

**مشروع التطوير العادل للانتاج الزراعي PTIB 39**

**Developing Equitable Agricultural Production and Market Systems for Resilient Economic Development in the occupied Palestinian Territory**

**مجموعة الهيدرولوجيين الفلسطينيين**

**عطاء: اعداد مخططات لشبكة ري رئيسية في سهل طوباس**

**August 2019**

جدول الكميات

**1-Main Supply Pipes and fittings for Sahl Tubas / Tubas Governorate**

| Item No. | Description works | Unit | QTY | Unit price $ | Total price($) |
| --- | --- | --- | --- | --- | --- |
| 1. **SUPPLYING, TRANSPORTING & INSTALLING PIPES AND FITTINGS:**   *Supplying, transporting and unloading in the site of work in Tubas/Tubas Governorate the following pipes and fittings, all to be new and not used before or renewed, and they must have the (Techen stamp or local and international equivalent).The working pressure for the fittings is 16 Bar as a minimum unless otherwise is required*. | | | | | |
| 1.1 | Supply anywhere in the community and to the site of work new inside diameter **8 inch** nominal diameter pressure steel pipes, not less than (7/32 inch) 5.56 mm wall thickness, with the (Techen Stamp or equivalent) on each pipe. The pipes must be newly manufactured, smoothly rounded on the edges and no signs of corrosion or welding along the pipe. The pipes should be manufactured according to specifications S9 or equivalent. The price includes all necessary works to supply the pipes to the site of work including transport costs, loading and unloading. | M.L | 1000 | 32 | 32000 |
| 2.1 | Ditto 1.1, but for pipes wall thickness (3/16 inch) 4.76 mm | M.L | 1000 | 28 | 28000 |
| 3.1 | Ditto 1.1, but for pipes wall thickness (5/32 inch) 3.97 mm | M.L | 2550 | 25 | 63750 |
| 4.1 | Supply and install in the site of work **8" cast iron wedge gate valve** for 16 Bar working pressure (W.P).-enamel coated. Complete with flanges, gaskets, bolts and nuts, (None rising stem) with hand wheel for each valve. All in accordance with ISO Standard No. 5996 or local and international equivalent. The general specifications are according to Annex S2. The installation works includes all costs of excavations, cutting, shaping, welding, paintings, either on new or old pipe lines. | Piece | 3 | 500 | 1500 |
| 5.1 | Supplying and installing of **8" Strainer** of cast iron body for 16 bar working pressure complete with companion flanges, gaskets, bolts and nuts. The general specifications are according to Annex S6. The installation works includes all costs of excavations, cutting, shaping, welding, paintings, either on new or old pipe lines. | Piece | 2 | 300 | 600 |
| 6.1 | Supply and install in the site of work **2 inches** (**Compound air valve)** complete As ARI, 16 bar or local and international equivalent and according to general specifications mentioned in Annex 1, S3. The price includes the installation of 2” ball valve and 2” black coupling welded on the steel pipes. The installation works includes all costs of excavations, cutting, shaping, welding, paintings, either on new or old pipe lines. | Piece | 3 | 350 | 1050 |
| 7.1 | Supply and install in the site of work **(8") Dresser** for (16) Bar working pressure) complete (flanges, gaskets, nuts, bolts etc.) with two tie rods 600 mm long, diameter of 5/8" and 4 ears for each dresser. The installation works includes all costs of excavations, cutting, shaping, welding, paintings, either on new or old pipe lines. | Piece | 3 | 200 | 600 |
| 8.1 | Supply and install in the site of work **(8") cast iron swing check** valve, complete with complete with counter weight, flanges, gaskets, bolts and nuts, for 16 Bar working pressure) -Epoxy coated with extended arm and lid (cover) in accordance with BS. No. 5153 or local and international equivalent and according to general specifications mentioned in Annex 1, S1. The installation works includes all costs of excavations, cutting, shaping, welding, paintings, either on new or old pipe lines. | Piece | 1 | 1,800 | 1800 |
| 9.1 | Supply and install **8 " steel elbow** at either 90 or 45 degrees angle | Piece | 50 | 60 | 3000 |
| 10.1 | Supply and install **8 " Woltman water meter** complete with flanges, gaskets, bolts and nuts for 16Bar (W.P)- Epoxy coated. The measuring unit should be removable type without removing the body from the pipe (interchangeable type). The price includes all necessary works and costs for installing by **welding** steel coupling and nipples and all necessary accessories for the farms’ openings to irrigate the farms and to install future branches across these pipes. The water meter should be according to ISO 4064 or equivalent as S5 | Piece | 1 | 1000 | 1000 |
| 11.1 | Supply and apply all paints to make two faces for **8"** lines, one as **red oxide primer** as lead-free, oil-based, high-quality, rust-resistant as shown in **Annex S8b**and where necessary within the project area (on old existing pipes or the new pipes). The other face is made of **zinc oxide oil-based paint**, high-quality, corrosive-resistant as shown in **Annex S8b.** The viscosity of the paint may be modified by the addition of a solvent such as turpentine, or thinner. Pigment and filler materials as titanium dioxide, linseed oil, or alkyd resins as bindersand where necessary within the project area (on old existing pipes or the new pipes). The paint quantities are calculated based on the amount of paint used for the meter length. | M.L | 4550 | 3 | 13650 |
| 12.1 | **Distribution & welding of pipes 8"** according to the attached map route using machine carriers and workers to distribute in open areas (where no dirt roads) the 8” pipes on the route of pipelines. The price includes all necessary works and costs for installing by **welding** 8" inches steel pipes and accessories (as 2" or 3" or 4" or 6", 8" coupling, tees and nipples) including all necessary farms’ openings to irrigate the farms and to install future branches across these pipes. This is according to specifications S8a and the price includes all costs of welding bars, costs of welding machine and power. The price for this item includes all costs of works and materials necessary including the excavations depth noth less than 80 cm, width 50 cm, basecourse backfilling, compaction 98%, and reinstatement to the same conditions (asphalt roads, concrete roads). This is to install the 6” pipes at the main road crossings and internal main roads and where necessary. This include the roads inside the Tubas Village and adjacent to school and municipality building and the main road. The pipe must be buried along the street and despite the length. The contractor should investigate all (main and secondary) longitudinal and crossings and roads where the pipes buried in the ground according to the above specifications. The price includes all works and materials necessary to carry out the main connections of the outlet existing 8” pipes at the booster pump site and to connect to the water supply groundwater well and the supply line to the distribution reservoir. This is including excavation, backfilling, cutting, shaping, and welding and the backfill materials as specified in annex S8a. All works and materials according to the specifications S10. Therefore, the contractor should follow the route of the pipe and watch carefully the entire road crossing and the entire width at each section and the number of crossing and total lengths of crossings because there no payment for this work and must be included in the 6" unit price. | M.L | 4550 | 3.5 | 15925 |
| 13.1 | **Champers:** Supplying and placing ready mixed concrete B250 for the inlet outlet and overflow manholes of the reservoir. The unit price including supplying, placing reinforcing steel bars, (ASTM designation A-615 or equivalent, strees =4200 kg/cm2), the price includes all excavation and back-filling, leveling and compacting around the chamber according to the Engineer instructions.  The price includes the supply of all materials and works to install 3-fence aprons placed at the inlet, outlet and over flow clean pits. The size for each apron (open shed) must be enough to hold all fittings compounded in the apron and with at least 0.5 meter extra size from all sides of the fittings. The apron is built on solid and leveled base made of reinforced concrete slab 12cm thickness and mesh steel bars 5bars (Ø10 mm) in each meter in both directions. It includes building the apron floor tie beams 30 heights and 20 cm wide reinforced with 4 Ø10 mm and Ø8 mm stirrups each 20 cm. Fix in the tie beams steel tubes RHS 80\*40\*2 mm galvanized tube each meter center to center. The tubes total height 2.0 m of which 1.7 meter installed at right angle and 0.3 meter at angle 60 degrees pointing outward. A galvanized steel mesh around each apron space and opening of 15\*5 cm, and 6- mm thickness over the tubes’ height. The mesh is to the tube by welding 10 points at each tube. The apron contains full open door (90 cm wide) of the same design materials and height as for the apron with main frame (profile RHS 80\*40\*2mm, double braced in the middle height to fix a sliding rod and lock. The mesh is welded to the apron frame with the same specifications. The price for this item includes all works as excavation, backfilling, transportation, cutting, shaping, welding, painting to connect with old networks pipes, and at the booster pump station and the existing concrete reservoir. | M3 | 10 | 500 | 5000 |
| 14.1 | **Relief valve:** Supply and install a 3 inches pressure relief valve, 40 bar, complete, The price includes excavation, cutting, welding, adding 2” record, screws, bolts and accessories that are needed to assemble the valve and according to specifications Annex 1/ S7. | Num. | 1 | 3000 | 3,000 |
| **Total of supplying and installing pipes and fittings excluding vat (zero vat)** | | | | | **170,875** |

