1+204.699 2.00%	1+242.000			6.30%
	-2.00%			-2.00%						-2.00%		-2.00%					

PLAN S=1:1000 MTS

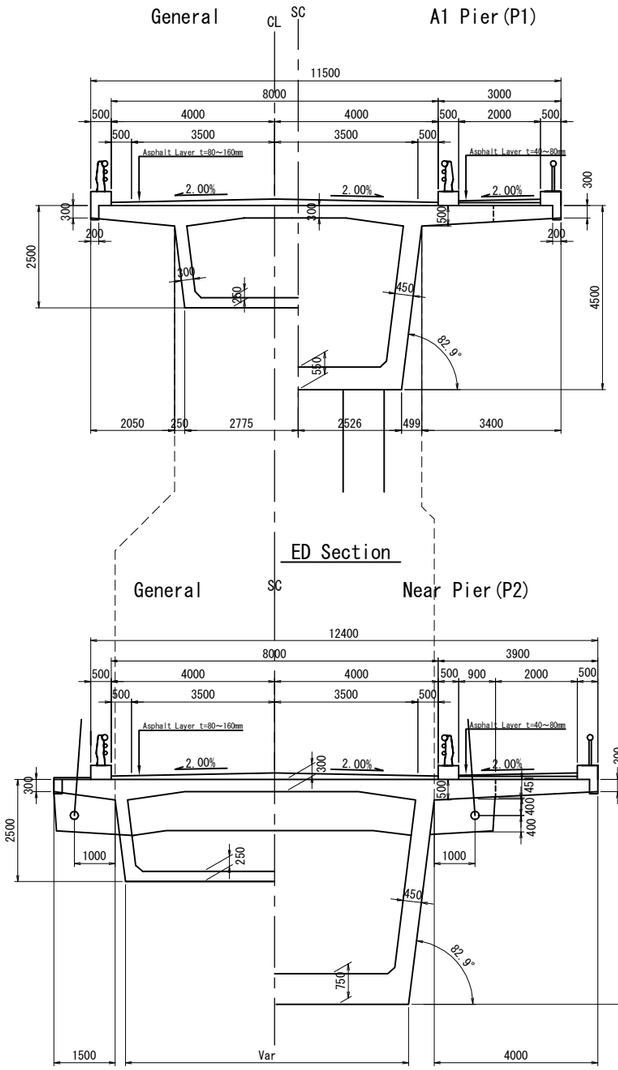


PROJECT:	DRAWING TITLE:	SCALE:	DRAWING No.:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA	Karuma Bridge General Drawing(1/2)	1 : 1000	

Superstructure general cross section 1:150

PC Girder Section

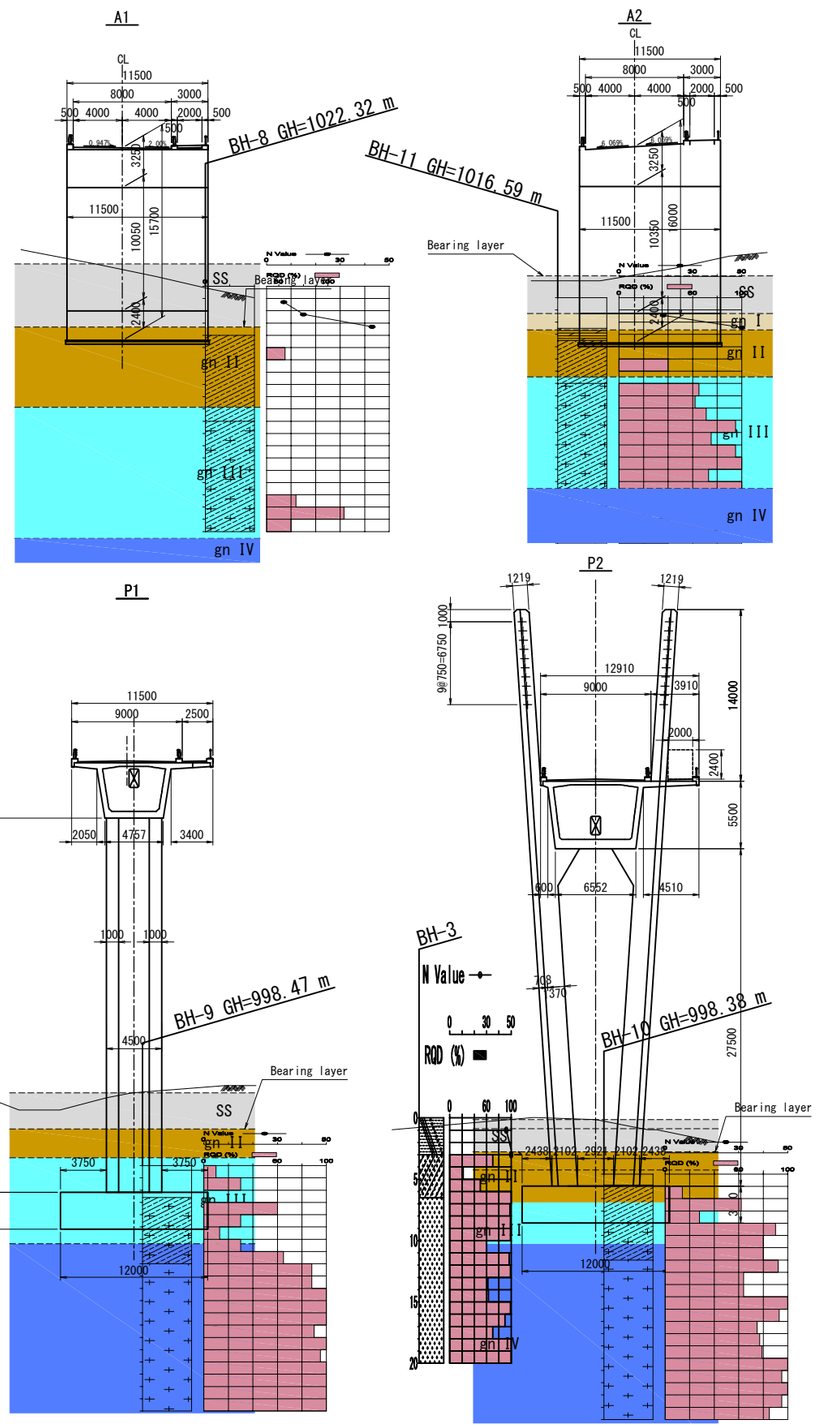
General CL SC A1 Pier(P1)



ED Section

General SC Near Pier(P2)

CROSS SECTION S=1:500 MTS

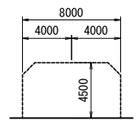


DESIGN ASSUMPTION

Road type		Class 3 Level 3 Mountain road
Route name		The Kampala – Gulu/Arua Highway
Design speed		V=60km/h
Bridge length		240.000m
Span arrangement		39.000m + 120.000m + 79.000m
Bridge width		B=11.500m (0.5m + 8.0m + 0.5m + 2.0m + 0.5m)
Curvature		R=200 ～ A=120 ～ R=∞ ～ A=130 ～ R=200
Transverse gradient		2.0% ～ 2.0%
Longitudinal gradient		2.0%
Superstructure type		PC Cantilevered Box Girder, PC Extra Dosed Box Girder Bridge
Substructure type		Inverted T-type abutment, Y-shaped pier
Foundation type		Spread Footing
Seismic coefficient		kh= ##
Material Properties	Concrete	Superstructure: σck=50N/mm², Substructure: σck=40N/mm² Foundation: σck=24N/mm²
	Rebar	Superstructure: SD435 , Substructure: SD435
	Cable	Outer Cable; 18Φ15.24/ 24Φ15.24 PE-Coated ECF Strand Inner Cable; 13Φ15.24/ 15Φ15.24/ 17Φ15.24/ 18Φ15.24 Top Slab; 3Φ15.24,@1.00m/ 4Φ15.24,24@1.00m
Design standards		Road Design Manual vol. 4 Bridge Design 2005

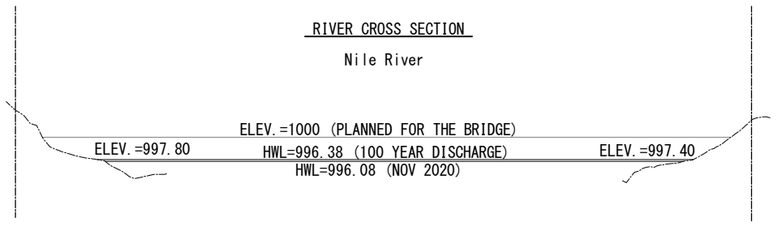
CROSSING ROAD

The Kampala – Gulu/Arua Highway

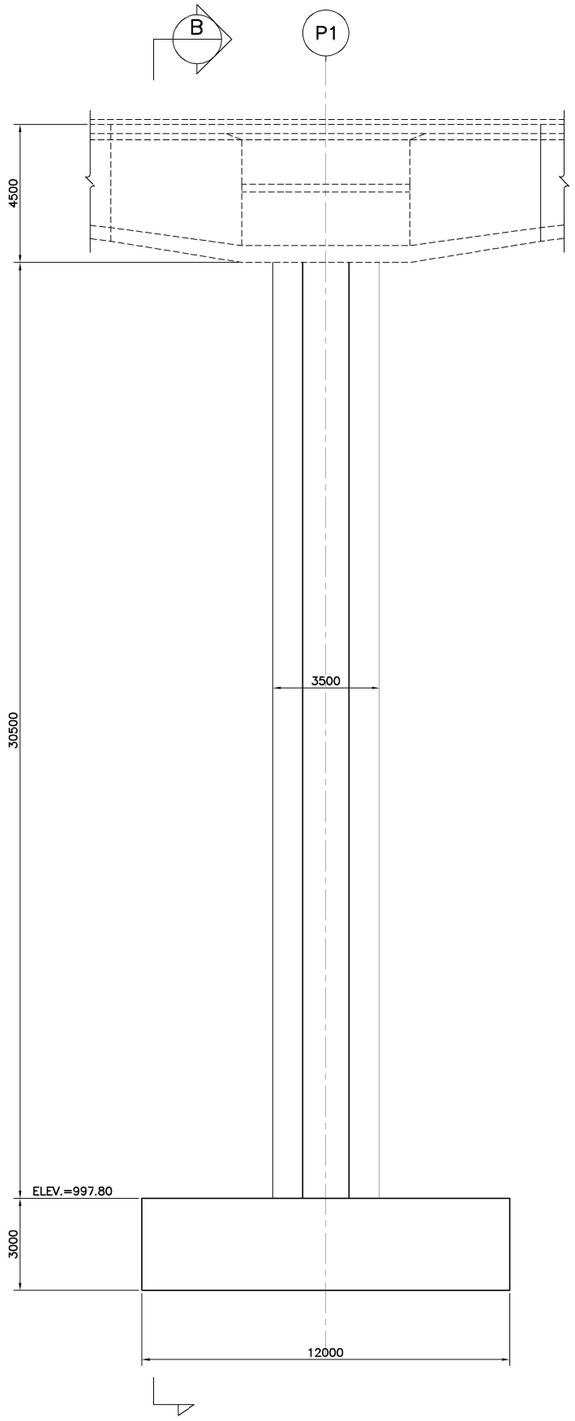


RIVER CROSS SECTION

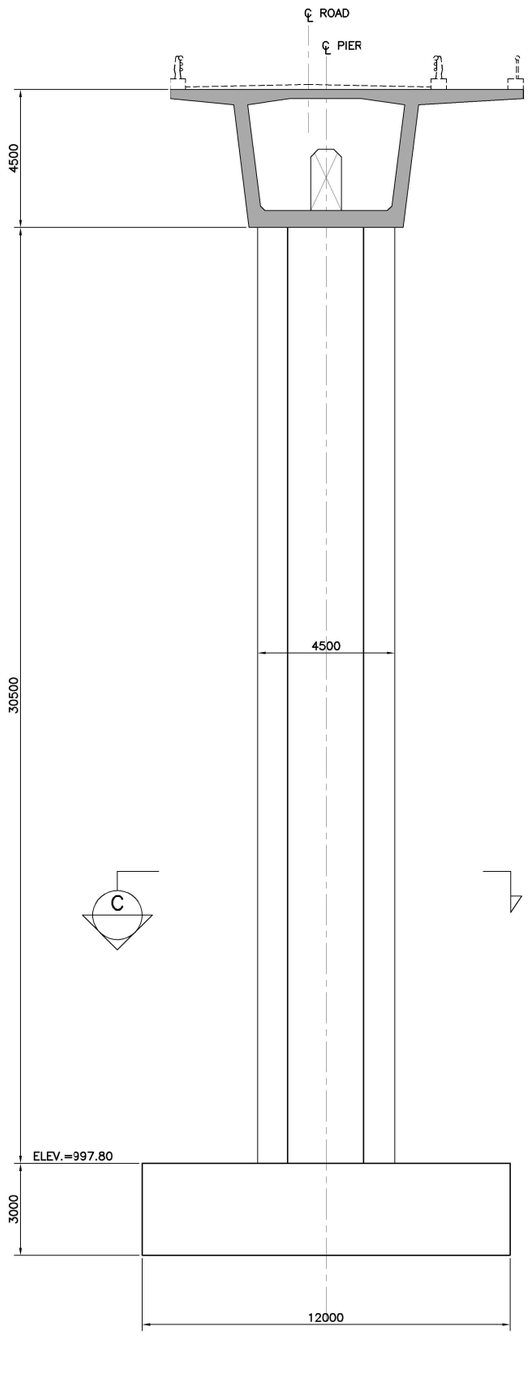
Nile River



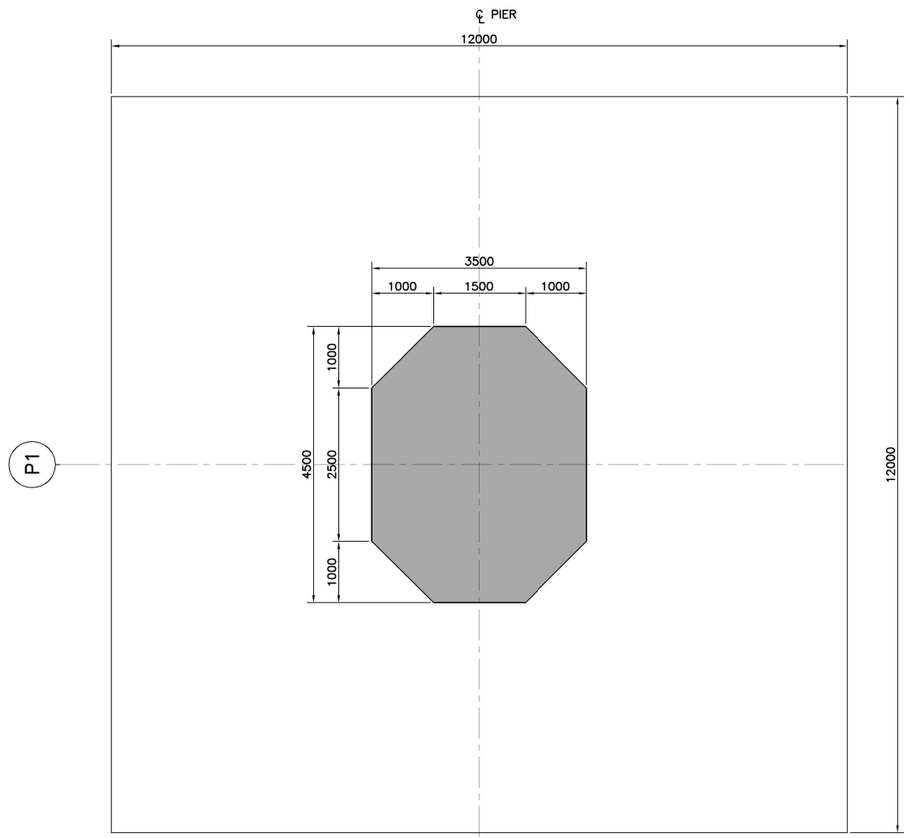
PROJECT:	DRAWING TITLE:	SCALE:	DRAWING No.:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA	Karuma Bridge General Drawing(2/2)	1 : 500	



