8. Warehouses Costs and Annual Management Cost Estimates
9. CAA Storage Facilities by Location and Capacity
10. Drawings of Storage Features
11. Reception Provisoire for the USAID Warehouses and Correspondence (LBII)
12. Minutes of Construction, Meetings, Correspondence, and Reports
13. Photographs
14. References.

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ii. PROJECT EVALUATION SUMMARY

Summary

This project is part of a multi-donor effort to improve the capacity of the national marketing board of Senegal (ONCAD) to store and market locally-produced millet and sorghum. The USAID project has financed 1) the construction of 23 warehouses with a total storage capacity of 30.000 metric tons and 2) a training program (carried out under contract by KSU) to provide technical training in food grain storage practices. ONCAD was expected to effectively administer a grain buying program and to balance annual supplies between surplus and deficit areas within the country.

While the project has fulfilled a major objective of constructing the specified MT grain storage capacity, the use of design criteria inappropriate to local climate and conditions, as well as reliance on U.S. - imported rather than locally-purchased materials, has led to unnecessarily high building and maintenance costs and warehouses deficient in many aspects of construction. A major fault lies in USAID's failure to review and modify the AAPC warehouse plans in view of local considerations and recommendations from outside groups. To date, USAID has still only provisionally accepted the warehouses from the builders and is withholding 10 percent of the construction costs pending the completion of essential work.

The USAID-financed training program included the following elements:

- Long-term training in the U.S. at KSU for three Senegalese ONCAD trainees.

- Three summer sessions for ONCAD employees at KSU
- An in-country "train the trainers" program conducted by KSU
- Training courses in Dakar for commercial agents, storekeepers and pest control agents, conducted by CAA.

On the three students sent for U.S. long-term training, one has been placed as an engineer for CAA, where his skills are reasonably well utilised; another is working for the Marine Authority and thus is of no benefit to the agricultural sector; and a third is scheduled to return to Dakar in December 1982.

The KSU summer courses have been judged to be somewhat inappropriate to students' needs in that they focused too heavily on marketing practices and techniques, areas more suited to senior-level employees able to influence government policy.

Both the KSU incountry trainign program and the CAA courses were successful in attaining their objectives. The KSU program got off to a slow start, but once underway, ran smoothly, with the support and guidance of the USAID Grain Storage Advisor contributing significantly to its success.

Delays in clearing some of the project equipment through customs have had a detrimental effect on the training program, causing furstration among returned trainees who lack access to the equipment in which they are skilled and creating a need for retraining once the equipment arrives.

With the dissolution of ONCAD in October 1980, the grain buying and storage activities of that organization were transferred to the CAA.

The collapse of ONCAD and the inability of the CAA to efficiently purchase, store, manage, and market millet in Senegal has been the major reason for the cost ineffectiveness of the project in general and of the millet program in particular.

EVALUATION METHODOLOGY

This evaluation was conducted to assess the quality of grain storage warehouses and technical training financed under this project as well as to examine the effectiveness of Senegal's food grain marketing program. The primary purpose of the evaluation was to assess the need to revise project objectives and approaches to reflect local conditions and address current problems. The investigating team assembled by USAID included a grain storage advisor, a grain storage/extension specialist, and an agricultural economist. The evaluation involved the study of documents, technical papers, correspondence, and course timetables; discussions with participating donors, private organizations, and government departments; field visits to grain storage and handling facilities in a wide range of climatic zones; and interviews with trainees in the project's training programs at all technical levels.

EXTERNAL FACTORS

GRAIN MARKETING AND STABILIZATION PROGRAM

This project was based on the underlying assumption of a strong commitment and capacity on the part of ONCAD to effectively administer the bying of local millet for a security stock and price stabilization program. The two most detrimental external factors hindering project success have been the collapse of ONCAD following reports of corruption and inefficiency, and the inability of its successor, the CAA, to efficiently purchase, store, manage, and market millet in Senegal. At the time the CAA tookover the grain marketing program, it was a small organization handling only distribution of donated grain and having no experience in the field of graim commercialization. It now appears that CAA management was neither motivated nor equipped to handle the grain marketing program; as a result, it sent misleading signals to millet farmers, purchased millet in a manner that exacerbated price instability, and failed to build a reserve stock of grain. In addition, as of May 1982, it had purchased only about half of the 70,000 MT originally promised. Owing to these external factors, the 1981/82 millet harvest has led to a costly overproduction of millet at the expense of investments in lucrative crops such as groundnuts and rice.

TRAINING COMPONENT

. After the dissolution of ONCAD, project trainees joined either the CAA or SONAR. As SONAR is not involved in the handling of graim, the usefulness of project training cannot be evaluated and is not directly applicable to this project.

. One long-term training candidate joined the Marine Authority upon completion of his training; thus his training must be considered a loww to the agricultural sector and to the project.

. Unforeseen delays in clearing project equipment that was demonstrated in training programs has hindered the success and applicability of the training.

INPUTS

Project inputs have been largely accomplished as scheduled in the PP, with some modification. For example, with the demise of ONCAD, training courses geared toward its employees were directed to personnel of the DGPS of CAA. The length of short-term in-country training sessions was reduced from courses of one-month to one-week duration, a change deemed wise by the evaluation team. In addition to the training inputs outlined in the PP, the CAA has proposed a number of training courses and studies aimed at addressing the needs of quality control agents, cooperative and pest control personnel, private sector companies, and storekeepers. The evaluation team supports the concept of an integrated pest control program under the supervision of the CAA technical department.

In terms of warehouse construction inputs, project personnel decided to accelarate the warehouse construction program from the planned three building phases of 10,000 MT capacity to a single continuous phase of 30,000 MT. This move was made in light of Government grain buying achievelents at the time of the first project evaluation in 1979.

