**CONSTRUCTION OF THE KAJARAN TUNNEL PROJECT**

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| **TERMS OF** **REFERENCE** **TECHNICAL SUPERVISION FOR CONSTRUCTION OF ABOUT 7 KM KAJARAN TUNNEL AND RECONSTRUCTION OF ABOUT 4 KM APPROACHING ROADS** |

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| **A. Background** 1. “North-South Road Corridor Investment Program” is a major infrastructure project (hereafter NSRCIP project) which aims at connecting the Southern border of the country with its Northern point by means of 556 km-long Meghri-Yerevan-Bavra highway by reducing it to about 85km and reaching up to 470km. North South Corridor is also a part of the Asian Highway corridor (AH 82) which connects the Central Asian countries (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan). As a result, the reconstruction of the current road of 556 km of the 2nd category with the average of 60km/h will reach to 470 km road with 80-100 km/h as a result of which the crossing of the mentioned section will decrease from current 9-9.5 hours up to 5-6 hours and will increase comfort and safety, ensuring also the goal of becoming a transit route of freight and transport movement from East to West and from West to East. The construction of this highly important strategic road will ensure easier traffic from the Southern border of Armenia to the Georgian border and up to Black Sea ports and will allow passenger and cargo transportation in accordance with European standards. The highway will also provide serious development opportunities for all communities from the North to the South of Armenia. Eventually, NSRCIP project implementation will result in the following outcomes:
* Improved road corridor in compliance with national and, in some respects, international standards;
* Four-lane Category 1 road on Yerevan-Gyumri and Yerevan-Ararat sections;
* Other road sections meeting national and, in some respects, international standards with the possibility to be widened up to four-lane road in the future;
* Efficient and safe road corridor traffic management.
1. The [Ministry of Territorial Administration and Infrastructure](https://www.gov.am/en/structure/276/) of Republic of Armenia is responsible for the overall management of the Project on the Republic of Armenia side.
2. “Road Department” Fund (**hereafter: Client**) was appointed as the Project Implementation Unit acting under the Agency Agreement signed between the [Ministry of Territorial Administration and Infrastructure](https://www.gov.am/en/structure/276/) of Republic of Armenia of Republic of Armenia and “Road Department” Fund. It should be emphasized that within the framework of this Project, the Client has the following primary responsibility for the overall implementation of the Project, including, but not limited:
* holding of tenders,
* selection of Consultants and Contractors,
* control over the preparation of designs by the Consultants and the approval of designs,
* conduct of the design’s required expertise,
* control over the preparation and implementation by the Consultants of LARP and EIA,
* through the Consultants, control of the quality and quantity of construction work,
* time control,
* ensuring timely payments for the work performed by the Consultants / Contractors,
* other functions for the implementation of the Project delegated to the Client.
1. Within the framework of the loan program financed by the Eurasian Development Bank, the joint venture “IRD Engineering S.R.L. (Italy) and GP Ingegneria S.R.L (Italy)” prepared a detailed design for the construction of the Kajaran tunnel (total length about 7.2 km) and reconstruction of the existing M-2, Yerevan-Yeraskh-Goris-Meghri-Iran border road section (total length about 4.0 km).
2. This Terms of Reference is prepared to conclude a Contract for Technical supervision for constructionof the Kajaran tunnel (total length about 7.2 km) and reconstruction of the existing M-2, Yerevan-Yeraskh-Goris-Meghri-Iran border road section (total length about 4.0 km) with an International consulting company (**hereafter: Consultant**) with specific experience in the field of technical supervision/ Engineer services under FIDIC contracts in the reconstruction/construction of road tunnels.
3. A short description (based on the detailed design) of the Kajaran Tunnel planned for construction is given below:
* *Kajaran tunnel is a single-bore bi-directional tunnel 7,215 km long*.
* *The road alignment inside tunnel is mainly on a straight road, with the exception of a curve inside the tunnel and with portals on curves.*
* *In detail, proceeding from the North Portal towards increasing sections, the following elements are met:*
* *left bound curve (L = 98 m, Radius = 300 m);*
* *horizontal transition curve;*
* *straight line (L = 6243 m);*
* *horizontal transition curve;*
* *left bound curve (L = 48 m, Radius = 500 m);*
* *horizontal transition curve;*
* *straight line (L = 335 m);*
* *horizontal transition curve;*
* *left bound curve (L = 100 m, Radius = 250 m).*
* *The longitudinal profile is on two uphill’s with:*
* *4,0 % gradient (L = 5585 m);*
* *3,5 % gradient (L = 1620 m).*
* *The tunnel has a mean longitudinal slope of about 3,8 %.*
* *The tunnel has a circular cross section. The cross-section area is about 74 m2:*

