

PEOPLE'S DEMOCRATIC REPUBLIC OF YEMEN
STUDY
ON
THE IMPROVEMENT OF MA'ALLA AND TAWAHI
SEWERAGE SYSTEM IN ADEN
FINAL REPORT

VOL. 3
APPENDICES

JANUARY, 1990

JAPAN INTERNATIONAL COOPERATION AGENCY

PEOPLES DEMOCRATIC REPUBLIC OF YEMEN
STUDY ON THE IMPROVEMENT OF MA'ALLA AND TAWAHI SEWERAGE SYSTEM IN ADEN

FINAL REPORT
APPENDICES
VOL. 3

JANUARY

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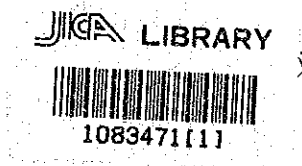
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APPENDICES



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JUNUARY, 1990

JAPAN INTERNATIONAL COOPERATION AGENCY



STUDY
ON
THE IMPROVEMENT OF MA'ALLA AND TAWAHI
SEWERAGE SYSTEM IN ADEN
IN
PEOPLE'S DEMOCRATIC REPUBLIC OF YEMEN

FINAL REPORT

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APPENDIX A
MINUTES OF MEETINGS AND OFFICIAL LETTERS

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MINUTES OF THE JOINT MEETING

1. Time and Date: 9:00 am to 10:30 am 7th December 1988
2. Place: General Directorate for Local Government
3. Project: Feasibility Study on the Improvement of Ma'alla and Tawahi Sewerage System in Aden
4. Subject: Explanation of the Inception Report
5. Attendants:

For the Government of PDRY

Mr. Rasid El-Hag	Assistant Deputy Director, GDLG
Mr. Hameed Said A. Majid	Director, Planning and Statistic Dept. GDLG
Mr. Badr M. Nagi	Director, Environmental Health Dept. Capital Municipality
Mr. Ahmed A. Almas	Sewerage Engineer, Environmental Health Dept. Capital Municipality
Mr. Farook Mohamed Zaid	Sewerage Engineer, Environmental Health Dept. Capital Municipality
Mr. Alawi Al-Mohdar	Head of Distribution System, Public Water Corporation
Mr. Kasim A. Muflehi	Assistant Port Engineer, Yemen Port Authority
Mr. Ahmed Said Majid	Director, Inspection, Public Corporation for Electric Power
Mr. Abdulla Al-Fareedi	Head Designer, Highway Authority
Dr. Baharoon Ahmed	Head of Land and Town Planning Dept. Ministry of Construction

For JICA Study Team

Mr. Hiichiro Makino	Leader, JICA Study Team
Mr. Masafumi Miyamoto	Co-leader, JICA Study Team
Mr. Kaoru Suzuki	Sewerage Facility Engineer, JICA Study Team
Mr. Hideaki Ito	Member, JICA Advisory Committee
Mr. Yoshio Kikuta	Member, JICA Advisory Committee

Mr. Shozo Matsuura

JICA Coordinator

Mr. Isao Dekiba

Charge d'Affaires,
Embassy of Japan

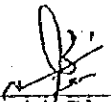
6. Topics of the Meeting:

Chairman of the meeting, Mr. Rasid El-Hag, opened the meeting at 9:00 a.m. in the conference room in GDLG. He briefed the purpose of the meeting to Yemeni attendants, and requested Mr. Makino to explain the Inception Report. Mr. Makino, leader of the study team, then expressed his assurance to attend the first meeting for the commencement of the study. He also explained the basic concept of the study on which the Inception Report is based and overall study schedule. Titles and timings of the reports, which the study team will prepare for the entire study period were explained. The study is expected to be completed by January 1990, with 15 month period. During the course of the study, two on-site works in Aden are scheduled. He also emphasized the importance of the cooperation of the counterpart personnel assigned from the authorities concerned of the government of PDRY.


Mr. Miyamoto, co-leader of the study team, continued explanation of the components of the study according to the description presented in the Chapter Two of the Report. He focussed on the study team's activities during the first on-site work period. He also requested the chairman to provide the team with some documents such as topographic maps, John Taylor and Son's Report and Urban Development Plan prepared by the Committee under the Ministry of Construction. Chairman assured that these documents would be given to the team as requested. During the discussion regarding the socio-economic survey, chairman informed the study team that no charges are imposed on the beneficiaries to recover the operation and maintenance cost of the sewerage project.

After the explanation of the Report, questions were raised by representatives from the Public Water Corporation and the Public Corporation for Electric Power. These questions were clarified. Regarding the target years of the master plan and feasibility study, no objection was mentioned to setting the year of 2010 to be the target year of the master plan, while the target year of the feasibility study yet to be decided. Target year of the feasibility study will be discussed later and a proposal will be presented in the Progress Report (1). The study team mentioned that after arrival of the second party of the study team members on 18th of this month, the study team will visit offices of the authorities concerned to collect data and information. It was confirmed that counterpart personnel either from GDLG or Capital Municipality would accompany the study team members when they visit the offices. The meeting was concluded at 10:30.

For General Directorate for
Local Government


Mr. Rasid El-Hag
Assistant Deputy Director

For JICA Study Team


Mr. Heiichiro Makino
Leader, Study Team

MINUTES OF THE SECOND JOINT MEETING

1. Time and Date: 10:00 am to 11:30 am, 7th March, 1989
2. Place : General Directorate for Local Government
3. Project : Feasibility Study on the Improvement of Ma'alla and Tawahi Sewerage System in Aden
4. Subject : Explanation of the Progress Report (I)
5. Attendants :

For the Government of PDRY

Mr. Rashid El-Hag	Assistant Deputy Director, GDLG
Mr. Badr M. Nagi	Director, Environmental Health Dept. Capital Municipality
Mr. Ahmed A. Almas	Sewerage Engineer, Environmental Health Dept. Capital Municipality
Mr. Farook Mohamed Zaid	Sewerage Engineer, Environmental Health Dept. Capital Municipality
Mr. Abdulla A. Noman	Director of Design, Supervision Dept. Highway Authority
Mr. Abdulla Alfareedi	Civil Engineer of Road Construction, Highway Authority
Mr. Ahmed Aboteeba	Sewerage Engineer, GDLG
Dr. Abdulkader Baharoon	Chief of Land and Town Planning, Ministry of Construction
Ms. Nagwa Ahmed	Town Planning, Ministry Planning

For JICA Study Team

Mr. Heiichiro Makino	Leader, JICA Study Team
Mr. Masafumi Miyamoto	Co-leader, JICA Study Team
Mr. Osamu Nakagome	Sewerage Planning, JICA Study Team
Mr. Kaoru Suzuki	Sewerage Facilities Planning, JICA Study Team
Mr. Takehiko Oga	Sewerage Facilities Planning, JICA Study Team
Mr. Nobuo Narushima	Design and Cost Estimation, JICA Study Team
Mr. Seiji Takashima	Land Survey, JICA Study Team
Mr. Masahiro Kawachi	Water Quality Analysis and Environment, JICA Study Team
Mr. Naoki Nagai	Financial and Economic Analysis, JICA Study Team

Mr. Hiroshi Kameda	Vice-president, Tokyo Engineer Consultants
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6. Topic of the Meeting:

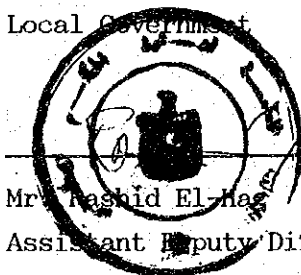
Chairman of the meeting, Mr. Rashid El-Hag, opened the meeting at 10:00 a.m. in the conference room in GDLG. Before the explanation of the Progress Report (I), Mr. Nagi requested the study team to include Khormaksar area to first stage of the study. The study team replied that in order to include Khormaksar in the feasibility study, an official request is necessary from the government of PDRY to the Government of Japan. The study team expressed their recognition that immediate improvement of the existing sewerage facilities in Khormaksar is needed. It was agreed that the study team would carry out the study according to the Scope of Work until JICA instruct them of the change of the Scope of Work.

Mr. Nagi pointed out that last paragraph on page 54 be eliminated. The study team agreed.

Mr. Rashid requested the team to explain the report. Mr. Makino, leader of the team, then expressed his pressure to attend the meeting for conclusion of the first field study. He also introduced Mr. Kameda, vice-president of Tokyo Engineering Consultants, to attendants of PDRY. Mr. Miyamoto then, explained the results of the study according to the Progress Report (I), section by section.

After the explanation of the report, comments were made by engineers from the Ministry of Construction that results of the last population census in 1988 should be referred to regarding future population projection. The study team agreed that if these data would be available well before the preparation of the Interim Report, these data would be reflected in population projection. The meeting was concluded at 11:30 a.m.

For the General Directorate for
Local Government



Mr. Rashid El-Hag
Assistant Deputy Director

For the Study Team

Mr. Heiichiro Makino
Leader, JICA Study Team

MINUTES OF THE MEETING

1. Time and Date: 10:00 am to 17:00 pm, 18 May, 1989
2. Place: Urawa Office, TEC
3. Project: Feasibility Study on the Improvement of Ma'alla and Tawahi Sewerage System in Aden
4. Subject: Comments Made by PDRY Authorities Concerned on the Progress Report (1)
5. Attendants:

For the Government of PDRY

- | | |
|------------------------|--|
| Mr. Ahmed N. Abo Teeba | Head of Sanitary Engineering Section
GDLG |
| Mr. Ahmed A. Almas | Sewerage Engineer
Environmental Health Dept.
Aden Capital Municipality |

For JICA Study Team

- | | |
|-----------------------|--|
| Mr. Heiichiro Makino | Leader, JICA Study Team (part) |
| Mr. Masafumi Miyamoto | Co-leader, JICA Study Team |
| Mr. Kaoru Suzuki | Sewerage Facility Engineer,
JICA Study Team |

6. Topics of the Meeting

Representatives of the PDRY Government visited Japan for counterpart training program financed by JICA. They brought the comments made by the authorities concerned of the government of PDRY on the Progress Report (1) which had been submitted to the authorities concerned on 7 March. Comments were received by GDLG in forms of official letter issued from the authorities. Translation of the letters were made by the representatives. Names of the authorities and contents of the letters, and subsequent discussion are as follows.

1) Public Water Corporation (PWC)

- a. Table 5 on page 33. Service ratio of C and D classification is not correct. Presently there is no unconnected house in Greater Aden, inclusive of study area (Ma'alla, Tawahi, Crater and Khormaksar)
- b. Table 6 on page 34. There are contradictions in industrial water consumptions in this table and those in Table 7 on page 35.
- c. Table 7 on page 36. The present water consumption in the four districts exceeds the projection figure for 2000. Therefore, these should be re-calculated.
- d. The last paragraph in Section 6.2.1. An assumption made for the lower projection is not correct, since future per capita water consumption

will increase as the number of house connection increase.
The Study Team explained that these tables are abstracts from Water Supply Master Plan and that water consumption figures in these tables are not used for the projection of sewage flow. However, some sentences in Section 2.6.1 are misleading, and therefore require rewriting. Table 7 was agreed to be removed.

2) Central Statistical Organization (CSO)

The letter from CSO stated that populations obtained from 1973 Census can be used for the study and that present populations by districts published in the Statistical Year Book can also be used for the study. The study team insisted the necessity of 1988 Census results. However, it was clarified in the discussions that populations by districts based on the 1988 Census are unlikely to be obtained. Problems envisaged if district populations in the Book are used for projection were discussed. The study team insisted the propriety of their projections. It was agreed that this issue would be discussed further.

3) Town Planning Section

Town Planning section does not have any comments on general outlook of the Progress Report (1). They have no objection to the location of STP proposed in the Alternative 3B. They hope further information on this project to comment on.

4) Yemen Port Authority (YPA)

They object to the locations of the ocean outfall proposed in the Alternative 1A and STP in the Alternative 1B. The reasons for objection are i) pollution in Tawahi Harbor, ii) obstruction to future development of harbor facilities, and iii) no utilization of the final effluent.

5) Public Corporation for Electric Power (PCEP)

They do not have comments on the Progress Report (1) since there is no statement about electric power supply. However, they request details of electrical design of pumping stations, which was agreed with the study team.

6) Highway Authority

The letter from the Highway Authority asked the study team to consult with them regarding exact location of proposed force main along causeway and Abyan road in Khormaksar. They expressed their opposition to discharge untreated sewage into inner harbor (Alternative 1A). They asked the study team to discuss about possibility of combined sewerage system in Aden.