**2- 1000 m3 steel balance reservoir at the Booster Pump Site (E= 35°  25′ 21″ N= 32° 16′ 54′ )**

| **Item No.** | Description works | unit | QTY | Unit  Price $ | Total  Price $ |
| --- | --- | --- | --- | --- | --- |
| 1.2 | Supply and Install metallic corrugated galvanized steel irrigation distribution reservoir with a volume capacity of **1000 m3** of water in Tubas-Tubas Governorate (see the attached drawing).  **Total Height** of the reservoir after assembly of the steel sheets is 2.56 m and the height level of water will be no more than 2.15 m. The wall sheets are metallic corrugated galvanized steel thickness of not less than 1.5 mm  The outer Radius of the reservoir is 11.8 m.  Total Height of the reservoir after assembly of the steel sheets is 2.56 m. The lining sheet is finished by smooth finish using polyester fabric and avoiding punching or scratching of the sheets. Therefore, the upper sheets edges nuts be covered with PE cover at edge sheets.  The whole reservoir should be removable (simple assembly and disassembly)  The fabric lining size must be enough to cover the whole tank area and extra length not less than 20 cm below the tank top level; the extra length must cover all tank wall form all sides as shown in the attached drawings and at the same level. The liner covers is fixed to the tank frame using ropes, (metallic cables not less than 4 mm thickness the cables to be fixed on sheet wall and bolts between two nuts and washers), the plastic ties to insure tightens and connection. The cover is fixed using metal rings and maximum spacing between rings does not exceed 50 cm and plastic tie between each two ties. The rings must be tightened to insure maximum tension with NO sagging in the cover.    All pipes to be fixed on the supporting Reinforced concrete beam using ring 1” pipes and welded to the 3” and 4” pipes (filled with concrete). The 1” pipes to be as galvanized ring 3.25 mm thickness as shown in the drawings.  The price includes the supply and installation of all piping for inlet, outlet, and washout and over flow as shown in the attached drawings. The pipes must be made of 8” galvanized steel pipe thickness not less than 3.96 mm lined from inside with cement mortar and lined from outside with PE layer 1.8 mm thicknesses. The reinforced concrete ring includes the supply and fix of 3” or 4” (According to drawing) galvanized pipes with thickness not less than **3.96** mm in circumference of the tank **filled with concrete**. The distance between each two pipes is **2.0** m (center-to-center of each two pipes) and the height of the pipes is the same as the height 2.56 m of the tank and taking into consideration the slope height which ranges between zero and 25 cm). The 3” and 4” pipes must be all filled with concrete inside to the top level. And to be connected from the above busing galvanized RHS profile 8\*4 cm \*3 mm thickness and the upper middle by ring of 1” galvanized steel pipe 3.25 mm as show in the attached drawings.  The pipe system inside the tank must be equipped with all necessary materials to insure tight joints for any small water leakages. The 8” steel pipe inlet lined from inside with cement mortar and epoxy painted or, PE from outside the thickness of the steel 3.96mm. The supply and installation shall include but not be necessary limited to:   * The price for this item includes the preparation, excavation in all types of rocks and Leveling of foundation; the foundation shall have a diameter of at least **two meters larger than the diameter of the reservoir**. The price of this item includes all works necessary to open a road (if necessary) and to transport all materials to construct the reservoir. This includes excavation and backfilling, and compaction works of any backfilling materials in layers and maintain 98% sub grade of the tank (rock cutting, backfilling to reach at least 40 cm level above the road level from north side of the tank). Excavation is done in all types of rock and soil. The reservoir sides: the price includes excavation, cutting and leveling the surrounding reservoir basement for building stone walls; which is made of boulders hard stone dimensions not less than 120\*80\*50cm. The dimension 120 cm is toward reservoir center, and 80 cm wide, and 50 cm thickness) and act as a retaining wall. It is built on leveled reinforced concrete base (60 cm wide, 15 cm thickness along stone wall base and reinforced by steel mesh (Ø12mm the height of the wall is up-to reservoir finish level (40 cm above the adjacent dirt road level from the northern side). The maximum wall height at any side should not exceed 1.5 meter then make step or enough slope from the base to the ground level. The stone walls are added everywhere necessary around the reservoir from all side sides; so as to obtain fully stable reservoir base against movement and water drainage from the roads. The price includes clean the site and transport excavated and unwanted materials away from the site. * Supply and lay two-base course layers each should not be less than 15 cm thickness after compaction; the overall layer shall be compacted to not less than 30 cm and relative compaction 98% . * Supply and add a sand layer with min. 15 cm thick; this layer shall be installed inside the tank above the base coarse layer. * Fixing of the tank (assembly) including all materials and works that were mentioned or not mentioned in the specifications and must insure stable, level and tight reservoir. * The price for this item includes the supply of materials (all reservoir 8” pipes and fittings show in the attached drawings and where placed on inlet, two main water outlets, clean and over flow pipes) and according to standard fittings specification for all pipes and fittings. This includes supply and install of all internal and external 8” pipes, and these fittings as follows (#,diam, PN16 all according to Annex 1): **three**  **gate** valves diam 8” and two gate valves 6” , **three** dressers diam 8”, and two **two** dressers diam 6”, three compound steel **air** valves 2” with 2” globe valve and couplings for each one, 8” **float valve** complete including float ball valve and piping 1”, supply and install 1” transparent water level indicator with 1” globe valve and 1” couplings , **three strainers** 8”, one **Non Return Valve** 8”, **three water meter** 8”, **jacks, elbows**, Tees, couplings….etc as shown in the attached drawings. The price for this item includes all works as (welding, cutting, shaping, transporting, distribution….etc) to connect the piping system to the reservoir (Inlet & two outlets, wash out, over flow) as shown in the attached drawings   The price includes supply and install a reinforced concrete B-300 ring beam (**50cm depth\*25cm width**) shall be constructed around the tank at the ground level. The outer face of the beam must be **fair face finish** or by using plaster 3 -faces of plaster (rough, smooth, and shebreez) using standard percentages of plaster materials. The supporting concrete beam reinforcements details are as follows:  **Use 9 steel bars, Ø12 mm** as shown in the attached drawing  Use stirrups Ø 8mm each 20 cm. over all the beam  Before casting concrete, obtaining the approval of the field supervisor is mandatory. The price includes having 2 concrete samples for compression testing.  