CONTRACT DOCUMENT
FOR
CONSTRUCTION
OF
WATER SUPPLY FACILITIES
IN
NORTH SUMATRA
HEALTH PROMOTION PROJECT
(ASAHAN HEALTH IMPROVEMENT PROJECT)
REPUBLIC OF INDONESIA

水供給施設 設計図書
(工事発注用)

November 1986

JAPAN INTERNATIONAL COOPERATION AGENCY

DRAFT
21 Sept. 1986

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PART VII SPECIFICATIONS - STRUCTURES

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PART I - NOTICE AND INSTRUCTIONS TO THE CONTRACTOR

1.01 DESCRIPTION OF THE WORK

1.01.1 Objectives of Work

This work aims at construction of water supply facilities to improve the health conditions at pilot villages in North Sumatra under the agreement between the Republic of Indonesia and the Government of Japan. On behalf of the Government of Japan, Japan International Cooperation Agency (JICA) execute the work mentioned above. In the execution of the Contract, main features of which are required to fully cooperate and coordinate JICA for his obtaining the intended effects.

1.01.2 Scope of Work

The Contractor shall furnish all machines, labor, equipment and materials required for the execution of the following construction work under the Contract:

Construction Work

Location	Elevated Tank	Pump & Generator	Distribu Pipelines	Stand-pipe	Bathing Room
1) Sub Village No.16 of Simpang Gambus Village	1 tank	1 set	1 L.S.	2 places	2 places
2) Sub Village of Pematang Pao of Ujung Kubu Village	1	1	1	7	1
3) Tinggi Raja Village	1	1	1	2	—
4) Silau Maraja Village	1	1	1	5	1
5) Padang Mahondang Village	1	1	1	10	—
6) Pulau Rakyat Health Center	1	1	1	—	—

1.02 PERFORMANCE PERIOD

All work under this contract shall be completed within ____ days from the date on which the Notice to Proceed is issued.

1.03 CONTRACTOR'S EXAMINATION OF SITES

Before submitting the Proposal, the Contractor shall carefully examine the drawings, specifications and other documents, and he shall visit the work sites, and have a clear understanding of the requirements of the contract regarding the furnishing of materials, equipment and performance of the work.

1.04 PREPARATION AND SUBMISSION OF THE PROPOSAL

1.04.1 General

The Contractor shall prepare the forms furnished. The Contractor shall specify a unit price in figures, and shall also show the product of the respective unit prices and quantities. Forms must be filled out either by typewriter or in ink. The proposal and any communication shall be in the English language.

1.04.2 Submittal of Proposal

The proposal shall consist of the following:

(a) The proposal letter,
(b) Proposed prices including unit prices,
(c) Schedule of work,
(d) Illustrative data on any equipment the Contractor proposes to use on the work,
(e) Fiscal certificate and work permit, and
(f) Certificate of business registration.

1.04.3 Prices

The Contractor shall furnish a price for all work items.

Escalation of prices with respect to labor and materials will not apply to the work covered by this Contract.

1.04.4 Work Schedule

The Contractor shall include with his proposal a detailed program of work to clearly show the schedule the Contractor will adopt to complete the work within the number of calendar days specified herein, after signing of the Contract.

The work schedule will be considered in evaluation of the proposal, and will be binding on the Contractor unless an amended schedule is approved under the procedure specified in Section 4.05.3 "Extension of Time".

1.05 CONTRACT

1.05.1 Performance Bond

The Contractor shall submit to JICA at the time of signing of the agreement, a Faithful Performance Bond in the amount of five percent (5 %) of the total contract price. The bond shall be issued by a Bank acceptable to JICA. (See Section 4.06 "BONDS, INSURANCE AND LEGAL RESPONSIBILITY".)

1.05.2 Value Added Tax

The Contractor shall pay Value Added Tax to the Government of Indonesia according to the Indonesian Law.

1.06 COMMENCEMENT OF WORK

Within seven (7) days after the contract has been executed, JICA will issue a Notice to Proceed, and the Contractor shall commence his work by not later than ten (10) days after receipt of Notice to Proceed.

1.07 PAYMENT

Payment will be made in three times; namely; Advance , Interim and Final.

All payments will be made in Rupiah, Indonesian Currency.

Advance payment (10% of the contract price) will be done before the commencement of the work.

Payments of Interim and Final will be made on the basis of actual work performed in accordance with the unit price included in the proposal.

1.08 LIQUIDATED DAMAGES

Should the Contractor fail to complete the work within the required performance period, without reasonable cause for delay, liquidated damages may be withheld from any outstanding payment in accordance with Section 4.05.4 "Failure to Complete on Time" and 5.02 "Liquidated Damages".

Failure of the Contractor to perform his obligations under the Contract will not be considered a default under the Contract if such failure results from any event of Force Majeure as defined in Section 4.05.9 "Force Majeure".

1.09 WARRANTY

The Contractor shall warrant the work he has performed, for a period of a half (1/2) year starting from the date of completion of the work and acceptance by JICA. When any defects or damages or any like matters occur or are found in this period due to the inadequacy of his workmanship or the materials which he has supplied, he shall restore them to the normal condition at his expense without any delay. Requirements for guarantee bond shall be as set forth in Section 4.06.2 "Warranty" of the Specifications.

PART IV GENERAL CONDITIONS

4.01 DEFINITIONS AND ABBREVIATIONS

4.01.1 JICA

The word "JICA" shall mean Japan International Cooperation Agency and/or the person/s authorized by JICA in order to carry out this work program.

4.01.2 Engineer

The word "Engineer" shall mean the person authorized by JICA to oversee the execution of this contract, acting either directly or through his properly authorized agent/s, each agent acting only within the scope of authority delegated to him. The Engineer will be made known to the Contractor in writing after execution of the Contract and is an engineer(s) of JICA or person(s) or firm appointed by JICA.

4.01.3 Contractor

The word "Contractor" shall mean the party entering into contract with JICA for performance of the work called for in these specifications and shown on the drawings, including his authorized agent(s), supplier(s) and subcontractor(s).

4.01.4 Subcontractor

The word "Subcontractor" shall mean any person, firm or corporation entering into agreement with the Contractor for performance of work of any part of the contractor's obligation under the Contract.

4.01.5 Contract

The word "Contract" shall mean the contract documents and shall include: the written Agreement entered into by JICA and the Contractor for the performance of work described in the Specifications and Drawings; the Notice and Instruction to the Contractor; the Proposal; and all change orders issued by JICA after the Contract is awarded.

4.01.6 Specifications

The word "Specifications" shall mean the General Conditions, the Special Provisions and Specifications together with all addenda and change orders issued with respect thereto.

4.01.7 Drawings

The word "Drawings" or "Contract Drawings" shall mean those drawings accompanying the Specifications which show the location, nature, extent and form of the work together with the applicable details.

4.01.8 Warranty

The word "Warranty" means a written assurance by the Contractor, or his Subcontractor or Agent, for that work done and material furnished by the Contractor found to be damaged or defective or failing to meet the requirement of the Specifications will be repaired or replaced or corrected at his own expense. Unless otherwise specified, a warranty is not secured by a bond or cash deposit.

4.01.9 Abbreviations

Standard abbreviations of the metric system of units will be used according to prevailing engineering usage.

4.02 SPECIFICATIONS, DRAWINGS AND RELATED DATA

4.02.1 Intent of Specifications and Drawings

The intent of the Specifications and Drawings is that the Contractor furnishes labor and which are required to fully complete the work, and sufficiently execute the work.

4.02.2 Specifications and Drawings Complementary

The Specifications and Drawings are complementary and what is called for in one shall be as binding as if called for in both.

4.02.3 Discrepancies in Specifications and Drawings

Any discrepancies, errors or commissions found in the Specifications or Drawings shall be promptly reported to the Engineer, who will issue a correction in writing. The Contractor shall not take advantage of any such discrepancies, errors or commissions, but shall comply with any corrective measures prescribed by the Engineer.

4.02.4 Conflicts between Specifications and Drawings

In case of conflict between the Specifications and Drawings the Special Provisions shall govern over the General Conditions and the General Conditions shall govern over the Drawings.

4.02.5 Shop/Work Drawings

(a) The Contractor shall furnish to the Engineer for review two (2) copies each of any shop/work drawings necessistated in the progress of the work as specified or directed by the Engineer, such drawings shall be submitted along with necessary calculations and specifications for approval by the Engineer.

After receipt of said shop/work drawings, the Engineer will return one copy of each drawing to the Contractor with his comments noted thereon.

(b) If the drawing is returned to the Contractor marked "APPROVED", revision of said drawing will not be required and the Contractor shall immediately submit three (3) additional copies to the Engineer for his records.

(c) If the drawing is returned to the Contractor marked "MAKE CORRECTIONS NOTED" the Contractor shall revise the drawings and submit three (3) additional copies to the Engineer for his records.

(d) If the drawing is returned to the Contractor marked "AMEND AND RE-SUBMIT" or "REJECTED", the Contractor shall revise the drawings and submit two (2) copies of said revised drawings to the Engineer for further review. One copy will be returned to the Contractor with the Engineer's comments noted thereon.

(e) No work shall be commenced on any part of the work for which the shop/work drawing was submitted, before the Engineer has reviewed the shop/work drawings and returned copies to the Contractor marked "APPROVED".

(f) Revisions indicated on shop/work drawings shall be considered as changes necessary to meet the requirement of the Specifications and shall not be taken as the basis of claims for extra work. The Contractor has no claims for extension of time due to any delay resulting from making required revisions to shop/work drawings. The review of said drawings by the Engineer shall apply to the general design only and shall in no way relieve the Contractor of responsibility for errors or omissions contained therein nor shall such review operate to waive or modify any provision or requirement contained in these Contract Specifications.

4.02.6 Reference to Standards or Publications

Reference to any national standard or publication in the Specifications is intended to indicate general configuration, type and quality. Materials may be furnished which meet other internationally accepted standards; provided that overall quality will be at least equal to that required by the standard specified.

4.03 JICA-ENGINEER-CONTRACTOR RELATIONS

4.03.1 Engineer's Authority

The Engineer will be JICA's representative during the contract period and will act as JICA's agent in supervising the work of the Contractor. He shall have the authority to take whatever actions he deems necessary, and decide all questions that may arise, with respect to the following:

(1) Interpretation of Contract Documents.

(2) Approvals of quantity and quality of materials and equipment to be furnished under the Contract.

(3) Inspection and acceptance or rejection of work performed by the Contractor under the Contract.

(4) Certification of progress in connection with payments invoiced by the Contractor.

(5) The Engineer shall have the authority to require additional information from the Contractor to determine any questions relative to the qualifications of the Contractor and his Subcontractors, quality of materials and equipment to be furnished, and origin of goods and services. He may, when appropriate, order such tests as he deems necessary to determine compliance with the Specifications.

4.03.2 Disputes

Any dispute or difference arising out of this Contract or in connection herewith which cannot be settled by direct negotiation between the parties shall be settled by arbitration. Each party shall appoint an arbitrator, and the two arbitrators appointed respectively by the parties shall select a third arbitrator to form a board. The parties hereto agree to accept any arbitral award by the board as final and binding upon them. In the event no decision is made by the board either party reserves the right to bring the dispute into court.

4.03.3 Protests

If the Contractor considers any work demanded of him to be outside the requirements of the Contract, or if he considers any order, instruction or decision of the Engineer or of any inspector to be unfair, he shall immediately upon receipt of such order, instruction, or decision, ask for a written confirmation of the same, whereupon he shall proceed without delay to conform to the order, instruction or decision; but, unless the Contractor finds such order, instruction or decision satisfactory, he shall, within ten (10) calendar days after receipt of the same, file a written protest with

the Engineer, stating clearly and in detail his objection and the reasons therefor. Except for such protests or objections as are made of record in the manner specified and within the time stated herein, the Contractor hereby waives all grounds for protects or objections to the orders, instructions, or decisions of the Engineer and hereby agrees that, as to all matters not included in such protest, the orders, instructions and decisions of the Engineer shall be considered final and bidding.

4.03.4 Assignment Forbidden

(a) The Contractor shall not assign, sublet, sell, transfer, or otherwise dispose of the Contract or any portion thereof, nor of his right, title or interest therein, nor of his obligations hereunder, without prior written consent of JICA.

(b) If the Contractor violates the provisions of the foregoing paragraph, the Contract shall be terminated at the option of JICA. In such event, JICA shall be relieved of all liability and obligations to the Contractor, and to his assignee or transferee, growing out of such termination.

4.03.5 Inspection

(a) JICA has the right to inspect all materials and equipment to be used for the work, and the work being performed by the Contractor under the Contract.

(b) The Contractor shall provide facilities for the inspection of JICA.

(c) The Engineer shall be permitted access to all parts of the work, including plants where materials are fabricated, and he shall be furnished with such materials, information and assistance by the Contractor and his Subcontractors and suppliers as is required to make a complete and detailed inspection.

(d) Except as otherwise provided herein, the cost of inspection by the Engineer will be paid by JICA. All inspection fees imposed by agencies other than those of JICA shall be paid by the Contractor.

(e) The Engineer may make, or have made, such independent tests or inspection as he deems necessary to insure that the work is being accomplished in accordance with the requirement of the Contract. Unless otherwise specified in the Special Provisions, the cost of such testing will be borne by JICA. In the event that such test or inspection reveal non-compliance with the requirement of the Contract, the Contractor shall bear the cost of corrective measures deemed necessary by the Engineer, as well as the cost of subsequent retesting.

(f) The Contractor shall notify the Engineer in advance of any testing carried out by the Contractor's personnel or otherwise, in order to enable the Engineer to witness such test.

4.03.6 Subcontractors

(a) For purposes of this contract, the term Subcontractors will include in its definition, manufacturers and suppliers of goods to be used under the Contract, and all persons or firms rendering services to the Contractor in connection with the Contract. Each Subcontractor shall be fully qualified for the type of work he is to perform.

(b) The Contractor shall be responsible to JICA and the Engineer for the acts and omissions of his Subcontractors and their employees to the same extent that he is responsible for the acts and omissions of his own employees. Nothing contained in this Section shall create any contractual relationship between any subcontractor and JICA or Engineer, or relieve the Contractor of any liability or obligation under the prime contract.

4.03.7 Suspension of Work

(a) The Engineer, acting on behalf of JICA, may be written notice to the Contractor, suspend the work, in whole or in part, at any time during execution of the Contract, in the event of any conditions considered unfaborable for prosecution of the work, or failure of the Contractor to carry out the provisions of the Contract or to provide materials or equipment meeting the requirements of the Specifications, or while investigating any suspected wrong-doing by the Contractor relative to bidding or execution of the Contract. Suspended work shall be resumed by the Contractor within three (3) days of receipt from the Engineer of written notice to proceed.

(b) The Contractor shall have no claim for damages alleged to have been suffered by reason of any suspension of the work without termination of the contract, and he shall receive no additional compensation because of any such suspension.

4.03.8 Termination of Contract by JICA

(a) Contractor Not at Fault

JICA may terminate the Contract upon ten (10) days written notice to the Contractor if it is found that reasons beyond the control of either JICA or the Contractor make it impossible or against JICA's interests to complete the work. In such case, the Contractor shall have no claims against JICA except (1)

for the value of work performed up to the date the Contract is terminated and, (2) for the cost of materials furnished by the Contractor on hand, intransmit, or on definite commitment, as of the date the Contract is terminated. The value of work performed and the cost of goods on hand, in transit or on commitment, as mentioned above, shall be determined by the Engineer in accordance with the procedure prescribed for the making of final estimate and payment as described in Section 4.05.6, "Final Estimate and Payment".

(b) Contractor at Fault

JICA may terminate the contract upon ten (10) days written notice to the Contractor in the event f any default by the Contractor. It shall be considered a default by the Contractor whenever he shall (1) declare bankruptcy, become insolvent, or assign his assets for the benefit of his creditors; (2) disregard or violate substantial provision of the contract documents or Engineer's instructions, or fail to prosecute the work according to the approved progress schedule; or (3) fail to provide materials or equipment meeting the requirements of the Specifications. In the event the contract is terminated in accordance with this subsection, JICA may take possession of all materials on hand or in transit, and may make arrangements for completing the work by whatever means necessary. The cost of completing the work shall be deducted from the balance which would have been due to the Contractor, should the contract not been terminated and the work completed in accordance with the Specifications. If such cost exceeds the balance which would have been due, the Contractor shall pay the excess amount to JICA. If such cost is less than the balance which would have been due, the Contractor shall have no claim to the difference except to such extent as may be necessary, in the opinion of the Engineer, to reimburse the Contractor or the Contractor's sureties for any expense properly incurred for materials, equipment, services and labor devoted to the execution of the work, of which JICA shall have received the benefit.

4.03.09 Termination of Contract by Contractor

The Contractor may terminate the contract upon ten (10 days written notice to JICA, whenever (1) the entire work has been suspended in accordance with Section 4.03.7 for thirty (30) calendar days through no fault or negligence of the Contractor, and notice to resume work or to terminate the Contract has not been received from JICA within this time period; or (2) JICA should fail to pay the Contract any substantial sums due him in accordance with the terms of the Contract and within the time limits prescribed. In the event of such termination, the Contractor shall have no claims specifically enumerated in Section 4.03.8 (a) and determined in accordance with that Section.

4.03.10 Failure to Comply

If the Contractor should refuse or neglect to comply with the provisions of the Contract or the orders of the Engineer, JICA may have such provisions or orders that the work be carried out by others at the expense of the Contractor.

4.04 MATERIALS AND WORKMANSHIP

4.04.1 Quality of Materials

Unless otherwise specified, shown, or permitted by the Engineer, all materials furnished by the Contractor shall be new and of current manufacture. The Engineer may request the Contractor to furnish manufacturer's certificates to this effect.

4.04.2 Damaged Materials

Materials found, upon delivery to the sites, to be damaged in any way by the Contractor shall be promptly replaced or repaired to the satisfaction of JICA.

Final payment under the contract will not be made until the Engineer certifies to JICA that all materials found to have been delivered and installed in damaged condition have been replaced or satisfactorily repaired by the Contractor.

4.04.3 Defective Materials

Inspection of the materials and equipment furnished by the Contractor upon arrival at the sites shall not relieve the Contractor of any of his obligations under the Contract. Even though materials required to be provided under the Contract have been inspected, accepted and estimated for payment, the Contractor shall, at his own expense, replace or repair, to the satisfaction of JICA, any such materials found to be defective or otherwise not to comply with the requirements, up to the end of the guarantee period provided in Section 4.06.2.

4.04.4 Safeguarding of Equipment, Materials and Work

The Contractor shall properly safeguard all equipment, materials and work against loss, damage, malicious mischief or tampering by unauthorized persons, until acceptance of the work by JICA. Locked and covered storage or continuous surveillance by a watchment shall be provided if required to accomplish this purpose.

4.04.5 Title of Materials Found on the Work

JICA reserves the right to retain title to all soils, stone, sand, gravel, artifacts and other materials developed and obtained from the excavation and from other operations connected with the work. Neither the Contractor nor any Subcontractor shall have any right, title, or interest in or to any such materials. The Contractor will be permitted to use in the work, without charge, any such materials which meet the requirements of the Specifications and Drawings.

4.04.6 Preservation of Historical Remains

In the event the evidence of archealogical remains or historical artifacts are encountered in the course of the Contractor's dilling or excavation operations, such drilling or excavating shall be stopped immediately and the Engineer notified.

If it is determined that continuation of the work at the site may result in destruction of historically important evidence, the Engineer may order relocation of the work to another site in accordance with Section 4.05.1 "Change Orders". In any event, the Contractor may claim additional time to complete the work, the extent that work is delayed by such occurrence.

4.04.7 Contractor's Utilities

The Contractor shall make his own arrangements and pay for water, electric power or telephone service to the site, when necessary.

4.04.8 Character of Workmen

None but skilled workmen shall be employed on work requiring special qualifications. When required in writing by the Engineer, the Contractor or any Subcontractor shall remove from the work any person who is, in the opinion of the Engineer, incompetent, disorderly or otherwise unsatisfactory. Such removal shall not be a basis for any claim for damages against JICA.

4.04.9 Rubbish Control

During the progress of the work, the Contractor shall keep the site of the work and other areas used by him clean condition, and free from any accumulation of rubbish.

4.04.10 Dust Control

Whenever the Contractor's operation take place in inhabited areas, he shall all times conduct his work so as to avoid unnecessary dust. He shall provide adequate equipment and water as determined by the Engineer to be necessary for this objective.

4.04.11 Cleaning Up

The Contractor shall promptly remove from the vicinity of the completed work all rubbish, unused materials, forms, equipment and temporary structures used during construction, and shall restore the site to a condition at least as neat as it was prior to the start of work.

4.05 PROGRESS AND PAYMENT

4.05.1 Change Orders

(a) JICA may, as the need arises, order changes in the work through additions, deletions, or modifications, without invalidating the Contract. Such changes will be effected through written change orders delivered to the Contractor, describing the change required in the work, together with any adjustment in contract price or time of completion as hereinafter provided. No such change shall constitute the basis of claims for damage or anticipated profits; however, the Engineer may make reasonable allowance for the value of any work, materials, or equipment furnished and subsequently rendered useless because of such change. Any adjustment in contract price resulting from a change order will be considered in computing subsequent payments due the Contractor. Any work performed in accordance with a change order shall be subject to all provisions of the original contract, and the Contractor's sureties shall be bound thereby to the same degree and under the original contract.

(b) Any adjustment in contract price shall be based on unit price items or additive and deductive items submitted by the Contractor in his original proposal on the work, where such items are applicable.

(c) If the original prices are not applicable, the adjustment in contract price shall be based on a lump sum or unit price agreed upon by JICA and the Contractor prior to executing the change order.

4.05.2 Overtime Work

Except as otherwise provided in this contract, the Contractor shall receive no additional compensation for overtime work, even though such overtime work may be required under emergency.

4.05.3 Extension of Time

(a) The Contractor may be entitled to an extension of contract time (1) if the work has been suspended by JICA, in whole or in part; or (2) where weather or other circumstances occur which delay progress and which is clearly beyond the control of the Contractor; provided that, in either case, the Contractor is not at fault and is not negligent under the terms of the Contract. The extension of time allowed shall be as determined by the Engineer.

(b) To perceive consideration, a request for extension of time must be made in writing to the Engineer starting the reason for said request, and such request must be received by the Engineer within 3 days following the end of the delay causing condition.

4.05.4 Failure to Complete on Time

The Contractor shall pay liquidated damages to JICA in the amount specified in the Special Provisions, if he fails to complete the work within the time agreed upon. The period for which said damages shall be paid shall be the number of calendar days from the agreed date of completion as contained in the Contract, or from the date of termination of any extension of time approved by the Engineer, to the date the Engineer certifies completion of work. JICA may deduct the amount of said damages from any monies due or to become due the Contractor.

4.05.5 Advance Payment

The Contractor is entitled to request the advance payment of an amount ten (10) percent of the contract price subject to approval of JICA. The advance payment may be done prior to or just after the commencement of the work.

The advance payment shall be independent from the commencement of the work, which date is stipulated in Section 1.11 "COMMENCEMENT OF WORK".

4.05.6 Interim Estimate and Payment

(a) The Contractor is entitled to request the interim payment in accordance with the work that has been performed, only once in the course of construction. When the Engineer approves that the Contractor has performed approximately a half (1/2) of the entire

construction work, the Engineer will prepare and certify to JICA, an estimate of the cumulative amount and value of the work performed by the Contractor up to that day. JICA will pay the interim payment to the Contractor within thirty (30) days after receipt of the Engineer's estimate for the interim payment.

(b) The Engineer's estimate of the interim payment due the Contractor will not be required to be made by strict measurement, and an approximate estimate will suffice. The interim payment may be withheld or reduce if, in the Engineer's opinion, the Contractor is not diligently or efficiently endeavoring to comply with the intent of the contract, or if the Contractor fails to pay his labor and material bills as they become due.

(c) The Contractor shall furnish the Engineer promptly, upon request, all information and records necessary to determine the cost of the work for purposes of estimating interim payments, including an itemized statement, in a form satisfactory to the Engineer, of the actual cost of all acceptable materials delivered by the Contractor to the site.

(d) No interim payment shall be construed as an acceptance of the work or of any portion of the work, nor shall the making of such payment preclude the JICA's demanding and recovering from the Contractor such damages as it may sustain by reason of the Contractor's failure to comply with the requirements of the contract.

4.05.7 Final Estimate and Payment

(a) When the Engineer is of the opinion that the Contractor has completely performed all work required under the Contract, he will submit to the Contractor a draft of the final estimate. The Contractor will be expected to submit his written approval of said final estimate within 5 calendar days after receipt, or, in the event the Contractor disagrees with said final estimate, he shall, within said 5-day period, file a written statement of all claims which he intends to present. If the Contractor delays more than 5 calendar days in approving said final estimate or in presenting is own claims, the time for the final payment shall be extended by the period of such delay. Upon receipt by the Engineer of the Contractor's written approval of said final estimate, the Engineer will certify physical completion of the work to JICA and will recommend acceptance of the work.

(b) After acceptance of the work by JICA and 30 calendar days after filling of the Notice of Completion, JICA will pay to the Contractor the amount remaining after deducting all prior payments and all amounts to be kept or retained under the provisions of the Contract.

4.05.8 Final Payment and Termination of JICA's Liability

The acceptance by the Contractor of the final payment referred to in Section 4.05.6, shall serve to release JICA from all claims of and liability to the Contractor for anything done or furnished for, or relating to, the work or for any act or neglect of JICA or of any person relating to or affecting the work, except claims against JICA for the remainder, if any, of the amounts kept or retained under the provisions of Section 4.06.4.

4.05.9 Force Majeure

The Contractor shall promptly notify the Engineer in writing of the occurrence of any event of force majeure.

The term "Force Majeure" as employed herein shall mean strikes, lockouts, wars, blockades, insurrections, riots, epidemics, earthquakes, floods, washouts, explosions, civil disturbance, and any other causes similar to the kind herein enumerated or equivalent forces, not within the control of either JICA or the Contractor and which by the exercise of diligence neither party is able to overcome. During such period, duties and responsibilities of either party are suspended, modified, extended, or terminated, as provided elsewhere in this Contract.

4.06 BONDS, INSURANCE AND LEGAL RESPONSIBILITY

4.06.1 Faithful Performance Bond

The Contractor shall secure with a bank satisfactory to JICA, a bond in the amount of five (5) percent of the contract price to guarantee faithful performance of the Contract.

If, during the life of the faithful performance bond, any of the sureties named in said bond become insufficient in the opinion of JICA, the Contractor may be required to furnish additional sureties within five (5) days of receipt of written order to do so.

If the Contractor should default in performance of the work under the Contract, JICA may undertake to complete the work and the Contractor's surety shall be liable for any costs up to the amount of the bond.

4.06.2 Warranty

The Contractor shall guarantee the entire work constructed by him under the Contract to be free of defects in materials and workmanship for a period of a half (1/2) year following the date of acceptance of the work by JICA, and shall either; (a) furnish a guarantee bond in the amount of ten percent of the contract price or (b) extend the Faithful Performance Bond to remain valid for a half (1/2) year beyond the date of completion of the work and acceptance by JICA.

4.06.3 Unpaid Claims

If, upon or before the completion of the work, or at any time prior to expiration of the period within which claims of any lien may be filed for record, any person claiming to have performed any labor or to have furnished any materials, supplies, or services toward the performance of this Contract, or to have agreed to do so, shall file with JICA a verified statement of such claim stating in general terms the kind of labor and materials, the value of same, and the name of the person to or for whom the same was furnished, together with a statement that the same has not been paid; or if any person shall bring against JICA any action to enforce such claim; JICA will, until the action is settled, withhold from money due the Contractor an amount sufficient to satisfy the decision of the court together with costs.

4.06.4 Insurance

(a) The Contractor shall not commence work under this contract until he has secured all insurance required under the Contract, nor shall allow any Subcontractor to commence work on his subcontract until all similar insurance required of the Subcontractor has been obtained. Insurance shall be obtained from an insurance company or companies satisfactory to JICA. Certificates of insurance in the amounts required shall be furnished to JICA prior to commencement of work, and the insurance shall be maintained continuously during the work of the Contract up to the date of acceptance of the work by JICA.

(b) The Contractor shall maintain public liability and property damage insurance to protect the Contractor, JICA and the Engineer, and their officers, agents and employees, against loss from liability on account of bodily injury, including death resulting therefrom, suffered or alleged to have been suffered by any person or persons, resulting directly or indirectly from the performance of work pertaining to this Contract or any subcontract thereunder; and also to protect said parties against loss from liability for damage to any property resulting directly or indirectly from the performance of work pertaining to this Contract or of

any subcontract thereunder. Said public liability and property damage insurance shall name all of said parties as insured under the policy, and shall be maintained by the Contractor in full force during the entire period of performance under this Contract. The policy also shall obtain a clause stating that the coverage within 10 days written notice to JICA and the Engineer of its intensions to do so. Amounts of public liability and property damage insurance to be maintained by the Contractor shall be as specified in the Special Provisions.

4.06.5 No Personal Liability

The Contractor shall indemnify and save harmless JICA and the Engineer, and their officers, agents and employees, against and from all claims and personal liability arising under the Contract.

4.06.6 Law and Regulations

The Contractor shall observe and comply with all laws and regulations of the Government of Indonesia and all applicable international laws, regulations or agreements. If any discrepancy or inconsistency is discovered in this Contract in relation to any such law, regulation or agreement, the Contractor shall report the same in writing to the Engineer.

The Contractor shall indemnify and save harmless JICA and the Engineer, and their officers, agents and employees, against all claims or liability arising from violations of any such law, regulation or agreement, whether by the Contractor, or by his employee(s) or Subcontractor(s).

4.06.7 Permits and Licenses

Unless otherwise provided in the Special Provisions, the Contractor shall obtain at his own expense all permits and licenses required for prosecution of the work, and shall pay all taxes properly assessed against his equipment or property use in connection with the work.

4.06.8 Patents and Copyrights

The Contractor shall indemnify and save harmless JICA and the Engineer, and their officer(s), agent(s), and employee(s), against all claims or liability arising from the use of any patented or copyrighted design, device, material, or process by the Contractor or any of his Subcontractors in the performance of the work.

4.06.9 Public Safety and Convenience

(a) The Contractor shall at all times conduct his work so as to insure the least possible obstruction to traffic and inconvenience to the public, and adequate protection of persons and property in the vicinity of the work. No street shall be closed to the public without first obtaining permission of the Engineer and appropriate governmental authority. Where excavation is being performed in primary streets or highways, one lane in each direction shall be kept open to traffic at all times unless otherwise provided or shown. The boards shall be provided to retain excavated material if required by the Engineer or the agency having jurisdiction over the street or highway. Fire hydrants on or adjacent to the work shall be kept accessible to fire-fighting equipment at all times. Temporary provisions shall be made by the Contractor to insure the use of sidewalks and the proper functioning of all gutters, sewer inlets, and other drainage facilities.

(b) The Contractor shall provide adequate barricades, signs, warning lights, watchment, and flagmen as required, in the opinion of the Engineer and the agency having jurisdiction, to protect the work and the safety of the public. Warning lights using inflammable liquids will not be permitted; only electrically-operated warning lights will be approved for use. Warning lights shall be kept burning from sunset to sunrise, and barricades shall be painted to increase their visibility at night.