7) GDLG and Aden Municipality

a. Water consumption and sewage flow

Latest water consumption data in Ma'alla and Tawahi were given to the study team as follows.

	1988			1989		
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
	(unit: m3/day)					
Ma'alla	8,390	8,138	8,715	8,255	7,865	8,478
Tawahi	6,188	5,814	5,926	6,068	5,920	5,449
Total	14,578	13,952	14,641	14,323	13,785	13,927

Above flow rates were obtained from meter reading at Ithmas pumping station and include 20 - 23 % of losses. It was suggested based on the observation carried out by them that 95 % of the water consumed flows into sewerage system. Present sewerage flow in the two districts are therefore as follows.

	1988			1989		
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
	(unit: m3/day)					
Ma'alla	6,376	6,185	6,623	6,274	5,977	6,443
Tawahi	4,703	4,419	4,504	4,612	4,499	4,141
Total	11,079	10,604	11,127	10,886	10,476	10,584

Note: Water loss is assumed to be 20 %

It was confirmed that flow rates measured by the study team at Hedjuff P/S do not include flows from C class housing area. Taking into account this fact, flow rates calculated above and measured are found to be in good agreement. This fact was agreed to be stated in the Interim Report.

b. Table 6 on page 35

Water supply to ships from Tawahi was ceased since 1988, and all the water to ships are supplied from Caltex area. Total volume of the water during three months period from Jan. to Mar. 1988 was 29,905 m³, which is approximately 332 m³/day on average.

c. Table 7 and statement on page 36

Water consumptions by districts in the table do not reflect actual present situation mentioned in a. above. Therefore some clarifications are needed. An agreement reached to this issue is mentioned in 1) above.

d. Tables on pages 34 and 35

There are contradictions in figures in industrial water consumption. This will be looked into by the study team.

e. New housing development in Ma'alla

A new housing development of 1,000 flats in Victory area in Ma'alla was approved in Apr. 1989. Four to five stories buildings will be constructed. Further housing developments by the same type of building are expected in Ma'alla district. Possible locations of these developments were identified on a map by the representatives.

f. Mechanical and electrical equipment


An opposition to mechanical and electrical equipment for pumping stations except for screen and minimum necessary equipment was addressed.

g. Unsewered area

Unsewered areas in Ma'alla and Tawahi should be included in the Interim Report.

The meeting was concluded at 17:00 pm.

For GDLG



Mr. Ahmed N. Abo Teeba

For JICA Study Team



Mr. Heiichiro Makino

٢٠ / أبريل / ١٩٨٩ م

١٥٩ / ١٩ / ٨٠ / م

الاخ /

مدير دائرة صحة البيئة المحترم

تحية

الموضوع /

ملاحظاتنا حول الدراسة الخاصة بتطوير
مجارى المعلا والتواهي

من خلال اطلاعنا على الدراسة وبالذات الجزء الخاص بحجم استهلاك المياه
المتوقع للمناطق التي يشملها تطوير شبكة المجارى حتى عام ٢٠٠٠ م ، برزت الملاحظات
التاليه :-

((١) في الجدول رقم (٥) صفحه ٢٣ تصنيف نسبة المساكن التي تتضمن
عبر التوصيلات المنزليه الى المساكن التي تتضمن مبرار كز مياه عامه
للمجموعات (و) غير صحيح ، خصوصا اذا علمنا ان نسبة التوصيلات
المنزليه الان في المناطق المقترح فيها التطوير تبلغ ١٠٠ % .

((٢) في الجدول رقم (٦) صفحه ٢٥ هناك فروغ في كبله احتساب وتحديد
الاحتياجات من المياه للمنشآت الاقتصادية ٠٠ وغيرها حتى عام
٢٠٠٠ م حيث لم توضح الدراسة الاسس التي اعتمدتها في تحديد
هذه الاحتياجات .

((٣) يتضح من خلال الجدول رقم (٧) ان معدل استهلاك المياه في كل من
المعلا والتواهي ، كويت ، خور مكسر وبقية المناطق حتى عام ٢٠٠٠ م
غير منطقي حيث ان استهلاك المناطق المذكوره من المياه في الوقت
الراهن قد جاوز ما هو مخطط له او متوقع له حتى عام ٢٠٠٠ م ولديه
لا بد من اعاده احتساب الاستهلاك وفق المعطيات الجديد .

١١٤ اشارت الدراسة ان معدل استهلاك المياه للاغراض المنزلية في العاصمة سيبقى ثابتاً الا من الزيادة الناتجة عن النمو السكاني خلال الفترة حتى عام ٢٠٠٠م ، وهو غير صحيح اذا ما أخذنا بعين الاعتبار نسبة الزيادة في الاستهلاك المنزلي الناتج من التمديدات الجديدة لانابيب المياه في بعض المناطق المخططة حديثاً او تلك المناطق التي سيتوفر فيها صرف صحي مناسب .

هذه هي ملاحظتنا الاولى والسريعة حول مشروع الدراسة نأمل استفادتكم
منها .

مع بالغ تقديرنا ،،،



ام محمد / ٠٠

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٦
المستقر
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١٨ / ١١ / ١٩٨٨
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١٨ / ١١ / ١٩٨٨

الأخ / مدير عام الجهاز المركزي للإحصاء
تحية طيبة ...

الموضوع: طلب معلومات إحصائية

للعام ١٩٨٨ م

شأن مشارين الخفاء الاستثنائية للعام الرابع ١٩٨٨ م، تم مؤخراً موافقة الحكومة اليابانية
بتمويل الدراسة التفصيلية للمشروع، لذلك نرجو تزويدنا بالمعلومات
الإحصائية المتوفرة لديكم لعام ١٩٨٨ م والسماح بالصلا والتواهي بشكامل
خاص ومحافظة مدن بشكل عام للاستفادة من هذه المعلومات في الدراسة.

مع تقديري

المدير العام لشؤون الحكم
المجلس

نسخه الى الاخوه / . . .

رئيس المكتب التنفيذي لصالح الشعب المحلي

المستقر . . .

أسيا / . . .

توقيع



جمهورية اليمن الديمقراطية الشعبية

PEOPLE'S DEMOCRATIC REPUBLIC OF YEMEN

MINISTRY OF CONSTRUCTION AND HOUSING

Mu'askar Abi-Ubeida

Khormaksar

P. O. Box 6017 TEL:33411/6

CABLE: MINCONS

ADEN

وزارة الانشاءات والاسكان

معسكر ابي عبيدة - خورمكسر

ص. ب. ٦٠١٧ ، هاتف ٣٣٤١١/٦

الخط الكابلي : مينكونس

عدن

التاريخ : ٢٢ / ٤ / ٨٩

الموافق

المرجع : وا / تم / ٨٩ / ٢٠٠

Handwritten signature and notes in Arabic, including the name 'عبد القادر باهارون'.

المحترم

الاخ / المدير العام لشئون الحكم المحلي

المحترم

لعناية الاخ / رشيد الحجاج

تحية

الموضوع: مجازى المعلا والتواهي

=====

اشاره الى الدراسة المقدمه من الشركه اليابانيه
حول مجازى المعلا والتواهي نفيذكم انه بعد الاطلاع على
الدراسة انه لا يوجد ملاحظات حولها من القواهي
العامه وكذا البدائل المطروحه علما بان قد تم الاتفاق
معكم في الاجتماع السابق على اختيار البديل المناسب
وبأمل تزويدنا باية معلومات اضافيه جديده حول هذا
المشروع لتتمكن من اعطاء الراى حول ذلك .

"معتد يرى"



عن / نائب وزير الانشاءات والاسكان

الأخ / المدير العام للشئون الحكم المحلي . . . المحترم

بعده التحية

الموضوع/ تسجيل ملاحظات حول الدراسة الأولية لمشروع
مجارى المعسلا والتواهي

بالأشياء ره الى رسا لتكم مرجع أ ح م / ١١٠٠ / ٢٥٣ بتاريخ ٩ مارس ٨٩ م . نود
انفان تكم بأنه بعد الاطلاع على نسخة الدراسة الأولية لمشروع وتطوير وتحسين شبكات
مجارى المعلا والتواهي بمرنا تسجيل ملاحظاتنا حول الموضوع اعلاه والذي نامل ان ياخذ
باعتبار اثنا الدراسة اللاحده وعند التنفيذ .

ان نظام صرف مياه المجارى المستخدم حاليا فى كل من منطقتى المعلا والتواهي
أصبح بالتاكيد بحاجة الى اعادة النظر فيه والذي ياتى ضمن هذه الدراسة كمرحلة اولى من
مشروع صرف مياه المجارى للمعاصمه من اجل تطويره وتحسينه مراعاة للمسائل الصحية
والوقائية وتجنبها لتلوث البيئة خاصة وهناك زيادة طموسة فى السكان والمباني السكنية
والصناعة والمتغلب على كل هذه المشكله يجب العمل على ايجاد حل موحد وشامل لهذه وغيرها
من مسائل وقاية الصحة العامة التى تخطط لها الحكومه لتواكب التطور المتوخى ضمن اطر
التنمية الاقتصادية والاجتماعية فى بلادنا . ومشروع تطوير وتحسين شبكات المجارى فى المعاصمه
الذى توليه حكومه الشوره اهمية خاصه اذ هو احد الاجراءات التى يمكن ان يساهم فى جوده
على ايجاد الحل الناجح للمسائل الصحية الوقائية فيها .

وملاحظاتنا حول هذه الدراسة انما هى توصيتنا التى نامل ان تاخذ فى الاعتبار
وهى طلبنا مراعاة الظروف الطبيعية والمناخيه وكذا التضاريس الارضيه للرسو على مقترح نهائى
ممتازاى العوامل التى اخذت بالحسبان وصوره صحيحه ودقيقه سيصبح المشروع ناجحا وتكلفتها
اقل . . وهذا ما نرى اليه . ومن خلال اطلالنا على الدراسة نجد ان الشركة بالفعل استطعت
فى دراستها كل هذه العوامل المذكوره اعلاه وما نريده هنا فقط التركيز عليها اكثر فى الدراسات
اللاحقه بغية التخفيض من تكلفة المشروع ونجاحه من الناحية الصحية الوقائية وليعود بالنفع
فى الاخير .

ان افضل المقترحات الخمسه هو المقترح (3 B) والتى تصرف مياه المجارى فيسهه
فى منطقة حور مكسر قرب منطقة العريش كونه يشمل المناطق الاربع اى ضم المنطقتان كبرى
وخور مكسر الى منطقتى المعلا والتواهي كما سيعود بالفائده بعد معالجة التصريف للتشجير
التدبير المشهد والمنافع الذى سيضيف الى جمال المدينه ورونقها جمالا اكبر وسيطسف
الجو بتخفيف درجة الحرارة ويمتنع بعض من الاتربه وكذا سيعزز من تقويه التربه وغير ذلك من منافع
واختيار يعتمد بالطبع على نسبة زياره تكلفته من تكلفه مقترح (3 A) والتى كانت عليه جسدا
فالافضل اختيار مقترح (3 A) كبديل للمقترح (3 B) وكمرحله اولى اما بالنسبه للمقترحين
(1 A) و (1 B) واللذين سيتم فيها صرف مياه المجارى على النحو التالى :-

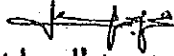
المقترح (1 A) فى منطقة التواهي غرب حاجز الامواج بدون معالجة وتكلفته ليست بالهينيه
حيث صيرت بتوسيع الحاجز الامواج وبناء منشآت خاصه اخرى تخفف من ثلوث الميناء الداخلى
المقترح الاخر (1 B) والذي تعالج مياه المجارى فيه قبل تصريفها الى البحر بعد وصولها
الى منشآت او محطات تصفية فتكلفته كبيره علاه على انه سيحد من التوسيع مستقبلا للميناء
المساحه التى ستشغلها منشآت التصفية تحتل جزءا كبير من المنطقه التى من الممكن استغلالها
لتوسيع وتحسين الميناء فى المستقبل بالاضافه الى خطورة الرواسب. فلذا يوجى صرف النظر من
هذ

هدى بن المقترحين حيث ما لهم من تأثير سلبي على الميناء كتلوث المياه فيه وتغيرها من الاسباب المدكورة انفا .