The tank shall be equipped with a transparent vertical pipe connected to the outlet to indicate the internal water level and to be properly fixed.  The lining, cover PE materials must be encased from inside with **plastic cover sheets over the entire walls to avoid punching of the PE lining** and all materials should be suitable for drinking water (**certificate should be provided**) and to have at least the following specifications:  **Fabric, Type polyester 1100 Dtx, 200 gm/m2**  **Total Weight 740 gm/m2.**  **Breaking strength: 280/260 kg/5cm.**  **Tear strength: 110/100 kg.**  **Adhesion 12 kg/5cm.**  All corrugated sheets shall be fixed vertically without any buckling; no spaces or voids shall be left between the sheets.  The price includes fixing with galvanized bolts and nuts of the corrugated galvanized steel sheets of the tank. The overlapping shall not be less than 25 cm in both directions: vertical and horizontal. The bolts spacing shall be two bolts each 5 cm over the entire tank assembly.  **The price include supply and install Steel Cover Shed (All According to the attached drawings)**: Supply and install all materials to build a steel shed to cover the tank against light and to achieve complete confinement using steel boxes and frames and covered with corrugated steel sheets 0.5 mm. The tank roof includes door opening 90\*90 cm made of galvanized sheets 2 mm and frame 4\*4 cm \*2 mm and lock. The roof cover includes 9 main footings 60\*60\*50 B-300 reinforced with a mesh of steel diam 10 mm. Supply and Install (S&I) Main RHS box steel Galvanized 10\*10\*cm \*4 mm to be fixed inside the foundations and to the level of tank taking into consideration the differences in height due slope for rain water drainage as show in the drawing. S&I to RHS Galvanized 10\*10\*cm \*4 mm to connect the main supporting columns and end at outer supporting 4” Galvanized pipes. S&I Other RHS boxes 8\*8cm \*3 mm to be installed between the main supporting beams and on the other direction each 3 m. S&I RHS boxes 8\*4cm \*2mm over the entire space maximum each 90 cm center to center as shown in the drawing. All welded steel profiles must be painted two faces. The whole RHS boxes to be fixed on the supporting 3**"**, 4**"** galvanized pipes and RHS ring 8\*4cm \*3mm. S&I corrugated galvanized steel sheets 0.5 mm over the entire reservoir space to the outer edge of the galvanized ring and fixed with bolts to the steel frames and shown in the drawings. The inner supporting frames are fixed in the concrete foundation and extend to the sand level and ends with steel cap steel plate 25\*25 cm \*1 cm thickness. The upper supporting frames start with the same cap/plate and the polyester liner laid on the inner plated and bolted tightly to the upper plate by 8 bolts diam 14 mm. The main supporting farmers to be fixed by welding as rigid connections using standard welding bars and specifications. To avoid punching of inner liner the reservoir must be filled by 30 cm of water height before start welding. The secondary frames are to be fixed on skids before welding.  **The price includes water quantities to fill the tank (1000 mcub) to the top level and conduct all necessary test as overflow, closure by the float valve and to carry the leakage test..**  The ESDC reserves the right for carrying additional testing for any part of the works included in the contract, during and/ or after the execution of the work. In the event that the results of such tests are not satisfactory and not in conformity with the specifications requirements, the contractor shall bear the costs and any other implications of such tests. | L.S | 1 | 62,000 | 62,000 |
| **Total of supplying ,installing & transporting of the 1000 m3 steel tank excluding vat (zero vat)** | | | | | **62,000** |

**3- 1000 m3 steel Distribution reservoir at (E= 35° 24′ 8″ N= 32° 18′ 38″ )**

| **Item No.** | Description works | unit | QTY | Unit  Price $ | Total  Price $ |
| --- | --- | --- | --- | --- | --- |
| 1.3 | Supply and Install metallic corrugated galvanized steel irrigation distribution reservoir with a volume capacity of **1000 m3** of water in Tubas-Tubas Governorate (see the attached drawing).  **Ditto 1.2** , but for three main outlets as follows:   * The price for this item includes the supply of materials (all reservoir 8” pipes and fittings show in the attached drawings and where placed on inlet, three main water outlets, clean and over flow pipes) and according to standard fittings specification for all pipes and fittings. This includes supply and install of all internal and external 8” pipes, and these fittings as follows (#,diam, PN16 all according to Annex 1): **four**  **gate** valves diam 8” and two gate valves 6” , **four** dressers diam 8”, and two **two** dressers diam 6”, four compound steel **air** valves 2” with 2” globe valve and couplings for each one, one 8” **float valve** complete including float ball valve and piping 1”, supply and install 1” transparent water level indicator with 1” globe valve and 1” couplings , **four strainers** 8”, one **Non Return Valve** 8”, **three water meter** 8”, **jacks, elbows**, Tees, couplings….etc as shown in the attached drawings. The price for this item includes all works as (welding, cutting, shaping, transporting, distribution….etc) to connect the piping system to the reservoir (Inlet & two outlets, wash out, over flow) as shown in the attached drawings | L.S | 1 | 65,000 | 65,000 |
| **Total of supplying ,installing & transporting of the 1000 m3 steel tank excluding vat (zero vat)** | | | | | **65,000** |