OUTPUTS

A. Warehouse Construction

Construction of the 30,000 MT of grain storage capacity specified for the project was completed on target. Because of design flaws and deficiencies in construction, however, USAID has only provisionally accepted the warehouse from the contractors and is withholding 10 percent of construction fees pending further alterations.

B. Training Program

The training program originally outlined in the PP was modified considerably after the collapse of ONCAD, the intended target of training efforts. The following table provides a comparison of the training program, outputs as specified in the PP and the modified outputs of the project.

- Of the three candidates sent for U.S. long-term training, one is working as an engineer for CAA, one is with the Marine Authority, and the other has not yet completed his training.

- Three groups of trainees, all CAA or SONAR employees following ONCAD's dissolution, received short-term training at KSU's summer course in 1976, 1978, and 1981, surpassing project goals.

- Although the in-country training program was judged successful by participants and evaluators, the total number of trainees was substantially below PP goals. In lieu of the ONCAD secco warehouse managers, project

Type of Training	Number of Trainees	
	PP	Actual Project
Long-term U.S. training (KSU)	3	3
Short-term U.S. training (KSU)	13 (ONCAD & ITA)	19 (CAA and SONAR)
Short-term in-country training (USAID in conjunction with various GOS departments)	ONCAC 54 fumigators 47 reserve warehouse managers 6 central warehouse managers 500-600 secco. warehouse managers	DGPS* 40 warehouse managers 10 quality control agents 10-20 fumigators 20 coop. commercial agents
In-country "Train the trainers" Course (KSU)	Not specified in PP	15 CAA employees

* Direction de la Gestion des Projets de Stockage.

personnel decided to provide training to some 240 commercial cooperative agents, but to date only 20 have received such training.

C. Marketing Program

Primarily owing to the failure of ONCAD and its successor, the CAA, to effectively administer the grain storage and marketing program, key verifiers of end-of-project success were not fulfilled, including the following:

- increased quality of grain stored;
- annual grain losses reduced to five percent annually;
- rational management of grain stocks;
- assurance of 10,000 MT of cereals stocked during normal rainfall years.

The GOS failed to purchase the promised amount of grain for the security program. At the last year of the project (1981/82), the CAA had purchased only about 34,000 MT of the 70,000 specified for the program and only 16,000 of that was sold to the CEE for export to other Sahelian countries.

PROJECT PURPOSE

The stated purpose of this project was to increase the capability of the Government of Senegal's national marketing board (ONCAD) to store and market locally-produced millet and sorghum.

PROJECT GOALS/SUBGOALS

- Finance construction of 30,000 MT of grain storage warehouses over a three year period in three phases of 10,000 MT.

- Finance in-country and overseas training in grain storage managemnent and cereals preservation science for 715 ONCAD management and technical personnel.

- Provide external training assistance to organize and facilitate the training, grain storage, management, cereals preservation, and storage facility construction.

- Provide short-term technical assistance as needed to advise ONCAD on mechanisms for price policy and food grain marketing.

PROJECT BENEFICIARIES

As a result of the mismanagement and inefficiency of the millet marketing and storage program under ONCAD and the CAA, small rural millet farmers and consumers, the project's intended direct beneficiaries, have obtained zero benefits from this project. The project's main premise was not fulfilled: That it would aid the rural poor by creating a grain reserve for distribution to deficit areas during times of inadequate local production, this driving down high local prices and reducing the burden on the rural consumer.

In the absence of recent severe drought, it is not possible to judge the effectiveness of the current storage program in aiding drought relief efforts that would certainly benefit this target group.

The project may have stimulated indirect and induced benefits through employment and knowledge gained by the local population involved in millet purchasing, marketing grain storage, and warehouse construction. Yet it failed to benefit the Senegalese economy and population as a whole in the measures outlined in the PP, which included relieving constraints to the large-scale commercialization of millet, providing a security buffer stock pf grain, stabilizing millet prices, raising production incentives, and promoting self-sufficiency by eliminating the need for large imports of rice and other grains and increasing the local supply of more reasonably-priced and domestically-produced commodities.

UNPLANNED EFFECTS

None.

LESSONS LEARNED

1. To ensure that werehouses are built to suit local climate and construction technologies in the future, USAID should carefully review and evaluate plans submitted by contractors, seek and consider recommendations from outside experts and sources, and modify warehouse plans accordingly.

2. USAID should encourage the use of local materials and labor of acceptable quality in warehouse construction whenever possible to keep costs down and stimulate the local private sector.

3. USAID should withhold final acceptance of and payment for contractors' work until warehouses meet desired quality standards.

4. Training programs in administration and grain marketing techniques should be geared toward executive management, heads of departments, regional coordinators, and other capable of affecting government grain policy.

5. Careful attention should be paid to ensure that the one remaining long-term U.S. trainee and future long-term participants are placed in positions within the CAA that fully exploit their training and skills.

6. Section VII of this evaluation offers a series of detailed recommendations for a price stabilization and food stock strategy that would fuel a successful grain marketing and storage program such as the GOS has been unable to maintain up to now. Major recommendations include stressing the trade aspects of food self-sufficiency and shifting the current emphasis from import substitution to a diversified export promotion; building adequate physical infrastructure, marketing data, and communication bases; providing the CAA with operational guidelines for financial management and a mandate for autonomy and independent funding; expanding or diminishing the CAA's security stock level on the basis of its management of the grain program over the next few harvests; and encouraging a diversified system of credit and savings, marketing structure, and distribution institutions.