A MAIN PIER SIDE ELEVATION (P1)
SCALE 1:100



B MAIN PIER CROSS–SECTION (P1)
SCALE 1:100

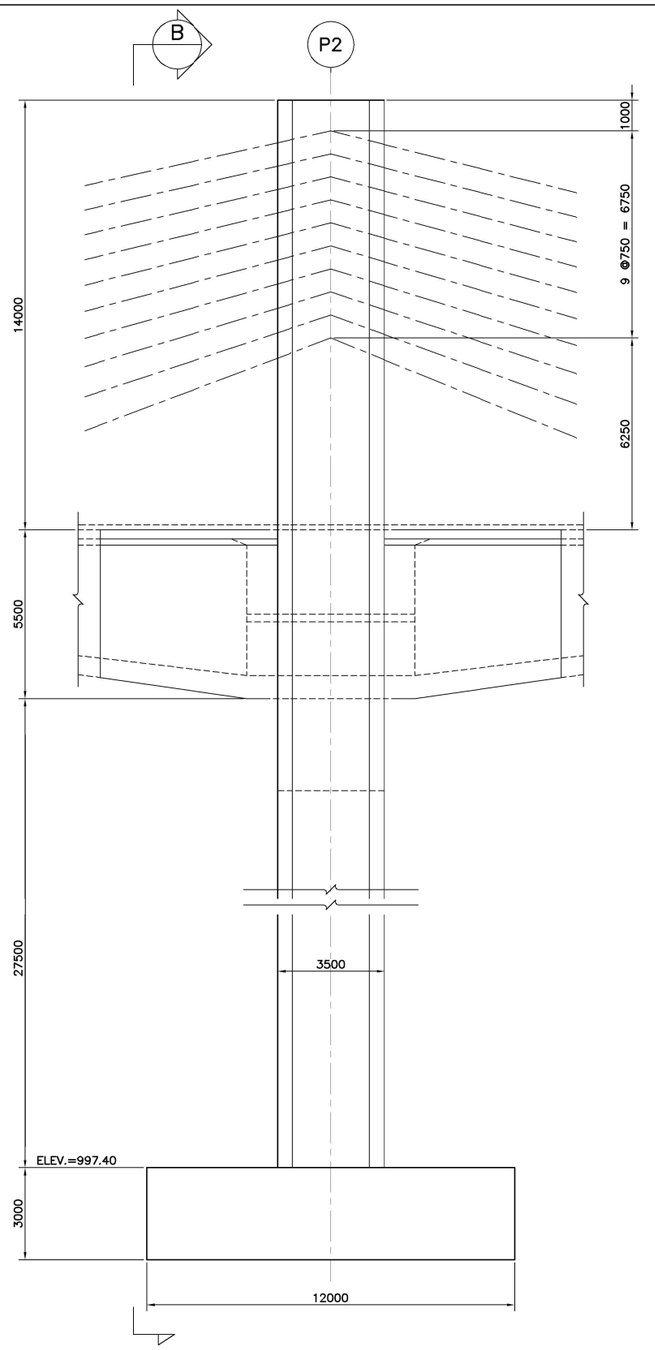


C SECTION
SCALE 1:50

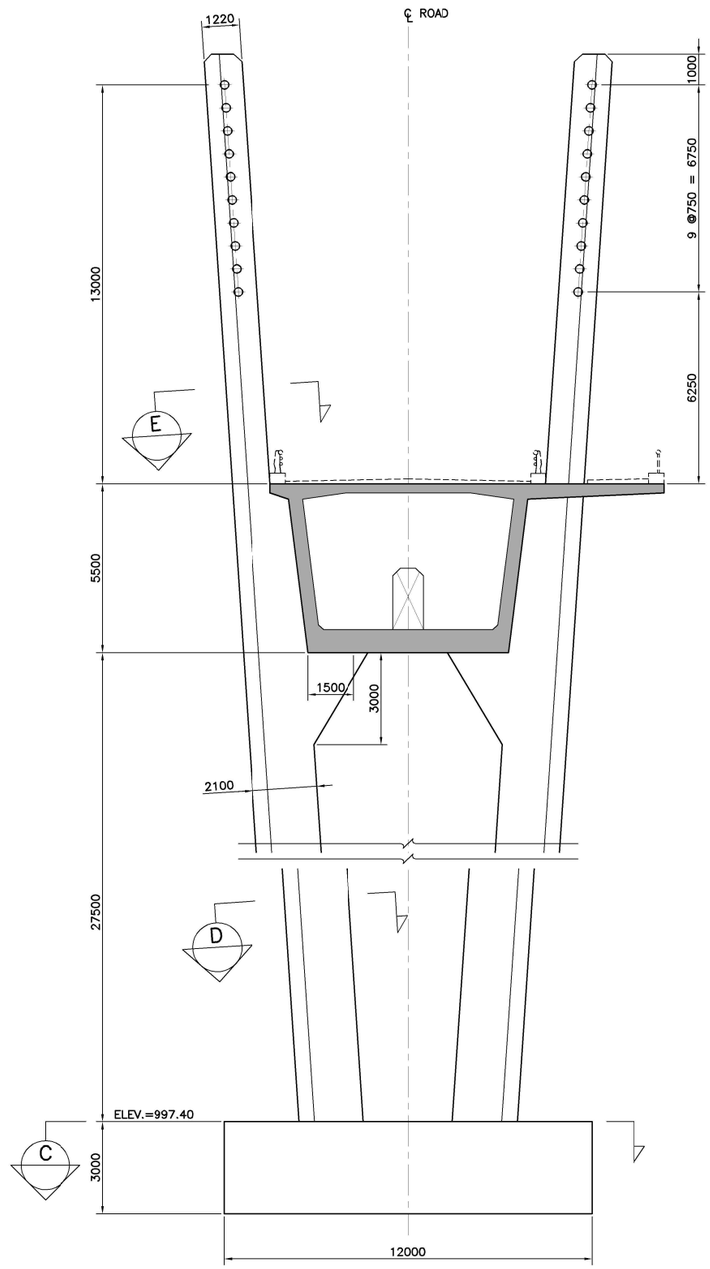
NOTE :

1. PIER CONCRETE CUBE STRENGTH 40 MPa.

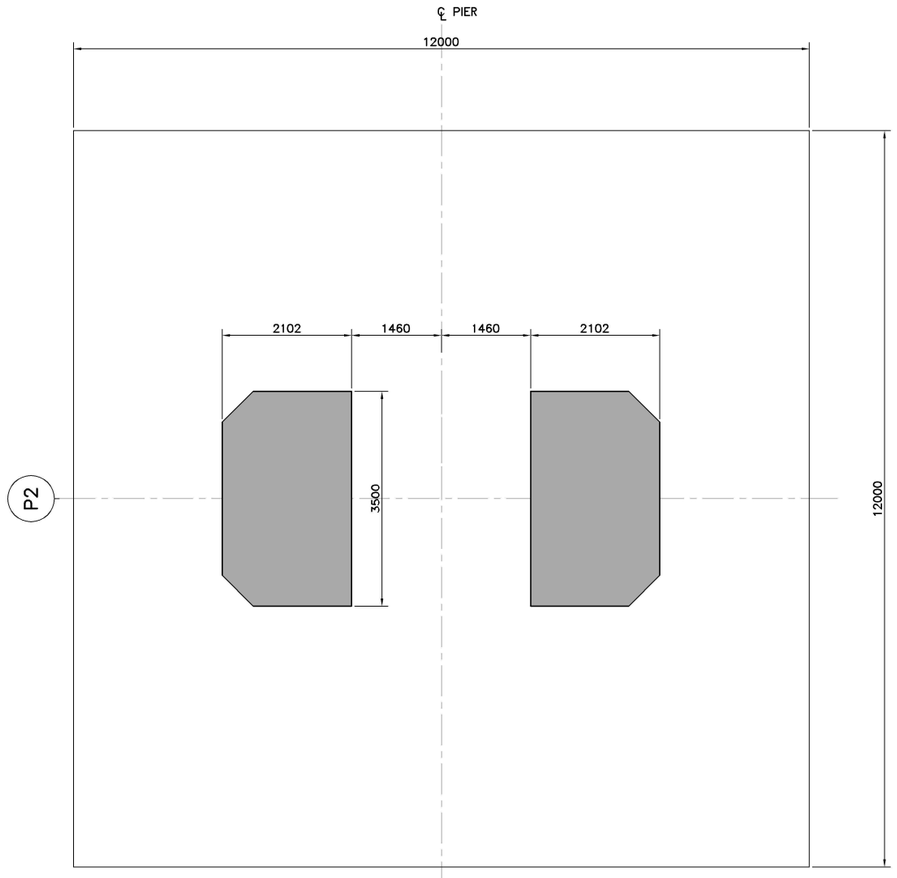
PROJECT:	DRAWING TITLE:	SCALE:	DRAWING No.:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA	P1 PIER STRUCTURAL DRAWING	AS SHOWN	



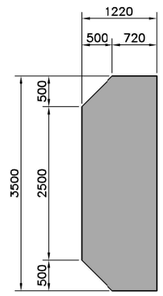
A MAIN PIER SIDE ELEVATION (P2)
SCALE 1:100



B MAIN PIER CROSS-SECTION (P2)
SCALE 1:100



C SECTION
SCALE 1:50



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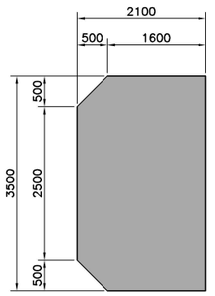
SCALE 1:50



E SECTION
SCALE 1:50

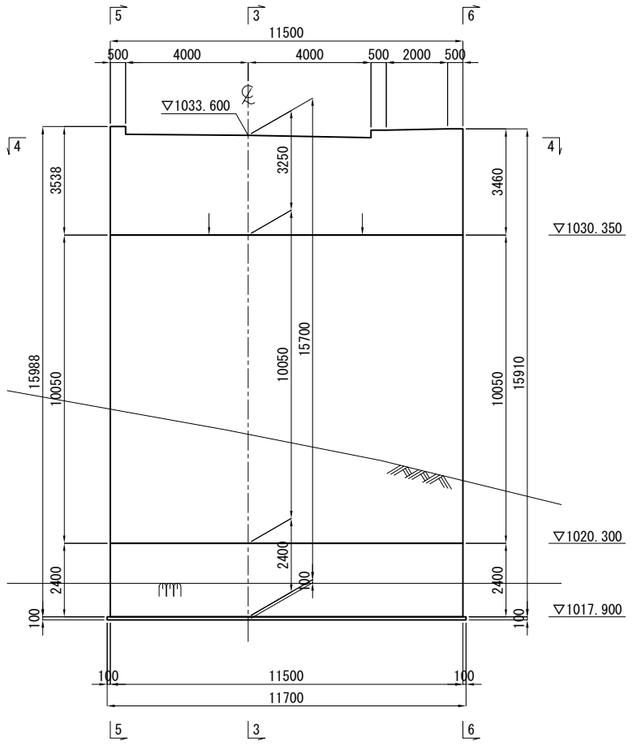
NOTE :

1. PIER AND TOWER CONCRETE CUBE STRENGTH 40 MPa.

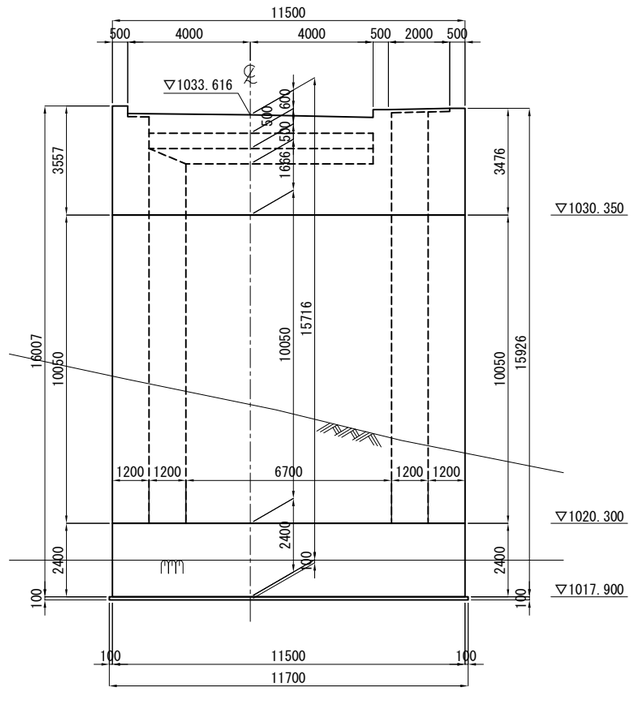
PROJECT:	DRAWING TITLE:	SCALE:	DRAWING No.:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA	P2 PIER STRUCTURAL DRAWING	AS SHOWN	