اما المقترح (2) فهو مكلف جدا نظرا لامتداد الشبكة فيه اكثر من اى من المقترحات الاربعة الاخرى بالإضافة الى تكلفة تشغيل عالية للمضخات رغم ميزته بوجود برك أو أحواض معالجة جاهزة تحتاج فقط التزسيبها وكذا وجود مساحات هائلة لهذا الخرض في منطقة الشعب .

هدا ونأمل ان نكون قد سجلنا بوضوح ملاحظتنا حول الدراسة ونحسى ان تكون لنا منفعة كما نأمل موافقتا بالدراسات اللاحقة مستقبلا .

مع بالغ تقديرا ،،،


الدكتور / محمد عبد الرسول نجدي
دكتوراه في فلسفة العلوم الهندسية
مساعد مدير الإدارة الفنية

/ فهدوز /

د ت أ / ت / ١ / ١٩٨٩ م

١٩٨٩ / ٤ / ١

٣ رمضان ١٤٠٩ هـ

"المحترم"

الأخ / المدير العام لشؤون الحكم المحلي
الإدارة العامة لشؤون الحكم المحلي

مستند

بعد التحية

الموضوع: تسجيل الملاحظات حول الدراسة الأولية
لمشروع مجارى المعلا والتواهي

اشارة الى رسالتكم مرجع أ ح م / ١١٠ / ٢٥٣ والخاصة بتسجيل الملاحظات حول
الدراسة الأولية لمشروع مجارى المعلا والتواهي المستلمه من قبلنا نود الافاده انفسه
لا توجد لدينا أى ملاحظات حول هذه الدراسة التي لم تتطرق الى الجوانب الكهربائيه
للمشروع . لكننا على ثقة من أنكم سوف توافون بالتصاميم الكهربائيه طمخات المجسارى
لهذا المشروع كما أتفق سابقاً مع الجانب الإيطالي .

"وتقايماً فائق شكرنا وتقديرنا"

"أحمد سيف عبد المجيد"

عن / المدير العام للهيئة العامة للقوى الكهربائيه

"المحترم"

النسخ مع التحية :

الأخ / المدير العام ✓

المستند .

٠م١٩٨٩/٤/٢٢

وأ/مط/ت/١/٢/٣/٤

المحترم

الأخ / المدير العام لشئون الحكم المحلي

تحية واحتراماً ..

وعند

الموضوع / ملاحظات طرد دراسة الجسود
الاقتصاد به لمشروع مجازي صمدن
المعلا / والتواهي

مرفق اليكم الملاحظات البسيطة التي أردنا مرعات دراستها
هند وفق التفاصيل النهائية للمشروع المذكور أعلاه .

وبما أن التقرير رقم (١) والخاص بالموضوع قد كان شاملاً
ولم يبق هناك ملاحظات أخرى ذات أهمية ..

نرجو لكم التوفيق ..

مع فائق الاحترام والتقدير ..

ع/ مدير عام مصلحة الطر
هد الله طي نعمان

نسخه للأخ / المحترم :-

نائب وزير الانشاءات والاشكان

Comments to Progress Report (1)
on the Feasibility Study of the
Improvement of Midalla and Tawahi
Sewerage System.

1. Sewerage route along the Khor-meksar shore shall be properly located due to future additional carriage way, or across the existing road. We expect good co-operation on this matter during your detail engineering work.
2. We think it is not advisable to discharge of untreated Sewerage to inner harbor as it is described in detail in Alternative (1A).
It is important to consider the future development along the Northern shores of the harbour.
3. The proposed Sewerage route along the Causeway should be placed on the Northern side of the Carriage Way, and proper solution should be considered where the pipe line approaches the Bridges and in front or across the culvert under the Carriage Ways.
4. During the last few years the Intensity of rainfall has been increased and therefore causing a lot of storm water stagnation in the streets of Aden Towns. Therefore we are considering the
the water in the streets of Aden.

The increase of the Surface Water. (Storm water drainage).

Due to high cost of adopting a separate system for discharge of the above, we shall appreciate your co-operation to consider

Combine system for collection of the Surface Water into the Sewers mains.

We are willing to discuss this matter with you during your detail engineering stage

MINUTES OF THE TECHNICAL MEETING

1. Time and Date: 9:00 am to 11:30 am, 2nd July, 1989
2. Place : General Directorate for Local Government
3. Project : Feasibility Study on the Improvement of Ma'alla and Tawahi Sewerage System in Aden
4. Explanation and Discussion on the Interim Report
5. Attendants :

For the Government of PDRY

Mr. Rashid El Hag	Assistant Deputy Director, GDLG
Mr. Badr M. Nagi	Director, Environmental Health Dept. Aden Capital Municipality
Mr. Ahmed N. Abo Teeba	Head of Sanitary Engineering Section, GDLG
Mr. Ahmed A. Almas	Sewerage Engineer, Environmental Health Dept. Aden Capital Municipality
Mr. Farook M. Zaid	Sewerage Engineer, Environmental Health Dept. Aden Capital Municipality
Ms. Nagwa Ahmed	Town Planning Section, Ministry of Construction

For JICA Study Team

Mr. Masafumi Miyamoto	Co-leader, Sewerage Planning
Mr. Osamu Nakagome	Sewerage Planning
Mr. Kaoru Suzuki	Sewerage Facilities Planning
Mr. Nobuo Narushima	Design and Cost Estimation

6. Topics of the Meeting

The meeting was started at 9:00 am in Mr. Rashid office. Mr. Miyamoto briefed contents of the Interim Report. He mentioned that the study team would appreciate any comments on the report. Major points of discussions are as follows.

1) Sewage Flow

Projection of sewage flow, particularly those in Tawahi and various military camps and government areas, should be reconfirmed with PWC. Pump operating records are not reliable since many pumps in military camp in Khormaksar are out of order.

2) Sewerage Characteristics

For the design of STP, BOD concentration of 300 mg/l should be used. According to Aden Municipality estimation, per capita waste loading in term of BOD will reach around 54 gcd by 2010 instead of 46 gcd. This matter will be discussed further.

3) Type of Pump

Opposition was expressed by Aden Municipality against submersible pumps recommended for the rehabilitation of the existing pumping stations. They have many problems with this type of pump. Investigation of the existing pumping stations with submersible pumps is decided. The study team agreed to provide technical data regarding proposed submersible pump.

4) Deletion of Alternative 3A

The study team expressed their concern that justification of proposed Alternative 3B is not sufficient. After discussions, it was agreed that Alternative 3A should be deleted from the alternative study on long term sewerage system.

5) Inclusion of Khormaksar in the First Phase

Exclusion of Khormaksar district from the first phase program can not be accepted by PDRY government because of the political reasons. Residents in Khormaksar district will oppose to treat sewage from Ma'alla and Tawahi at proposed site unless their sewage is treated.

6) STP Site

Alternative site for STP near the police camp north to the airport was suggested by Mr. Nagi. The study team agreed to visit the site with him.

7) Two Series of Stabilization Pond System for the First Phase

GDLG and Aden Municipality insisted that two series of stabilization ponds should be constructed for the first phase program regardless of the cost.

8) Modified Cost Estimation

Modified cost estimation to cope with the requirements mentioned in 5) and 7) above was requested to the study team. The study team agreed to work out modified cost estimation within a few days.

9) Names of Pumping Stations

Names of pumping stations in Table 4.9 should be changed to those used by Aden Municipality.

It was agreed that the next meeting would be held before haji holidays as soon as the study team complete modified cost estimation. The meeting was concluded at 11:30 am.

For the General Directorate for
Local Government



Mr. Rashid Elshag
Assistant Deputy Director

For the Study

A handwritten signature in cursive script, reading "H. Makino".

Mr. Heiichiro Makino
Leader, JICA Study Team

MINUTES OF MEETING
FOR
THE STUDY ON
THE IMPROVEMENT OF MA'ALLA AND TAWAHI
SEWERAGE SYSTEM IN ADEN

ADEN, JULY 10th 1989



Mr. Morsin Ali Al Naqeeb
Deputy General Director

D.G.L.G.

Mr. Yasutake KAMEDA

Chairman of the Advisory Committee

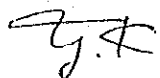
Japan International Cooperation Agency

The Advisory Committee Members of the Japan International Cooperation Agency (JICA) visited the People's Democratic Republic of Yemen from July 9th to 16th 1989, to discuss the Interim Report of the Study on the improvement of Ma'alla and Tawahi Sewerage System in Aden.

The Members carried out field surveys of the study area and had a series of discussion with officials of the General Directorate for Local Government (GDLG).

The final meeting was held on July 10th, 1989, at the conference room of GDLG in Aden and GDLG requested that the Khormaksar district should be included in the Feasibility Study area because the improvement of Khormaksar Sewerage System is now being planned and it is imperative to combine the system according to the route of the Alternatives proposed by the Study Team.

As a result of discussions, both sides agreed that Khormaksar district should be studied in the same depth in addition to Ma'alla and Tawahi area which were set forth in the Scope of work for the Study on the Improvement of Ma'alla and Tawahi Sewerage System in Aden.



MINUTES OF THE THIRD JOINT MEETING

1. Time and Date: 10:00 am to 11:30 am, 18 July, 1989
2. Place : General Directorate for Local Government
3. Project : Feasibility Study on the Improvement of Ma'alla and Tawahi Sewerage System in Aden
4. Explanation and discussion on the Interim Report with the authorities, concerned of PDRY government
5. Attendants

For the Government of PDRY

Mr. Mohed A. Moosa	Director, Municipal Dept. GDLG
Mr. Badr M. Nagi	Director, Environmental Health Dept. Aden Capital Municipality
Mr. Ahmed N. Aboteeba	Head of Sanitary Engineering Section, GDLG
Mr. Ahmed A. Almas	Sewerage Engineer, Environmental Health Dept. Aden Capital Municipality
Mr. Husein Abdul K. Rashid	Civil Engineer of Road Construction, Highway Authority
Mr. Abdulla Alfareedi	Civil Engineer of Road Construction, Highway Authority
Mr. Alawi Almohdan	Head of Distribution System, Public Water Cooperation
Mr. Kasin Muflenhi	Assistant Port Engineer, Yemen Port Authority

For JICA Study Team

Mr. Masafumi Miyamoto	Co-leader, Sewerage Planning
Mr. Osamu Nakagome	Sewerage Planning
Mr. Kaoru Suzuki	Sewerage Facilities Planning
Mr. Takehiko Oga	Sewerage Facilities Planning
Mr. Hisashi Takanashi	Economist

6. Topics of the Meeting

The meeting was started at 10:00 am in a conference room at GDLG. Mr. Moosa, chairman of the meeting, opened the meeting and asked the study team to explain the Interim Report. Mr. Miyamoto thanked the representatives for their comments on the Progress Report, and then briefed contents of the Interim Report and schedule of the team's activities. He mentioned that the study team would appreciate any comments on the Report and asked further cooperation with the authorities concerned. Comments shall be submitted in writing to GDLG by 18 August. These comments will be duly reflected in Draft Final Report which will be submitted in December of this year.

During the explanation of the Report section by section, Mr. Miyamoto asked specific authorities to provide supplemental data and information, e.g. latest water consumption data from PWC. It was confirmed that discussion would be held between the study team and GDLG and Aden Municipality regarding sewerage characteristics and design criteria.

After the explanation, Mr. Husein from High Way Authority asked when the study team mentions their comments on the Progress Report which was raised before. Mr. Miyamoto replied that we would like to have meeting with Highway Authority as soon as possible.

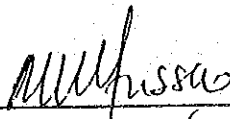
Mr. Miyamoto reported that JICA and GDLG agreed that Khormaksar district be added to the feasibility study area, and the study team would carry out field survey in Khormaksar in the same depth as they had done in Ma'alla and Tawahi

before. He mentioned that this does not necessarily mean inclusion of Khormaksar into the first phase program of the project.

Mr. Miyamoto asked GDLG to issue letters to the authorities concerned whose representatives did not attend this meeting for their comments.

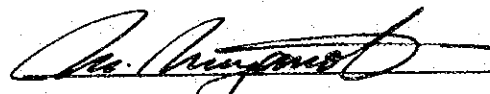
The meeting was concluded at 11:30 am.

For the General Directorate for
Local Government



Mr. Mohed A. Moosa
Director, Municipal Dept.