* *The roadway is 9.00 m wide.*
* *The carriageway is 7.20 m wide and is composed by 2 traffic lanes, each one 3.60 m wide.*
* *The shoulders are 0.90 m wide.*
* *On both sides of the roadway a walkway of variable width (about 0.80 m wide) is present. The walkway is about 15 cm high above road surface.*
* *The minimum headroom on the roadway is always > 5.0 m.*
* *On the tunnel’s ceiling a smoke extraction duct is present (section area 10 m2).*
* *Under the road’s pavement in tunnel an escape way is realized (2.4 m wide, 2.3 m high).*
* *The tunnel has an asphalt concrete road pavement.*
* *The tunnel has a drainage system with gutters and fire-break manholes on the side of the roadway.*
* *Emergency stations will be realized in niches:*
* *n. 28 emergency stations on the right side of the tunnel lining, about every 250 m (min. 200 m, max. 265 m);*
* *n. 29 emergency stations on the left side of the tunnel lining, about every 250 m (min. 100 m, max. 250 m);*
* *The tunnel has 14 emergency exits other than the tunnel portals. The mean distance between emergency exits is 481 m (min. 315 m, max. 500 m). People on wheelchairs can reach the tunnel’s portal or the other emergency exits moving along the right hard clearance (whose width is 90 cm, as usually required for the passage of a wheelchair).*
* *The emergency exits lead to a safety tunnel (escape way) constructed under the walkway.*
* *Inside tunnel 14 lay-bys are present.*
* *Tunnel Systems:*
* *Lighting System. The lighting system has been designed in accordance to CIE 88/2004. The lighting system of the tunnel will be composed by LED lighting fixtures with symmetrical optics for indoor (permanent) lighting and asymmetric optics for the entrance and exit lighting (reinforcement). The lights will be fixed, by special fastening systems, along 2 parallel lines.100% of the permanent lighting is connected to an Uninterruptible Power Supply (UPS) active for at least 30 minutes, to provide a minimum visibility for tunnel users to evacuate the tunnel in their vehicles in the event of an interruption of the normal power supply. The lighting system will be managed in automatic mode for the regulation of the bright intensity and for the management of the threshold zone lighting extinction (turned off in night schedule or whichever in situations of low external illumination).It will be realized an evacuation lighting system to guide the users along the evacuation path by means of evacuation lighted markers.*
* *Ventilation. The tunnel is equipped with a semi-transverse ventilation system. The system is designed to control:*
* *the pollutants during the normal traffic conditions;*
* *the pollutants during traffic stop or queuing (due to accidents or another functional anomaly);*
* *heat and smoke control in case of fire.*

*The ventilation system is composed by an air extraction system and longitudinal ventilation system with jet fans to control the air speed in the tunnel. The dimensioning of the extraction system considered:** *two ventilation rooms located at the portals;*
* *extraction duct on the celling, divided in two parts to allow the ventilation rooms to work independently, with dampers 2.0 m x 3.0 m. Dampers are placed every 75 m and the first damper and the last damper are about 300m from the tunnel portals.*

*The ventilation system is designed to operate with locally open dampers so that the smoke extraction area will be of 300 m. The extraction system’s flow rate is 135m3/s. The longitudinal ventilation system has 16 couples of jet-fans, for total 32 jet-fans installed in vault. Each jet-fan has the following characteristics:** *diameter = 710 mm;*
* *thrust = 540 N;*
* *air speed = 34.5 m/s.*

*In fire emergency conditions, two possible scenarios are considered:* * *fire inside the tunnel and*
* *fire close to the portals.*

*In the case of a fire inside the tunnel that is over about 1000m from the tunnel portals the ventilation system will concentrate all the smoke on the fire region, preventing the smoke to spread. In case of a fire close to the tunnel portals, the ventilation system will concentrate all the smoke on the fire region, and prevent the smoke to spread inside the tunnel. To compensate the pressure difference created by the extraction close to the portal, the extraction system of the area not interested by the fire will have to blow fresh air inside the tunnel.**The ventilation of safe places and of the safety tunnel is provided by means of a ventilation system independent from the tunnel’s ventilation system.**The following operations are envisaged:** *creation of 2 "filter" rooms set between the escape route and the emergency tunnel;*
* *installation of new fire doors REI 120, operated by pushing, to facilitate escape*
* *pressurization of the filter zones and protected areas of the tube involved in the accident, to between 50 and 80 Pa under closed door conditions;*
* *air flow speed exiting the area to be protected and flowing into the tunnel of not less than 0.75 m/s under open door conditions, thus preventing smoke from flowing into the protected structure;*
* *air flow speed exiting the area to be protected and flowing into the tunnel of not less than 2.00 m/s under open door conditions, thus allowing fire-fighting and emergency personnel to enter the tube involved in the accident from the safe places.*
* *Firefighting systems. The extinguishers will be in every emergency station, about every 250 m on both the tunnel’s sides. The hydrants will be in fire stations (equipped with DN 45/70), inside the tunnel, connected to steel pipe at intervals of maximum 250 m (on both sides).Hydrant columns (equipped with DN 70) will be placed also outside the tunnel, near the portals. A 150m3 water tank will be realized near the tunnel’s exit. A water’s pipe (PEAD PE100 De 160 Pn 16) will be used. The water’s pipe will be placed underground, in position protected from the effects of a fire, under the walkway (inside the safety tunnel, where available).The water’s pipe will be pressurized by means of a pump station (40 m h2O, 780 l/min). Three overpressure valves will be installed to limit the pressure in the system. A pressurization station will be realized near the South portal. The pressurization station will have two pumps in parallel configuration to ensure the availability of the system.*
* *Traffic, failures and fire detection. A Video monitoring system (TVCC) with cameras will be available in the tunnel. Cameras will be installed every 100m on both sides of the tunnel and inside the lay-bys. Cameras (dome) will be installed also in front of the tunnel’s portals. An automatic accident detection system based on the automatic analysis of the images from the TVCC system will be installed. Fire detection inside tunnel will be provided with a linear digital cable detector (fibrolaser) in vault. Detectors of CO, NOx, opacimeters and anemometers are available about every 300 m in the tunnel. Smoke detectors will be installed in the technical rooms placed along the escape way tunnel, in the niches in tunnel and in the technical buildings (substations and fire protection pump stations). Emergency stations with SOS alarm and telephones (using VoIP technology) will be every about 250 m inside tunnel, in boxes on the sidewall. Call boxes with telephones for emergency calls will be installed also in the safe places beyond the emergency exits and inside the escape way tunnel. The system provides a network node within each technical area within the escape way and the closure of the network ring in Fibre Optic is provided in the cabins at the entrances. Each SOS in niche tunnel or escape way will be connected to the nearest network node (each 500m) and power supply too. A Control centre room (CC) operating 24h/day will be realized.*
* *Communication and alarm systems. The emergency communication network connects the emergency stations, placed every 250 m inside the tunnel, with the CC. In the tunnel are provided: radio transmission tunnel for first responders’ services, as infrastructure manager, law enforcement, police, fire department, emergency workers identified by infrastructure manager; an installation for the repetition of the FM radio frequencies established by infrastructure manager, to transmit any information to the users in tunnel. The arrangement for mobile communications will be provided too. The fulfilment of a mobile re-broadcasting system will depend from the agreements of the tunnel manager with the mobile operators. Variable message signs (VMS) will be installed inside the tunnel, every 500 m near the emergency exits. A phonic system with loudspeakers inside the tunnel, the safe places and the escape way tunnel will be installed, connected to the control centre room.*
* *Road signs. Vertical and horizontal signs inside the tunnel will be realized according the Armenian standards. Lighted signs will be installed inside the tunnel to point out the available safety devices (SOS, emergency exits, extinguishers, and lay byes). Lighted Evacuation signs will be placed on the two sides of the tunnel every about 75 m. Traffic signals will be installed near the tunnel entrance to close the tunnel. Traffic signals will be installed inside tunnel too, every 500 m near the emergency exits. Barriers will be placed near the tunnel entrances to physically close the traffic lanes. The barriers will be staggered to allow the passage of emergency services.*
* *Centralized technical management. The Control centre room will be operating 24h/day. It is charged with the following tasks:*
* *monitoring the traffic conditions;*
* *monitoring the operation and the conditions of the systems;*
* *signalling accidents/failures, etc;*
* *remotely operating the systems.*

