

8.3 関係資料

8.3.1 北京市の農業

表8.7 北京市の農業生産

| 作物 | 播種面積 10 ³ ha (%) | 総生産量 10 ³ t | 収量 t/ha |
|-----------|--------------------------------|---------------------------|------------|
| A. 食糧作物 | 529.6 (83.0) | 2,015 | 3.8 |
| 稲 | 46.1 | 270 | 5.9 |
| 小麦 | 187.1 | 660 | 3.5 |
| イモ類 | 7.2 | 20 | 2.8 |
| トウモロコシ | 200.7 | 835 | 4.2 |
| コーリヤン | 12.5 | 30 | 2.4 |
| その他 | 76.0 | 200 | 2.6 |
| B. 工業作物 | 27.5 (4.3) | | |
| 棉花 | 3.4 | 2.1 | 0.6 |
| 油料類 | 19.3 | 20.6 | 1.1 |
| 麻類 | 0.3 | 0.2 | 0.6 |
| 糖料類 | 0.3 | 3.9 | - |
| タバコ | 0.1 | 0.4 | - |
| その他 | 4.1 | | |
| C. その他の作物 | 81.0 (12.7) | - | - |
| 野菜 | 56.8 | - | - |
| ウリ類 | 4.9 | - | - |
| 飼料 | 15.3 | - | - |
| 緑肥 | 3.0 | - | - |
| その他 | 1.0 | - | - |
| 合計 | 638.1 (100) | | |

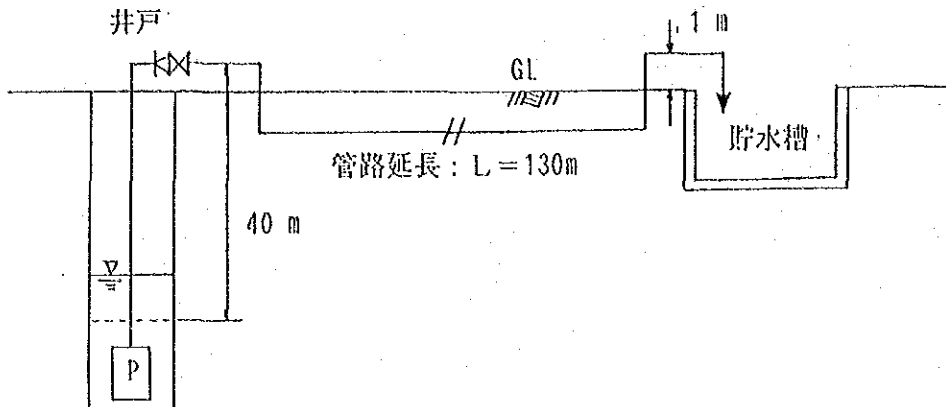
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8.3.2 水源設備諸元（中国側負担による設備）

表8.8 中国側負担による工事概要

| 工 種 | 数 量 | 摘 要 |
|--------------|-------|--|
| 1. 送水管布設工 | 210 m | 鋳鉄管 ϕ 150mm (No.1, No.3井戸～新設貯水槽) |
| 2. 貯 水 槽 | 1式 | RC製、有効容量 220 m^3 |
| 3. 加 圧 ポンプ | 2台 | 吐出量 1,500 l /min、揚程 40m (灌漑ブロック No.1, No.2) |
| 4. 圧 カ タ ン ク | 1基 | 容量 1.6～ 2.1 m^3 |
| 5. 加 圧 ポンプ | 2台 | 吐出量 500 l /min、揚程 35m (灌漑ブロック No.3) |
| 6. 配水管布設工 | 1式 | 鋳鉄管、温室への配管を含む。 |
| 7. 既設貯水槽改造 | 1式 | 容量 10 m^3 以上 (灌漑ブロック No.3) |

(1) 送水管



管 種 : 鋳鉄管

ポンプ揚水量 : $Q = 2.0 \text{ m}^3/\text{min} = 0.033 \text{ m}^3/\text{sec}$.

管路延長 : $L = 130 \text{ m}$

Hazen-Williams公式を用い流速係数 $C=80$ とする。

a. 管径 $\phi 150 \text{ mm}$ とした場合、

$$A = \pi/4 \cdot D^2 = 0.01767 \text{ m}^2$$

$$V = Q / A = 0.033 / 0.01767 = 1.868 \text{ m/s}$$

$$\begin{aligned} \text{摩擦損失水頭 } h_1 &= (6.819 \cdot L \cdot V^{1.852}) / (C^{1.852} \cdot D^{1.167}) \\ &= 6.819 \times (130+40) \times 1.868^{1.852} / (80^{1.852} \times 0.15^{1.167}) \\ &= 7.71 + 2.37 = 10.08 \text{ m} \end{aligned}$$

$$\text{バルブ回り } h_2 = 2.0 \text{ m}$$

$$\text{全摩擦損失水頭 } H = h_1 + h_2 = 10.1 + 2.0 = 12.1 \text{ m}$$

$$\text{全揚程} = \text{実揚程} + \text{損失水頭} = 41 + 12.1 = 53.1 = 54 \text{ m}$$

b. 管径 $\phi 125 \text{ mm}$ とした場合、

$$A = \pi/4 \cdot D^2 = 0.01227 \text{ m}^2$$

$$V = Q / A = 0.033 / 0.01227 = 2.689 \text{ m/s}$$

$$\begin{aligned} \text{摩擦損失水頭 } h_1 &= (6.819 \cdot L \cdot V^{1.852}) / (C^{1.852} \cdot D^{1.167}) \\ &= 6.819 \times (130+40) \times 2.689^{1.852} / (80^{1.852} \times 0.125^{1.167}) \\ &= 18.73 + 5.76 = 24.49 \text{ m} \end{aligned}$$

$$\text{バルブ回り } h_2 = 2.0 \text{ m}$$

$$\text{全摩擦損失水頭 } H = h_1 + h_2 = 24.5 + 2.0 = 26.5 \text{ m}$$

$$\text{全揚程} = \text{実揚程} + \text{損失水頭} = 41 + 26.5 = 67.5 = 68 \text{ m}$$

以上より、送水管の管径は $\phi 150 \text{ mm}$ を推薦する。

(2) ポンプ

a. 灌漑ブロック No.1 および No.2 用水系統

必要ポンプ能力 --- 1,500 Q /min.

必要水頭 --- 40 m

スプリンクラーノズル圧 --- 25.0 m

擦損失水頭 --- 8.0 m

ポンプ回り --- 3.0 m

実揚程 --- 4.0 m

計 40.0 m

b. 灌漑ブロック No.3 用水系統

必要ポンプ能力 --- 500 Q /min.

必要水頭 --- 35 m

スプリンクラーノズル圧 --- 25.0 m

擦損失水頭 --- 4.0 m

ポンプ回り --- 2.0 m

実揚程 --- 4.0 m

計 35.0 m

(3) 貯水槽の容量

灌漑用ポンプ容量の2時間分を見込むものとする。

必要有効容量： 灌漑用水 --- 180 m^3 (90 m^3 /hr X 2hr)

生活用水 --- 40 m^3

合 計 --- 220 m^3

表8.9 畑別実灌水量

| ブロック | 畑 別 | ドリップライン全長(m) | 実灌水量(Q/min) |
|------|-----|--------------------|-------------|
| No.1 | A | 7,600 | 348.33 |
| | B | 11,200 | 513.33 |
| | E1 | 3,168 | 145.20 |
| | E2 | 4,851 | 222.24 |
| | F | 3,930 | 180.13 |
| 小計 | | 30,749 | 1,409.23 |
| No.2 | C | 6,660 | 305.25 |
| | D | 12,600 | 577.50 |
| | G1 | 3,300 | 151.25 |
| | G2 | 7,150 | 327.71 |
| | H | 144 (導水ホース全長) | 78.00 |
| 小計 | | 29,710 + 導水 144 | 1,439.71 |
| No.3 | I | 10,000 | 458.33 |
| | J | 9,562 | 438.25 |

8.3.3 用水計画

灌漑間断日数の算定

1. 有効根群の利用可能給水分量AMの決定

$$AM = \frac{1}{100} (F_{cn} - W_{pn}) S_{an} D_n \dots\dots\dots (4 \cdot 1)$$

- AM : 有効根群域の利用可能給水分量
- F_{cn} : 各層の圃場容水量 (%)
- W_{pn} : 各層の初期萎調点 (%)
- S_{an} : 各層の仮比重
- D_n : 各層の厚さ (cm)

上式に中国側より示された土壌条件を適用してAMを求めると下表のとおりとなる。

表8.10 土壌諸元(既設圃場)

| 区分 | 層の深さ (cm) | 仮比重 | 圃場容水量 | 初期萎調点 | 備 考 |
|----|-----------|------|-------|-------|-----|
| 1 | 0~10 | 1.17 | 32.18 | 11.00 | |
| 2 | 10~20 | 1.25 | 〃 | 〃 | |
| 3 | 20~30 | 〃 | 〃 | 〃 | |
| 4 | 30~40 | 〃 | 〃 | 〃 | |

表8.11 AM算出表(既設圃場)

| 区分 | 層の深さ (cm) | 利用可能水分量 (AM) |
|----|-----------|--|
| 1 | 0~10 | $1/100 (32.18 - 11.00) \times 1.17 \times 100 = 24.78$ |
| 2 | 10~20 | $1/100 (\quad \quad) \times 1.25 \times 100 = 26.47$ |
| 3 | 20~30 | 同 上 |
| 4 | 30~40 | 同 上 |

表8.12 土壌諸元(新設圃場)

| 区分 | 層の深さ (cm) | 仮比重 | 圃場容水量 | 初期萎調点 | 備 考 |
|----|-----------|------|-------|-------|-----|
| 1 | 0~10 | 1.42 | 26.76 | 11.00 | |
| 2 | 10~20 | 1.31 | 〃 | 〃 | |
| 3 | 20~30 | 〃 | 〃 | 〃 | |
| 4 | 30~40 | 〃 | 〃 | 〃 | |

表8.13 AM算出表(新設圃場)

| 区分 | 層の深さ (cm) | 利用可能水分量 (AM) |
|----|-----------|--|
| 1 | 0~10 | $1/100 (26.76 - 11.00) \times 1.42 \times 100 = 22.38$ |
| 2 | 10~20 | $1/100 (\quad \quad) \times 1.32 \times 100 = 20.80$ |
| 3 | 20~30 | 同上 |
| 4 | 30~40 | 同上 |

2. 容易利用可能水分量(1回の純灌水量)の算定

表8.14 既設圃場 (TRAM) の算定表

| 区分 | 層の深さ (cm) | 吸水効率 | A M | T. R. A. Mの算出 | TRAM |
|----|-----------|------|-------|--|-------|
| 1 | 0~10 | 40 | 24.78 | $24.78 \times 1/40 \times 100 = 61.75$ | 61.95 |
| 2 | 10~20 | 30 | 26.47 | $26.78 \times 1/30 \times 100 = 89.27$ | (制限層) |
| 3 | 20~30 | 20 | 〃 | $〃 \times 1/20 \times 100 = 133.90$ | |
| 4 | 30~40 | 10 | 〃 | $〃 \times 1/10 \times 100 = 267.80$ | |

表8.15 新設圃場 (TRAM) の算定表

| 区分 | 層の深さ (cm) | 吸水効率 | A M | T. R. A. Mの算出 | TRAM |
|----|-----------|------|-------|--|-------|
| 1 | 0~10 | 40 | 22.38 | $22.38 \times 1/40 \times 100 = 55.95$ | 55.95 |
| 2 | 10~20 | 30 | 20.80 | $20.80 \times 1/30 \times 100 = 69.33$ | (制限層) |
| 3 | 20~30 | 20 | 〃 | $〃 \times 1/20 \times 100 = 104.0$ | |
| 4 | 30~40 | 10 | 〃 | $〃 \times 1/10 \times 100 = 208.0$ | |

上記計算の結果TRAMの両方の畑を通しての制限層は新設圃場の第1層と言う事になりその値は 55.95mmである。

3. 間断日数の算定

このTRAM(1回灌水可能量) 55.95mmから1日用水量 $8/0.9=8.89$ mmを用い間断日数を求めると $55.95 \div 8.89=6.29$ 日 6日間断となる。

4. ドリップ灌漑の間断日数の算定

ドリップ灌漑の湿潤域は1個のエミッターについて作られる湿潤域の重複度合により決定されることから、TRAMの算定に対する考え方を生長阻害水分点（萎凋点）から任意の点滴灌水点水分量に置き換えたものである。従ってドリップ灌漑の間断日数の算定は次のとおりとなる。

(1) 点滴総迅速有効水分量（DTRAM）

$$\begin{aligned} \text{DTRAM} &= (F_c - O_1) \cdot D \cdot \frac{1}{C_D} \\ &= (1 - C_r) \times \text{TRAM} \end{aligned}$$

F_c : 24時間圃場容水量（容積比）

O_1 : 点滴灌水点水分量（ 〃 ）

C_D : 水分吸収比率係数

C_r : 好水分作物係数

| | | |
|-------|-----------|------|
| C_r | キュウリ・ピーマン | 0.15 |
| | レタス | 0.10 |
| | ナス | 0.08 |

作物不定であるので安全性を考えてキュウリ、ピーマンの0.15を用いると

$$\begin{aligned} \text{DTRAM} &= (1 - 0.15) \times \text{TRAM} \\ &= 0.85 \times 55.95 = 47.56 \end{aligned}$$

又、ドリップの湿潤巾を考えて全面積を仮想すると

$$\text{全面積換算仮想TRAM} = \text{DTRAM} \times \text{湿潤率} (P)$$

$$\text{湿潤率} (P) = \frac{\text{湿潤巾} \times \text{湿潤長} \times \text{ドリップライン数}}{\text{圃場面積}}$$

今、当試験圃場の単位区画について考えると

湿润巾 : 0.4m 湿润長 : 100m
ドリップライン : 25m × 100m に 26本が標準

従って

$$P = \frac{0.4 \times 100 \times 26}{2,500\text{m}^2} = 0.42$$

従って、全面積換算仮想TRAMは $0.42 \times \text{DTRAM}$ となる。

$$0.42 \times 47.56 = 19.98$$

全面積換算仮想TRAM = 19.98mm

従ってドリップ間断日数は

$$\frac{19.98}{8.89} = 2.25 \text{ 日となる。}$$

即ちドリップラインの場合は2日間断となる。

8.3.4 圧力伝播速度の検討

圧力伝播速度は次の式から求める。

$$\alpha = \sqrt{\frac{1}{\frac{W}{g} \left(\frac{1}{K} + \frac{D \cdot C_1}{E \cdot t} \right)}}$$

- ここで
- α : 水撃波の伝播速度 (m/sec)
 - g : 重力の加速度 9.80 (m/sec²)
 - W : 水の単位体積重量 1,000 (kg/m³)
 - K : 水の体積弾性係数 2.2×10^8 (kg/m²)
 - E : 管材料の縦弾性係数 (kg/m²)
ビニルパイプは 3×10^8 (kg/m²)
 - D : 管の直径 (m)
 - t : 管厚 (m)
 - C_1 : 管の埋設状況による係数。1.0とする。

上記条件を代入すると下表の結果を得る。

| | | | | |
|----|------------|-----|-----|-----|
| 直径 | D_{mm} | 125 | 100 | 75 |
| 管厚 | t_{mm} | 7.5 | 7.1 | 5.9 |
| 波速 | α_m | 422 | 434 | 456 |

長さ l の管路を圧力波が往復する時間 $2l/\alpha$ と弁の開閉時間 T との関係で、次の3つのケースの水撃圧が求められる。

- 1) $T=0$ (瞬間閉そく)

$$H_{max} = \frac{\alpha V}{g}$$

$$h_x = H_{max}$$

- 2) $T \leq 2l/\alpha$ (急閉そく)

$$H_{max} = \frac{\alpha V}{g}$$

$$x < \frac{\alpha T}{2} \text{ のとき } \quad h_x = \frac{\alpha V}{g} \cdot \frac{x}{x_0}$$

$$x \geq \frac{\alpha T}{2} \text{ のとき } \quad h_x = H_{max}$$

$$3) \cdot T > \frac{2L}{\alpha} \quad (\text{緩閉そく})$$

$$H_{\max} = \left(\frac{K_1}{2} + \sqrt{K_1 + \frac{K_1^2}{4}} \right) H_0$$

$$h_x = \frac{\alpha V}{g} \cdot \frac{\mu}{T} \cdot \frac{x}{L}$$

- ここに H_{\max} : 最大水撃水頭 (m)
 h_x : 流入距離 x の断面の水撃水頭 (m)
 v : 初期流速 (m/sec)
 x_0 : $\alpha t/2$ (m)
 x : 流入口よりの距離 (m)
 T : バルブの閉そく時間 (sec)
 H_0 : 弁位置の静水頭 (m)
 μ : $2L/\alpha$
 L : 管路の長さ L (m)
 K_1 : $\left(\frac{LV}{gH_0 T} \right)^2$

従って、水撃圧を小さくするには、初期流速 V を小さくする、バルブの閉そく時間 T を大きくする。即ち、緩やかに閉そくする等を考えねばならない。

8.3.5 工事費内訳

(1) 労務費および材料単価

表8. 16 労務費および材料単価表

| 番 号 | 名 称 | 単 位 | 単 価 (元) | 摘 要 |
|-----|---------------------|----------------|---------|-----|
| 1 | 特殊作業員 | 人 | 15.00 | |
| 2 | 普通作業員 | 〃 | 10.00 | |
| 3 | 補助作業員 | 〃 | 5.00 | |
| 4 | 砂 | m ³ | 22.00 | |
| 5 | 碎石 | m ³ | 21.00 | |
| 6 | 砂利 | m ³ | 18.00 | |
| 7 | 煉瓦 | ヶ | 0.10 | |
| 8 | 釘 | kg | 2.15 | |
| 9 | 鉄線 (22#) | kg | 2.90 | |
| 10 | 鉄線 (8#) | kg | 1.97 | |
| 11 | 鉄筋 | t | 865.00 | |
| 12 | 型枠板 | m ³ | 497.00 | |
| 13 | 軽油 | kg | 1.30 | |
| 14 | 機械油 | kg | 1.50 | |
| 15 | 潤滑油 | kg | 3.60 | |
| 16 | ガソリン | kg | 1.00 | |
| 17 | アスファルト | t | 453.00 | |
| 18 | セメント | t | 150.00 | |
| 19 | 人孔ふた(鋳鉄製)φ600mm | ヶ | 168.00 | |
| 20 | 人孔ふた(コンクリート製)φ600mm | ヶ | 94.00 | |
| 21 | 鉄筋コンクリート管 φ600mm×2m | 本 | 210.00 | |
| 22 | 薄鋼板 | kg | 0.96 | |