A1 ABUTMENT STRUCTURAL DRAWING S=1:200

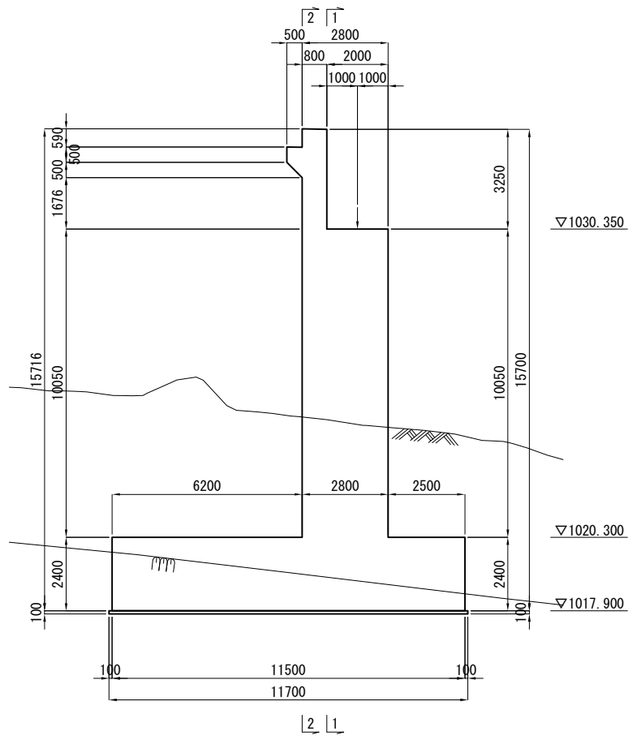
1 - 1



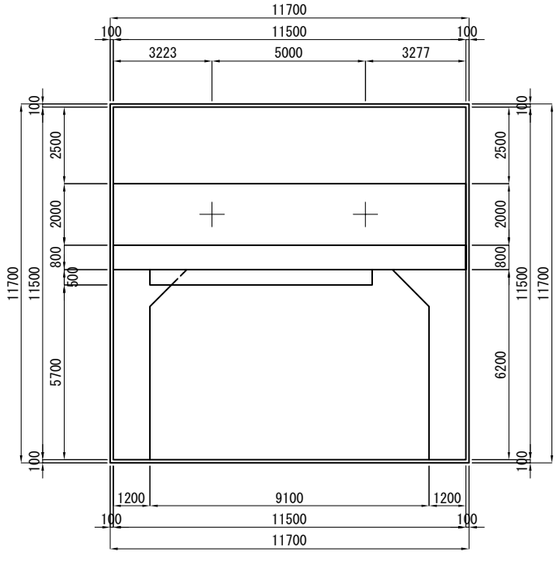
2 - 2



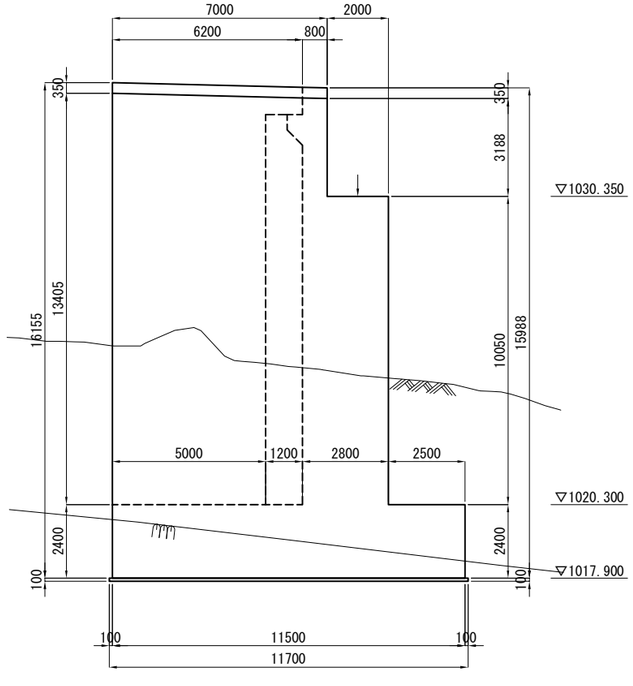
3 - 3



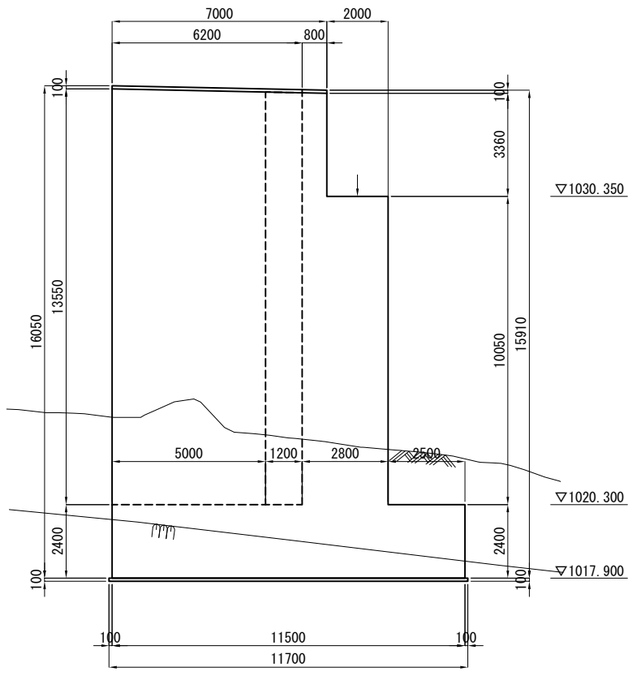
4 - 4



5 - 5



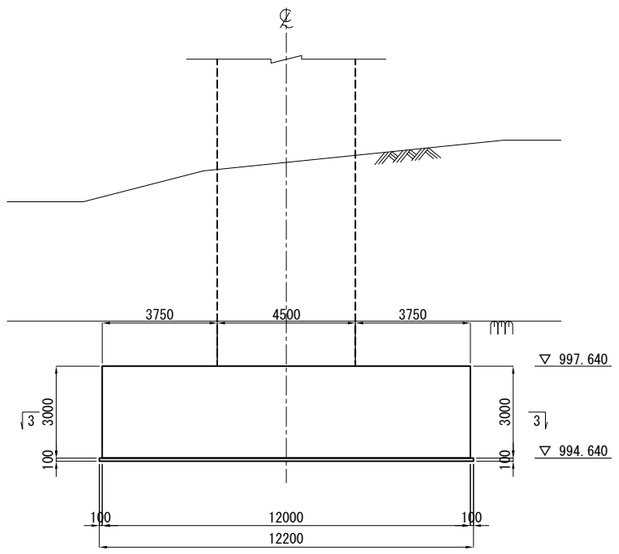
6 - 6



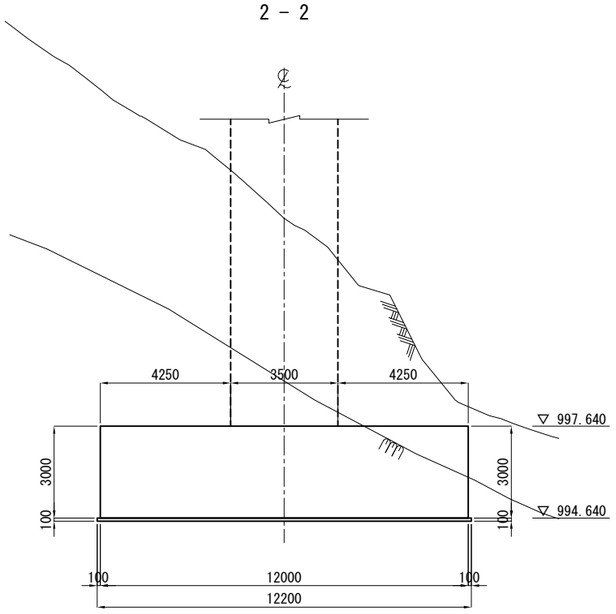
PROJECT:	DRAWING TITLE:	SCALE:	DRAWING No.:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA	A1 ABUTMENT STRUCTURAL DRAWING	1 : 200	A-00

P1 PIER STRUCTURAL DRAWING S=1:200

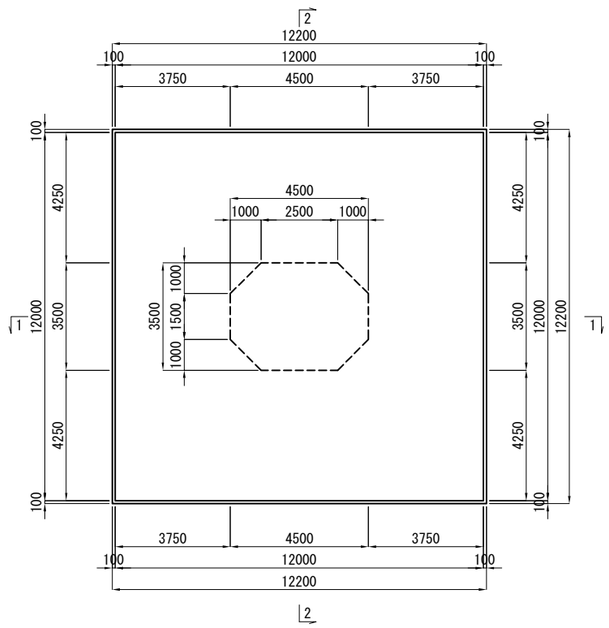
1 - 1



2 - 2



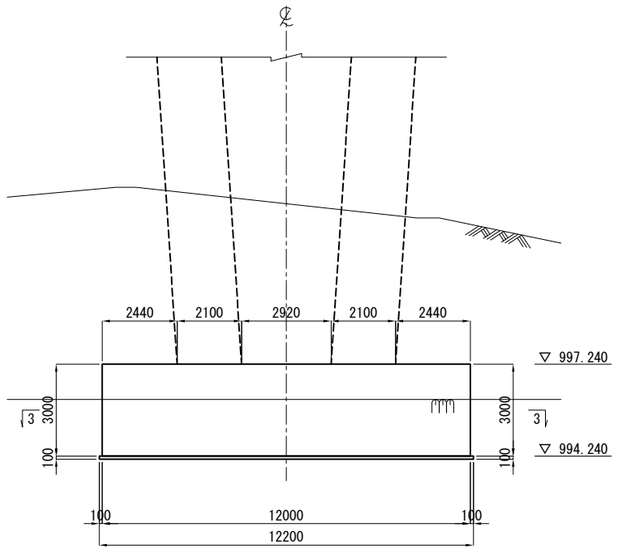
3 - 3



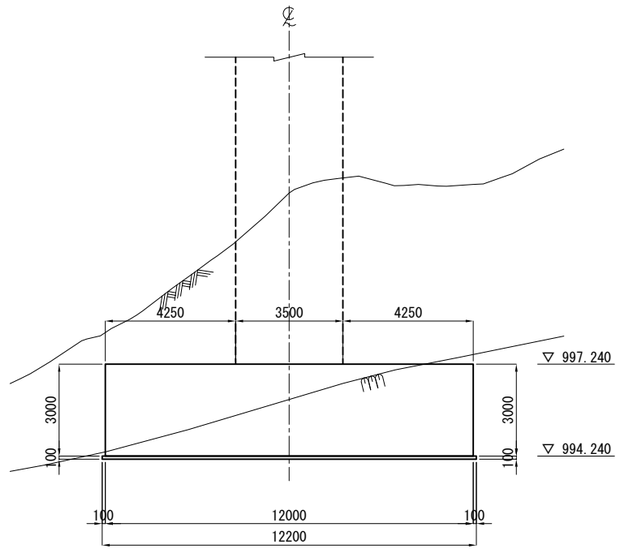
PROJECT:	DRAWING TITLE:	SCALE:	DRAWING No.:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA	P1 PIER STRUCTURAL DRAWING	1 : 200	A-00

P2 PIER STRUCTURAL DRAWING S=1:200

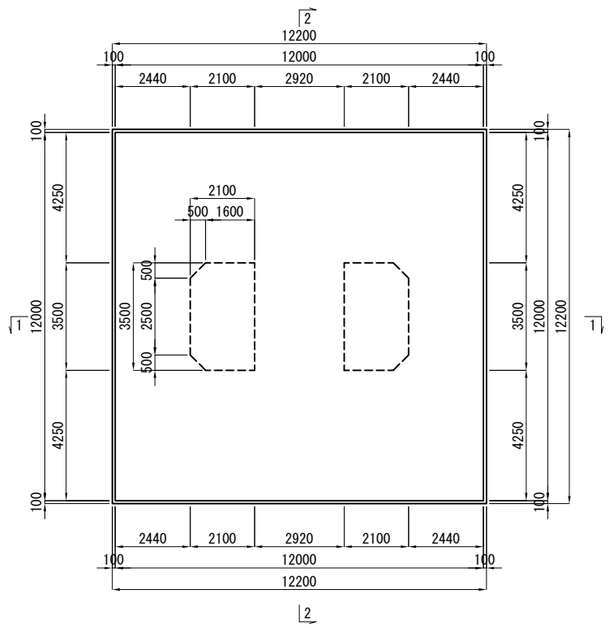
1 - 1



2 - 2



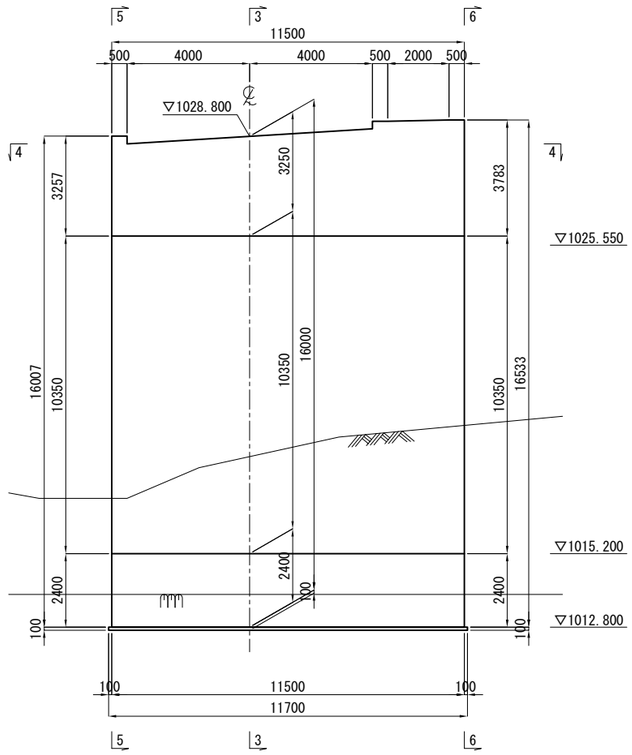
3 - 3



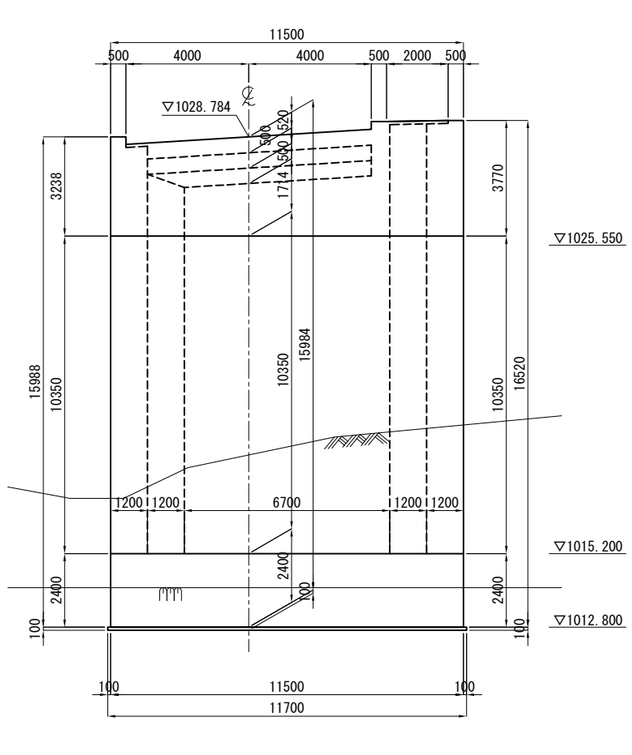
PROJECT:	DRAWING TITLE:	SCALE:	DRAWING No.:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA	P2 PIER STRUCTURAL DRAWING	1 : 200	A-00