*The Control Centre must be provided with a SCADA (Supervisory Control and Automatic Data Acquisition) system in order to monitor, manage and control the systems along the infrastructure. The control of all the tunnel’s facilities will be performed by means of a SCADA control system. The signals from all the controlled systems converge in PLCs placed inside the technical rooms. Data are transmitted from the PLCs to the CC by means of the transmit data network. A data network connects all the “on field” detector and actuators to the local PLCs and these to the CC. PLCs in the technical rooms are used to receive process and transmit to the CC the operational data from the “on field” detector and actuators. An optical fibre data network is used for the connection between the PLCs to the CC.** *External supply systems. The tunnel will be equipped with two electric cabins placed at the tunnel entrances; the power supply will be provided from two new medium voltage supply point. The cabins, in addition to the internal systems of the tunnel, will also supply electrical power to the fans provided for the semi-transverse ventilation of the tunnel. Two three-phase medium voltage lines will start from this delivery point supply and will arrive at medium voltage electrical panels. From these, downline of the reducing transformers, low voltage lines will go to the main distribution panels, from which all the plants will be powered. No-break systems (UPS) will be installed in the general electrical rooms to support the following safety circuits and the electronic systems in case of interruption of the general power supply:*
* *Emergency lighting made of all permanent lighting devices;*
* *Evacuation lighting and road light markers;*
* *Variable Message Panel;*
* *Portal traffic lights;*
* *Supervision and control system;*
* *Fire detection system;*
* *Radio system;*
* *TVCC system;*
* *Auxiliary systems.*

*An emergency power supply with diesel generators will be also available.** *Internal monitoring. The traffic conditions and the technical alarms status will be constantly monitored by the CC. An emplacement aimed to the collection and the processing of all the data and alarms coming from the tunnel and to manage the maintenance and rescue services will be installed in the CC.*
* *External monitoring. Rescue services will be operating 24h/day.*