For the Study Team



Mr. Masafumi Miyamoto
Co leader, JICA Study Team

MINUTES OF THE MEETING

1. Time and Date: 12:00 pm to 13:45 pm, 16 August, 1989
2. Place: Aden Minicipality
3. Project: Feasibility Study on the Improvement of Ma'alla and Tawahi Sewerage System in Aden
4. Subject:
 - 1) Design Sewage Flows and Characteristics
 - 2) Submersible Pumps for Rehabilitation
 - 3) Change of Force Main Route
 - 4) Design and Layout Plan of STP
 - 5) Confirmation of STP Site Boundary
 - 6) Approval from MOC for Clay Soil Mining from Sheik Othman
 - 7) Confirmation of P/S Sites
5. Attendants:

For the Government of PDRY

Mr. Badr M. Nagi	Director, Environmental Health Dept. Capital Municipality
Mr. Ahmed N. Aboteeba	Head of Sanitary Engineering Section, GDLG
Miss Rashma A. Malik Makki	Sanitary Engineer, GDLG
Mr. Ahmed A. Almas	Sewerage Engineer, Environmental Health Dept. Capital Municipality

For JICA Study Team

Mr. Masafumi Miyamoto	Co-leader, JICA Study Team
Mr. Kaoru Suzuki	Sewerage Facility Engineer, JICA Study Team
Mr. Takehiko Oga	Sewerage Facility Engineer JICA Study Team

6. Topics of the Meeting

An agenda and documents for the meeting which are attached herein were prepared by the study team. Mr. Miyamoto explained the subjects to the attendants according to the order of presentation. After intensive discussions on each subject, proposals prepared by the study team were agreed on as presented in the documents except for the matters mentioned below.

2) Submersible Pumps for Rehabilitation

Mr. Nagi will review the report and make comments if necessary.

3) Change of Force Main Route

Force main route from Ma'alla P/S to Dakka area shown in Fig. 2 of the document was suggested to change to the original route along the Ma'alla main road, however, not in carriage way, but in service road.

4) Design and Layout Plan of STP

It was suggested that effluent discharge open channel be changed to closed pipe system because of environmental problem.

5) Approval from MOC for Clay Soil Mining in Sheik Othman

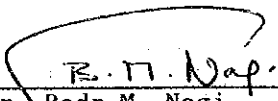
Bir Omar site (No.2) for clay soil mining shall be omitted. A new site in Dar Saad shall be added. This site is the most appropriate for mining of soils, because it is the Municipality property reserved for solid waste disposal by sanitary land fill, therefore, no permission is required, and soils are of good quality. Samples should be taken from the site for test.

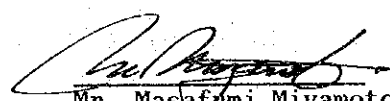
6) Confirmatiin of P/S Sites

Proposed site for Tawahi P/S shall be changed, since it is not allowed to use Municipal garden for P/S construction. Alternative site should be investigated in the vicinity of the present site.

For Aden Capital Municipality

For JICA study Team


Mr. Badr M. Nagi
Director,
Environmental Health Dept.


Mr. Masafumi Miyamoto
Co-leader
JICA Study Team

Agenda and document are attached to the minutes.

MINUTES OF THE JOINT MEETING

1. Time and Date : 10:30 am to 12:00 am, 10th September, 1989
2. Place : Conference room, GDLG
3. Project : Feasibility Study on the Improvement of Ma'alla and Tawahi Sewerage System in Aden
4. Explanation and Discussion on the Progress Report (II)
5. Attendants :

For the Government of PDRY

Mr. Mohed A. Moosa	Director, Municipal Dept., GDLG
Mr. Ahmed N. Aboteeba	Head of Sanitary Engineering Section, GDLG
Mr. Ahmed A. Almas	Sewerage Engineer, Environmental Health Dept., Aden Capital Municipality
Mr. Saeed Rasheed	Town Planning, Ministry of Construction
Ms. Ilham Hanam	Town Planning, Ministry of Construction
Mr. Abdulla Alfareedi	Highway Authority, Ministry of Construction
Mr. Awad M. Saleh	Highway Authority, Ministry of Construction
Mr. Kasim Muflehi	Assistant Port Engineer, YPA

For JICA Study Team

Mr. Heiichiro Makino	Leader
Mr. Masafumi Miyamoto	Co-leader, Sewerage Planning
Mr. Osamu Nakagome	Sewerage Planning
Mr. Kaoru Suzuki	Sewerage Facilities Planning
Mr. Takehiko Oga	Sewerage Facilities Planning
Mr. Nobuo Narushima	Design and Cost Estimate
Mr. Hitoshi Kato	Survey

6. Topics of the Meeting

The meeting was started at 10:30 am in the conference room of GDLG. Mr. Moosa, chairman of the meeting, opened the meeting and asked the JICA study team to explain the Progress Report (II). Mr. Makino, team leader, thanked the

representatives for their help cooperation to the study team during the second field survey in Aden. Mr. Miyamoto, co-leader, briefly explained the Progress Report (II) section by section.

After explanation, Mr. Moosa asked all the representatives for their comments on this report. He told them comments would be received until the study team's departure on 17 September. Mr. Moosa asked the study team to add the comments on sewage treatment plan design prepared by Mr. Aboteeba to Progress Report (II).

A comment was expressed by the representatives of YPA that YPA has a objection to use their property for construction of Tawahi pumping station. The place of the proposed main pumping station in Tawahi will be decided by discussion of higher authorities, GDLG and YPA. The place of the sewage treatment plant had been already confirmed with Town Planning, MOC, however, it is necessary to reconfirm because size of the treatment plant increased. Mr. Miyamoto requested the authorities to comment on the Progress Report (II) within a week. The meeting was concluded at 12:30 am.

For the General Directorate for
Local Government



Mr. Mohed A. Moosa
Director, Municipal Dept.

For the JICA Study Team



Mr. Heiichiro Makino
Team Leader, JICA Study Team



جمهورية اليمن الديمقراطية الشعبية

PEOPLE'S DEMOCRATIC REPUBLIC OF YEMEN

MINISTRY OF CONSTRUCTION AND HOUSING

Mu'askar Abi-Ubeida

Khormaksar

P. O. Box. 6017 TEL:33411/6

CABLE . MINCONS

ADEN

وزارة الانشاءات والاسكان

معسكر أبي عبيدة - خورمكسر

ص.ب. ٦٠١٧ ، هاتف ٣٣٤١١/٦

التموان البرقي : منكونس

عدن

المرجع : ٨٩/٢٥٥/ت.م/

التاريخ : ٨٩/٨/١٩

الموافق

محمود رشيد
رئيس اللجنة
واجب اجراء
١٩٨٩
عبدالمعطي
٨

المحترم

الأخ / المدير العام لشؤون الحكم المحلي

تحية ..

الموضوع: دراسة مجارى المعلا والقواهي

بموجب رسالة رقم مرجح أ.م/ ١١٠ / ٥٢٢ بتاريخ ٨٩/٨/١ م

• حول الموضوع اعلاه

اود ان اشعركم بعدم وجود اى ملاحظات او مقترحات تتعلق

• بالمشروع المذكور اعلاه

" .. "

سعيد رشيد
مدير / نائب وزير الانشاءات والاسكان
=====



جمهورية اليمن الديمقراطية الشعبية

PEOPLE'S DEMOCRATIC REPUBLIC OF YEMEN

MINISTRY OF CONSTRUCTION AND HOUSING

HIGHWAYS AUTHORITY

Mu'askar Abi-Ubeida
Khormiaksar

P. O. Box. 6179 TEL:33411/9

CABLE MINCONS
ADEN

وزارة الاقناعات والاسكان

مصلحة الطرق

مركز ابى عبدة - خورمكسر

ص. ب. ٦١٧٩ ، هاتف ٣٣٤١١/٩

البرق : مكورس
عدن

المرجع : أ/م/ط/ت/١٧/١(٣)/٥٩

التاريخ : ١٩٨٩/٨/٢٦ م

المحترم

الأخ / المدير العام لشؤون الحكم المحلي

تعمة

الموضوع / دراسة مجارى المعلا والتواهي

بناءً على رسالتكم مرجع: أ/م/١١٠/٢٥٣ بتاريخ ١٩٨٩/٨/٢٠
حول الموضوع أعلاه والتي طلبتم برفع ملاحظاتنا حول الدراسة المعدة مسن
قبل الشركة ، وعليه نحب أن نوضح ما يلي :-

١- تم رفع ملاحظتنا من سابق حول الدراسة الأولية حيث تم حضور
ممثلينا لمناقشة سودة الدراسة حيث تم الإتفاق على الجلوس مع
الشركة الاستشارية للمناقشة على ضوء الخرائط المعدة ، والتي لم
تسلم من سابق قبل الاجتماع .

وقد تم الجلوس مع ممثل الشركة مداعة التمهيد الأثرية وتم المناقشة
حول الرسومات المقترحة مستقبلاً وكذا تم استلامنا الخرائط المقترحة من قبل
الشركة حول الشبكة .

٢- تم اطلعنا على الرسومات ونرفق لكم بعض ملاحظاتنا حسب رقم
الرسمة للاطلاع والجلوس معنا في حالة الاستفسار .

٣- من الملاحظ أن بعض خط المجارى سيمر بوسط الطريق ومصلحة
البارك الاثرية على ذلك ، وإذا صار ضرورياً فأن المشروع سيتحمل
تكاليف الجزء المقطوع وكذا عرض الطريق بالكامل وليس عرض الحفر
فقط ، ويجب اعادة الردم بموجب مواصفات الطرق والمواد التي
تراه المصلحة مناسبة . .

وتقبلاً فائق الاحترام والتقدير

Drawing No	Comments	
1	Pipe to STP at Khormuker District to be located according to drawing deliver to consultant for our widening for abyen beach road	
3	Main line should be shifted to outer side (Harbour Rd) or Reclamation area.	
4	Location + crossing the roads are not clear, it should be clarified.	
6	Proposed STP site near USSA camp Khormuker site should be clear out of the flooding Bund. this to be discussed with JICA	
8	a) ϕ 250 length 1120 m Force Main to be keep out of the road according Drawing delivered. b) Traffic confusion at about 26 september & agricultur	
15	the proposal for sewer to be checked according to the alignment of the constructing new yiny yoad.	A-33

Drawing no	Comments	
17	Critical zones along c/w. extra cost of surfacing the c/w on the project	
18	Proposed force main to be shift to front area reclamation Harbour Road	
21	Proposed Trunk sewer to be out side the road	
23	Proposed force main to be out side the road.	
25	Proposed force main to be out side the existing c/way, as discussed before with the consultant that MOCH have future proposal for canal c/way from court yard to petrol station connecting abyen beach road.	
26	Proposed force main to be out side the road, a drawing deliver to consultant for new entrance road to harbour.	

Drawing No	Comments	
28	<p>Proposed force main</p> <p>a) crossing R/about at 26 september to be revised and must be at narrow location</p> <p>b) there is proposal for widening to 3 lane from agriculture R/about to hospital R/about at the camp side.</p>	



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الإدارة العامة لشئون الحكم المحلي

N.B ON PROGRESS REPORT (II)

- 1) The mainly important thing for any study is the total cost of the project, but ~~and~~ this study it is not given to it any importance so with this the study is considered as incomplete from practical point of view.
- 2) (N.B) According to our previous ~~notabene~~ and discussion with the team who prepared this study, an agreement is done to provide flow measurement at outlets for knowing the balance between the flow before and after treatment. But this suggestion is not mentioned in the study although it is mentioned for the inlets.
- 3) As it is clear that there are some changes ~~are~~ happened on some data which are ~~in relative~~ with the increment in the flow and population as well as in the flow factor and so on, though these changes are discussed but the study doesn't mentioned about them and their effect on the previous design and shall these changes will take into consideration while preparing the new design.
- 4) (N.B) In our previous ~~notabene~~ it is mentioned about the process (method) which followed in the peak flow calculation according to the national standard which gives peak flow by multiplying the average



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consumption into daily flow factor (K_1) into hourly flow factor (K_2).
(ie $Q_{avg} \times K_1 \times K_2$), but the peak flow in this study is calculated
by multiplying the daily average consumption into hourly flow factor
and so on whereas the daily and hourly flow factors are 1,1 and 2 resp.
and in the light of previous information of the study the peak flow
for first phase upto year 2000 for the four districts is 77365 m³/day,
but according to the specification of the national standard the peak
flow for the same phase (ie 1st phase) is $(77365 - 3145) \times 1,1 + 3145$
 $= 88787$ m³/day. (whereas 3145 is the value of infiltration) and the
difference between the two values is 11422 m³/day which is nearly equals
the value of daily maximum for malla district and this difference ^{inturn}
can make changes in the design. [as case of reference of national bank is
submitted to insure the peak flow calculation].