**4)- Booster Pump (well site) at (E= 35° 25′ 21″ N= 32° 16′ 54″ )**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TOTAL**  **Price($)** | **UNIT**  **Price($)** | | | **QTY** | | **UNIT** | **DESCRIPTION OF WORKS** | **Item NO.** |
| **The contractor must submit the materials specifications, certificate of origin, catalogs and on site testing report which shows that the materials are matching with the manufacturer specifications.** The contractor shall submit in his offer and supply maintenance manuals, catalogs, characteristic curves, testing certificates, shipping, lading documents and specifications of pumps, motor, fittings, mechanical and electrical control devices, cables, wiring and all accessories and ancillaries to complete the work. All to be new and not renewed in accordance with the specified specifications. The contractor should verify the design equipments by conducting field visits to the pump site and must be before ordering any equipment or materials as follows: the contactor must check and verify and match between the reality and the design quantities mentioned in this tender. If he notices any difference or no matching, then he must inform the supervisor engineer and find together a suitable solution to such conditions. The contractor should be responsible technically and financially to supply the suitable materials. All connections including the electrical and mechanical fittings should be according to the PWA general pumping standards and the layout view. | | | | | | | | 1.4 |
|  |  |  |  | |  | | **Supply to the site of the balancing tank at Tubas well site, Main Electrical Control Panel Unit**: suitable for **110 m3/hr** at total dynamic head **380 m**, for the mode of operation, a control board according to the following specifications and supervisor instructions:  Control panel box shall be made of 2 mm thick steel sheets with lock. Installing in the site for the mode of operation, a control board according to the following specifications and supervisor instructions: control panel box shall be made of three compartments: one for main hour meter with fusses- and main breaker 300 hp. The second compartment for the 280 hp inverter as Siemens, main breaker as Siemens, contactor, capacitor(s) bank, main cables 400 v connections inlet/outlet.) 24 v transformers, It shall be IP 66 protected thermally painted paint as (RAL 7302). All main cables and wiring must be closed with special plastic cover and protected against human electric shock. The third compartment includes all control circuits, and secondary contactor, breakers for the high voltage cabinet or the low voltage. The control panel must be fixed to the wall by six Jumbo screws and laid on a reinforced concrete foundation 40-50 cm above the ground. The contractor should submit as built drawing including soft and hard copy. In case the contractor will use any digital equipment including PLC he must submit the following: data cable, the software, the suitable laptop computer and any other accessories that are necessary to operate and maintain these digital equipments and give training on software how to operate the pump using the PLC . The control panel must function consistently as integrated unit with the overall control system installed at the well site. Therefore, the contractor should match the logic control of the control panel to operate in harmony with the existing control panels of the groundwater well and booster pump. The price for this item includes the supplying and installing all necessary devices and to carry all wiring to achieve this overall control condition. |
| 25,000 | 25,000 | | 1 | | L.S | | The labeled nameplate should be mounted at the front of the main board behind the doors and above every switch and group of lamps. Control electric lamps 24v must be fixed to control all operation system, the starter shall be used to start, run, stop , protect and control manually and automatically by using the general required installation of the following equipments completely:   * The power circuit must consist of the following: main circuit breaker MCCB 3\*400 A, 25 KA adjustable for the company and for generator (MOLLER ) two pieces. The price includes supplying and installing manual change over switch 4\*400A, SOCOMEC type for manual operation. * Bus bar 150A/0.4KV (3 phases and neutral and earth) * Complete 4p \* 20 KA surge arrestors of replaceable type. With box fuse 3\*63. * Digital programmable screen inverter 280 Hp as Siemens or ABB (The booster pump should be inverter duty type with bypass contactor 300 hp as MOELLER type equipped with over /under load, over temperature and all control system needed with all protections rated at suitable power that matches the pump motor with (0.8-1.2) over load range. * Temperature relay unit rated at the motor thermal sensor, including digital motor screen protection control board with all cables and connections. * Supply and install on outside cabinet a Potentiometer to manually control the motor speed within the permissible range * Suitable standby capacitor banks (if necessary with inverter) with discharge resistors compensating reactor dry type 400v 50 Hz to reach power factor 0.97 Ducati. Three phase capacitor with resistors 40 KVAR as Ducati type. * Digital multi meter which is able to read directly from a screen (V, Hz, KW, A, PF). * No voltage phase sequence and phase failure relays of best quality as MOELLER. * On-off push button set and emergency off button. * Reset push buttons red color 22 mm. * Overload relay unit rated at 1-1.5 of motor full load including digital motor screen protection control board. * Temperature relay unit rated at the motor thermal sensor, including digital motor screen protection control board with all cables and connections. * HRC fuses 3\*63 A complete Fernaz type. * WHM 50\*50 mm. * 24 h clock with 150 hr mechanical reserve. * Suitable automatic breaker with adjustable thermal and magnetic protection (ISC>=25KA) NZM. * (0-500V) 96\*96mm Voltmeter with selector switch between phases and neutral. * (0-300A) 96\*96mm ammeter. * 3 phase fuse holders set , 10\*38mm , with 20A fuses * Suitable earth leakage relay class A (AC and Dc trip). * Contactor with discharge 40KVAR Moeller type. * Breakers for service Siemens type. * Relays and timers and connections 24 V for no flow switch and high-pressure, low-pressure sensors. * Three phase 50 Hz 380V (KWh-meter), /5A-200/5 CT’s. The KW-h meter as electromechanical meter or solid state and pre-paid card electric type. * 24V/ 50 Hz indication lamps installed in front of the control cabinet.. * 3 position selector switch A-O-M. * 220-2 12V (AC) transformer 100 VA. * the price includes all cables to be used for control purposes shall have the following cross section: * **(3\*95 mm2 + 50 mm2**) for the internal connections inside main board and the contractor has to check and order the exact required length. * \*1.5 mm2 for the driving wheel circuits. * \*2.5 mm2 for the circuits of tension measurements. * \*1.5 mm2 for the sensors. * \*4.0 mm2 for the circuits of intensity measurements. * All terminals shall be carefully protected to assure electrical insulation. * Switches, measuring instruments, and warning slights shall be installed in the front side of the panel. * The control panel shall be manufactured with enough space (minimum 40% free space of the total size) to insure easy maintenance and no interface between the wiring for all circuits. * All wires must be coded clearly and fixed with special wire heads to avoid loose connection. * All timers (PSK), relays and contactors shall be of best quality as Siemens * The contractor shall supply any other materials and devices that might be missed here and considered to be essential to complete the work without claiming any changes in unit prices. * The control panel must be equipped with an alarming bell (100 dB measured at 30 meters distance) and flashing red alarm (should be visible from 300 meter during day). Alarms for all cases of failure as: voltage drop, no voltage or phase failure high or low pressure and no flow, high temperature etc. * The alarm must be muted without general reset and there should a special button in the front door to stop it alone. * Circuits must consist of the all necessary materials to operate and protect the system automatically and manually, the wiring color system, numbering all the components. The price includes the design of the whole system of control the contractor is intending to carry. The contractor should also submit at the end of work a s built drawing. * The control panel deign should include: * Transformer 230/24V 100 VA. * 220 V AC /80 Watt with 2 fans in each compartment, one for taking in air and the other for taking out the air with grid ( for the panel) complete with thermostat protection. * SIREN (alarm system)   Alarm system 24V for :   1. High pressure outlet 2. Low pressure outlet 3. No flow (non return valve) 4. Soft start fault 5. High temperature  * The price includes the excavation works installing pressure switches, flow switch and level sensor and all the electrical parts with suitable conduits and metal ducts to complete the works. * The price includes installing and testing for the mode of operation all mentioned devices and sensors. The control panel must be equipped with earthing unit so the price includes. * **Earthing** : The price of the control panel includes supplying and installing complete earth unit with earth equalizer compressing C40 box copper B.B. 35 mm2, with minimum two concrete manholes as foundation lines , three earth electrodes, D>19m, L=1.5m and any other missing materials to earth the pumping station . The price includes testing earth unit so as to fulfill the standard requirements (resistance less than 1.5-2 ohm). The across different fittings in the piping system.   **The price includes supplying and installing all necessary materials to execute all Wiring and Lighting works as follows:**   * All electrical preparations as 1-phase control box with all breaker for lighting and sockets, pvc piping, wiring, fixing electric holder boxes, cables of all sizes, on-off buttons, lighting fixtures , sockets, breakers, steel trenches needed for inside and outside lighting of the station * 8x36 W flourcent surface mounted IP55 as A- quality type or equivalent for inside- outside the room. Lighting the room from inside by four pieces double-glass fluorescent lamps (36 w) in the room. * 2x36 w emergency 10 hours duration lighting fixture to be fixed in accordance with the supervisor engineer's instructions. * DGB. Its power source and which is directly controlled through a double pole MCB * Lighting the outside of the room by External four projectors each of at least 400 W Metal Halide water proof IP 55 with aluminum body (high quality) (the price includes 3/4" galvanized pipe (arm ) 2 m for connecting projectors, they will be switched on from the service DGB. Distribution box for lighting suitable for 24 circuit breaker (DBG). * Also the price includes conduits, (3x2.5mm) and all size of cables& all accessories needed to complete the work. * Supplying materials and executing 4 power sockets, and one as 3-phase and the other three as 1-phase. * The price includes supplying electric cables, leads, on-off keys, power sockets, trenches…etc. * The price includes all any other missed works or materials to execute the lightening item |
| 40000 | 40,000 | | 1 | | pump | | **Supply and install** in the site of the well a **booster pump turbine** with a capacity of **110 m3/hour at a total dynamic head of 380 m.** It has to be installed inside a new room (shed) as shown in the specifications below. All stages of the turbine made from casting iron, bronze, stainless steel column, a stainless steel screen filter for the pump and any other additions to achieve the required head and quantity. Operating efficiency should not be less than 72%, The booster technical data are as follows:   * Liquid water is suitable drinking. * Design capacity (m3/h): **110** * Design anticipated total head (TDH) (m): * Anticipated turbine discharge at TDH at **380 m** * Shut-off head limits (m):minimum **450m** * Pump overall efficiency at the intended point is not less than 72% * Minimum bowl efficiency at run out capacity (78 %) * NPSHA at maximum run out capacity (m): 6 * NPSHA at maximum anticipated TDH (m): 4 * Motor and pump operating speed (rpm): 2900-3000 * Stainless steel column, stainless steel screen filter * Closed impellers manufactured from bronze and cast iron bowels. * the pump shall be capable to run at shut off head for a few minutes without mechanical problems * The electrical motor must be supplied with RTD (PT 100) temperature protection. The type of motor connection must be suitable to present the motor temperature digitally. The price include all wiring, PT cables and connections and works required to connect the motor inside the well and the main control panel with relay and off-alarm * Contractor has to connect the motor to the control panel upon his responsibility and the price includes all cables as follows:   The price includes supplying all cables and materials and executing all electrical connections needed between the following elements and despite of the length required: A- cable one (including works and materials) to connect between the main 3-phase power source (Municipality Transformer) and the Main Electric Control Board inside the pumping room as ABC type 3x95+1x50 mm2 B- a cable between the Main Electric Control Board and the electric motor. The cable size and specifications are as follows green color, copper conductors are solid and made of pure copper XPLE, PVC insulated, with inner sheath, 600 V, conductors sizes **3x95+1x50** mm2. The price includes all materials and works to install the above cables including whatever of electric, mechanical fittings and accessories as PVC and steel trenches, anchors with clamps, jumpers, stays including base, anchors steel wires, standard wood columns. The cables must be lay inside 4"PVC/as rubber pipes of flexible spring type two layers. The price includes excavation inside all types of soil and rock trenches not less than 40\*30 cm and lay the cable inside these trenches and adding pure sand as backfilling to all size of the trenches and casting in the last 10 cm of the trenches with plain concrete over the pipes. The price includes supplying and installing all electric motor control devices (as RTDs thermal, over load) and any other connections including cabling inside or outside the pumping station relevant to this work and according to standard specifications for this work. The opening tender committee will receive an offer about type and motor specifications, catalogues, and an in site testing report which shows that the motor is matching with these specifications.   * The motor shall be designed and built for prime 24-hours continuous service at any and all points within the required range of operation without overheating, cavitations excessive vibration and strain. * Motor has to be new and furnished with a stainless steel name plate with data of the serial no., speed, Kw, input voltage, full load, Hz, power etc.) and motor must be at least 1.25 larger than Pump brake horse power or 1.15 larger than the total Input Horsepower to the Electrical Motor. * All works from supplying, installing connecting running and testing are under the contractor's expenses. * All works must be according to the Palestinian standards and engineer’s instructions and the specification and drawings. * The price also includes any missing works not mentioned to execute this work. * The contractor must submit the motor specifications, certificate of origin, catalogues and on site testing report which shows that the motor is matching with the manufacturer specifications. * The booster pump shall be capable to run at on/off without electro-mechanical problems. * The turbine and motor torque design should be duty inverter at speed range the design torque values between 1:10   The price includes supplying and installing all required flanges, coupling, reducers, bolts, spacers, sleeves, nuts, etc. to connect between the turbine outlet, and pumping pipes and fittings. The price also includes casting reinforced concrete foundation and to hold the motor and turbine. The price includes supply and install suitable size reinforced concrete foundation (2-mesh steel bars 10 mm diameter @ 15 cm in all directions)   * The size of the concrete foundation must be suitable to hold the booster pump and motor. * The contractor shall do in site testing the booster in accordance with the performance curve and submitting the test report. Before installing any new materials, the contractor must get the initial records for the proposed balancing reservoir including: the reservoir supply capacity in m3/hr and suction. , water level inside the (dynamic and static). * The booster electric motor of suitable power must be inverter duty, 3000 rpm, and basic run as 50 Hz, 380/400 volts and motor efficiency not less than 0.9 with 1.15 service factor (squirrel cage induction motor). The motor has to be inverter duty as 10:1 (6-60 Hertz) Speed Range Constant Torque voltage 220/380-420. The motor shall be of standard construction and suitable high thrust bearing to carry the loads of the rotating radial thrust, equipped with weather protection type-1 standard, insulation class H complete thermal protection unit, complete current overload unit. * The electrical motor must be supplied with RTD (PT 100-3/4 cables) temperature protection. The type of motor connection must be suitable to present the motor temperature digitally inside the control panel. The price of this item includes all costs of materials and works to install and test the RTD control device.   The price for the booster pump includes testing the pump and matching with factory performance curve. The price includes all works and materials to connect the booster pump to the balance tank and install inlet/outlet connections to the existing well pipe at pump site. The price includes all works to connect the reservoir inlet connection at the existing 8” outlet of the well. Moreover; it includes the connection of the booster inlet to the outlet balance tank. The price for this item includes the supply and installation of all fittings of all sizes related to the installation of booster pump accessories as: 1” 2”, 3”, 4”, 6”,8” steel pipes, and all 45 or 90 elbows, Tees, adapters, reducers, couplings, bolts, flanges, couplings; meanwhile to execute these main connections as follows: a- connect the existing balance tank to the well source supply pipe b- connect the balance tank outlet to the booster transmission line. c- Supply and install 3”, 4”, 6”,8” steel pipes to connect the booster with the balance tank, pressure reducing outlet and the balance tank cleaning pipe and tank overflow to the adjacent disposal site. The price includes all works and any type of fittings to install the booster pump and connect to the balance tank including float valve, transparent pipes indicator 1", steel pipes 1" with globe valve.  