COMMENTS

Lists of evaluation participants, persons, contacted, and references consulted are provided in the Section VIII annexes of this report.

I. INTRODUCTION

The Senegal Grain Storage Project constitutes the AID input to a major multi-donor effort to improve the capability of the national marketing board of Senegal to store and market locally produced millet and sorghum.

Through this project USAID has financed the construction of 30,000 metric tons of storage capacity and carried out a training program to improve food grain storage practices. The total, initial cost of the project was 11,147,000 $U.S.; of this amount, 4,900,000 $U.S. was for warehouse construction, training for management and technical personnel, and technical assistance on pricing policy and food grain marketing.

The authors of this report were mandated to review the accomplishments of the project and also to provide the storage organization with working recommendations for further improving the use and management of the storage facilities provided under this project.

The terms of reference used for this evaluation were as follows:

. determine whether the project's major premises and assumptions remain valid, modifying and changing them where they do not;

. evaluate the need to revise the objectives and approaches of the various components of the project;

. compare the level of project inputs and outputs as of 31st May 1982 with those projected in the project paper (PP) explaining any discrepancies;

. determine the causes of change in project indicators that have occurred since its inception;

. determine to what extent project outputs need to be revised to make them a more realistic reflection of the current situation and the present rate of input delivery.

An investigating team made up of a grain storage advisor, a grain storage/extension specialist, and an agricultural economist was assembled by USAID for a period of approximately 30 working days to carry out this evaluation.

II. SUMMARY OF RECOMMENDATIONS

A. Warehouse Construction and Design

1. Upgrading of Current Warehouse

- modify ventilation system.
- replace doors
- fill in joints between walls and roof supporting frame.
- improve site and access roads.
- furnish office space and watchman's quarters.
- ensure that contractor's responsibilities are carried out or enlist new contractor to correct warehouse deficiencies (see Annex II).

2. Guidelines for Future Warehouses

- Design warehouses to suit local climate and construction Technologies.
- Encourage use of local materials and labor.
- Install side windows instead of skylights.
- Avoid roof insulation; use aluminium sheeting or asbestos cement roofing;
- Bury roof supporting columns in warehouse walls.
- Construct suitable doors and ventilation system.
- Cast foundations and floor slabs to prevent termites.
- Do not surpass 1,000 MT capacity warehouse size.
- Provide office space and watchman's quarters.
- Withhold final acceptance and payment to contractor until warehouse quality judged acceptable.

III. PROJECT DESCRIPTION

A. Background

Senegal is politically stable, sub-Sahelian country somewhat sensitive to drought and terms of trade movement.

In the early 1970's, the GOS began to participate in foreign owned enterprises and the investment rate declined. Although there was some economic recovery from 1973 to 1977, by the late 70's, low economic growth was being maintained by external borrowing and grants. In 1980, following a bad harvest, the GDP fell 4 percent to its 1977 level. External borrowing in the face of a trade deficit generated a financial crisis, and continued external assistance today remains critical to the economic health of the country.

Senegal has been described as on the borderline between low and middle income African countries, with a GDP per capita in 1979 of 430. This figure is misleading, as 70 percent for Senegalese work in the rural sector at an estimated $40 - $100 per year. The dynamic and bustling capital of Dakar enjoys a relatively high per capita income of over $1000 per year.

Most of the rural population resides in the central and southern parts of the country. It is mainly engaged in growing groundnuts (the principal export), millet (the principal grain consumed in the rural sector) and livestock. Arable land is still available, and there is a great potential for irrigation in the "Fleuve" region of the Senegal River Basin. At present this is the main rural deficit area.

Government policy has aimed to diversify exports (away from the relatively volatile international groundnut market) and to increase domestic production of non-rainfed agriculture for local consumption. A major aim has been to reduce dependence on food imports, particularly rice.

A number of para-public enterprises dealing with marketing, storage, extension, and credit have developed over the years supported to a greater or lesser extent by foreign donors.

B. Training

. Promote in-country training programs (courses and seminars) for executive management, heads of department, and regional coordinators in appropriate administration and grain marketing techniques.

. Ensure that the Senegalese grain storage technologist at present undergoing training at the KSU is suitably place when he returns to Senegal in December 1982.

C. Price stabilization and Food Stock Strategy

. Stress the trade aspects of food self-sufficiency strategy and shift the current emphasis from import substitution to diversified export promotion.

. Encourage private traders.

. Provide timely regional marketing (price) data.

. Create an effective system for disseminating market information.

. Increase the expansion rate of physical infrastructure (market roads and the communication system).

. Encourage a diversified system of credit and savings, marketing structure, and distribution institutions.

. Build a better information base.

. Intensify efforts to improve millet quality control and increase usage of standard weights.

. Encourage productive alternative uses for current and anticipated unused or underutilised millet storage.

. Provide the CAA with operational guidelines for good financial management and a mandate for self support.

. Obtain good executive leadership with a strong commitment to the program.

. Cease the practice of giving away millet.

. Encourage improved home storage technology through better extension services.

. Remove fertilizer subsidies.

. Provide CAA autonomy and independent funding.

. Use appropriate (warehouse) design and local or African-made parts and services.

. On the basis of good or bad management of the system over the next few harvests, expand or diminust CAA's security stock level and thus its ability to intervene in the millet market.

Other, more specific recommendations for the CAA are outlined in the main text.

D. Use of AID funding

. Upgrade the existing warehouses.

. Audit the AAPC Al Sand Inc. contract.

. Support (by eliminating financial constraints) the on-going CAA technical training program.

Senegalese industries have, for the most part, been directed toward supplying backward linkages to the agricultural sector such as groundnut milling and cotton textile production. For a recent, in depth description and analysis of Senegal's economic problems and plans the reader should consult USAID Country Development Strategy Reports for 1981 and 1982.)