(2) 工事単価

表8. 17 工事単価一覧表(その1)

| 番 号 | 名 称 | 単 位 | 単 価 (元) | | 摘 要 |
|-----|--------------------|----------------|---------|--------|-----|
| | | | 労務費 | 資材費 | |
| 1 | 人力掘削 | m ³ | 5.12 | | |
| 2 | 人力埋め戻し | m ³ | 2.74 | | |
| 3 | 砂基礎 | m ³ | 2.74 | 29.04 | |
| 4 | 残土処理 | m ³ | 2.31 | | |
| 5 | VP管布設工 φ125mm | m | 0.68 | | |
| 6 | VP管布設工 φ100mm | m | 0.60 | | |
| 7 | VP管布設工 φ75mm | m | 0.50 | | |
| 8 | VP管布設工 φ50mm | m | 0.43 | | |
| 9 | VP管布設工 φ40mm | m | 0.43 | | |
| 10 | VP管布設工 φ25mm | m | 0.35 | | |
| 11 | PIPELINE土工 φ125mm | m | 12.43 | | |
| 12 | PIPELINE土工 φ100mm | m | 12.10 | | |
| 13 | PIPELINE土工 φ75mm | m | 11.77 | | |
| 14 | PIPELINE土工 φ50mm | m | 11.44 | | |
| 15 | PIPELINE土工 φ40mm | m | 11.31 | | |
| 16 | PIPELINE土工 φ25mm | m | 11.12 | | |
| 17 | 制水弁人力据付工 φ100mm | 基 | 28.85 | | |
| 18 | 制水弁人力据付工 φ75mm | 基 | 27.35 | | |
| 19 | 制水弁人力据付工 φ50mm | 基 | 21.00 | | |
| 20 | 空気弁人力据付工 φ50mm | 基 | 5.45 | | |
| 21 | FILTER人力据付工 φ150mm | 基 | 31.70 | | |
| 22 | FILTER人力据付工 φ75mm | 基 | 27.35 | | |
| 23 | 小バルブ類取付工 φ40mm | 個 | 2.65 | | |
| 24 | 小バルブ類取付工 φ25mm | 個 | 1.34 | | |
| 25 | DRIP LINE 取付工 | ha | 255.00 | | |
| 26 | CONTROL HEAD据付工 | set | 18.75 | | |
| 27 | 制水弁室 | ヶ所 | 5.50 | 204.38 | |
| 28 | 空気弁室 | ヶ所 | 5.50 | 204.38 | |
| 29 | 排泥弁室 | ヶ所 | 5.50 | 204.38 | |
| 30 | 排泥工排水ピット | ヶ所 | 12.47 | 310.78 | |
| 31 | 流量計室 φ75mm φ50mm | ヶ所 | 32.74 | 68.36 | |
| 32 | 碎石基礎 | m ³ | 2.74 | 21.00 | |

表8. 18 工事単価一覧表 (その2)

| 番 号 | 名 称 | 単 位 | 単 価 (元) | | 摘 要 |
|-----|-----------------|-----|---------|--------|-----|
| | | | 労務費 | 資材費 | |
| 33 | 管防護工 | m3 | 25.58 | 91.97 | |
| 34 | 道路取壊し復旧 | m2 | 3.79 | 8.85 | |
| 35 | 排水路取壊し復旧 | 1 式 | 185.00 | 363.00 | |
| 36 | 水位計取付け | 1 式 | 20.00 | | |
| 37 | フィルター保護工 φ150mm | ヶ所 | 96.67 | 183.42 | |
| 38 | フィルター保護工 φ75mm | ヶ所 | 77.71 | 152.62 | |
| 39 | 無筋コンクリート | m3 | 25.58 | 91.97 | |
| 40 | モルタル (配合 1 : 3) | m3 | 15.00 | 102.60 | |
| 41 | 煉瓦積 | m2 | 7.01 | 21.13 | |

(3) 工事費内訳

表8. 19 土木工事費

Summary

| Section | Total Amount (Japanese Yen) |
|--|--------------------------------|
| A. Earthwork for pipeline | 871,000 |
| B. Pipe laying | 36,000 |
| C. Installation of valves | 23,000 |
| D. Installation of dripline | 40,000 |
| E. Installation of control heads | 19,000 |
| F. Construction of sluice valve hole | 36,000 |
| G. Construction of air valve hole | 22,000 |
| H. Construction of scour valve hole | 167,000 |
| I. Construction of metering valve hole | 21,000 |
| J. Appurtenant work | 66,000 |
| Grand Total | 1,301,000 |

表8. 20 パイプライン土工内訳書

Section A. Earthwork for pipeline

| No. | Work | Unit | Q'ty | Unit Price (¥) | Amount (¥) |
|------------------------|------------------------|----------------|---------|-------------------|------------------------------|
| A.1 | Excavation | m ³ | 2,699.4 | 179.2 | 483,732 |
| A.2 | Backfilling | m ³ | 2,573.3 | 95.9 | 246,779 |
| A.3 | Sand bed | m ³ | 117.4 | 1,112.3 | 130,584 |
| A.4 | Disposal of spoil soil | m ³ | 126.1 | 80.85 | 10,195 |
| Total Section A | | | | | 871,000 (rounded) |

表8. 21 パイプライン布設工内訳書

Section B. Pipe laying

| No. | Work | | Unit | Q'ty | Unit Price (¥) | Amount (¥) |
|-----------------|-------------|------|------|---------|-------------------|---------------------|
| B.1 | Pipe laying | ∅125 | m | 40 | 23.80 | 952 |
| B.2 | do. | ∅100 | m | 557 | 21.00 | 11,697 |
| B.3 | do. | ∅ 75 | m | 471 | 17.50 | 8,242 |
| B.4 | do. | ∅ 50 | m | 807 | 15.05 | 12,145 |
| B.5 | do. | ∅ 40 | m | 23 | 15.05 | 346 |
| B.6 | do. | ∅ 25 | m | 236 | 12.25 | 2,891 |
| Total Section B | | | (m) | (2,134) | | 36,000 (rounded) |

表8.22 弁類据付工内訳書

Section C. Installation of valves

| No. | Work | | Unit | Q'ty | Unit Price (¥) | Amount (¥) |
|-----------------|-----------------------------------|------|------|------|-------------------|---------------------|
| C.1 | Installation of sluice valve | ∅100 | No. | 3 | 1,009.75 | 3,029 |
| C.2 | do. | ∅ 75 | No. | 1 | 957.25 | 957 |
| C.3 | do. | ∅ 50 | No. | 1 | 735.00 | 735 |
| C.4 | Installation of scour valve | ∅ 50 | No. | 9 | 735.00 | 6,615 |
| C.5 | Installation of air valve | ∅ 50 | No. | 5 | 190.75 | 953 |
| C.6 | Installation of filter | ∅150 | No. | 1 | 1,109.50 | 1,109 |
| C.7 | do. | ∅ 75 | No. | 1 | 957.25 | 957 |
| C.8 | Installation of small valve | ∅ 40 | No. | 1 | 92.75 | 92 |
| C.9 | do. | ∅ 25 | No. | 86 | 46.90 | 4,033 |
| C.10 | Installation of metering valve | ∅ 75 | No. | 4 | 957.25 | 3,829 |
| C.11 | do. | ∅ 50 | No. | 2 | 735.00 | 1,470 |
| Total Section C | | | | | | 23,000 (rounded) |

表8. 23 ドリップライン取付工内訳書

Section D. Installation of dripline

| No. | Work | Unit | Q'ty | Unit Price (¥) | Amount (¥) |
|-----------------|---------------|------|--------|-------------------|---------------------|
| D.1 | Plot A | ha | 0.76 | 8,925.00 | 6,783 |
| D.2 | Plot B | ha | 1.12 | " | 9,996 |
| D.3 | Plot C | ha | 0.67 | " | 5,979 |
| D.4 | Plot D | ha | 1.26 | " | 11,245 |
| D.5 | Vinylhouse E1 | ha | 0.32 | " | 2,856 |
| D.6 | Vinylhouse F | ha | 0.39 | " | 3,480 |
| Total Section D | | (ha) | (4.52) | | 40,000 (rounded) |

表8. 24 コントロールヘッド据付工内訳書

Section E. Installation of control head

| No. | Work | Unit | Q'ty | Unit Price (¥) | Amount (¥) |
|-----------------|---------|-------|------|-------------------|---------------------|
| E.1 | Plot A | set | 2 | 656.25 | 1,312 |
| E.2 | Plot B | set | 5 | " | 3,281 |
| E.3 | Plot C | set | 2 | " | 1,312 |
| E.4 | Plot D | set | 5 | " | 3,281 |
| E.5 | Plot E2 | set | 2 | " | 1,312 |
| E.6 | Plot G1 | set | 2 | " | 1,312 |
| E.7 | Plot G2 | set | 3 | " | 1,968 |
| E.8 | Plot I | set | 4 | " | 2,625 |
| E.9 | Plot J | set | 5 | " | 3,281 |
| Total Section E | | (set) | (30) | | 19,000 (rounded) |

表 8. 25 制水弁築造工内訳書

Section F. Construction of sluice valve hole

| No. | Work | | Unit | Q'ty | Unit Price (¥) | Amount (¥) |
|-----------------|--------------------------------------|------|------|------|-------------------|---------------------|
| F.1 | Construction of sluice valve hole | ø100 | No. | 3 | 7,345.80 | 22,037 |
| F.2 | do. | ø 75 | No. | 1 | " | 7,345 |
| F.3 | do. | ø 50 | No. | 1 | " | 7,345 |
| Total Section F | | | | | | 36,000 (rounded) |

表8. 26 空氣弁室築造工内訳書

Section G. Construction of air valve hole

| No. | Work | Unit | Q'ty | Unit Price (¥) | Amount (¥) |
|-----------------|---|------|------|-------------------|---------------------|
| G.1 | Construction of air valve hole ϕ 50 | No. | 3 | 7,345.80 | 22,037 |
| Total Section G | | | | | 22,000 (rounded) |

表 8. 27 排泥弁室築造工内訳書

Section H. Construction of scour valve hole

| No. | Work | Unit | Q'ty | Unit Price (¥) | Amount (¥) |
|-----------------|-------------------------------------|------|------|-------------------|----------------------|
| H.1 | Construction of scour valve hole | No. | 9 | 7,345.80 | 66,112 |
| H.2 | Construction of drain pit | No. | 9 | 11,313.75 | 101,823 |
| Total Section H | | | | | 167,000 (rounded) |

表8. 28 定流量自動停止弁室築造工内訳書

Section I. Construction of metering valve hole

| No. | Work | Unit | Q'ty | Unit Price (¥) | Amount (¥) |
|------------------------|--|---------|------|-------------------|-----------------------------|
| I.1 | Construction of metering valve hole | ø75 No. | 4 | 3,538.50 | 14,154 |
| I.2 | do. | ø50 No. | 2 | " | 7,077 |
| Total Section I | | | | | 21,000 (rounded) |

表8. 29 付帯工内訳書

Section J. Appurtenant work

| No. | Work | Unit | Q'ty | Unit Price (¥) | Amount (¥) |
|-----------------|--------------------------------------|----------------|------|-------------------|---------------------|
| J.1 | Pipeline protection work | m ³ | 3.2 | 4,114.25 | 13,165 |
| J.2 | Road arrangement | m ² | 50 | 309.75 | 15,487 |
| J.3 | Drainage canal arrangement | L.S. | 1 | 19,180.00 | 19,180 |
| J.4 | Installation of water level gauge | L.S. | 1 | 700.00 | 700 |
| J.5 | Filter protection work ϕ 150 | No. | 1 | 9,803.15 | 9,803 |
| J.6 | do. | ϕ 75 No. | 1 | 8,061.55 | 8,061 |
| Total Section J | | | | | 66,000 (rounded) |

8.3.6 入札図書(案)

(1) 工事契約書(案)

CONTRACT AGREEMENT

MODEL INFRASTRUCTURE IMPROVEMENT WORKS
FOR
BEIJING VEGETABLE RESEARCH CENTER PROJECT
CONTRACT FOR CIVIL WORKS

AGREEMENT

THIS AGREEMENT made between JAPAN INTERNATIONAL COOPERATION AGENCY, JICA (Hereinafter called "The EMPLOYER") of the one part and whose Registered Office is at (Hereinafter called "THE CONTRACTOR") of the other part.

WHEREAS the Employer is desirous that certain works should be constructed, namely the Construction of Irrigation Systems in Model Infrastructure Improvement Works for the Beijing Vegetable Research Center Project and has accepted the Contractor for the Construction Completion of such Works NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

ARTICLE 1

(a) Description of Work

The Contractor shall carry out the construction works of the Irrigation Systems in Model Infrastructure Improvement Works for the Beijing Vegetable Research Center Project in the People's Republic of China.

(b) Contract Documents

The following documents shall be deemed to form and to read and construed as part of this Agreement, namely:

- (i) The Drawings
- (ii) The Conditions of Contract
- (iii) The Specifications
- (iv) The Bill of Quantities
- (v) The Schedule of Rates and Prices (if any)

ARTICLE 2 - CONTRACT SUM OF CONSTRUCTION

The construct sum of construction shall be
.....
.....

ARTICLE 3 - TIME LIMIT OF SUBMISSION OF PRICED BILL OF QUANTITIES

The Contractor shall submit a copy of the Priced Bill of Quantities to the Employer within seven (7) days after signing by both parties of this agreement. The Contractor reserves the right to remeasure the work and check the Bill, both for quantity and description of required.

ARTICLE 4 - COMMENCEMENT AND TIME FOR COMPIETION

The Contractor shall commence the work within ten (10) days after signing by both parties of this agreement, and complete the work by _____, 1988.

ARTICLE 5 - DELAYS

In a case where it is clear that the Contractor is failing to fulfill his obligations within the period referred to in the preceding Article, the Contractor shall inform the Employer of this by a letter as soon as possible, and if the Employer agrees that the delay is due to such causes as natural calamity or others for which the Contractor is not liable, a reasonable extension of time will be approved. In this case, the sum referred to in Article 16 will not be collected.

ARTICLE 6 - PROCESS OF CARRYING OUT OF WORK

The Contractor shall carry out the work in accordance with the Drawings and Specifications referred to in Article 1 (b). In cases where it is necessary for the Contractor to carry out such work as is not mentioned therein for the purpose of promoting the present construction or for reasons of established practices, the Contractor shall carry out the said work under the direction of the Employer. In cases where the Contractor finds any doubt in the plans of construction, the Contractor shall ask the Employer for the necessary directions before commencing the work on that part for which there exists some doubt.

The Employer must provide such information and details within seven (7) days of the written request from the Contractor.

ARTICLE 7

The Contractor shall follow the direction of the Employer or a supervisor to be appointed by the Employer (Hereinafter called "The Supervisor"). As to materials for the construction, the Contractor shall use only those inspected and approved by the Employer or the Supervisor. In cases where any defective work has been done as a result of such use of materials which have not been inspected by the Supervisor, or of disobedience to the direction of the Supervisor, the Contractor shall be liable to change the materials or repair the work at his own responsibility. The construction shall be carried out in accordance with the proper technique, and durability shall be the principal aim as regards to the construction.

ARTICLE 8 - WORKMEN

As to the workmen to be hired by the Contractor for the work, the Contractor shall assume the responsibility as entrepreneur or employer, as provided for by Laws and Regulations in the People's Republic of China.

ARTICLE 9 - TRANSFER OF RIGHT AND OBLIGATION

The Contractor shall not assign or sublet to a third party the whole or part of the construction except in cases where the Contractor has obtained written approval from the Employer.

ARTICLE 10 - DAMAGES

In cases where any damage is caused to the Employer or a third party, materials or constructions, through carelessness on the part of the Contractor during the course of work or transportation of materials, the Contractor shall be liable to repair or compensate such damages at his own expense by the date appointed by the Employer or the third party.

ARTICLE 11

In cases where the Contractor fails to repair or compensate such damages referred to in the preceding Article by the fixed date, the Employer may pay for such repair on behalf of the Contractor, and collect compensation from the Contractor by deducting the amount from the sum of construction to be paid to the Contractor by the Employer under the provisions of Article 21, and in cases where the damages exceed the sum of construction, the Employer may collect the deficit from the Contractor.

ARTICLE 12

- (a) Change of Construction Drawings and Submission of Necessary Documents
- In cases where the Employer feels it necessary to discontinue the work owing to unavoidable circumstances, or to alter the plan of construction, the Employer may request the Contractor to calculate, on the basis of the unit prices as detailed in the priced Bill of Quantities referred to in Article 3, as to increase or decrease in the sum of construction resulting from the suspension or alteration of the work, and the Contractor shall comply with the request. When the Employer orders such a suspension or alteration, depending on the statement of the above mentioned calculation, the Contractor shall submit a written consent by the date appointed by the Employer.

- (b) Where work cannot be properly measured and valued on the basis of the unit price in the Bill of Quantities referred to in Article 3, the Contractor will be allowed to calculate on the basis of the daywork rates which shall be approved by the Employer before their application.

ARTICLE 13

(a) Price Adjustment

In the case of the costs of materials rising sharply as a result of the fluctuation in the market prices due to an unexpected change in the economic conditions, a reasonable adjustment of the contract sum or the unit prices in the Bill of Quantities will be made through negotiations between the Employer and the Contractor.

- (b) In a case where a loss such as may render it unreasonable for the contract sum referred to in Article 2, is inflicted upon the Contractor by virtue of the Employer's failure to provide the information and details referred to in Article 6 or to obtain the necessary approvals under the local bye-laws, then a reasonable adjustment of the above mentioned sum will be made on the basis of the detailed claim submitted by the Contractor.

ARTICLE 14 - RIGHT TO RESCIND CONTRACT AND PENALTY

In cases where the Contractor fails to fulfil his obligations under this contract, the Employer may rescind the whole or part of the Contract. In such a case, the Employer may collect from the Contractor a sum as a penalty of ten percent (10%) of the amount which is equivalent to the rescinded. In cases where the damages caused on the Employer, on account of the non-fulfilment of Contract by the Contractor, exceed the sum referred to in the preceding paragraph, the Employer may further demand the Contractor to pay the excess.

ARTICLE 15

In cases other than provided for in Article 14 where the Contractor fails to fulfil his obligations, or in cases where the fulfilment of obligations by the Contractor is regarded to be difficult, the Employer may ask a third party to fulfil, at the cost of the Contractor, the whole or part of the obligations of the Contractor. Even if liability of the Contractor exceeds the contract sum referred to in Article 2 in consequence of this, the Contractor shall not raise any objection to it.

ARTICLE 16

In cases other than provided for in Article 14 where the Contractor fails to complete the construction at his own responsibility within the period referred to in Article 4, the Contractor shall be liable, within a period fixed by the Employer, to pay the Employer per week of delay a sum equivalent to 0.1 percent (0.1%) of the contract sum referred to in Article 2.

ARTICLE 17 - DAMAGE CAUSED BY NATURAL CALAMITY, ETC.

In cases where serious damages occur to the completed part of the work, or the materials, tools etc., already carried into the field of construction, the Contractor shall promptly inform the Employer of the circumstances. If such damages are caused by a natural calamity, an earthquake, a flood, a civil war, a war, an epidemic, or a general/trade strike, riot or other unavoidable reasons, for the occurrence of which no responsibility can be attributed to either the Employer or the Contractor, and it is admitted that the Contractor has paid the care of good administrator to avoid the occurrence of such damages, the Employer shall be liable for the amount of the damages which shall be fixed through negotiations between the Employer and the Contractor.

ARTICLE 18

(a) Inspection

The work at any stage shall be subject to inspection to be conducted by the Employer or an inspector appointed by the Employer in the presence of the Contractor, and necessary labour and articles required for such an inspection shall be provided by the Contractor.

(b) In cases where the work fails to pass the inspection referred to in the preceding paragraph, the Contractor shall carry out necessary repair at his own cost under the direction of the Employer.

ARTICLE 19 - DATE OF COMPLETION OF CONSTRUCTION AND OBLIGATION THEREAFTER

The date of completion of construction shall be regarded as that on which the final work, including removal of temporary facilities and cleaning, has passed the inspection referred to in Article 18, and on that date the object of the construction shall be delivered to the Employer by the Contractor. For a period of one year thereafter, any defect in the construction, the cause of which is judged in the opinion of the Employer to be attributable to faulty or inadequate techniques or materials employed by the Contractor, shall be immediately repaired or improved by the Contractor at the cost of the Contractor.

ARTICLE 20 - PAYMENT

The Employer agrees to effect payments for the Works to the Contractor in the following manner:-

(a) Advance Payment, to be effected upon the bringing of equipment and materials required for the Works and properly stored at the job site by the Contractor and of value estimated by the Supervisor.

An amount of which corresponds to Forty (40) per cent of the Contract Price shall be paid upon signing of this Contract.

- (b) Final Payment, to be effected upon the satisfactory completion of the Works by the Contractor and accepted by the Supervisor.

The remainder of which corresponds to Sixty (60) per cent of the Contract Price, shall be paid after issue of the Final Certificate by the Employer for payment to the Contractor. Payment under (b) shall be effected within ten (10) days after the respective acceptance of the Works by the Supervisor.