4.06.10 Publicity

Neither the Contractor nor his Subcontractor(s) shall issue any information, publication, document or article for publication, in any media which includes technical details of the work under the Contract without prior approval of the Engineer.

The Contractor shall ensure that all his Subcontractor(s) comply with this requirement.

PART V SPECIAL PROVISIONS

5.01 GENERAL

The Contractor shall furnish all materials, equipment, labor, transportation, and power and provide all services for the complete construction of six deep wells in North Sumatra in accordance with the Drawings and these Specifications.

All materials supplied by the Contractor shall be new, of current manufacture and of best quality, and shall be approved by the Engineer.

5.02 LIQUIDATED DAMAGES

The Contractor shall pay liquidated damages in an amount of two-tenths of one per cent (0.2%) of the contract price per day, up to a maximum of five per cent of the total contract price, for each day that the Contractor exceeds the agreed-upon time schedule as specified in the Contract.

5.03 PROGRESS SCHEDULES

The Contractor shall submit progress schedules showing the order in which he proposes to carry on the work and the dates when the various parts are to be begun and completed. Progress schedules shall be subject to the approval of the Engineer and if in his opinion a schedule submitted is inadequate to secure the completion of the work in the time agreed upon, or is otherwise not in accordance with the Specifications, he may require the Contractor to submit a new schedule which will insure timely completion of the work.

5.04 BREAKDOWN OF CONTRACT PRICE

Prior to the commencement of the work, if requested by the Engineer, the Contractor shall submit a detailed price breakdown of all lump sum bid items for the work. Such price breakdown shall include quantities, unit prices, and any other information required, in sufficient detail to enable it to be used by the Engineer in preparing progress estimates and evaluating requests for payment. The amounts shall represent a true breakdown of the bid price for each lump sum item. An unbalanced breakdown will not be acceptable. The total amount must equal the bid price shown on the bidding schedule.

5.05 CONTRACTOR'S SUPERRINTENDENCE

A qualified English speaking superintendent, acceptable to the Engineer, shall superintend the work and shall be provide competent supervision of the work until its completion. The superintendent shall be approved by the Engineer prior to his being appointed and shall not be removed from the project without the prior written consent of the Engineer. The superintendent shall have full authority to act in behalf of the Contractor, and all directions given by the Engineer to the superintendent shall be considered given to the Contractor. If the superintendent is not present on a part of the work where the Engineer desires to give instructions, such instructions may be given by the Engineer to the foreman in charge of the particular work to which the instructions apply. Such instructions given to a foreman likewise shall be considered given to the Contractor. Such instructions given by the Engineer to the superintendent or to a foreman, when they concern items of substantial importance, will be confirmed in writing. All instructions and directions given by the Engineer will be limited to matter properly falling within the Engineer's authority.

5.06 RECORDS AND REPORTING

The Contractor shall at all times keep complete and accurate records in accordance with sound engineering practice and to the satisfaction of the Engineer. All records relating to the work shall be available to the Engineer at all times. In addition, a copy of the Drawings and Specifications shall be kept at the work site at all times.

After completion of all work the Contractor shall submit completion drawings which shall clearly indicate all major and minor changes in the well drilling work. The Contractor shall report the daily progress of the work to the Engineer. The report shall include the quantities of materials delivered to the site and used, labor and work, and also the cumulative totals, respectively. Three copies of the daily report shall be made daily; the copies shall be submitted to the Engineer and one kept at the work site.

5.07 LANGUAGE

All correspondence shall be made in English including the reports stipulated in the previous chapter.

5.08 WAYLEAVE

Wayleave required by the Contractor in connection with access to the site shall be provided by him at his own expense.

5.09 COORDINATION OF WORK

At the commencement of work, and from time to time, the Contractor shall confer with the Subcontractor(s), persons engaged on separate contracts in connection with the work, and with the Engineer, for the purpose of coordination and execution of the various phases of the work.

5.10 PROTECTION OF EXISTING STRUCTURES

Trees, shrubbery, fences, poles, and all other property and surface structures shall be protected unless their removal is authorized by the Engineer. When it is necessary to cut roots and tree branches, such cutting shall be done under the approval or the supervision of the Engineer.

Temporary support, adequate protection, and maintenance of all underground and surface structures, drains, sewers, and other obstructions encountered in the progress of the work shall be furnished by the Contractor at his expense and under the direction of the Engineer.

If any trees, shrubbery, fences, sidewalks, curbing, gutters, poles, or other property and surface or subsurface structures have been damaged, removed, or disturbed by the Contractor, whether deliberately or thorough failure to carry out the requirement of the Contract Documents, governmental regulations, or the directions of the Engineer, or thorough failure to employ usual and reasonable safeguards, such property and structures shall be replaced or repaired at the expense of the Contractor.

5.11 CLEAN UP

Upon completion of the work, the Contractor shall remove from the site all rubbish, unused materials, concrete forms, equipment, and temporary structures used during construction.

5.12 TERMINATION OF CONTRACT DUE TO EXCESS DELAY

In the event that work behind schedule reaches twenty percent (20 %) of the contract period, the Contract may be subject to termination with no additional payment to be made to the Contractor.

PART VI SPECIFICATIONS -- MECHANICAL & ELECTRICAL EQUIPMENT

6.01 Deep Well Pump

The contractor shall furnish a deep well pump as specified hereinafter and install as shown on the Drawings.

Requirements

Type	: Submersible motor pump for deep well
Number	: 1 unit
Nominal Diameter of Pump Delivery	: 40 A
Capacity	: 0.15 m^3/min
Head	: Approx. 15 m
Pump Speed	: 3000 rpm
Motor Output	: 1.5 KW (Single phase, 220V, 50Hz, direct start)

Construction and Materials

The pump shall conform to the requirements of JIS B 8324 " Submersible Motor-Pumps for Deep Well " or other requirement acceptable to the Engineer.
Major materials of the pump shall be as follow :

Bowl	: Cast iron
Impeller	: Cast-bronze or Stainless Steel
Shaft	: Stainless Steel
Motor Casing	: Steel

Riser pipes, which convey pump discharge to ground level and support the pump, shall be steel pipes with threaded sleeve couplings or flange couplings.
A discharge elbow , which is used to connect the riser pipes to valves and system pipings, shall be of surface plate type with flanged elbow. The discharge elbow shall be equipped with a compound gauge and an automatic air vent valve.
The flange on suction piping side and check valve side shall conform to JIS B 8324 and JIS 10 Kg/cm^2, respectively.

Accessories

The contractor shall provide the following accessories and spare parts.

- Automatic air vent valve	1 set
- Pressure gauge, connection pipe and cock	1 set
- Companion flange	1 set
- Well cover with discharge elbow	1 set
- anchor bolts and nuts for well cover	1 set
- Check valve (40^A) (JIS B 2045, 10 Kg/cm^2 Cast Iron Flanged Swing Check Valves or equivalent)	1 set
- Gate valve (40^A) (JIS B 2044 10 Kg/cm^2 Cast Iron Flanged Gate Valves or equivalent)	1 set
0 - Power Cable (Size ... mm^2 x ... m)	1 lot
0 - Riser pipe (40^A x ... m)	1 lot
- Other necessary appurtenances	complete

6.01 Lifting Pump

Requirements

Type	: Horizontal, end suction top vertical discharge, centrifugal pump, directly coupled with a motor
Number	: 1 unit
Nominal Diameter of Pump Suction & Delivery	: 40^A
Capacity	: 0.15 m^3/min
Head	: Approx. 15^m
Pump Speed	: 1500 rpm
Motor Output	: $1,5^{KW}$ (Single phase, 220V, 50Hz direct start).

Construction and Materials

Major materials of the pump shall be as follows :

Casing : Grey iron casting

Impeller : Grey iron casting

Shaft : Stainless steel

And easily removable gland shall be provided for the stuffing box. The flange on suction and delivery side of the pump shall conform to JIS 10 Kg/cm^2.

Accessories

The contractor shall provide the following accessories and spare parts.

- Common base with foundation bolts and nuts	1 set
- Shaft coupling with safety guard	1 set
- Companion flange	1 set
- Air cock and drain plug	1 set/each
- Float valve	1 set
- Pressure gauge, connection pipe and cock	1 set
- Check valve (40^A) (JIS B 2045, 10 Kg/cm^2 Cast Iron Flanged Swing Check Valves or equivalent)	1 set
- Gate valve (40^A) (JIS B 2044, 10 Kg/cm^2 Cast Iron Flanged Gate Valves or equivalent)	1 set
- Gland packing	10 sets

603 Engine-Driven AC Generator

The contractor shall furnish a engine-driven AC generator as specified hereinafter and install as shown on the Drawings.

Requirements

(1) AC Generator

Type	: Revolving-field, protection type AC synchronous generator
Continuous Rating	: 3.0 KVA (Approx 2.4 KW) 5.2 KVA (Approx 4.4 KW)
Frequency	: 50 Hz
Rated Voltage	: 220 V
Phase	: Single phase (two (2) wires)
Power factor	: 1.0
Insulation	: F class
Cooling System	: Self-ventilation
Number	: 1 unit

(2) Diesel Engine

Type	: Four (4) cycle, horizontal diesel engine
Rating Output	: 4 PS/1500 rpm 8 PS/1500 rpm
No. of Cylinder	: 1
Cooling System	: Water cooling by radiator with fan
Starting System	: Hand
Fuel Tank Capasity	: Approx 10.5 l Approx 18.2 l
Fuel Consumption	: Approx 1 l/hr Approx 2 l/hr
Lubrication System	: Forced lubrication with trochoid pump
Number	: 1 unit

Construction and Materials

The generator set shall be designed manufactured and tested in accordance with the latest standards of JIS C 4004, JEC 114 and JEM 1398.

JIS : Japan Industrial Standard
JEC : Standards of the Japanese Electrotechnical commitee.
JEM : Standards of the Japan Electrical Manufacturers Association.

The generator set shall be equipped with an automatic voltage regulator, which will hold the voltage withim 5% and be equipped with AC voltmeter, circuit breaker, pilot lamp and other articles required.

The engine shall be a standard production model except as modified by these specifications, of proven ability. The engine and the generator shall be coupled by flat pulleys and belts.

Accessories

The Contractor shall provide the following accessories and spare parts.

(1) For the generator

- Foundation bolts and nuts	1 set
- Flat pulley	1 set
- Other necessary appurtenances	complete

(2) For the engine

- Fuel filter	1 set
- Maintenance & inspection tools	1 set
- Starting handle	1 set
- FO tank, complete	1 set
- Air cleaner with filer elements	1 set
-Exhaust silencer, complete	1 set
- V-belt for radiator fan	1 set
- Bolts and washer for stab shaft	1 set
- Stab shaft, complete	1 set
- Flat pulley with belts	1 set
- Foundation bolts and nuts	complete
- End nut spanner for flywheel	1 set
- Removing tool for flywheel	1 set
- Valve lapping tool and compound	1 set
- Removing tool for cylinder liner	1 set
- Inserting tool for piston	1 set

- Thickness gauge		1 set
- Gasket for cylinder head	(spare part)	1 unit
- Compression ring (top)	(- ditto)	1 unit
- Compression ring (second,third)	(- ditto)	1 each
- Oil scraping ring	(- ditto)	1 unit
- Needle valve & case	(- ditto)	1 set
- V - belt for radiator fan	(- ditto)	1 set
- Other necessary appurtenances		complete.

16.04 Electrical Work (Except Site No. 6)

The contractor shall furnish a pump control box as specified hereinafter and install with required wirings as shown on the Drawings.

Pump Control Box

Type : Wall-mounted type

Number : 1 set

Mounted Equipment :

- Residual current operated circuit breaker	1 set
- ON - OFF Switch	1 set
- Thermal relay	1 set
- Ammeter	1 piece
- Internal wiring and terminals	1 lot
- Other necessary articles	complete

Wirings

Conductor of wires and cables shall be larger than 2.0 sq mm. All wires and cables shall conform to the latest applicable JEC - 228, JIC C 3307, 3041, 3605 or equivalent. The power cables shall have sufficient cress sections for load current, interrupting current and lealeast voltage drop.

Site No. 6

Pulau Rakyat Health Center

6.05 Electrical Work

The contractor shall furnish a pump control box a receiving board, a change over switch board as specified hereinafter and install with required wirings as shown on the Drawings.

1. Pump Control box

Type : Wall-mounted type

Number : 1 set

Monted equipment:

- Residual current operated circuit breaker	1 set
- ON - OFF Switch	1 piece
- Thermal relay	1 set
- Ammeter	1 piece
- Internal wiring and terminals	1 lot
- Other necessary articles	complete

2. Reciving Board

Type : Wall-mounted type

Number : 1 set

Mounted equipment :

- Watt/Hour meter	1 piece
- Mold case circuit breaker	1 set
- Internal wiring and terminals	1 lot
- Other necessary articles	complete

3. Change over switch board

Type : Wall-mounted type

Number : 1 set

Mounted equipment :

- Change over switch	1 set
- Internal wiring and terminals	1 lot
- Other necessary articles	complete

4. Wirings

Conductor of wires and cables shall be larger than 2.0 sq mm. All wires and cables shall conform to the latest applicable JEC-228, JIS C 3307, 3401, 3605 or equivalent.

The power cables shall have sufficient cross sections for load current, interrupting current and least voltage drop.

PART VII SPECIFICATIONS - STRUCTURES

7.01 EARTHWORK

7.01.1 Excavation

The Contractor shall perform all earthwork required for construction of the work as specified and/or directed by the Engineer.

Except when specifically provided to the contrary, excavation shall include the removal of all materials of whatever nature encountered, including all obstructions of any nature that would interfere with the proper execution and completion of the work. The removal of said materials shall conform to the lines and grades approved by the Engineer. Unless otherwise provided, the entire construction site shall be stripped of all vegetation and debris, and such material shall be removed from the site prior to performing any excavation or placing any fill. If excavation is carried out preparatory to construction of a structure which will be covered by an earth fill, the top 60 cm of excavated material, after stripping, shall be stockpiled for that purpose.

The Contractor shall furnish, place, and maintain all supports and shoring that may be required for the sides of the excavations, and all pumping, ditching, or other approved measures for the removal or exclusion of water, including taking care of storm water and waste water reaching the site of the work from any source so as to prevent damage to the work or adjoining property.

Excavations shall be sloped or otherwise supported in a safe manner, as approved by the Engineer.

7.01.2 Disposal of Excess Excavated Material

The Contractor shall remove and dispose of all excess excavated material at his own expense.

7.01.3 Backfill

Backfill shall not be dropped directly upon any structure.

Materials used for backfill shall be selected material, free from grass, roots, brush, or other vegetation, or boulders having maximum dimension larger than 15 cm. Material coming within 15 cm of any structure shall be free of rocks or unbroken masses of earthy materials having maximum dimension larger than 75 mm. Backfill shall not be placed around

or upon any structure until the concrete has attained sufficient strength to withstand the loads imposed. Backfill around water retaining structures shall not be placed until the structures have been tested, and the structures shall be full of water while backfill is being placed.

Except where otherwise specified for a particular structure or ordered by the Engineer, backfill placed around and beneath structures, and beneath paved areas, shall be placed in horizontal layers not exceeding 15 cm in thickness before compaction, and compaction shall be attained by means of hand-operated power-driven tampers. The backfill shall be brought up evenly with each layer moistened and compacted by mechanical means to 95 per cent of maximum density beneath structures, and 90 per cent of maximum density around the sides of structures and beneath paved areas.

The remainder of the backfill shall be selected material obtained from the excavation and shall be placed in horizontal layers. Each layer shall be moistened, tamped, puddled, rolled, or otherwise compacted to 95 per cent of maximum density where the trench is located under structures, and 90 per cent of maximum density elsewhere. If the backfill material is sandy or granular in nature and the trench is not located under a structure, the layer construction may be eliminated, and compaction may be obtained by flooding and jetting. If flooding and jetting is permitted, the remaining backfill shall be placed in layers not exceeding one meter in thickness. Each layer shall be flooded, jetted and poled to secure complete saturation of the material before placing the next layer.

7.02 CONCRETE

7.02.1 Scope

The Contractor shall furnish all materials for concrete and shall form, mix, place, cure, repair, finish and do all other work incidental to the construction of all concrete as shown.

7.02.2 Standards

All materials and construction, unless otherwise specified, shall conform to the latest revisions of the following standards:

(a) Peraturan Bangunan Nasional dan Pelengkap (Regulation of National Building and Completion)

(b) Undang[2] dan Peraturan[2] Pemerintah Dibidang Perumahan (Government Regulations and Laws for Housing)

(c) Peraturan Umum untuk Bahan Bangunan, NI-3 (General Conditions for Building Materials)

(d) Peraturan Beton Bertulang Indonesia, PBI, 1971-NI 2 (Indonesian Reinforced Concrete Code)

Where the local codes listed above do not have applicable provisions, construction shall be in accordance with the 1973 Edition of the Uniform Building Code published by the International Conference of Building Officials.

7.02.3 Proportioning

Concrete shall be composed of cement, admixtures, aggregates, and water. These materials shall be of the qualities specified. The exact proportions in which these materials are to be used for different parts of the work shall be determined by the Contractor and submitted to the Engineer for review prior to use in the work. In general, the mixing shall be designed to produce a concrete capable of being deposited so as to obtain maximum density and minimum shrinkage and, where deposited in forms, to have maximum smoothness of surface. Mix designs with more than 41 per cent of sand of the total weight of fine and coarse aggregate shall not be permitted. The proportions shall be changed whenever necessary or desirable in the opinion of the Engineer.

7.02.4 Water-Cement Ratio and Compressive Strength

The minimum compressive strength and cement content of concrete shall be not less than that shown in the following tabulation. The Engineer may order the cement content for any class of concrete to be increased over the quantity specified in the tabulation if he determines that such increase is necessary to attain the required strength. Such increased quantities of cement, if so ordered, shall be furnished by the Contractor at no additional cost to JICA. The maximum water-cement (W/C) ratio shall be 55 liters of water per 100 kg of cement.

Class of Concrete Min 28-Day Compr. Strength (kg/cm2)	Type of Work	Max. Size of Aggregate (mm)	Min. Cement per m^3 (kg)
250	Reservoir walls, column & floors, All other structures	40	375
200	Thrust blocks, Pipe encasement, Concrete backfill	40	340

The determination of compressive strength in kg/cm2 will be made by testing 15 cm diameter by 30 cm length cylinders, made and cured in accordance with the "Method of Making and Curing Concrete Specimens" (JIS A1132-1976) or the "Method of Test for Compressive Strength of Concrete" (JIS A1108-1976). Two concrete test cylinders shall be made for every 40 cubic meters or each class of concrete placed. One cylinder shall be tested at 7 days and one at 28 days. Test reports shall be submitted to the Engineer in duplicate. Any time the concrete strength at 7 days is below 70 per cent of 28 day strength the Engineer may order additional cement added to the mix immediately. The mixes used may also be changed whenever, in the opinion of the Engineer, such change in necessary or desirable to secure the required workability, density, impermeability, surface finish and strength, and the Contractor shall be entitled to no additional compensation because of such changes. The Contractor shall pay all costs for testing of the cylinders at the rate of two tests (one 7 day and one 28 day) for each 40 m^3 of each class of concrete placed. Tests required in excess of this number shall be paid as an extra to the Contract.

7.02.5 Materials

All cement used on the work shall be standard brand portland cement from an approved source conforming to the requirements of portland cement class I-2475 (PBI, 1971-NI2). A single brand of cement shall be used throughout the work. The cement shall be suitably protected from exposure to moisture until used. Cement that has become lumpy shall not be used. Sacked cement shall be stores in such a manner to permit access for inspection and sampling.

Aggregates shall be hard, durable and clean and shall not contain deleterious materials in such form or quantity as to adversely affect the strength of concrete. Aggregates shall comply with the requirements of Section 3, PBI, 1971-NI2 except maximum size of coarse aggregate shall be as specified in Subsection 7.02.

Water shall be clean and free from objectionable quantities of organic matter, alkali, salts and other impurities.

7.02.6 Admixture

At the Contractor's option, or at the request of the Engineer, but in either case at the expense of the Contractor, an admixture may be added to the concrete to control the set, effect water reduction and increase workability. Such admixture may be either a hydroxylated carboxylic acid type or a lignin-sulfonate type, but shall contain no calcium chloride. The admixture shall conform to "Chemical Admixtures for Concrete" (ASTM C494). The required quantities of cement shall be used in the mix regardless of whether or not any admixture is used. The quantity of admixture used and the method of mixing shall be in accordance with the manufacturer's instructions. The use of calcium chloride in concrete is not permitted.

7.02.7 Consistency

The quantity of water entering into a batch of concrete shall be just sufficient, with a normal mixing period, to produce concrete which, in the judgment of the Engineer, can be worked properly into place without segregation, and which can be compacted by the vibratory methods herein specified to give the desired density, impermeability and smoothness of surface. The quantity of water shall be changed as necessary, with variations in the nature or moisture content of the aggregates, to maintain uniform production of a desired consistency. The consistency of the concrete in successive batches shall be determined by the "Method of Test for Slump of Concrete" (JIS 1101-1975) or "Test for Slump of Portland Cement Concrete" (PBI, 1971-NI2). The slumps to be used will be determined by the Engineer for the various parts of the work, but in general they shall be as follows:

PART OF WORK	SLUMP MAX (cm)	SLUMP MIN (cm)
Footings and slabs	7.5	5.0
Other works	10.0	5.0

7.02.8 Mix Design

The Contractor shall submit to an independent laboratory, approved by the Engineer, samples of coarse and fine aggregate and cement proposed to be used in the work. From analyses and tests of the samples furnished the laboratory shall design a concrete mix to meet each of the strength requirements and slumps specified. The laboratory shall also prepare two (2) test cylinders of each design mix from the samples furnished and test one at 7 days and one at 28 days as described in section 7.02.3. Three (3) copies of test results and mix designs shall be submitted to the Engineer for approval prior to placing any concrete. All costs for furnishing samples, mix design and testing shall be at the expense of the Contractor.

7.02.9 Measurement

The amount of cement and of each separate size of aggregate entering into each batch of concrete shall be determined by direct weighing equipment furnished by the Contractor and approved by the Engineer.

The quantity of water entering the mixer shall be measured by a suitable water meter or other measuring device of a type approved by the Engineer and capable of measuring the water in variable amounts within a tolerance of one per cent. The water feed control mechanism shall be capable of being locked in position so as to deliver constantly any specified amount of water to each batch of concrete.

7.02.10 Forms

Forms to confine the concrete and shape it to the required lines shall be used wherever necessary. The Contractor shall assume full responsibility for the adequate design of all forms. However, any forms which in the opinion of the Engineer are unsafe or inadequate in any respect may at any time be condemned by the Engineer, and the Contractor shall promptly

replace the condemned forms at his own expense. A sufficient number of forms of each kind shall be provided to permit the required rate of progress to be maintained. Whenever, in the opinion of the Engineer, additional forms are necessary to maintain the progress schedule, such additional forms shall be provided by the Contractor at his own expense. The design and inspection of concrete forms, falsework and shoring shall comply with the applicable standards of section 7.02.

All lumber brought on the job site for use as forms, shoring, or bracing shall be new material. All forms shall be smooth surface forms and shall be of good quality timber boards or plywood as approved by the Engineer.

All forms shall be true in every respect to the required shape and size, shall conform to the established alignment and grade, and shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete. When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete. Pipe stubs and anchor bolts shall be set in the forms where required.

Unless otherwise shown, exterior corners in concrete members shall be provided with 20 mm chamfers. Reentrant corners in concrete members shall not have fillets unless otherwise shown. Form ties with integral water stops shall be provided with a cork or other suitable means for forming a conical hole to insure that the form tie may be broken off back of the face of the concrete.

Forms shall be maintained at all times in good condition, particularly as to size, shape, strength, rigidity, tightness and smoothness of surface. Forms, when in place, shall conform to the established alignment and grades. Before concrete is placed, the forms shall be thoroughly cleaned. The forms' surfaces shall be treated with a non-staining mineral oil or other lubricant approved by the Engineer.

Directions of the Engineer concerning the removal of forms shall be strictly followed, and this work shall be done with care so as to avoid injury to the concrete. No heavy loading on green concrete will be permitted. In the case of roof slabs and above-ground floor slabs, forms shall remain in place until test cylinders for the roof concrete attain a minimum compressive strength of 75 per cent of the 28-day strength specified in section 7.02.4.

7.02.11 Preparation of Surfaces for Concreting

Earth surfaces shall be thoroughly wetted by sprinkling, prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud, and debris at the time of placing concrete. A surface consisting largely of coarse aggregate shall be avoided. The joint surfaces shall be cleaned of all laitance, loose or defective concrete, and foreign material. Such cleaning shall be accomplished by sandblasting followed by thorough washing. All pools of water shall be removed from the surface of construction joints before the new concrete is placed.

7.02.12 Mixing

The cement, sand, and coarse aggregate shall be so mixed and the quantity of water added shall be such as to produce a homogenous mass of uniform consistency. Dirt and other undesirable substances shall be carefully excluded. All concrete shall be thoroughly mixed in a batch mixer of an approved type and size, so designed to positively insure a uniform distribution of all of the component materials throughout the mass during the mixing operation. Only sufficient water shall be used in mixing to give a workable mix, conforming to the consistency requirements of section 7.02.7. The mixing of each batch shall continue not less than 1-1/2 min after all materials, including water, are in the mixer, during which time the mixer shall rotate at the speed for which it has been designed or at such speed as will produce a mass of uniform consistency at the end of the mixing period. Wherever necessary to secure proper results, the concrete shall be mixed for a longer period than herein specified, but overmixing of concrete or overloading of mixers shall not be permitted. A batch timer and counter, including lock release, and audible indicator shall be installed and used on each concrete mixer.

7.02.13 Placing Concrete in Hot Weather

Care shall be taken to prevent rapid drying of newly placed concrete. When the ambient temperature in the forms is more than 32°C or when so directed, the temperature of the concrete as placed shall not exceed 32°C. The fresh concrete shall be shaded as soon as possible after placing and curing started as soon as the surface of fresh concrete is sufficiently hard. Concrete placement will not be permitted, if in the opinion of the Engineer, the Contractor does not have proper facilities available for placing, curing, and finishing the concrete in accordance with the Specifications.

The order of placing concrete in all parts of the work shall be subject to the approval of the Engineer.

7.02.14 Tamping and Vibrating

As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted, throughout the entire depth of the layer which is being consolidated, into a dense, homogenous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete during placement. The concrete shall be carefully worked by rodding and vibrating to make sure that all air and rock pockets have been eliminated. Concrete in walls shall be internally vibrated and at the same time rammed, stirred, or worked with suitable appliances, tamping bars, shovels, or forked tools until it completely fills the forms or excavations and closes snugly against all surfaces. Subsequent layers of concrete shall not be placed until the layers previously placed have been worked thoroughly as specified.

The Contractor shall use internally vibrated, high speed power vibrators of an approved immersion type in sufficient numbers, with standby units as required, to accomplish the results herein specified within 15 minutes after concrete of the prescribed consistency is placed in the forms. The vibrating head shall be kept from contact with the surfaces of the forms. Care shall be taken not to vibrate concrete excessively or to work it in any manner that causes segregation of its constituents or tends to bring an excessive amount of water to the surface.

7.02.15 Curing and Waterproofing

All concrete shall be cured for not less than 14 days after placing, in accordance with the methods specified herein for the different parts of the work, and described in detail in the following subsections.

Surface to be cured or waterproofed:	Method
Unstripped wooden forms	1
All concrete surfaces not specifically provided for elsewhere in this subsection	4
Floor slabs in hydraulic structures and exterior surfaces of exposed roof slabs	5

Method 1: Wooden forms shall be wetted immediately after concrete has been poured and shall be kept wet with water until removed. If forms are removed within 14 days of placing the concrete, curing shall be continued in accordance with the applicable method.

Method 2: DELETED

Method 3: DELETED

Method 4: The surface shall be sprayed with a liquid curing compound which will not affect the bond of paint to the concrete surface. It shall be applied in accordance with the manufacturer's instructions at a maximum coverage rate of 5 m2/l in such a manner as to cover the surface with a uniform film which will seal thoroughly. The curing compound shall be as approved by the Engineer. Where the curing compound method is used, care shall be exercised to avoid damage to the seal during the curing period. Should the seal be damaged or broken before the expiration of the curing period, the break shall be repaired immediately by the application of additional curing compound over the damaged portion. Wherever curing compound may have been applied by mistake to surfaces against which concrete subsequently is to be placed and to which it is to adhere, said compound shall be entirely removed by wet sandblasting just prior to the placing of new concrete. Where curing compound is specified, it shall be applied within 2 hours after completion of the finish on unformed surfaces, and within 2 hours after removal of forms on formed surfaces. Repairs required to be made to formed surfaces shall be made within the said 2-hour period; provided, however, that any such repairs which cannot be made within the said 2-hour period shall be delayed until after the curing compound has been applied. When repairs are to be made to an area on which curing compound has been applied, the area involved shall first be wet-sandblasted to remove the curing compound, following which repairs shall be made as provided under subsection.

Method 5: Immediately after the concrete has been troweled, it shall be given a coat of curing compound herein. Not less than one hour nor more than 4 hours after the coat of curing compound has been applied, the surface shall be wetted with water delivered through a fog nozzle, and concrete-curing blankets shall be placed on the

slabs. The curing blankets shall consist of one of the following two types:

(a) Sheets of heavy, water proof paper laid with the edges butted together and with the joints between strips sealed with 5 cm wide strips of sealing tape or with the edges lapped not less than 7-1/2 mm and fastened together with a waterproof cement to form a continuous watertight joint.

(b) Sheets of clear polyethylene having a thickness of not less than 0.152 mm (6 mils) laid with edges butted together and with the joints between sheets sealed with 25 mm wide strips of acetate tape.

The curing blankets shall be left in place during the 14 day curing period and shall not be removed until after concrete for adjacent work has been placed. Should the curing blankets become torn or otherwise ineffective, the Contractor shall replace damaged sections. During the first 7 days of the curing period, no traffic of any nature and no depositing, temporary or otherwise, of any materials shall be permitted on the curing blankets. During the remainder of the curing period, foot traffic and temporary depositing of materials that impose light pressure will be permitted only on top of plywood sheets 15 mm minimum thickness, laid over the curing blanket.

7.02.16 Care and Repair of Concrete

The Contractor shall protect all concrete against damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by JICA. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed work, or which departs from the established line or grade, or which for any other reason does not conform to the Specifications, shall be satisfactorily repaired or removed and replaced with acceptable concrete at the Contractor's expense.

7.02.17 Finish of Concrete Surfaces

All finished or formed surfaces shall conform accurately to the shape, alignment, grades, and sections as shown on the plans or as prescribed by the Engineer. Surfaces shall be free from fins, bulges, ridges, offsets, honeycombing, or roughness of any kind, and shall present a finished, smooth, continuous, hard surface.