- (5) Referring to page 62, The ^{rate of} water losses calculation is found very high
due to high temperature, and since the evaporation process is depend upon
the area and the retention time, the evaporation causes increment in
the rate of the salts and consequently effects on the efficiency of the
ponds. The increment of the salinity make the treated water unsuitable



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for irrigation purpose. whereas the facultative pond in this study is with the dimensions of 360m in length and 140m in breadth which are correct from calculation point of view but from the point of operation and salinity is not practical particularly in the first phase of the operation of this pond. The reason is due to increment in the retention time twice the designed period, so to avoid this problem we suggest to divide this ponds into two ponds operated sequentially and that is by reinforced a black wall.

- (6) Transportation of soil from the site to a distance 5 km away, we suggest ^{that} the rate of transportation should be calculated.
- (7) while preparing the design of pumping stations the ventilation problem of the stations should be taken into account particularly those which will construct in the future so that they will not become as a nuisance source for the people due to foul gases generated from them.
- (8) Because of availability of animals nearby the STP, we suggest the provision of fence around the ponds is essential.



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- (9) To prevent the STP from floods (as which happened in 1982), we suggest that to provide protection defenses on the STP.
- (10) Completion ~~to~~ comment (5) The ideal solution from all views particularly the operation and the reduction in the quantity of salts and algae it is suggest to establish the Ponds in two strains with the same area and retention time.
- (11) we see that, the final study should contains the details of works like the machinery ^{and} ~~and~~ the specifications of reinforcement as well as the construction method of Pond's walls and the way of protection against H₂S either in the sewer or on the building ... etc.
- (12) The final study should contains the break down for cost and net total cost
- (13) This study is submitted on 10/19 and the date 17/19 is fixed for receiving any N.B on this study and ~~we think that~~ ^{we think that} this period is not enough ^{not} ~~even~~ for GDLG but even for other Public org. (intention)



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with this project and we think in case of not getting any N-13 this
will not mean that there is no N-13 but this is regarded to ^{very}
^{short}
adequate time.

الادارة العامة لشئون الحكم المحلي
A. ABOTEEDA

SSE
GDLG
17.9.89

Minutes of Technical Meeting

1. Time and Date: 9:00-12:00, 3rd December, 1989
2. Place: General Directorate for Local Government (GDLG)
3. Project: Feasibility Study on the Improvement of Ma'alla and Tawahi Sewerage System in Aden
4. Subject: Presentation on the Draft Final Report
5. Attendants:

For the Government of PDRY:

Mr. Rashid El Hag	Assistant Deputy Director, GDLG
Mr. Badr M. Nagi	Director, Environmental Health Dept. Aden Capital Municipality
Mr. Mohamed A. Mussa	Director, Municipal Dept. GDLG
Mr. Ahmed A. Almas	Sewerage Engineer, Environmental Health Dept. Aden Capital Municipality
Mr. Ahmed N. Aboteeba	Head, Sanitary Engineering Section, GDLG
Mr. Nasser M. Ahmed	Sanitary Engineer, GDLG
Ms. Nagwa Ahmed A. Rub	Town Planning Section, Ministry of Construction

For JICA Study Team:

Mr. Heiichiro Makino	Leader, JICA Study Team
Mr. Masafumi Miyamoto	Co-Leader, JICA Study Team
Mr. Hisashi Takanashi	Economist, JICA Study Team

6. Topics of the Meeting

The presentation on the draft final report was made by the JICA Study team with particular references to the some of the important subjects which were not dealt with in the Interime Report. Comments, thereafter, were given by the Aden Municipality. The following are the summary of the major points of discussion.

1) Military Area

The JICA Team understood that due to limited data and information available, long-term planning for the inside of the military areas were excluded in the study. Nevertheless Aden Municipality requested that though implementation of sewerage facilities in the camps may not be a responsibility of the Municipality, at least location of pump stations in the existing sewer system and if new pumping stations are necessary their proposed locations should be indicated on the drawings attached to the Report for the future reference. In this connection, it was requested that necessary costs should be also estimated as additional costs to the Project costs. The JICA Team replied that this matter should be further discussed based on available information on the military area. The joint review meeting was decided to be held on the following day.

2) Planning Area in Khormaksar

In the Report, a few sections of the planning area in Khormaksar including coastal area remained untouched for future development due to limited information given to the Team. However it was revealed by the Municipality that there is a detailed development plan for this area prepared by the Town Planning Section and it was requested that sewerage facility required to connect to the proposed system and costs should be included in the Report. The JICA Team stated that during the field survey no such plan was provided and if it is obtainable the JICA Team would review it in order to accommodate in the Report. The representative of the Town Planning Section attended promised that it would provide the said development plans to the JICA team for joint evaluation as soon as possible.

3) Unsewered Area in Ma'lla and Tawahi

The Aden Municipality pointed out that the unsewered area in Ma'allala district and low-income family area in Tawahi were not fully described in the Report. It was requested that for the use of future planning on these areas details of the existing sewer system such as locations and diameters of branch sewer pipes should be indicated on the Report drawings. The JICA Team replied that upon joint review of available information by both Aden Municipality and the Team the details of existing system in related Ma'allala and Tawahi districts would be accommodated in the drawings of the Report.

4) Emergency Outfalls for Tawahi and Ma'allala Pumping Stations

The Municipality raised that in case of sudden blockade of the force main emergency by-pass outfalls at pumping stations should be considered in such a way as utilizing existing outfalls or new outfalls. The JICA Team commented that as emergency by-pass outfalls were already examined in their analysis it would be fully added in the Report.

5) Additions of Some Existing Facilities to Drawings

It was pointed out that in the drawings attached to the Report some of the existing facilities such as pumping stations, sewer system, public buildings and new Ring Road were not shown. The JICA Team answered that all the information supplied by the Municipality were incorporated in the drawings. Besides, the JICA Team mentioned that they had requested the Yemeni side to check all the drawings prepared if any thing is missing at the time of presentation of the Interim Report and there was no substantial comments delivered to the Team. However The both sides agreed that they would go through together all maps and information given to the Team which were kept in files and revise them if found necessary. In addition, the Municipality requested that as defected or collapsed sewer were shown only in the figures of the Main Report these should be also inserted in the drawings of the Report. The JICA Team agreed to do so.

6) Inclusion of the Extra-Catchment Area

The Municipality requested that as the proposed Project allows sewerage flow from the extra-catchment area, future development plans, investment cost and details of existing sewer system should be included in the drawings of the Report. The Study Team reacted that the extra-catchment area was considered out of the study scope and no detailed information on future plan was given, only volume of future sewerage flow was taken into account in their long-term development plan. However, the Team agreed to prepare estimated costs in these areas separately and to illustrate existing system in the extra-catchment area based on available information supplied and to be supplied by the Yemeni side.

7) Inclusion of Main Public Utility Lines in Drawings

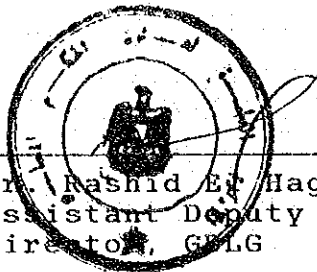
The Aden Municipality requested that for the use of future implementation of the proposed Project, existing underground public utility lines e.g. water pipeline, electricity cables and oil pipeline should be shown in the drawings together with sewerage network. Nevertheless the related routes of lines which should be incorporated in the drawings would be confined to the such main routes as main water pipe, power cables (33kv, 11kv) and main oil pipelines. The JICA Team accepted it as necessary data and information had been collected from the relevant organizations.

8) Project Cost

A question was raised on the break-downs of the project cost. In particular, the Yemeni side mentioned that the provisional sums were defined as cost for the uncertain items which is at the disposal of the engineer while temporary work costs should be indicated outside of provisional sums. Additional costs such as construction cost for temporary road for transportation of soils should be included in the total project costs as provisional sums. The cost for restoring the pavement which is limited to trench width should be also included in the direct construction costs. The JICA Team agreed. The Technical Meeting was thus adjourned at 12:15.

For the General Directorate
for Local Government

For the JICA Study Team



Mr. Rashid E. Hag
Assistant Deputy
Director, GDLG

H. Makino

Mr. Heiichiro Makino
Team Leader,
JICA Study Team

Minutes of Joint Meeting

1. Time and Date: 10:15-11:05, 9th December, 1989
2. Place: General Directorate for Local Government (GDLG)
3. Project: Feasibility Study on the Improvement of Ma'alla and Tawahi Sewerage System in Aden
4. Subject: Presentation on the Draft Final Report
5. Attendants:

For the Government of PDRY:

Mr. Rashid El Hag	Assistant Deputy Director General GDLG
Mr. Badr M. Nagi	Director, Environmental Health Dept. Aden Capital Municipality
Mr. Mohamed A. Mussa	Director, Municipal Dept. GDLG
Mr. Ahmed A. Almas	Sewerage Engineer, Environmental Health Dept. Aden Capital Municipality
Mr. Ahmed N. Aboteeba	Head, Sanitary Engineering Section, GDLG
Mr. Nasser M. Ahmed	Sanitary Engineer, GDLG
Mr. Hameed A. Mohd	Economist, GDLG
Mr. Fuad Waked	Engineer, Study and Design Section, PCEP
Ms. Nagat A. Wasa	Electrical Engineer, PCEP

For JICA Advisory Committee:

Mr. Yasutake Kameda	Chairman, Advisory Committee, JICA
Mr. Seigo matsumoto	Coordinator, JICA

For JICA Study Team:

Mr. Heiichiro Makino	Leader, JICA Study Team
Mr. Masafumi Miyamoto	Co-Leader, JICA Study Team
Mr. Hisashi Takanashi	Economist, JICA Study Team

6. Topics of the Meeting

Mr. Rashid started the meeting at 10:15. He requested the JICA team to report the follow-up works of the previous Technical Meeting held on 2nd December, 1989 on presentation of the draft Final Report.

On behalf of the JICA Team, Mr. Miyamoto, on the basis of the previous Minutes of the Meeting, explained in details about the follow-up activities carried out jointly with Yemeni counter-parts after the Technical Meeting.

Mr. Rashid and other Yemeni representatives approved these activities and agreed to the study results, which would be then duly incorporated into the Final Report.

Mr. Waked, PCEP, gave a comment on arrangement of electricity supply for the proposed Sewage Treatment Plant (STP). He, particularly, mentioned that there was an existing over-head power line along the Abian road and thus its necessary power supply would be easily available from this line. Nevertheless it was pointed out that the new step-down transformer must be installed at the implementation of the Project. For other works related to electricity he stated that the PCEP would proceed the same procedure as they did with the Sheik Othman Project.

Mr. Miyamoto raised a question regarding the possibility of the relocation of the proposed STP to nearer point, say El Arish fisherman's village in order to reduce the construction cost for the force main. He added that according to the Town Planning there would be a large-scale re-development plan for this area in near future in which the existing village was planned to be demolished.

Mr. Nagi replied that the costs to be incurred for relocation of the existing village population would be extremely large and it would be financially difficult. He said that the location of the proposed STP should thus remain unchanged.

Mr. Rashid told the JICA Team that he would send the additional official comments, if any, from other public organizations such as PWC, Highway Authority, YPA etc. by 9th January, 1990.

In conclusion, Mr. Kameda, the chairman of the JICA advisory committee, remarked that the feasibility study on the improvement of Ma'alla and Tawai sewerage system in Aden was to be completed shortly and the Final Report would be submitted early next year. At this last stage of the said study he expressed his warm appreciations to the all Yemeni counter-part staff members headed by Mr. Rashid for their sincere and energetic cooperations rendered to the JICA study team during their stay in Aden. He wished lastly that the proposed Project would be successfully implemented in near future. Thus, the meeting was adjourned at 11:05.