The price for this item includes all work and materials to build a sun and rain protection concrete/ steel cover for the booster pump as follows:  Room net Dimensions: 8 m\*5 m \*3.3 m (see the attached drawing)   * Prepare the room foundation including excavation in all types of rocks and soils. The foundation must be leveled on solid base and sub base to the anticipated level decided by the supervisor engineer (the room concrete floor level must be 50 cm below the ground level of the balance tank). This includes leveling and laying a base course layer (200 m2) at the booster pump site of grade A- minimum thickness after compaction (95%) is 20 cm. * Supply and casting reinforced concrete base over the entire room dimension (8\*5 m) and thickness 20 cm B-300 and reinforced with a bottom mesh of steel bars 14 mm diameters in both directions at 20 cm, and top layer mesh of steel bars 12 mm diameters in both directions at 20 cm. The price include constructing a corridor of reinforced concrete (mesh 10 mm steel at 20 cm in both directions) concrete 10 cm thinness B-250 width 1 meter around the **pumping room and the balance tank** * Supply materials and casting 6- reinforced concrete columns **50x20 cm.** The columns concrete is B300, 6 bars diameter 14 mm and stirrups 5/meter and diameter 8mm and build as shown in the pumping room layout. The height of coumns above concrete base ranges between 3.3m and 3 meters to achieve the rainwater collection slope. * Supply and install all materials to build on top of the concrete base and up to 20 cm below the 3.0 meter upper level wall, using hollow concrete block 40\*20\*20 cm over the entire room sides including the internal partiotion wall and leaving 2-door openings from outside for the room and one door opening inside the pumping room, meanwhile two openings for windows (see the drawing). * Supply and casting concrete tie beam (20-50) cm height X 20 cm wide of reinforced concrete (B-300) on top of the last row of hollow concrete block. Reinforcement includes 6 bars diameter 12 mm and stirrups 5/meter and diameter 8mm. * Supply and Install inside the top walls concrete beams 7- galvanized steel boxes 10x10 cm x 4 mm each length 5.4 m. The steel boxes must be fixed inside the concrete tie beams before casting using steel plate and maintain smooth finish with top surface of the tie beams. * Supply and install corrugated galvanized steel sheets 1 mm thickness to cover the room roof. The sheets must be larger the room at least 30 cm in all directions and with steel rain water collector and drain 4” pvc pipes * Supply and install steel guard for the two room windows: 2X1.2 m and 1X1 m using galvanized steel frame 4\*4 cm, thickness 3 mm and inside frame using galvanized steel bars 16 mm each 8 cm. * Supply and install aluminum 7000 window 2\*1.2 m, 1\*1 m fixed from all side on reinforced concrete (minimum steel) frame 20\*20 cm width two leaves in addition to a third leave as fine mesh for ventilation. * Supplying and executing three steel doors and frame with dimension one 160X220 cm, and two 100X220 cm, and the doors are fixed from all side on reinforced concrete frame 20 cm width. The door sheets from inside and outside (2 mm thickness) is fixed over box beams each of 8\*4\*cm and 2.5 mm thickness every 40 cm height. The door is composed of 2 main parts. The outside frame is made of galvanized steel frame not less than 23 cm and 3 mm thickness fixed to reinforced concrete sides 20\*20\*over the whole door sides. The price includes all materials needed to complete the work such as, double joint locks and main locks; oil base face and hummarite finish paints. * The price for this item includes painting two faces for all steel work one as primer coat and the second oil base and the color according to the supervisor engineer instructions. * Supplying and installing all materials needed such as cement, sand, fine aggregate, water, ect. For executing the internal plastering (3 coats). The first coat is sand and cement 1:1, the second coat is mix of cement, fine sand and crushed powder limestone 1:2:3 , and finally a soft coat * The price include supplying and installing all materials needed such as cement, sand, fine aggregate, water, ect. For executing the external plastering (4 coats, the last coat should be white shipreez) with 2 coats of Super creel and super Gameesh paint above texture according to the standard specifications and instructions of supervisor engineer. | 2.4 |
| 300 | 300 | | 1 | | piece | | **Flow Control switch:** Supplying and installing an electrical flow switch suitable for 8" pipes -40 bar, powered by a 24 v-dc power source. Price includes all cables required to connect it with the control panel. | 3.4 |
| 600 | 300 | | 2 | | piece | | **Pressure Control switch** Supply and install two pressure switches 1-50 bar. Price includes all cables required to connect it with the control panel. | 4.4 |
| 700 | 700 | | 1 | | Num. | | **Gate valve**: Supply and assemble gate valve, 3" complete, 40 bar. Price includes excavation, cutting, welding, adding screws, bolts and accessories that are needed to assemble the valve. The valves could be installed anywhere within the project area and according to specifications mentioned in Annex 1, S2 , as shown pumping layout view. | 5.4 |
| 200 | 200 | | 1 | | Num. | | **Dresser conical record:** Supply and assemble 2" dresser complete. Price includes rods and screws, bolts, excavation, cutting, welding, and adding accessories that are needed to assemble the dresser with NP 40 bar, as shown pumping layout view. | 6.4 |
| 3,000 | 3,000 | | 1 | | Num. | | **Relief valve:** Supply and install a 3 inches pressure relief valve, 40 bar, complete, The price includes excavation, cutting, welding, adding 2” record, screws, bolts and accessories that are needed to assemble the valve and according to specifications Annex 1/ S7. | 7.4 |
| 8,000 | 4,000 | | 2 | | Piece | | Supply and install **8 " Woltman water meter** complete with flanges, gaskets, bolts and nuts for 40 Bar (W.P)- Epoxy coated. The measuring unit should be removable type without removing the body from the pipe (interchangeable type). The price includes all necessary works and costs for installing by **welding** steel coupling and nipples and all necessary accessories for the farms’ openings to irrigate the farms and to install future branches across these pipes. The water meter should be according to ISO 4064 or equivalent as S5 | 8.4 |
| 4,000 | 2,000 | | 2 | | Piece | | Supply and install in the site of work **8" cast iron wedge gate valve** for 40 Bar working pressure (W.P).-enamel coated. Complete with flanges, gaskets, bolts and nuts, (None rising stem) with hand wheel for each valve. All in accordance with ISO Standard No. 5996 or local and international equivalent. The general specifications are according to Annex S2. The installation works includes all costs of excavations, cutting, shaping, welding, paintings, either on new or old pipe lines. | 9.4 |
| 10,000 | 5,000 | | 2 | | Piece | | Supply and install in the site of work **(8") cast iron swing check** valve, complete with complete with counter weight, flanges, gaskets, bolts and nuts, for 40 Bar working pressure) -Epoxy coated with extended arm and lid (cover) in accordance with BS. No. 5153 or local and international equivalent and according to general specifications mentioned in Annex 1, S1. The installation works includes all costs of excavations, cutting, shaping, welding, paintings, either on new or old pipe lines. | 10.4 |
| 3000 | 1000 | | 3 | | Piece | | Supplying and installing of **8" Strainer** of cast iron body for 40 bar working pressure complete with companion flanges, gaskets, bolts and nuts. The general specifications are according to Annex S6. The installation works includes all costs of excavations, cutting, shaping, welding, paintings, either on new or old pipe lines. | 11.4 |
| 1,500 | 500 | | 3 | | Piece | | Supply and install in the site of work **(2") valve** for 40 Bar (W.P) local or international equivalent. The installation works includes all costs of excavations, cutting, shaping, welding, paintings, either on new or old pipe lines. | 12.4 |
| 1500 | 750 | | 2 | | Piece | | Supply and install in the site of work **2 inches** (**Compound air valve)** complete As ARI, 40 bar or local and international equivalent and according to general specifications mentioned in Annex 1, S3. The price includes the installation of 2” ball valve and 2” black coupling welded on the steel pipes. The installation works includes all costs of excavations, cutting, shaping, welding, paintings, either on new or old pipe lines. | 13.4 |
| 3000 | 3000 | | 1 | | Num. | | **Pressure Surge Tank:**  Supplying and installing of a pressure Surge Tank 40 bar size (1000 liter). The contractor shall supply and install all the pipes and fittings to connect with outlet main8” pipes of the pump and should be according to specifications. The price include, complete instrumentation of the pressure Tank including all fittings and steel pipes and fittings. The price includes supplying and installing all necessary materials and works to connect to the pressure switches and casting a suitable reinforced foundation under Tank, and above the pump ground level, as shown pumping layout view |  |
| **100,800** | **Total of supplying and installing materials (zero vat) of the booster pump and its fittings** | | | | | | | |