Except as otherwise provided herein, unformed top surfaces of concrete shall be brought to uniform surfaces and worked with suitable tools to a reasonably smooth wood-float finish. Excessive floating of surfaces while the concrete is plastic will not be permitted. All surfaces shall be placed monolithically with the base slab. Dusting of dry cement and sand on the concrete surface to absorb excess moisture will not be permitted. Floor slabs and exposed tops of walls and curbs shall be given a steel trowel finish. At the Contractor's option, the above-mentioned floor slabs may be finished with a power float after screeding. Subsequent to the aforementioned finish, all sloping surfaces of floor slabs shall be lightly broomed to provide a skidresistant surface.

7.02.18 Treatment of Surface Defects

As soon as forms are removed, all exposed surfaces shall be carefully examined and any irregularities shall be immediately rubbed or ground in a satisfactory manner in order to secure a smooth, uniform, and continuous surface. Plastering or coating of surfaces to be smoothed will not be permitted. No repairs shall be made until after inspection by the Engineer, and then only in strict accordanc with his directions. Concrete containing voids, holes, honeycombing, or similar depression defects, shall be completely removed and replaced. All repairs and replacements herein specified shall be promptly executed by the Contractor at his own expense.

Holes left by tie-rod cones shall be reamed with suitable toothed reamers so as to leave the surfaces of the holes clean and rough. These holes then shall be repaired in an approved manner with dry-packed mortar. Holes left by form-tying devices having a rectangular cross-section, and other imperfections having a depth greater than their least surface dimension, shall not be reamed but shall be repaired in an approved manner with dry-packed mortar. All repairs shall be built up and shaped in such a manner that the completed work will conform to the requirements of subsection 7.02.17, using approved methods which will not disturb the bond, cause sagging, or horizontal fractures. Surfaces of said repairs shall receive the same kind and amount of curing treatment as required for

the concrete in the repaired section. Prior to filling any structure with water, any cracks that may have developed shall be "vee'd" and filled with sealant approved by the Engineer.

7.03 REINFORCING STEEL

7.03.1 General

The Contractor shall furnish, fabricate, and install all reinforcement steel shown on the drawings and described in these specifications. The work shall include the installation of all tie wires, clips, supports, and other appurtenances necessary to fulfill the requirements of the Specifications and produce finished concrete structures in accordance with the best engineering practice.

Prior to fabrication of reinforcement steel, the Contractor shall prepare and submit to the Engineer shop bending diagrams, placing lists, and drawings in accordance with section 4.02.5. Approval of shop drawings by the Engineer will be limited to general compliance with the contract drawings. The Contractor shall be fully responsible for accuracy of dimensions and details, and said dimensions and details will be checked in the field by the Engineer at the time of placement.

7.03.2 Materials

Reinforcement steel shall be plain or deformed steel bars with a yield strength of 2,400 kg/cm2 and shall conform to the requirements of PBI, 1971-NI2 or JIS G3112 "Steel Bars for Concrete Reinforcement".

7.03.3 Fabrication

Reinforcement shall be accurately fabricated to the dimensions indicated on the Drawings. Particular care shall be exercised not to have stirrups oversized in order to maintain proper coverage of concrete. Reinforcement shall not be bent or straightened in a manner that will damage the material. The heating of reinforcement for bending will not be permitted. Cold bends or hooks, unless otherwise shown or required, shall be bent around a pin having a diameter not less than 6 bar diameters except for bars larger than 25 mm, in which case the diameter of the pin shall be not less than 8 bar diameters. Stirrups and tie bars shall be bent around a collar having a diameter not less than two and one-half times the minimum thickness of the bar.

7.03.4 Cleaning

Reinforcement steel, before being positioned, shall be free from loose mill and rust scale, and from coatings that may destroy or reduce the bond. Where there is delay in depositing concrete, reinforcement steel shall be reinspected and cleaned when necessary.

7.03.5 Placing

Reinforcement steel shall be accurately positioned in accordance with the Drawings and secured by using annealed iron wire ties or suitable clips at intersections, and shall be supported by concrete or metal supports, spacers, or metal hangers. Metal clips or supports shall not be placed in contact with the forms. Tie wires shall be bent away from the forms in order to provide the specified concrete coverage.

Unless otherwise shown, in addition to normal accessories used to hold reinforcing steel firmly in position, the following shall be added:

(a) In slabs, 13 mm diameter riser bars at 90 cm on centers maximum to support top reinforcing slab.

(b) In walls with two layers of reinforcement 6.5 mm U or Z shape spacers at 180 cm on centers each way.

7.03.6 Concrete Cover

Except as otherwise shown on the drawings, reinforcement shall be installed with clearance for concrete coverage in centimeters as follows:

Concrete places against earth	8
All surfaces in contact with water or soil ..	5
Underside of slab over water in enclosed conduits, and beams and columns not exposed to soil or warer	4
Surfaces exposed to air and all interior surfaces in pipe galleries and dry rooms	2.5

7.03.7 Tolerances

Tolerances in placing reinforcement shall be:

For members 60 cm or less in depth ..... ±0.6 cm

For members more than 60 cm in depth ... ±1.2 cm

7.03.8 Dowels

Dowels shall be of the same size and spacing as bars with which they are lapped. Unless otherwise noted, the lap and embedment shall be 64 bar diameters minimum for each. Dowels shall be wired or otherwise held in position. Dowels shall be installed prior to placing concrete. They shall not be shoved into freshly placed concrete.

7.03.9 Bar Splices

Unless otherwise shown or specified on the Drawings, vertical reinforcing bar splices in columns and all other bar splices shall be lapped 64 bar diameters minimum. The length of the lap splice of bars of different diameters shall be based on the larger diameter. Bar splices may also be made by welding in accordance with the local codes. Where local codes do not have applicable provisions, welding shall be in accordance with the details for reinforcing steel splices and with AWS Specification D12.1.

7.03.10 Approval by Engineer

In no case shall any reinforcing steel be covered by concrete until the amount and position of the reinforcement have been checked by the Engineer and his permission given to proceed with the concreting. The Engineer shall be given ample prior notice of the availability of the set reinforcement for checking.

7.03.11 Straightening

Reinforcing steel shall not be straightened or rebent in a manner that will injure the material. Bars with kinks or bends not shown on the Drawings shall not be used.

7.04 MASONRY WORK

7.04.1 General

Masonry work described in this section includes, but is not limited to, clay brick, concrete block, and ornamental concrete work. The contractor shall submit samples of masonry materials to the Engineer for approval. Samples shall be representative of quality, texture, color and strength of materials to be used in the work.

7.04.2 Materials

All materials shall be of the colors, textures and dimensions shown on the drawings.

(1) CLAY BRICK: All brick shall be first quality, sound, hard, well burnt, true sided and square edged. Dimensions of bricks shall be 5.2 x 11.5 x 24.0 cm conforming to "Batu Merah Sebagai Bahan Bangunan NI-10, Penerbitan Kedua, 1973".

(2) Cement: Portland cement shall conform to the requirements of PBI, 1971-NI2. Masonry cements shall not be used.

(3) Hydrated lime: Lime for masonry mortar shall be hydrated, conforming to ASTM C207 "Hydrated Lime for Masonry Purposes", Type S.

(4) Sand: Sand shall conform to requirements of Fine Aggregate as specified in ASTM C 404, "Aggregate for Masonry Grout".

(5) Water: Water shall be free from injurious amounts of oils, acids, alkalis, organic matter or other deleterious substances.

7.04.3 Mortar Mix

Masonry mortar for setting block and brick shall be in the proportion of 1 part cement to 4.5 parts sand or as otherwise approved by the Engineer. Mortars shall be mixed with water in an amount compatible with workability. Ingredients shall be accurately measured by volume.

Mortar shall be mixed in a mechanically operated mortar mixer for at least three minutes after all ingredients are in the drum, and at least long enough to make a thorough, complete,

intimate mix of the materials. The mixing of mortar by hand will be permitted only when the quality of hand mixing is comparable to mechanical mixing. The Engineer reserves the right to reject hand mixing and require all mixing by mechanical means. Mortar shall not be retained for more than one and a half hours and shall be constantly mixed until used.

Mortar boxes shall be cleaned out at the end of each day and all tools shall be kept clean. Mortar that has begun to set shall not be used.

7.04.4 Installation

All masonry shall be laid plumb and true to lines and built to the thickness and bond required with courses level and joints and bond uniform. Masonry shall be carried up in a uniform manner. No one portion shall be raised more than a meter above adjacent portions, except with the approval of the Engineer.

Solid brick shall be laid in common bond with all joints filled solidly with mortar and backs fully parged to form solid masonry structures. Joints of walls to receive plaster shall be lightly raked to provide a bond for plaster. Solid brick shall be plastered only when so indicated on the Drawings.

7.04.5 Lintels, Ties and Miscellaneous Items

The Contractor shall build in or provide all miscellaneous items to be set in masonry including frames, lintels, reinforcing steel, electrical boxes and fixtures, sleeves, grilles, anchors and other miscellaneous items. All anchorage, attachments, and bonding devices shall be set so as to prevent slippage and shall be completely covered with mortar.

7.04.6 Grouting

Grout and cement mortar for setting structural steel columns, railings, frames in walls and where otherwise required shall be done with mortar as hereinbefore specified. Before placing grout thoroughly clean all surfaces. Grout shall be tamped into place with a blunt tool to fill the entire void. In the event space does not permit tamping, the Contractor shall build the necessary forms and place grout by pouring from one side only. When grout is placed by pouring a head of grout shall be maintained in the form. Grout shall be kept wet for three days and after the temporary supports or adjusting wedges are removed the empty space shall be grouted and the surrounding grout pointed.

7.04.7 Cleaning

Masonry work, to be exposed, shall be thoroughly cleaned. Masonry work may be cleaned using a mild muriatic acid solution.

7.05 PLASTER WORK

7.05.1 General

The work required under this Section shall include all labor, materials, equipment and scaffolding required to complete all plastering indicated on the Drawings or specified herein.

7.05.2 Materials

Sand and cement shall conform to the requirements of PBI 1971-NI2, except that sand shall conform to the following gradation.

SIEVE SIZES	PERCENTAGE PASSING BY WEIGHT
4.75 mm	100
1.18 mm	70 - 100
600 um	35 - 70
300 µm	5 - 35
75 µm	0 - 5

Plaster shall be mixed in the following proportion:

Watertight masonry - 1 part cement : 2 parts sand

Ordinary masonry

Scratch coat - 1 part cement : 2 parts sand

Brown coat } - 1 part cement : 3 parts sand
Finish coat }

7.05.3 Construction

Surfaces that are to receive plaster shall be carefully examined by the Contractor and any unsatisfactory surface shall be repaired as directed by the Engineer.

Scaffolding shall be constructed and maintained in conformance with applicable laws and local ordinances and in such a manner as not to interfere with or obstruct the work of others.

Where finished surfaces such as tile, lighting or other fixtures have been installed prior to plastering they shall be protected from damage during plastering. Protection shall consist of covering with a non-staining kraft paper or polyethylene sheet. Protection shall be removed when plaster work is completed.

Concrete masonry and brick surfaces shall have sufficient roughness to provide proper bond and shall be dampened by brushing or spraying with water followed by plastering. All completed plaster work shall be flat and smooth and any undulating surfaces or cracks shall be repaired as directed by the Engineer. Plastered surfaces shall be shielded from the direct rays of the sun for two days and shall be kept moist but care shall be taken not to wash out cement.

Upon completion of the work, all plaster surfaces shall be cleaned and all rubbish, debris and excess material and equipment shall be removed.

7.05.4 Thickness and Workmanship

All plaster shall be applied according to the following thickness. An additional thiciness will be required to provide for any unevenness in the masonry surface.

	Thickness (mm)			
Location	Scratch Coat	Brown Coat	Finish Coat	Total Thickness
Floor	-	-	30	30
Interior Wall	10	6	4	20
Exterior Wall	10	9	6	25

a) Workmanship

Plaster shall be of three coats; scratch, brown and finish coats. If plaster is to be applied to a smooth cement or other surface which does not offer bonding characteristics for plaster, a dash coat shall be required as a bonding surfaces.

b) Dash Coat

Dash coat shall be of mushy consistency, composed of 1 part of portland cement and 1.5 parts of sand.

Apply the dash coat with a whisk bloom or fiber brush, in a whipping manner. The dash coat shall be kept moist for 48 hours before scratch coat is applied to the dash coat.

c) Scratch Coat

Scratch coat shall cover the full length of the wall or to the border line formed by columns, doors and windows. Before scratch coat hardens scratch the surface of the coat to provide mechanical key for the brown coat. Keep this coat moist for not less than 24 hours and allow it to set for not less than 14 days before applying brown coat.

d) Brown Coat

Before starting to apply the brown coat, dampen the surface of the scratch coat. Brown coat shall be brought to a true and even surface, then roughened with a wood float to provide bond for the finish coat.

e) Finish Coat

Finish coat shall be applied while the brown coat is moist and if brown coat dries out it shall be wetted evenly. Finish coat shall be first floated to a true and even surface, then troweled in a manner that the sand particles are not exposed on the surface and with the final troweling, leave the surface burnished smoothly and free from rough areas, trowel marks, checks, or other blemishes.

f) Plaster Applied to the Floor Slab

Before starting to apply the plaster, dampen the surface of the floor and apply the cement paste with a whisk bloom or fiber brush, to the floor entirely.

The stiff-consistency plaster shall be applied to the floor slab tamping it with wood float until the cement paste squeeze

up through the surface of the plaster and finally troweled to an even surface leaving the surface burnished smoothly and free from trowel marks, checks and other blemishes.

7.06 PRECAST U-SHAPE DRAIN CHANNEL

The Contractor shall supply all labor, materials, equipment and incidentals necessary to furnish and install drain channels of reinforced concrete as shown on the Drawings and specified herein.

The Contractor shall submit shop drawings showing the proposed details of U-shape drain channel including dimensions, reinforcing bars, tie wire details, and details of forms. The Contractor shall not initiate the casting operations until shop drawings have been reviewed and approved by the Engineer.

Concrete and reinforcement shall conform to the provisions of sections 7.02 and 7.03. Forms shall be sturdy, of smooth surface and accurately fabricated. They shall be so designed that all casting produced will be practically identical. The forms shall be carefully cleaned before each use. Placement of concrete in each section shall be continuous until the form is completely filled. Care shall be exercised to ensure that concrete fills all coids in the forms and thoroughly surrounds all reinforcement.

Channels after being cast shall be cured by water or such other method of curing as may be approved by the Engineer, and shall be kept wet for at least 3 days after casting. No section cast shall be removed from the casting yard until the specified cure is completed.

Any precast section which, in the opinion of the Engineer, is damaged beyond satisfactory repair by the Contractor, shall be removed from the site of the work and replaced with an acceptable section.

The edges of channel shall be strictly straight and smooth throughout entire length of the channel.

The thickness of channel wall shall not exceed 8 cm and inner surface of the channel shall be smooth.

7.07 PIPING SYSTEM ATTACHED TO THE STRUCTURES

7.07.1 General

The Contractor shall furnish all labor, equipment and materials necessary to install complete small diameter piping systems as described herein and as shown on the Drawings.

7.07.2 Materials

Pipe materials shall conform to the following requirement and shall be installed where shown on the Drawing:

Water Pipe - "Galvanized Steel Pipes for Water Service" (JIS G3442). Fitting for piping shall be galvanized malleable iron suitable for 7.0 kg/cm2 minimum working pressure.

7.07.3 Valves

Valves shall be furnished by the Contractor. All valves shall be gate valves, unless otherwise specified or indicated by the Engineer. No valve shall be installed on any line with its stem below the horizontal.

7.07.4 Unions

Unions shall be installed in easily accessible locations. Gaskets for flanged unions shall be of the best quality fiber, plastic, or leather. Unions shall not be concealed in walls, ceilings, or partitions.

7.07.5 Faucets

Faucets shall be brass or bronze with 13 mm inlet threads, hexagon shoulder, and shall conform to JIS B 2061 or equivalent.

7.07.6 Steel Pipe Joints

Joints in steel piping may be screwed or flanged, except where flanged joint are indicated on the drawings. Installation of pipe and fittings shall be made in accordance with the manufacturer's recommendations. Mitering of joints for elbows and notching of straight runs of pipe for test will not be permitted. Threaded joints shall have ISO/R7 pipe threads with graphite or inert filler and oil, with an approved

graphite compound, or with polytetrafluoroethylene tape applied to the male threads only. Unions shall be provided where required for disconnection.

7.07.7 Defective Work

If inspection or test shows defects, such defective work or material shall be replaced or repaired as necessary and inspection and tests repeated. Repairs to piping shall be made with new materials. No caulking of screwed joints or holes will be acceptable.

PART VII SPECIFICATIONS - ELEVATED TANKS

- To be Completed -

PART IX SPECIFICATIONS - DISTRIBUTION PIPELINES

- To be Completed -

BILL OF QUANTITIES

PROPOSED / CONTRACT PRICE

No.	Sites	Amount
1)	Construction cost of water supply facilities in Sidpang Gambus Village	Rp. _____
2)	- ditto - Ujiung Kubu Village	Rp. _____
3)	- ditto - Tinggi Raja Village	Rp. _____
4)	- ditto - Silau Maraja Village	Rp. _____
5)	- ditto - Padang Mahondang Village	Rp. _____
6)	- ditto - Pulau Rakyat Health Center	Rp. _____
Total Price (1+2+3+4+5+6)		Rp. _____

Note: Above prices include Value Added Tax (PPN).

Bill of Quantities

1. Construction of Water Supply Facilities in Simpang Gambus Village

Item No.	Work Description	Quantity (Unit)	Unit Price (Rp.)	Amount (Rp.)
1-1.	Elevated Tank			
1-1-1.	Material			
a)	Elevated Tank ($V=5.0^{M^3}$, $H=8.0^{M}$)	1	unit	
b)	Foundation	1	unit	
c)	Inlet Pipe (SGP $10^{kg/cm^2}$) $\phi 40$	15	m	
d)	Outlet Pipe (〃) $\phi 80$	15	m	
e)	Overflow Pipe (〃) $\phi 50$	9	m	
f)	Drain Pipe (〃) $\phi 50$	4	m	
g)	Valves $\phi 80$	1	pc	
h)	〃 $\phi 50$	1	pc	
i)	〃 $\phi 40$	1	pc	
j)	Tower Ladder	9	m	
1-1-2.	Construction and Installation	1	L.S.	
1-2.	Well Pump			
1-2-1.	Pump Equipment ($\phi 40 \times 0.15^{M^3/min} \times 15.0^{M} \times 0.15\,kW$)	1	unit	
1-2-2.	Installation	1	L.S.	
1-3.	Generator			
1-3-1.	Generator Equipment (3.0 kVA × 4PS)	1	unit	
1-3-2.	Installation	1	L.S.	
1-4.	Generator House ($3.0^{M} \times 3.5^{M} \times 3.0^{H}$) including Material and Construction	1	L.S.	

Item No.	Work Description	Quantity (Unit)	Unit Price (Rp.)	Amount (Rp.)
1-5.	Electrical Work including a Pump Control Box and Wirings	1 L.S.		
1-6.	Fence and Gate			
1-6-1.	Fence (H=1.8 m)	40 m		
1-6-2.	Gate (H=1.8 m)	1 set		
1-7.	Pipelaying Works			
1-7-1.	Material			
	a) Pipes VP 10 kg/cm² φ80	5 m		
	" " φ65	30 m		
	" " φ50	73 m		
	" " φ40	428 m		
	b) Fittings	1 L.S.		
	c) Valves φ40	4 pc		
1-7-2.	Installation VP φ80	5 m		
	" φ65	30 m		
	" φ50	73 m		
	" φ40	428 m		
1-8.	Bathing Room including Material and Construction	2 unit		
1-9.	Public Standpipe including Material and Construction (4 taps)	2 unit		
1-10.	Monumental Plate	1 pc		
1-11.	Miscellaneous Works	1 L.S.		
1-12	System Test Operation and Leakage Test	1 L.S.		
	Sub - Total			
1-13.	Tax			
	Total			

2. Construction of Water Supply Facilities in Ujung Kubu Village

Item No.	Work Description	Quantity (Unit)	Unit Price (Rp.)	Amount (Rp.)
2-1.	Elevated Tank			
2-1-1.	Material			
a)	Elevated Tank ($V=6.0^{m^3}$, $H=9.0^{m}$)	1	unit	
b)	Foundation	1	unit	
c)	Inlet Pipe (SGP $10^{kg/cm^2}$) ϕ40	16	m	
d)	Outlet Pipe (〃) ϕ80	16	m	
e)	Overflow Pipe (〃) ϕ50	10	m	
f)	Drain Pipe (〃) ϕ50	4	m	
g)	Valves ϕ80	1	pc	
h)	〃 ϕ50	1	pc	
i)	〃 ϕ40	1	pc	
j)	Tower Ladder	10	m	
2-1-2.	Construction and Installation	1	L.S.	
2-2.	Well Pump			
2-2-1.	Pump Equipment (ϕ40 × 0.15 m^3/min × 27.0 m × 1.5 kW)	1	unit	
2-2-2.	Installation	1	L.S.	
2-3.	Generator			
2-3-1.	Generator Equipment (5.2kVA × 8 PS)	1	unit	
2-3-2.	Installation	1	L.S.	
2-4.	Generator House (3.0 m × 3.5 m × 3.0 m (H)) including Material and Construction	1	L.S.	
2-5.	Electrical Work including a Pump Control Box and Wirings	1	L.S.	
2-6.	Fence and Gate			

Item No.	Work Description	Quantity (Unit)	Unit Price (Rp.)	Amount (Rp.)
2-6-1.	Fence (H=1.8 m)	40 m		
2-6-2.	Gate (H=1.8 m)	1 set		
2-7.	Pipelaying Works			
2-7-1.	Material			
a)	Pipes VP 10 kg/cm² φ80	30 m		
	" " φ65	83 m		
	" " φ50	193 m		
	" " φ40	456 m		
	" " φ32	519 m		
b)	Fittings	1 L.S.		
c)	Valves φ40	1 pc		
	φ32	7 pc		
2-7-2.	Installation VP φ80	30 m		
	" φ65	83 m		
	" φ50	193 m		
	" φ40	456 m		
	" φ32	519 m		
2-8.	Canal Crossing-Work including Material, Air Valve and Construction	1 unit		
2-9.	Bathing Room including Material and Construction	1 unit		
2-10.	Public Standpipe including Material and Construction (2 taps)	7 unit		
2-11.	Monumental Plate	1 pc		
2-12.	Miscellaneous Works	1 L.S.		
2-13.	System Test Operation and Leakage Test	1 L.S.		
	Sub-Total			
2-14.	Tax			
	Total			

3. Construction of Water Supply Facilities in Tinggi Raja Village

Item No.	Work Description	Quantity (Unit)	Unit Price (Rp.)	Amount (Rp.)
3-1.	Elevated Tank			
3-1-1.	Material			
a)	Elevated Tank ($V=4.0^{M^3}$, $H=7.0^{M}$)	1	unit	
b)	Foundation	1	unit	
c)	Inlet Pipe (SGP $10^{kg/cm^2}$) $\phi 32$	14	m	
d)	Outlet Pipe (〃) $\phi 65$	14	m	
e)	Overflow Pipe (〃) $\phi 50$	8	m	
f)	Drain Pipe (〃) $\phi 50$	4	m	
g)	Valves $\phi 65$	1	pc	
h)	〃 $\phi 50$	1	pc	
i)	〃 $\phi 32$	1	pc	
j)	Tower Ladder	8	m	
3-1-2.	Construction and Installation	1	L.S.	
3-2.	Well Pump			
3-2-1.	Pump Equipment ($\phi 32 \times 0.067^{M^3/min} \times 32.0^{M} \times 0.15 kW$)	1	unit	
3-2-2.	Installation	1	L.S.	
3-3.	Generator			
3-3-1.	Generator Equipment (3.0kVA x 4PS)	1	unit	
3-3-2.	Installation	1	L.S.	
3-4.	Generator House ($3.0^{M} \times 3.5^{M} \times 3.0^{H M}$) including Material and Construction	1	L.S.	
3-5.	Electrical Work including a Pump Control Box and Wirings	1	L.S.	
3-6.	Pipelaying Works			

Item No.	Work Description	Quantity (Unit)	Unit Price (Rp.)	Amount (Rp.)
3-6-1.	Material			
a)	Pipes VP 10 kg/cm² Φ65	2 m		
	" " Φ50	44 m		
	" " Φ40	9 m		
	" " Φ32	101 m		
	" " Φ20	35 m		
	" " Φ10	12 m		
b)	Fittings	1 L.S.		
c)	Valves Φ50	1 pc		
	Φ40	1 pc		
	Φ32	1 pc		
	Φ10	6 pc		
3-6-2.	Installation VP Φ65	2 m		
	" Φ50	44 m		
	" Φ40	9 m		
	" Φ32	101 m		
	" Φ20	35 m		
	" Φ10	12 m		
3-7.	Public Standpipe including Material and Construction (2 taps)	1 unit		
	- ditto - (4 taps)	1 unit		
3-8.	Monumental Plate	1 pc		
3-9.	Miscellaneous Works	1 L.S.		
3-10.	System Test Operation and Leakage Test	1 L.S.		
	Sub - Total			
3-11.	Tax			
	Total			

4. Construction of Water Supply Facilities in Silau Maraja Village

Item No.	Work Description	Quantity (unit)	Unit Price (Rp.)	Amount (Rp.)
4-1.	Elevated Tank			
4-1-1.	Material			
a)	Elevated Tank ($V=5.0^{m^3}$, $H=9.0^{m}$)	1	unit	
b)	Foundation	1	unit	
c)	Inlet Pipe (SGP $10^{kg/cm^2}$) $\phi 40$	16	m	
d)	Outlet Pipe (〃) $\phi 80$	16	m	
e)	Overflow Pipe (〃) $\phi 50$	10	m	
f)	Drain Pipe (〃) $\phi 50$	4	m	
g)	Valves $\phi 80$	1	pc	
h)	〃 $\phi 50$	1	pc	
i)	〃 $\phi 40$	1	pc	
j)	Tower Ladder	10	m	
4-1-2.	Construction and Installation	1	L.S.	
4-2.	Well Pump			
4-2-1.	Pump Equipment ($\phi 40 \times 0.15^{m^3/min} \times 36.0^{m} \times 1.5\,kW$)	1	unit	
4-2-2.	Installation	1	L.S.	
4-3.	Generator			
4-3-1.	Generator Equipment (5.2kVA x 8PS)	1	unit	
4-3-2.	Installation	1	L.S.	
4-4.	Generator House ($9.0^{m} \times 3.5^{m} \times 3.0^{H\,m}$) including Material and Construction	1	L.S.	
4-5.	Electrical Work including a Pump Control Box and Wirings	1	L.S.	
4-6.	Fence and Gate			

Item No.	Work Description				Quantity (unit)	Unit Price (Rp.)	Amount (Rp.)
4-b-1.	Fence (H=1.8 m)				40 m		
4-b-2.	Gate (")				1 set		
4-7.	Pipelaying Works						
4-7-1.	Material						
a)	Pipes	VP	$10^{kg/cm^2}$	Φ80	10 m		
		"	"	Φ65	375 m		
		"	"	Φ50	64 m		
		"	"	Φ40	141 m		
		"	"	Φ32	551 m		
b)	Fittings				1 L.S.		
c)	Valves	Φ40			1 pc		
		Φ32			5 pc		
4-7-2.	Installation	VP	Φ80		10 m		
			Φ65		375 m		
			Φ50		64 m		
			Φ40		141 m		
			Φ32		551 m		
4-8.	Bathing Room including Material and Construction				1 unit		
4-9.	Public Standpipe including Material and Construction (2 taps)				5 unit		
4-10.	Monumental Plate				1 pc		
4-11.	Miscellaneous Works				1 L.S.		
4-12.	System Test Operation and Leakage Test				1 L.S.		
	Sub-Total						
4-13.	Tax						
	Total						

5. Construction of Water Supply Facilities in Padang Mahondang Village

Item No.	Work Description	Quantity (unit)	Unit Price (Rp.)	Amount (Rp.)
5-1.	Elevated Tank			
5-1-1.	Material			
a)	Elevated Tank ($V=6.0^{m^3}$, $H=13.0^{m}$).	1	unit	
b)	Foundation	1	unit	
c)	Inlet Pipe (SGP $10^{kg/cm^2}$) ϕ40	20	m	
d)	Outlet Pipe (〃) ϕ80	20	m	
e)	Overflow Pipe (〃) ϕ50	14	m	
f)	Drain Pipe (〃) ϕ50	4	m	
g)	Valves ϕ80	1	pc	
h)	〃 ϕ50	1	pc	
i)	〃 ϕ40	1	pc	
j)	Tower Ladder	14	m	
5-1-2.	Construction and Installation	1	L.S.	
5-2.	Well Pump			
5-2-1.	Pump Equipment (ϕ40 × 0.13 m^3/min × 31.0 m × 1.5 kW)	1	unit	
5-2-2.	Installation	1	L.S.	
5-3.	Generator			
5-3-1.	Generator Equipment (5.2 kVA × 8PS)	1	unit	
5-3-2.	Installation	1	L.S.	
5-4.	Generator House ($3.0^{m} \times 3.5^{m} \times 3.0^{m}$ H) including Material and Construction	1	L.S.	
5-5.	Electrical Work including a Pump Control Box and Wirings	1	L.S.	
5-6.	Fence and Gate			

Item No.	Work Description	Quantity (unit)	Unit Price (Rp.)	Amount (Rp.)
5-6-1.	Fence (H=1.8 m)	40 m		
5-6-2.	Gate (")	1 set		
5-7.	Pipelaying Works			
5-7-1.	Material			
a)	Pipes VP $10^{kg/cm^2}$ φ80	5 m		
	" " φ65	690 m		
	" " φ50	690 m		
	" " φ40	560 m		
	" " φ32	565 m		
b)	Fittings			
c)	Valves φ32	10 pc		
5-7-2.	Installation VP φ80	5 m		
	" φ65	690 m		
	" φ50	690 m		
	" φ40	560 m		
	" φ32	565 m		
5-8.	Canal Crossing Work including Material, Air Valve and Construction	4 unit		
5-9.	Public Standpipe including Material and Construction (2 taps)	10 unit		
5-10.	Monumental Plate	1 pc.		
5-11.	Miscellaneous Works	1 L.S.		
5-12.	System Test Operation and Leakage Test	1 L.S.		
	Sub-Total			
5-13.	Tax			
	Total			

b. Construction of Water Supply Facilities in Pulau Rakyat Health Center

Item No.	Work Description	Quantity (Unit)	Unit Price (Rp.)	Amount (Rp.)
6-1.	Elevated Tank			
6-1-1.	Material			
a)	Elevated Tank ($V=4.0^{m^3}$, $H=5.0^{m}$)	1 unit		
b)	Foundation	1 unit		
c)	Inlet Pipe (SGP $10^{kg/cm^2}$) ϕ32	12 m		
d)	Outlet Pipe (〃) ϕ80	12 m		
e)	Overflow Pipe (〃) ϕ50	6 m		
f)	Drain Pipe (〃) ϕ50	4 m		
g)	Valves ϕ80	1 pc		
h)	〃 ϕ50	1 pc		
i)	〃 ϕ32	1 pc		
j)	Tower Ladder	6 m		
6-1-2.	Construction and Installation	1		
6-2.	Well Pump			
6-2-1.	Pump Equipment (ϕ32 × 0.067 $^{m^3/min}$ × 32.0^{m} × 0.75kW)	1 unit		
6-2-2.	Installation	1 L.S.		
6-3.	Generator			
6-3-1.	Generator Equipment (3.0kVA × 4PS)	1 unit		
6-3-2.	Installation	1 L.S.		
6-4.	Generator House (3.0^{m} × 3.5^{m} × H 3.0^{m})	1 L.S.		
6-5.	Electrical Work	1 L.S.		
6-6.	Pipelaying Works			