For General Directorate
for Local Governments

For JICA Study Team



Mr. Rashid El Hag
Assistant Deputy Director
General, GDLG

Mr. Heiichiro Makino
Leader, JICA Study Team

For JICA Advisory Committee
and Witnessed by

Mr. Yasutake Kameda
Chairman, Advisory Committee
JICA

APPENDIX B
RESULTS OF TOPOGRAPHIC SURVEY

APPENDIX B
RESULTS OF TOPOGRAPHIC SURVEY

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APPENDIX B
RESULTS OF TOPOGRAPHIC SURVEY

1. Introduction

The first leveling survey was carried out during the period of the first on-site work along the proposed trunk sewer and possible pumping mains routes and main branch sewer routes in Ma'alla, Tawahi and neighboring areas. The survey started on 2nd January and finished at the end of January, 1989. During the survey, confirmation of the official bench marks of which levels were given by the Highway Authority (HA), Ministry of Construction, were carried out under the supervision of the counterpart engineers. Also a temporary bench mark in Khormaksar to be used for sewerage planning was established by the study team. A discrepancy between levels given by HA and that of the study team's measurement was found at BM 3. Environmental Health Department of Aden Municipality was notified in writing of this for their action. Although this discrepancy is not fatal, all the levels presented in the planning are based on the study team's measurement.

Various topographic surveys to supplement those conducted during the period of the first on-site work were carried out in the second on-site work period. These surveys include the following.

- (1) Leveling survey along the proposed force main route in Crater from Crater P/S to Law Court.
- (2) Measurement of distance along Abyan road from Yemeni Authors Union junction to the proposed STP site to confirm the length of the force main.
- (3) Leveling survey along the alternative route of force main on Wharf Road in Ma'alla.
- (4) Plain table survey at the sites for the proposed major pumping stations in Ma'alla, Tawahi, Crater and Khormaksar.
- (5) Survey at the proposed treatment plant site to confirm topographic conditions at the site.

- (6) Leveling of sewer pipes of C-Class Housing route in Ma'alla to confirm connection to the proposed trunk sewer.

Results of the leveling survey are plotted on the maps with scale 1:5,000, which are included in Volume Four of this report. Major points and results of the leveling survey are summarized in the following sections. Sections 2 and 3 describe the survey carried out during the first on-site work, and Section 4 describes that during the second on-site work.

2. Official Bench Marks

For the leveling survey, the study team used the official bench marks of the Highway Authority, Ministry of Construction. The Design Department of the Authority has established networks of bench marks for road construction. The accuracy of the levels of the bench marks is within $30\sqrt{S}$ mm (where S is one way distance of the survey in km). The bench marks for the study were selected from those of the Authority so as to cover conveniently all the districts for the study. The datum point of the Yemen Port Authority (YPA) in Tawahi was used to confirm the levels of the official bench marks. As a result, all the levels inclusive of those used in the previous design were confirmed to be in conformity. In addition to these official bench marks, a temporary bench mark was established in Khormaksar area. Locations of these bench marks used are shown in Figure B-1. Sketches and photographs of the bench marks are shown in Figures B-2 to B-8 and Photo B-1 to B-6, respectively. The levels of the official and temporary bench marks are as follows.

Name	Number by HA	Area	Place	Level(m)
BM 1	1201	Tawahi	in front of ABC tank No.5	4.490
BM 2	1205	Ma'alla	near the Blind Center	16.432
BM 3	2403	Crater	near the National Bank of Yemen	10.304
BM 4	2106	Al Mansura	near the Caltex Rotary	5.311
Datum point (YPA)		Tawahi	at the Aden News Agency	3.475
Temporary BM		Khormaksar	in front of Aden Hotel	3.500

3. Leveling Survey for Sewer Pipes

3.1 Trunk Sewer Route

The routes of the leveling survey are illustrated in Figure-B.1. Ground levels usually at 80 m intervals were measured. Levels of such main features as curves and crossings of main roads were also measured. Accuracy of the error of closure is set at less than $10\sqrt{S}$ mm (where S is one way distance of the survey in km). The results of the leveling survey are plotted on the maps and are used for longitudinal sections of trunk sewers and pumping mains.

3.2 Main Branch Sewer Routes

Leveling survey along the routes of main sewers in Ma'alla and Tawahi districts were carried out. Routes for survey were selected taking into account present conditions of the existing sewer in the districts and anticipated future sewer alignment as well. As a rule, longest sewer lines which serve larger areas were selected. Selected routes are illustrated in Figures B.2 and B.3. Results of the survey are used for design of sewers.