**B. Scope of Consulting Services** |
| 1. In accordance with this Term of Reference the Consultant shall perform duties of FIDIC Engineer as described in the FIDIC Conditions of Contract for Construction, MDB Harmonized Edition, June 2010 (Pink Book) for all civil works provided by the detailed design prepared by the Joint Venture “IRD Engineering S.R.L. (Italy) and GP Ingegneria S.R.L (Italy)”and in Contract to be signed between the Client (Employer) and the Contractor.
2. Services provided by the Consultant will be paid on the Time-based basis.
3. The terms and special conditions of the Consultant Contract will be determined by the Special Conditions of Contract. Planned duration of Consultant Contract (Civil Works Defects Notification Period (DNP)[[1]](#footnote-1) including): 96 (ninety-six) months.
4. A detailed description of the tasks is given below:
5. The Consultant will carry out all construction supervision (FIDIC Engineer) activities for construction of the Kajaran tunnel (total length about 7.2 km) and reconstruction of the existing M-2, Yerevan-Yeraskh-Goris-Meghri-Iran border road section (total length about 4.0 km) under FIDIC Conditions of Contract for Construction, MDB Harmonized Edition, June 2010 (Pink Book) in compliance with final documentation prepared by the Joint Venture “IRD Engineering S.R.L. (Italy) and GP Ingegneria S.R.L (Italy)”. The Consultant must adhere to the scope of the civil works contract as defined in the bills of quantities. All proposed modifications should be discussed and agreed with Client prior to commencing with the variations.
6. The Consultant will cooperate closely with the Client and other stakeholders.
7. The Consultant will ensure all contractual arrangements, including all changes required from the parties of the contract, in order to ensure quality and compliance with the rules and procedures of Client.
8. The Consultant will ensure compliance with the terms of the contract, terms of payment, changes, dispute resolution, monitoring and so on.
9. The Consultant will also support the Client mission during visits to monitor the progress.
10. The Consultant will supervise the performance of the construction of the Kajaran tunnel (total length about 7.2 km) and reconstruction of the existing M-2, Yerevan-Yeraskh-Goris-Meghri-Iran border road section (total length about 4.0 km) and ensure compliance with all environmental and social safeguards policy requirements of ADB SPS 2009, applied for this project, requirements of EIA/EMP (February 2022), recommendations of and the requirements of design solutions. The Consultant will ensure that all Client policies and procedures on safeguards are followed throughout the implementation period.
11. The Consultant will carry out technical supervision of the Contractor's instrumental monitoring during the work on tunneling
12. The Consultant 's responsibilities will be:
13. Develop and implement an overall monitoring plan;
14. Together with the Contractor review the design provided by the Client, and if significant errors are discovered, propose specific solutions and roadmap for the corrections, including modifications of the original design. During the construction propose new technical solutions and / or modify basic technical solutions to adapt the design to the specific site condition (if necessary). In such cases, the Consultant will propose new technical solutions and / or modification of the basic design solutions. Changes and modifications proposed by the Consultant must be justified and provided in the form of revised drawings, scope of revised works, revised cost and time estimates and submitted for the approval of the Client. After the Client’s no objection, the Consultant can proceed the variation in accordance of technical specifications and terms of the FIDIC contract. In case of any land acquisition issues revealed, the Consultant shall support the Client by providing detailed data on subject matter. All the mentioned variations cannot cause delays or suspensions of the Works carried out for the certain period of time, according to the approved Program of Works of the Contractor.
15. Together with the Contractor develop a consolidated construction program, showing the critical path of the overall implementation program. Any actions required Government actions that have potential implication in implementation should be attended timely and properly. Update overall Program planning accordingly;
16. Monitor and report to Client compliance construction of the Kajaran tunnel (total length about 7.2 km) and reconstruction of the existing M-2, Yerevan-Yeraskh-Goris-Meghri-Iran border road section (total length about 4.0 km) with the provisions preventing discrimination in employment, enforcing gender equality, and reducing risks of spread of communicable deceases; preventing human trafficking, and ensure that such requirements are included in the bid and contract documents;
17. Monitor and report to Client compliance construction of the Kajaran tunnel (total length about 7.2 km) and reconstruction of the existing M-2, Yerevan-Yeraskh-Goris-Meghri-Iran border road section (total length about 4.0 km) with assurances, that the construction is carried out in compliance with design and technical specifications requirements, as well as the requirements of environmental and social safeguards;
18. Ensure that the construction methods proposed by the contractor for carrying out the works are satisfactory, with particular reference to the technical requirements of sound national and international environmental standards and the EIA and EMP (February 2022) prepared for the construction of the Kajaran tunnel (total length about 7.2 km) and reconstruction of the existing M-2, Yerevan-Yeraskh-Goris-Meghri-Iran border road section (total length about 4.0 km) assurances, including compliance with all environmental and social safeguards;
19. Document results/findings in quarterly progress reports.
20. During the period of this assignment the Consultant ensures the storage of all records, in the framework of the contract for construction works, implements the daily coordination, monitoring and supervision of all actions, including the preparation and submissions to the Client of the relevant reports.
21. Evaluation and reporting:
* *The Consultant will report implementation progress of the construction of the Kajaran tunnel (total length about 7.2 km) and reconstruction of the existing M-2, Yerevan-Yeraskh-Goris-Meghri-Iran border road section (total length about 4.0 km) implementation status, major issues, and proposed corrective actions.*
1. TECHNICAL SUPERVISION:
* *The Consultant shall carry out all technical supervision activities for construction of the Kajaran tunnel (total length about 7.2 km) and reconstruction of the existing M-2, Yerevan-Yeraskh-Goris-Meghri-Iran border road section (total length about 4.0 km) in compliance with the requirements of Armenian legislation regarding the implementation of technical supervision, requirements of international standards and best practices for tunnel construction;*
* *The civil works are executed using FlDIC Conditions of Contract for Construction (Multilateral Development Bank Harmonized Edition, 2010);*
* *The Consultant will take over all the powers and responsibilities entrusted to "Engineer" within the framework of the contract of construction work;*
* *Planned duration of Civil Works (Defects Notification Period (DNP) excluded): 72 (seventy two) months. Defects Notification Period (DNP) will be 24 (twenty four) months calculated from the date on which Civil Works is completed as certified by Taking-over Certificate.*
* *The Consultant must adhere to the scope of the civil works contract as defined in the specifications and bills of quantities. All proposed variations should be discussed and agreed with Client prior to commencing with the corresponding variation.*
* *To the extent not already included in the scope of its responsibilities as the "Engineer" under the civil works contract, the Consultant shall also be responsible for:*
* *Ensure the contractor adheres to the agreed schedule at the time of signing the contract for submitting all documents (performance bonds, insurance policies, license, etc.) and any other requirements as stipulated in the specifications and the civil works contract;*
* *Preparation of an IPC (Interim Payment Certificate);*
* *Review Civil Works implementation schedule in consultation with the Contractor and approves the Contractor's work plan if, in the opinion of the Consultant, it complies with the terms of the Contract between the Client and the Contractor.*
* *Hold joint regular* *technical meetings and monthly progress meetings with Client and Contractor;*
* *Ensure Daily presence (either full time or part time as required) on site such as but not limited to inspectors of works, surveyors, material Engineers' and senior Engineers' staff. Day-to-day quality control and quantity measurements of the works carried out;*