Item No.	Work Description	Quantity (unit)	Unit Price (Rp.)	Amount (Rp.)
6-6-1.	Material			
a)	Pipes VP 10 kg/cm² Φ80	3 m		
	" " Φ65	19 m		
	" " Φ50	36 m		
	" " Φ40	8 m		
	" " Φ32	5 m		
	" " Φ25	77 m		
	" " Φ20	15 m		
	" " Φ10	36 m		
b)	Fitting	1 L.S.		
c)	Valves Φ10	11 pc		
6-6-2.	Installation VP Φ80	3 m		
	" Φ65	19 m		
	" Φ50	36 m		
	" Φ40	8 m		
	" Φ32	5 m		
	" Φ25	77 m		
	" Φ20	15 m		
	" Φ10	36 m		
6-7.	Monumental Plate	1 pc		
6-8.	Miscellaneous Works	1 L.S.		
6-9.	System Test Operation and Leakage Test	1 L.S.		
	Sub-Total			
6-10.	Tax			
	Total			

Breakdown of Bathing Room

Item No.	Work Description	Quantity (unit)		Unit Price (Rp.)	Amount (Rp.)
	Earth Work (Excavation)	15	m^3		
	Hardcore Foundation	10	m^3		
	Base Concrete Work (1:3:6)	9	m^3		
	Floor Concrete Work (1:2:4)	3	m^3		
	Reinforced Concrete Work	8	m^3		
	Brick Masonry	10	m^3		
	Water-proof Mortar (t = 15 mm)	50	m^2		
	Plastering (t = 15 mm)	90	m^2		
	Pipes, Valves and Water Taps	1	L.S.		
	Placement of U-shape Drain (W300mm x L600mm) with R.C. Cover	10	m		
	R.C. Manhole Cover (800mm x 800mm)	1	pc		
	Installation of Ventilator (ϕ50mm)	1	pc		
	Installation of Step-bars	1	L.S.		
	Total				

Breakdown of Public Standpipe (2 taps)

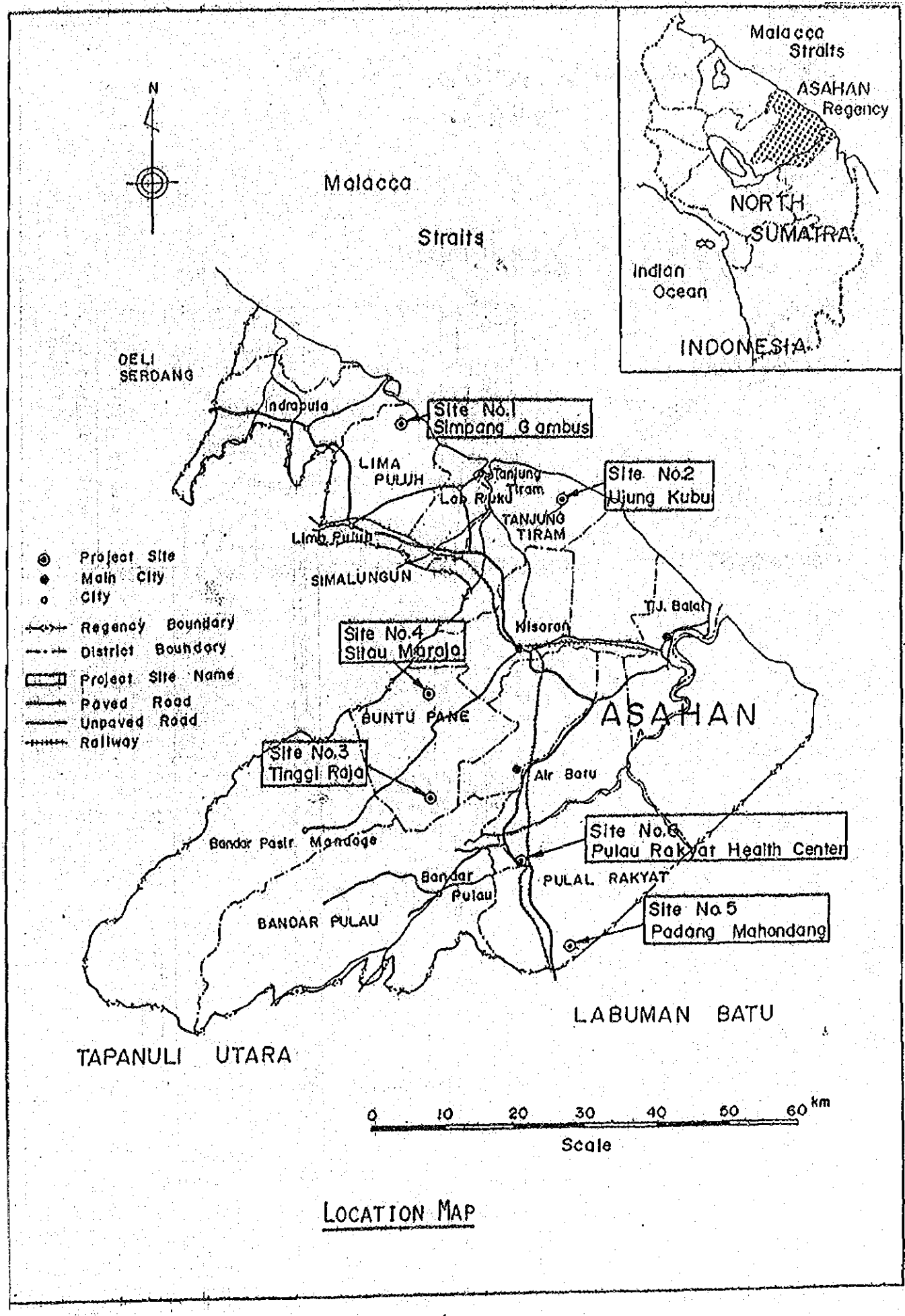
Item No.	Work Description	Quantity (unit)	Unit Price (Rp.)	Amount (Rp.)
	Earth Work (Excavation)	0.5 m^3		
	Base Concrete Work (1:3:6)	0.3 m^3		
	Concrete Work (1:2:4)	0.4 m^3		
	Pipes and Water Taps	1 L.S.		
	Total			

Breakdown of Public Standpipe (4 taps)

Item No.	Work Description	Quantity (unit)	Unit Price (Rp.)	Amount (Rp.)
	Earth Work (Excavation)	0.8 m^3		
	Base Concrete Work (1:3:6)	0.5 m^3		
	Concrete Work (1:2:4)	0.7 m^3		
	Pipes and Water Taps	1 L.S.		
	Total			

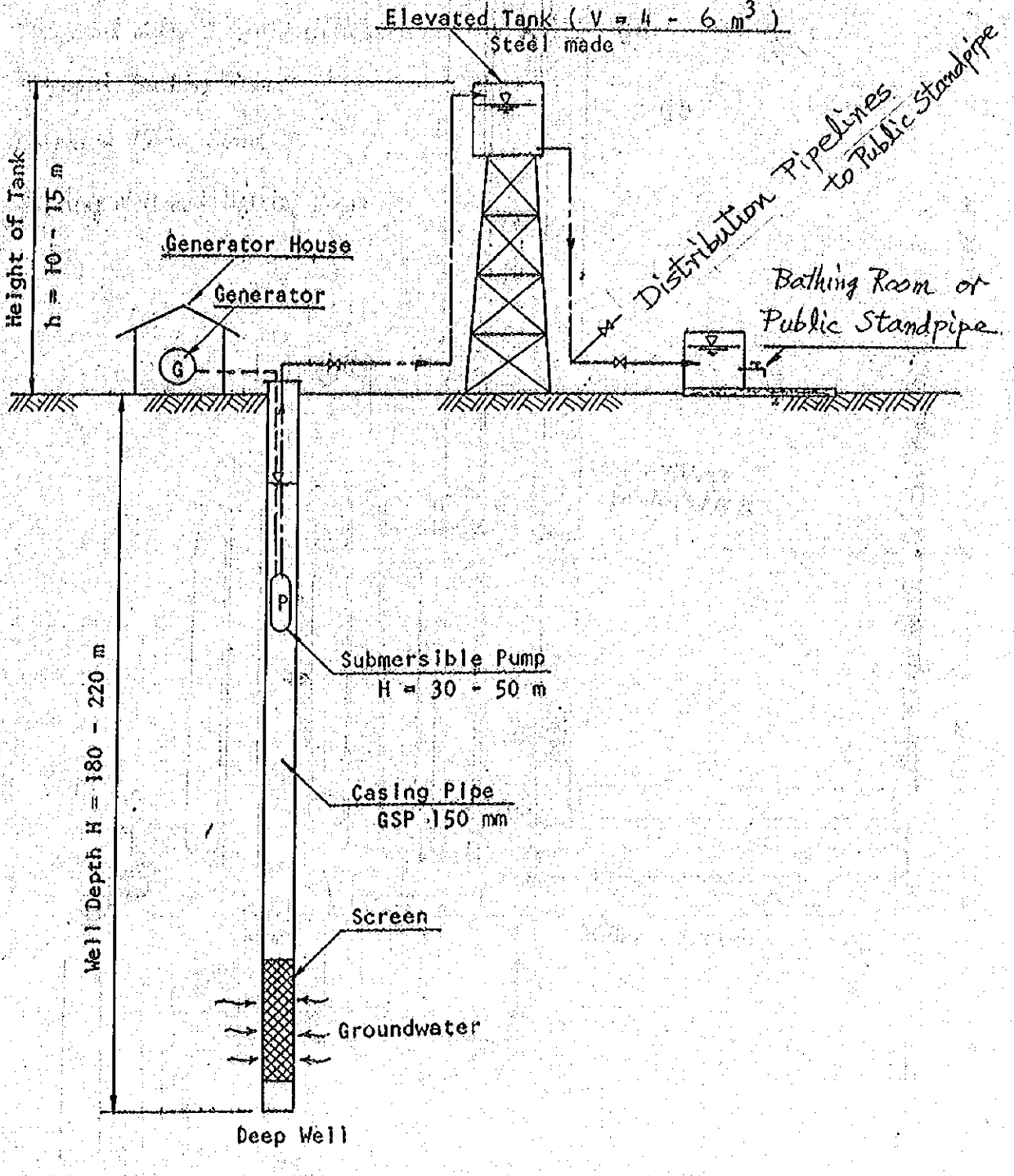
DRAWINGS

LIST OF DRAWINGS

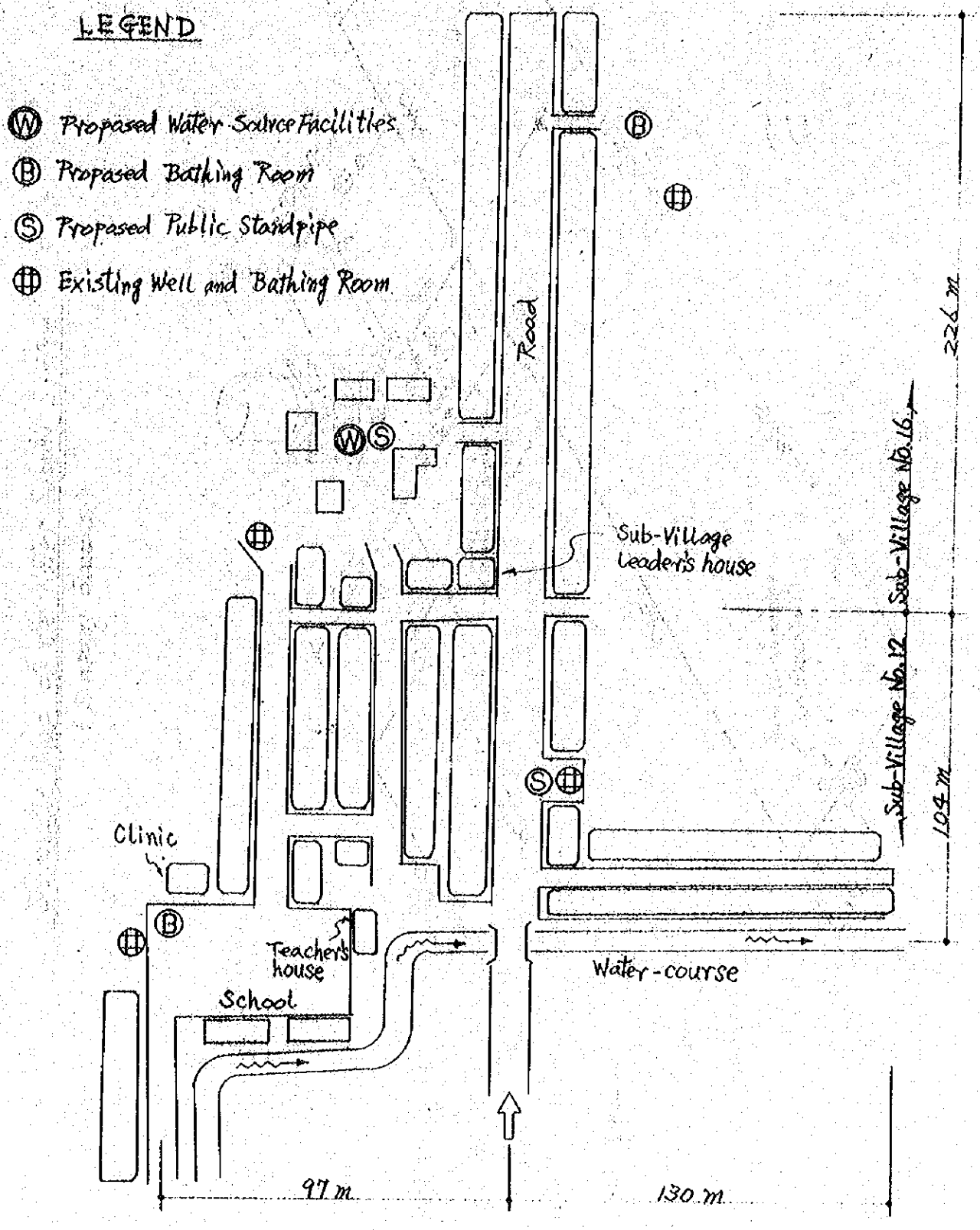


LOCATION MAP

Fig. General Plan of Water Supply System in the Villages



General Map of Sub-villages No. 12 & No. 16 in Simpang Gambus



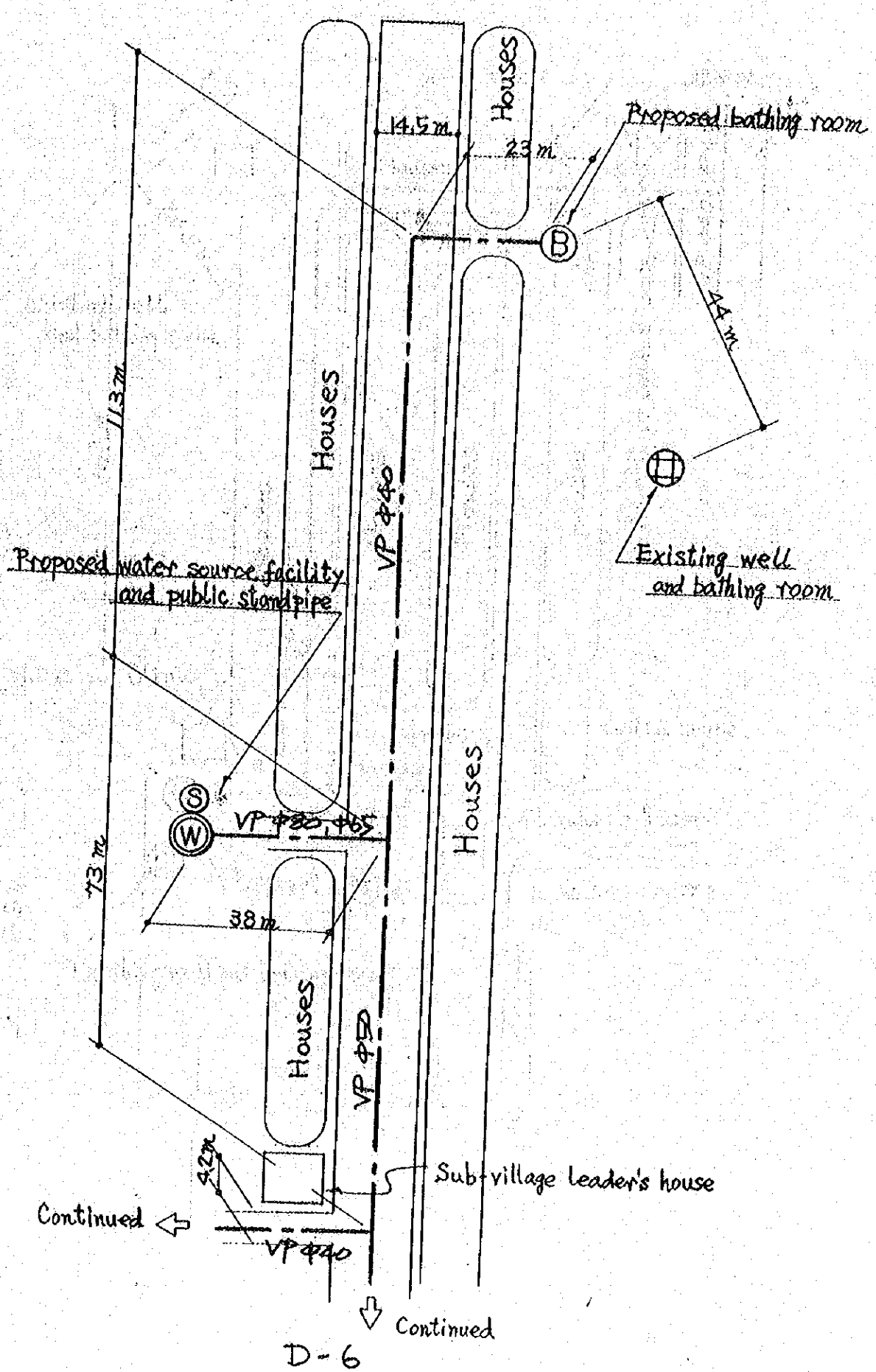
Schematic Map of the Water Supply System

(Simpang Gombus)

Water Source Facilities
(Simpang Gambus)

Distribution Pipelines (1)

(Simpang Gambus)



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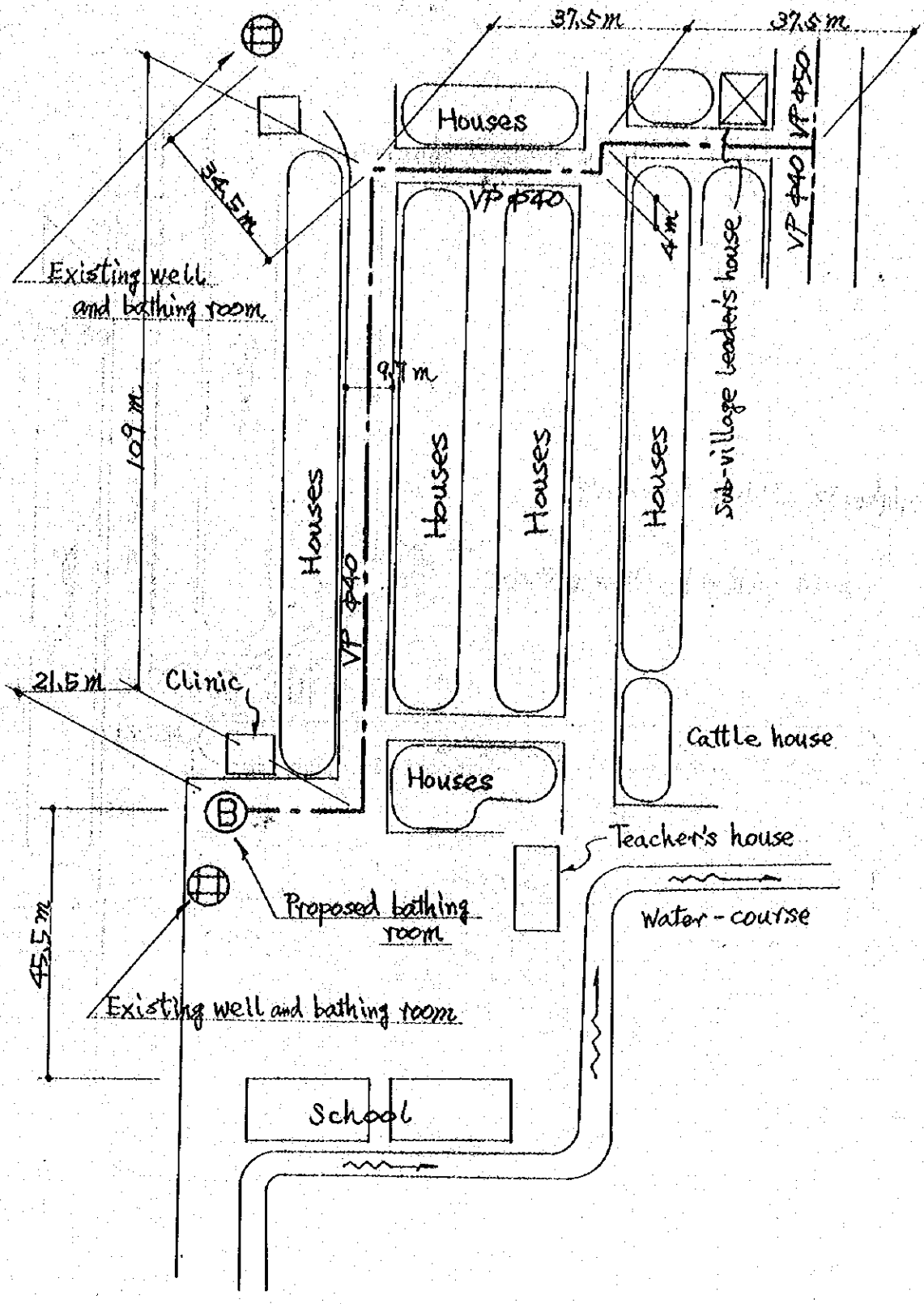
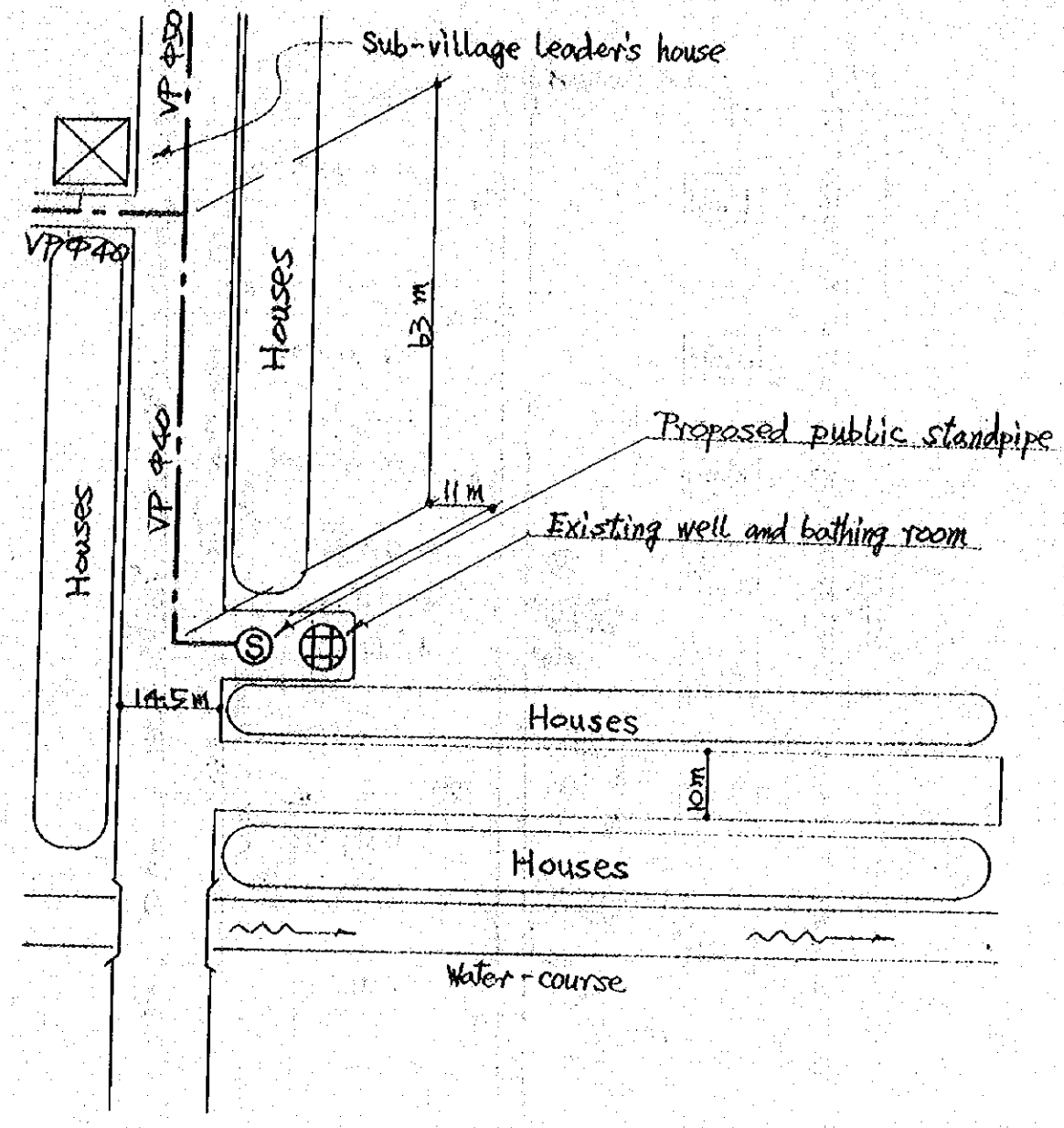
Distribution Pipelines (2.)
(Simpang Gambus.)

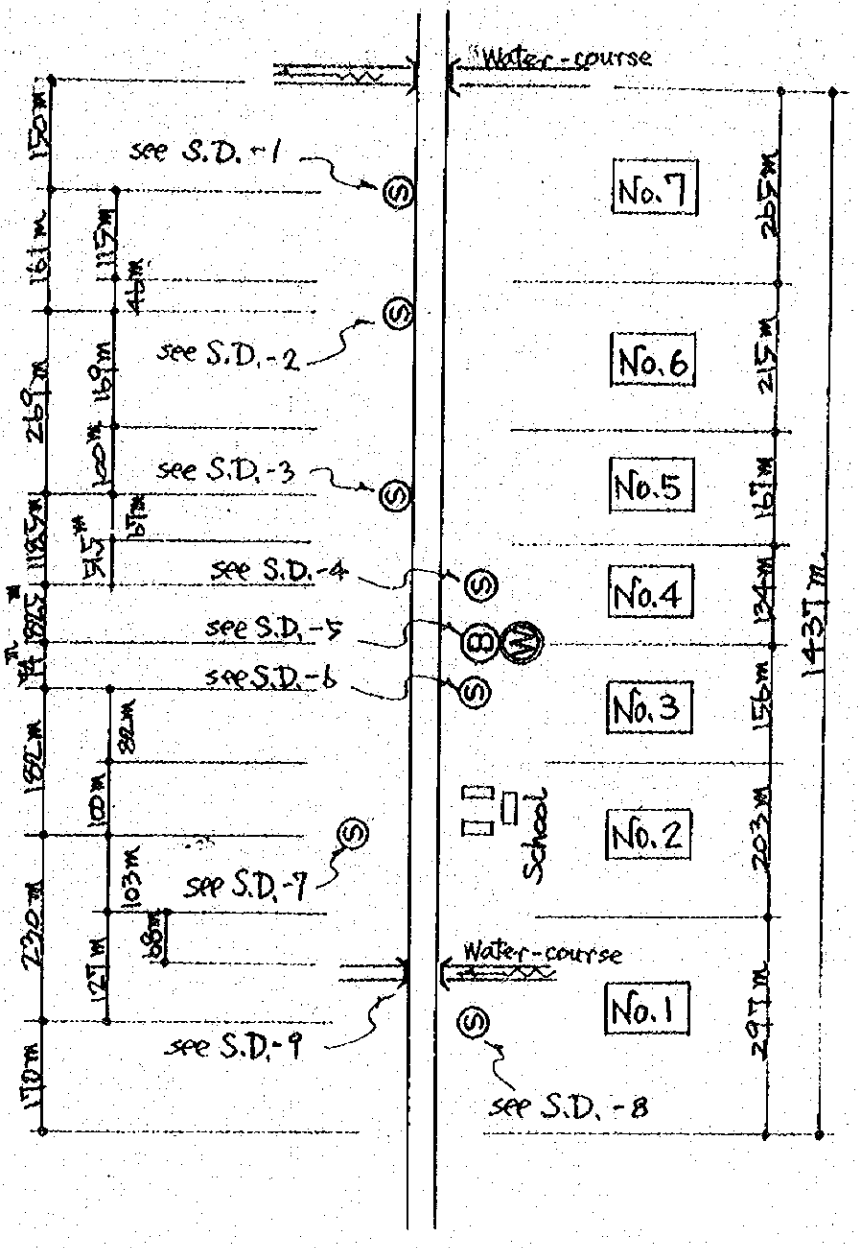


Distribution Pipelines (3)

(Simpang Gambus)