A2 ABUTMENT STRUCTURAL DRAWING S=1:200

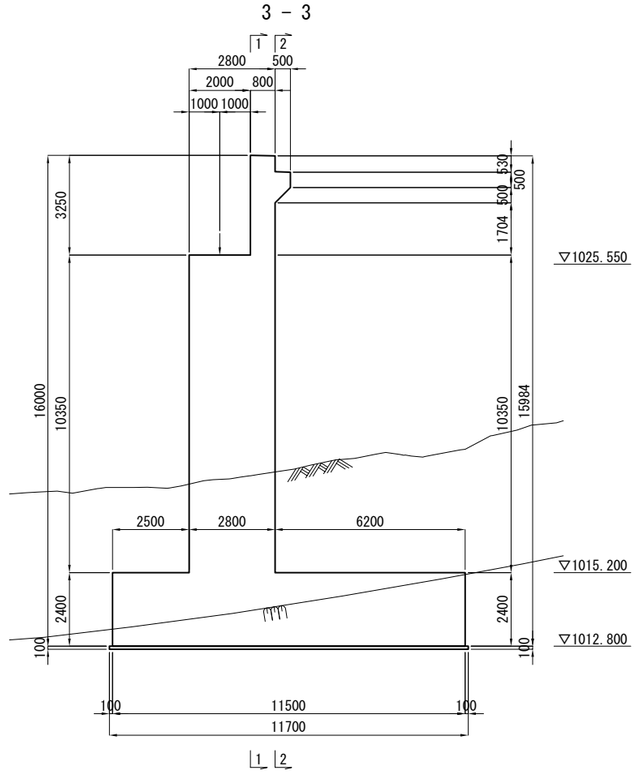
1 - 1



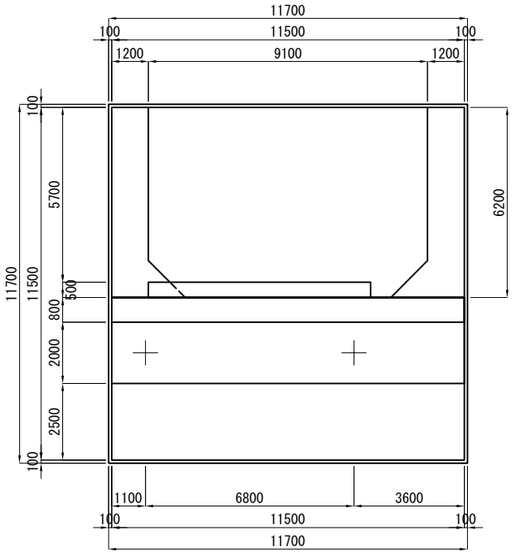
2 - 2



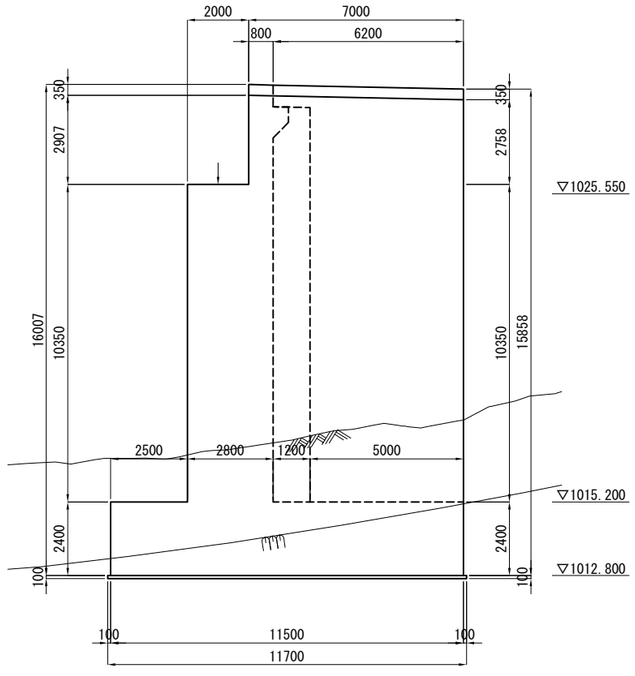
3 - 3



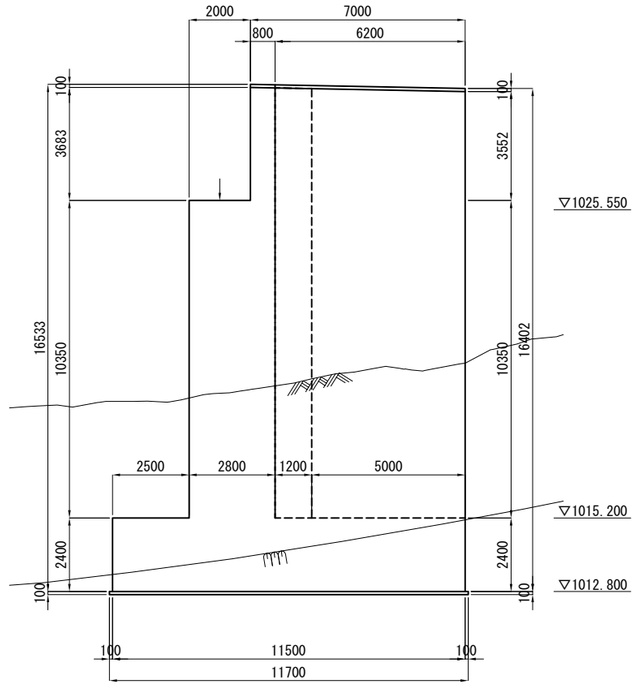
4 - 4



5 - 5



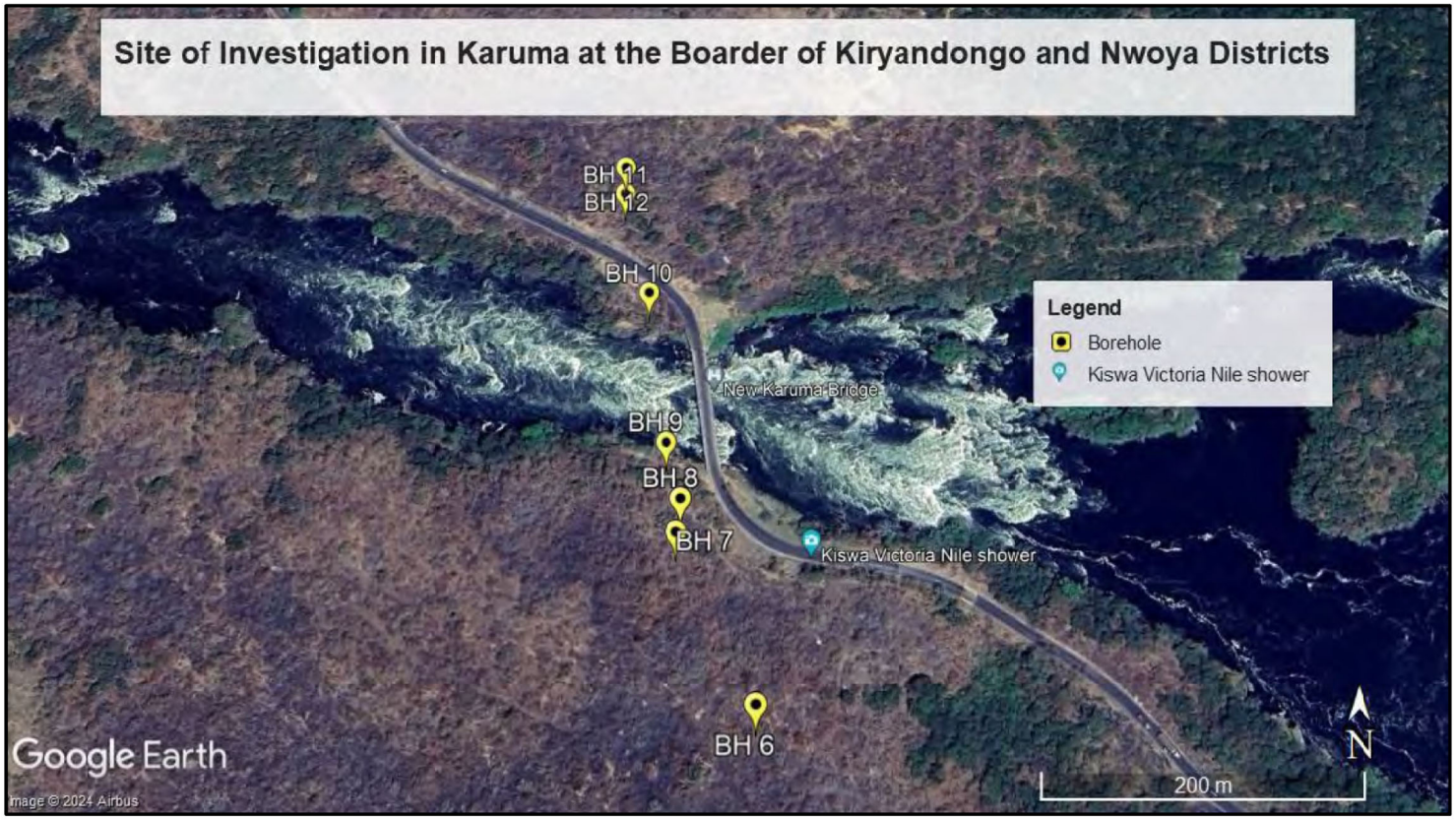
6 - 6



PROJECT:	DRAWING TITLE:	SCALE:	DRAWING No.:
PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF KARUMA BRIDGE IN THE REPUBLIC OF UGANDA	A2 ABUTMENT STRUCTURAL DRAWING	1 : 200	A-00

別添資料7. 地質調査結果

Appendix 1 – Site Layout


Site of Investigation in Karuma at the Boarder of Kiryandongo and Nwoya Districts
BH 11
BH 12
BH 10
New Karuma Bridge
BH 9
BH 8
BH 7
Kiswa Victoria Nile shower
BH 6
Legend
Borehole
Kiswa Victoria Nile shower
Google Earth
Image © 2024 Airbus
N
200 m

Appendix 2 – Borehole drilling Logs

CLIENT: ORIENTAL CONSULTANTS GLOBAL COMPANY LIMITED

CONTRACTOR: Teclab A GEOSCIENCES COMPANY

BOREHOLE RECORD

PROJECT	: G.I. for the proposed New Karuma Bridge-Phase II	DRILLING METHOD	: Rotary	BOREHOLE No.	: BH 6	Logged By:	AK
PROJECT NO.	: 2024-014	DRILLING RIG	: GY-200	WATER LEVEL	: NIL m	Checked By:	JI
LOACATION	: Karuma Game Reserve	OPERATOR	: Peter Muwanguzi	TEST METHOD	: BS 5930: 2015	Approved By:	RO
COORDINATES	: 415499.857 m E 247714.981 m N	ELEVATION	: 1038.97 m	COORDINATE SYSTEM	: WGS84	START DATE: 04/02/2024	END DATE: 04/02/2024

Ground Water	Depth (m)	FI (per m) C.D (mm) F.R (%)	TCR SCR RQD (%)	Description of Strata	Legend	Level	Samples & Tests Depth (m)	Type	No	SPT 75	75	75	75	75	75	N	Remarks
	0.00	- 110 -	- - -	Medium dense slightly moist brown silty gravelly fine to coarse grained SAND. The gravel is subrounded to subangular fine to coarse grained.		clayey 1038.47	0.50										
	1.00					1037.97	1.00	SPT	1	2	4	5	4	4	5	18	
	1.50	- 110 -	- - -	Stiff to very stiff moist brown mottled yellow sandy SILT. The sand is fine to coarse grained.		1037.47	1.50										
	2.00					1036.97	2.00	SPT	2	2	4	4	4	3	3	14	
	2.50	- 110 -	- - -			1036.47	2.50										
	3.00					1035.97	3.00	SPT	3	3	4	5	4	4	5	18	
	3.50	- 110 -	- - -			1035.47	3.50										
	4.00			Very stiff slightly moist to moist pale yellow mottled orange and brown sandy SILT. The sand is fine to coarse grained.		1034.97	4.00	SPT	4	3	4	5	6	5	6	22	
	4.50	- 110 -	- - -			1034.47	4.50										
	5.00					1033.97	5.00	U	1								
	5.50	- 110 -	- - -			1033.47	5.50	SPT	5	3	5	7	6	7	7	27	
	6.00					1032.97	6.00										
	0.50	- 110 -	- - -	Very stiff moist reddish brown mottled pale yellow and orange sandy micaceous SILT. The sand is fine to coarse grained		1032.47	0.50	SPT	6	2	3	4	7	8	7	26	
	7.00					1031.97	7.00										
	7.50					1031.47	7.50	SPT	7	3	4	4	8	6	8	26	

Borehole (BH 6) Terminated at 7.0m

Remarks

Ground Water

Sample Types

SPT : Disturbed (SPT) sample

U:Undisturbed sample

SPT: Standard Penetration Test

Key

GRAVEL
SAND
CLAY
SILTS
ROCK

F.I Fracture Index
C.D Core diameter
F.R Flush Rate

Comments

TECLAB LIMITED
A GEOSCIENCES COMPANY
EST. 2002

CLIENT: THE COSORTIUM OF TTC & CMEC

CONTRACTOR: Teclab A GEOSCIENCES COMPANY

BOREHOLE RECORD

PROJECT	: G.I. for the proposed New Karuma Bridge-Phase II	DRILLING METHOD	: Rotary	BOREHOLE No.	: BH 7	Logged By: AK
PROJECT NO.	: 2024-014	DRILLING RIG	: GY-200	WATER LEVEL	: NIL m	Checked By: JI
LOACATION	: Karuma Game Reserve	OPERATOR	: Peter Muwanguzi	TEST METHOD	: BS 5930: 2015	Approved By: RO
COORDINATES	: 415450.242 m E 247822.061 m N	ELEVATION	: 1027 m	COORDINATE SYSTEM	: WGS84 START DATE: 06/02/2024 END DATE: 11/02/2024	

Ground Water	Depth (m)	FI (per m) C.D (mm) F.R (%)	TCR SCR RQD (%)	Description of Strata	Legend	Level	Samples & Tests Depth (m)	Type	No	SPT 75	75	75	75	75	75	N	Remarks
	0.00																
	0.50	- 110 -	- - -	Medium dense moist brown dark brown silty fine to coarse grained SAND. Presence of numerous vegetation roots		1026.11	0.50										
	1.00					1025.61	1.00	SPT	1	3	4	4	5	3	4	16	
	1.50	- 110 -	- - -			1025.11	1.50	U	1								
	2.00			Very stiff moist olive grey mottled orange and dark grey sandy SILT. The sand is fine to coarse grained.		1024.61	2.00	SPT	2	3	4	4	4	4	4	16	
	2.50	- 110 -	- - -			1024.11	2.50										
	3.00					1023.61	3.00	SPT	3	5	5	10	12	11	15	48	
	3.50	- 110 -	- - -	Dense moist olive grey mottled orange and black silty fine to coarse grained SAND.		1023.11	3.50										
	4.00					1022.61	4.00	SPT	4	5	6	9	10	12	12	43	
	4.50	- 110 -	- - -			1022.11	4.50	U	2								
	5.00			Hard moist olive grey green mottled orange and yellow sandy SILT. The sand is fine to coarse grained.		1021.61	5.00	SPT	5	9	14	15	16	19		50/225	
	5.50	- 110 -	- - -			1021.11	5.50										
	6.00					1020.61	6.00	SPT	6	10	14	50/60				50/60	
	6.50	>20 110 80	95 55 0	very weak to weak dark grey mottled yellow sub-rounded to sub-angular fine to medium grained micaceous weathered ROCK. Presence of numerous vertical and horizontal fractures terminating both internally and externally with highly stained joints.		1020.11	6.50										
	7.00					1019.61	7.00	SPT	7	10	15	50				50/75	
	7.50	>20 110 80	80 25 20			1019.11	7.50										
	8.00					1018.61	8.00										
	8.50	>20 110 85	95 0 0	Very weak to weak foliated olive grey dark grey mottled yellow sub-rounded to sub-angular fine to medium grained weathered micaceous GNEISS ROCK. Presence of various fractures both horizontal and vertical very closely to mediumly spaced terminating both ternall and externally with stained joints.		1018.11	8.50										
	9.00					1017.61	9.00										
	9.50	>20 110 85	95 0 0			1017.11	9.50										
	10.00					1016.61	10.00										
	10.50	>20 110 85	80 32 10			1016.11	10.50										

Ground Water

Sample Types

SPT : Disturbed (SPT) sample

U:Undisturbed sample

SPT: Standard Penetration Test

Key

GRAVEL
SAND
CLAY
SILTS
ROCK

F.I Fracture Index
C.D Core diameter
F.R Flush Rate

Comments

TECLAB LIMITED
A GEOSCIENCES COMPANY
EST. 2002

CLIENT: THE COSORTIUM OF TTC & CMEC

CONTRACTOR: Teclab A GEOSCIENCES COMPANY

BOREHOLE RECORD

PROJECT : G.I. for the proposed New Karuma Bridge-Phase II	DRILLING METHOD : Rotary	BOREHOLE No. : BH 7			Logged By: AK
PROJECT NO. : 2024-014	DRILLING RIG : GY-200	WATER LEVEL : NIL m			Checked By: JI
LOACATION : Karuma Game Reserve	OPERATOR : Peter Muwanguzi	TEST METHOD : BS 5930: 2015			Approved By: RO
COORDINATES : 415450.242 m E 247822.061 m N	ELEVATION : 1027 m	COORDINATE SYSTEM : WGS84	START DATE: 06/02/2024	END DATE: 11/02/2024	