For many years Senegal has depended on imported rice and wheat to support its urban population. The rural peoples have generally been self sufficient in food and have produced peanuts as a major cash crop. A delicate balance between production and consumption was broken by the 1972/74 drought when imported food grains were required in greater quantities than usual. Storage facilities were purportedly indadequate to handle this extra grain.

Since the drought, it has been the policy of CILSS to encourage donors to finance the establishment of grain reserves in all Sahelian countries. While geographically, Senegal occupies a relatively favorable position, the Government of Senegal feels the country should have a grain reserve of 70,000 MT.

Although Senegal suffered grain crop reductions during the drought, it is far better situated to deal quickly with emergencies of this kind than inland states such as Mali, Niger, and Chad. Firstly, although refugees from Mauritania may pose a problem, it does not have a large, nomadic population of its own, depending traditionally on anumal products for sustenance (such groups are invariably hit hard by drought, and in turning to grain as a food substitute, they increase demand at a time when supplies are short). Secondly, Senegal's major deficit population is urban and concentrated around its major port where is is regularly supplied on a pre-planned basis with imported wheat and rice. (The population of Dakar is less dependent on local millet than other, major, Sahelian towns such as Bamako, Mali). Thirdly, Senegal's main rural deficit area, the "Fleuve", enjoys good communications with port of Dakar and the major centres of production by means of a tarmac road system. Thus, grain supplies can be imported and distributed far more quickly than in most other Sahelian states, which are forced to rely on tenuous road and rail links with the coast and the good will and cooperation of other African states.

Despite Senegal's relative grain security, however, there are several reasons for establishing grain (mainly millet) reserves based on a local

buying program. Four reasons cited by the GOS include: 1) to relieve the adverse effects of crop reductions due to drought and natural causes (discussed above), 2) to provide millet as an alternative to peanuts as a cash crop for farmers, 3) to reduce dependency on grain imports to conserve foreign exchange, and 4) to provide an infrastructure for a millet price stabilization program.

Accordingly, the GOS sought and obtained the cooperation of USAID and other grain donors (principally the FRG) in providing the necessary infrastructure to support such a program.

At the project's inception, the government organization, ONCAD was understood to have a "proven" capability in handling peanut and imported grain marketing. It was thus decided that this organization should handle the millet reserve and price stabilization program.

The project's original objective was to cooperate with other donors in helping ONCAD to establish grain reserve stocks 1) by increasing grain storage capacity and 2) by providing technical training to personnel charged with managing the warehouses and protecting the accumulated stocks. This combined package supported AID's policy, following the drought of linuing suitable training programs with the provision of storage facilities The building program of the project was designed to be flexible to accomodate increases, allowing for a more rapid expansion if high cereal supply should dictate it. ONCAD, in turn, would be expected to effectively administer a grain buying program and to balance annual supplies between surplus and deficit areas within the country.

To encourage what was then considered to be a strong commitment by ONCAD to buy local millet for a security stock and price stabilization program, USAID agreed to provide 30,000 MT of storage capacity over a three year period as well as associated overseas and in-country technical training. This agreement was based on the understanding that the GOS had sufficient financial resources to purchase the grain and manage the program effectively.

The buildings, consisting of seven 2,000 MT and sixteen 1,000 MT warehouses, were to be constructed in three phases of 10,000 MT each. The program would be reviewed annually and linked to GOS grain buying achievement.

Without neglecting rural deficit areas, the project would concentrate warehouse construction on good routes of communication in the main production areas, thus facilitating stock rotation. In the extreme south, where high humidities favor more rapid grain deterioration, wherehouse capacity would be kept to a minimum.

To fill senior technical staff positions in ONCAD, USAID agreed to train three Senegalese at the university level in the U.S. Training would be offered for one student in the field of economics and grain marketing and for two others in grain storage and preservation.

Middle level, in-country, and overseas training would be provided by the Food and Feed Grain Institute of Kansas State University under contract to USAID. ONCAD personnel would continue to attend summer courses at KSU. +

+ (A group of ONCAD personnel attended the 1976 session in Kansas as pre-project training).

An in-country training program would supplement this training. The objective was to establish a nucleus of technically competent personnel who could then train and supervise lower level staff.

An AID financed Grain Storage Advisor would provide technical assistance in Senegal. The advisor, atteched to ONCAD, would be responsible for coordinating and supervising project implementation.

Other inputs promised by USAID included essential equipment, vehicles (including two for mobile training purposes), short-term technical assistance on pricing policy and the marketing of food grains, and supervisory engineering services for the building program.

IV. STATUS OF PROGRAM

A. Overview

Annex VIII-6 presents a detailed timetable of events, including a project implementation outline. Project activities in Senegal did not begin until the GSA arrived in Senegal, about 18 months after the project agreement was signed by the GOS.

The GSA participated in the first project evaluation soon after his arrival. In light of Government grain buying achievements (108,000 MT in 1978/79), USAID decided to accelerate the warehouse building program. The steel framework for the first 10,000 MT of warehouse capacity was by then in the port of Dakar.

The decision to accelerate the warehouse building program resulted in a continuous construction schedule from late 1979 until December 1980. It proved difficult to monitor progress, and quality control suffered. The warehouses still have only been provisionally accepted from the builders, and 10 percent of the construction cost has been withheld pending the completion of essential work.

With the dissolution of ONCAD in October 1980, the grain buying and storage activities of that organization were transferred to the CAA, then a small organization handling only distribution of donated grain and having no experience in the field of grain commercialization.