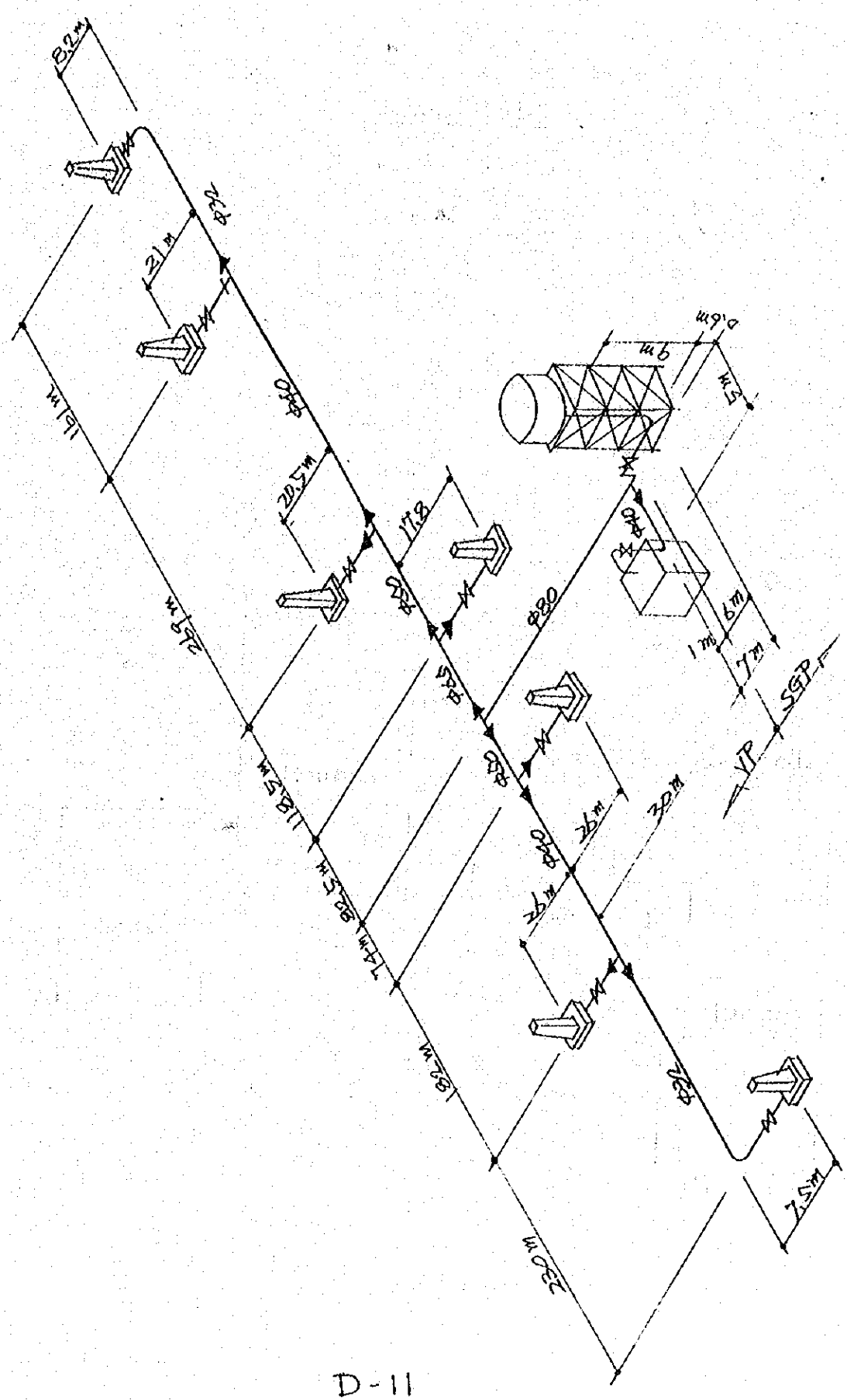
General Map of Sub-Village Pematang Pao
(Ujung Kubu Village)



Note : S.D. : Spot detail

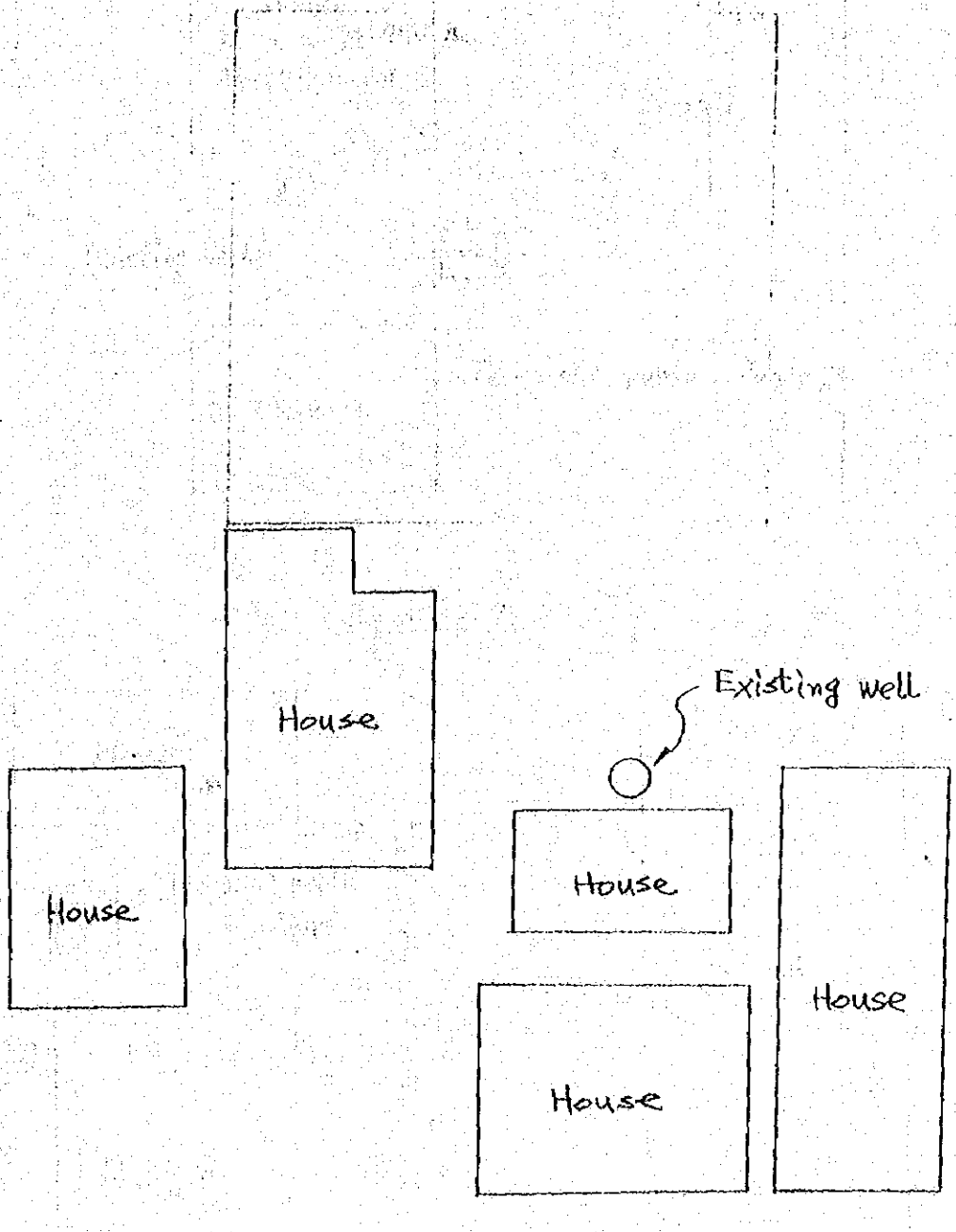
Distribution Pipelines
(Ujung Kubu)

Schematic Map of the Water Supply System
(Ujung Kubu)



Water Source Facilities

Spot - 5



Road

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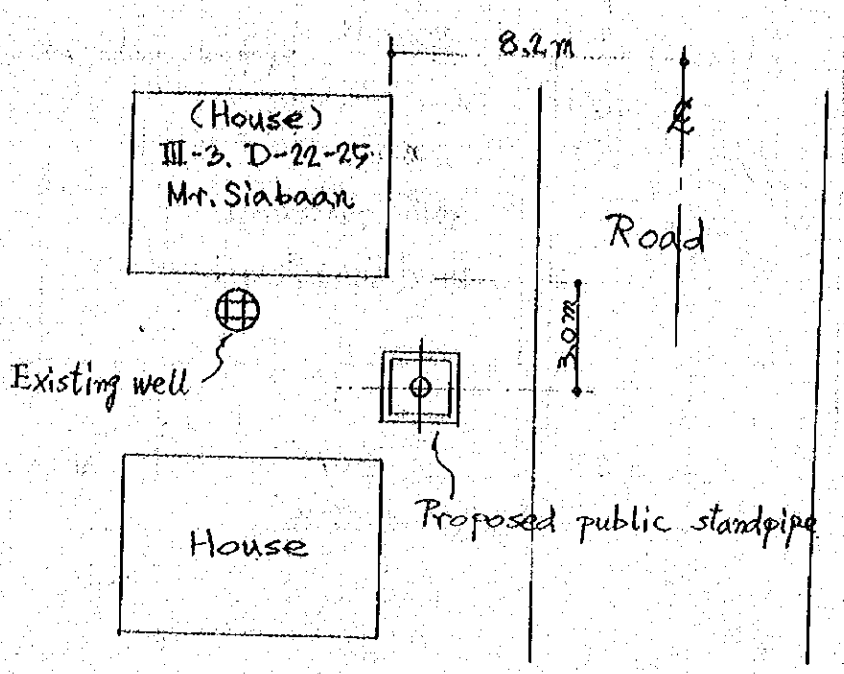
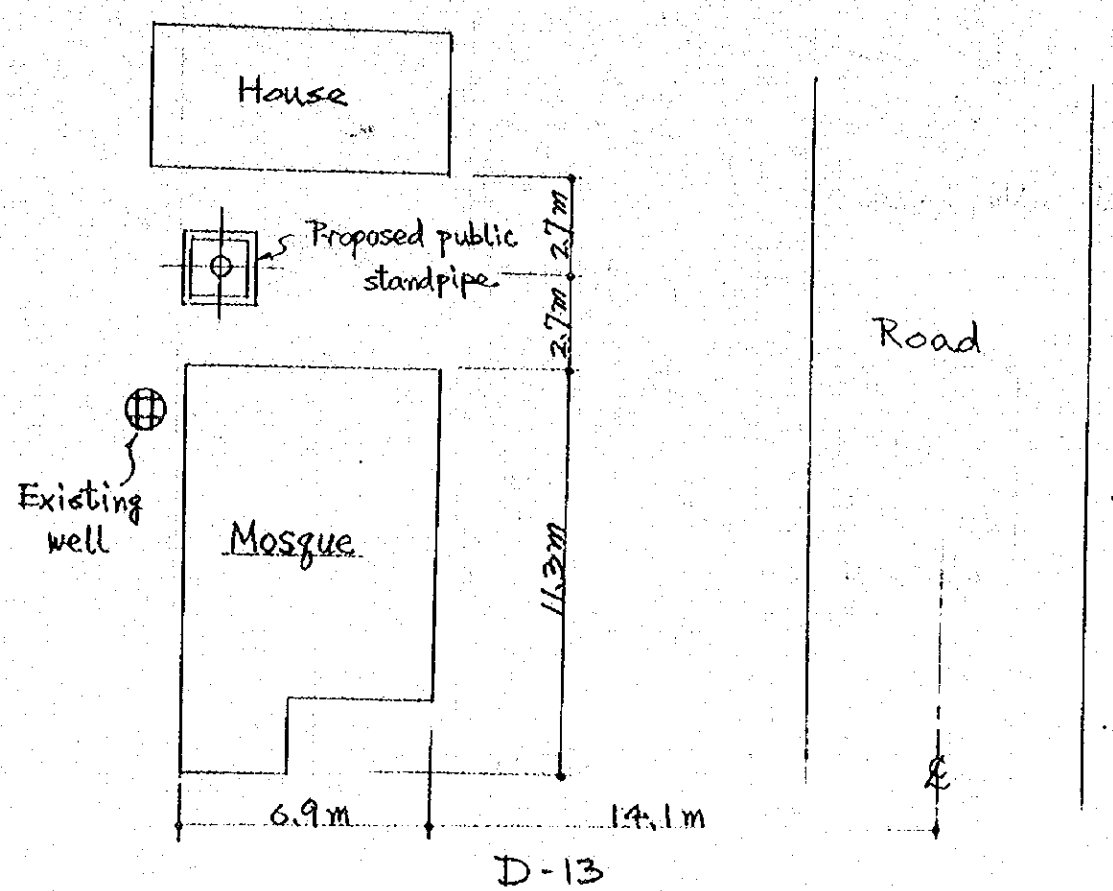
Spot Detail (1)

Spot - 1



Spot - 2



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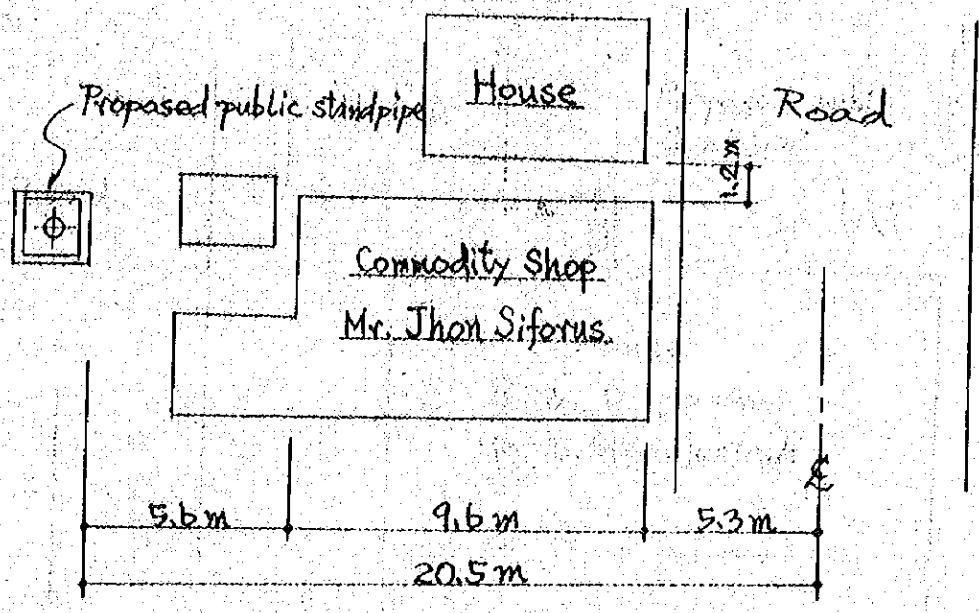
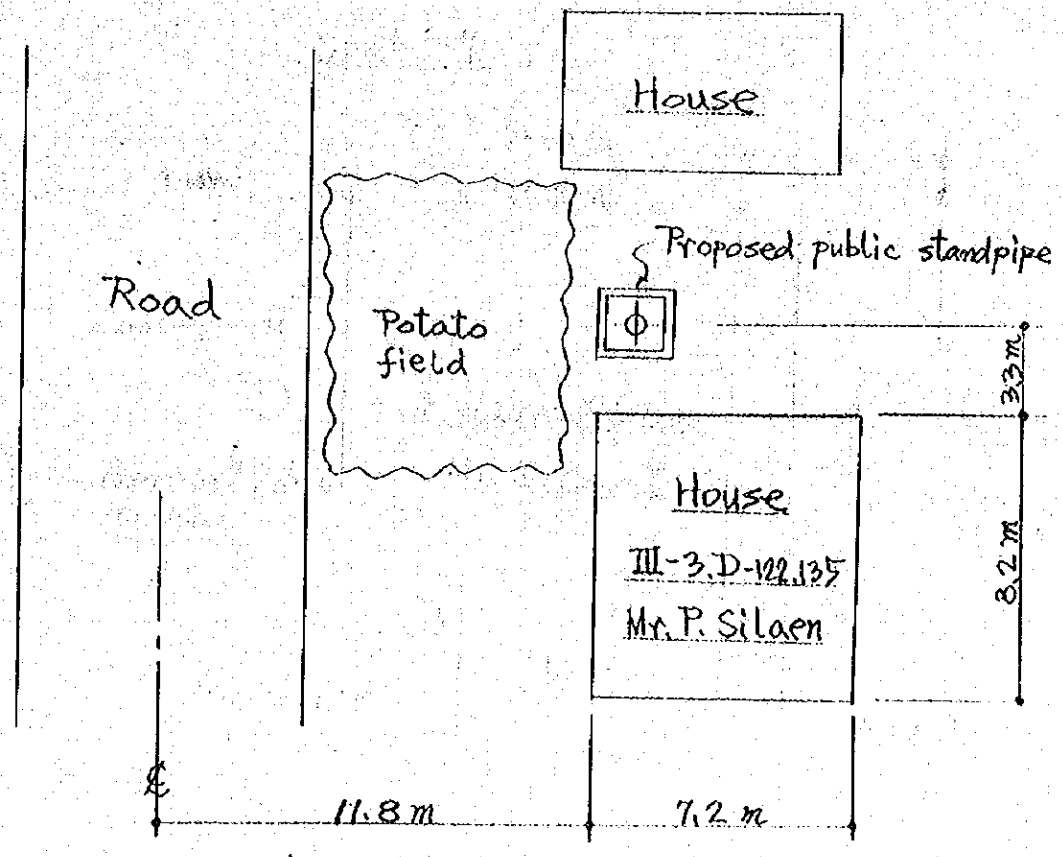
Spot Detail (2)

Spot - 3

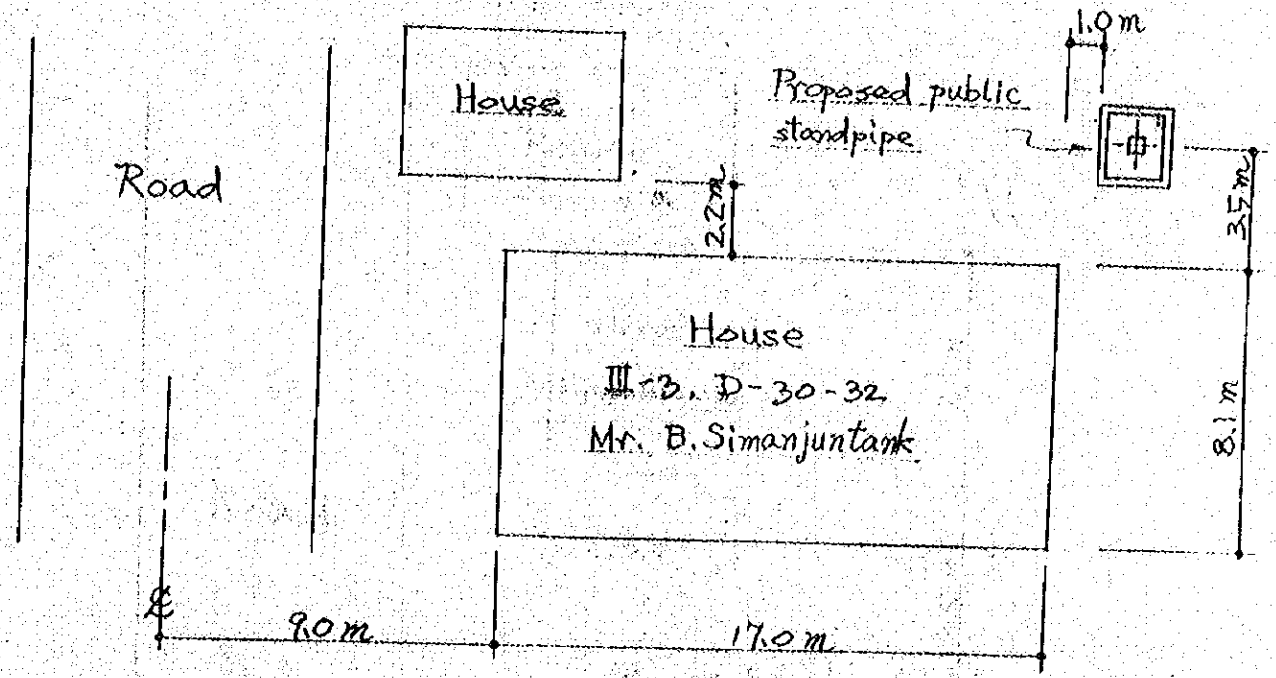


Spot - 4

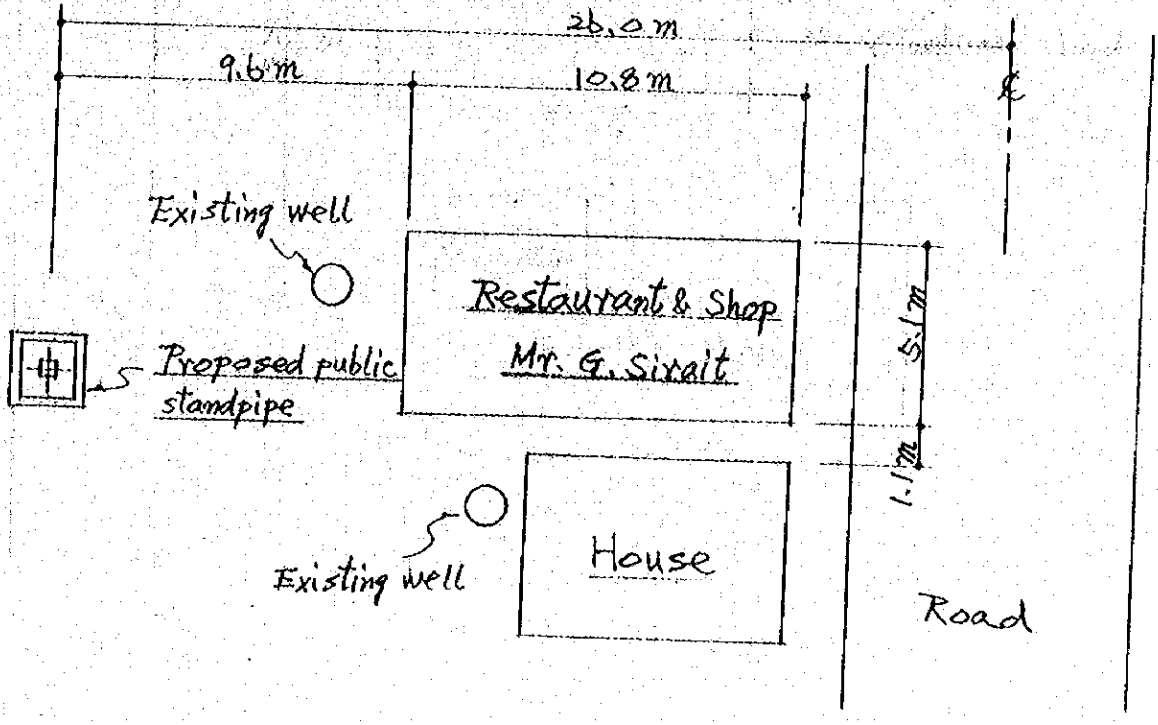


Spot Detail (3)

Spot - 6

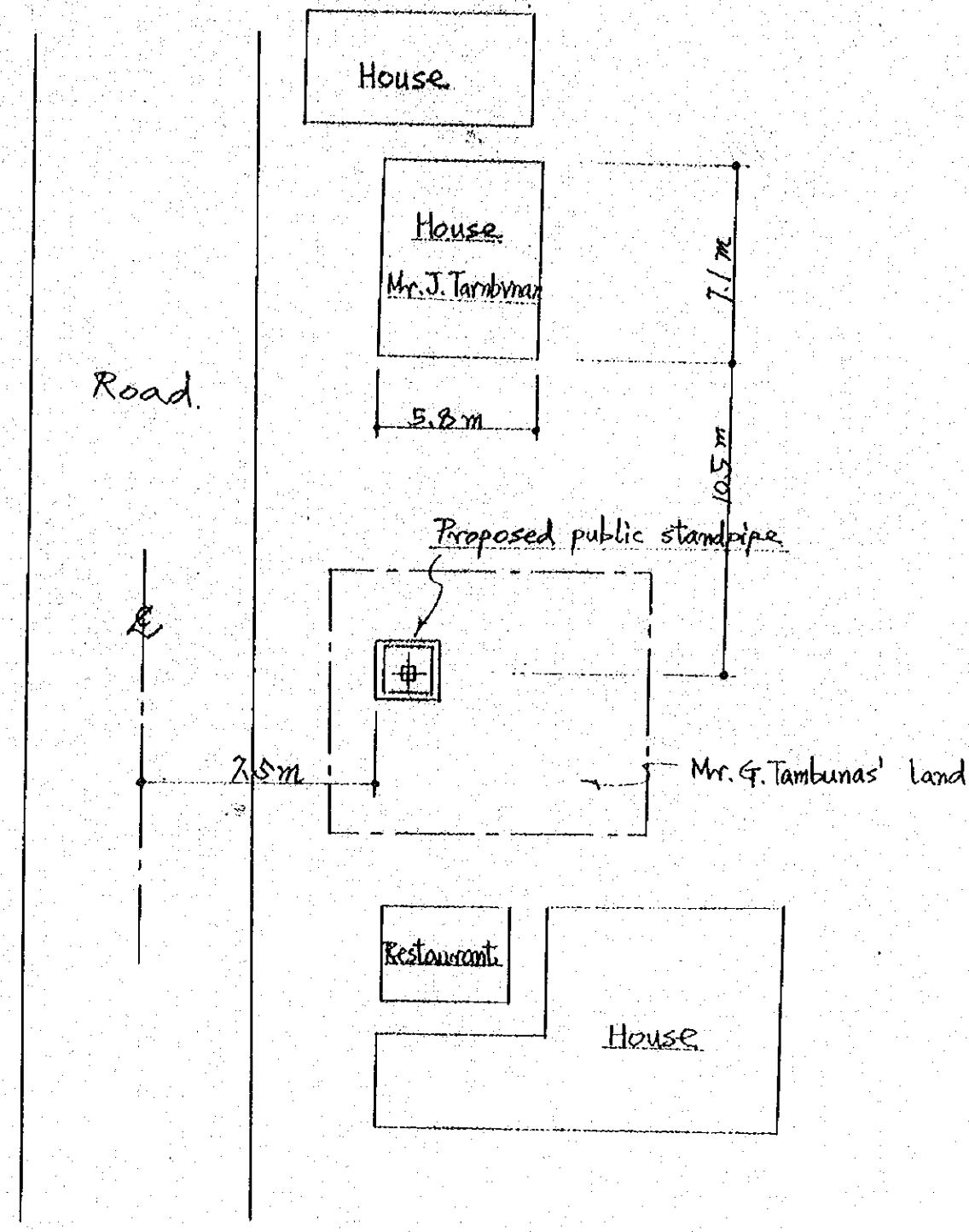


Spot - 7



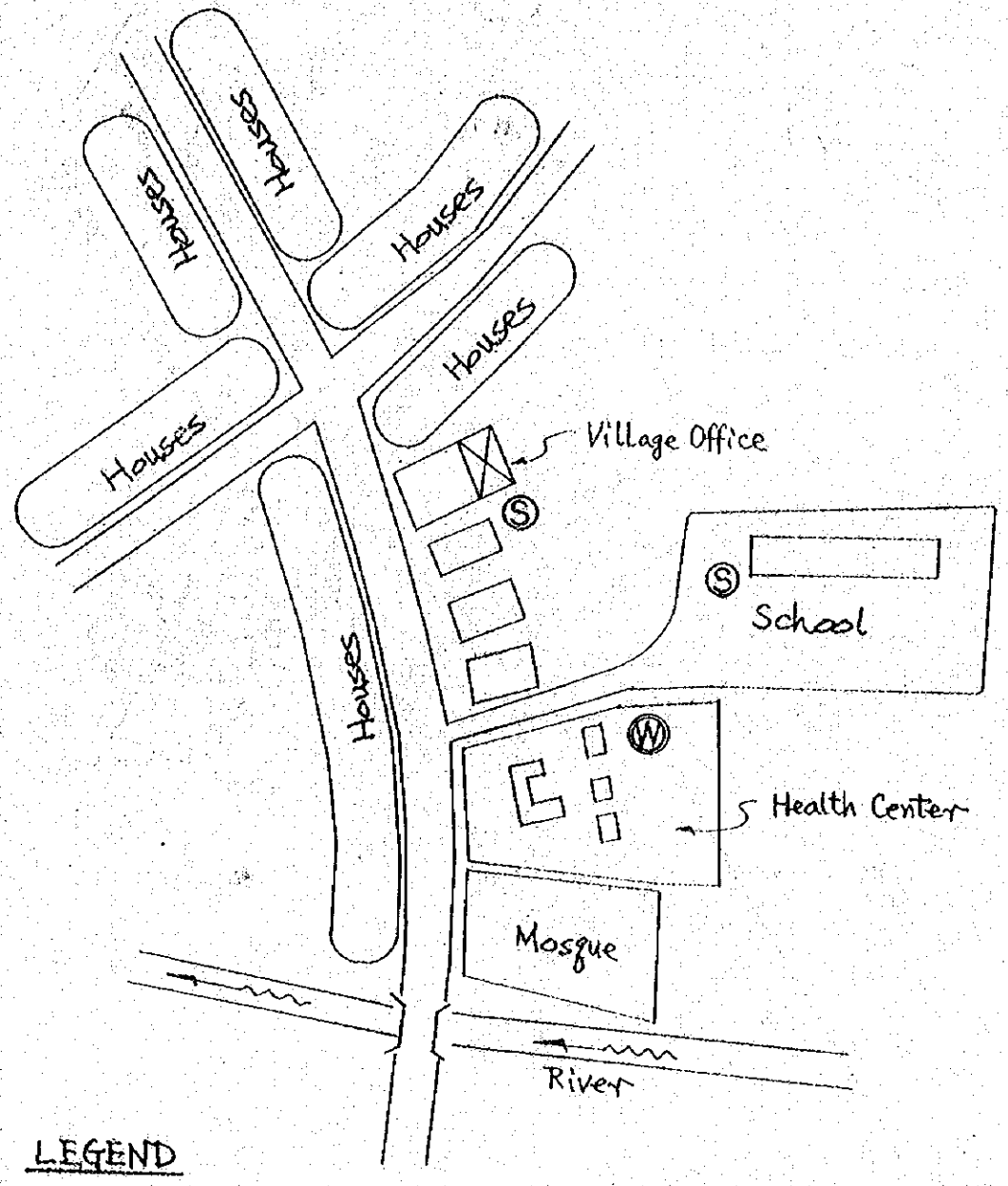
Spot Detail (4)

Spot - 8



Canal Crossing
(Ujung Kubu)