ARTICLE 21 - INTEREST FOR THE DELAY OF PAYMENT

In cases of the payment referred to in Article 20 being delayed owing to a cause or causes attributable to the Employer, the Contractor may request the Employer to pay interest on arrears of payment at one percent (1%) over the bank rate.

ARTICLE 22

- (a) Settlement of Dispute

If there arises any dispute with regard to this Agreement on the Detailed Drawings or Specifications referred to in Article 1 (b), it shall be settled by a mutual consultation between the Employer and the Contractor.

- (b) If it should not be possible to reach a mutual agreement between the Employer and the Contractor on such dispute, then it shall be referred to an Arbitrator or Arbitrators acceptable to both the Employer and the Contractor and the decision of this Arbitrator or Arbitrators shall be binding on both the Employer and the Contractor.

IN WITNESS WHEREOF, the parties hereto have hereunto set their respective hands and seals, the day and year first above written.

Signed Sealed and Delivered by

Signed Sealed and Delivered by

(Resident Representative)

(Contractor)

(2) 工事条件書(案)

CONDITIONS OF THE CONTRACT

1. Objectives

The Employer, Japan International Cooperation Agency (JICA) wants to construct an Irrigation System in the Beijing Vegetable Research Center Project in the People's Republic of China.

2. Work Schedule

The Contractor shall submit to the Employer for this approval the detailed work schedule for performing the construction works specified in Article 1 (b) of the Contract within fifteen (15) days after signing by both parties of this agreement.

3. Operation of Work

To control the construction works, the engineer of the Contractor is required to stay at the construction office. If the engineer does not stay at the office without appropriate reason, the Employer reserves the right to stop the works or part of works instantly and the Contractor is required to be responsible for any damage from this neglect.

4. Progress Report

The progress reports shall be submitted to the Employer by the Contractor every month. If there is any delay of work from agreed schedule, the Contractor shall submit the modified work schedule to the Employer to justify for such a delay so as to achieve the originally set target.

5. Acceptance of Completed Work

Upon receipt of the written request from the Contractor, the Employer will check the work actually performed in the field. If everything is satisfactorily completed, the Employer will accept that part of work within seven (7) days after the receipt of the request. If there are any inconsistency and shortcomings in the work presented by the Contractor, the Employer will reserve the right not to accept the work. During the improvement of the work, it will be regarded that the work has not been accepted. After completion of the improvement work, the Contractor shall request the Employer to inspect it. If the improvement work is satisfactorily completed, the Employer will accept the work within seven (7) days after the receipt of the request.

However, the acceptance does not necessarily mean the discontinuation of the responsibility of the Contractor for possible damages of that part of the work. The complete acceptance takes place only when all the works have been completed and accepted.

6. Increase or Decrease of Unit Price

In the event of remarkable fluctuation in the costs of labor, materials, equipment, etc., the adjustment of unit prices may be made based on the escalation factors through negotiations between the Employer and the Contractor. However, no adjustment will be made in case of the delay of construction works due to the fault of the Contractor.

7. General Text

The construction works shall be proceeded in accordance with the Drawings and Specifications in every respect. In case, however, the Employer adds to or revises the original Drawings and/or Specifications in order to attain further engineering perfection, the Contractor is required to proceed with the construction in accordance with the added or revised drawings and/or specifications in every without any objections.

8. Alignment, Leveling and Site-Plan Setting

The Employer is to inform the Contractor of the bench mark which gives the base elevation to be used for the construction. The succeeding steps shall be the duty of the Contractor. The Contractor shall set and determine the alignment and elevations in accordance with the Drawings in the construction area and ask for the inspection of the Employer prior to the commencement of the construction. The Contractor is required to preserve all the pegs that indicate the alignment and elevations in a good condition throughout the construction period. In cases where the Employer requests the Contractor shall conduct checking survey and submit the results to the Employer as soon as possible.

GENERAL SPECIFICATIONS

1. General Description

In the Beijing Vegetable Research Center Project, it is urgently necessary to prepare irrigation facilities of the Experimental Farm that serve for the activities of the Project. Therefore, the Japan International Cooperation Agency (JICA) intends to construct an irrigation system for an area of 8.6 ha in the Research Center under the Model Infrastructure Improvement Works for the Beijing Vegetable Research Center Project. The irrigation system will consist of drip system and low pressure sprinkler system in order to economize water.

The works provided for in this Contract are:

- the installation of irrigation pipelines including the related facilities.

2. Scope of Contract

The Contractor shall, except as otherwise provided for in the Contract, furnish all labor, materials, Constructional Plant, Temporary Works and other necessary for the construction of the Works. The Contractor shall execute, complete and maintain the Works in strict accordance with the Specifications and Drawings or as directed by the Supervisor.

The Works to be carried out under the Contract will include the followings.

- (1) The construction and maintenance of any temporary facilities and access roads required by the Contractor for the execution of the permanent works.
- (2) The installation of irrigation pipelines and their related facilities.
 - Irrigation Pipeline : Approx. 2,100 m

3. Equipment and Materials to be Supplied by the Employer

The Employer will supply the Contractor the below-listed equipment and materials and the Contractor shall use the said equipment and materials only for the execution of the Work.

The Contractor shall thoroughly check and examine the list of equipment and materials hereof and the Drawings, and shall satisfy himself as to the quantities of the equipment and materials to be supplied under this Clause. If there is any incompleteness in the quantities, the Contractor shall so notify the Employer in writing. Failure to do so shall in no way relieve the Contractor from his obligation to complete the Works.

These equipment and materials will be handed over to the Contractor at the Site within 30 days from the commencement order.

(See Attached Lists of Equipment and Materials.)

4. Setting Out

The Contractor shall be entirely responsible for the accurate setting out of the Works from the information supplied on the Drawings and the instruction given by the Supervisor.

5. Drawings

The attached drawings accompany and form a part of this Specification. During the progress of the Works, additional drawings will be issued by the Supervisor as necessity arises to supplement, supersede or further set forth details shown on the Drawings hereto attached and such additional drawings shall thereupon become part of the Specification.

6. Construction Program

Within seven (7) days after the award of the Contract, the Contractor shall submit to the Supervisor for his approval, a construction program in bar chart form or otherwise, as may be required by the Supervisor, showing in detail his proposed schedule of operation and providing for the orderly completion of the Work by the dates specified in the Contract. The Supervisor's estimate of the construction time schedule shown on the Drawings is to be used only for consideration by the Contractor and does not relieve the Contractor from preparing and submitting his own time bar construction schedule.

The submission to and approval by the Supervisor of such program shall not relieve the Contractor from any of his duties of responsibilities under the Contract.

PROGRESS REPORT AND PHOTOGRAPHS

7. Progress Report

(1) The Contractor shall, before the tenth (10) day of each month or at any time designated by the Supervisor, submit five (5) copies of a monthly progress report in a form acceptable to the Supervisor on the progress of the Works during the preceding month. The report shall show but not be limited to:

- (a) the total percentage of progress as of the end of the report period and the percentage of each type of work progress for each structure during the preceding month,
- (b) list of activities scheduled to be in progress or actually in progress during the report period with the Contractor's actual forecast start and/or completion date for each activity,
- (c) lists of works done, and labours and equipment used during the report period,
- (d) list of the equipment and materials supplied by the Employer and used during the report period,
- (e) list of activities scheduled to be started within one (1) month with forecast starting dates, and
- (f) photographs set out in Clause 7 (2) hereof.

From time to time during the execution of the Contract, the Supervisor is empowered to call meetings, either in his office or at the Contractor's offices or on site, as he deems necessary for the purpose of control of the Contract. As required by the Employer or the Supervisor, responsible representatives of the Contractor shall attend such meetings.

(2) Photographs

The Contractor shall, if so required, furnish to the Supervisor photographs of the work in progress at the locations directed by the Supervisor throughout the Contract period. The photographs to be furnished to the Supervisor shall be attached with monthly progress report specified in Clause 7 (1) and shall be in five (5) copies and suitably inscribed. The negatives of the photographs shall be the property of the Employer and no prints from these negatives may be supplied to any person or persons without the approval of the Supervisor. The cost of such photographs shall not be paid separately and shall be deemed to be included in the rates for the various items in the Bill of Quantities.

PRECAUTIONS FOR SAFETY

8. General

(1) The Contractor shall take all necessary precautions against risks of loss of life or of injury to any person employed on the Works or to employees of the Employer and the Supervisor or of others or to visitors or to persons having good and sufficient reasons to be about the Works and to his end shall properly safeguard the Works to the satisfaction of the Supervisor.

The Contractor shall furthermore take all necessary precautions against damage to the property of the Employer or of other located at or adjacent to the Site.

The Contractor shall report promptly to the Supervisor all accidents involving the death of or serious injury to any person, on the Site or resulting from the Contractor's operations.

No separate payment will be made for complying with the provisions of this Clause and all costs shall be deemed to be included in the Rates for the various items in the Bill of Quantities.

(2) Temporary Fencing

If required, the Contractor shall erect and maintain at his own expense suitable and approved temporary fencing to enclose such areas of the Works to be carried out and all area of land occupied by the Contractor within the Site as may be necessary to implement his obligations as specified in the Conditions of Contract to the satisfaction of the Supervisor.

Where any temporary fence has to be erected alongside a public road, footpath, railway, etc., it shall be of the type required by and shall be to the satisfaction of the Authority concerned.

9. Contractor's Offices, Stores and Workshops

The Contractor shall provide, maintain and remove when directed, such temporary buildings as Contractor's offices, workshops and adequately fenced store compounds as are necessary for the execution of the Works.

Not less than 14 days before constructing such buildings, the Contractor shall submit site plans and general particulars to the Supervisor for his approval.

10. Assistance to the Supervisor

The Contractor shall render all necessary assistance to the Supervisor and shall provide as required pegs, poles, straight edges, stagings, moulds, templates, profiles and all other requisites to be used for checking and measuring the Works.

11. Water and Power Supply

The Contractor shall provide, operate, maintain and remove when directed upon completion of the Works, an adequate supply of water and electricity to his office, workshops and places of Work on the Site.

12. Materials and Standards

The Contractor shall inform the Supervisor of the names of the persons or firms from whom he desires to obtain any materials, ironwork, pipes, manufactured articles or other things which are to be supplied by him for use in the Works and, except as regards trifling and unimportant matters, no order shall be placed except with the sanction of the Supervisor. The Contractor shall keep the Supervisor fully advised of the orders and delivery dates of materials. Delivery shall be made sufficiently in advance to enable further samples to be taken and tested, if required.

All materials and equipment to be furnished under the Contract shall be new and shall conform to the authorized standard for materials and tests in Japan. Other national or international standards may be accepted provided the requirements therein are, in the opinion of the Supervisor, equivalent to the current issue of the said standards.

If the Contract Documents conflict in any way with any or all of the above standards or codes, the Contract Documents shall have precedence and shall govern.

13. Specifications, Drawings and Data to be Supplied by the Contractor

The Contractor shall submit to the Supervisor for approval five (5) sets of complete specifications, drawings and data for materials and equipment to be supplied under the Contract within fourteen (14) days from the Supervisor's order to commence.

However, it is to be understood that approval of the specifications, drawings and data will not exonerate the Contractor from any responsibility as stipulated elsewhere in the Contract.

MEASUREMENT AND PAYMENT

14. Measurement and Payment

(1) Excavation

Measurement for excavation will be made for the net volume in cubic meters of earth excavated from the natural ground surface to the lines and grade shown on the Drawings or as directed by the Supervisor. Payment for excavation measured as above shall be at the Rate entered in the Bill of Quantities, which shall include the cost of excavation, trimming of side slopes, draining, earth slip or slide prevention; laying out, constructing and maintaining catch-water drains in good order during the works; hauling and disposal of the excavated material; backfilling for structures, except if it is already covered under other items in the Bill of Quantities; removal of materials in earth slips or slides, including the costs of all materials, labour, depreciation of equipment and all else necessary therefor and incidental thereto.

(2) Backfill for Structure

Measurement for backfill for structures shall be made for the net volume of filled materials measured in cubic meters after compacting and trimming of the slope as shown on the Drawings or as directed by the Supervisor.

Payment for backfilling of the structures measured as above shall be made at the Contract Rate per cubic meter in the Bill of Quantities, which Contract Rate for backfilling shall include the cost of supplying suitable material, placing by hand tools or machines, mixing, harrowing (if required), spreading, trimming, watering and compacting, and the cost of all other works connected therewith. The Contract Rate shall apply whatever the source of the material.

(3) Concrete

Measurement of concrete for payment shall be made only to the neat lines of the structures as shown on the Drawings or as established by the Supervisor. In measuring concrete for payment, the volume of all cavities, depressions and openings shall be deducted. Payment for concrete in any concrete measured as above shall be made at the Rates in the Bill of Quantities for:

Payment of concrete in the various parts of the Work shall be made at the Rates per cubic meter in the Bill of Quantities. The Rate shall include the cost for excavation, cost of all labour and materials, depreciation of equipment required in the construction, handling of cement, and the cost for concrete form of furnishing all labour, equipment and materials, erecting and removing the forms, depreciation of the forms, scaffoldings, backfilling and also the cost of all other necessary works connected therewith.

(4) Brick

Measurement of brick for payment shall be made for the net volume in cubic meter after compaction to the dimensions shown on the Drawings or as directed by the Supervisor. The Rates for brick shall include the cost of furnishing bricks and of pointing, cutting and fitting to spandrils, masonry and concrete, etc., and of all templates, centering, scaffolding and labour required to complete the Work as specified or as shown on the Drawings.

(5) Plastering and Cement Mortar

Measurement of plastering and cement mortar for payment shall be made for the net volume in cubic meter of cement mortar shown on the Drawings or as directed by the Supervisor. Payment for plastering measured as above shall be at the Rate entered in the Bill of Quantities, which shall include the cost for plastering of all labour and materials except cement, depreciation of tools and equipment, and other necessary works.

(6) Reinforcing Bar

Measurement for payment for furnishing and placing reinforcing bars shall be made only of the weight of the bars placed actually in the concrete in accordance with the Drawings or as directed by the Supervisor. Payment for furnishing and placing of reinforcing bars shall be made at the Rate per unit weight in the Bill of Quantities, which shall include the cost of furnishing and attaching wire ties and metal supports, if used, and of delivering, unloading, hauling, storing, sorting, cutting, bending, cleaning, placing, and securing the maintaining in position all reinforcing bars, as shown on the Drawings or as directed by the Supervisor.

(7) Precast Concrete Pipe

Measurement for precast concrete pipes shall be made for the length from end-to-end of the pipes in place, and no allowance shall be made for lap at joints or of connecting pipes shall include the cost of furnishing of all labour required in handling, hauling, and storing the pipe; preparing a suitable and even bedding; and laying the pipe and constructing the joints.

(8) Installation of Irrigation Pipelines

Measurement for the installation of irrigation pipelines shall be made for the length from end to end of the pipes in place as shown on the Drawings or as directed by the Supervisor, and no allowance shall be considered for laps at joints or of connecting pipes to wall, collars or structures. The payment for the installation of irrigation pipelines shall be made at the Rate stated in the Bill of Quantities, which shall include the cost of furnishing, unloading, hauling and handling the necessary materials such as sand, etc. except pipes and fittings, furnishing all labourer's tools and other necessary items.

(9) Land Grading

The measurement of land grading for payment shall be made for only the area where the land grading has been done in accordance with the Supervisor's direction at Site. The payment shall be made at the Rate provided in the Bill of Quantities, which shall include the cost of tools, labourers and materials necessary for completing the works under this item including excavation, handling and hauling the excavated materials, placing and spreading in fill, smoothing and

finishing the ground surface within the allowance to satisfy the Supervisor, and other incidental items of the work. No extra payment shall be made for the extra volumes due to shrinkage, swelling, losses or compaction of soil, increasing or decreasing of volume to cause repairment or additional works.

(10) Others

Measurement for payment for each of the items other than the items specifically mentioned above shall be made on the basis of the respective units indicated in the Bill of Quantities. The respective Contract Rate shall include the cost of furnishing all labour, materials, Constructional Plant, plant and appliance, and the performance of all work necessary to complete the works intended to be covered under the items, including minor works not mentioned but normally deemed to form a part of the works.

LIST OF MATERIALS FOR IRRIGATION SYSTEM - 1

| Item | Specifications | Quantity |
|------------------|----------------|----------|
| PVC pipe (VP) | φ125 x 4 m | 11 nos. |
| | φ100 x 4 m | 147 nos. |
| | φ 75 x 4 m | 122 nos. |
| | φ 50 x 4 m | 208 nos. |
| | φ 40 x 4 m | 7 nos. |
| | φ 25 x 4 m | 76 nos. |
| PVC socket (TS) | φ 50 | 203 nos. |
| | φ 40 | 7 nos. |
| | φ 25 | 54 nos. |
| PVC reducer (TS) | φ125 x 100 | 1 no. |
| | φ100 x 75 | 2 nos. |
| | φ 75 x 50 | 14 nos. |
| | φ 50 x 40 | 1 no. |
| | φ 40 x 25 | 1 no. |
| PVC tee (TS) | φ125 x 100 | 1 no. |
| | φ100 | 1 no. |
| | φ100 x 75 | 5 nos. |
| | φ100 x 50 | 6 nos. |
| | φ 75 | 5 nos. |
| | φ 75 x 50 | 19 nos. |
| | φ 50 | 5 nos. |
| | φ 50 x 25 | 40 nos. |
| | φ 40 x 25 | 2 nos. |
| φ 25 | 1 no. | |
| PVC elbow (TS) | φ125 | 1 no. |
| | φ100 | 5 nos. |
| | φ 75 | 2 nos. |
| | φ 50 | 17 nos. |
| PVC bend (TS) | φ100 x 45° | 4 nos. |

LIST OF MATERIALS FOR IRRIGATION SYSTEM - 2

| Item | Specifications | Quantity |
|----------------------|----------------|----------|
| Socket (SGP) | ø 25 | 44 nos. |
| Elbow (SGP) | ø 50 | 125 nos. |
| | ø 25 | 83 nos. |
| Reducing elbow (SGP) | ø 50 x 20 | 28 nos. |
| Bend (SGP) | ø 75 x 45° | 16 nos. |
| | ø 50 x 45° | 8 nos. |
| Tee (SGP) | ø 50 x 20 | 60 nos. |
| | ø 50 x 13 | 4 nos. |
| | ø 40 x 13 | 30 nos. |
| | ø 20 x 8 | 41 nos. |
| Bushing (SGP) | ø 50 x 40 | 60 nos. |
| | ø 25 x 20 | 41 nos. |
| | ø 13 x 8 | 30 nos. |
| Nipple (SGP) | ø 50 | 99 nos. |
| | ø 40 | 90 nos. |
| | ø 25 | 41 nos. |
| | ø 20 | 82 nos. |
| | ø 8 | 71 nos. |
| Polyethylene pipe | ø 50 | 420 m |
| | 7/8" | 277 m |
| Dripline | ø 16 | 45,158 m |
| Drip starter | ø 16 | 570 nos. |
| Drip adapter | ø 16 | 110 nos. |
| PLA tee | ø 50 | 14 nos. |

LIST OF MATERIALS FOR IRRIGATION SYSTEM - 3

| Item | Specifications | Quantity |
|-----------------------|----------------|----------|
| PLA adapter | ø 50 | 28 nos. |
| Drip end | ø 16 | 680 nos. |
| PVC valve socket (TS) | ø 75 | 8 nos. |
| | ø 50 | 36 nos. |
| | ø 25 | 45 nos. |
| Galvanized Steel Pipe | ø125 x 2,000 L | 2 nos. |
| | ø 75 x 2,000 L | 2 nos. |
| | ø 75 x 600 L | 8 nos. |
| | ø 75 x 565 L | 8 nos. |
| | ø 50 x 5,500 L | 1 no. |
| | ø 50 x 1,500 L | 1 no. |
| | ø 50 x 1,000 L | 30 nos. |
| | ø 50 x 600 L | 4 nos. |
| | ø 50 x 565 L | 4 nos. |
| | ø 50 x 500 L | 63 nos. |
| | ø 25 x 1,500 L | 7 nos. |
| Ball valve | ø 8 | 71 nos. |
| | ø 20 | 64 nos. |
| 3-way valve | ø 50 | 30 nos. |
| PE tee | 7/8" | 41 nos. |
| PE elbow | 7/8" | 82 nos. |
| Pressure gauge | | 71 nos. |
| Angle valve | ø 50 x 90° | 1 no. |
| | ø 25 x 90° | 4 nos. |