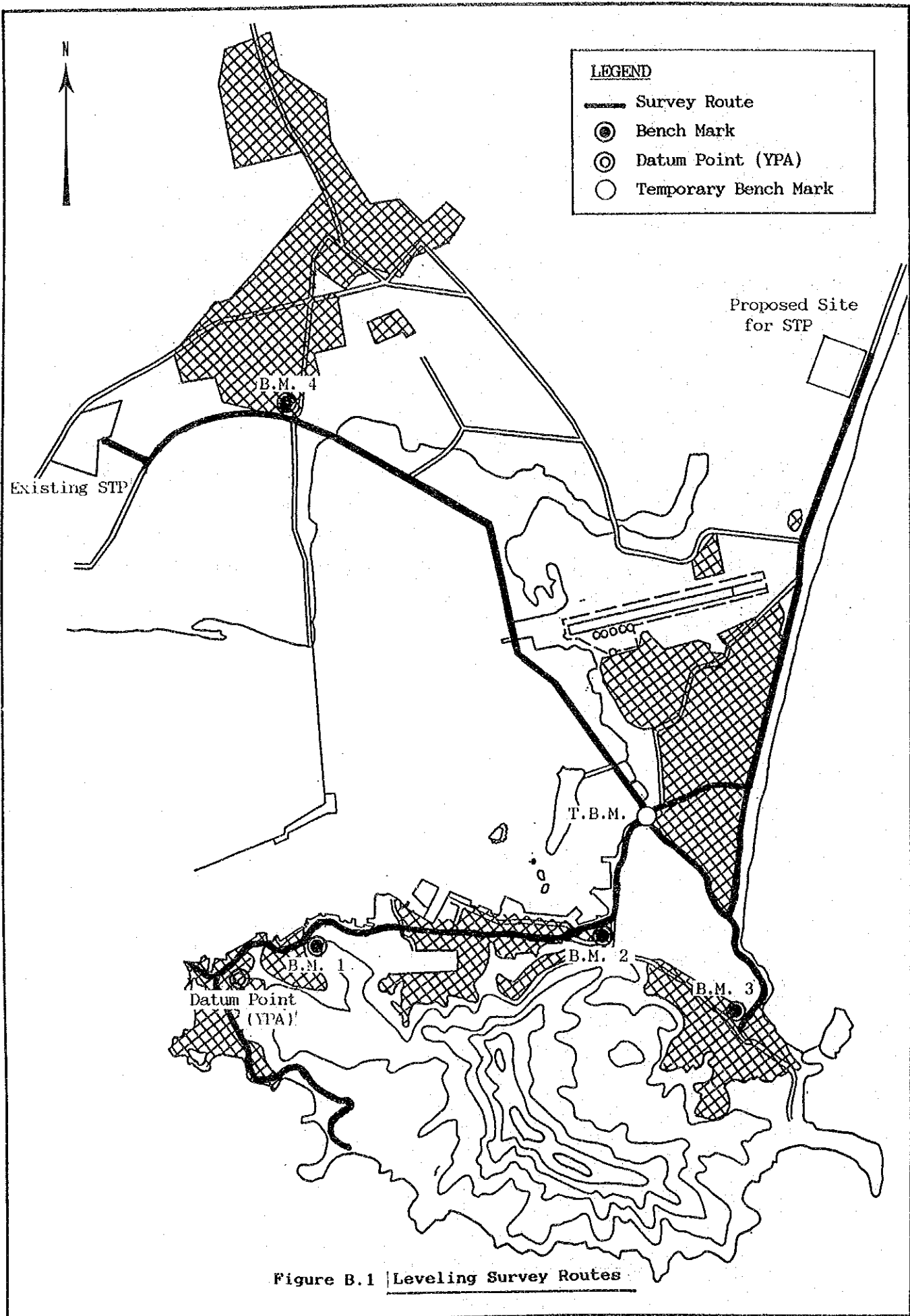


Figure B.1 | Leveling Survey Routes

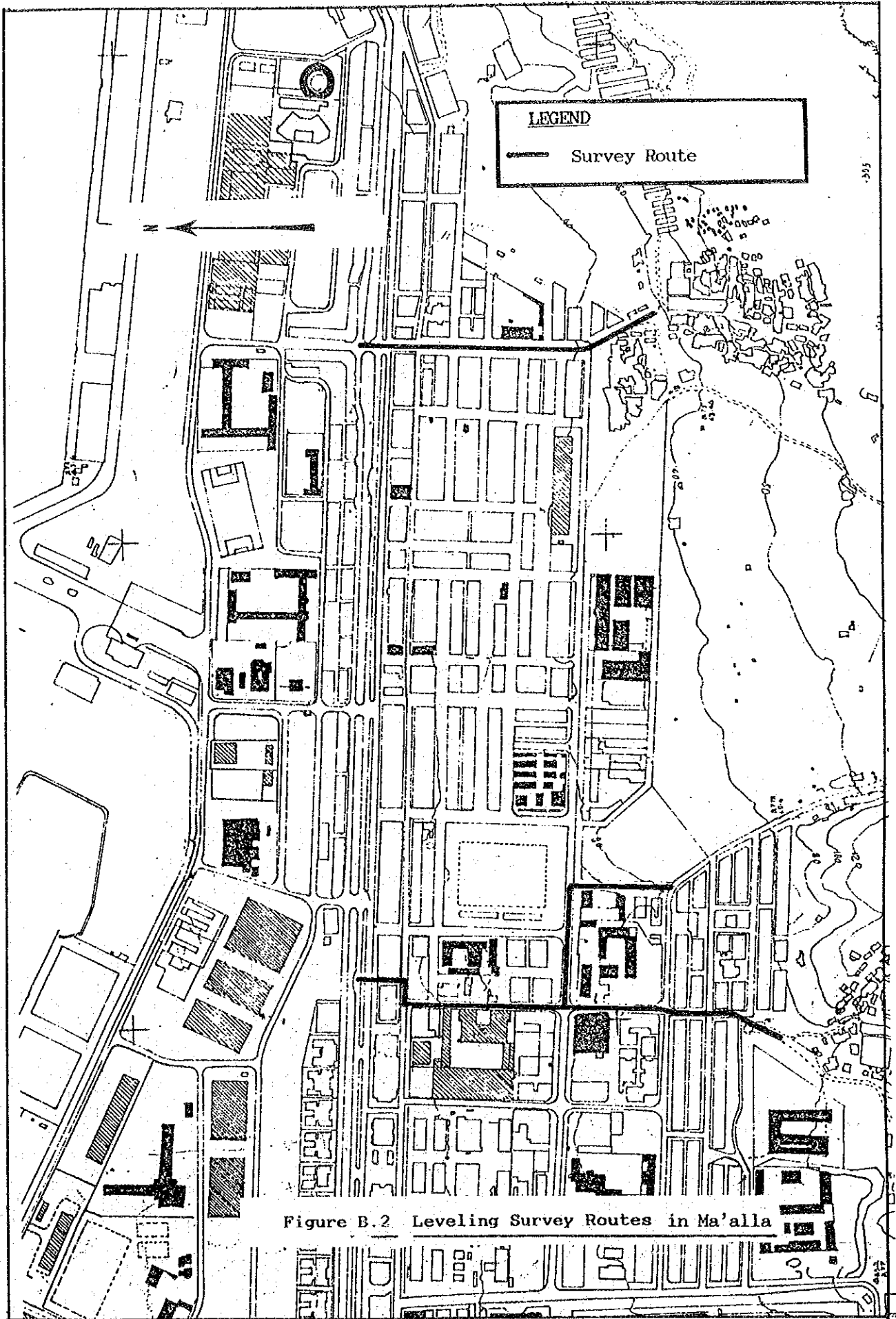


Figure B.2 Leveling Survey Routes in Ma'alla



Figure B.3 Leveling Survey Routes in Tawahi

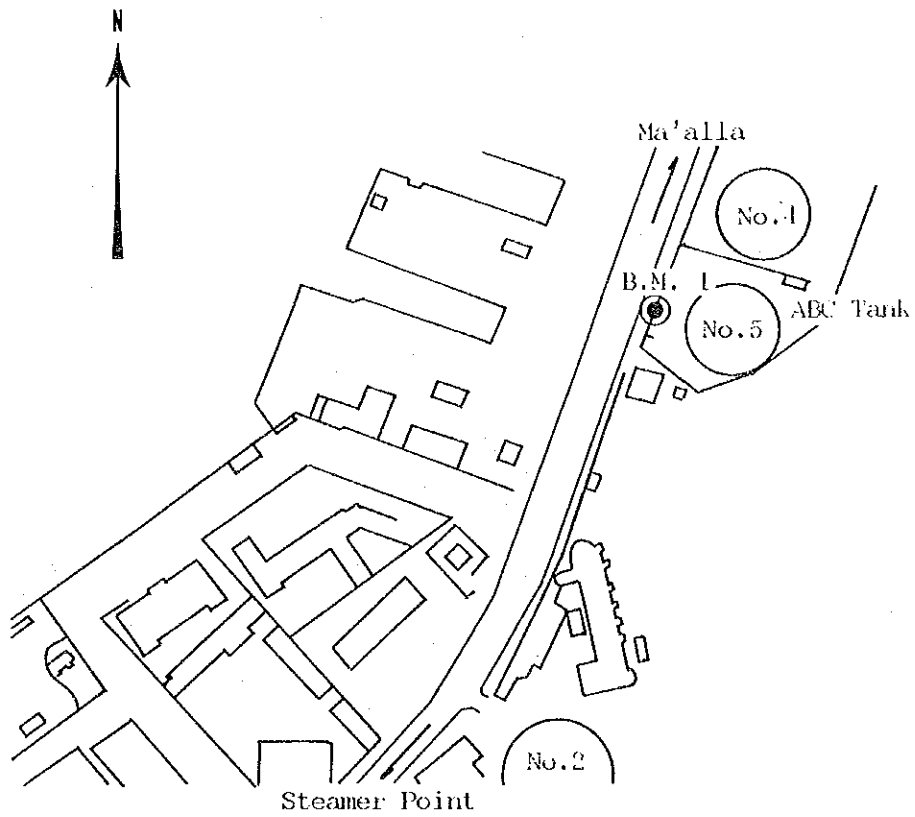


Figure B.4 Sketch of BM 1 in Tawahi



Photo B.1 BM 1 in Tawahi

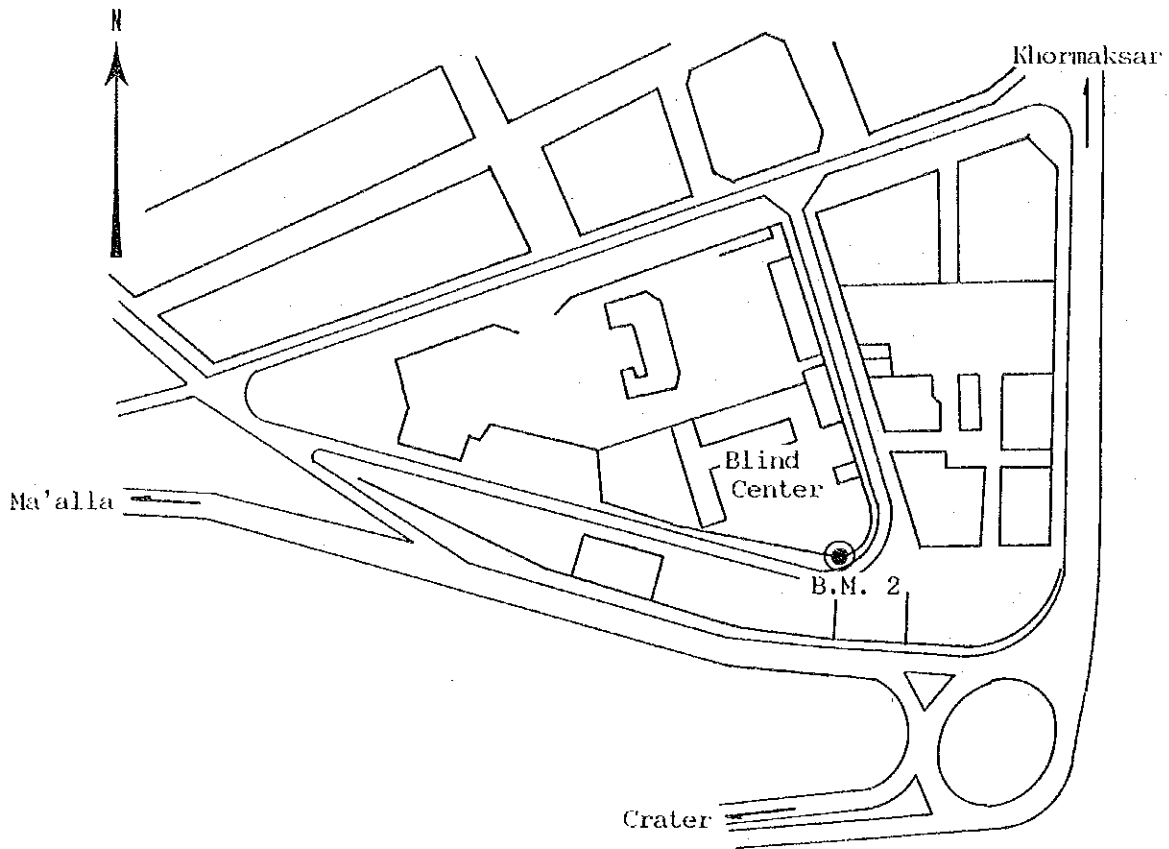


Figure B.5 Sketch of BM 2 in Ma'alla



Photo B.2 BM 2 in Ma'alla

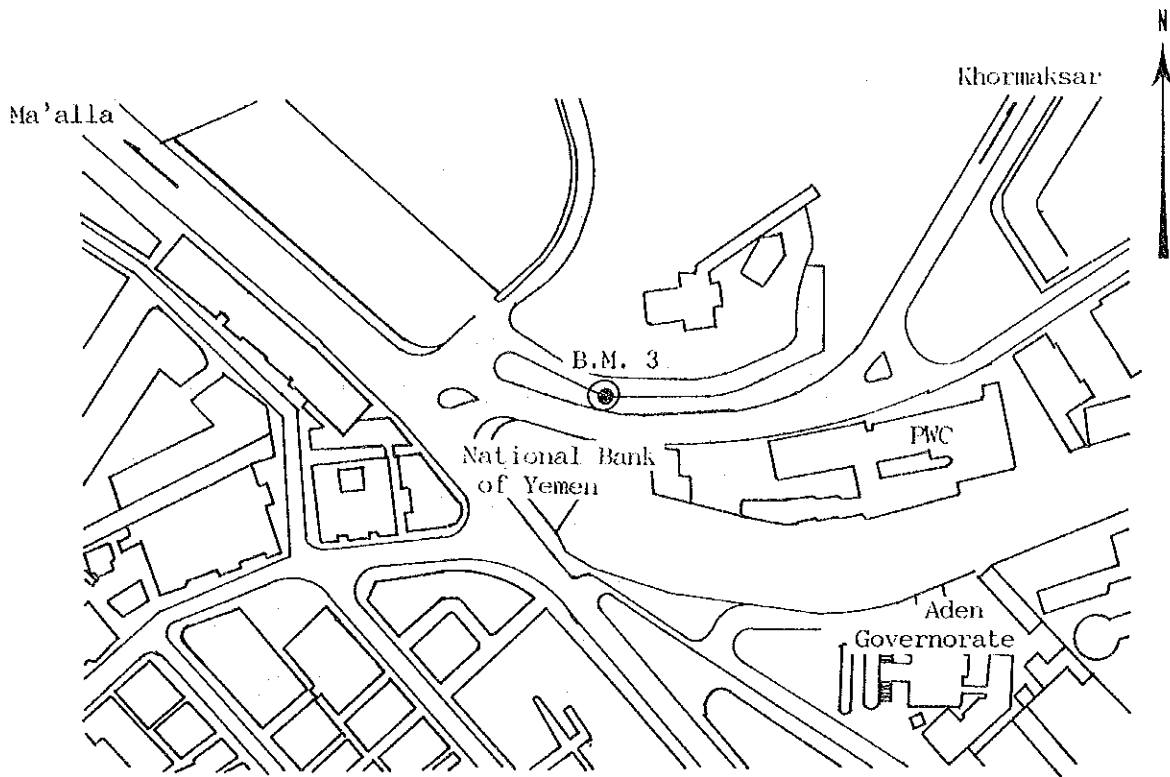


Figure B.6 Sketch of BM 3 in Crater

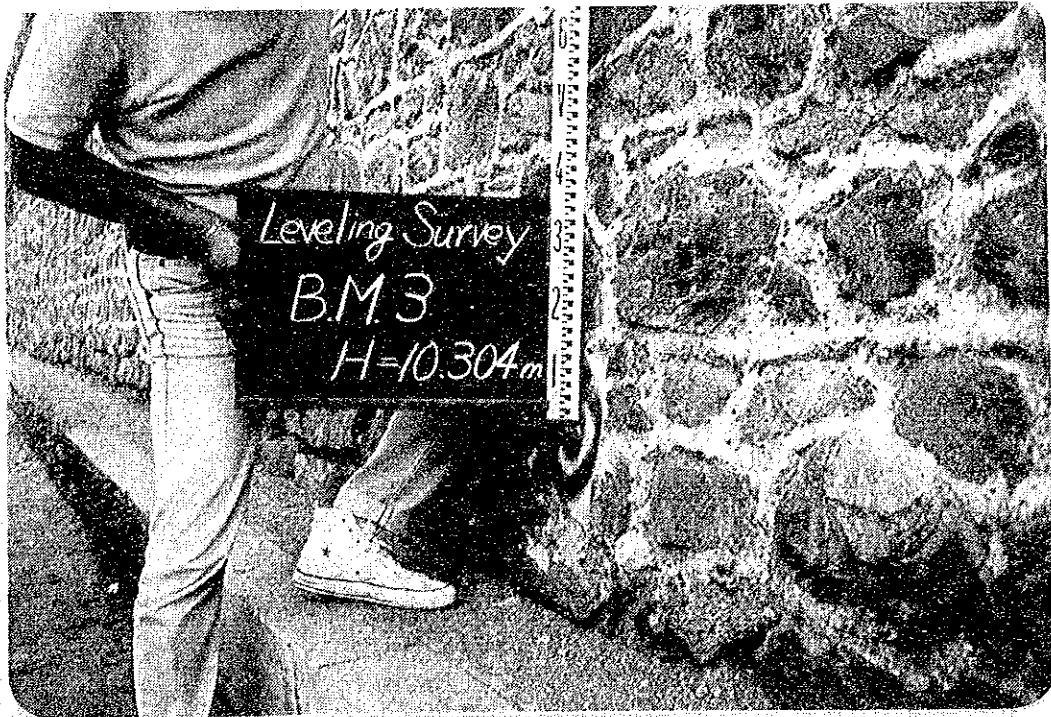


Photo B.3 BM 3 in Crater

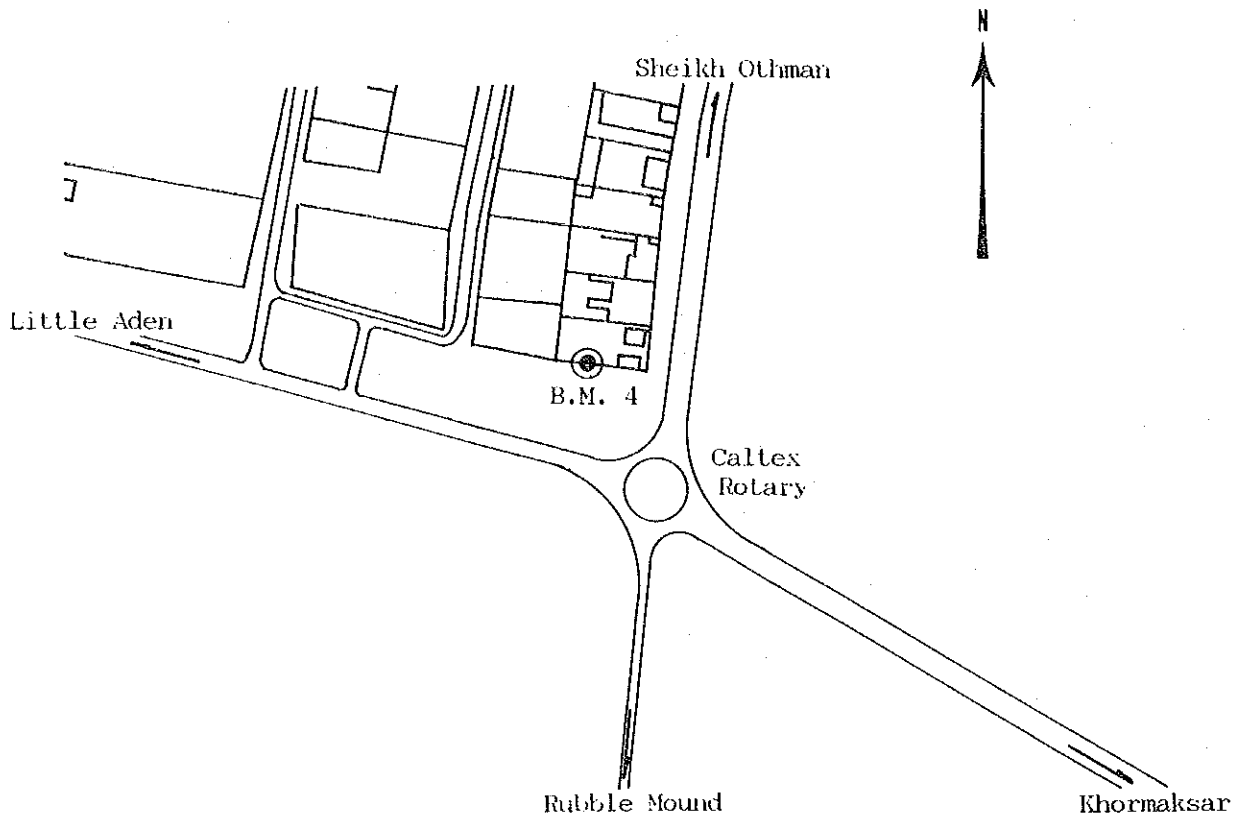


Figure B.7 Sketch of BM 4 in Al Mansura



Photo B.4 BM 4 in Al Mansura

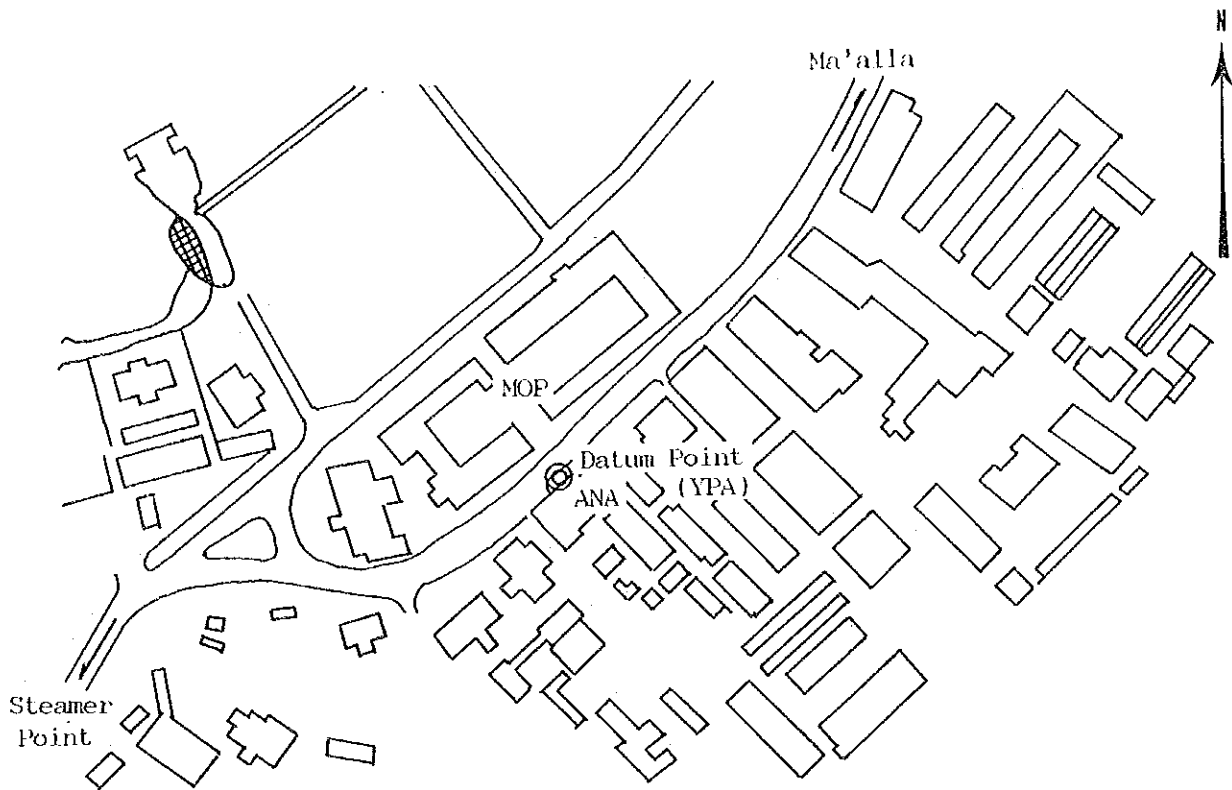


Figure B.8 Sketch of Datum Point (YPA) in Tawahi



Photo B.5 Datum Point (YPA) in Tawahi

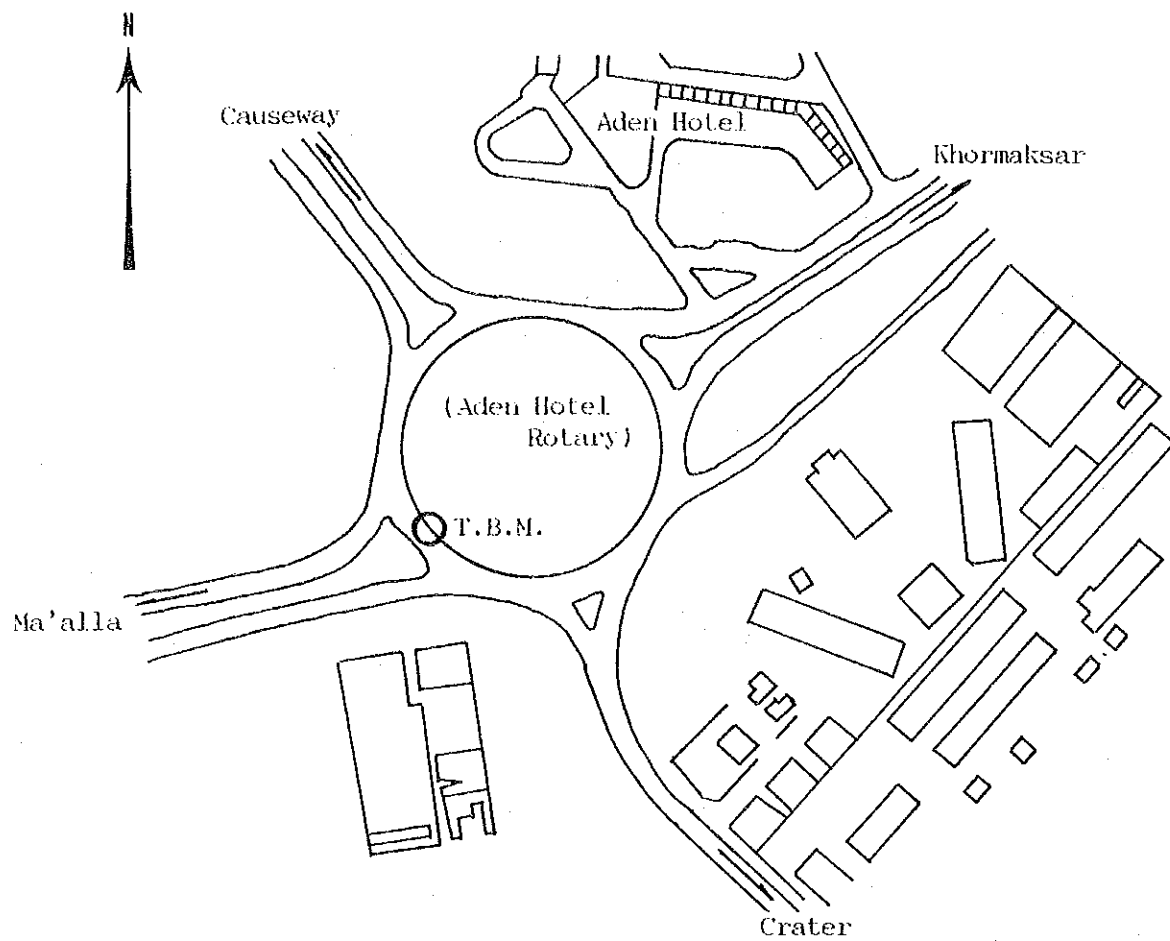


Figure B.9 Sketch of Temporary BM in Khormaksar



Photo B.6 Temporary BM in Khormaksar

4 Surveys in the Second On-site Work

4.1 Leveling Survey in Crater

The route of the leveling survey in Crater is shown in Figure B.10.

Leveling survey was carried out in the same manner as had been conducted for the previous survey during the first on-site work. Accuracy of the survey is also set at the same level of $10\sqrt{S}$ mm (where S is one way distance of the survey route in km).

As a result of leveling survey, the distance of the proposed force main in this section became longer than the previous one by 30 m. Profile of force main has been modified accordingly.

4.2 Measurement of Distance of Force Main

The route of distance measurement along the Abyan road is shown in Figure B.11.

Distance of the proposed force main in this section was confirmed to be almost same as previous measurement. Difference is only 3 m. This has been reflected in the profile of force main.

4.3 Leveling Survey in Ma'alla

At the meeting with the Highway Authority, change of the force main route along the Ma'alla main road was suggested. Thus, leveling survey along the alternative route from Ma'alla P/S to Dakka area was carried out. The route of the survey is shown in Figure B.12.

Method and accuracy of the survey were the same as mentioned in 4.1 above.

The route of the force main in Ma'alla returned to the original proposal afterward with consultation with Aden Municipality.

4.4 Plain Table Survey at P/S Sites

Confirmation of the sites for proposed major pumping stations in the four districts was carried out at the sites with the presence of counterpart personnel. As a result, Tawahi P/S was shifted from the previous site in the Municipal Garden to neighborhood of the Marine Training Center of YPA. The site for Tawahi P/S was finally agreed on by YPA and GDLG as shown in Figure B.14.