No grain was purchased in 1979/80, and very little was bought the following season. During this, the last year of the project (1981/82), only about 16,000 MT of a total of 34,000 purchased by the CAA has been sold to the CEE for export to other Sahelian countries. Little stock therefore remains for the security stock program of 70,000 MT.

In the interim period before project activities began in Senegal, two groups of ONCAD trainees had completed summer technical courses at KSU, and three ONCAD technicians had begun university-level training in the U.S.

Despite repeated prodding from the GSA, the KSU was slow to organize its in-country training course, which did not take place in Dakar until some 16 months after his arrival. Training of lower level technicians was undertaken a year later, in the Autumn of 1981.

The GSA completed his contract with USAID one year before the project assistance completion date, soon after the training program finished.

B. Design Criteria and Construction Procedures

Following the report of an evaluation mission (Conseil de l'Entente, May 1976) and the KSU report (Spencer, et al, 1975), AID/Dakar prepared the PP for approval. The PP proposed a pre-engineered, U.S. manufactured warehouse, with concrete block walls and local roofing system as recommended in the reports mentioned above. The funds allocated also included engineering services.

In contrast, engineers from REDSO/Abidjan were in favor of an all-steel structure. Their primary recommendation, however, was that an engineering organization having regular contact with USAID be engaged to prepare plans, specifications, contact documents, and cost estimates. Those specifications and plans were to permit U.S manufacturers of pre-engineered structures to bid.

Contrary to KSU recommendations, project leaders gave a mandate to AAPC to prepare bidding documents based on Al Sand Inc. steel-prefabricated warehouses similar to the ones built in Upper Volta in 1974.

1. Specifications and design criteria

The basic specifications outlined by AAPC were as follows:

Foundation plans assumed a soil bearing capacity of 1,0 kg/cm2 Design loads:

- live loads (roof) 97,6 kg/m2
- wind load 122,1 kg/m2
- dead load (as required)
- earth quake (if required)
- dynamic loads, based on wheat to be stored to a height of 3,5 metres, plus normal surcharge.

Criteria used in the structural design of the building system to be within the U.S. standard manual and codes.

Dimensions (pre-selected)

Roof insulation

Galvanized steel sheeting for roof and walls

Skylights in the roof

Ridge and eaves ventilators

Wall louvres

Sliding doors

Roof extensions and canopy

Project managers made no effort to revise the design criteria to meet specific country needs at this stage.

2. Procedures

The AAPC bidding document was for a first phase of seven warehouses of

a 10,000 MT total capacity and it included technical supervision (by the bidders) in Senegal for a period of three weeks to guide the erection of the first building. Of the four companies that bid on these specifications, Al Sand Inc. was the second lowest bidder. The lowest bidder, according to AAPC report, did not meet the contract specifications, Al Sand Inc. was therefore chosen.

Al Sand Inc.'s plans were presented to the ONCAD Director and Engineers in March 1978. ONCAD/AID and Al Sand Inc.'s representatives agreed to modified the warehouse plans after quotation. The modifications were as follows:

- steel-sheeting walls were replaced by concrete block walls
- eaves ventilators were eliminated
- more translucent roofing panels were added
- number of ridge ventilators was increased

New plans were then made available to AID/ONCAD for their approval and those of the insurance controller (VERITAS).

Although construction had been planned to take place in three phases of 10,000 MT capacity over a three-year period, because of the apparent acceleration of the ONCAD buying program, it was agreed to proceed with a single phase of 30,000 MT.

Building started in September 1979. The contractors experienced difficulties with the assembly of the structure, mainly because of lack of experience and inadequate assistance from Al Sand Inc.'s respentative.

The warehouses were provisonally handed over between January and May 1981, and the contractors were asked to complete essential work within a two-month period. They did not proceed and no action was taken by the CAA or AID to enforce compliance. Ten percent of their contract was withheld by the CAA pending completion of these works.

C. Training of Technical Personnel

1. Long-term training (M.S. and B.S.) in the USA

This training involved one student in each of the following disciplines:

- Agricultural Economics (M. Sidibe);
- Grain Storage Technology (M. N'Dir), and
- Civil Engineering (A.S. Khouma)

Two students have so far returned to Senegal after successfully completing their courses. One of these, the economist, has since transfered to his chosen discipline. The store management trainee, at present at KSU, is due to return in December 1982.

2. Short-term training in the USA (2 months)

Eighteen ONCAD/CAA technicians and one from the ITA participated in three summer short courses at the KSU in 1976, 1978, and 1981. These courses were held in collaboration with the USDA, who organized (with USAID) one week of orientation in Washington and a further week of visits to grain storage and handling organizations prior to the six-week formal course in Kansas.

The curriculum dealt with the basics of grain storage and marketing, with special emphasis either on marketing or on the technical aspects of grain storage. It was decided that the Senegalese students should take the latter option.

Simultaneous translation was provided in French and Spanish, as students from several developing countries participated in each course. (In 1978, 14 countries sent 42 trainees).

A good range of visual aids was used including slides, films, tape recorded commentaries, posters, acetates, and flip charts.

There was no examination at the end of the course to assess the degree of retention of information, but each student was asked to complete a course criticism questionnaire.

Five loose-leaf volumes of text were provided to support the course, as well as several technical books. The texts were a mixture of published papers/reports and detailed subject headings with spaces left for note taking. The texts were provided in three languages (English, French and Spanish), sometimes on separate pages but often (as in the case of brief notesà on the same page. Four volumes covered the grain storage aspects of the course (Fundamentals; Inspection and grading; Handling, conditioning and storage, Sanitation) and one was devoted to Marketing operations and management.

The course was residential, but interpreters were not generally available in the evening.