LIST OF MATERIALS FOR IRRIGATION SYSTEM - 4

| Item | Specifications | Quantity |
|--------------------|-------------------------|----------|
| Hose with coupling | ø 25 x 10 m | 1 no. |
| | ø 25 x 2.5 m | 7 nos. |
| BC nipple | ø 25 | 8 nos. |
| BC connector | ø 4 | 8 nos. |
| Tube | ø 4 x 1,200 L | 8 nos. |
| Fiberglas spike | 1.0 m | 8 nos. |
| Mini-sprinkler | ø2.5 mm | 8 nos. |
| Cap | ø 25 | 1 no. |
| Filter | 6" | 1 no. |
| | 3" | 1 no. |
| PVC flange (TS) | ø100 | 6 nos. |
| | ø125 | 2 nos. |
| | ø 75 | 4 nos. |
| | ø 50 | 20 nos. |
| Elbow with flanges | ø125 x 90° | 6 nos. |
| | ø 75 x 90° | 6 nos. |
| Pipe with flanges | ø125 x 1,282 | 2 nos. |
| | ø125 x 200(with branch) | 1 no. |
| | ø 75 x 1,409 | 2 nos. |
| | ø 75 x 300 | 1 no. |
| | ø 75 x 200(with branch) | 2 nos. |
| | ø 75 x 100 | 4 nos. |
| Reducer | ø150 x 125 | 1 no. |
| | ø150 x 125(with branch) | 1 no. |

LIST OF MATERIALS FOR IRRIGATION SYSTEM - 5

| Item | Specifications | Quantity |
|--------------------------------|----------------|----------|
| Sluice valve with handwheel | φ125 | 1 no. |
| | φ 75 | 5 nos. |
| | φ 50 | 40 nos. |
| | φ 25 | 41 nos. |
| | φ 20 | 1 no. |
| Air valve | φ 50 | 5 nos. |
| Solvent cement | can | 5 nos. |
| Pressure-reducing valve | φ 40 | 30 nos. |
| | φ 20 | 41 nos. |
| Metering valve | 3" | 4 nos. |
| | 2" | 2 nos. |
| Flange | φ125 | 3 nos. |
| | φ 75 | 3 nos. |
| Rabbit coupler | φ 20 | 64 nos. |
| Riser saddle | φ100 x 50 | 2 nos. |
| Dresser tee | φ 75 x 50 | 1 no. |
| Sluice valve without handwheel | φ100 | 3 nos. |
| | φ 75 | 1 no. |
| | φ 50 | 1 no. |
| MF joint | φ125 | 1 no. |
| | φ 75 | 1 no. |
| Valve key | | 5 nos. |
| Scour valve | φ 50 | 9 nos. |

LIST OF MATERIALS FOR IRRIGATION SYSTEM - 6

| Item | Specifications | Quantity |
|---------------------|----------------------|----------|
| Quick coupler | ϕ 50 | 30 nos. |
| Cap | ϕ 50 | 30 nos. |
| New coupler | ϕ 50 | 30 pair |
| Delivery hose | ϕ 50 x 2 m | 2 nos. |
| Line tee | ϕ 50 x 90° | 2 nos. |
| Line elbow | ϕ 50 x 90° | 2 nos. |
| Aluminium pipe | ϕ 50 x 6 m | 60 nos. |
| Riser with supports | 3/4" x 1 m | 28 nos. |
| Sprinkler head | 3.6 x 2.4 mm | 28 nos. |
| End cap | | 4 nos. |
| Chemical injector | with hydraulic motor | 1 set |
| Water level gauge | with 3 points | 2 sets |

TECHNICAL SPECIFICATIONS

A. EARTHWORKS

A.01 Excavation-General

All excavation shall be carried out to the lines and levels shown on the Drawings or to such lines and levels as the Supervisor may direct. The Contractor shall trim all permanent excavations to the levels and dimensions shown on the Drawings.

Before commencing excavation, the Contractor shall survey and take levels over the entire area in which excavation is to be carried out. The surface levels so determined shall be subject to the Supervisor's Approval, and measurement of excavation shall be based upon the approved surface levels.

When any excavation has been taken out and trimmed, the Supervisor shall be informed accordingly so that he may inspect the completed excavation, and no excavation shall be filled in or covered with concrete until it has been inspected and the Contractor has been authorized to precede with the Works.

If from any cause whatsoever excavations other than for concrete work are carried out beyond their true line and level other than at the direction of the Supervisor, the Contractor shall at his own cost make good to the required line and level with approved material and in such a manner as the Supervisor may direct.

If from any cause whatsoever excavations for concrete works are carried out beyond their true line and level other than at the direction of the Supervisor, the Contractor shall at his own cost fill in to the required line and level with concrete similar in grade to that intended to be used in the true excavation unless otherwise directed.

A.02 Excavation for Structures

Excavation for foundation work shall be carried out in a safe manner and to the lines and levels shown on the Drawings or to such lines and levels as may be approved by the Supervisor. Firm foundations are to be achieved by moistening and tamping if necessary.

A.03 Excavation for Trenches of Irrigations Pipelines

Excavation for trenches of irrigation pipelines shall be made in accordance with Clause A.01 hereof, and excavation is to be executed in such a manner as shown on the Drawings or as directed by the Supervisor.

A.04 Backfilling--General

No excavations for foundation work shall be backfilled before they have been inspected by the Supervisor. Backfilling shall, unless otherwise specified, be carried out with approved materials and shall be well compacted in 15-centimeter layers compacted thickness to the satisfaction of the Supervisor. Topsoil, vegetation or other organic material shall be excluded from backfilling material.

A.05 Backfilling for Trenches of Irrigation Pipelines

Trenches of irrigation pipelines shall be backfilled after completion of the field test as directed by the Supervisor. Backfilling shall be carried out in accordance with Clause A.04 hereof. Backfill is to be executed such a manner as to deposit material without any damage to the pipe and to fill completely all spaces surrounding the pipe. The material shall be compacted in 7.5-centimeter layers compacted thickness below the crown of the pipe and in 15-centimeter above the crown of the pipe, to the satisfaction of the Supervisor.

A.06 Fill Adjacent to Structures

Fill materials adjacent to structures shall be placed in such a manner as will ensure that they can be satisfactorily compacted without damage to the structures. Compaction adjacent to all structures shall be carried out by hand or by a suitable hand operated plant.

Unless otherwise specified, no fill material shall be placed and no compaction shall be permitted adjacent to concrete for fourteen (14) days after the placing of the concrete.

Compaction of backfilling material placed above buried concrete, however mature, shall not be permitted to be carried out with vibrating rollers within 0.5 meter vertically of the surface of the concrete, except with the prior approval of the Supervisor.

A.07 Land Grading

The land grading shall include the supply of all labourers, materials and tools, excavating, hauling and filling the excavated soils, planning and finishing the ground surface, and other incidental operations pertaining to land grading works as directed by the Supervisor.

The land grading operation shall generally include the followings:

- (1) Cut of high places, haulage, fill in low places in each land-grading plot to adjust the inclinations and levels in each plot as directed by the Supervisor.
- (2) Cut, haulage, heaping of suitable materials for construction extracted from land grading plot as directed by the Supervisor.
- (3) Planning and finishing to remove any difference in levels and to obtain a surface totally smooth and inclined to the satisfaction of the Supervisor.

B. CONCRETE WORKS

B.01 Cement

The Cement to be used throughout the Works shall be ordinary Portland cement and shall be provided to the Contractor by the Supervisor. The Portland cement shall comply with the requirements of JIS "Ordinary Portland Cement" or its equivalent.

B.02 Storage of Cement on the Works

Immediately after the cement is handed over to the Contractor, it shall be stored in a dry, weathertight, properly ventilated structure, to adequately prevent absorption of moisture. The Contractor's method of handling and storing cement shall be subject to the approval of the Supervisor.

B.03 Concrete Aggregate

All concrete aggregates are to be obtained from sources approved by the Supervisor. They shall be free from earth, clay, chalk, lime, loam, soft clayey shaley or decomposed stone, vegetable and organic matter and other impurities. The stone shall be hard and dense.

B.04 Coarse Aggregates

The nominal sizes of the coarse aggregate in structural concrete shall be 38 millimeters, except where otherwise specified. The coarse aggregate; as far as practicable, shall conform to the grading requirements.

B.05 Fine Aggregate

Grading of the fine aggregate as delivered to the mixer, as far as practicable, shall conform to the requirements.

B.06 Storage of Aggregates

Provision shall be made on the site for the separate storage of fine and coarse aggregates, as well as of each size of coarse aggregate, in such a manner as to avoid the contamination of the concrete by foreign material and to prevent segregation and excessive breakage; stockpiles shall be provided with suitable drainage facilities to ensure, as far as practicable, that the aggregates delivered to the batching equipment shall have the uniform and stable moisture content directed by the Supervisor. Aggregates shall, during not weather, be covered to protect them from the direct rays of the sun.

B.07 Mixing Water

Water for mixing concrete, mortar, and rendering shall be subject to the approval of the Supervisor. It shall be clean, fresh and free from oil, acid, alkali, sugar and vegetable substances, and it shall, be free of organic or inorganic matter in solution or suspension in such amount that it may impair their strength, appearance of durability.

B.08 Concrete Mixer

Concrete shall consist of cement, graded aggregates and water thoroughly mixed and compacted to provide strengths as detailed below.

| Type of Concrete Mix | Maximum Size of Aggregate | Specified Compressive Strength at 28 Days |
|----------------------|---------------------------|---|
| 1:2:4 | 38 mm | 180 kg/cm ² |
| 1:3:6 | 38 mm | 120 kg/cm ² |

Type of concrete mix is indicated by the volumetric proportions of cement, fine aggregate and coarse aggregate. The mix proportions shown in the table above are given as a guide to the mixes ordinarily needed to achieve the specified strengths and shall not relieve the Contractor of the responsibility to obtain the specified strengths.

B.09 Batching

The aggregates and cement may be proportioned by volume in accurately calibrated gauge boxes unless otherwise directed by the Supervisor.

B.10 Mixing Concrete by Machine

The materials for concrete shall be mixed in an approved mechanical mixer. The mixing time for each batch shall not be less than the minimum mixing time, shall not exceed three (3) times the minimum time, and shall be constant for a series of batches of concrete for a particular structure.

The mixer shall not be loaded beyond their rated capacity, nor shall they be operated at a speed in excess of that recommended by the manufacturer. They shall produce a concrete of uniform consistency and appearance, at a continuous rate approved by the Supervisor.

All mixing equipment shall be clean before commencing mixing, and shall be kept free from set concrete.

B.11 Mixing Concrete by Hand

Where it is not possible to employ machine mixing and approval has been obtained from the Supervisor, concrete shall be mixed by hand, as near as practicable to the site where it is to be deposited. Clean mixing bankers or platforms of sufficient areas for the proper execution of the Work shall be provided. These platforms if constructed of timber shall consist of plants closely jointed so as to avoid the loss of any grout or liquid from the wet concrete. The whole of the aggregate and

cement shall be turned over on the banker in a dry state at least twice. The water shall then be added gradually through a rose head, after which the materials shall again be entirely turned over in a wet state at least three (3) times before leaving the banker.

B.12 Protected Concreting in Unfavorable Weather

No concreting will be allowed in the open during storms or heavy rains. All concreting materials and plant are to be adequately protected against the effects of heavy storms and strong winds.

B.13 No Partially Set Material to be Used

All concrete and mortar must be placed and compacted within 30-minutes of its being mixed: no partially set material shall be used in the Work.

B.14 Depositing Concrete

The arrangements for placing concrete are to be such that in all cases the material may be conveniently handled and placed in the required position as directed by the Supervisor without re-handling or segregation. Wherever possible the concrete is to be deposited from bottom opening skips and in all cases shall be deposited in layers of such depth that each layer can be easily incorporated with the layer below with the use of internal vibrators or by spading, slicing, and ramming. Concrete shall not be delivered by chute or dropped from barrows or otherwise handled through a height greater than 1.5 meters except with the approval of the Supervisor who may order the concrete to be dropped on to a banker to be turned over by hand before being placed.

The area on which any concrete is to be deposited must be made and maintained free from standing water during concreting operations unless otherwise approved. Running water crossing or entering such areas must be brought under control before concreting proceeds.

Concrete in reinforced concrete work shall be deposited in small quantities in a plastic state with a water cement ratio to give the specified strength. The depositing of concrete in individual member shall be continued without stoppage up to an approved pre-arranged construction joint or until the member is completed and shall be finished off in such manner that the junction of members shall be monolithic unless otherwise specified.

B.15 Compaction of Concrete

Concrete shall, during placing, be compacted by vibrators or any other compaction tool of approved type. Compaction shall continue until the concrete being placed shall be judged to be compacted by the appearance of a blistering and even surface except for slight irregularities where the coarse aggregate break through. All air shall this time be expelled.

B.16 Curing and Protection

The Contractor shall take adequate measures to ensure that the concrete is cured. These shall include covering the concrete with burlap matting or other effective means which shall be kept damp continuously for a minimum period of three (3) days after casting or for such other time as the Supervisor may direct. After removal of this covering, the concrete shall then be sprayed with water for a minimum period of a further seven (7) days. Other methods of preventing the water of hydration in the concrete from evaporating may be used with the approval of the Supervisor.

All concrete liable to be affected by running water or wave action shall be adequately protected from damage during the setting period and all temporary protective works shall be erected to the satisfaction of the Supervisor.

B.17 Embedded Items

Before placing concrete, care shall be taken to determine that all embedded items are securely fastened in place as shown on the Drawings or as otherwise directed. All embedded items shall be thoroughly clean and free from oil and other foreign matter, such as loose coatings of rust, paint, scale, mortar, etc. The embedding of wood in concrete shall be prohibited unless specifically authorized.

Any pipelines or other materials embedded in structures under the Contract, as construction expedients, shall conform to the above requirements and upon completion of their use, shall be backfilled with concrete at no extra cost to the Employer.

B.18 Formwork

Forms shall be used, wherever necessary, to confine the concrete and shape it to the required lines. All exposed concrete surface having slopes steeper than 1:1 shall be formed, unless otherwise directed or approved by the Supervisor.

Forms shall be simple; they shall be rigidly constructed of approved materials and shall be braced and strutted to withstand the pressure resulting from placing and vibrating the concrete, constructional loads, wind and other forces without appreciable deformation.

Surfaces of the forms to be in contact with concrete shall be free from adhering foreign matter, projecting nails and the like, grooves, splits or other defects. Shutting boards shall be carefully jointed and so arranged as to be able to swell under the influence of humidity of the concrete, without causing any deformation to the forms. Interstices shall be properly filled with glazier's putty and the water-proofing of the forms shall be sufficient to prevent escape of cement resulting from excess of water in the concrete. However, paper tamping shall not be used unless otherwise approved by the Supervisor.

A non-staining commercial mineral oil or other approved material shall be applied to the faces of the forms before concreting to prevent adherence to the concrete. Care must be exercised to prevent the material applied to the faces of the forms from coming in contact with the reinforcement, but if this should inadvertently occur, the reinforcement must be cleaned.

When forms have been built and have been prepared ready for concreting, they will be inspected by the Supervisor and no concrete shall be placed until the forms have been approved by him. In order to avoid delays in obtaining approval, the Contractor shall inform the Supervisor, at less 24 hours in advance, of his intention to have the forms ready for inspection.

The Contractor shall take full responsibility that the proper time has elapsed for the concrete to attain sufficient strength before forms are removed. Nevertheless, the forms shall not be struck without the prior approval of the Supervisor, and in any case at least three (3) days shall elapse before forms are struck.

Connections shall be so formed as to permit the easy removal of the forms without hammering, etc., and without the necessity of levering against the surface of the concrete.

B.19 Reinforcing Bar

Reinforcing bar for concrete shall be deformed not-rolled milled steel bars complying with JIS, or its equivalent, and shall be supplied to the Contractor by the Employer as required.

The Contractor's method of handling and storing reinforcing bars shall be subject to the approval of the Supervisor.

B.20 Placing of Reinforcing Bar

The number, size, form and position of all reinforcing steel bars, fabric, ties, links, stirrups and other parts of the reinforcement are to be placed in exact accordance with the Drawings and kept in the correct

position in the forms without displacement during the process of vibrating, tamping and ramming the concrete in place. The Contractor shall provide all necessary distance pieces and space bars at his own cost to maintain the reinforcement in the correct position. Any ties, links or stirrups connecting the bars shall be taunt so that the bars are properly braced, the inside of their curved parts shall be in actual contact with the bars around which they are intended to fit. Bars shall be bound together with the best black annealed mild steel wire which is subject to the Supervisor's approval, and the binding shall be twisted tight with proper pliers. The free ends of the binding wire shall be bend inwards.

The Contractor shall provide, at his own cost and to the approval of the Supervisor, working drawings of all reinforcement accompanied by bending schedules and copies of the orders placed for bars.

Before any steel reinforcement is embedded in the concrete any scale, loose rust, oil, grease or other deleterious matter shall be removed. Partially set concrete which may be adhering to the exposed bars during concreting operations shall likewise be removed.

When reinforcement bar has been placed and is ready for concreting, it will be inspected by the Supervisor and no concrete shall be placed until the reinforcement has been approved by him. The Contractor shall inform the Supervisor at least 24 hours in advance of his intention to have the reinforcement ready for inspection.

The minimum concrete cover of reinforcement bar measured from the outside of the bar shall be 3 centimeters.

C. BRICK WORKS

C.01 Bricks

All bricks shall be of the best quality of their respective kinds; they shall be hard, square, sound, throughly well burnt, true to shape, uniform in size, shape and texture, free from lime and hair cracks with well defined arises, uniform in colour, and clean. They shall be

obtained from manufacturers approved by the Supervisor. The porosity shall in no case exceed 20% by weight but in the case of engineering bricks not more than 5% will be allowed. Facing bricks shall, except where otherwise directed, be approved red engineering bricks of the best quality; they shall be of slightly larger dimensions than the brick used for internal work in order to allow neat joints to be formed on the face. Before any order for bricks is placed by the Contractor samples must be submitted to the Supervisor for his approval, together with the name of the manufacturer. Any consignment of bricks delivered on the Works must be equal in every respect to the approved samples submitted. Hand labour shall be employed in discharging and stacking bricks on delivery. No broken, chipped or bats shall be brought on to the Site.

C.02 Cement Mortar

Cement mortar for brick works shall be, unless otherwise specified, Portland cement and sand mixed in the volumetric proportion of 1:3. The size of sand shall be less than 2.5 millimeters. The constituent materials shall be accurately gauged and mixed in an approved manner.

The cement mortar shall be made in small quantities only as and when required, and any mortar which has begun to set or which has been mixed for a period of more than one hour shall be rejected.

C.03 Wet Brick Masonry

Wet brick masonry work shall be built in level courses with bricks of the quality or description specified and to the dimensions shown on the Drawings. Walls are to be carried up in a uniform manner and no one portion raised more than one (1) meter above another at one time, the open end being racked up and no toothed. All perpend are to be kept strictly plumb and square and the whole properly bonded together so that there are no continuous vertical joints through any two courses of brick work. No broken bricks will be allowed except where necessary to form proper bond. The net brick masonry, where one brick thick or over, shall, unless otherwise directed, or approved, be laid in English bond. All arching, inverting and circular lining is to be built in rings 10-centimeters thick.