* *Planning and execution of technical supervision and contract administration, including effective and regular supervision of the works, maintenance of construction of the Kajaran tunnel (total length about 7.2 km) and reconstruction of the existing M-2, Yerevan-Yeraskh-Goris-Meghri-Iran border road section (total length about 4.0 km) records, correspondence and diaries, as well as quality control testing to ensure that the Works are executed in accordance with the Contract;*
* *Approve and monitor the contractor's construction program and method statements, verifying that those are consistent with the implementation schedule and with the design solutions, the requirements of existing normative documents, technological sequence and safety of construction, informing about it in a written form to Client;*
* *Develop quality and quantity assurance control manual and conduct daily monitoring in accordance with the manual, which will be oriented to the day-by-day quantity and quality control and approval of the contractor’s works;*
* *Inspect, prepare inspection acts, and control all materials and works to ensure compliance with specifications and giving immediate notice to the contractor in the event that such materials and works fail to comply with the specifications. Copies of notices will be included in the quarterly progress reports to Client;*
* *Inspect regularly the contractor's construction equipment, installations, housing, medical facilities, etc. and prepare inspection acts, and ensure that they are adequate and in accordance with the terms and conditions specified in the contract for the works;*
* *Issue notices to the contractor advising of any noncompliance with design solution/construction methods, as set out in the contract documents and instruct remedial measures and corrections. Copies of all notices should be provided to Client at the time of issue. Before issuing such notices, the Consultant should, as appropriate, have advised the contractor of the noncompliance and given an opportunity to the Contractor to make good any adverse impact prior to the notice being issued;*
* *Maintain, check, record and approve the daily progress records produced by the contractors on work progress, labor, equipment, major construction materials at site, work accomplished, weather, accidents as well as any other events affecting of construction cost or implementation conditions;*
* *Ensure that road safety design requirements are implemented in accordance with the contract;*
* *Support Client in the implementation of the ESMP.*
* *Ensure that the Contractors execute appropriately all the environmental and social impact mitigation and monitoring measures as stipulated in Project’s Environmental Impact Assessment (EIA) report and the Environmental and Social Management Plan (ESMP).*
* *Review the site-specific Environmental management plans (SSEMP) to be developed and submitted by Contractor, develop recommendations on its revision/improvement and verify the quality of the SSEMP before its submission to Client, and approve SSEMP of Contractor before commencement of construction works;*
* *Conduct regular field monitoring visits to check the implementation of ESMP/EIA requirements by Contractor;*
* *Review and approval of documents: review of contractors' construction environment and social management plans, reports as instructed by Consultant comments and recommendation for approval or rejection.*
* *Issue non-conformance or non-compliance notices to the contractor advising of any noncompliance with environmental mitigation measures set forth in EMP, as set out in the contract documents. Copies of all non-compliance notices should be provided to Client at the time of issue. Before issuing such notices, the Consultant should, as appropriate, have advised the contractor of the noncompliance and given an opportunity to the Contractor in form of corrective action plan to mitigate any adverse impact prior to the notice being issued;*
* *Provide trainings on environmental, health and safety issues to environmental, health and safety staff of Contractors and Client;*
* *If any anticipated environmental and/or social risks and impacts arise during construction, implementation of the Project that were not considered in the EIA, the ESMP, promptly inform Client of occurrence of such risks or impacts, with detailed description of the event and proposed time-bound corrective action plan;*
* *In case of unforeseen environmental impacts, significant changes in project design or additional works covered by EIA/ESMP of February 2022, the Consultant will support PIU in updating of environmental assessment and EMP or preparation of new environmental assessment and ESMP to assess potential impacts, evaluate the alternatives, and outline mitigation measures and resources to address those impacts;*
* *Establish efficient procedures for verifying contractor performance and reporting progress and problems in a timely manner, including quality control reports, quantity survey records, requests for variation or change orders, requests for time extension, and contractor's claims and invoices;*
* *Ensure that the contractor does not involve child labor in the execution of civil works contracts in accordance with the provisions of the contract agreement;*
* *Prepare and issue to Client the following reports, whose format and content should be acceptable to Client: monthly progress reports, detailed quarterly reports, semi-annual environmental monitoring reports, completion report;*
* *Certify payments for the works against the relevant bill of quantities and issue the Interim Payment Certificates, the Final Payment Certificate and other certificates, including Taking Over Certificate, as required under the civil works contract;*
* *Keep Client timely informed of implementation problems that could jeopardize the construction objectives and recommend on how those objectives can be safeguarded;*
* *Evaluate claims, disputes, extensions of time, financial issues etc., including issuing variation orders list and quantity of additional works for Client's approval as appropriate and in line with the limits placed on Engineer's authority (as far as Variation Orders are concerned), provide evaluation of financial fees/charges and delay damages, if any, provide risk assessments, time impact analysis, as well as advising Client on all matters relating to the execution of the works;*
* *Provide assistance in drafting claims, referrals, statement of defenses and other related documents arising from the FIDIC Contract on Civil Works, in the manner and format requested by the Client, including providing time schedule for such assignments;*
* *Issue Engineer’s determinations / instructions as appropriate under the civil works contract;*
* *Provide timely assistance to the contractor in all matters related to interpretation of the contract documents, planning, quality control testing and other matters relating to construction;*
* *Provide Client with complete records, reports and check “as-built” drawings for the works provided by the Contractor;*
* *Conduct a complete joint review of the works with all stakeholders, as well as a safety audit, prior to handover of the site to Client;*
* *Following the issue of the Taking Over Certificate, during the balance of the contract period inspect and approve the execution of the outstanding works (if any), as well as the rectification of any defects or damage - advise on any extension to the contract period that may be required for such works;*
* *The Consultant will be responsible (to the limit of liability stated in the consultancy contract) for the contractor’s low-quality works and/or low-quality materials used by the contractor if such works or materials have already been accepted and approved by the Consultant.*
1. Ensuring Road Safety during Construction:
* *The Consultant will review and approve, in coordination with Client, traffic control plans prepared by the Contractor (which must be agreed in advance with the Road Police) and ensure compliance with all applicable road safety standards, guidelines and regulations, before commencement of road works. The Consultant will ensure adequacy of measures in contractor’s traffic control plans for the safety of all road users, including vulnerable road users, under different traffic, weather, and daytime/night time conditions. The Consultant will, among others, verify design of temporary diversions and traffic management arrangements; adequacy of signing, marking and delineation at work zones; adequacy of road safety devices (e.g., temporary and movable barriers, crash cushions, truck mounted attenuators, etc.) and proper maintenance of the devices; and adequacy of personal protective equipment for the workers. The Consultant will regularly inspect road safety audit work zones under traffic, and coordinate and control the timely addressing of all road safety issues. The Consultant will be responsible for reporting to Client, and following up on road safety issues/lapses as appropriate.*
1. Accident Analysis and Mitigation:
* *The Consultant will also conduct analysis of road collisions occurred during implementation, if any, identify road/traffic management related causes, and recommend specific road safety countermeasures for review and endorsement by Client.*