Ground Water	Depth (m)	FI (per m) C.D (mm) F.R (%)	TCR SCR RQD (%)	Description of Strata	Legend	Level	Samples & Tests Depth (m)	Type	No	SPT 75	75	75	75	75	75	N	Remarks
	11.00	>20 110 85	80 32 10	Very weak to weak foliated olive grey dark grey mottled yellow sub-rounded to sub-angular fine to medium grained weathered micaceous GNEISS ROCK. SET 1: Between 7.7 - 11.0 m, presence of numerous fractures both horizontal and vertical terminating externally as well as internally with highly stained joints. SET 2: Open horizontal fracture dipping 35^0 very closely spaced between 12.4 - 12.5 m terminating externally striated rough with highly stained joint surfaces. SET 3: Open horizontal fracture dipping 40^0 closely spaced between 12.6 - 12.7 m terminating externally striated rough with sand infill.		1015.61	11.00									
	11.50	>20 110 85	100 30 10			1015.11	11.50										
	12.00					1014.61	12.00										
	12.50	>20 110 80	80 37 28			1014.11	12.50										
	13.00					1013.61	13.00										
	13.50	>20 110 90	100 52 30	Very weak to weak foliated olive grey dark grey mottled yellow sub-rounded to sub-angular fine to medium grained weathered micaceous GNEISS ROCK.		1013.11	13.50										
	14.00					1012.61	14.00										
	14.50	>20 110 90	50 18 0	Weak foliated grey black sfine grained micaceous weathered ROCK. Numerous fractures closely spaced 14.0 -15.7 m striated rough with stained with sand infill and highly atained joint surfaces.		1012.11	14.50										
	15.00					1011.61	15.00										
	15.50	>20 110 90	- - -			1011.11	15.50										
	16.00					1010.61	16.00										
	16.50	>20 110 90	40 5 0	Assumed Zone of Core Loss		1010.11	16.50										
	17.00			Weak foliated grey olive green black sub-rounded to sub-angular fine to coarse grained micaceous weathered ROCK. Presence of numerous fractures both horizontal and vertical with stained joints		1009.61	17.00										
	17.50	>20 110 90	63 40 40	Assumed Zone of Core Loss		1009.11	17.50										
	18.00			Weak foliated grey olive green black sub rounded to sub angular fine to coarse grained micaceous weathered ROCK. SET 1:Two horizontal fractures dipping 10 - 20^0 very closely spaced striated rough with stained joint surfaces. SET 2: Two vertical fractures between 17.6 - 17.7 m terminating externally with stained joints. SET 3: Numerous horizontal fractures both open and closed fractures with stained joints.		1008.61	18.00										
	18.50	>20 110 90	50 19 19			1008.11	18.50										
	19.00					1007.61	19.00										
	19.50	>20 110 90	55 20 12	Assumed Zone of Core Loss		1007.11	19.50										
	20.00			Presence of silty fine to coarse grained sand infill between 19.85 -20.0 m.		1006.61	20.00										

Borehole (BH 7) Terminated at 20.0m

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CLIENT: ORIENTAL CONSULTANTS GLOBAL COMPANY LIMITED

CONTRACTOR: Teclab A GEOSCIENCES COMPANY

BOREHOLE RECORD

PROJECT : G.I. for the proposed New Karuma Bridge-Phase II	DRILLING METHOD : Rotary	BOREHOLE No. : BH 8		Logged By:	AK
PROJECT NO. : 2024-014	DRILLING RIG : GY-200	WATER LEVEL : NIL m		Checked By:	JI
LOACATION : Karuma Game Reserve	OPERATOR : Peter Muwanguzi	TEST METHOD : BS 5930: 2015		Approved By:	RO
COORDINATES : 415453.247 m E 247843.932 m N	ELEVATION : 1022 m	COORDINATE SYSTEM : WGS84	START DATE: 12/02/2024	END DATE:	15/02/2024

Ground Water	Depth (m)	FI (per m) C.D (mm) F.R (%)	TCR SCR RQD (%)	Description of Strata	Legend	Level	Samples & Tests Depth (m)	Type	No	SPT 75	75	75	75	75	75	N	Remarks
	0.00			Loose slightly moist dark brown silty fine to coarse grained SAND with gravel.		1022.00											
	0.50	- 110 -	- - -			1021.82	0.50										
	1.00			Loose moist brown reddish brown mottled yellow gravelly silty fine to coarse grained SAND.		1021.32	1.00	SPT	1	1	2	2	1	2	2	7	
	1.50	- 110 -	- - -			1020.82	1.50										
	2.00			Medium dense moist yellowish brown olive grey silty micaceous fine to coarse grained SAND.		1020.32	2.00	SPT	2	3	3	3	4	5	3	15	
	2.50	- 110 -	- - -			1019.82	2.50										
	3.00					1019.32	3.00	SPT	3	5	6	9	11	12	11	43	
	3.50	7 110 90	- - -	Very weak olive green mottled yellow subrounded to subangular fine to coarse grained weathered ROCK.		1018.82	3.50										
				Medium dense moist pale yellow mottled olive green siltymicaceous fine to coarse grained SAND.													
	4.00					1018.32											
	4.60	>20 110 85	80 0 0	Weak foliated olive green light grey black sub-rounded to sub-angular fine to coarse grained micaceous weathered ROCK. Presence of various open fractures striated rough with highly stained joint surfaces.		1017.92	4.60										
	5.00					1017.32	5.00										
	5.50	>20 110 85	95 15 15			1016.82	5.50										
	6.00					1016.32	6.00										
	6.50	>20 110 85	90 0 0	Very weak to Weak foliated olive green light grey black sub-rounded to sub-angular fine to coarse grained micaceous weathered ROCK. Presence of various open fractures both horizontal and vertical striated rough with highly stained joint surfaces.		1015.82	6.50										
	7.00					1015.32	7.00										
	7.50	>20 110 85	95 0 0			1014.82	7.50										
	8.00					1014.32	8.00										
	8.50	>20 110 85	60 5 0			1013.82	8.50										
	9.00			Very weak to Weak foliated olive green pale yellow black sub-rounded to sub-angular fine to coarse grained micaceous weathered GNEISS ROCK. SET 1: Presence of numerous open fractures both horizontal and vertical very closely to mediumly spaced striated rough with highly stained joint surfaces. SET 2: Presence of sand / silt infill between 8.3-8.6 m, 8.7 - 9.0 m and 9.6 - 10.0 m		1013.32	9.00										
	9.50	>20 110 85	60 0 0			1012.82	9.50										
	10.00					1012.32	10.00										
	10.50	>20 110 85	80 0 0			1011.82	10.50										

Remarks: Ground Water

Sample Types
SPT : Disturbed (SPT) sample
U:Undisturbed sample
SPT: Standard Penetration Test

Key: GRAVEL, SAND, CLAY, SILTS, ROCK

F.I Fracture Index
C.D Core diameter
F.R Flush Rate

Comments

TECLAB LIMITED A GEOSCIENCES COMPANY EST. 2002

CLIENT: ORIENTAL CONSULTANTS GLOBAL COMPANY LIMITED

CONTRACTOR: Teclab A GEOSCIENCES COMPANY

BOREHOLE RECORD

PROJECT : G.I. for the proposed New Karuma Bridge-Phase II	DRILLING METHOD : Rotary	BOREHOLE No. : BH 8			Logged By: AK
PROJECT NO. : 2024-014	DRILLING RIG : GY-200	WATER LEVEL : NIL m			Checked By: JI
LOACATION : Karuma Game Reserve	OPERATOR : Peter Muwanguzi	TEST METHOD : BS 5930: 2015			Approved By: RO
COORDINATES : 415453.247 m E 247843.932 m N	ELEVATION : 1022 m	COORDINATE SYSTEM : WGS84	START DATE: 12/02/2024	END DATE: 15/02/2024	

Ground Water	Depth (m)	FI (per m) C.D (mm) F.R (%)	TCR SCR RQD (%)	Description of Strata	Legend	Level	Samples & Tests Depth (m)	Type	No	SPT 75	75	75	75	75	75	N	Remarks
	11.00	>20 110 85	60 0 0	Very weak to Weak foliated olive green pale yellow black sub-rounded to sub-angular fine to coarse grained micaceous weathered GNEISS ROCK		1011.32	11.00										
	11.50	>20 110 85	75 0 0			1010.82	11.50										
	12.00	>20 110 90	60 0 0			1010.32	12.00										
	12.50	>20 110 90	80 23 0			1009.82	12.50										
	13.00	>20 110 90	80 0 0	Weak foliated light yellow mottled black sub-rounded to sub-angular fine to coarse grained micaceous weathered GNEISS ROCK. Presence of numerous fractures both horizontal and vertical very closely spaced striated rough with stained joint surfaces.		1009.32	13.00										
	13.50	>20 110 90	90 8 0			1008.82	13.50										
	14.00	>20 110 90	35 5 0			1008.32	14.00										
	14.50	>20 110 90	90 38 24			1007.82	14.50										
	15.00	6 110 95	68 68 63			1007.32	15.00										
	15.50	3 110 95	25 25 20			1006.82	15.50										
	16.00			Assumed Zone of Core Loss		1006.32	16.00										
	16.50					1005.82	16.50										
	17.00			Weak foliated olive green light grey black sub-rounded to sub-angular fine to coarse grained micaceous weathered GNEISS ROCK. Presence of various fractures both horizontal and vertical very closely spaced striated rough with stained joint surfaces		1005.32	17.00										
	17.50					1004.82	17.50										
	18.00					1004.32	18.00										
	18.50			Medium strong foliated light grey mottled black sub-rounded to sub-angular fine to coarse grained micaceous weathered ROCK		1003.82	18.50										
	19.00					1003.32	19.00										
	19.50					1002.82	19.50										
	20.00					1002.32	20.00										

Borehole (BH 8) Terminated at 20.0m

TECLAB LIMITED
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CLIENT: ORIENTAL CONSULTANTS GLOBAL COMPANY LIMITED

CONTRACTOR: Teclab A GEOSCIENCES COMPANY

BOREHOLE RECORD

PROJECT : G.I. for the proposed New Karuma Bridge-Phase II	DRILLING METHOD : Rotary	BOREHOLE No. : BH 9		Logged By:	AK
PROJECT NO. : 2024-014	DRILLING RIG : GY-200	WATER LEVEL : 6.00 m		Checked By:	JI
LOACATION : Karuma Game Reserve	OPERATOR : Peter Muwanguzi	TEST METHOD : BS 5930: 2015		Approved By:	RO
COORDINATES : 415442.748 m E 247883.399 m N	ELEVATION : 998 m	COORDINATE SYSTEM : WGS84	START DATE: 17/02/2024	END DATE:	20/02/2024

Ground Water	Depth (m)	FI (per m) C.D (mm) F.R (%)	TCR SCR RQD (%)	Description of Strata	Legend	Level	Samples & Tests Depth (m)	Type	No	SPT 75	75	75	75	75	75	N	Remarks
	0.00																
	0.50	10 110 85	90 10 10	Medium dense moist brown dark grey mottled yellow silty fine to coarse grained micaceous SAND.		997.97	0.50										
	1.00			Medium strong light grey mottled black sub-rounded to sub-angular fine to coarse grained micaceous weathered GNEISS ROCK		997.47	1.00										
	1.50	8 110 85	95 40 40			996.97	1.50										
	2.00			Medium dense moist olive grey mottled yellow silty fine to coarse grained SAND.		996.47	2.00										
	2.50	- 110 85	90 0 0			995.97	2.50										
	3.00					995.47	3.00										
	3.50	13 110 90	95 95 95			994.97	3.50										
	4.00			Medium strong foliated light grey mottled black sub-rounded to sub-angular fine to coarse grained micaceous weathered GNEISS ROCK. SET 1: Presence of numerous fractures between 4.1 - 4.4 mstriated rough with stained joints surfaces. SET 2: A horizontal fracture dipping 25^0 very closely spaced between 4.6 - 4.75 m very closely spaced terminating externally striated rough with stained joint. SET 3: Four horizonal fractures oriented between 35-50^0 very closely between 5.0 - 5.6 m terminating externally spaced striated rough with slightly stained joints. SET 4: Two horizontal fractures dipping 35^0 very closely spaced between 5.6 - 6.0 m striated rough with stained joint surfaces. SET 5: Presence of sandy silt infill between 6.5 - 6.7 m. SET 6: A horizontal fracture dipping 20^0 very closely spaced between 7.4 - 7.55 m striated rough with stained joint surfaces.		994.47	4.00								
	4.50	10 110 90	75 37 30			993.97	4.50										
	5.00					993.47	5.00										
	5.50	12 110 90	90 27 13			992.97	5.50										
▼	6.00					992.47	6.00										
	6.50	10 110 90	85 43 30			991.97	6.50										
	7.00					991.47	7.00										
	7.50	15 110 90	95 65 65			990.97	7.50										
	8.00					990.47	8.00										
	8.50	3 110 95	100 88 88	Medium strong to strong foliated light grey black sub-rounded to subangular fine to coarse grained micaceous partially weathered GNEISS ROCK. SET 1: A vertical open fracture closely spaced between 8.4 - 8.45 m very terminating externally striated rough with stained joint. SET 2: A horizontal fracture dipping 30^0 very closely spaced between 9.3 - 9.4 m terminating externally striated rough with stained joint surfaces.		989.97	8.50								
	9.00					989.47	9.00										
	9.50	4 110 95	95 90 90			988.97	9.50										
	10.00					988.47	10.00										
	10.50	2 110 100	100 100 100	Strong foliated light grey mottled black sub-rounded to subangular fine to coarse grained micaceous partially fresh GNEISS ROCK.		987.97	10.50										

Remarks:

Ground Water

Sample Types

SPT : Disturbed (SPT) sample

U:Undisturbed sample

SPT: Standard Penetration Test

Key

GRAVEL
SAND
CLAY
SILTS
ROCK

F.I Fracture Index
C.D Core diameter
F.R Flush Rate

Comments

TECLAB LIMITED A GEOSCIENCES COMPANY EST. 2002

CLIENT: ORIENTAL CONSULTANTS GLOBAL COMPANY LIMITED

CONTRACTOR: Teclab A GEOSCIENCES COMPANY

BOREHOLE RECORD

PROJECT : G.I. for the proposed New Karuma Bridge-Phase II	DRILLING METHOD : Rotary	BOREHOLE No. : BH 9		Logged By:	AK
PROJECT NO. : 2024-014	DRILLING RIG : GY-200	WATER LEVEL : 6.00 m		Checked By:	JI
LOACATION : Karuma Game Reserve	OPERATOR : Peter Muwanguzi	TEST METHOD : BS 5930: 2015		Approved By:	RO
COORDINATES : 415442.748 m E 247883.399 m N	ELEVATION : 998 m	COORDINATE SYSTEM : WGS84	START DATE: 17/02/2024	END DATE:	20/02/2024

Ground Water	Depth (m)	FI (per m) C.D (mm) F.R (%)	TCR SCR RQD (%)	Description of Strata	Legend	Level	Samples & Tests Depth (m)	Type	No	SPT 75	75	75	75	75	75	N	Remarks
	11.00	2 110 100	100 100 100	Strong to very strong foliated light grey banded black sub-rounded to sub-angular fine to coarse grained micaceous fresh GNEISS ROCK.		987.47	11.00										
	11.50	2 110 100	100 100 100			986.97	11.50										
	12.00	2 110 100	100 100 100			986.47	12.00										
	12.50	2 110 100	100 100 100			985.97	12.50										
	13.00	4 110 100	100 90 90	Strong foliated light grey banded black sub-rounded to sub-angular fine to coarse grained micaceous partially weathered GNEISS ROCK.		985.47	13.00										
	13.50	3 110 100	100 100 100			984.97	13.50										
	14.00	3 110 100	95 95 95			984.47	14.00										
	14.50	3 110 100	95 95 95			983.97	14.50										
	15.00	3 110 100	95 95 95			983.47	15.00										
	15.50	3 110 100	95 95 95			982.97	15.50										
	16.00	2 110 100	100 100 100	Strong foliated light grey black sub-rounded to sub-angular fine to coarse grained micaceous partially fresh GNEISS ROCK.		982.47	16.00										
	16.50	2 110 100	100 100 100			981.97	16.50										
	17.00	2 110 100	100 100 100			981.47	17.00										
	17.50	2 110 100	100 100 100			980.97	17.50										
	18.00	2 110 100	100 100 100			980.47	18.00										
	18.50	2 110 100	100 100 100			979.97	18.50										
	19.00	2 110 100	100 100 100			979.47	19.00										
	19.50	2 110 100	100 100 100			978.97	19.50										
	20.00					978.47	20.00										