Immediately before use bricks are to be immersed in fresh water and thoroughly wetted to the satisfaction of the Supervisor; before continuing partly completed work, the exposed bed shall likewise be wetted. All beds and joints are to be completely filled with cement mortar notwithstanding any local or common custom to the contrary. All brick works are specified to be pointed unless otherwise specified. The face joints shall be raked out to a depth of two (2) centimeters and later refilled with the mortar specified by the Supervisor for each individual case and ironed in to give a neat finished surface. Faces of brick work due to be plastered shall have joints raked out and left open to form a key for plastering. All face works shall be built from scaffolding on the outside and in no case shall face work be built overhand unless specially authorized by the Supervisor. The brick faces of all arches are to be cleaned off after the centres have been struck and the joints left flush with the face.

The laying of brick work is not to be carried out during storms or heavy rain.

C.04 Dry Brick Masonry

Dry brick masonry shall be performed at the location, with thickness and in a manner as shown on the Drawings or as directed by the Supervisor. Bricks used for dry brick masonry shall be of the quality for wet brick masonry specified in Clause C.01 or as directed by the Supervisor.

Bricks shall be placed so that firm foundation is achieved to the satisfaction of the Supervisor.

No broken bricks shall be allowed except where necessary to form proper bond. The manners and methods of placing bricks shall be those directed by the Supervisor.

D. PIPE WORKS FOR IRRIGATION PIPELINE

D.01 General

Rigid polyvinyl chloride (PVC) pipes as well as necessary equipment and fittings to be installed for irrigation pipelines such as Main Irrigation Pipeline, Branch Irrigation Pipelines shall be supplied to the Contractor by the Employer free of charge. These equipment and materials are listed in the General Specifications.

PVC pipe will comply with VP (10 kg/cm²) of JIS K 6741 (Rigid Polyvinyl Chloride Pipe) as shown on the Drawings. The fitting of pipe will comply with JIS K 6743 (Rigid Polyvinyl Chloride Pipe Fitting for Water Works) as solvent welding socket (TS joint).

The installation of irrigation pipelines shall be carried out in accordance with the details shown on the Drawings and the instruction given by the Supervisor.

D.02 Pipe Bedding

The Contractor shall lay pipes not less than 100 centimeters below the ground surface as shown on the Drawings or as directed by the Supervisor. The bedding material of sand below the pipes shall be placed in accordance with the Drawings and shall be well compacted to the satisfaction of the Supervisor.

D.03 Pipe Jointing

Before the pipes are jointed together, the Contractor shall inspect for any damage to the pipes and clean the inside and outside parts of the pipe ends and the joints as directed by the Supervisor. If a TS joint is used, adhesive shall be applied to the pipe to be carefully inserted into the TS joint and held for 30 to 50 seconds.

D.04 Excavation and Backfilling for Trenches

Excavation and backfill of trenches shall be carried out in accordance with Clauses A.03 and A.05, respectively.

D.05 Installation of Appurtenance

The Contractor shall install appurtenance such as air valves, sluice valves and hydrants under the instruction of the Supervisor.

D.06 Field Testing

Before backfilling trenches, all pipelines and their appurtenance shall be tested at the Site to ensure proper water tightness. Field tests shall be performed by the Contractor under the direction of the Supervisor. The Contractor shall prepare all necessary instrument required by the Supervisor for the proper testing of pipelines.

The maximum allowable quantity of leakage per one (1) centimeter of diameter and one (1) kilometer of length shall be 100 liter/day in the pipeline.

Defects found from the above-mentioned tests shall be investigated and shall be repaired immediately at the expense of the Contractor.

After the water conduction tests, the pipelines shall be drained completely and carefully to a safe place such as drainage canal by the Contractor with the approval of the Supervisor.

(5) 工事数量書

Bill of Quantities

Summary

| Section | Total Amount (Japanese Yen) |
|--|--------------------------------|
| A. Earthwork for pipeline | |
| B. Pipe laying | |
| C. Installation of valves | |
| D. Installation of dripline | |
| E. Installation of control heads | |
| F. Construction of sluice valve hole | |
| G. Construction of air valve hole | |
| H. Construction of scour valve hole | |
| I. Construction of metering valve hole | |
| J. Appurtenant work | |
| Grand Total | |

Section A. Earthwork for pipeline

| No. | Work | Unit | Q'ty | Unit Price (₹) | Amount (₹) |
|-----|------------------------|----------------|---------|-------------------|---------------|
| A.1 | Excavation | m ³ | 2,699.4 | | |
| A.2 | Backfilling | m ³ | 2,573.3 | | |
| A.3 | Sand bed | m ³ | 117.4 | | |
| A.4 | Disposal of spoil soil | m ³ | 126.1 | | |

Total Section A

Section B. Pipe laying

| No. | Work | Unit | Q'ty | Unit Price (¥) | Amount (¥) |
|-----------------|------------------------|------|------|-------------------|---------------|
| B.1 | Pipe laying ϕ 125 | m | 40 | | |
| B.2 | do. ϕ 100 | m | 557 | | |
| B.3 | do. ϕ 75 | m | 471 | | |
| B.4 | do. ϕ 50 | m | 807 | | |
| B.5 | do. ϕ 40 | m | 23 | | |
| B.6 | do. ϕ 25 | m | 236 | | |
| Total Section B | | | (m) | (2,134) | |

Section C. Installation of valves

| No. | Work | Unit | Q'ty | Unit Price (¥) | Amount (¥) |
|-----------------|--|------|------|----------------|------------|
| C.1 | Installation of sluice valve $\phi 100$ | No. | 3 | | |
| C.2 | do. $\phi 75$ | No. | 1 | | |
| C.3 | do. $\phi 50$ | No. | 1 | | |
| C.4 | Installation of scour valve $\phi 50$ | No. | 9 | | |
| C.5 | Installation of air valve $\phi 50$ | No. | 5 | | |
| C.6 | Installation of filter $\phi 150$ | No. | 1 | | |
| C.7 | do. $\phi 75$ | No. | 1 | | |
| C.8 | Installation of small valve $\phi 40$ | No. | 1 | | |
| C.9 | do. $\phi 25$ | No. | 86 | | |
| C.10 | Installation of metering valve $\phi 75$ | No. | 4 | | |
| C.11 | do. $\phi 50$ | No. | 2 | | |
| <hr/> | | | | | |
| Total Section C | | | | | |

Section D. Installation of dripline

| No. | Work | Unit | Q'ty | Unit Price (₱) | Amount (₱) |
|-----------------|---------------|------|--------|-------------------|---------------|
| D.1 | Plot A | ha | 0.76 | | |
| D.2 | Plot B | ha | 1.12 | | |
| D.3 | Plot C | ha | 0.67 | | |
| D.4 | Plot D | ha | 1.26 | | |
| D.5 | Vinylhouse E1 | ha | 0.32 | | |
| D.6 | Vinylhouse F | ha | 0.39 | | |
| Total Section D | | (ha) | (4.52) | | |

Section E. Installation of control head

| No. | Work | Unit | Q'ty | Unit Price (₹) | Amount (₹) |
|-----------------|---------|-------|------|-------------------|---------------|
| E.1 | Plot A | set | 2 | | |
| E.2 | Plot B | set | 5 | | |
| E.3 | Plot C | set | 2 | | |
| E.4 | Plot D | set | 5 | | |
| E.5 | Plot E2 | set | 2 | | |
| E.6 | Plot G1 | set | 2 | | |
| E.7 | Plot G2 | set | 3 | | |
| E.8 | Plot I | set | 4 | | |
| E.9 | Plot J | set | 5 | | |
| Total Section E | | (set) | (30) | | |

Section F. Construction of sluice valve hole

| No. | Work | Unit | Q'ty | Unit Price (₹) | Amount (₹) |
|-----------------|--------------------------------------|------|------|-------------------|---------------|
| F.1 | Construction of sluice valve hole | ø100 | No. | 3 | |
| F.2 | do. | ø 75 | No. | 1 | |
| F.3 | do. | ø 50 | No. | 1 | |
| <hr/> | | | | | |
| Total Section F | | | | | |
| <hr/> | | | | | |

Section G. Construction of air valve hole

| No. | Work | Unit | Q'ty | Unit Price (¥) | Amount (¥) |
|-----|------|------|------|-------------------|---------------|
|-----|------|------|------|-------------------|---------------|

| | | | | | |
|-----|---|-----|---|--|--|
| G.1 | Construction of air valve hole ϕ 50 | No. | 3 | | |
|-----|---|-----|---|--|--|

Total Section G

Section H. Construction of scour valve hole

| No. | Work | Unit | Q'ty | Unit Price (₹) | Amount (₹) |
|-----------------|-------------------------------------|------|------|-------------------|---------------|
| H.1 | Construction of scour valve hole | No. | 9 | | |
| H.2 | Construction of drain pit | No. | 9 | | |
| <hr/> | | | | | |
| Total Section H | | | | | |

Section I. Construction of metering valve hole

| No. | Work | Unit | Q'ty | Unit Price (¥) | Amount (¥) |
|-----------------|--|---------|------|-------------------|---------------|
| I.1 | Construction of metering valve hole | ø75 No. | 4 | | |
| I.2 | do. | ø50 No. | 2 | | |
| <hr/> | | | | | |
| Total Section I | | | | | |
| <hr/> | | | | | |

Section J. Appurtenant work

| No. | Work | Unit | Q'ty | Unit Price (₹) | Amount (₹) |
|-----|--------------------------------------|----------------|------|-------------------|---------------|
| J.1 | Pipeline protection work | m ³ | 3.2 | | |
| J.2 | Road arrangement | m ² | 50 | | |
| J.3 | Drainage canal arrangement | L.S. | 1 | | |
| J.4 | Installation of water level gauge | L.S. | 1 | | |
| J.5 | Filter protection work ϕ 150 | No. | 1 | | |
| J.6 | do. | ϕ 75 | No. | 1 | |

Total Section J

(6) 機材仕様書 (案)

機材仕様書 (案)

1. 硬質塩化ビニル管 (各種)

使用圧力 $10\text{kg}/\text{cm}^2$ (VP管) とし、JIS K6741 または同等の規格を満足するものとする。 $\phi 50$ 以下は直管、 $\phi 75$ 以上は接着受口管とする。

2. 硬質塩化ビニル継手 (各種)

圧送用継手 (TS継手) とし、JIS K6743 または同等の規格を満足するものとする。

3. フランジ継手 (各種)

適用圧力 $10\text{kg}/\text{cm}^2$ に十分に耐えられる構造とし、JIS 10K 形とする。

4. 鋼 管

亜鉛メッキ水道用鋼管とし、JIS G3442 または同等の規格を満足するものとする。

5. 定流量自動閉止弁 (メタリングバルブ) ; $\phi 50, 75$

ウォルトマン型量水器と水圧駆動式ダイヤフラム弁を一体化したもので、設定流量が流れた後、自動的に閉弁する。

量水器には積算計を搭載する。

適用圧力 : $0.7\sim 10.0\text{kg}/\text{cm}^2$

最大流量 : $23\text{ ml}/\text{時} (\phi 50)$ 、 $60\text{ ml}/\text{時} (\phi 75)$

材 質 : 鋳鉄

6. 90° アングルバルブ (360° 回転式) ; $\phi 25, 50$

適用圧力 (最大) : $10.0\text{kg}/\text{cm}^2$

材 質 : アルミ合金

取 付 : 内ネジ式

7. 自動空気弁 ; $\phi 50$

適用圧力 : $0.1\sim 12.0\text{kg}/\text{cm}^2$

取 付 : 強化プラスチック、亜鉛合金

8. 直動型減圧弁 ; $\phi 20$ 、40

一次圧力の変動にかかわらず、二次圧力を一定に減圧する。

一次側適用圧力(最大) : 12.0 kg/cm²

適用流量(最大) : 5.5 m³/時 ($\phi 20$)、18 m³/時 ($\phi 40$)

材 質 : 砲金、強化プラスチック

9. メタルフィルター ; $\phi 75$ 、150

Yパターン式手動フィルター

適用圧力(最大) : 10.0 kg/cm²

流 量(最大) : 50 m³/時 ($\phi 75$)、160 m³/時 ($\phi 150$)

メッシュサイズ : # 120~# 155

材 質 : 銅 管

10. スプリングラーヘッド

ノズルサイズ : 3.6×2.4 (mm)

適用 圧 力 : 2.5 kg/cm²

吐 出 量 : 18.2 l /min

散 水 直 径 : 24.9m

材 質 : 砲 金

11. ドリップチューブ ; $\phi 16$

ポリエチレンチューブ内に減圧式ドリッパーを配置した点滴カンガイ用チューブ

ドリッパー間隔 : 0.4m

適用 圧 力 : 0.75 ~2.5 kg/cm²

吐 出 量 : 1.1 l /時

最大敷設長 : 100m以下

12. 薬液混入機

本管ライン圧力を利用してピストンを駆動し薬液をラインに圧入する。

適用 圧 力 : 0.5~8.0 kg/cm²

混入量(最大) : 320 l /時

13. ポリエチレンホース（低密度型）；φ50 JIS-6761-1971

破壊圧力：14.0kg/cm²

適用圧力（最大）：4.6kg/cm²

14. アルミパイプ（両端クイックカップラー付）

適用圧力：4.5kg/cm²以上

パイプ長：6.0m/本

15. ミニスプリンクラー

ターボハンマー式 小水量 低角度型 小型スプリンクラー

ノズル口径：φ2.5mm

適用圧力：2.0kg/cm²

吐出量：4.38ℓ/min

散水直径：13.0mm

材質：強化プラスチック

(7) 資機材内訳書

資機材一覧表(その1)

| 品 目 | 仕 様 | 単 位 | 数 量 | 単 価 | 金 額 (円) |
|-----------------|-------------|------|-----|-----|---------|
| V P 管 | φ 125× 4m | 本 | 11 | | |
| | φ 100× 4m | 〃 | 147 | | |
| | φ 75× 4m | 〃 | 122 | | |
| | φ 50× 4m | 〃 | 208 | | |
| | φ 40× 4m | 〃 | 7 | | |
| | φ 25× 4m | 〃 | 76 | | |
| | T S ソ ケ ッ ト | φ 50 | ヶ | 203 | |
| φ 40 | | 〃 | 7 | | |
| φ 25 | | 〃 | 54 | | |
| T S レ ジ ュ ー サ ー | φ 125× 100 | ヶ | 1 | | |
| | φ 100× 75 | 〃 | 2 | | |
| | φ 75× 50 | 〃 | 14 | | |
| | φ 50× 40 | 〃 | 1 | | |
| | φ 40× 25 | 〃 | 1 | | |
| T S チ ー ズ | φ 125× 100 | ヶ | 1 | | |
| | φ 100 | 〃 | 1 | | |
| | φ 100× 75 | 〃 | 5 | | |
| | φ 100× 50 | 〃 | 6 | | |
| | φ 75 | 〃 | 5 | | |
| | φ 75× 50 | 〃 | 19 | | |
| | φ 50 | 〃 | 5 | | |
| | φ 50× 25 | 〃 | 40 | | |
| | φ 40× 25 | 〃 | 2 | | |
| φ 25 | 〃 | 1 | | | |
| T S エ ル ボ | φ 125 | ヶ | 1 | | |
| | φ 100 | 〃 | 5 | | |
| | φ 75 | 〃 | 2 | | |
| | φ 50 | 〃 | 17 | | |
| 小 計 | | | | | |

資機材一覧表(その2)

| 品 目 | 仕 様 | 単 位 | 数 量 | 単 価 | 金 額 (円) |
|---------------|-----------|-----|--------|-----|---------|
| T S ベ ン ド | φ 100×45° | ヶ | 4 | | |
| 白 ソ ケ ッ ト | φ 25 | ヶ | 44 | | |
| 白 径 違 い エ ル ボ | φ 50×20 | ヶ | 28 | | |
| 白 エ ル ボ | φ 50×90° | ヶ | 126 | | |
| | φ 25×90° | 〃 | 83 | | |
| | φ 50×45° | 〃 | 8 | | |
| | φ 75×45° | 〃 | 16 | | |
| 白 チ ー ズ | φ 50×20 | ヶ | 60 | | |
| | φ 50×13 | 〃 | 4 | | |
| | φ 40×13 | 〃 | 30 | | |
| | φ 20× 8 | 〃 | 41 | | |
| 白 ブ ッ シ ン グ | φ 50×40 | ヶ | 60 | | |
| | φ 25×20 | 〃 | 41 | | |
| | φ 13× 8 | 〃 | 30 | | |
| 白 ニ ッ プ ル | φ 50 | ヶ | 99 | | |
| | φ 40 | 〃 | 90 | | |
| | φ 25 | 〃 | 41 | | |
| | φ 20 | 〃 | 82 | | |
| | φ 8 | 〃 | 71 | | |
| ポリエチレンパイプ | φ 50 | m | 420 | | |
| | 7/8 | 〃 | 277 | | |
| ドリップライン | φ 16 | 〃 | 45,158 | | |
| ドリップラインスターター | φ 16 | ヶ | 570 | | |
| ドリップラインアダプター | φ 16 | 〃 | 110 | | |
| P L A チ ー ズ | φ 50 | ヶ | 14 | | |
| P L A アダプター | φ 50 | 〃 | 28 | | |
| 小 計 | | | | | |

資機材一覧表(その3)

| 品 目 | 仕 様 | 単 位 | 数 量 | 単 価 | 金 額(円) |
|-----------|--------------|-----|-----|-----|--------|
| ドリップエンド | φ16 | ヶ | 680 | | |
| TSバルブソケット | φ75 | ヶ | 8 | | |
| | φ50 | 〃 | 36 | | |
| | φ25 | 〃 | 45 | | |
| S G P | φ 125×2,000L | 本 | 2 | | |
| | φ 75×2,000L | 〃 | 2 | | |
| | φ 75× 600L | 〃 | 8 | | |
| | φ 75× 565L | 〃 | 8 | | |
| | φ 50×5,500L | 〃 | 1 | | |
| | φ 50×1,500L | 〃 | 1 | | |
| | φ 50×1,000L | 〃 | 30 | | |
| | φ 50× 600L | 〃 | 4 | | |
| | φ 50× 565L | 〃 | 4 | | |
| | φ 50× 500L | 〃 | 63 | | |
| | φ 25×1,500L | 〃 | 7 | | |
| | φ 25×1,000L | 〃 | 82 | | |
| | φ 20× 150L | 〃 | 41 | | |
| ボールコック | φ 8 | ヶ | 71 | | |
| | φ20 | 〃 | 64 | | |
| 三方コック | φ50 | 〃 | 30 | | |
| PE用チーz | 7/8" | ヶ | 41 | | |
| PE用エルボ | 7/8" | 〃 | 82 | | |
| 圧 力 計 | | ヶ | 71 | | |
| アングルバルブ | φ50×90° | ヶ | 1 | | |
| | φ25×90° | 〃 | 4 | | |
| 小 計 | | | | | |

資機材一覧表(その4)

| 品 目 | 仕 様 | 単 位 | 数 量 | 単 価 | 金 額(円) |
|-------------------|------------|-----|-----|-----|--------|
| ホース金具付 | φ25×10m | 本 | 1 | | |
| | φ25×5.4m | 〃 | 7 | | |
| BCニップル | φ25 | ヶ | 8 | | |
| BCタケノコ | φ4 | 〃 | 8 | | |
| チューブ | φ4×1,200L | 〃 | 8 | | |
| 支柱 | 1m | ヶ | 8 | | |
| ミニスプリングラー | 2.5mm | 〃 | 8 | | |
| キャップ | φ25 | 〃 | 1 | | |
| フィルター | 6" | ヶ | 1 | | |
| | 3" | 〃 | 1 | | |
| TSフランジ | φ100 | ヶ | 6 | | |
| | φ125 | 〃 | 2 | | |
| | φ75 | 〃 | 4 | | |
| | φ50 | 〃 | 20 | | |
| 両フランジ付エルボ | φ125×90° | ヶ | 6 | | |
| | φ75 | 〃 | 6 | | |
| 両フランジ付短管 (分岐付) | φ125×1.219 | 本 | 2 | | |
| | φ125×200 | 〃 | 1 | | |
| | φ75×1.371 | 〃 | 2 | | |
| | φ75×300 | 〃 | 1 | | |
| | φ75×200 | 〃 | 2 | | |
| | φ75×100 | 〃 | 4 | | |
| レヂューサー (分岐付) | φ150×125 | ヶ | 1 | | |
| | φ150×125 | 〃 | 1 | | |
| 小 計 | | | | | |