**Summary of the bill**

|  |  |  |
| --- | --- | --- |
| **Item** | **Description** | **Price (US $)** |
| **1.** | **Total of supplying and installing Main Supply Pipes and fittings for Sahl Tubas excluding vat (zero vat)** | **170,875** |
| **2.** | **Total of supplying, installing & transporting materials of the 1000 m3 balance steel tank excluding vat (zero vat)** | **62000** |
| **3.** | **Total of supplying, installing & transporting materials of the 1000 m3 distribution steel tank excluding vat (zero vat)** | **65000** |
| **4.** | **Total of supplying, installing & transporting materials of the booster pump excluding vat (zero vat)** | **100800** |
| **Total of all works excluding vat (zero vat)** | | **398,675** |

**Annex 1: Fittings Materials Specifications**

**S1: Check valves**

1. Body: Cast Iron
2. Disc: Cast Iron
3. Cover: Cast Iron
4. Seat Holder Cast: Iron
5. Body Seat Ring: Bronze ASTM B62
6. Disc Seat Ring: Rubber (BUNA-N) ASTM D 2000 AA 7008
7. Hinge Pin: Stainless Steel
8. Plug: Malleable Iron
9. Cover: Bolt & Nut: Steel
10. Seat Holder Bolt: Stainless Steel
11. Cover Gasket: Rubber (BUNA-N)
12. Coating: fusion bonded epoxy inside and outside

**S2: Gate valves none rising stem:**

1. Body: Cast Iron
2. Bonnet: Cast Iron
3. Packing Box: Cast Iron
4. Disc Cast: Iron
5. Hand Wheel: Cast Iron
6. Body Seat Ring: Bronze
7. Disc Seat Ring: Bronze
8. Gland Cast: Iron
9. Stem Nut: Bronze
10. Stem Bronze
11. Bonnet Gasket: steel
12. Packing Box Gasket: steel
13. Bonnet Bolt & Nut: Steel
14. Gland Stud & Nut: Steel
15. Packing Box Stud & Nut: Steel
16. Top Nut: Steel
17. Washer: Steel
18. Packing: Graphite Fiber Commercial
19. Operating Nut: Cast Iron A 126 Class B
20. Coating: Electro statically applied epoxy inside and outside,

**S3: Combination Air Valve**

1. Body: PN21 Sphero Nodular ASTM-536 60-40-18
2. Rolling Seal: Rubber E.P.D.M
3. Clamping Stem: Reinforced Nylon
4. Float: Foamed Polypropylene
5. Base: Brass ASTM B-124
6. O-Ring: Buna-N
7. Cover : PN21 Cast iron ASTM A-48 CL-35B
8. Nozzle Seat: Bronze ASTM B-62 B-271 C83600
9. Nozzle Seal: Rubber E.P.D.M
10. O-Ring: Buna-N
11. Bolt and Nut: Galvanized Steel, Chromate Plated
12. Float: Stainless Steel 304L
13. Body: PN21 Cast iron ASTM A-48 CL-35B
14. Sleeve: Reinforced Nylon
15. Threaded Outlet: Brass
16. Coating: fusion bonded epoxy inside and outside