After the dissolution of ONCAD, ten of the trainees who followed these courses were placed in SONAR.

3. KSU "Train the Trainers" short course in Dakar

It was proposed in the PP that four Senegalese should receive two month's instruction and that this team should then be responsible for further in-country training of ONCAD personnel at lower technical levels.

In fact, the course was eventually held for 14 ONCAD trainees (plus one from the ITA), and it was of six-week duration. Two of the students had already undertaken the short-term training course in Kansas. Training was carried out at the CPTC on the outskirts of Dakar by three lecturers from the KSU and the in-country GSA. The disciplines were divided as follows:

Biology, pest control and pesticides	KSU
Warehouse management/sanitation	KSU
Training methods	KSU
Structures	GSA

The course stressed training skills such as the preparation and us of audio-visual aids and demonstration techniques. There was a practical demonstration after each lecture, and plenty of time was devoted to discussion. Written tests were given weekly and later used by instructors to prepare a general performance assessment.

Course outlines, manuals, and training aids were planned for a series of in-country training sessions to be conducted for:

54	ONCAD	Regional Fumigators
47	"	Reserve Warehouse Managers
6	"	Central Warehouse Managers
500-600	"	Secco Warehouse Managers

The written text provided with the course was essentially a course outline enclosed in a single ring binder. Each trainee also received a copy of the USDA handbook on stored grain insects.

4. Short-term training of lower level CAA technicians

It was suggested in the PP that courses of one month's duration were suitable for warehouse managers and pest control agents. Courses held by three of the CAA technical officers who had followed the KSU Course were considerably shorter, however.

Before the training began, some time was devoted to the preparation of photographic slides, acetates for the overhead projector, and course training notes under the direction of the GSA.

The technicians trained were as follows:

20 pest control agents:	One, 6-day course
40 storekeepers:	Two, 6-day courses
18 commercial agents:	One, 5-day course which involved one day of technical instruction.

The commercial agents and storekeepers also received instruction in stock accounting and documentation from the relevant departments of the CAA. The courses were presented in French and local languages as necessary at the Crop Protection Training Center (CPTC). The practical aspects of the work were particularly emphasized. A test was held at the end of each course to assess the degree of retention of technical information.

The AO and USAID advisors acted as collaborators during this training program, but were not involved in the presentation of technical material. The USAID advisor assumed administrative responsibility and assembled the necessary equipment, stationery, and supplies at the CPTC. Each trainee was given a hand magnifier for his own use after the course. All costs were met by USAID.

A brief course outline (in a loose-leaf file) was given to the participants at the beginning of each course. Each trainee also received an audio-visual revision system financed by the German aid programme.

Immediately after the course, ONCAD wad disbanded and the trainees joined either the CAA or SONAR. Those joining SONAR took with them the responsibility of training some of the pest control agents and storekeepers and all of the Secco managers. As SONAR is not concerned with the handling of grain, the training program of this organization was not evaluated.

V. PROJECT EVALUATION

A. Assessment of USAID Warehouses

A major objective of this program was to build 23 warehouses of a total capacity of 30,000 MT in different areas of the country. While this objective was accomplished, it could have been achieved using a more appropriate technology and better procedures. From the project files, it appears that AID did not profit from previous experience and did not take into consideration some of the recommendations offered by outside groups.

In the following text, the impact of design criteria, building features, construction procedures, and management systems used by USAID for this project is discussed.

1. Technical deficiencies

As descrived in Annex VIII-7, certain design criteria and features are desirable for warehouses constructed in tropical climates. Unfortunately, some of these were ignored during the planning of this project.

- Design loads

The design for wind and live loads on the roof were too high on inappropriately applied. The plans of the foundations from Al Sand Inc. had to be revised to take into account the up-lift forces due to wind effect.

Dimensions and shape of the building

The shape of the building influences construction costs and the quantity of materials used. Square buildings have the shortest perimeter for a given floor area, but the cost of roof trusses may be higher. A building 1 1/2 to 2 times longer than its width is better proportioned for management purposes and has a reasonable perimeter for a given floor area, (see VIII-7).

On this particular project, warehouse width was based on the 2,000 MT building (21 X 46 m) and the 1,000 MT warehouse was therefore half as long. The use of two different spans would have been more appropriate or should have based on the 1 000 MT structure.

Type of Structure

The portal frame type of structure may be appropriate for grain warehouses in general, but for Senegalese conditions and the capacity required, the column and conventional truss type building would have made better use of the structural steel. Building the walls outside the roof supporting framework may be common practice in most frame-type buildings, but in food warehouses effective storage space is reduced by the intruding pillars; they also collect dirt and pest residues (Photo N° 1).

Roofing materials

It was thought that the use of galvanized steel sheeting for the roof necessitated the introduction of insulation (See VIII-13 photo N° 2) to prevent heat transfer to the inside of the building. The use of corrugated

aluminium or asbestos cement sheeting would reduce heat transfer (particularly the latter) although asbestos sheeting has the disadvantage of becoming brittle with age. Generally speaking, the cost of insulation outweighs its advantages, and provided that sufficient space is left between the top of the stack and the roof, grain quality is unlikely to suffer excessively.

. Ventilation

The prefabricated ventilation system has been heavily criticized. The chain mechanism sticks with time and often breaks, leaving the roof-crest open and susceptible to rain penetration. Another shortfall is that ventilators do not close tightly (see VIII-13, photo Nos. 3-4). Maintenance and repair of the system is difficult and calls for skilled personnel with appropriate ladders.