資機材一覧表(その5)

| 品 目 | 仕 様 | 単 位 | 数 量 | 単 価 | 金 額(円) |
|-----------------|---------|-----|-----|-----|--------|
| ス ル ー ス 弁 | φ125 | ケ | 1 | | |
| | φ75 | ケ | 5 | | |
| | φ50 | ケ | 40 | | |
| | φ25 | ケ | 41 | | |
| | φ20 | ケ | 1 | | |
| 空 気 弁 | φ50 | ケ | 5 | | |
| 接 着 剤 | | ケ | 5 | | |
| 減 圧 弁 | φ40 | ケ | 30 | | |
| | φ20 | ケ | 41 | | |
| 定流量自動停止弁 | 3" | ケ | 4 | | |
| | 2" | ケ | 2 | | |
| 合 フ ラ ン ジ | φ125 | ケ | 3 | | |
| | φ75 | ケ | 3 | | |
| ラピットカップラー | φ20 | ケ | 64 | | |
| 分岐サドル ドレッサーT | φ100×50 | ケ | 2 | | |
| | φ75×50 | ケ | 1 | | |
| 制 水 弁(水) | φ100 | ケ | 3 | | |
| | φ75 | ケ | 1 | | |
| | φ50 | ケ | 1 | | |
| 開 栓 棒 | | 本 | 5 | | |
| M F ジョイント | φ125 | ケ | 1 | | |
| | φ75 | ケ | 1 | | |
| 排 泥 弁(水) | φ50 | ケ | 9 | | |
| 小 計 | | | | | |

資機材一覧表(その6)

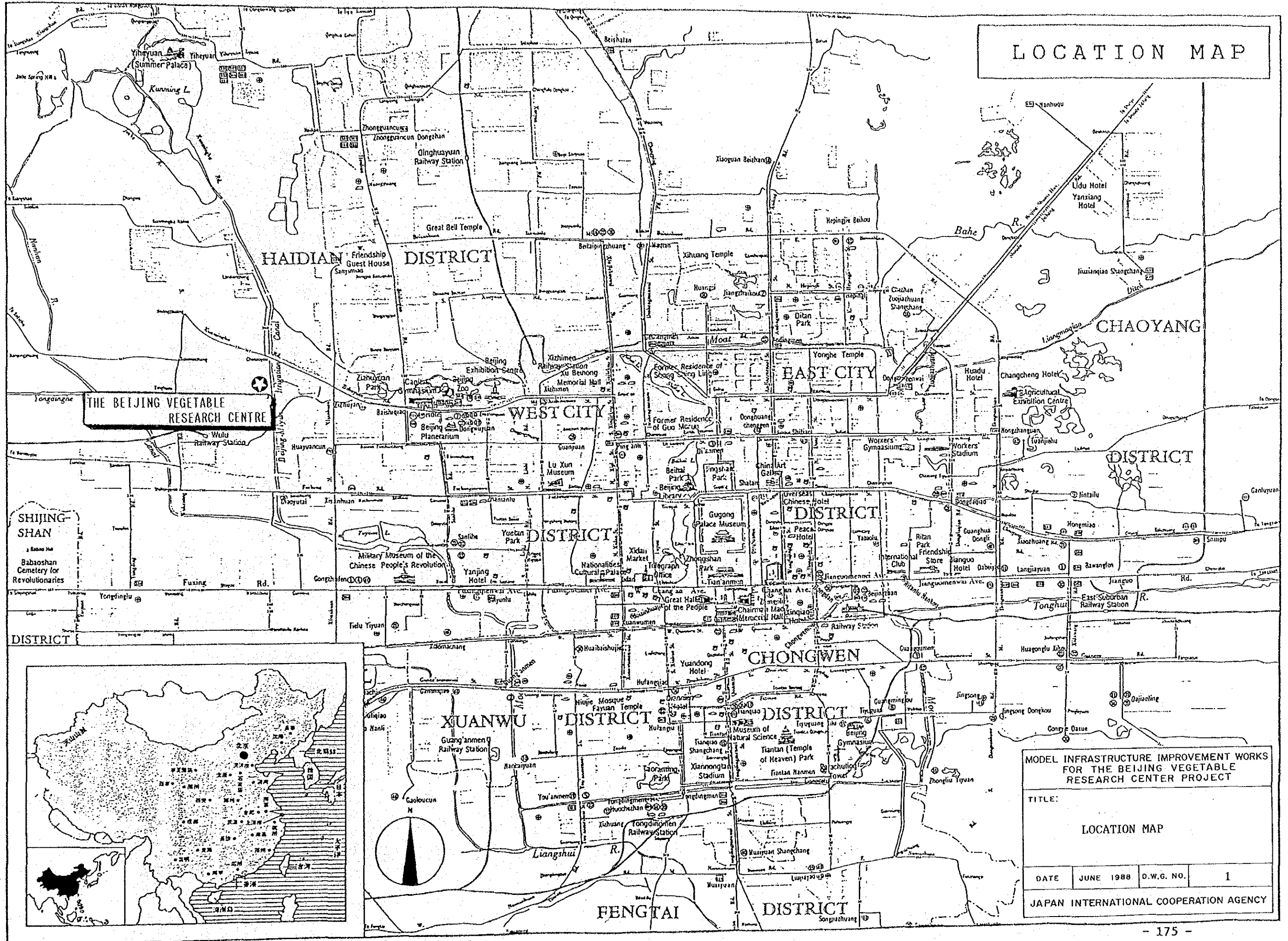
| 品 目 | 仕 様 | 単 位 | 数 量 | 単 価 | 金 額(円) |
|---|------------|-----|-----|-----|--------|
| マチノオスメガスオス | φ50 | ケ | 30 | | |
| マチノキャップ | φ50 | 〃 | 30 | | |
| ニューカップラーオス | φ50 | 〃 | 30 | | |
| 〃 メス | φ50 | 〃 | 30 | | |
| 布 ホ ー ス | φ50×2m | 本 | 2 | | |
| ラ イ ン チ ー ズ | φ50×90° | ケ | 2 | | |
| ラ イ ン エ ル ポ | φ50×90° | 〃 | 2 | | |
| アルミパイプ(導水) | φ50×6m | 本 | 32 | | |
| 〃 (立付) | φ50×6m | 〃 | 28 | | |
| 三脚付立上り管 | 3/4"×1m | 〃 | 28 | | |
| スプリングラー | 3.6×2.4 mm | ケ | 28 | | |
| エ ン ド ア ラ グ | | 〃 | 4 | | |
| 薬 液 混 入 機 | 水圧駆動式 | ケ | 1 | | |
| 水 位 計 | 3P | 組 | 2 | | |
| 小 計 | | | | | |
| 合 計 | | | | | |

(8) 工事図面集

THE BEIJING VEGETABLE RESEARCH CENTRE

LIST OF DRAWINGS

| TITLE | |
|-------|--|
| 1 | LOCATION MAP |
| 2 | GENERAL LAYOUT |
| 3 | PIPE ARRANGEMENT OF PIPELINE IRRIGATION SYSTEM |
| 4 | DRIP IRRIGATION SYSTEM |
| 5 | SPRINKLER IRRIGATION SYSTEM |
| 6 | HOUSE DRIP IRRIGATION SYSTEM NETHOUSE SPRINKLER IRRIGATION SYSTEM |
| 7 | VALVE BOX AND HYDRANT |
| | |



LOCATION MAP

THE BEIJING VEGETABLE RESEARCH CENTRE

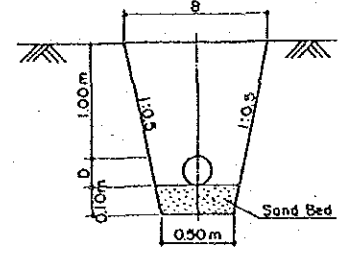
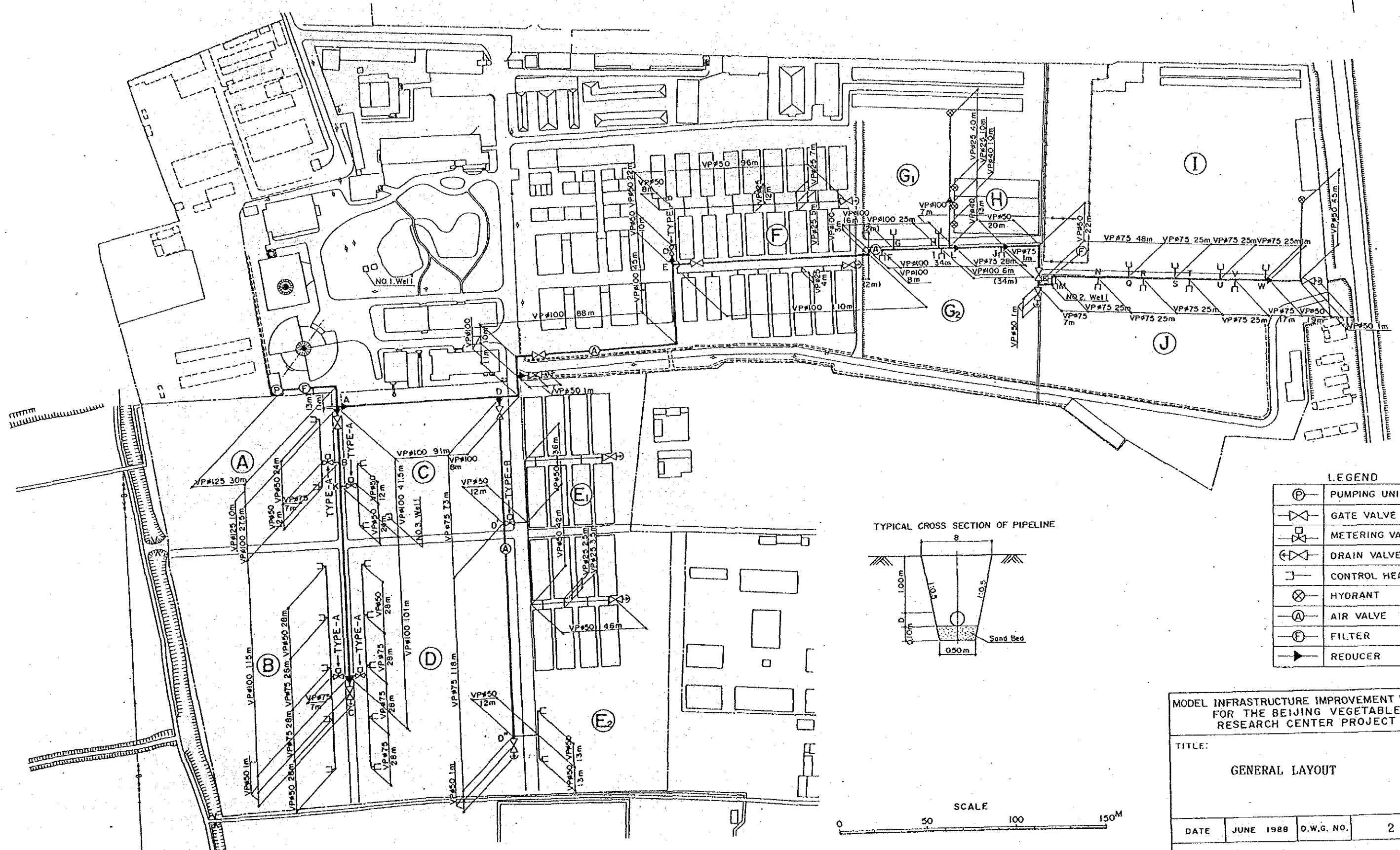
MODEL INFRASTRUCTURE IMPROVEMENT WORKS FOR THE BEIJING VEGETABLE RESEARCH CENTER PROJECT

TITLE:

LOCATION MAP

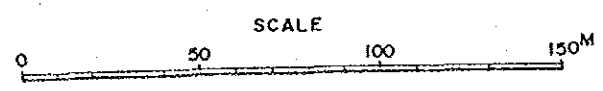
| | | | |
|------|-----------|------------|---|
| DATE | JUNE 1988 | D.W.G. NO. | 1 |
|------|-----------|------------|---|

JAPAN INTERNATIONAL COOPERATION AGENCY

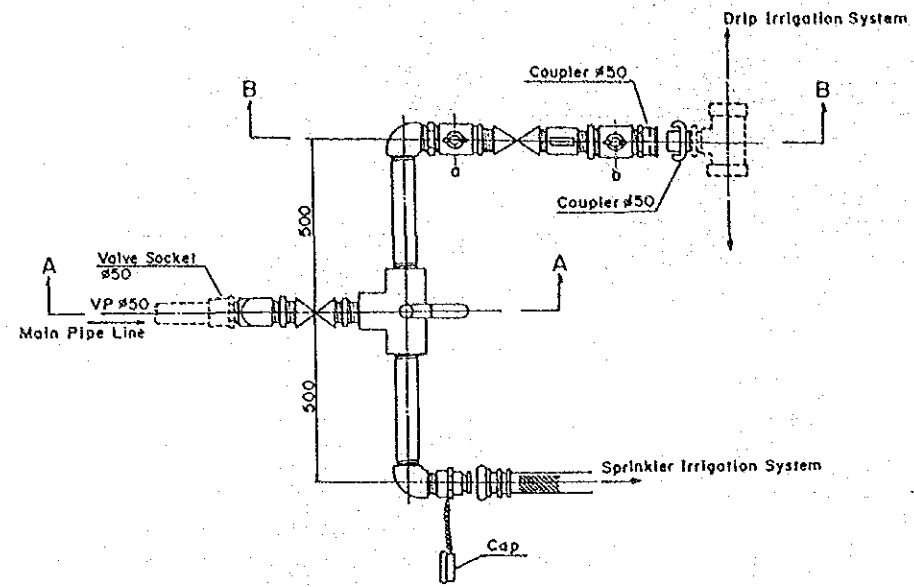


| LEGEND | |
|--------|----------------|
| | PUMPING UNIT |
| | GATE VALVE |
| | METERING VALVE |
| | DRAIN VALVE |
| | CONTROL HEAD |
| | HYDRANT |
| | AIR VALVE |
| | FILTER |
| | REDUCER |

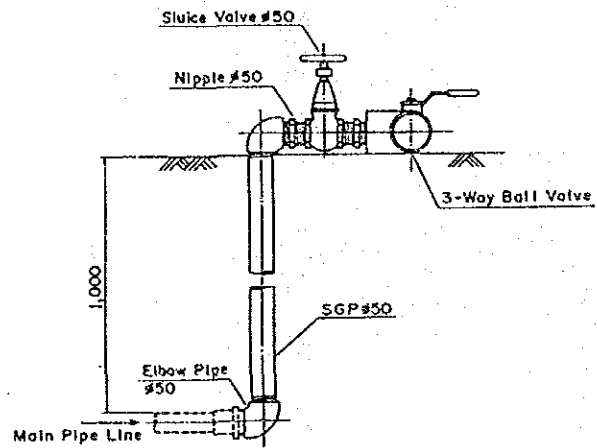
| MODEL INFRASTRUCTURE IMPROVEMENT WORKS FOR THE BEIJING VEGETABLE RESEARCH CENTER PROJECT | | | |
|--|-----------|------------|---|
| TITLE: GENERAL LAYOUT | | | |
| DATE | JUNE 1988 | D.W.G. NO. | 2 |
| JAPAN INTERNATIONAL COOPERATION AGENCY | | | |



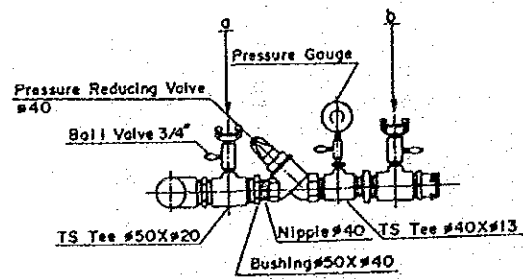
CONTROL HEAD



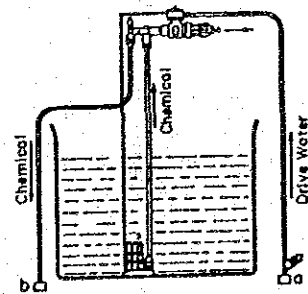
A - A



B - B

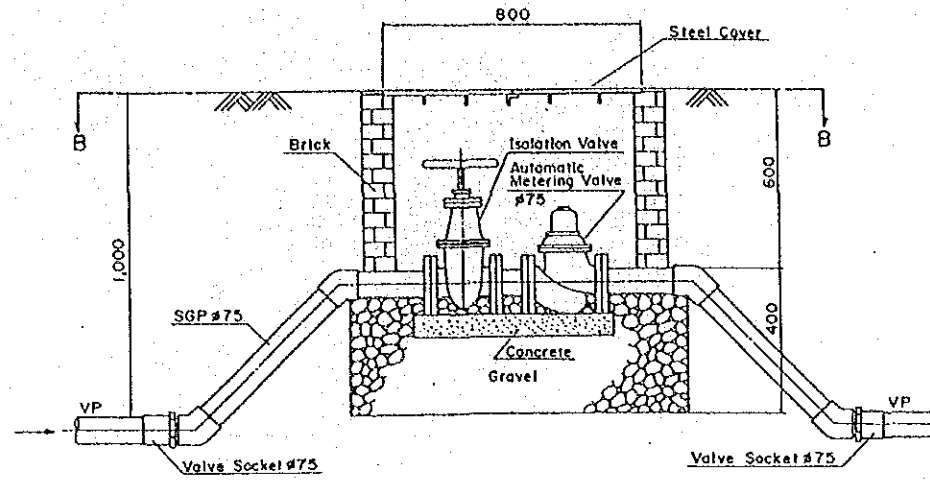


CHEMICAL INJECTOR

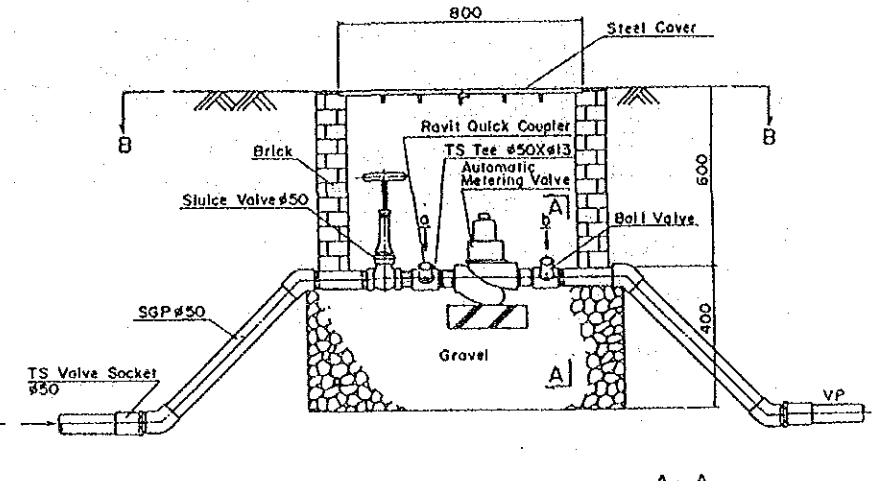


METERING VALVE

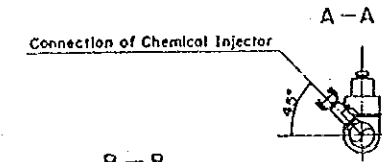
TYPE A



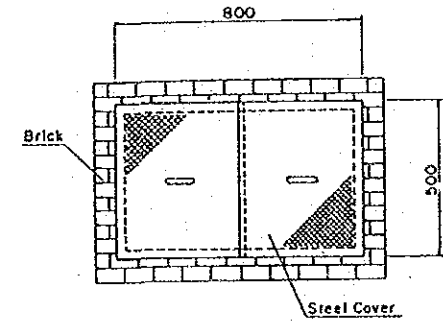
TYPE B



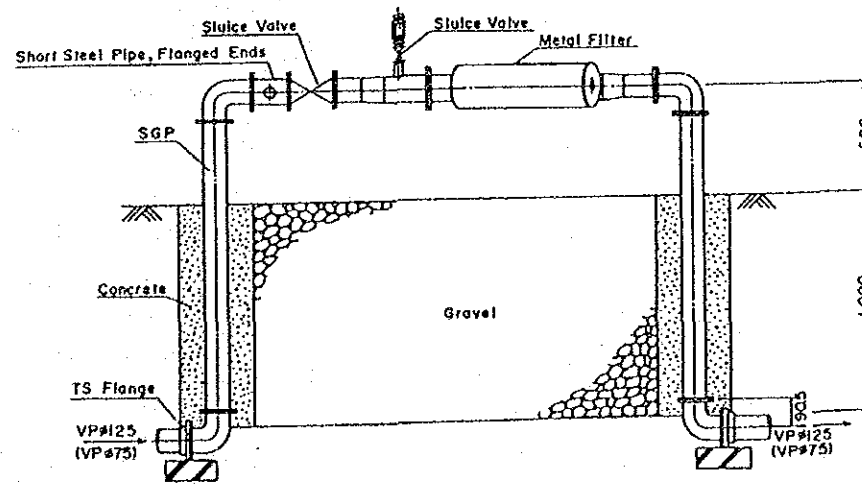
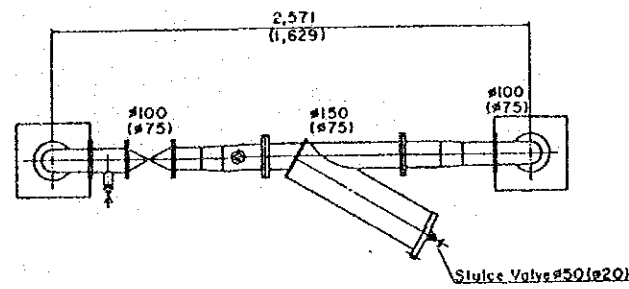
Note: Type A is for plot A, B, C and D.
Type B is for plot E and F.