Borehole (BH 9) Terminated at 20.0m

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CONTRACTOR: Teclab A GEOSCIENCES COMPANY

BOREHOLE RECORD

PROJECT	: G.I. for the proposed New Karuma Bridge-Phase II	DRILLING METHOD	: Rotary	BOREHOLE No.	: BH 10	Logged By: AK
PROJECT NO.	: 2024-014	DRILLING RIG	: GY-200	WATER LEVEL	: 6.50 m	Checked By: JI
LOACATION	: Karuma Game Reserve	OPERATOR	: Peter Muwanguzi	TEST METHOD	: BS 5930: 2015	Approved By: RO
COORDINATES	: 415430.219 m E 247990.495 m N	ELEVATION	: 998 m	COORDINATE SYSTEM	: WGS84	START DATE: 23/02/2024 END DATE: 26/02/2024

Ground Water	Depth (m)	FI (per m) C.D (mm) F.R (%)	TCR SCR RQD (%)	Description of Strata	Legend	Level	Samples & Tests Depth (m)	Type	No	SPT 75	75	75	75	75	75	N	Remarks
	0.00																
	0.50	10 110 80	100 10 0	Medium dense slightly moist grey yellow brown gravelly silty fine to coarse grained SAND.		997.88	0.50										
	1.00					997.38	1.00										
	1.50	>20 110 30	60 22 14	Weak foliated light grey sub-rounded to sub-angular fine to coarse grained micaceous weathered ROCK.		996.88	1.50										
	2.00					996.38	2.00										
	2.50	14 110 60	90 68 62	Medium strong foliated light grey black sub-rounded to sub-angular fine to coarse grained micaceous weathered ROCK. Presence of an infill between 3.6 - 3.8 m.		995.88	2.50										
	3.00					995.38	3.00										
	3.50	15 110 80	60 40 28			994.88	3.50										
	4.00					994.38	4.00										
	4.50	3 110 85	100 90 90			993.88	4.50										
	5.00					993.38	5.00										
	5.50	3 110 90	90 80 80	Strong foliated light grey black sub-rounded to sub-angular fine to coarse grained micaceous Partially weathered ROCK		992.88	5.50										
	6.00					992.38	6.00										
▼	6.50	4 110 85	100 85 80			991.88	6.50										
	7.00					991.38	7.00										
	7.50	3 110 90	100 92 92	Very strong foliated light grey sub-rounded to sub-angular fine to coarse grained micaceous Partially weathered GNEISS ROCK.		990.88	7.50										
	8.00					990.38	8.00										
	8.50	7 110 90	95 64 64			989.88	8.50										
	9.00			Strong foliated light grey black sub-rounded to sub-angular fine to coarse grained micaceous Partially weathered GNEISS ROCK. SET 1: A vertical fracture oriented 25° very closely spaced between 8.37 - 8.7 m terminating internally striated rough with stained joint. SET 2: A vertical fracture very closely between 9.8 - 10.0 m terminating externally striated rough with stained joint.		989.38	9.00										
	9.50	5 110 90	97 69 64			988.88	9.50										
	10.00					988.38	10.00										
	10.50	3 110 95	100 100 100			987.88	10.50										

Ground Water

Sample Types
SPT : Disturbed (SPT) sample
U:Undisturbed sample
SPT: Standard Penetration Test

Key
GRAVEL
SAND
CLAY
SILTS
ROCK

F.I Fracture Index
C.D Core diameter
F.R Flush Rate

Comments

TECLAB LIMITED
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EST. 2002

CLIENT: ORIENTAL CONSULTANTS GLOBAL COMPANY LIMITED

CONTRACTOR: Teclab A GEOSCIENCES COMPANY

BOREHOLE RECORD

PROJECT : G.I. for the proposed New Karuma Bridge-Phase II	DRILLING METHOD : Rotary	BOREHOLE No. : BH 10		Logged By:	AK
PROJECT NO. : 2024-014	DRILLING RIG : GY-200	WATER LEVEL : 6.50 m		Checked By:	JI
LOACATION : Karuma Game Reserve	OPERATOR : Peter Muwanguzi	TEST METHOD : BS 5930: 2015		Approved By:	RO
COORDINATES : 415430.219 m E 247990.495 m N	ELEVATION : 998 m	COORDINATE SYSTEM : WGS84	START DATE: 23/02/2024	END DATE:	26/02/2024

Ground Water	Depth (m)	FI (per m) C.D (mm) F.R (%)	TCR SCR RQD (%)	Description of Strata	Legend	Level	Samples & Tests Depth (m)	Type	No	SPT 75	75	75	75	75	75	N	Remarks
	11.00	3 110 95	100 100 100			987.38	11.00										
	11.50	7 110 100	93 93 93			986.88	11.50										
	12.00					986.38	12.00										
	12.50	5 110 100	100 79 75			985.88	12.50	...									
	13.00					985.38	13.00										
	13.50	5 110 95	100 77 77			984.88	13.50										
	14.00					984.38	14.00										
	14.50	5 110 95	100 79 79	Strong foliated grey banded black sub-rounded to sub-angular fine to coarse grained micaceous Partially weathered GNEISS ROCK. SET 1: A vertical fracture oriented 25^0 very closely spaced between 12.5 - 12.8 m terminating externally striated rough with slightly stained joint. SET 2: A vertical fracture oriented 30^0 very closely spaced terminating externally striated rough. SET 3: A vertical fracture oriented 20^0 between 15.0 - 15.30 m terminating externally striated rough with stained joint. SET 4 : A Horizontal open fracture oriented 30^0 very closely spaced terminating externally striated rough with stained joint surfaces.		983.88	14.50										
	15.00					983.38	15.00										
	15.50	8 110 100	100 100 100			982.88	15.50										
	16.00					982.38	16.00										
	16.50	5 110 100	97 95 95			981.88	16.50										
	17.00					981.38	17.00										
	17.50	2 110 100	100 100 100			980.88	17.50										
	18.00					980.38	18.00										
	18.50	3 110 100	100 95 95			979.88	18.50										
	19.00					979.38	19.00										
	19.50	4 110 100	97 85 85			978.88	19.50										
	20.00					978.38	20.00										

Borehole (BH 10) Terminated at 20.0m

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CONTRACTOR: Teclab A GEOSCIENCES COMPANY

BOREHOLE RECORD

PROJECT : G.I. for the proposed New Karuma Bridge-Phase II	DRILLING METHOD : Rotary	BOREHOLE No. : BH 11		Logged By:	AK
PROJECT NO. : 2024-014	DRILLING RIG : GY-200	WATER LEVEL : 0.00 m		Checked By:	JI
LOACATION : Karuma Game Reserve	OPERATOR : Peter Muwanguzi	TEST METHOD : BS 5930: 2015		Approved By:	RO
COORDINATES : 415411.519 m E 248067.080 m N	ELEVATION : 1017 m	COORDINATE SYSTEM : WGS84	START DATE: 05/03/2024	END DATE:	09/03/2024

Ground Water	Depth (m)	FI (per m) C.D (mm) F.R (%)	TCR SCR RQD (%)	Description of Strata	Legend	Level	Samples & Tests Depth (m)	Type	No	SPT	Remarks
	0.00	- 110 -		Stiff moist yellowish dark brown sandy SILT. The sand is fine to coarse grained							
	0.50					1016.09					
	1.00	- 110 -		Medium dense to very dense moist light grey yellowish brown olive grey silty fine to coarse grained SAND of distinctly weathered Rock.		1015.59	1.00	SPT	1	3 4 4 5 4 5 18	
	1.50					1015.00					
	2.00	>20 110 80	100 0 0			1014.59	2.00	SPT	2	7 10 14 19 17/25 50/175	
	2.50			Very weak foliated light grey yellow olive grey sub-rounded to sub-angular fine to coarse micaceous weathered ROCK		1014.09					
	3.00	>20 110 80	90 10 0			1013.59					
	3.50					1013.09					
	4.00	>20 110 80	90 25 0	Very weak to weak foliated light grey yellow brown black sub-rounded to sub-angular fine to coarse micaceous weathered ROCK. Presence of numerous fractures both horizontal and vertical extremely to very closely spaced striated rough with stained joints.		1012.59					
	4.50					1012.09					
	5.00	>20 110 85	90 45 40			1011.59					
	5.50					1011.09					
	6.00	>20 110 80	80 8 0			1010.59					
	6.50					1010.09					
	7.00			Assumed Zone of Core Loss		1009.59					
	7.50	8 110 90	75 65 65	Medium strong foliated light grey black sub-rounded to subangular fine to coarse grained micaceous weathered GNEISS ROCK. SET 1: Avertical fracture dipping 20^0 extremely closely spaced between 8.45 - 8.65 m terminating internally striated rough with stained joint. SET 2: A horizontal fracture dipping 40^0 very closely spaced between 9.30 - 9.40 m terminating externally planar rough with stained joint surfaces. SET 3: Avertical fracture dipping 10^0 beteen 9.40 - 9.60 m terminating internally striated rough with highly stained joint.		1009.09					
	8.00					1008.59					
	8.50	8 110 95	97 81 62			1008.09					
	9.00					1007.59					
	9.50	8 110 95	100 76 71			1007.09					
	10.00			Strong foliated grey black sub-rounded to sub-angular fine to coarse grained icaceous partially weathered GNEISS ROCK.		1006.59					
	10.50	4 110 100	100 95 95			1006.09					

Ground Water

Sample Types
SPT : Disturbed (SPT) sample
U:Undisturbed sample
SPT: Standard Penetration Test

Key
GRAVEL
SAND
CLAY
SILTS
ROCK

F.I Fracture Index
C.D Core diameter
F.R Flush Rate

Comments

TECLAB LIMITED A GEOSCIENCES COMPANY EST. 2002

CLIENT: ORIENTAL CONSULTANTS GLOBAL COMPANY LIMITED

CONTRACTOR: Teclab A GEOSCIENCES COMPANY

BOREHOLE RECORD

PROJECT : G.I. for the proposed New Karuma Bridge-Phase II	DRILLING METHOD : Rotary	BOREHOLE No. : BH 11			Logged By: AK
PROJECT NO. : 2024-014	DRILLING RIG : GY-200	WATER LEVEL : 0.00 m			Checked By: JI
LOACATION : Karuma Game Reserve	OPERATOR : Peter Muwanguzi	TEST METHOD : BS 5930: 2015			Approved By: RO
COORDINATES : 415411.519 m E 248067.080 m N	ELEVATION : 1017 m	COORDINATE SYSTEM : WGS84	START DATE: 05/03/2024	END DATE: 09/03/2024	

Ground Water	Depth (m)	FI (per m) C.D (mm) F.R (%)	TCR SCR RQD (%)	Description of Strata	Legend	Level	Samples & Tests Depth (m)	Type	No	SPT 75	75	75	75	75	75	N	Remarks
	11.00	4 110 100	100 81 75	Strong foliated grey black sub-rounded to sub-angular fine to coarse grained icaceous partially weathered GNEISS ROCK. SET 1: A horizontal fracture dipping 20^0 very closely spaced between 12.7 - 12.75 m terminating externally undulating rough with stained joint surfaces. SET 2: A horizontal fracture dipping 20^0 closely spaced between 14.20 - 14.25 m terminating externally undulating rough with stained joint surfaces.		1005.59	11.00										
	11.50	7 110 100	100 95 95			1005.09	11.50										
	12.00					1004.59	12.00										
	12.50	3 110 90	100 95 95			1004.09	12.50										
	13.00					1003.59	13.00										
	13.50	2 110 100	100 100 100			1003.09	13.50										
	14.00					1002.59	14.00										
	14.50	6 110 100	95 90 75			1002.09	14.50										
	15.00					1001.59	15.00										
	15.50	2 110 100	100 100 100			1001.09	15.50										
	16.00					1000.59	16.00										
	16.50	4 110 100	97 97 97			1000.09	16.50										
	17.00					999.59	17.00										
	17.50	10 110 100	100 35 25	Strong foliated grey black sub-rounded to sub-anglar fine to coarse grained weathered GNEISS ROCK. A vertical fracture dipping 40^0 terminating internally striated rough with stained joint surfaces.		999.09	17.50										
	18.00					998.59	18.00										
	18.50	4 110 100	100 100 100	Strong foliated grey black sub-rounded to sub-angular fine to coarse grained micaceous partially weathered GNEISS ROCK.		998.09	18.50										
	19.00					997.59	19.00										
	19.50	6 110 95	97 58 40	Strong foliated grey black sub-rounded to sub-anglar fine to coarse grained weathered GNEISS ROCK. SET 1: A vertical fracture dipping 40^0 between 19.30 - 19.40 m striated rough with stained joint surfaces. SET 2: A vertical fracture dipping 35^0 between 19.45 - 19.65 m striated rough with stained joint surfaces.		997.09	19.50										
	20.00					996.59	20.00										

Borehole (BH 11) Terminated at 20.0m

TECLAB LIMITED
A GEOSCIENCES COMPANY
EST. 2002

CLIENT: ORIENTAL CONSULTANTS GLOBAL COMPANY LIMITED

CONTRACTOR: Teclab A GEOSCIENCES COMPANY

BOREHOLE RECORD

PROJECT : G.I. for the proposed New Karuma Bridge-Phase II	DRILLING METHOD : Rotary	BOREHOLE No. : BH 12		Logged By:	AK
PROJECT NO. : 2024-014	DRILLING RIG : GY-200	WATER LEVEL : 0.00 m		Checked By:	JI
LOACATION : Karuma Game Reserve	OPERATOR : Peter Muwanguzi	TEST METHOD : BS 5930: 2015		Approved By:	RO
COORDINATES : 415411.982 m E 248088.013 m N	ELEVATION : 1021 m	COORDINATE SYSTEM : WGS84	START DATE: 29/03/2024	END DATE:	03/03/2024

Ground Water	Depth (m)	FI (per m) C.D (mm) F.R (%)	TCR SCR RQD (%)	Description of Strata	Legend	Level	Samples & Tests Depth (m)	Type	No	SPT 75	75	75	75	75	75	N	Remarks
	0.00	- 110 -		Medium dense slightly moist brown dark brown yellow silty fine to coarse grained SAND.		1020.34	0.50										
	1.00	- 110 -		Medium dense to dense moist pale yellow brown mottled olive grey silty fine to coarse grained SAND.		1019.84	1.00	SPT	1	6	9	8	7	6	13	34	
	1.50	- 110 -		Dense moist white brown yellow olive grey silty fine to coarse grained SAND.		1019.34	1.50										
	2.00	- 110 -				1018.84	2.00	SPT	2	10	9	14	20	16/50		50/200	
	2.50					1018.34	2.50										
	3.00	- 110 -				1017.84	3.00	SPT	3	7	11	16	19	15/30		50/180	
	3.50					1017.34	3.50										
	4.00	- 110 70	100 0 0	Extremely Weak foliated brown yellow olive grey sub-rounded to sub-angular fine to coarse grained distinctly Weathered ROCK		1016.84	4.00	SPT	4	9	12	16	22	12/35		50/185	
	4.60					1016.34	4.60										
	5.00	- 110 70	100 0 0			1015.84	5.00										
	5.50					1015.34	5.50										
	6.00	>20 110 80	95 10 10	Weak foliated light grey olive grey sub-rounded to sub-angular fine to coarse grained weathered ROCK. Presence of various fractures both open and closed extremely to very closely spaced striated rough with highly stained joint surfaces		1014.84	6.00										
	6.50					1014.34	6.50										
	7.00	>20 110 80	96 21 21			1013.84	7.00										
	7.50					1013.34	7.50										
	8.00	>20 110 80	35 0 0			1012.84	8.00										
	8.50			Assumed Zone of Core Loss		1012.34	8.50										
	9.00	>20 110 80	20 6 0			1011.84	9.00										
	9.50					1011.34	9.50										
	10.00	>20 110 85	85 33 33	Weak olive grey black with fine grained weathered ROCK.		1010.84	10.00										
	10.50					1010.34	10.50										