The sites for the remaining three pumping stations in Ma'alla, Crater and Khormaksar were confirmed as proposed. Proposed pumping stations will be constructed in the immediate vicinities of the existing facilities.

Locations and plans of the pumping stations are shown in Figures B.13 through B.16.

4.5 Survey at the Proposed STP Site

Preliminary reconnaissance survey for the alternative site for the treatment plant north to the airport was carried out by the study team members and Aden Municipality representatives. However, this site was found to be insufficient for construction. Consequently, the treatment plant site was decided to be as proposed.

The purpose the survey at the proposed sewage treatment plant site include the followings:

- (1) Confirmation of any topographic features of the site, particularly possible obstacles to the construction work.
- (2) Confirmation of the ground levels.
- (3) Measurement of the groundwater levels.

Findings of the survey are as follows:

- (a) Concrete piles on the north of the site
- (b) Antennas on the west

(c) Military shooting area

(d) Embankment

(e) Trace of watercourse

In addition to the above, it was informed that a PWC water main to supply the military camp runs beside the site along the Abyan road.

All the findings illustrated in Figure B.17 were reported to GDLG and Aden Municipality in writing. At the meeting with representatives of the authorities held on 16th August, the boundary of the site for the treatment plant was confirmed as shown in Figure B.18.

It was informed that embankment had been constructed after the severe flood in 1982. The flood water came from north at that time. The trace of the water course might be formed by that flood. The embankment can be moved to the area for the convenience of construction. However, protection against flood should be provided, most likely by the same embankment.

The concrete piles are the remains of old British camp and do not affect the construction. Construction of the treatment plant, particularly that of the first phase, can be carried out avoiding antennas and shooting area.

As the result of the survey, an average ground level of the site is determined to be around +2.9 m.

Measurement of the groundwater level at the site was carried out on 20th August. The day of the highest tide in August was selected for the measurement, since the groundwater level was thought to be affected by tide levels because of the proximity to the sea. Measurement of levels around high tide and low tide were carried out three times each in a observation hole set by the study team. The groundwater table was found to be +1.35m. Location of the observation hole is shown in Figure B.17. The results of the measurement and tide levels are shown in Figure B.19.

As shown in the figure, there was no change in groundwater levels suggesting no influence of the tide levels.