General Map of Tinggi Raja Village



LEGEND

Ⓦ Proposed Water Source Facilities

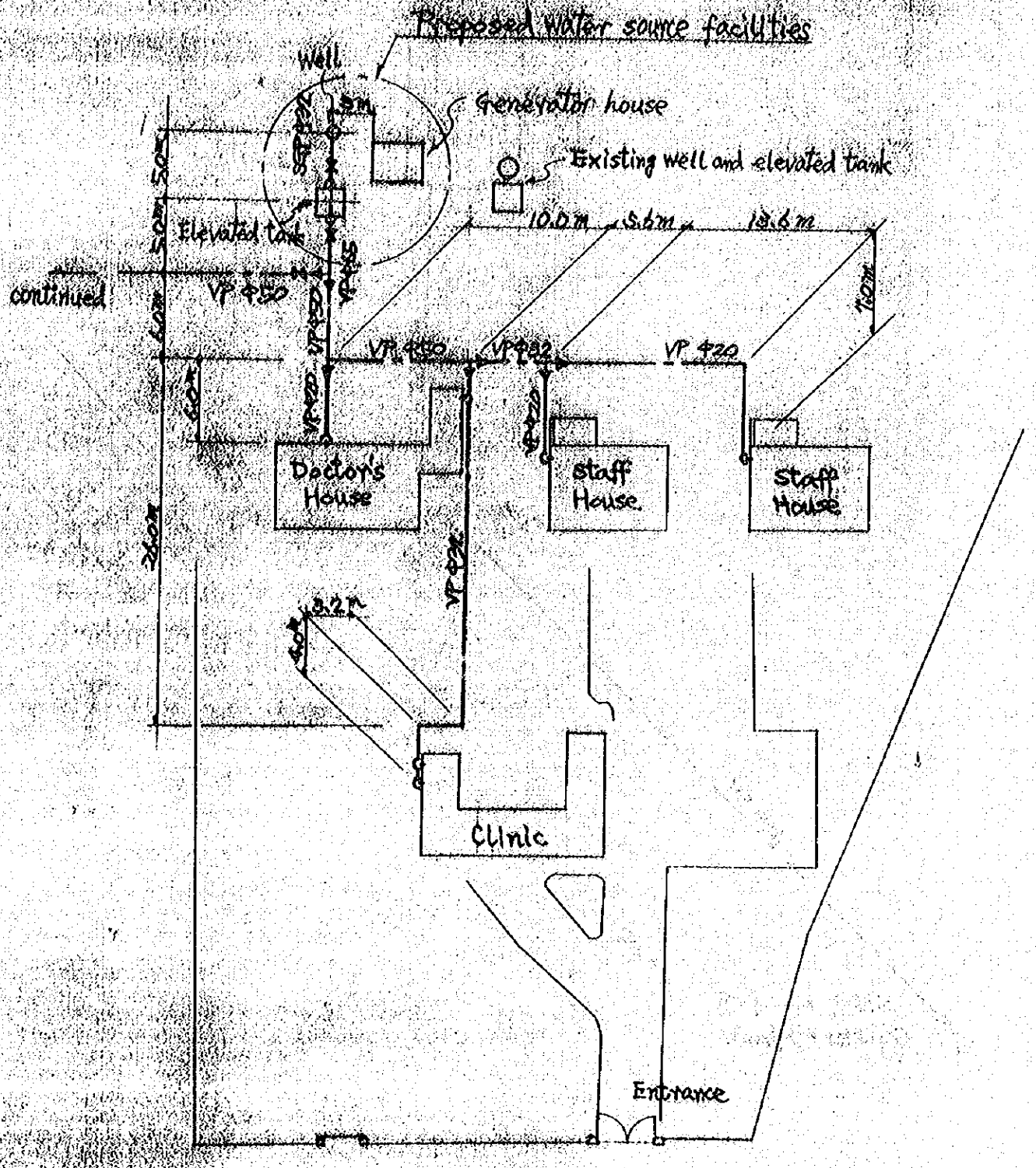
Ⓢ Proposed Public Standpipe

Schematic Map of the Water Supply System

(Tinggi Raja)

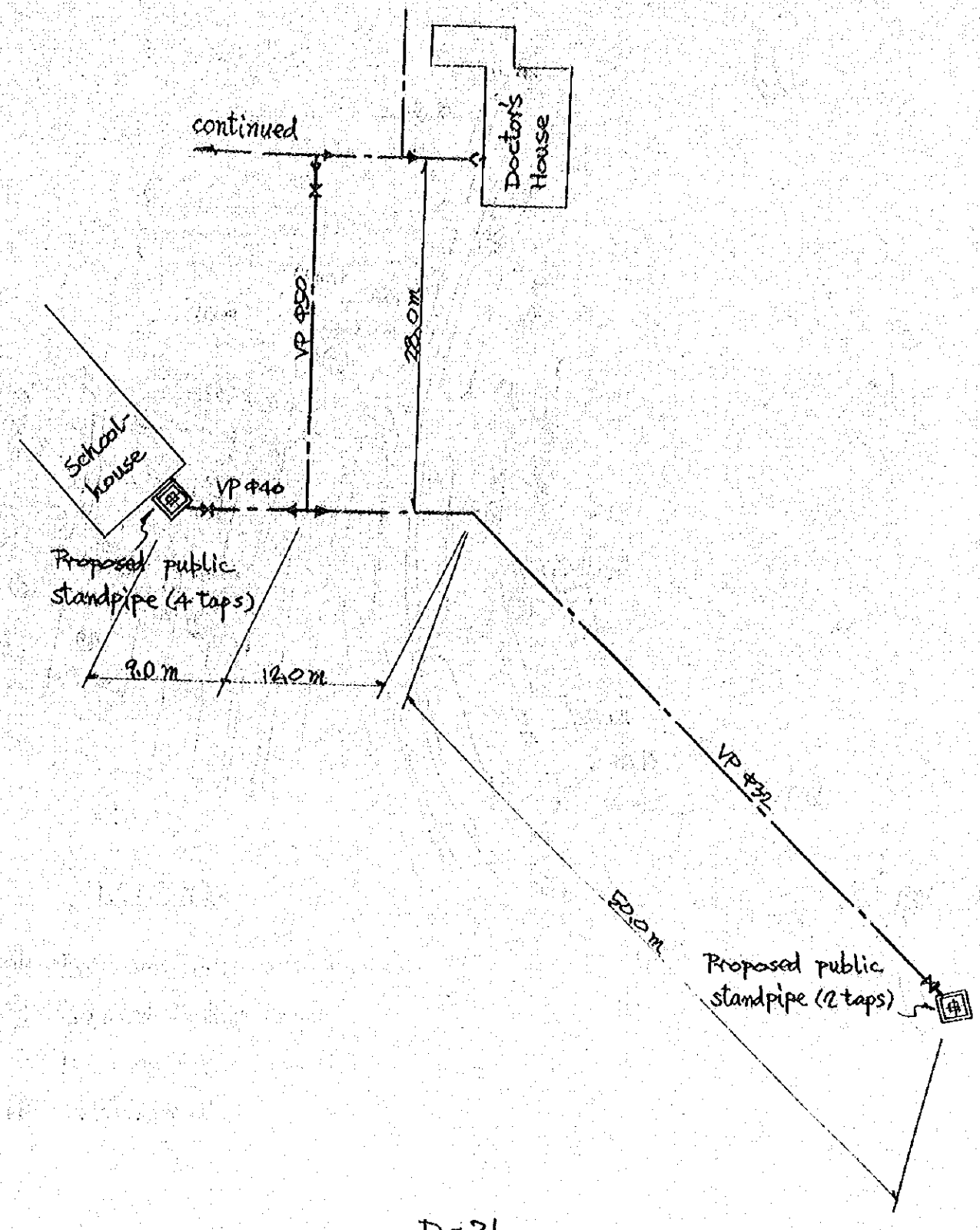
Water Source Facilities and Distribution Pipelines (1)

(Tinggi Raja)

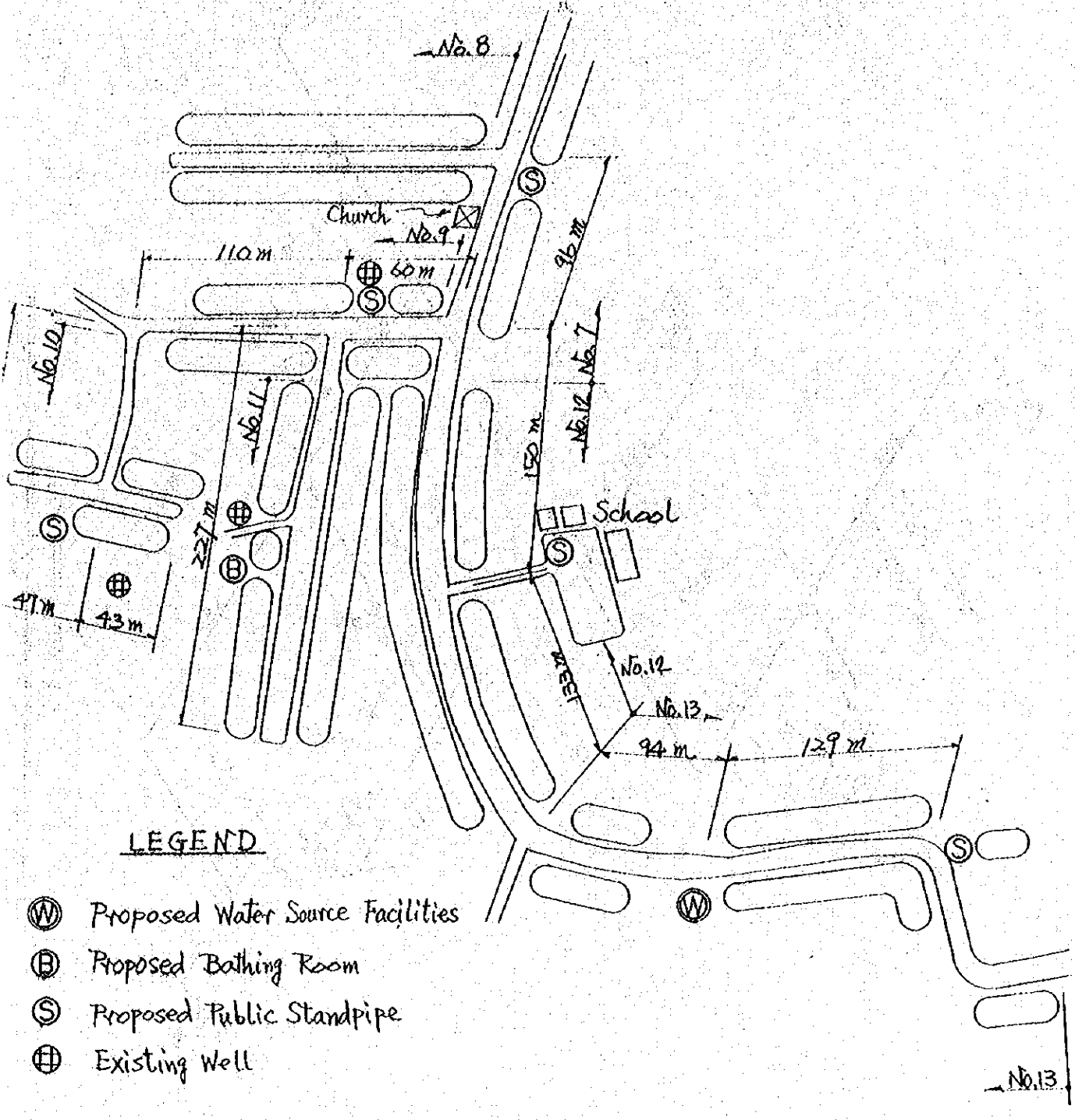


Distribution Pipelines (2)

(Tinggi Raja)



General Map of Sub-Villages No. 9 - No. 13
(Silau Maraja Village)



LEGEND

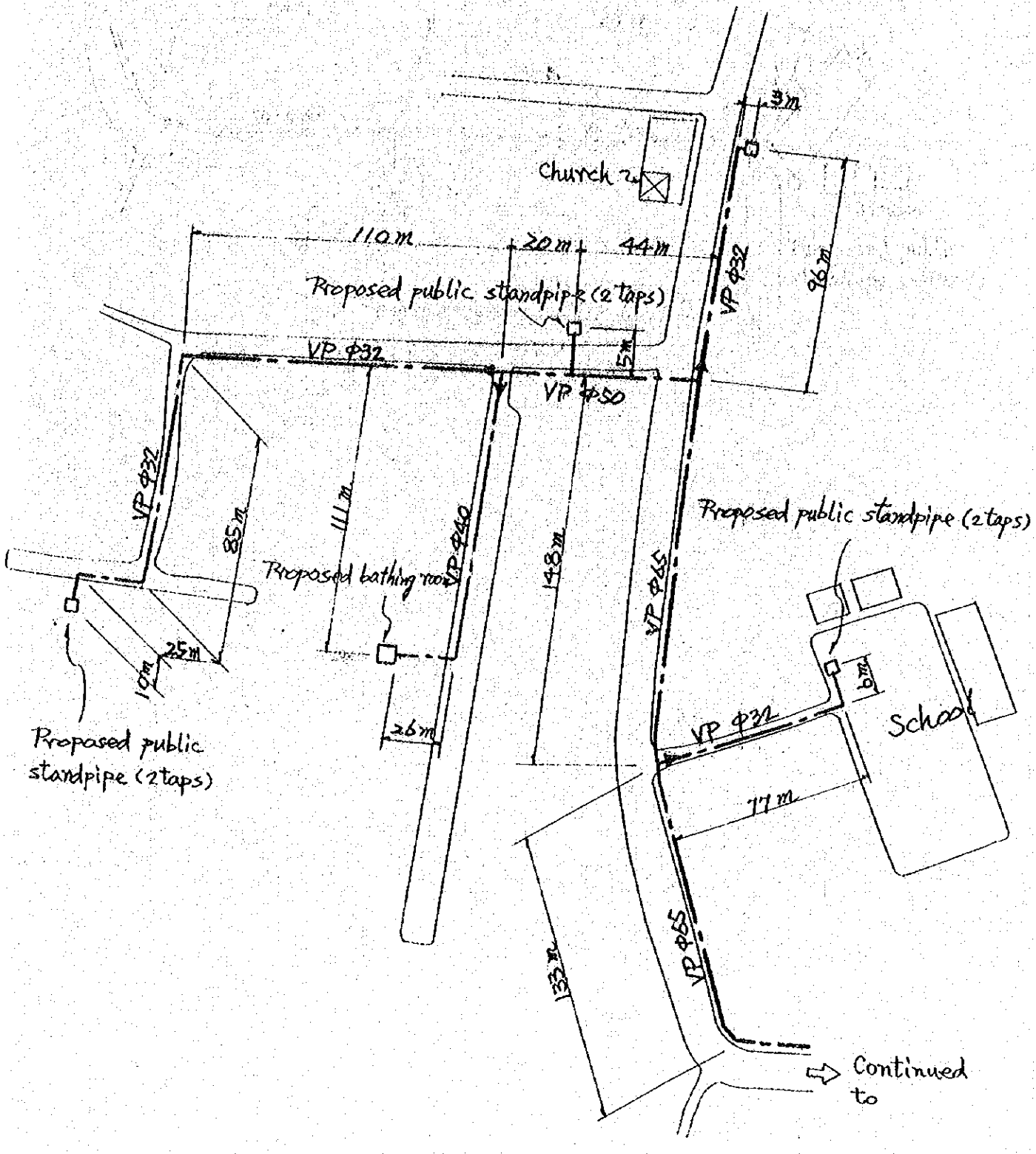
- Ⓦ Proposed Water Source Facilities
- Ⓑ Proposed Bathing Room
- Ⓢ Proposed Public Standpipe
- ⊕ Existing Well

Schematic Map of the Water Supply System

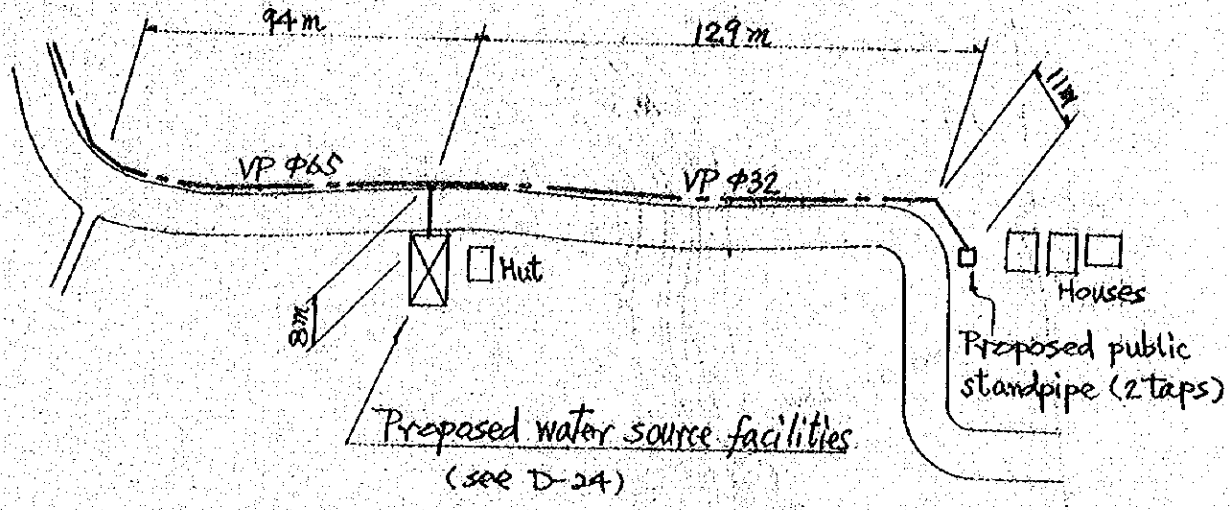
(Silau Marapa)

Water Source Facilities
(Silau Maraja)

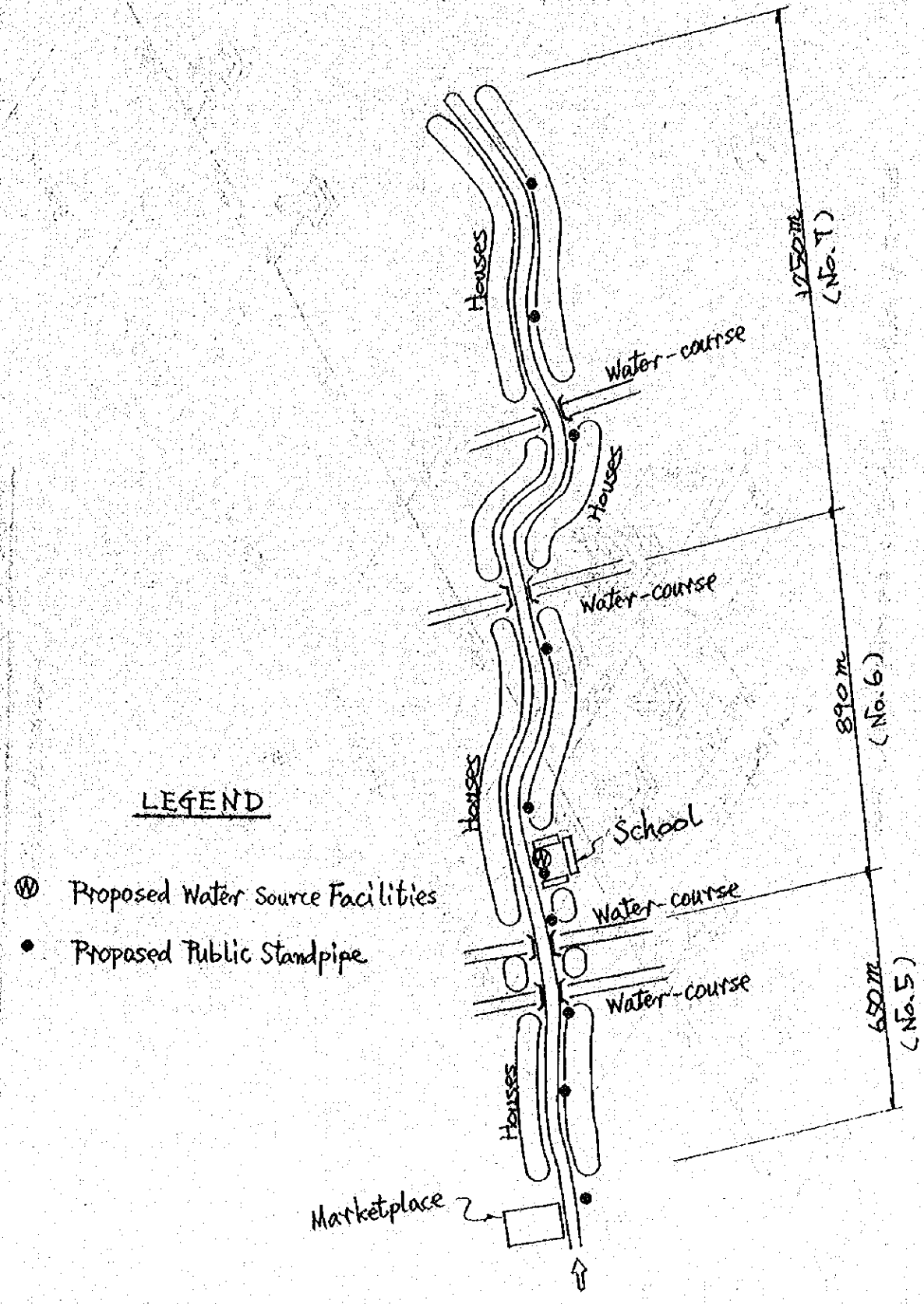
Distribution Pipelines (1)
(Silau Maraja)



Distribution Pipelines (2)
(Silau Maraja)



General Map of Sub-Villages No.5 - No.7
(Padang Mahondang Village)

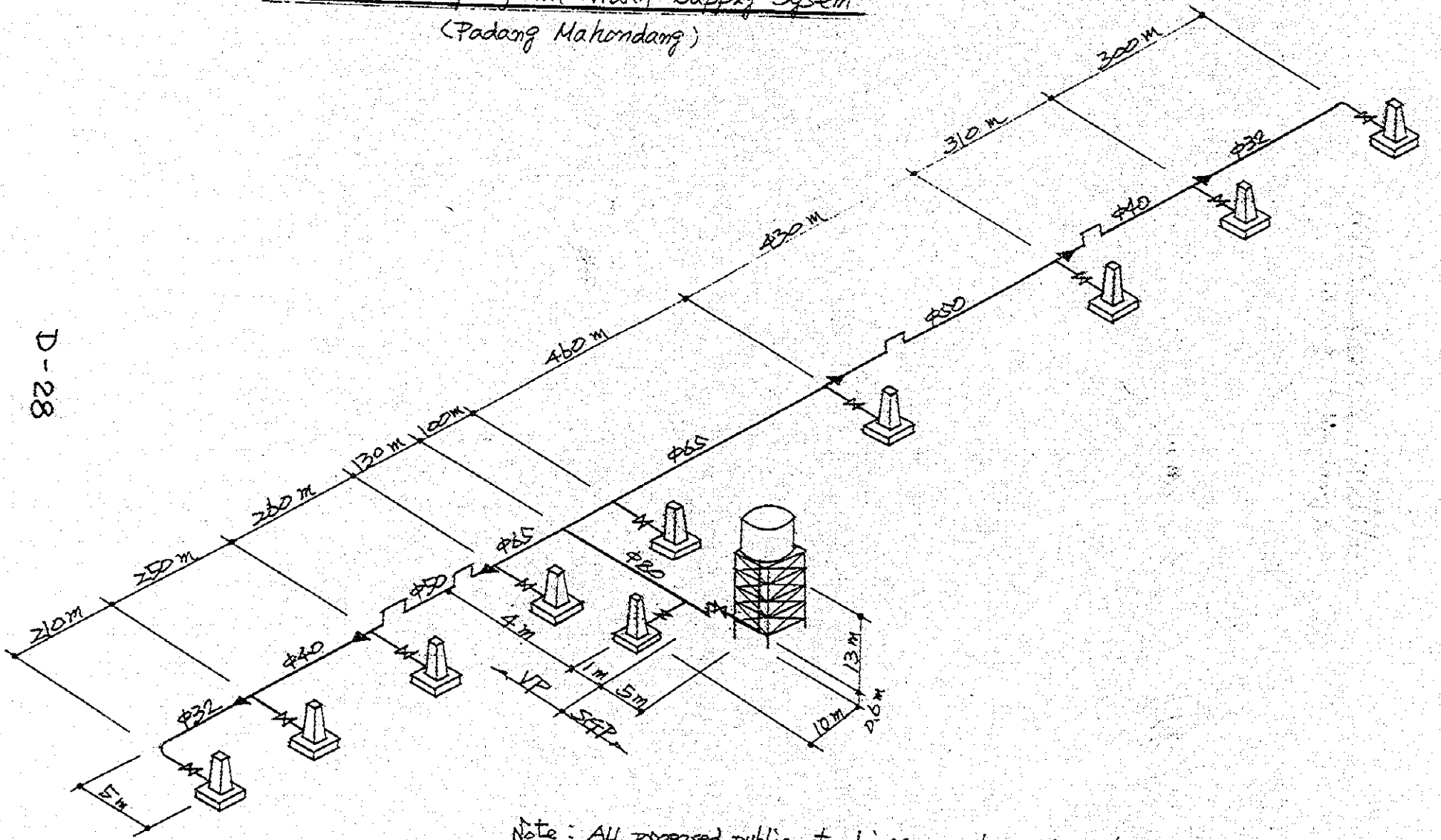


LEGEND

- Ⓦ Proposed Water Source Facilities
- • Proposed Public Standpipe

Schematic Map of the Water Supply Sysem

(Padang Mahondang)



Note : All proposed public standpipes are those of two taps.

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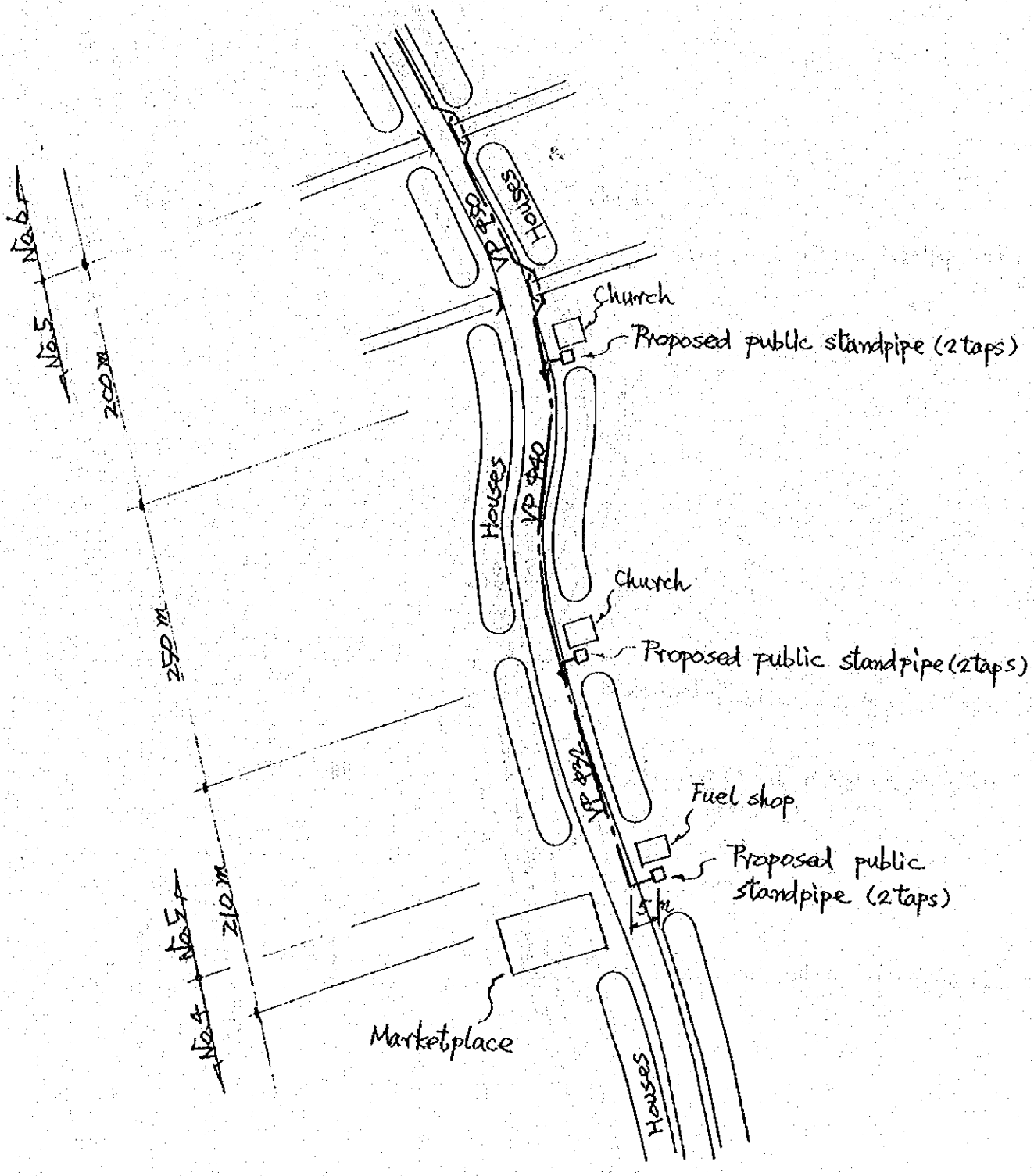
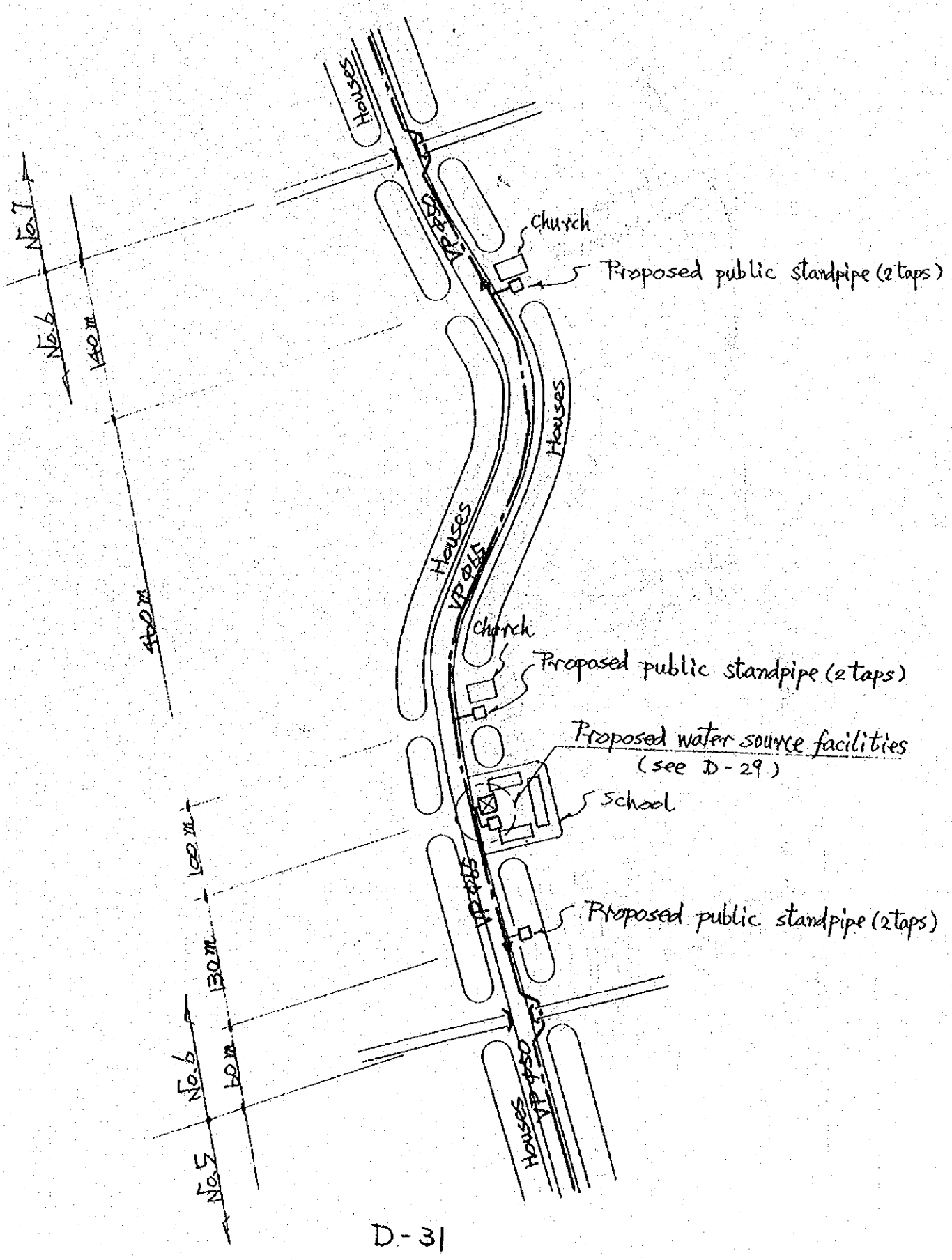
Water Source Facilities
(Padang Mahondang)