Ground Water

Sample Types
SPT : Disturbed (SPT) sample
U:Undisturbed sample
SPT: Standard Penetration Test

Key
GRAVEL
SAND
CLAY
SILTS
ROCK

F.I Fracture Index
C.D Core diameter
F.R Flush Rate

Comments

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CLIENT: ORIENTAL CONSULTANTS GLOBAL COMPANY LIMITED

CONTRACTOR: Teclab A GEOSCIENCES COMPANY

BOREHOLE RECORD

PROJECT	: G.I. for the proposed New Karuma Bridge-Phase II	DRILLING METHOD	: Rotary	BOREHOLE No.	: BH 12	Logged By: AK
PROJECT NO.	: 2024-014	DRILLING RIG	: GY-200	WATER LEVEL	: 0.00 m	Checked By: JI
LOACATION	: Karuma Game Reserve	OPERATOR	: Peter Muwanguzi	TEST METHOD	: BS 5930: 2015	Approved By: RO
COORDINATES	: 415411.982 m E 248088.013 m N	ELEVATION	: 1021 m	COORDINATE SYSTEM	: WGS84	START DATE: 29/03/2024 END DATE: 03/03/2024

Ground Water	Depth (m)	FI (per m) C.D (mm) F.R (%)	TCR SCR RQD (%)	Description of Strata	Legend	Level	Samples & Tests Depth (m)	Type	No	SPT 75	75	75	75	75	75	N	Remarks
	11.00	>20 110 85	85 33 33	Weak olive grey black with fine grained weathered ROCK. Presence of various fractures both horizontal and vertical very closely spaced striated rough with stained joints and sand / silt infill.		1009.84	11.00										
	11.50	>20 110 85	50 0 0			1009.34	11.50										
	12.00	15 110 90	100 37 32	Weak to medium strong folated grey banded black subrounded to subangular fine to coarse grained weathered GNEISS ROCK. Presence of various fractures both horizontal and vertical very closely spaced striated rough with stained joints.		1008.84	12.00										
	12.50					1008.34	12.50										
	13.00	3 110 100	100 100 100	Medium strong to strong foliated grey mottled black sub-rounded to subangular fine to coarse micaceous partially weathered GNEISS ROCK.		1007.84	13.00										
	13.50					1007.34	13.50										
	14.00	4 110 100	100 100 96			1006.84	14.00										
	14.50					1006.34	14.50										
	15.00	12 110 90	100 82 62	Strong foliated grey black sub-rounded to sub-angular fine to coarse grained micaceous weathered GNEISS ROCK. SET 1:16.4 -16.5 m, Presence of a horizontal fracture dipping 40° very closely spaced terminating externally with slightly stained joint. SET 2: Between 16.8 - 17.20 m, Four horizontal fractures very closely spaced striated rough terminating externally with stained joints.		1005.84	15.00										
	15.50					1005.34	15.50										
	16.00	5 110 95	100 81 73			1004.84	16.00										
	16.50					1004.34	16.50										
	17.00	7 110 95	100 95 82	Strong foliated grey black sub-rounded to sub-angular fine to coarse grained micaceous partially weathered GNEISS ROCK. SET 1:17.15 - 17.40 m, Presence of a vertical and horizontal closed fractures with stained joint. SET 2: A horizontal fracture dipping 30° extremely closely spaced between 18.65 - 18.75 m terminating externally striated rough with stained joint. SET 3: , Two horizontal fractures very closely spaced between 19.40 - 19.50 m terminating exterally striated rough with stained joint surface.		1003.84	17.00										
	17.50					1003.34	17.50										
	18.00	4 110 95	100 93 93			1002.84	18.00										
	18.50					1002.34	18.50										
	19.00	4 110 95	100 95 92			1001.84	19.00										
	19.50					1001.34	19.50										
	20.00					1000.84	20.00										

Borehole (BH 12) Terminated at 20.0m

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Appendix 4 – Bearing Capacity Results at Boreholes

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EXCELLENCE THROUGH PRECISION AND INTEGRITY

CERTIFICATE No.: 2024-014-01 **DATE: 22/05/2024**
VERSION 02

1. Client Name: Oriental Consultants Global Company Limited **2. Client Contact:** N/A
3. Client Address: N/A **4. Project Ref No.:** 2024-014
5. Project Title: Geotechnical Investigations for the proposed New Karuma Bridge - Phase II in Kiryandongo - Nwoya Districts, Uganda
6. Nature of test: Standard Penetration Test **7. Date of Testing:** 04/02/2024 - 05/03/2024
8. Test Method(s): BS EN ISO 22476-3:2005+A1;2011 / ASTM D6954-18 **9. Attachment(s):** None
10. Test Location: Karuma Game Reserve
11. Results:

EVALUATION OF ALLOWABLE BEARING CAPACITY BASED ON FIELD SPT 'N' VALUES

BH No.	Depth (m)	Predominant Soil Fraction	Measured SPT 'N' Value N	Equipment & Borehole Correction C_{EB}	*Correction for SPT N Value* N_{60}	Overburden Correction Factor C_N	*Over burden correction for SPT N Value* $(N_1)_{60}$	Unconfined Compressive Strength q_u (kPa)	Undrained Cohesion C_u (kPa)	Allowable Bearing Capacity By Terzaghi and Peck (1948) Q_{all} (kPa)	Allowable Bearing Capacity Terzaghi and Peck, 1967 Q_{all} (kPa)
BH 6	1.0	Silty SAND	18	0.75	23	1.5	34	Not Applicable for Cohesionless Soils			394
	2.0	Sandy SILT	14	0.75	18	1.0	18	229	115	175	196
	3.0	Sandy SILT	18	0.75	23	1.0	23	295	147	225	253
	4.0	Sandy SILT	18	0.85	26	1.0	26	334	167	255	286
	5.0	Sandy SILT	22	0.85	31	1.0	31	408	204	312	350
	6.0	Sandy SILT	27	0.95	43	1.0	43	560	280	428	480
	7.0	Sandy SILT	26	0.95	41	1.0	41	539	270	412	462
BH 7	1.0	Sandy SILT	16	0.75	20	1.0	20	262	131	200	224
	2.0	Sandy SILT	16	0.75	20	1.0	20	262	131	200	224
	3.0	Silty SAND	48	0.75	60	1.3	81	Not Applicable for Cohesionless Soils			>585
	4.0	Sandy SILT	43	0.85	61	1.0	61	798	399	609	684
	5.0	Sandy SILT	50	0.85	71	1.0	71	928	464	708	795
	6.0	Sandy SILT	50	0.95	79	1.0	75	986	493	753	845
	7.0	Very weak Rock	50	0.95	79	0.9	70	Not Applicable for Cohesionless Soils			>585
BH 8	1.0	Silty SAND	7	0.75	9	1.5	13	Not Applicable for Cohesionless Soils			139
	2.0	Silty SAND	15	0.75	19	1.5	28				322
	3.0	Gravelly silty SAND	43	0.75	54	1.3	72				>585

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EXCELLENCE THROUGH PRECISION AND INTEGRITY

CERTIFICATE No.: 2024-014-01 **DATE: 22/05/2024**
VERSION 02

1. Client Name: Oriental Consultants Global Company Limited **2. Client Contact:** N/A
3. Client Address: N/A **4. Project Ref No.:** 2024-014
5. Project Title: Geotechnical Investigations for the proposed New Karuma Bridge - Phase II in Kiryandongo - Nwoya Districts, Uganda
6. Nature of test: Standard Penetration Test **7. Date of Testing:** 04/02/2024 - 05/03/2024
8. Test Method(s): BS EN ISO 22476-3:2005+A1;2011 / ASTM D6954-18 **9. Attachment(s):** None
10. Test Location: Karuma Game Reserve
11. Results:

EVALUATION OF ALLOWABLE BEARING CAPACITY BASED ON FIELD SPT 'N' VALUES

BH No.	Depth (m)	Predominant Soil Fraction	Measured SPT 'N' Value N	Equipment & Borehole Correction C_{EB}	*Correction for SPT N Value* N_{60}	Overburden Correction Factor C_N	*Over burden correction for SPT N Value* $(N_1)_{60}$	Unconfined Compressive Strength q_u (kPa)	Undrained Cohesion C_u (kPa)	Allowable Bearing Capacity By Terzaghi and Peck (1948) Q_{all} (kPa)	Allowable Bearing Capacity Terzaghi and Peck, 1967 Q_{all} (kPa)
BH 11	1.0	Silty SAND	18	0.75	23	1.5	34	Not Applicable for Cohesionless Soils			394
	2.0	Silty SAND	50	0.75	63	1.5	94				>585
BH 12	1.0	Silty SAND	34	0.75	43	1.5	64	Not Applicable for Cohesionless Soils			>585
	2.0	Silty SAND	50	0.75	63	1.5	94				>585
	3.0	Silty SAND	50	0.75	63	1.3	84				>585
	4.0	Silty SAND	50	0.85	71	1.2	82				>585

For cohesive soils, the relationship qu = 13.00 x Design N-value is used for evaluation of the Unconfined Compressive Strength qu, the cohesion Cu = qu/2 and qult = 5.14 x Cu. q_{all} is evaluated using a factor of safety of 3.0

Allowable bearing capacity with settlement assumed to not exceed 25mm for cohesionless soils read off directly from the Chart (Published by Terzaghi and Peck, 1967), assuming a 2.0 m Foundation Widith

Estimates of presumed allowable bearing capacity values for scheme design not detail design

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********** END OF REPORT **********

Checked by: Julius Isingoma
Materials Engineer

Approved By: Robinson Onen
Technical Manager

Appendix 6 – Downhole Seismic Test Results

Geotechnical Investigation for the proposed New Karuma Bridge – Phase II

Oriental Consultants Global Company Limited

BH 7

Z (m)	Vp	Vs	g	ni	G	Ed	E	Ev
	[m/s]	[m/s]	[kN/mc]		[MPa]	[MPa]	[MPa]	[MPa]
2.12	880	423	17.43	0.35	312	1350	843	933
2.50	871	460	17.38	0.31	367	1317	960	827
3.81	910	473	17.58	0.32	393	1457	1034	933
5.22	933	495	17.68	0.30	434	1538	1131	960
6.67	3700	2101	24.96	0.26	11013	34167	27800	19483
8.14	3810	2224	25.14	0.24	12435	36495	30878	19915
9.62	4000	2300	25.45	0.25	13464	40725	33742	22773
11.10	4210	2250	25.78	0.30	13049	45686	33930	28287
12.59	3901	2330	25.29	0.22	13734	38481	33580	20169
14.08	4100	2546	25.61	0.19	16593	43044	39370	20920
15.57	3890	2000	25.27	0.32	10109	38242	26694	24763
17.07	3789	2010	25.11	0.30	10143	36044	26457	22520
18.56	4190	2780	25.75	0.11	19897	45199	44045	18670
20.00	4228	2872	25.80	0.07	21284	46127	45617	17748

BH 8

Z (m)	Vp	Vs	g	ni	G	Ed	E	Ev
	[m/s]	[m/s]	[kN/mc]		[MPa]	[MPa]	[MPa]	[MPa]
2.12	810	422	17.07	0.31	305	1120	800	714
2.50	820	438	17.12	0.30	329	1151	855	713
3.81	2800	1617	23.28	0.25	6083	18250	15208	10139
5.22	3051	1761	23.78	0.25	7379	22138	18449	12299
6.67	3060	1767	23.80	0.25	7429	22286	18571	12381
8.14	2960	1610	23.60	0.29	6117	20680	15781	12525
9.62	3000	1632	23.68	0.29	6304	21314	16265	12909
11.10	3250	1824	24.16	0.27	8041	25520	20423	14800
12.59	3380	1897	24.40	0.27	8782	27875	22308	16165
14.08	3300	1852	24.25	0.27	8322	26412	21137	15317
15.57	3700	2077	24.96	0.27	10765	34167	27343	19814
17.07	3927	2204	25.33	0.27	12308	39065	31263	22654
18.56	4950	2778	26.84	0.27	20721	65768	52632	38139
20.00	4960	2788	26.85	0.27	20874	66067	52981	38235

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BH 9

Z (m)	Vp [m/s]	Vs [m/s]	g [kN/mc]	ni	G [MPa]	Ed [MPa]	E [MPa]	Ev [MPa]
2.12	805	421	17.05	0.31	303	1105	794	701
2.50	845	452	17.25	0.30	352	1232	915	763
3.81	3330	1841	24.31	0.28	8236	26956	21085	15974
5.22	3350	1852	24.35	0.28	8348	27321	21371	16190
6.67	3360	1857	24.36	0.28	8404	27505	21515	16299
8.14	3460	1913	24.54	0.28	8978	29381	22983	17411
9.62	4350	2366	25.99	0.29	14545	49176	37526	29782
11.10	4700	2556	26.50	0.29	17311	58529	44663	35447
12.59	4800	2610	26.64	0.29	18151	61368	46830	37167
14.08	4900	2665	26.77	0.29	19013	64282	49054	38932
15.57	4925	2719	26.81	0.28	19822	65023	50774	38593
17.07	4950	2774	26.84	0.27	20649	65768	52497	38235
18.56	4975	2828	26.87	0.26	21494	66517	54221	37859
20.00	5010	2835	26.92	0.26	21638	67575	54722	38724

BH 10

Z (m)	Vp [m/s]	Vs [m/s]	g [kN/mc]	ni	G [MPa]	Ed [MPa]	E [MPa]	Ev [MPa]
2.12	890	465	17.48	0.31	379	1384	993	880
2.50	1800	1120	20.84	0.18	2615	6753	6192	3267
3.81	2790	1540	23.26	0.28	5516	18103	14130	10749
5.22	3400	1852	24.44	0.29	8380	28247	21606	17074
6.67	3760	2143	25.06	0.26	11506	35426	28983	20085
8.14	3990	2274	25.43	0.26	13149	40489	33124	22957
9.62	4150	2365	25.68	0.26	14365	44234	36186	25081
11.10	4260	2428	25.85	0.26	15235	46916	38379	26603
12.59	4364	2487	26.01	0.26	16084	49533	40518	28087
14.08	4410	2513	26.08	0.26	16468	50715	41485	28758
15.57	4610	2627	26.37	0.26	18195	56037	45837	31777
17.07	4671	2662	26.45	0.26	18741	57719	47213	32731
18.56	4750	2707	26.57	0.26	19462	59939	49028	33990
20.00	4851	2740	26.71	0.27	20050	62845	50756	36112

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Geotechnical Investigation for the proposed New Karuma Bridge – Phase II