B - B



FILTER SYSTEM

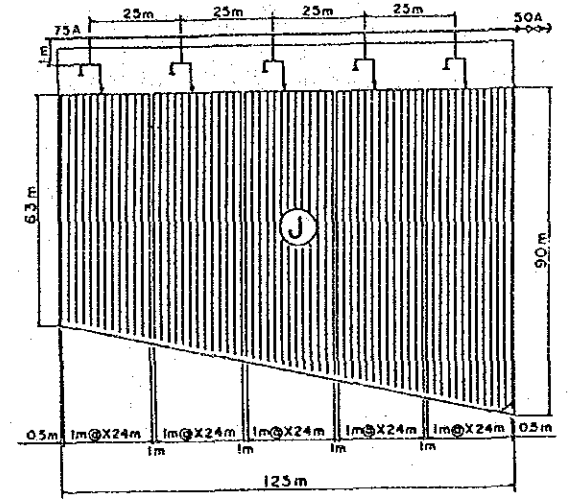
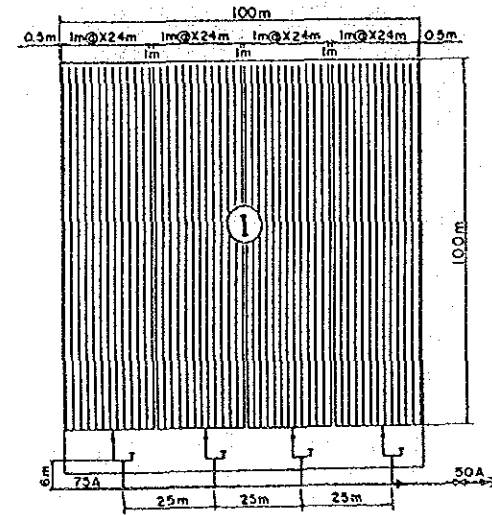
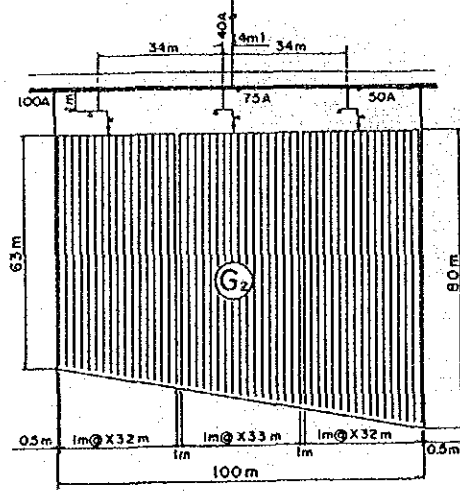
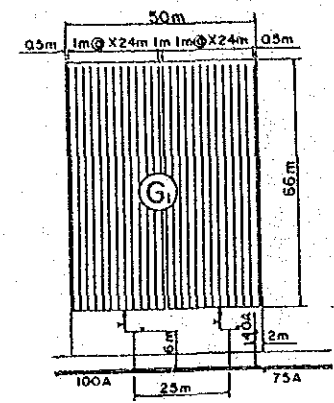
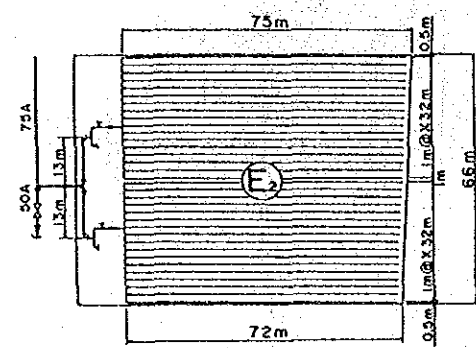
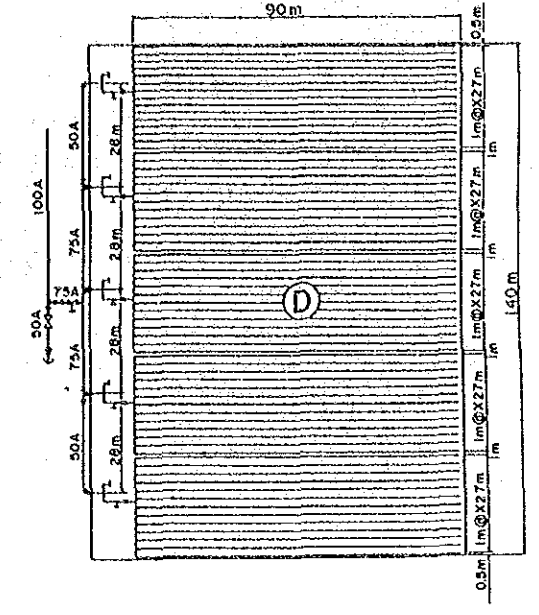
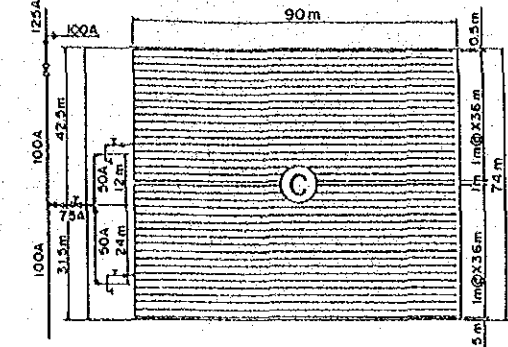
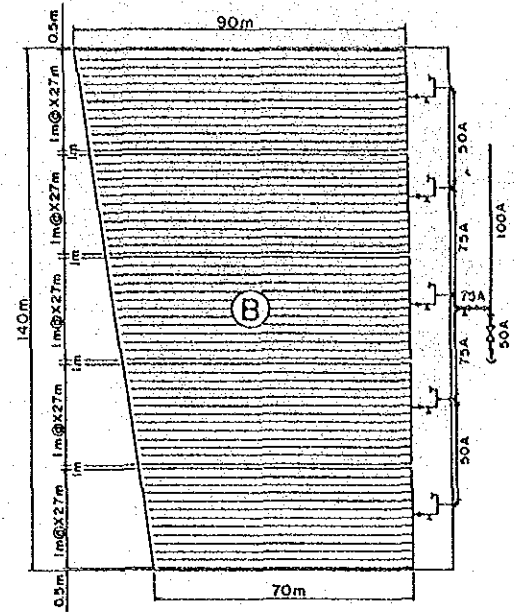
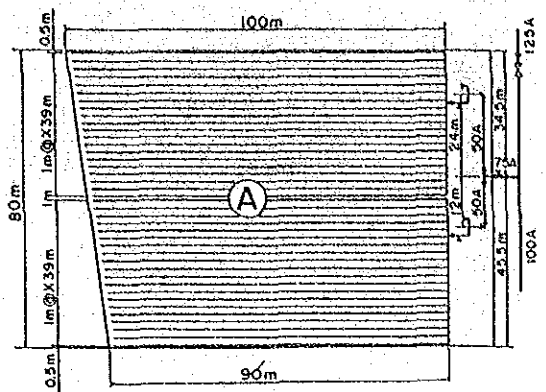
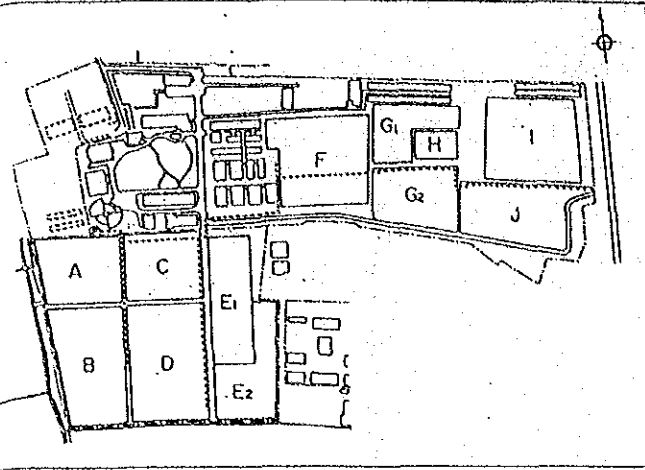


MODEL INFRASTRUCTURE IMPROVEMENT WORKS
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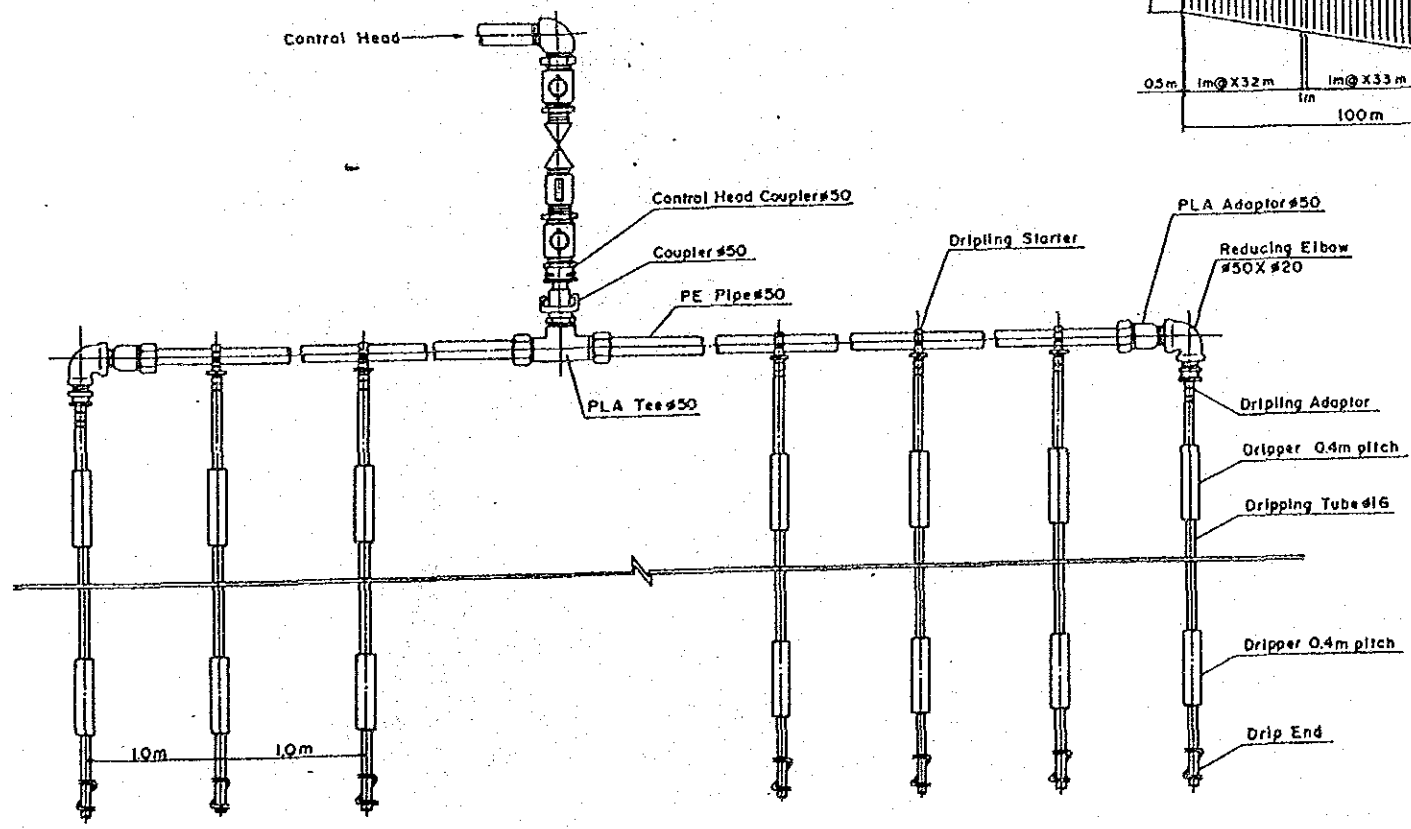
TITLE:
PIPE ARRANGEMENT OF PIPELINE
IRRIGATION SYSTEM

DATE: JUNE 1988 O.W.G. NO. 3

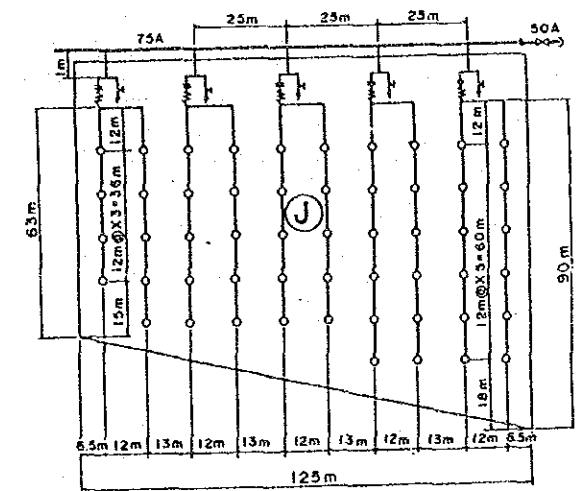
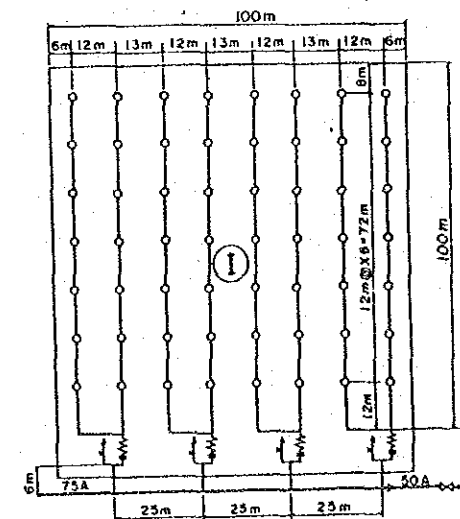
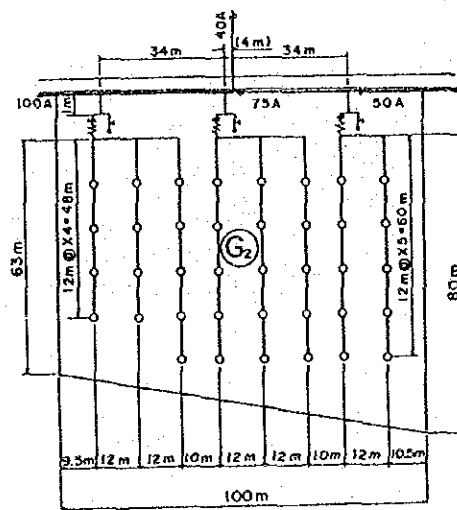
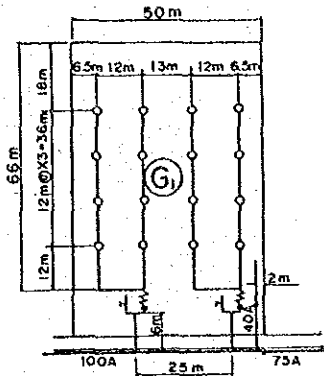
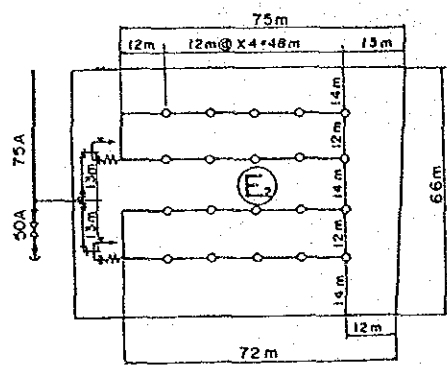
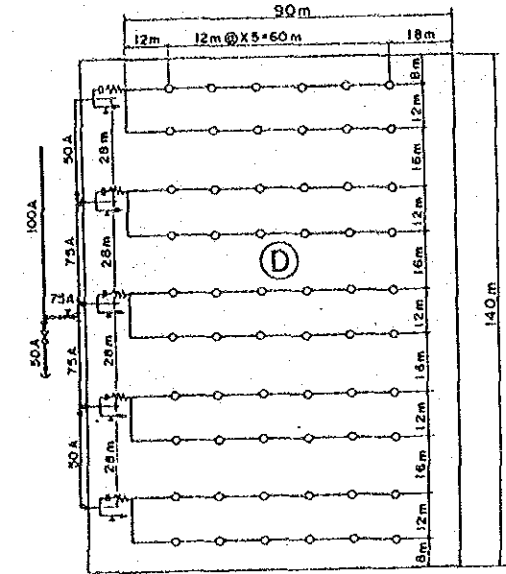
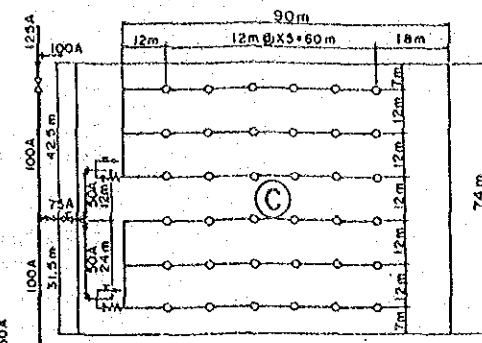
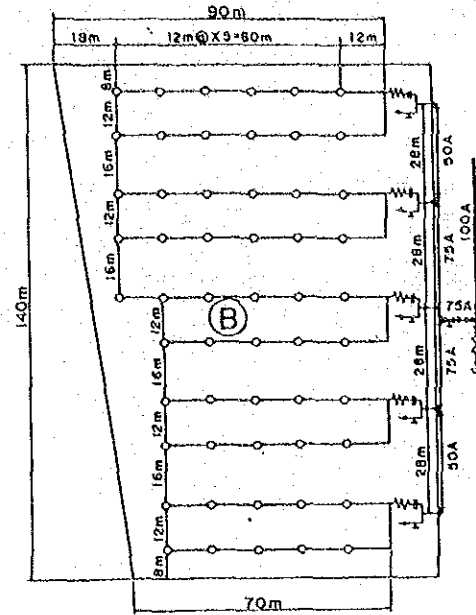
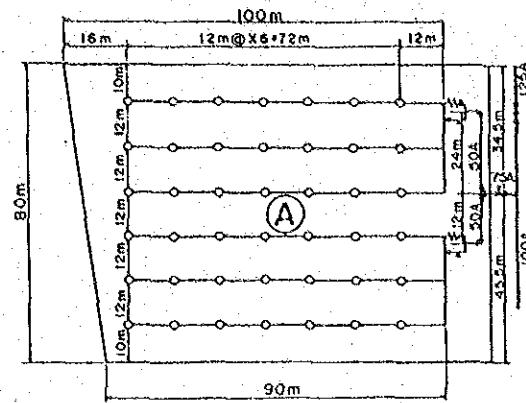
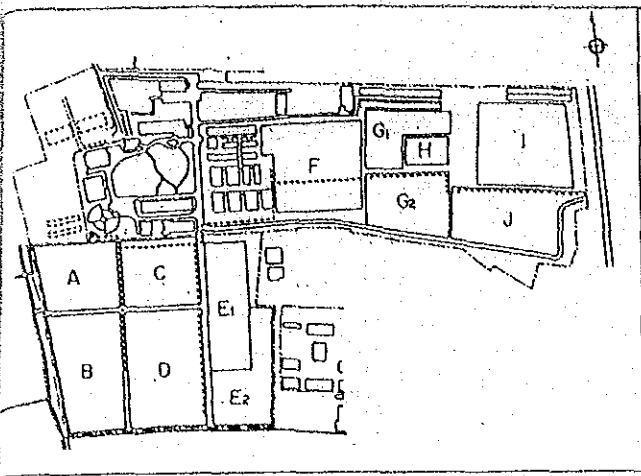
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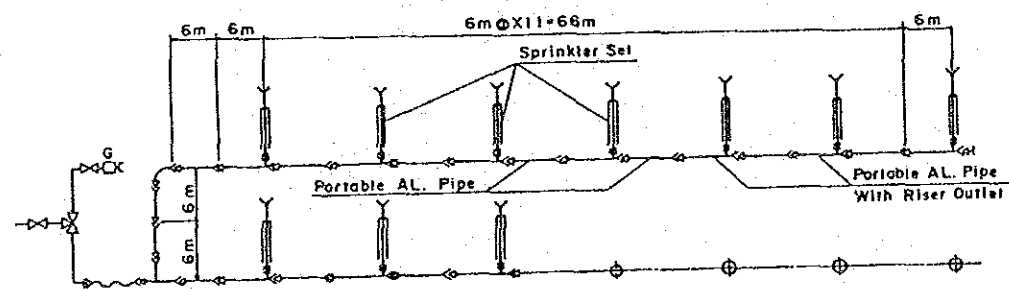
DETAILS OF DRIP LINE