This ventilation system was previously used in Niger and Upper Volta and proved to be unsatisfactory, except in one completely prefabricated warehouse, erected by an American team. A report (Conseil de l'Entente, 1976) mentioned that the ventilator controls were working well a few months after erection, but we have no information on their long-term performance.

In addition, the ventilation system itself is incomplete. The ridge, which serves as the air exit should have been coupled with eave level openings for air intake. Since air does not enter the building unless the doors are open, the ventilators are ineffective when the doors are closed. The ventilators are ineffective when the doors are closed. The ventilation

system is thus considered inadequate, although as the present doors are badly fitting, some air exchange will take place.

Doors

No specification was given for rodent proofing, which is a very important consideration in Senegal. Rodents are known to cause significant post-harvest grain losses in warehouses (Hayward; personal communication). On the technical side, the door structure is light in relation to size and the doors are excessively large. The channel at the bottom of the door is subject to dirt and dust accumulation and is a potential water-collecting hazard (see photo No. 5).

The doors do not close tightly and thus give poor protection against thieves as well as rodents (see photo No. 6).

No system was proposed to protect the doors from backing trucks. Even in warehouses that had not been widely used, we noted two doors damaged in this way (see photo No. 7).

Maintenance

Some components are considered to be sources of high maintenance costs. The translucent panels in the roof will have a limited life under strong sunlight, and will need replacement after five of six years.

The type of joint between the slab and the foundations has allowed termites to penetrate which will increase pest control costs (see photo No. 1).

The ventilation system, if not modified, will also incur high maintenance costs if unskilled personnel control it. The doors are weak and easily damaged.

Cost

Use of a large amount of structural steel, a sophisticated ventilation system, and insulation has hihed up building costs. Furthermore, the high off-shore costs (using a large proportion of building components from the U.S.) cannot be said to contribute much to the Senegalese economy.

2. Management

Inadequate planning and management from the start of the project is certainly responsible for many of the deficiencies mentioned above. As stated previously, project managers did not take into consideration recommendations from previous studies, outside groups, and project papers. For reasons that could not be clearly identified from the project files, AID officers initially chose a prefabricated warehouse with steel sheeting walls, sophisticated ventilation, and large sliding doors. No real effort was made to improve the design of the building, although certain modifications were made subsequently.

The contract with Al Sand Inc. was approved by USAID in February 1978 for the supplying of seven all-steel prefabricated warehouses. Plans were presented to ONCAD in March 1978 for approval. Since the walls were not as specified in the PP, ONXAD asked for them to be changed and also

requested that the ventilation and lighting (translucent panels) systems be modified. Unfortunately, these alterations to the plans were made without taking into account the technical implications. The building program was also modified from three phases of 10 000 MT over three years to a single phase of 30 000 MT total capacity. These alterations caused delays in final approval of the plans and the start of construction.

For the construction phase, LBII consulting engineers, were hired to prepare contract documents, site plans (VRD), and to select the contractors. LBII was also engaged to assist ONCAD with construction supervision. Unfortunately, the LBII mandate was not wide enough in scope to exert adequate supervision over the contractors, and ONCAD did not wield its authority sufficiently to exercise such control. The technical assistance from Al Sand Inc. for the erection of the first building was recognized as inadequate and inefficient, but no complaint was made in correspondence either between USAID and ONCAD, or between USAID and AAPC.

At the end of the construction period (May, 1981), the warehouses were provisionally handed over to the CAA and a list of deficiencies was given to the contractors (see Annex VIII-11-. No action was taken, and some warehouses were left in such a poor condition that subsequent deterioration has occurred (see photo No. 8).

Lack of good management and control during construction led to misunderstandings between the contractors and USAID. Construction delays resulted, poor quality materials were often used, and slipshod work was overlooked (see photo Nos. 9-10).

B. Assessment of Training Programs

1. Long-term training in the U.S.

Technical relevance

The relevance of this training can only be assessed at present for the engineer. He has been well placed within the CAA and has been charged with responsibilities appropriate to his qualifications. However, he studied civil engineering, while the team feels that an agricultural engineering course would have been more appropriate to the needs of a produce handling organization. It is appreciated, however, that the courses available to him were limited because of his lack of basic qualifications.

Job relevance

The engineer is reasonably content with his job but he is somewhat under-utilized. He could spend less time on routine paperwork and more on site inspection (particularly in relation to the current cooperative building program). There appear to be financial constraints on his travel program that should not be difficult to remove once clearly defined.

The Agricultural Marketing Economist now works for the Marine authority and is thus a loss to the agricultural sector especially in view of the poor performance exhibited in this field so far by the CAA.

The trainee studying grain storage technology at the KSU has an important role to play when he return to Senegal at the end of this year. His effective placement is discussed in the recommendations.

2. Short-term training in the USA

Pre-course preparations

Student C.V.'s were requested in advance in order (it was said) to make the training more relevant and to pitch the presentation at the correct level for maximum retention. A detailed country information sheet on grain production and handling was also forwarded to USAID Senegal for completion by participants before they left for the U.S.

Technical relevance and content

Students mentioned that there was a strong emphasis on marketing, event though they presumably took the technical grain storage option as previously planned. Unfortunately, the Senegalese trainees were unable to profit from this material as they were of insufficient standing in ONCAD to influence policy.

Similarly, because of the dominance of bulk storage installations and advanced grain handling techniques in the USA, there was a bias in this direction that was not generally applicable to the needs of Senegal. Similarly, in the discussion on grain grading and quality standards, although some effort was made to relate U.S. standards to the needs of developing countries, the Senegalese students felt that this effort was not carried far enough, and that undue emphasis was given to the sophisticated standards of an advanced, exporting economy. The section on sanitation was essentially practical and immediately relevant to the needs of the Senegalese

technicians. The insect identification and pesticide aspects were also well received.