***For sake of clarity, to the extent that duties of the Consultant described hereof directly conflict with such Consultant's duties as described under the FIDIC Conditions of Contract for Construction, MDB Harmonized Edition, June 2010 (Pink Book), then the Consultant shall be required to comply with the requirements specified in the FIDIC Conditions of Contract for Construction, MDB Harmonized Edition, June 2010 (Pink Book).*****C. Reporting Requirements** 1. The Consultant will prepare the following reports in English and Armenian languages (two printed copies in English, two printed copies in Armenian) and submit them to Client. The format and content of each report should be agreed with Client. All reports submitted must have signatures of the author, checker and approver, with seals of the Consultant. For each report submitted an electronic copy will be provided. Electronic copies will be in the format used in their preparation with all links, formulas, and fields active. For all reports an executive summary will be included.
2. ***Monthly Progress Reports***

The Consultant shall submit monthly progress report by the 15th of the month following the reporting month, reflecting the progress of the work during the reporting month.The Executive Summary of this report consisting of (i) the position for the complete construction together with (ii) project performance report update (quarterly), and (iii) contract status report. This report should normally include, but not limited to:* *a construction works program with a bar chart showing scheduled against actual financial/physical progress by major work item, illustrated by bars and percentage of accomplishment (total and by major work item); the work program and the bar chart (showing the critical path) shall be suitably updated in each progress report;*
* *financial data, updated as appropriate, giving time, cost and financial forecast, a schedule of certified payments, update of quantities and cost estimates for construction and supervision;*
* *summary of implementation progress, the work performed, variations issued, payments certified, the equipment and manpower (skilled/unskilled by foreign/local categories in person-months) utilized by the contractor during the reporting month, together with an outline of the work to be performed during the next reporting period; the Engineer's personnel arrivals and departures;*
* *statement of causes of possible delays and remedial measures taken or recommended;*
* *Environmental and Social Safeguards Monitoring Reports;*
* *A report on the work carried out by the Consultant during the reporting period, including a summary of the financial statements of the Consultant's expenses.*
1. ***Quarterly Progress Reports***

The Consultant shall prepare quarterly reports presenting a summary status (schedule, budget, actual and/or potential problems and delays) of construction, including illustration as necessary by means of photograph, graphs and tables to provide an up-to-date picture of construction progress during the reporting period. The reports shall be submitted within 30 days of the end of the report period and should include, but not limited to the following:* *Principal work accomplished during the period covered by the report;*
* *Comparison of actual progress with the original estimated schedule of construction with the schedule agreed upon with the contractor;*
* *Actual or contemplated major deviations and reasons thereof from original plans or schedules other than changes of a character which would require prior consultation with Client;*
* *Explanations on stoppages or delays, measures necessary to avoid any future delays; an indication of measures required to recover any lost time; and contractual variations;*
* *The development of cost estimates and expenditures and the availability of funds for construction;*
* *Conditions which would significantly affect construction schedules or the cost of the construction;*
* *Progress made and problems associated with environmental matters, any adverse environmental impacts that occur during construction, the corrective measures taken to remedy these impacts, and the steps taken to avoid their recurrence;*
* *Progress made and problems associated with resettlement;*
* *Highlights of all matters requiring action;*
* *A report on the work carried out by the Consultant during the reporting period, including a summary of the financial statements of the Consultant's expenses.*
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| 1. ***Semi-annual Environmental Monitoring Reports***

The Consultant submits to Client Semi-annual Environmental Monitoring Reports on environmental safeguards requirements implementation. 1. ***Project Completion Report (PCR)***

The Consultant will draft a PCR prior to overall completion of construction works in a manner satisfactory to Client, including but not limited to the following:* *the major events, performance of the contractor, operation, actual and price inflated (to completion year) cost (foreign and local costs separately) by implementation year, and labor employed by skilled/unskilled and foreign/local categories in man-years;*
* *the major events, the relative successes (problems) in the implementation of each of the sections, this section of the PCR shall also contain an assessment of the impact of road improvement on the economy and social aspects for the whole construction area;*
* *"as-built" drawings (to be submitted to Client). These "as-built" drawings will be furnished by the Contractor as per Clauses of the construction contract;*
* *detailed description of all the works by items of technical and non-technical matters, economic analysis, financial and disbursement data, analyses, difficulties and delays, and remedial actions taken or suggested, the overall progress as monitored, including recommendations to Client.*
* *completion (final) environmental monitoring report․*
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| **D. Experience and Qualifications Required of the Consultant key staff**1. The services of the Consultant will be provided through an international consulting firm. If the firm is in association or JV with another firm all the parties of the given association or the JV shall be jointly or severally liable under the contract.
2. The Consultant shall have extensive and proven experience in Project administration, financial management, and Project performance management, roads, bridges, roads tunnels design and technical supervision, preparation of technical specifications, quality control, contract management and dispute resolution of similar type and size international contracts.
3. The Consultant shall also have knowledge and experience in reviewing environmental assessments and resettlement action plans for road construction Programs in accordance with guidelines of international finance organizations (like ADB, WB, EBRD etc.).
4. The Consultant team shall comprise of specialists that have obtained, at least, a bachelor's degree from an accredited university, and have experience in similar international Programs.
5. The Consultant Team Leader/ Senior Resident Engineer shall be Regular Staff of the lead firm or its international associates (clarification: Staff having Regular Employment Status with the lead firm (or independent experts having worked with the Consultant for cumulative 3 years) or its international associates for a minimum of 3 years is considered Regular Staff).
6. The curriculum vitae of the key experts should contain information of the assignment they have successfully completed in the last 5 years, with complete names and addresses of the clients and the name and contact information of the immediate supervisors, and the number(s) of the membership(s) and the name(s) of the issuing organization(s).
7. The minimum experience and qualifications required of the consultant **key staff** are following:

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| --- | --- | --- | --- | --- |
| Position | International or Local staff | Minimum General Experience (Years) | Minimum Specific experience (Years) | Minimum required education |
| Consultant Team Leader/ Senior Resident Engineer | International | at least 20 years of professional experience in construction/supervision projects, at least 10 years professional experience in project/ program management (leading position) or in a senior engineering management position in the public or private sector | at least 15 years of professional experience on similar position in tunnel construction or supervision projects | At least Master's degree or above in tunnels construction and/or design |
| Deputy Team Leader | International | at least 15 years of professional experience in construction/supervision projects in project/ program management (leading position) or in a senior engineering management position in the public or private sector | at least 10 years of professional experience on similar position in tunnel construction or supervision projects | Bachelor's degree or above in tunnels construction and/or design |
| Asphalt concrete pavement Chief Engineer | International | at least 20 years of professional experience in construction/supervision projects |  at least 15 years of professional experience on similar position in construction or supervision projects | Bachelor's degree or above in Roads construction and/or design |
| Quality, Geotechnical and Materials Chief Engineer | International | at least 20 years of professional experience in Geotechnical and/or Construction Materials in construction/supervision projects (Quality, Geotechnical and Materials sphere) | at least 15 years of professional experience on similar position in construction or supervision projects | Bachelor's degree or above in tunnels construction and/or design |
| Bridges and Structures Chief Engineer | International | at least 20 years of professional experience in construction/supervision projects (Bridges and artificial structures sphere) | at least 15 years of professional experience on similar position in construction or supervision projects | Bachelor's degree or above in Bridges and/or Tunnels, and/or artificial structures construction and/or design |
| Tunnels Chief Engineer | International | at least 20 years of professional experience in tunnels construction/supervision projects (Tunnels sphere) | at least 15 years of professional experience on similar position in construction or supervision projects | Bachelor's degree or above in tunnels construction and/or design |
| Tunnel’s equipment Chief Engineer | International | at least 20 years of professional experience in tunnels construction/supervision projects (Tunnels sphere) | at least 15 years of professional experience on similar position in construction or supervision projects | Bachelor's degree or above in tunnels construction and/or design |
| Electrical Chief Engineer | International | at least 20 years of professional experience in construction/supervision projects  | at least 15 years of professional experience on similar position in construction or supervision projects | Bachelor’s degree or above in electrical networks construction and/or design |
| Occupational health and safety Chief Engineer | International | at least 20 years of professional experience in construction/supervision projects  | at least 15 years of professional experience on similar position in construction or supervision projects | Bachelor's degree or above in construction safety sphere and/or design |
| Environmental and social Specialist | International | at least 10 years of professional experience on environmental safeguards, environmental impact assessment and monitoring and implementation of EMP in road construction/supervision projects; preferably familiar with ADB Safeguards Policy Statement  | at least 8 years of professional experience on similar position in highways construction or supervision projects |  Master’s or above degree in environment or environment related areas |
| FIDIC Contracts and Claims expert | International | at least 10 years professional experience in the contracts administration and/or claims analysis and evaluation under infrastructure projects under FIDIC Contracts | at least 7 years of professional experience on similar position in construction and/or supervision projects  | Bachelor's degree or above in Management and Administration and/or Law |
| Bridge, Structural Engineer | Local | at least 7 years of professional experience in construction/supervision/design projects (Bridges and artificial structures sphere) | at least 5 years of professional experience on similar position in construction or supervision or design projects | Bachelor's degree or above in Bridges and/or Tunnels, and/or artificial structures construction and/or design |
| Tunnel Engineer 1 | Local | at least 5 years of professional experience in tunnels construction/supervision/design projects (Tunnels sphere) | at least 3 years of professional experience on similar position in construction or supervision or design projects | Bachelor's degree or above in tunnels construction and/or design |
| Tunnel Engineer 2 | Local | at least 5 years of professional experience in tunnels construction/supervision/design projects (Tunnels sphere) | at least 3 years of professional experience on similar position in construction or supervision or design projects | Bachelor's degree or above in tunnels construction and/or design |
| Tunnel’s equipment Engineer  | Local | at least 5 years of professional experience in tunnels construction/supervision/design projects (Tunnels sphere) | at least 3 years of professional experience on similar position in construction or supervision or design projects | Bachelor's degree or above in tunnels construction and/or design |
| Quality, Pavement, geotechnical and Materials Engineer | Local | at least 7 years of professional experience in Geotechnical and/or Construction Materials in construction/supervision/design projects (Quality, Geotechnical and Materials sphere) | at least 5 years of professional experience on similar position in construction or supervision or design projects | Bachelor's degree or above in Roads construction and/or design |
| Electrical Engineer | Local | at least 7 years of professional experience in construction/supervision/design projects  | at least 5 years of professional experience on similar position in construction or supervision or design projects | Bachelor's degree or above in electrical networks construction and/or design |
| Safety Engineer | Local | at least 7 years of professional experience in construction/supervision/design projects  | at least 5 years of professional experience on similar position in construction or supervision or design projects | Bachelor's degree or above in construction safety sphere  |
| Environmental, Health and Safety Specialist | Local | at least 7 years of professional experience in environmental safeguards monitoring of road civil works  | at least 5 years of professional experience on similar position in construction or supervision projects | Bachelor's degree or above in Environmental sphere |
| Social Development, Resettlement and Gender Specialist | Local | at least 7 years of professional experience in social safeguards monitoring of road civil works  | at least 5 years of professional experience on similar position in construction or supervision projects | Bachelor's degree or above in Social sphere |