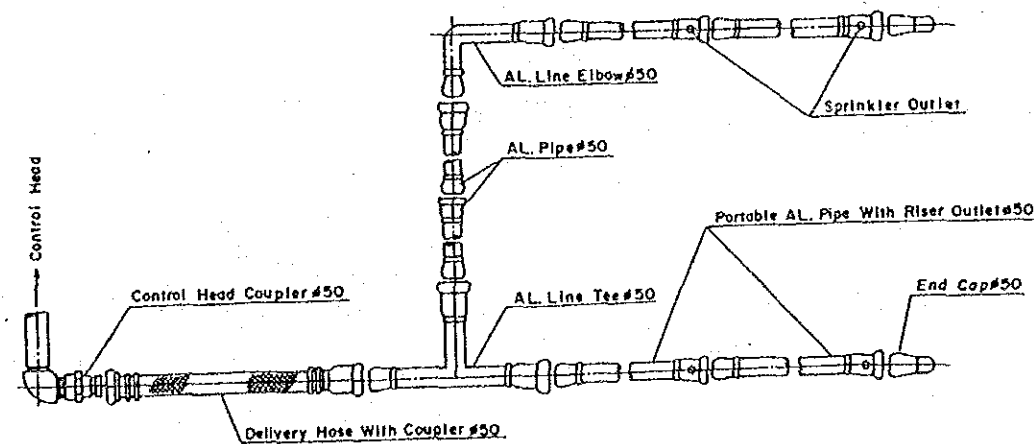
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|--|-----------|------------|---|
| MODEL INFRASTRUCTURE IMPROVEMENT WORKS FOR THE BEIJING VEGETABLE RESEARCH CENTER PROJECT | | | |
| TITLE: DRIP IRRIGATION SYSTEM | | | |
| DATE | JUNE 1988 | D.W.G. NO. | 4 |
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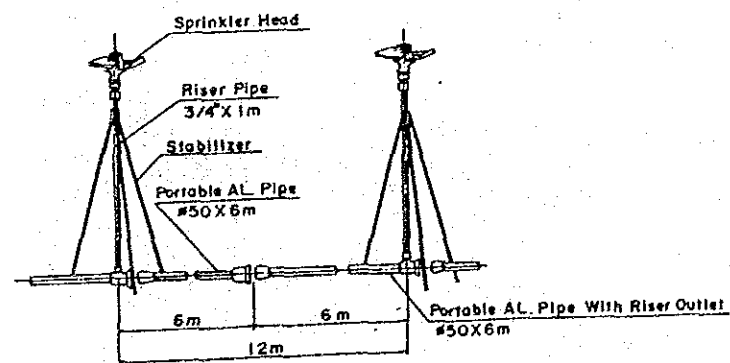
SPRINKLER SYSTEM



DEAILS OF SPRINKLER PIPE LINE



DETAILS OF SPRINKLER

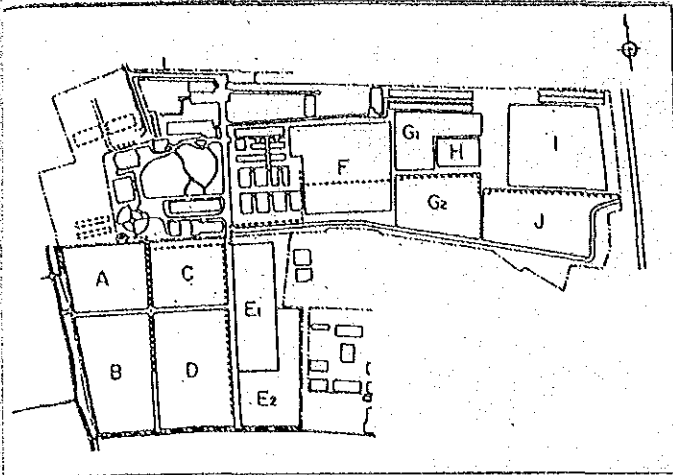


MODEL INFRASTRUCTURE IMPROVEMENT WORKS
FOR THE BEIJING VEGETABLE
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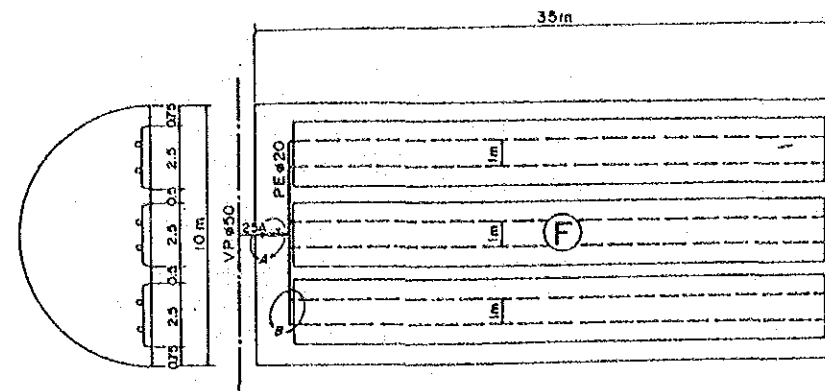
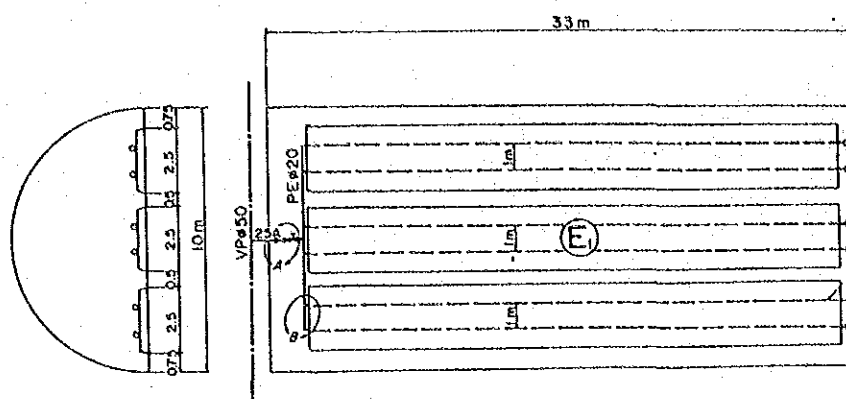
TITLE:
SPRINKLER IRRIGATION SYSTEM

DATE JUNE 1988 D.W.G. NO. 5

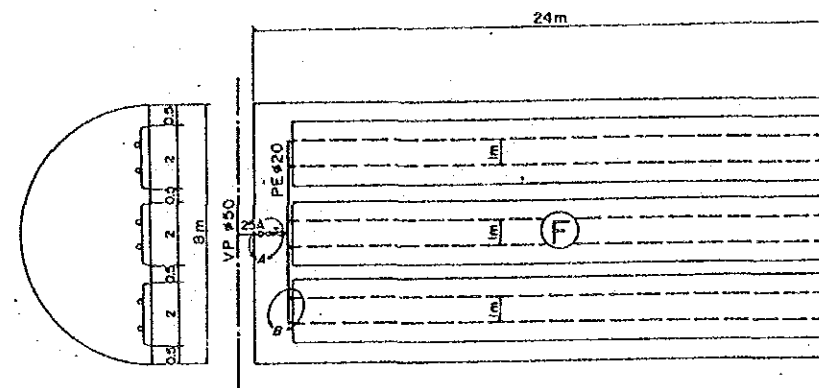
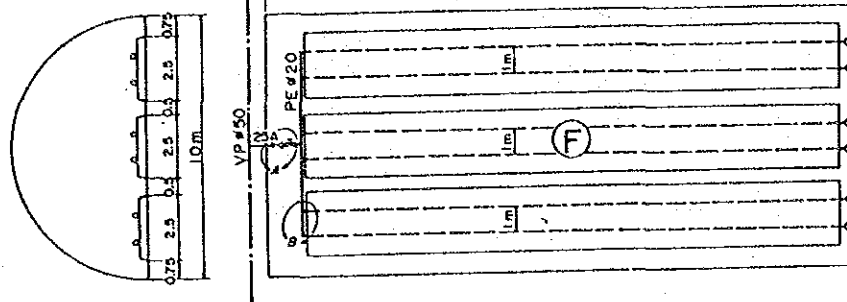
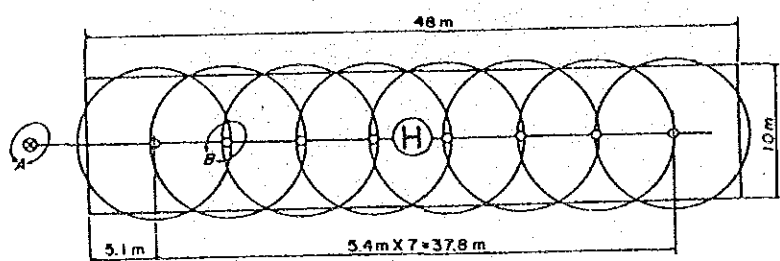
JAPAN INTERNATIONAL COOPERATION AGENCY



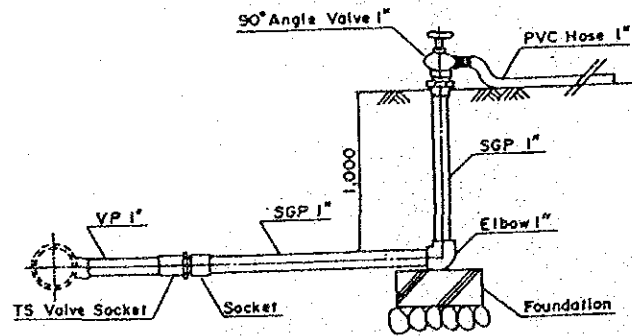
HOUSE DRIPLING IRRIGATION



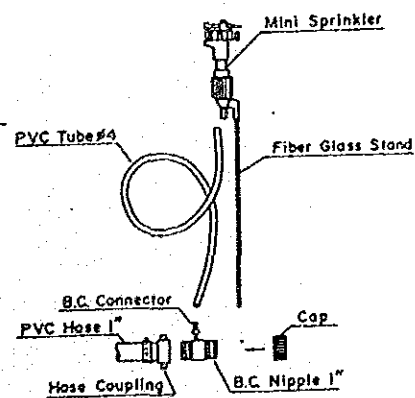
NET HOUSE IRRIGATION SYSTEM



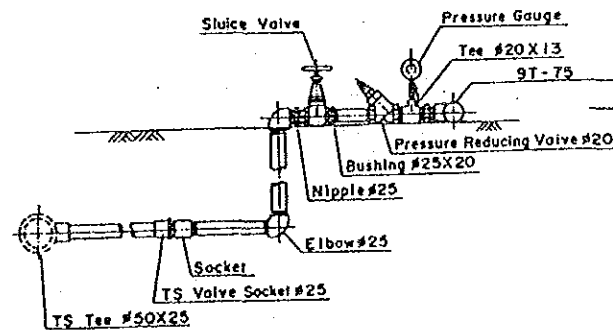
DETAILS A



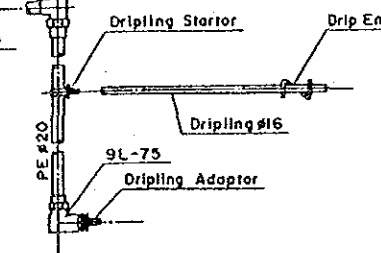
DETAILS B



DETAILS A



DETAILS B



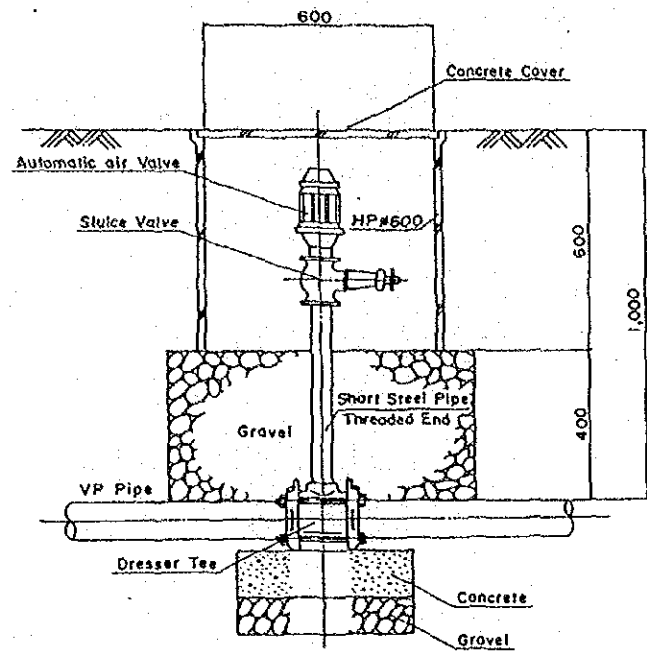
MODEL INFRASTRUCTURE IMPROVEMENT WORKS
FOR THE BEIJING VEGETABLE
RESEARCH CENTER PROJECT

TITLE:
HOUSE DRIP IRRIGATION SYSTEM
NETHOUSE SPRINKLER
IRRIGATION SYSTEM

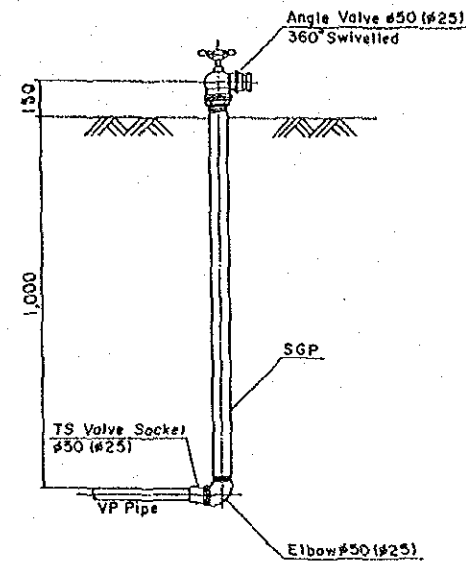
DATE JUNE 1988 O.W.G. NO. 6

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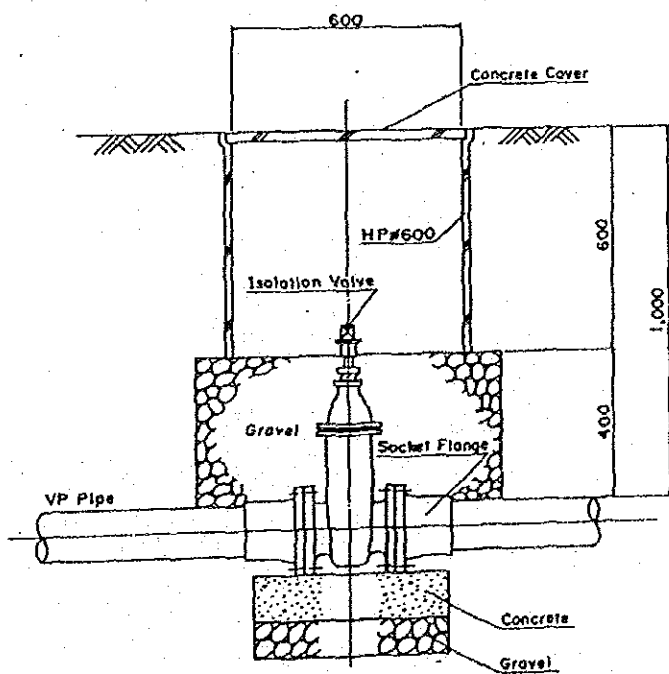
AIR VALVE



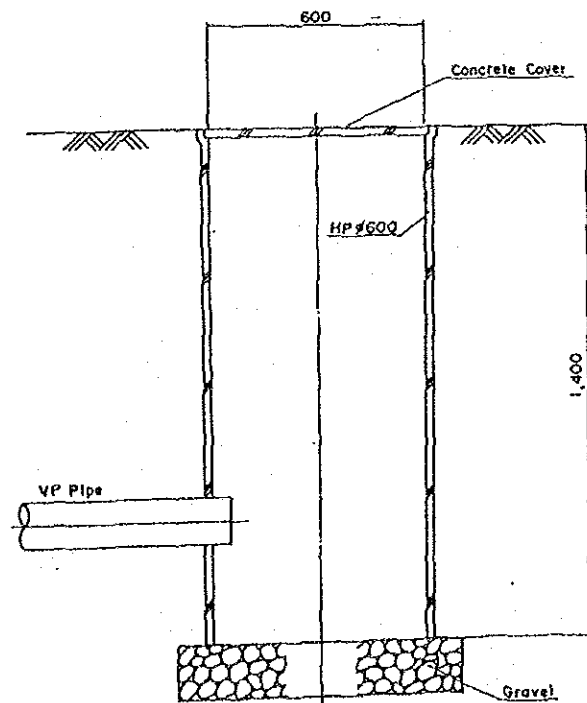
HYDRANT



GATE VALVE



DRAIN BOX



| | | | |
|--|-----------|------------|---|
| MODEL INFRASTRUCTURE IMPROVEMENT WORKS FOR THE BEIJING VEGETABLE RESEARCH CENTER PROJECT | | | |
| TITLE: VALVE BOX AND HYDRANT | | | |
| DATE | JUNE 1988 | D.W.G. NO. | 7 |
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