Distribution Pipelines (1)

(Padang Mahondang)

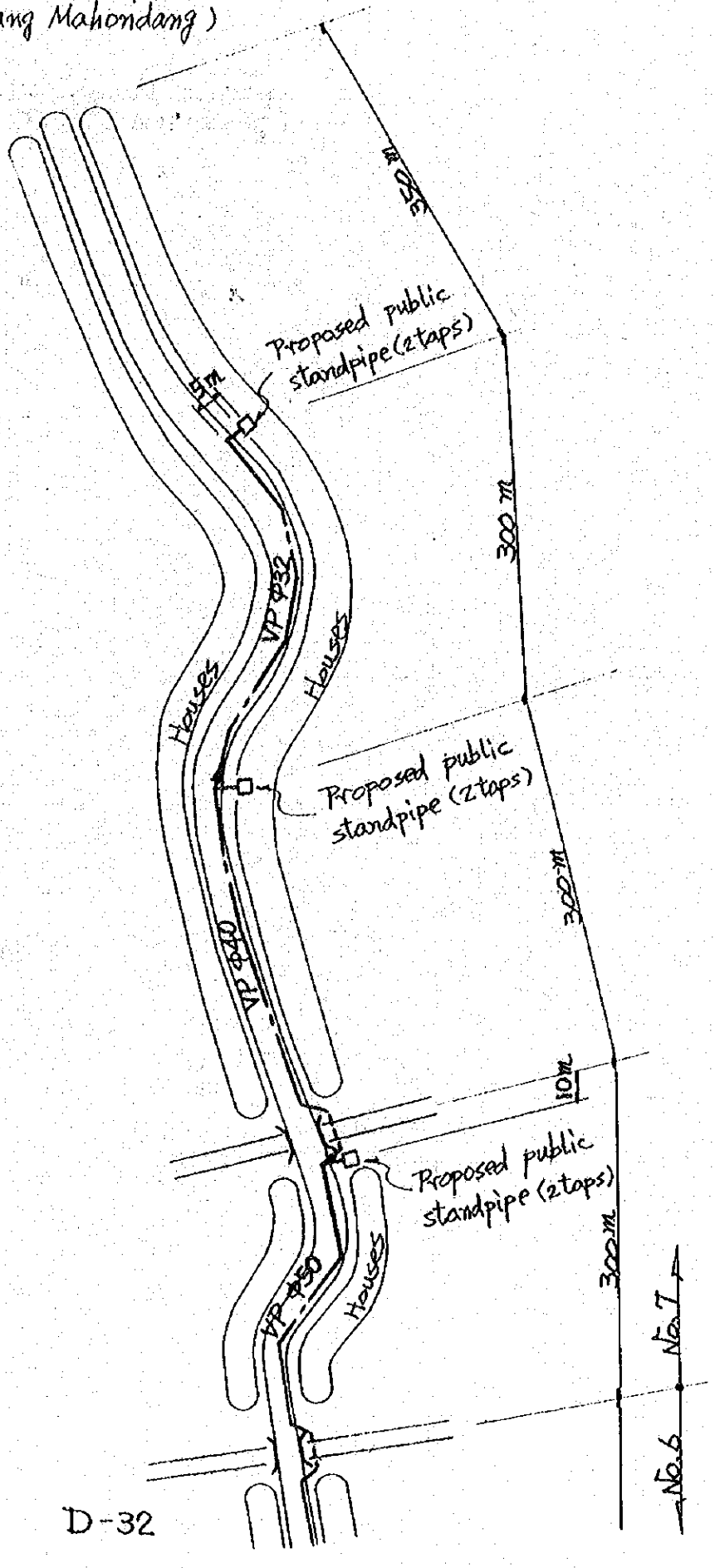


Distribution Pipelines (2)
(Padang Mahondang)



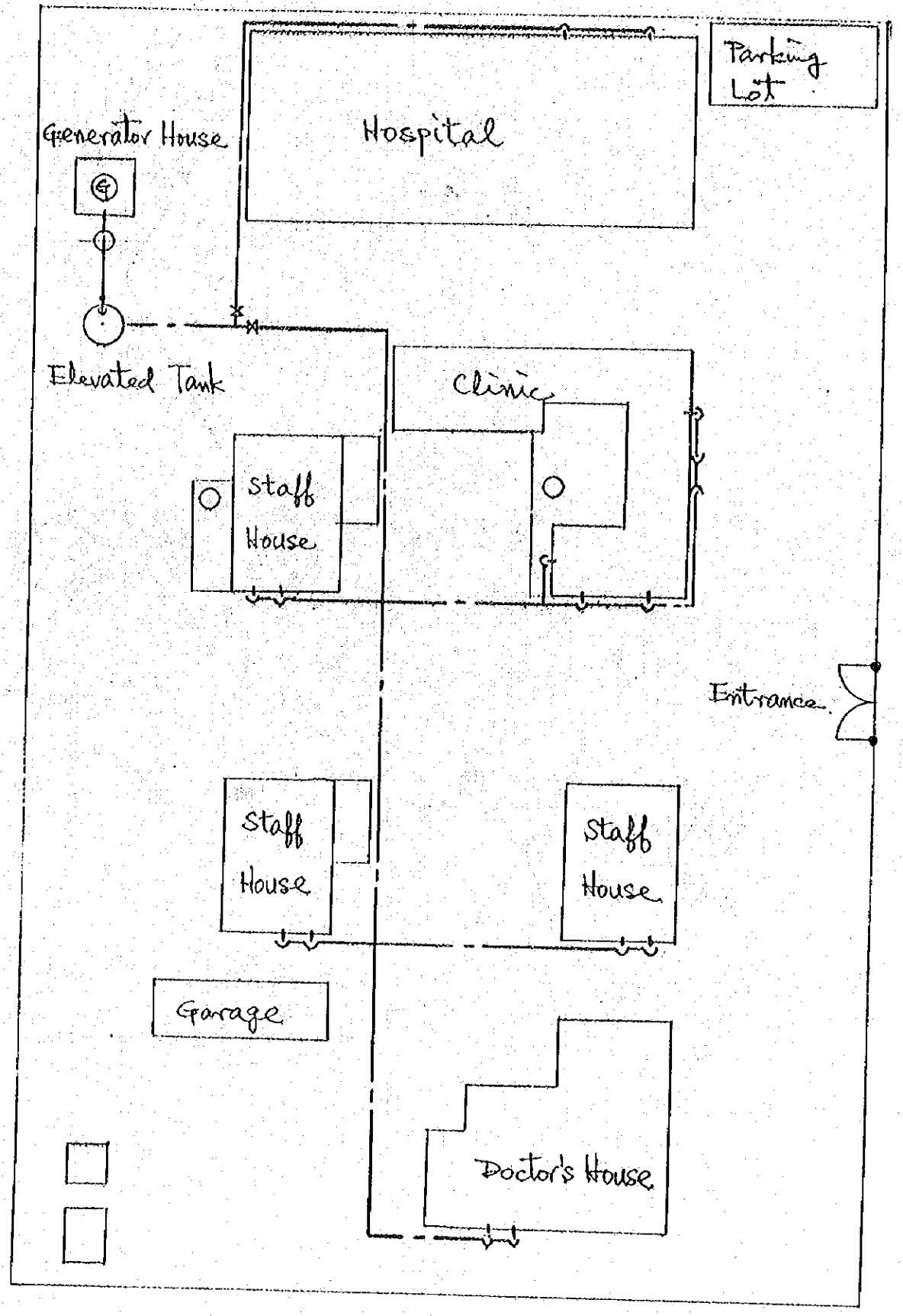
Distribution Pipelines (3)

(Padang Mahondang)



Canel Crossing
(Padang Mahondang)

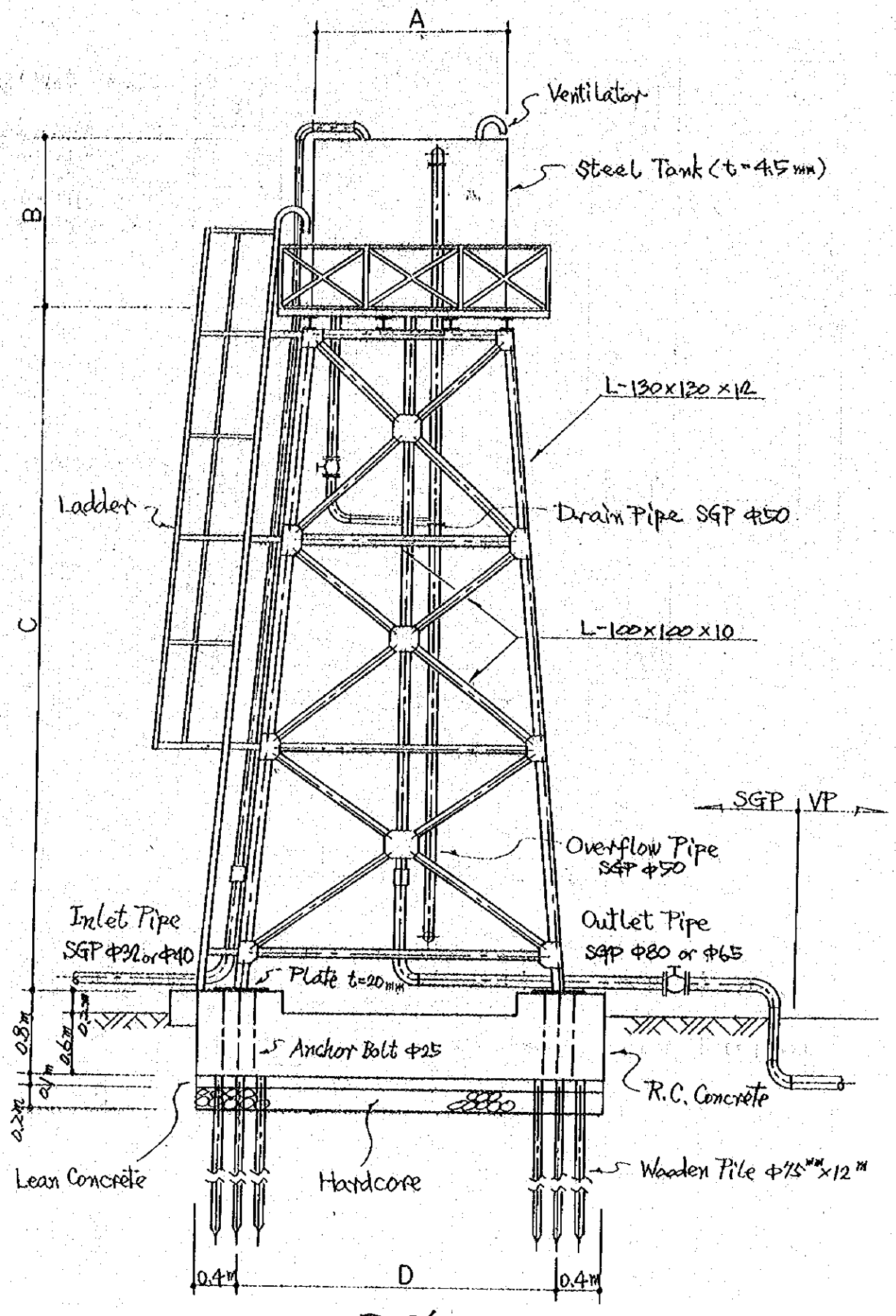
Water Supply System in Pulau Rakyat Health Center N=1/300



Schematic Map of the Water Supply System
(Pulau Rakyat Health Center)

Elevated Tank (1) (Type A)

Section



Elevated Tank (2) (Type A)

Plan of Foundation

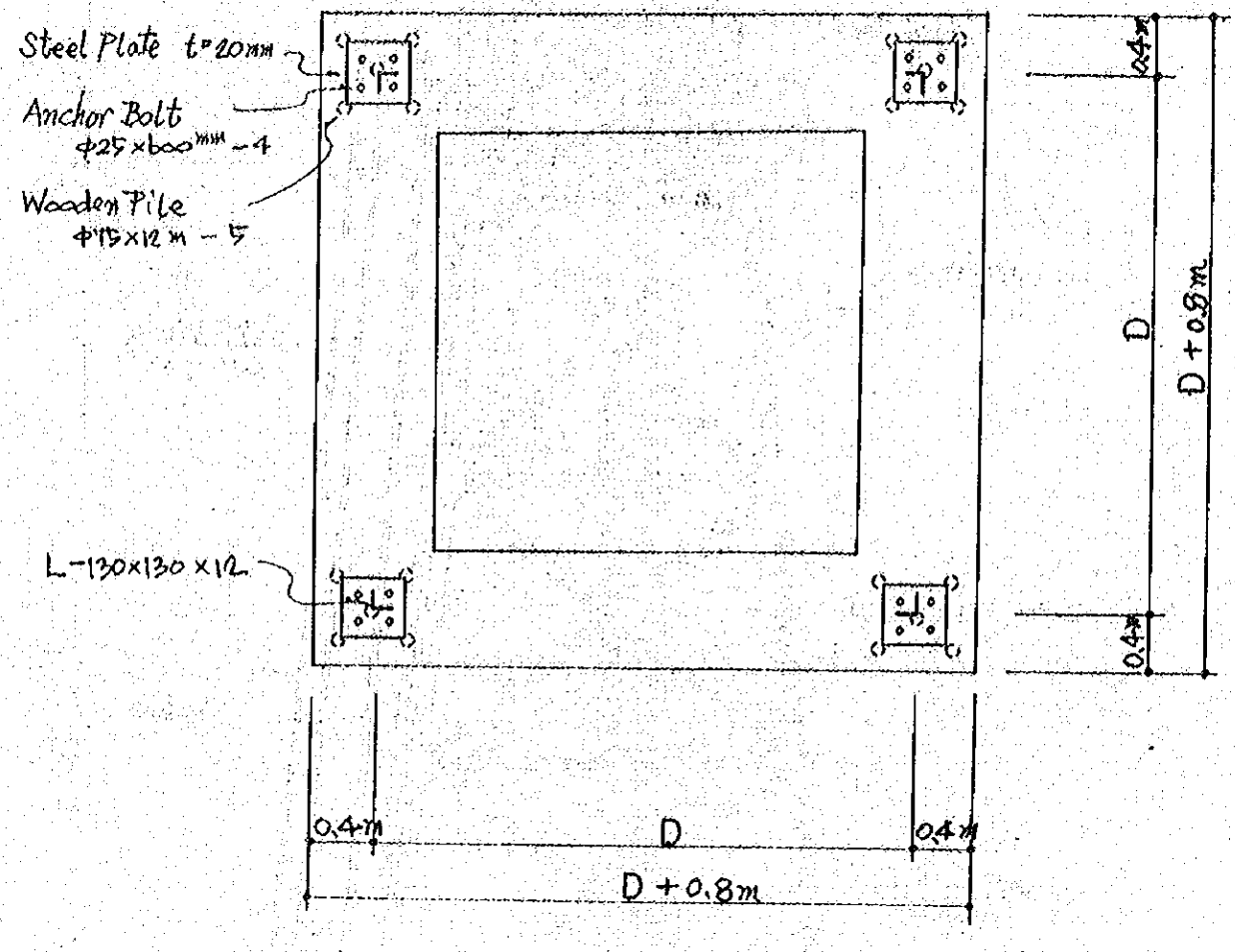
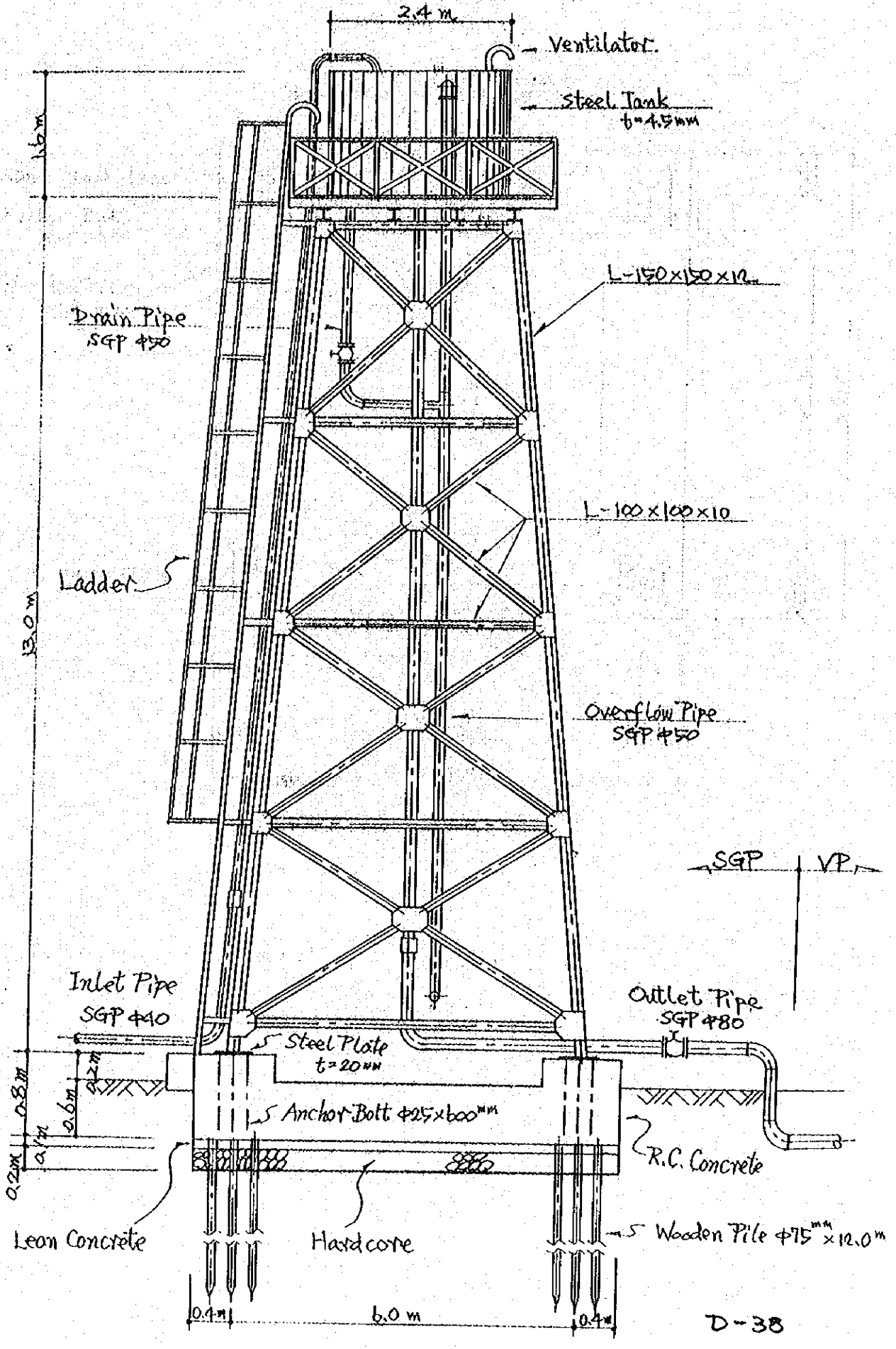


Table of Elevated Tanks

Item \ Site No.	No. 1	No. 2	No. 3	No. 4	No. 6
A	φ2.2m	φ2.4m	□ 1.8m	φ2.2m	□ 1.8m
B	1.6m	1.6m	1.6m	1.6m	1.6m
C	8.0m	9.0m	7.0m	9.0m	5.0m
D	3.8m	4.2m	3.4m	4.2m	2.9m

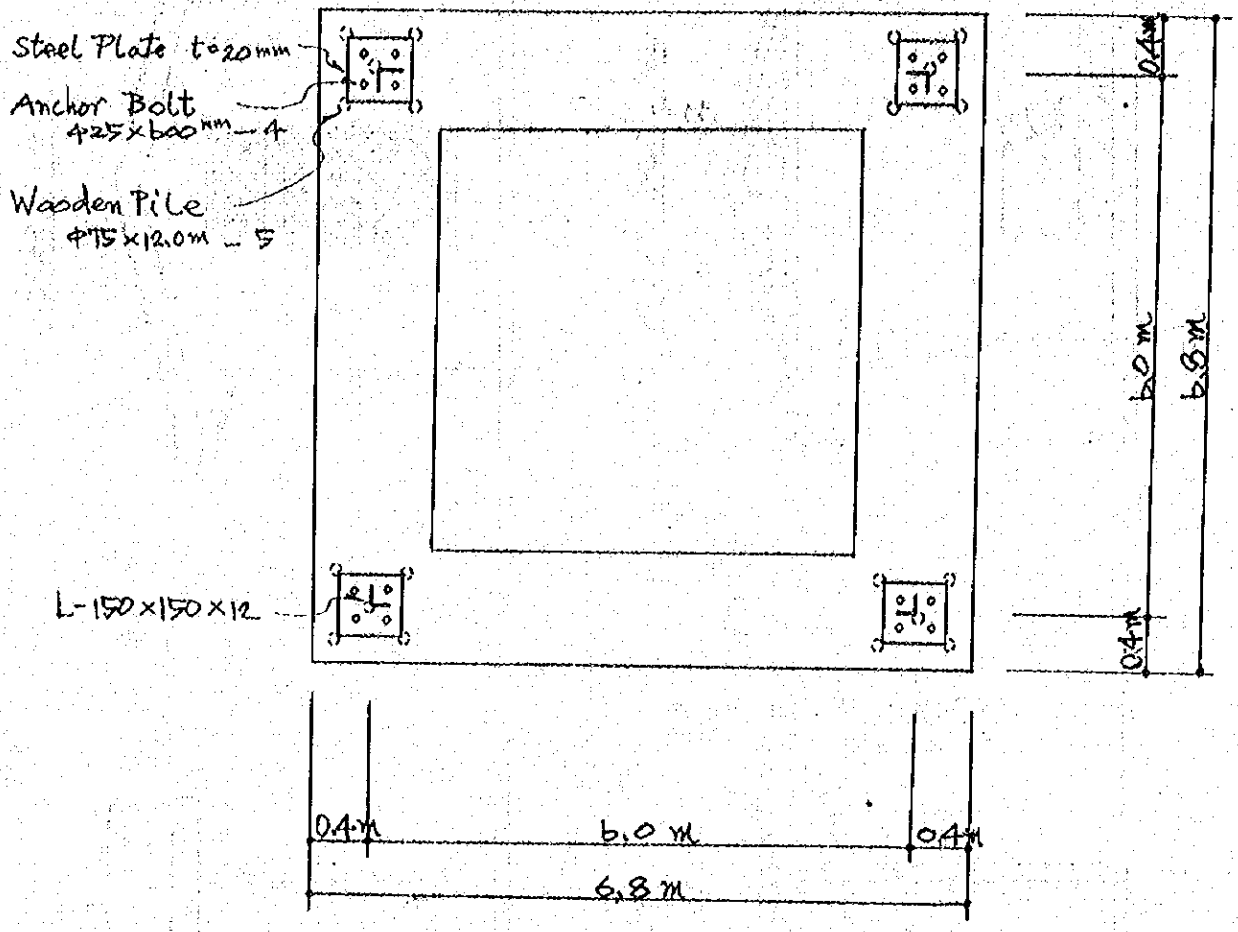
Elevated Tank (3) (Type B)

Section



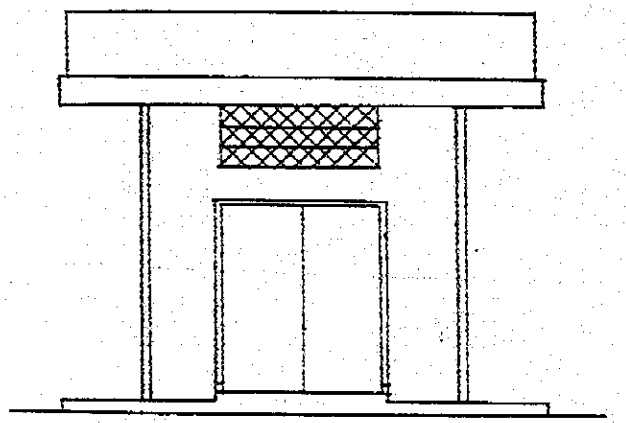
Elevated Tank (4) (Type B)