**S4: Butterfly Valves: (GEAR)**

1. Stem: Stainless steel
2. Body: Cast iron
3. Bushing: Brass
4. O ring: EPDM
5. Bushing (spacer): Polymeric
6. Disc: Stainless steel
7. Liner: EPDM
8. Washer: Bronze
9. Retaining ring: Spring steel
10. Plug: Plastic
11. Coating: Fusion bonded epoxy inside and outside

**S5: Water meter specification and materials.**

1. Working pressure 16 or 25 bars as required.
2. Max. temperature 60 C
3. Body: cast iron
4. Coating: epoxy
5. Connection: Flanged ends for 4” and above diameters or records 3” and less diameters

**S6: Strainers Specifications:**

1. Body: cast iron ASTM 126 class B
2. Cover: cast iron ASTM 126 class B
3. Screen: stainless steel
4. Gasket: Buna -N
5. Plug: steel
6. Bolts: steel
7. Coating: fusion bonded epoxy inside and outside

**S7: Control Valves specifications (float valves and pressure reducing valves)**

1. Connection: flanged
2. Water temperature up to 60 C
3. Working pressure 16 bars
4. Valve body and cover ductile iron (ASTM A-536)
5. Valve internals: stainless steel and bronze
6. Control trim: brass
7. Elastomers: Buna-N
8. Coating: fusion bonded epoxy

**S8a: the price per meter length includes all of the following.** Spreading along the route of pipe lines, welding two passes of the steel pipes including welding of readymade elbows (the unit price per meter length is valid for all the 8”, 6”, 4”,3” pipes and include all welding costs between each two pipes, or between pipes and elbows, or pipes and tees….etc. The price also includes the shaping and welding of elbows on site so as the pipe line will be always in the center of the route. The price include all welding of Tees, nipples and couplings for branches as8”,6”, 4”, 3”, 2″&1″, ¾” with plug for the future customers and as required by the supervisor engineer. Any pipes irregularities or damages must be repaired. Installation works are not limited to the routes specified in the attached drawing, but new route lines are expected as well and without variation in the technical specification and quality of works and unit prices in the whole tender items. No additional prices for the unit price what so ever the site of work is rough or far from the dirt roads. The distribution and welding works must be carried out in all intended pipes routes without variation in unit prices. Each Main pipe route line must be connected to the source well. The welding, cutting and shaping are including in the unit price (per meter length), and the welding costs include shaping and cutting without using elbows in case the outside angle is less than 22 degrees or the internal angle more than 168 degrees. The price of welding all types of elbows, tees, and other fittings are included in the unit price of the steel pipes and no payments for welding all these connections.

**S8b: Painting works include** adding two faces (red oxide as priming paint and zinc oxide base oil paint for finish). The pipe surface must be painted with two coats from all sides, particularly lower part to the ground. Therefore, the pipe must hold on supports above the ground minimum 30 cms, and then released to ground down after the paint was dry. Prepare the surface and stir the paint before use or mix using a power agitator. Before applying paint, a thinner liquid has to be added to the pipes surface to clean away oil and grease, use a detergent to remove excess dirt and contaminants. Remove the metallic debris such as mill scale and rust using disc sanders, sandpaper or wire brushes which ensures an adhesive surface.

**S9: Irrigation Steel Pipes Welded Black Steel Pipes,** [**ASTM A53**](http://www.techstreet.com/cgi-bin/detail?product_id=911886) **Or as API5L:**

**A53 Type F**, which is longitudinally furnace butt welded or continuous welded (Grade A only), **A53 Type E**, which is longitudinally [electric resistance welded](http://en.wikipedia.org/wiki/Seam_welding) (Grades A)

**S10: Road crossing for 6”, 4” and 3” pipes**. The price per unit length for any pipe diameter in this tender includes all costs of excavation (80\*50 cm) and basecourse backfill 98% relative compaction and where along roads and road crosisings as shown in the drawings. This includes all excavation works necessary for making pipes trenches across the whole road width (whatever is the road width). The width of trench should be not less than 50 cm plus the pipe diameter. The total trench depth should be not less than 70 cm plus the pipe diameter. The backfill materials must include soft back fill as follows: fine aggregates 2-3 mm diameters (symismya) below 10 cm below the pipe bottom plus pipe diameter and 10 cm above the pipe top crown (total soft backfill thickness inside the trench equal 20 cm plus the pipe diameter). The final backfill up to the original ground level must of compacted base course grade B.

**A1: Ready Mix Concrete**

a- Standard Specification for Ready-Mixed Concrete :ASTM C94/C94M-03

b- Testing Hardened Concrete Compressive strength: BS EN 12390-4

**A2: Steel Bars**

1. Standard Specification for reinforcement Steel Bars. ASTM 615/ Grade 60
2. Specification for mild steel. BS 1722-9

**A3- Base course materials:** it should be a result of hard crushed rocks as dolomite limestone free of organic and soil materials as follows:

* Gypsum materials 2% maximum
* Soil materials 6%
* Dry specific weight 2.1 ton/m3

**Base course Materials gradation by weight or according to the local standards**

|  |  |  |
| --- | --- | --- |
| **Specifications Limits (%)** | | **Sieve no** |
| **Grade B** | **Grade A** |
| 100 | - | 2’’ |
| 70-100 | 100 | 1.5’’ |
| 55-82 | 75-100 | 1’’ |
| 50-80 | 60-90 | ¾’’ |
| 45-75 | 45-80 | ½’’ |
| 40-70 | 40-70 | 3/8’’ |
| 30-60 | 30-65 | 4 # |
| 20-50 | 20-40 | 10 # |
| 10-30 | 8-20 | 40 # |
| 5-12 | 5-10 | 200 # |

**A4- Base Course Test:**

Before starting any base course supply to work site, the contractor should carry on the following tests and show that supply source or the quarry materials matches and pass these tests **or according to the local standards**:

|  |  |
| --- | --- |
| Crushed percent by sodium sulphate | According to AASHTO –T104, maximum 10% |
| Percentage of loss by magnesium sulphate | According to AASHTO –T104, maximum 12% |
| Percentage of loss by abrasion test Los Anglos Machine | 5% |
| Absorption ratio after 24 hours of immersion in water | % 10 maximum |
| Abrasion percentage after 24 hours immersion in water | % 5 maximum |
| Plasticity index | (AASHTO T 90) maximum 6% |
| Sand Equivalent | %30 minimum |
| CBR | 3-meter |