Oriental Consultants Global Company Limited

BH 11

Z (m)	Vp	Vs	g	ni	G	Ed	E	Ev
	[m/s]	[m/s]	[kN/mc]		[MPa]	[MPa]	[MPa]	[MPa]
2.12	890	425	17.48	0.35	316	1384	855	963
2.50	950	508	17.77	0.30	458	1603	1191	993
3.81	2780	1512	23.24	0.29	5311	17958	13703	10876
5.22	2910	1583	23.50	0.29	5887	19903	15188	12054
6.67	2950	1604	23.58	0.29	6070	20523	15661	12430
8.14	3001	1632	23.68	0.29	6309	21330	16277	12918
9.62	3010	1637	23.70	0.29	6352	21475	16387	13006
11.10	3200	1740	24.07	0.29	7290	24645	18807	14926
12.59	3330	1811	24.31	0.29	7973	26956	20570	16325
14.08	3250	1768	24.16	0.29	7548	25520	19475	15456
15.57	3650	1985	24.87	0.29	9801	33137	25287	20069
17.07	3877	2109	25.25	0.29	11226	37955	28963	22987
18.56	3900	2121	25.29	0.29	11376	38463	29351	23295
20.00	4008	2252	25.46	0.27	12913	40901	32781	23684

BH 12

Z (m)	Vp	Vs	g	ni	G	Ed	E	Ev
	[m/s]	[m/s]	[kN/mc]		[MPa]	[MPa]	[MPa]	[MPa]
2.12	880	423	17.43	0.35	312	1350	843	933
2.50	800	428	17.02	0.30	311	1089	809	674
3.81	2780	1605	23.24	0.25	5986	17958	14965	9977
5.22	3001	1733	23.68	0.25	7110	21330	17775	11850
6.67	3010	1738	23.70	0.25	7158	21475	17895	11930
8.14	2910	1583	23.50	0.29	5887	19903	15188	12054
9.62	2950	1604	23.58	0.29	6070	20523	15661	12430
11.10	3200	1796	24.07	0.27	7765	24645	19723	14292
12.59	3330	1869	24.31	0.27	8493	26956	21572	15632
14.08	3250	1824	24.16	0.27	8041	25520	20423	14800
15.57	3650	2049	24.87	0.27	10440	33137	26518	19216
17.07	3877	2176	25.25	0.27	11958	37955	30374	22010
18.56	3900	2189	25.29	0.27	12119	38463	30781	22305
20.00	4008	2272	25.46	0.26	13143	40901	33206	23377

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Appendix 8 –Summary for Unconsolidated Undrained Triaxial Compression Test Results for the Undisturbed Soil Sample

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EXCELLENCE THROUGH PRECISION AND INTEGRITY

CERTIFICATE NO: PK-669-02
VERSION 02

Date: 22/05/2024

1.	**Client Name:**	Oriental Consultants Company Limited		
2.	**Client Address:**	N/A	**3. Client Contact:**	N/A
4.	**Project Title:**	Geotechnical Investigation for Proposed New Karuma Bridge - Phase II at the Boarder of Kiryandongo - Nwoya Districts, Uganda		
5	**Project Ref:**	2024-014	**6 Date of Receipt:**	13/03/2024
7.	**Condition at receipt:**	Satisfactory	**8. Sampling Report:**	N/A
9.	**Sample Description:**	Undisturbed Soil Sample	**10. Date of Testing:**	20/03/2024
11.	**Nature of test:**	Unconsolidated Undrained Triaxial Test		
12.	**Test Method(s):**	BS EN 17892-8: 2018		
13.	**Test Location:**	Teclab Ltd Headquarters, Nalukolongo	**14. Attachment(s):**	01 No. (Unconsolidated Undrained Triaxial Test Results)

15. Results:

SUMMARY OF LABORATORY TEST RESULTS

Sample ID	Depth (m)	Cell Pressure	Membrane Correction	Axial strain	Corrected Deviator stress	Shear Stresses	Average undrained Shear Strength
		kPa	kPa	%	kPa	kPa	kPa
BH 6	4.60-5.0	87	1.36	11.6	141	**70**	**71**
		174	1.61	14.6	146	**73**	
		261	1.54	13.7	139	**69**	

16. Remarks

16.1 This report relates only to the samples tested.

16.2 All tested samples will be immediately discarded after receipt of results by the client

********** END OF REPORT **********

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Checked by;

Julius Isingoma
Materials Engineer

Approved By

Robinson Onen
Technical Manager

Appendix 9 –Uniaxial Compression Strength Test Results for the Tested Rock Core Samples

EXCELLENCE THROUGH PRECISION AND INTEGRITY

CERTIFICATE NO: PK-669-03 **Date:** 22/05/2024

VERSION 02

1. **Client Name:** Oriental Consultants Global Company Limited
4. **Client Address:** N/A
2. **Client Contact:** N/A
3. **Date of Receipt:** 13/03/2024
5. **Project Ref:** 2024-014
6. **Sampling Report:** N/A
7. **Date of Testing:** 29/03/2024
8. **Project Title:** Geotechnical Investigations for the proposed New Karuma Bridge Phase II at the Boarder of Kiryandongo - Nwoya District Uganda
9. **Condition at receipt:** Satisfactory
10. **Sample Description:** Rock Samples
11. **Test Location:** Teclab Ltd Headquarters, Nalukolongo
12. **Nature of test:** Uniaxial Compressive Strength Test
13. **Test Method(s):** ISRM
14. **Attachment(s):** None
15. **Results:**

Measurements and Test Results

Sample ID	Depth (m)	Diameter (mm)	Height (mm)	Weight (kg)	P (kN)	Area (mm^2)	Volume (m^3)	Density (kg/m^3)	δ_u (N/mm^2)	Failure
BH 9	4.70 - 4.90	88	101	1.600	110	6082.123	0.61	2.61	15.735	Satisfactory
		88	105	1.639	124.1	6082.12	0.64	2.57	17.752	Satisfactory
	11.10 - 11.40	88	165	2.225	165.4	6082.12	1.00	2.22	26.651	Satisfactory
		88	160	2.238	160.3	6082.12	0.97	2.30	25.829	Satisfactory
BH 10	2.60 - 2.90	87	136	2.113	133.1	5944.68	0.81	2.62	21.494	Satisfactory
		87	127	2.001	153.7	5944.68	0.76	2.64	24.821	Satisfactory
	4.50 - 4.80	88	149	2.412	154.8	6013.20	0.90	2.69	25.228	Satisfactory
		88	151	2.420	252.1	6013.20	0.91	2.67	41.086	Satisfactory
	7.50 - 7.80	88	158	2.349	293.2	6068.31	0.96	2.46	47.350	Satisfactory
		88	158	2.361	383.1	6068.31	0.96	2.47	61.869	Satisfactory

16. **Remarks**

16.1 All information about the samples provided by the client/ client representative.

16.2 This report relates only to the samples tested.

16.3 All tested samples will be immediately discarded after receipt of results by the client.

TECLAB LIMITED
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EST. 2002

Checked By:
Julius Isingoma
Materials Engineer

Approved By:
Robinson Onen
Technical Manager

EXCELLENCE THROUGH PRECISION AND INTEGRITY

CERTIFICATE NO: PK-669-03 **Date:** 22/05/2024

VERSION 02

1.	**Client Name:**	Oriental Consultants Global Company Limited					
4.	**Client Address:**	N/A	**2. Client Contact:**	N/A	**3. Date of Receipt:**	13/03/2024	
5.	**Project Ref:**	2024-014	**6. Sampling Report:**	N/A	**7. Date of Testing:**	29/03/2024	
8.	**Project Title:**	Geotechnical Investigations for the proposed New Karuma Bridge Phase II at the Boarder of Kiryandongo - Nwoya District, Uganda					
9.	**Condition at receipt:**	Satisfactory	**10.**	**Sample Description:** Rock Samples	**11. Test Location:**	Teclab Ltd Headquarters, Nalukolongo	
12.	**Nature of test:**	Uniaxial Compressive Strength Test	**13. Test Method(s):**	ISRM	**14. Attachment(s):**	None	

15. Results:

Measurements and Test Results

Sample ID	Depth (m)	Diameter (mm)	Height (mm)	Weight (kg)	P (kN)	Area (mm^2)	Volume (m^3)	Density (kg/m^3)	δ_u (N/mm^2)	Failure
BH 11	8.20 - 8.50	87.5	127.2	2.108	145.2	6013.205	0.76	2.76	22.940	Satisfactory
		87.5	140.6	2.428	140.60	6013.20	0.85	2.87	22.680	Satisfactory
	14.70 - 15.0	88.9	150.0	2.572	455.50	6207.17	0.93	2.76	71.181	Satisfactory
		88.9	143.1	2.476	374.20	6207.17	0.89	2.79	58.477	Satisfactory

16. Remarks

16.1 All information about the samples provided by the client/ client representative.

16.2 This report relates only to the samples tested.

16.3 All tested samples will be immediately discarded after receipt of results by the client.

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********** END OF REPORT **********

Checked By:
Julius Isingoma
Materials Engineer

Approved By:
Robinson Onen
Technical Manager

Appendix 10 –Point Load Test Results for the Tested Rock Core Samples

Teclab
A GEOSCIENCES COMPANY

EXCELLENCE THROUGH PRECISION AND INTEGRITY

CERTIFICATE NO: PK-669-04 **Date:** 22/05/2024

VERSION 02

1. **Client Name:** Oriental Consultants Global Company Limited
2. **Client Address:** N/A
3. **Client Contact:** N/A
4. **Date of Receipt:** 13/03/2024
5. **Project Ref:** 2024-014
6. **Sampling Report:** N/A
7. **Date of Testing:** 30/03/2024
8. **Project Title:** Geotechnical Investigations for the proposed New Karuma Bridge Phase II at the Boarder of Kiryandongo - Nwoya District, Uganda
9. **Condition at receipt:** Satisfactory
10. **Attachment(s):** None
11. **Sample Description:** Rock Samples
12. **Nature of test:** Point Load Test
13. **Test Method(s):** ASTM D5731-02
14. **Test Location:** Teclab Ltd Headquarters, Nalukolongo
15. **Results:**

Measurements and Test Results

Sample ID	Depth (m)	Direction	L (mm)	W (mm)	D_e (mm)	D_e^2 (mm^2)	P (kN)	I_s (MPa)	F	$I_{s(50)}$ (MPa)	δ_{uc} (MPa)	Validity	Failure	Notes
BH 8	4.0 - 5.0	d ∟	61.8	-	70.67	4994.25	5.52	1.11	1.168	1.291	31.64	Valid	Structure	olive grey pale yellow black foliated subrounded to angular fine to coarse grained micaceous GNEISS ROCK
		d ∟	37.8	-	67.10	4502.41	11.36	2.52	1.142	2.880	70.56	Valid	Structure	
	6.0 - 6.50	d ∟	84.3	-	68.50	4692.25	5.59	1.19	1.152	1.373	33.63	Valid	Structure	
		d ∟	75.8	-	68.00	4624.00	3.79	0.82	1.148	0.941	23.06	Valid	Structure	
	11.0 - 12.0	a	72.3	91	91.53	8377.02	1.08	0.13	1.313	0.169	4.15	Valid	Structure	
		a	89.4	91	101.78	10358.31	3.72	0.36	1.377	0.494	12.12	Valid	Structure	

16. **CALCULATION PARAMETERS**

I_s = Uncorrected; A = Cross sectional Area; D = Core diameter; F = Size correction factor
P = Failure Load; W = Width; D_e = Equivalent Core diameter; $I_{s(50)}$ = Size corrected Point Load Strength Index
δ_{uc} = Unconfined Compressive Strength

17. **Key:**

d Diametral Test; I Irregular lump test; ∟ Perpendicular
a Axial Test; // Parallel to planes of weakness; + Isotropic/No apparent anisotropy

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Materials Engineer

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EXCELLENCE THROUGH PRECISION AND INTEGRITY

CERTIFICATE NO: PK-669-04 **Date:** 22/05/2024

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8. **Project Title:** Geotechnical Investigations for the proposed New Karuma Bridge Phase II at the Boarder of Kiryandongo - Nwoya District, Uganda
9. **Condition at receipt:** Satisfactory
10. **Attachment(s):** None
11. **Sample Description:** Rock Samples
12. **Nature of test:** Point Load Test
13. **Test Method(s):** ASTM D5731-02
14. **Test Location:** Teclab Ltd Headquarters, Nalukolongo
15. **Results:**

Measurements and Test Results

Sample ID	Depth (m)	Direction	L (mm)	W (mm)	D_e (mm)	D_e^2 (mm^2)	P (kN)	I_s (MPa)	F	$I_{s(50)}$ (MPa)	δ_{uc} (MPa)	Validity	Failure	Notes
BH 9	3.0-4.0	a	62.0	88	83.35	6946.79	9.45	1.36	1.259	1.712	41.94	Valid	Structure	Grey black foliated subrounded to angular fine to coarse grained micaceous GNEISS ROCK
		d ∟	47.8	-	88.00	7744.00	25.49	3.29	1.290	4.245	104.00	Valid	Structure	
BH 10	0.9-1.5	d ∟	57.0	-	92.00	8464.00	19.59	2.31	1.316	3.045	74.61	Valid	Structure	
BH 11	3.5 - 5.0	a	89.2	92	102.20	10445.20	2.72	0.26	1.379	0.359	8.80	Valid	Structure	
		a	60.9	92	84.43	7127.85	1.84	0.26	1.266	0.327	8.01	Valid	Structure	

16. **CALCULATION PARAMETERS**

I_s = Uncorrected; A = Cross sectional Area; D = Core diameter; F = Size correction factor

P = Failure Load; W = Width; D_e = Equivalent Core diameter; $I_{s(50)}$ = Size corrected Point Load Strength Index

δ_{uc} = Unconfined Compressive Strength

17. **Key:**

d Diametral Test; l Irregular lump test; ∟ Perpendicular

a Axial Test; // Parallel to planes of weakness; + Isotropic/No apparent anisotropy

********** END OF REPORT **********

TECLAB LIMITED
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Checked By:

Julius Isingoma
Materials Engineer

Approved By:

Robinson Onen
Technical Manager

Appendix 11 –Ultrasonic Pulse Velocity Test Results for the Tested Rock Core Samples

Teclab
A GEOSCIENCES COMPANY

EXCELLENCE THROUGH PRECISION AND INTEGRITY

Certificate No: PK-669-05 Date: **22/05/2024**

VERSION: 02

1. Project Title: Geotechnical Investigations for the proposed New Karuma Bridge - Phase II at the Boarder of Kiryandongo - Nwoya Districts, Uganda

2. Client Name: Oriental Consultants Global Co. Ltd **3. Client Address:** N/A

4. Sample Description: Drilled rock cores

5. Condition at receipt: Satisfactory **6. Date of test:** 17- 20/05/2024

7. Nature of test: Ultrasonic Pulse Velocity

8. Equipment used: Proceq Pundit PL200

9. Test Method: ASTM C 597-02

10. Test Location: Teclab Ltd Headquarters, Nalukolongo

11. Attachments: UPV Data **12. Tested by:** Alice K.

13. Results:

RESULTS OF ULTRASONIC PULSE VELOCITY TEST

Borehole No.	Depth (m)	Weight (g)	Height (mm)	Alignment of Transducers	Transmission Time (µs)	Velocity, Vp (m/s)
BH 9	8.0-9.0	2244.9	139	Direct	27.1	5129
		2289.2	141	Direct	26.6	5301
	9.0-10.0	1938.1	117	Direct	21.5	5439
		1966.7	123	Direct	23.0	5346
BH 10	5.0-6.0	2321.1	138	Direct	23.6	5857
		2305.3	138	Direct	23.3	5923
	9.0-10.0	2559.2	141	Direct	23.3	6052
		2357.6	137	Direct	20.6	6644

Checked by: Julius Isingoma
Materials Engineer

Approved by: Robinson Onen
Technical Manager

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