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**Е. Consultant Team Composition**

1. **INTERNATIONAL EXPERTS (Minimum 414 person-month inputs)**

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| --- | --- | --- | --- | --- | --- |
| Title | Key or non-key expert | Minimum Inputs(person-months) | Minimum General Experience (Years) | Minimum Specific experience(Years) | Areas of specialization |
| Consultant Team Leader/ Senior Resident Engineer | Key | 76 (including 4 months for DNP) | 20 | 15 | Program Management and Administration, Tunnels Design, Quality Control, FIDIC Contract Administration |
| Deputy Team Leader | Key | 24 | 15 | 10 | Road Tunnels Construction and/or Road Tunnel Design and/or Road Tunnels Construction Management |
| Asphalt concrete pavement Chief Engineer | Key | 24 | 20 | 15 | Roads Pavement Design, standards, Construction Supervision |
| Quality, Geotechnical and Materials Chief Engineer | Key | 72 | 20 | 15 | Civil Engineering, Tunnels Design, materials and mix design methods, Construction Supervision |
| Bridges and Structures Chief Engineer | Key | 24 | 20 | 15 | Civil Engineering, Bridges, Tunnels and Structures Design/construction, Construction Supervision |
| Tunnels Chief Engineer | Key | 76 (including 4 months for DNP) | 20 | 15 | Civil Engineering, Tunnels, and/or Structures construction, Construction Supervision |
| Tunnel’s equipment Chief Engineer | Key | 12 | 20 | 15 | Civil Engineering, Tunnels, and/or Structures construction, Construction Supervision |
| Electrical Chief Engineer | Key | 12 | 20 | 15 | Civil Engineering, electrical networks construction, Construction Supervision |
| Occupational health and safety Chief Engineer | Key | 72 | 20 | 15 | Construction safety, Construction Supervision |
| Environmental and social Specialist | Key | 10 | 10 | 8 | Environmental safeguards, environmental impact assessment and monitoring and implementation of ESMP  |
| FIDIC Contracts and Claims expert | Key | 12 | 10 | 7 | Contract Law and FIDIC Contract Administration |

1. **NATIONAL EXPERTS (Minimum 881 person-month inputs)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Title | Key or non-key expert | Minimum Inputs(person-months) | Minimum General Experience (Years) | Minimum Specific experience(Years) | Areas of specialization |
|  |  |  |  |  |  |
| Bridge, Structural Engineer | Key  | 24 | 7 | 5 | Artificial Structures Construction and/or Artificial Structures Design |
| Tunnel Engineer 1 | Key | 36 | 5 | 3 | Tunnels Construction and/or Design |
| Tunnel Engineer 2 | Key | 36 | 5 | 3 | Tunnels Construction and/or Design |
| Tunnel’s equipment Engineer | Key | 12 | 5 | 3 | Civil Engineering, Tunnels, and/or Structures construction |
| Quality, Pavement, geotechnical and Materials Engineer | Key | 72 | 7 | 5 | Pavement Construction and/or Pavement Design |
| Electrical Engineer | Key | 12 | 7 | 5 | Electricity supply systems networks construction and/or Design |
| Safety Engineer | Key | 72 | 7 | 5 | Construction safety, Construction Supervision |
| Environmental, Health and Safety Specialist | Key | 72 | 7 | 5 | Environmental Science, environmental impact assessment, environmental safeguards monitoring, |
| Social Development, Resettlement and Gender Specialist | Key | 10 | 7 | 5 | Social Science – household and user surveys |
| Highways Design/CAD Engineer | Non-key | 24 | 7 | 5 | Roads and/or Tunnels Design  |
| Site Inspectors/Quality Control Specialists (3 persons) | Non-key | 3 x 72=216 | 7 | 5 | Road Construction Quality Control |
| Quantity Surveyors (3 persons) | Non-key | 3 x 72=216 | 7 | 5 | Road Construction Quantity Control |
| Archaeologist | Non-key | 3 | 7 | 5 | Archaeological surveys and/or assessments |
| Translator | Non-key | 76 (including 4 months for DNP) | 7 | 5 | Implementation of translations, both written and verbal |

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| **F. Assignments Administrative Arrangements** |
| 1. The Consultant is required to arrange and pay for appropriate office (including an office on the construction site) and living accommodation in Syunik marz (region) of Armenia, international and local travel expenses, vehicles and all other transport of his staff, equipment, supplies, surveys, investigations, testing, telecom equipment and services and consumables, secretarial / translation services and all other input required for the purpose of the assignment’s proper deliveries.
2. The Consultant should provide translators that might be required to undertake the assignments and ensure consistency and accuracy of English and Armenian versions of the deliverables and reports.
3. These costs should be included and identified in the Consultant’s Financial Proposal.
4. All information, data and reports to be provided by the Client in the execution of the services of the Consultant shall be properly reviewed and analyzed by the Consultant. The responsibility for the correctness of using such data shall rest with the Consultant. All such information, data and reports shall be treated as confidential.
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1. Civil Works Defects Notification Period (DNP) will be 24 (twenty four) months calculated from the date on which Civil Works is completed as certified by Taking-over Certificate. [↑](#footnote-ref-1)