Plan of Foundation

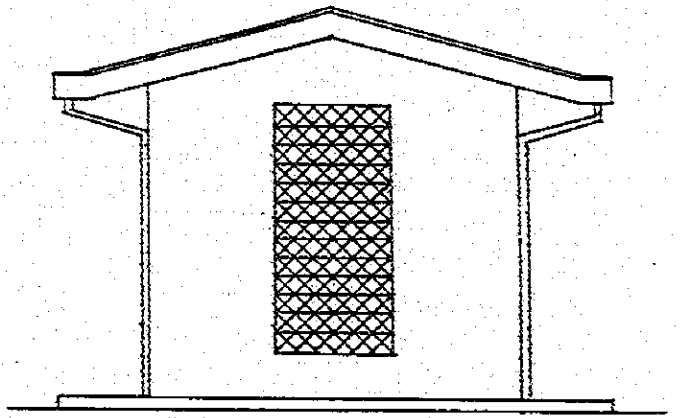


Generator House S=1/10

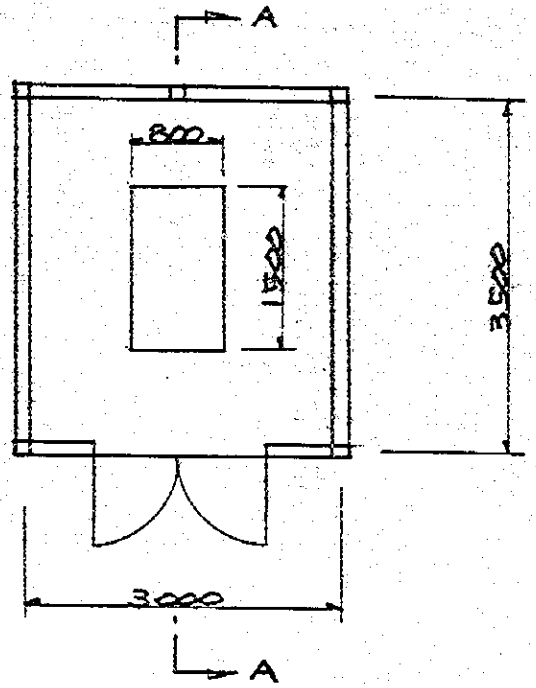
Front View



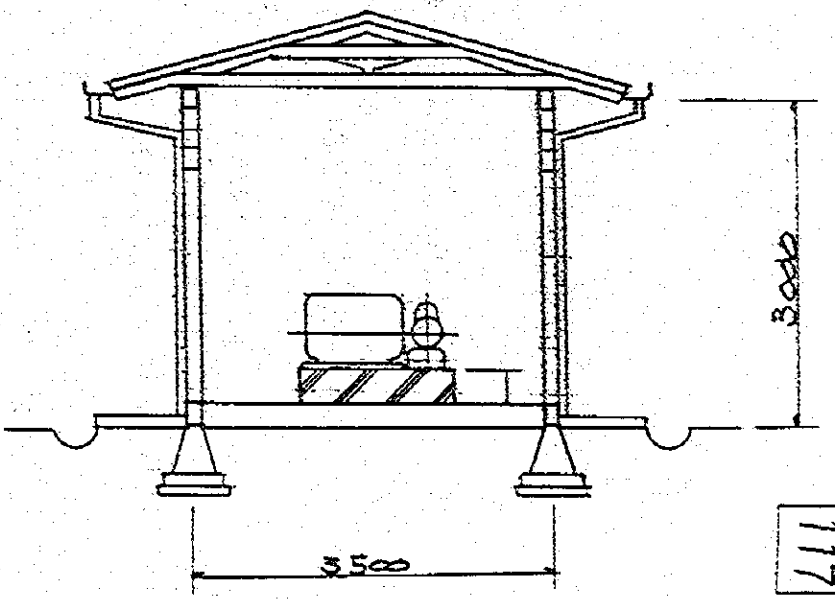
Side View



Sectional Plan



A-A Section



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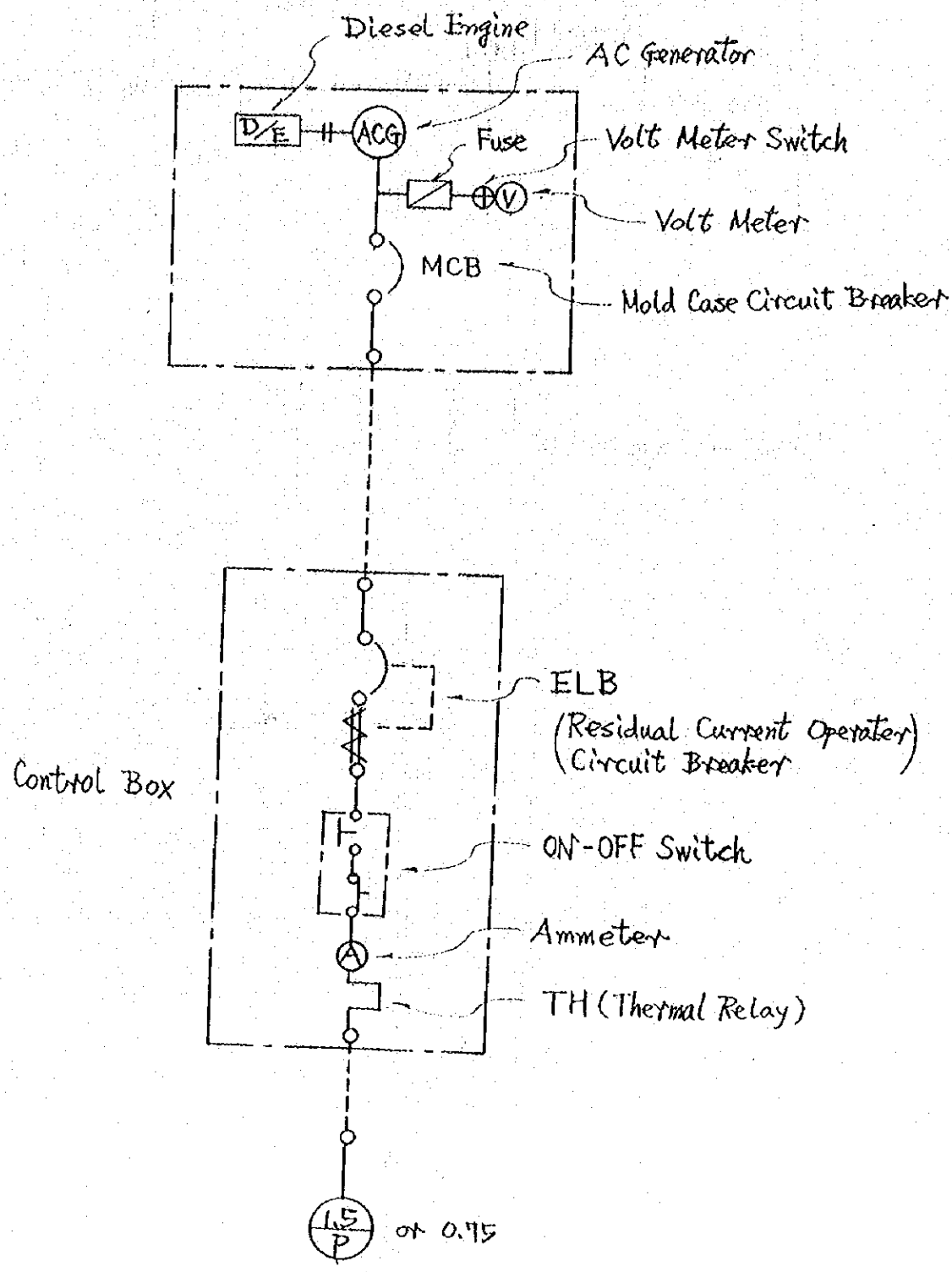
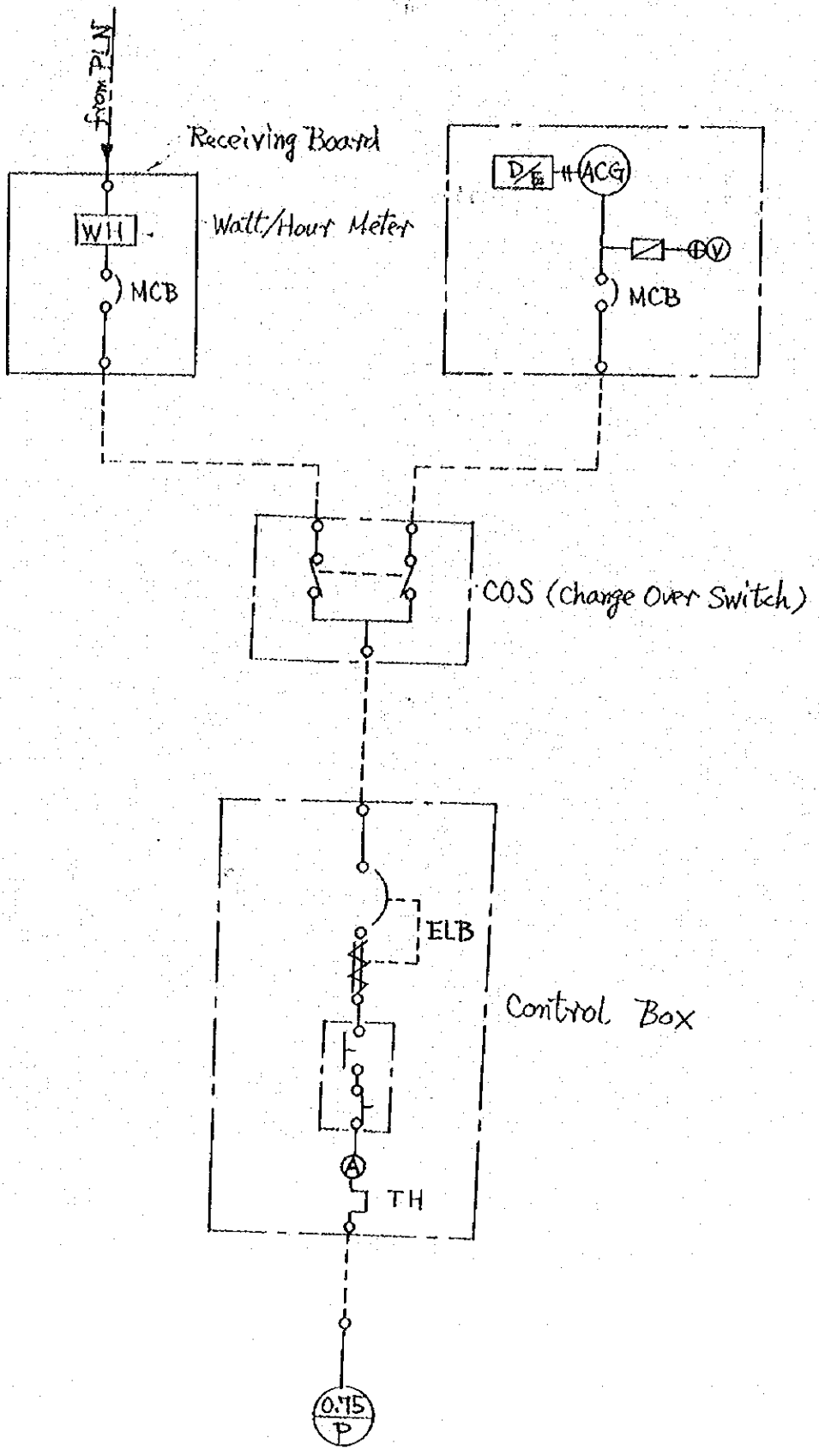
Control Panel for Sites No.1 - No.5



Control Panel for Site No.6



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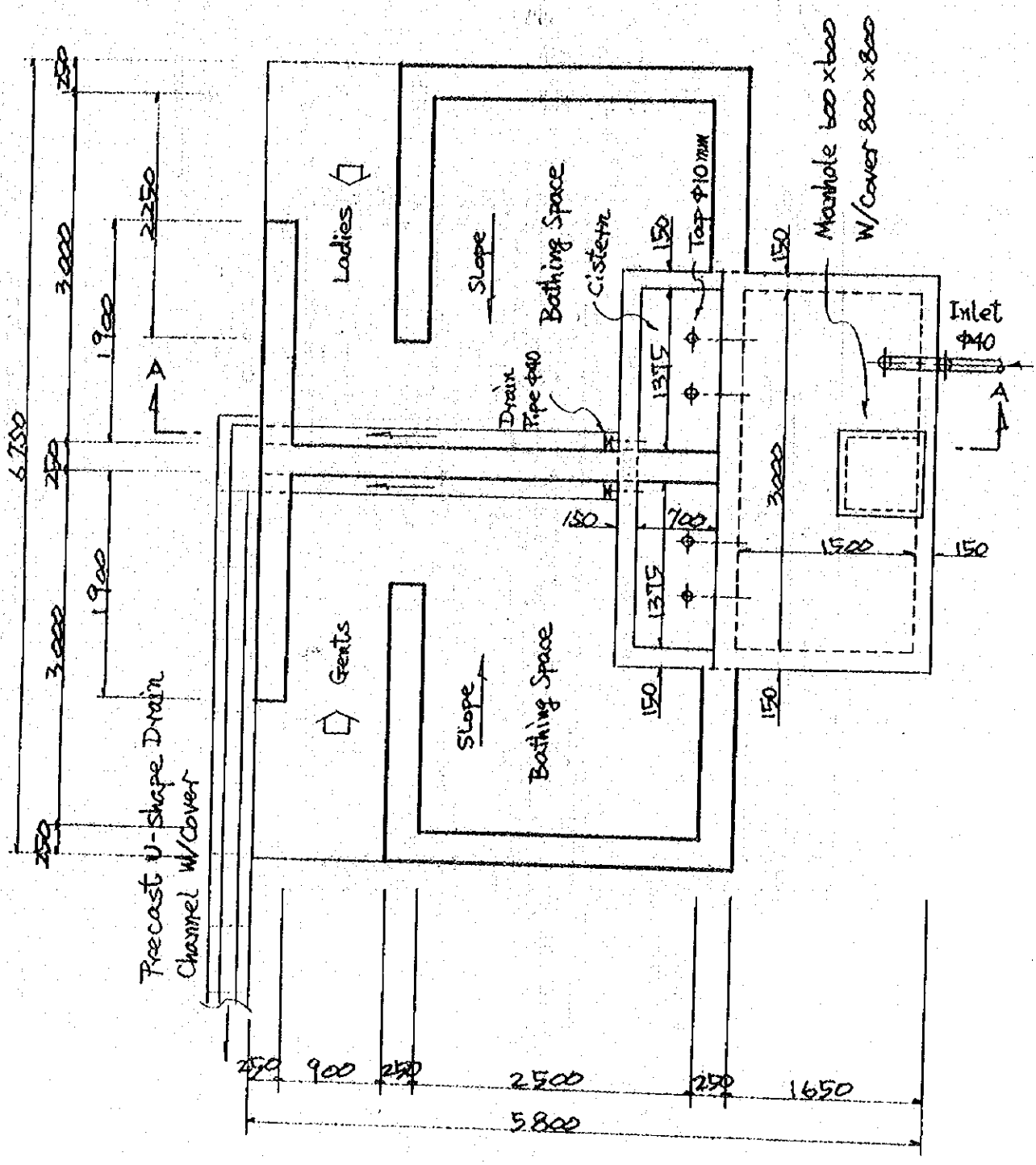
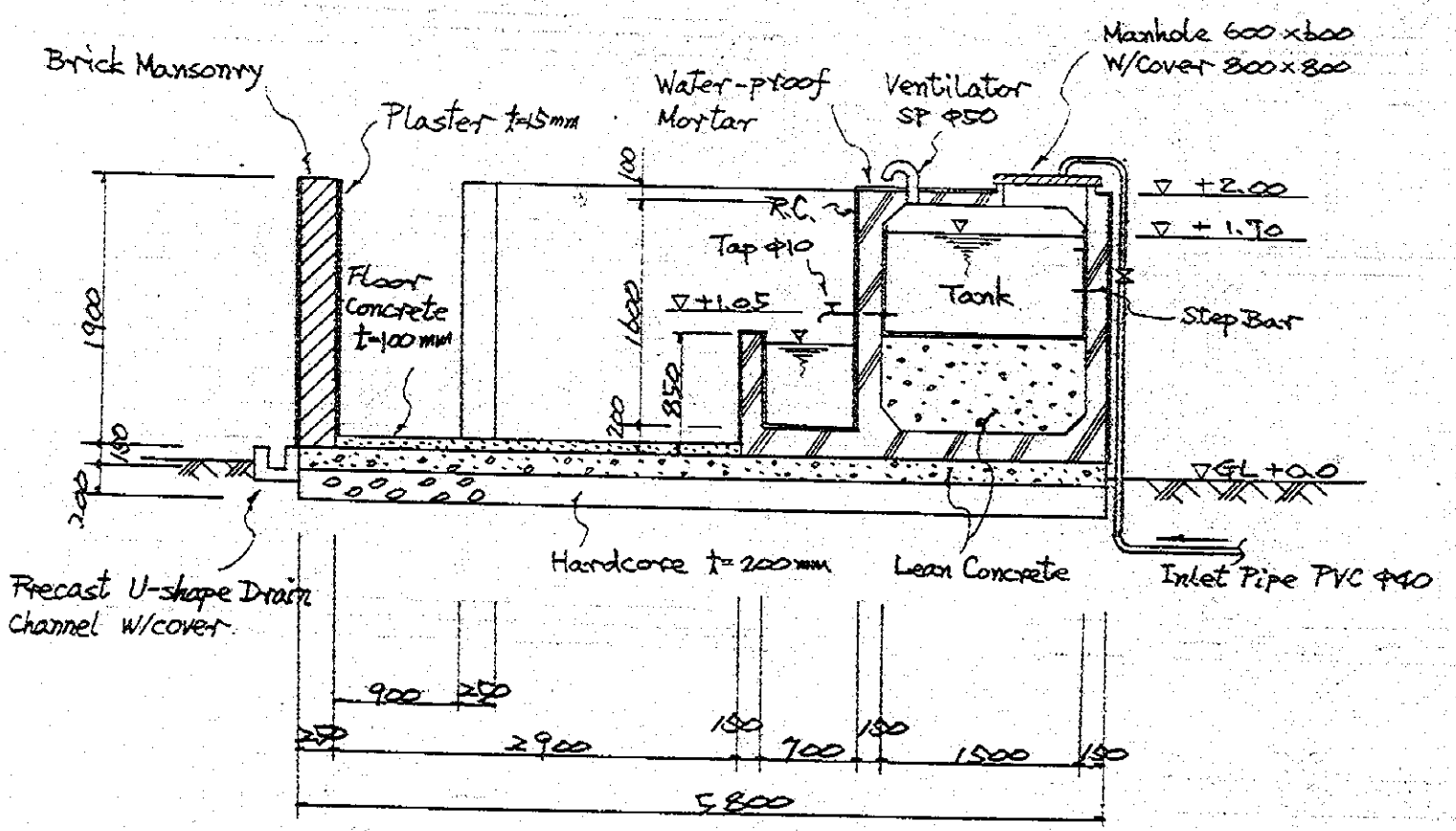
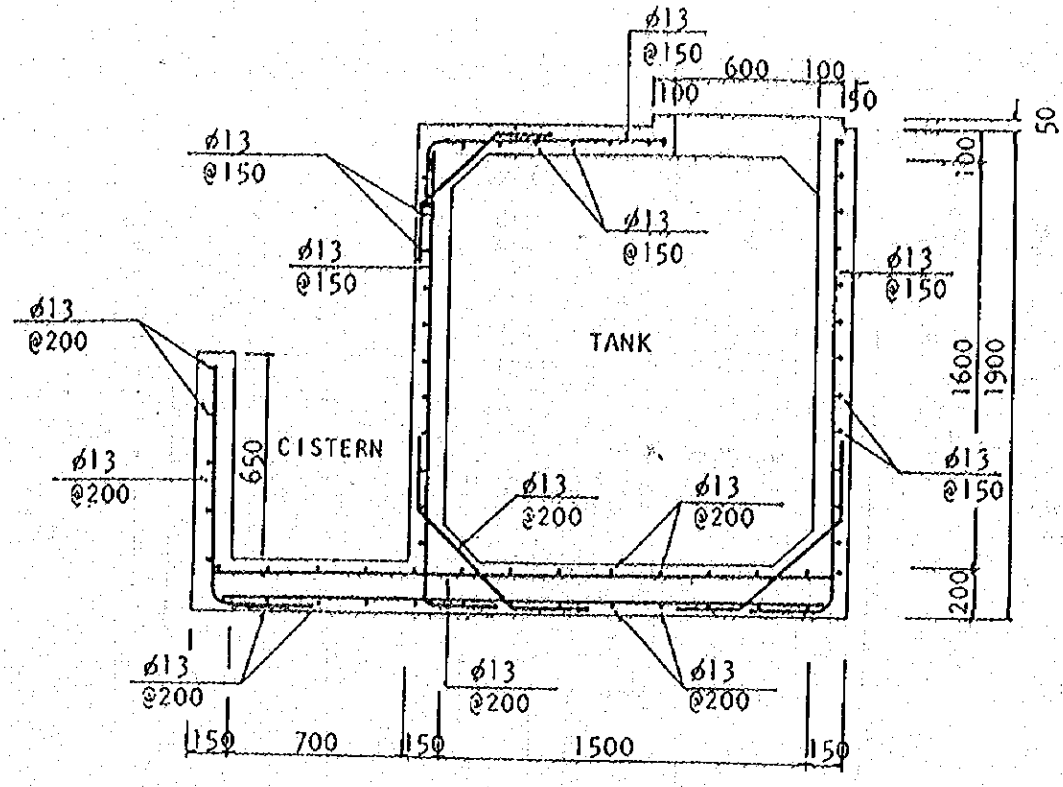
Fence and Gate

Bathing Room - Plan S=1/50

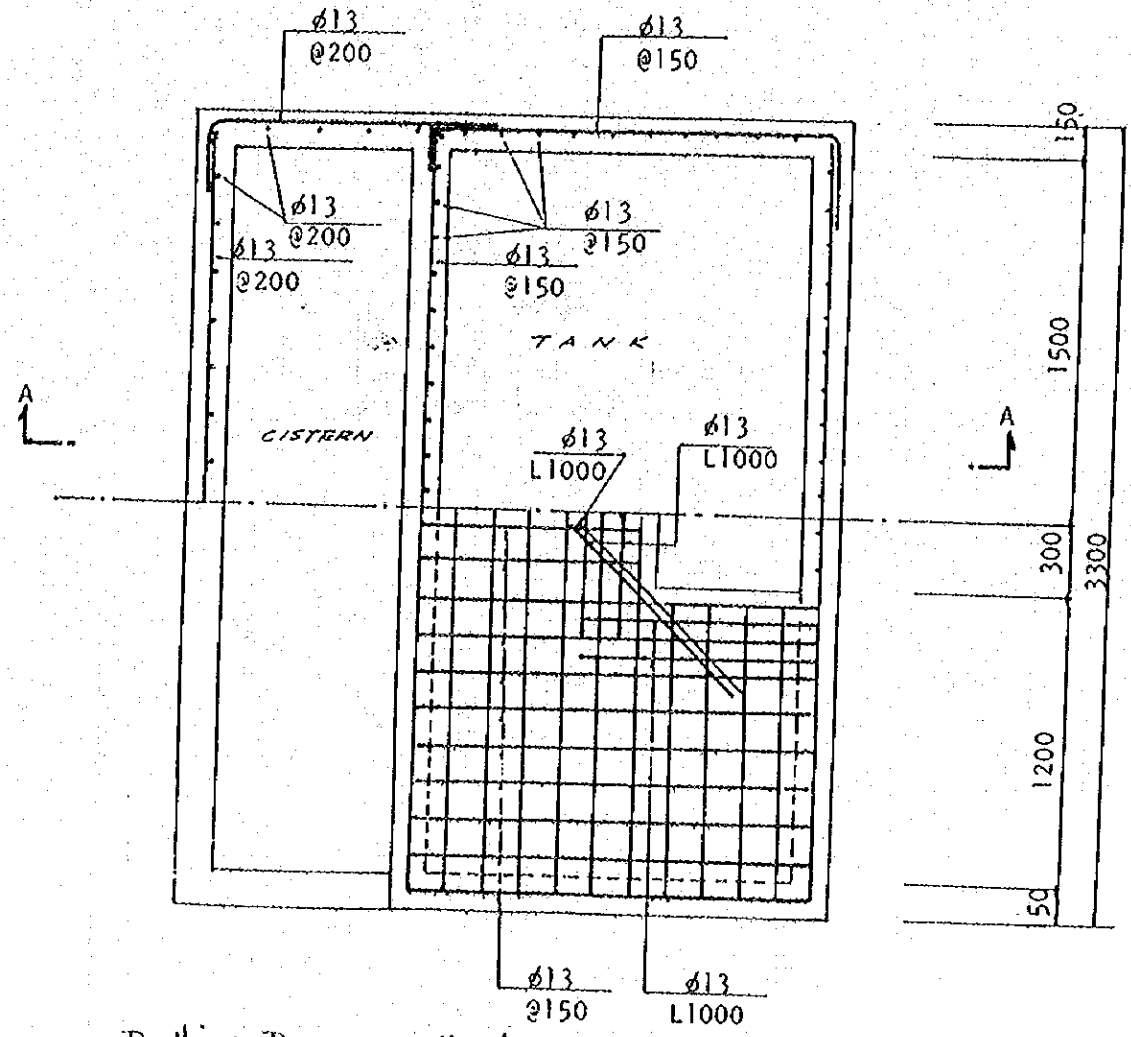


A-A Section of Bathing Room S=1/50





A - A SECTION



Bathing Room – Steel Bar Arrangement

SCALE: 1/30

D-46

Public Standpipe (1) (2 taps) S=1/20

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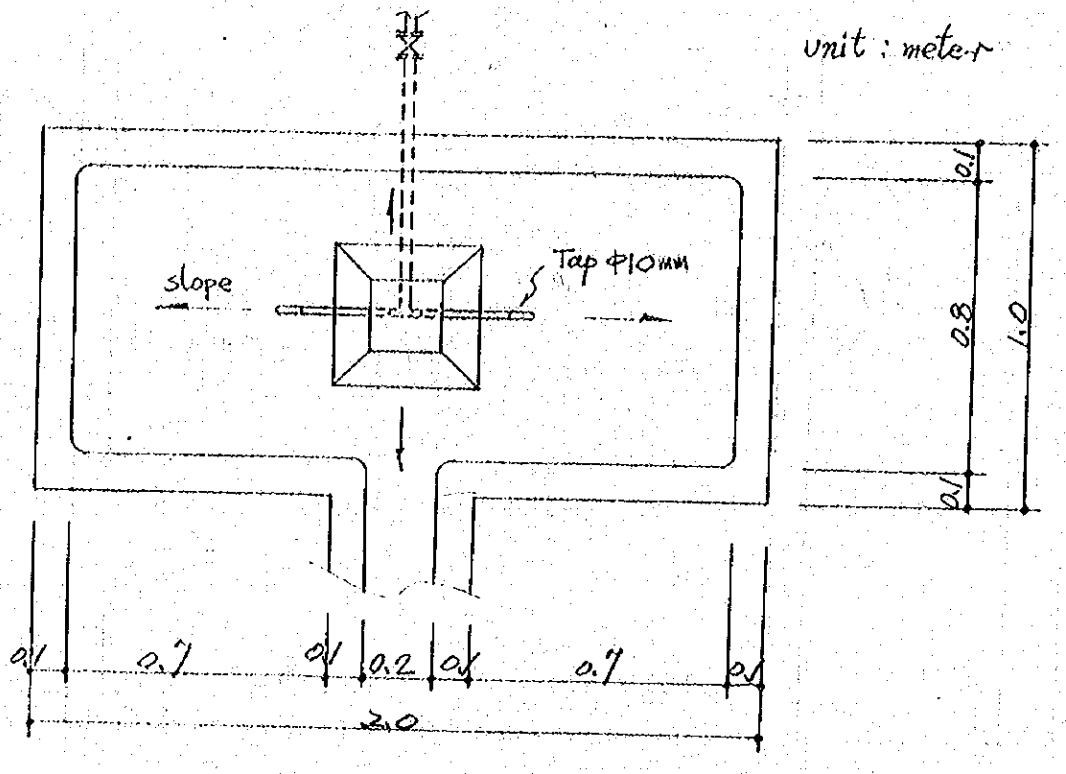
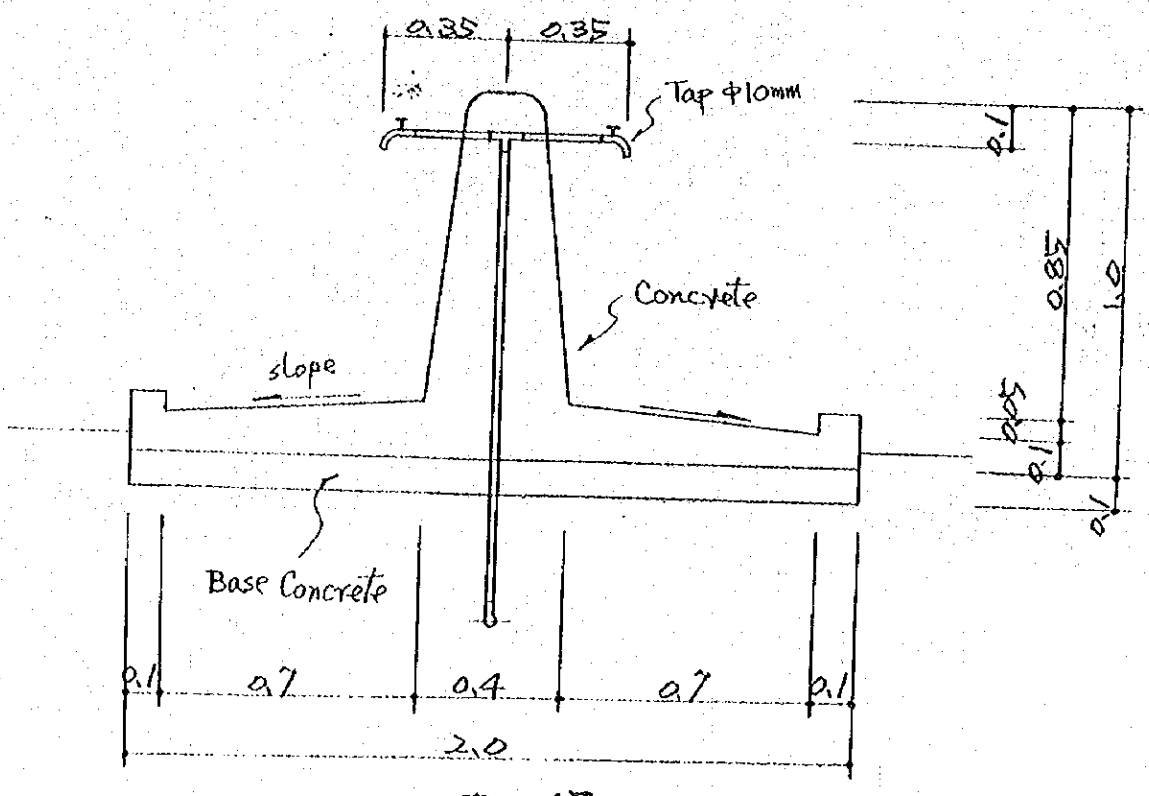
Plan

unit : meter



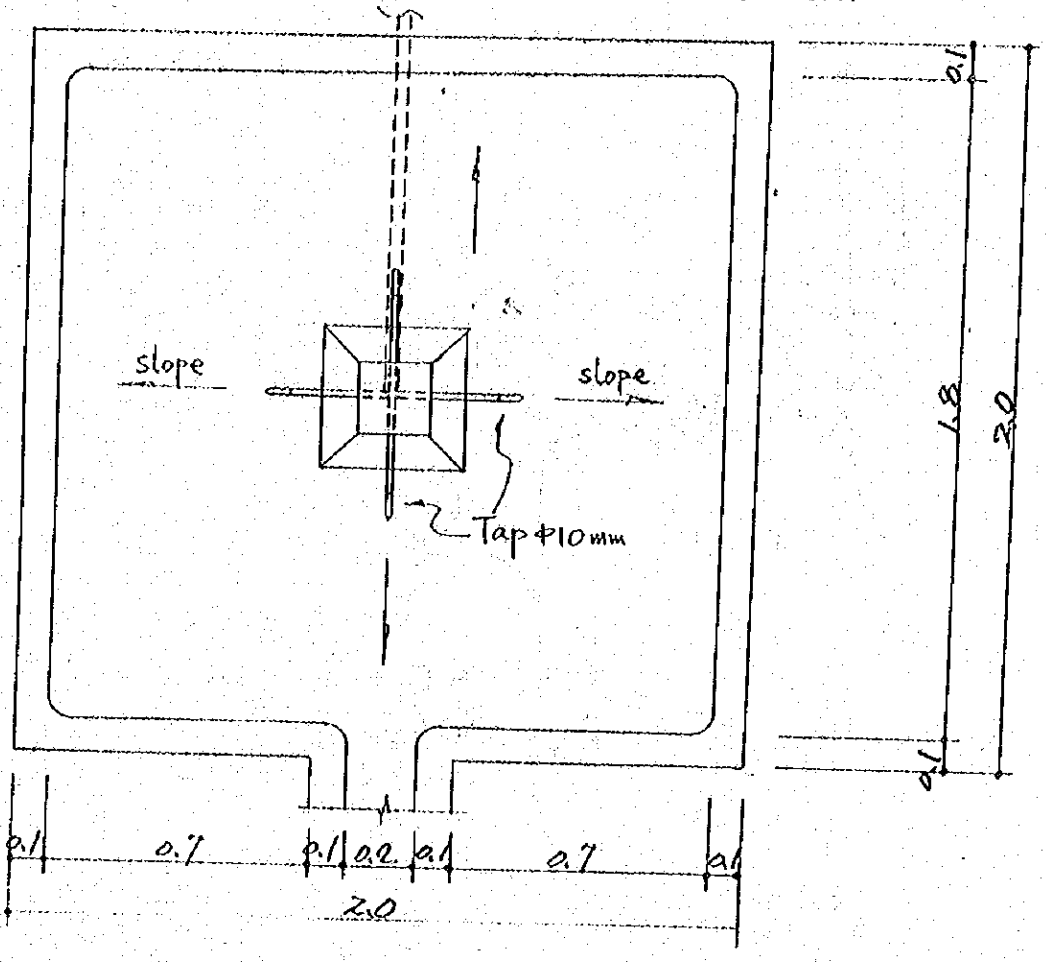
Section



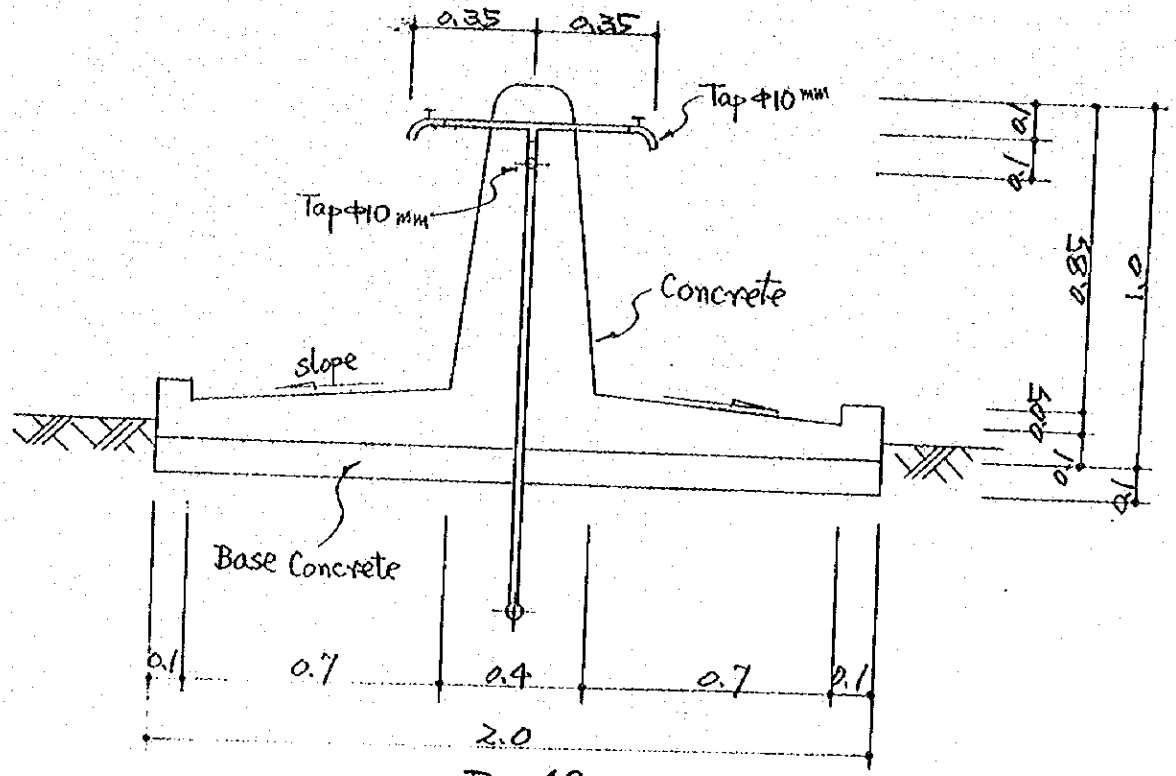
Public Standpipe (2) (4 taps) S=1/30

Plan

unit : meter



Section



Trench Standard S=1/10