With students of several nationalities participating in the same course (10 countries were represented in 1976; only 4 were from the African Continent), it is obviously difficult to achieve a program of total relevance to all students. Much must depend on the ability of the student to adapt the information he or she receives to his or her own working environment. The trainees interviewed felt that insufficient attention was paid to this aspect by the course professors and that exercises involving student participation might have helped. The country papers prepared and presented by the participants could have been useful in this respect, but professors did not appear to give them this particular emphasis. Students complained that these presentations took up too much time and this did not rate them very highly.

Documentation

Much of the text in the manuals provided can only be effectively used later for reference and revision if the student concerned has taken notes in the spaces provided under the subject heading. It appears that often this measure was not taken, and according to the students, no particular instructions were given by the professors on this point. We found the text confusing when the three languages were presented on the same page. This practice also effectively prevents the student from discarding the language texts he does not require.

After course re-orientation

As far as we are aware, no particular steps were taken to help returning students apply their newly acquired knowledge in their own working environments. With an overseas course of this kind, some form of reorientation is important. Unfortunately, the GSA was not appointed until 1979 and thus could not assist trainees from the 1976 and 1978 courses. It is not certain what action was taken following the 1981 course immediately preceeding the in-country training courses for lower level technicians.

Some trainees, on their return, requested items of equipment they had seen used in the U.S. Many of these requests were probably unrealistic and they were ignored. Post-course reorientation could have helped to prevent disappointment by ensuring that sensible requests would receive the attention they deserved.

Technical evaluation

We can find no record of many post-course technical evaluation of trainees and particularly of how the training affected job performance.

General comments

A major benefit usually derived from overseas training is that of contact between persons of different nationalities and cultures with similar technical interests. The residential nature of this course could have allowed for valuable exchanges outside working hours. The general lack of

a common language was naturally inhibiting, but we understand that the course teachers made commendable attempts to bring students together.

At least one of the Senegalese students trained in Kansas failed to understand some of the subject matter taught. Because the courses were too large to permit individual coaching, careful selection of candiates is of considerable importance.

3. KSU "Train the Trainers" short course in Dakar

Pre-course preparation

The USAID resident GSA provided the background information necessary to ensure that the material taught was relevant to the needs of the students. He was also responsible for ensuring adequate preparation of the training room and equipment provided by the CPTC and for arranging visits to grain storage installations. As a consequence, good use was made of the facilities available and the KSU lecturers were able to arrive immediately before the course commenced. Strong in-country coordination was a positive aspect of this training input.

Technical relevance and content

This training course benefited particularly from the supporting visits arranged to local grain storage facilities (including CAA warehouses). Training was carried out in a familiar working environment, demonstrating methodologies relevant to the immediate needs of the trainees. Of particular value was the instruction in training techniques, a subject not

covered in previous training courses attended by the participants.

Documentation

The single, loose-leaf volume provided both a framework for the course and a suitable text for later reference. However, it could be improved by supplementary personal notes (particularly on techniques and hints).

Post-course orientation

Following the course, the GSA assisted several of the students in preparing training materials for use in subsequent technical courses to be held for staff at lower levels. That such training was in fact stimulated and carried out under the guidance of the GSA and his AO colleague was an important, indeed essential, outcome of the training program.

General comments

The decision to train 15 technicians instead of four (as previously recommended) was wisely taken. We consider that this approach made better use of the visiting experts and did not detract from the value of the course. The maximum number on any future courses of this kind should be 20.

It is particularly unfortunate that much of the project equipment demonstrated to the students during the course was not available for immediate distribution afterwards. We consider this setback to be detrimental to the training program. Some retraining may be necessary when it is eventually made available.

The simultaneous translation provided by the KSU in Senegal was considered by one student who had participated in both courses to be of a higher standard that that provided in Kansas, particularly as regards technical vocabulary.

4. Short-term training of lower level CAA technicians

Pre-course preparation

Two months before training, the C.V.'s of all prospective participants were scrutinized to ascertain the appropriate level of presentation and to decide on the content of the written material provided. The training room made available in the CPTC was also organized well in advance and adequate visual aids were assembled. We consider these preparations appropriate.

Technical relevance and content

The approach to these courses was extremely practical and especially designed to suit the group being trained. The trainers had a good understanding of the essentials to be communicated, a most important feature in training people with a minimum of acedemic qualifications. It would appear that unnecessary detail was successfully eliminated and a good balance struck between theory and practice.

Documentation

Brief lecture outlines were supplemented with drawings of the major insect pests and hints on good stacking (taken from a storage manual prepared previously by the AO storage advisor when he was in Niger). We would

have considered these notes inadequate for future reference, but since the AO advisor is preparing a more detailed technical manual, they are sufficient as an interim measure.

Effectiveness of presentation

The AO storage advisor praised the efforts of the three teachers, singling out their enthusiastic and thorough approach. From the technical assessment of trainees carried out by this mission, it seems that the information presented has been well retained and reasonably effectively applied by the trainees, given their limited opportunities to practice their skills. All the trainees questioned recalled the courses well and easily identified aspects that they found to be of particular value. Our assessment was undertaken about six months after the training program was completed, which we consider a suitable length of time.

Pest control demonstration

Thiès made a special request for this demonstration so that actual performance could be measured in this important field. Regrettably, the actions taken by the supervisor (the Quality Control Agent at Thiès) were disappointing in that he had failed to plan ahead and was indecisive and unsure of himself during the demonstration. He had taken both KSU short courses and it was disturbing to not several basic misconceptions concerning the practicalities of pest control. We do not feel that his performance is likely to be typical, but this incident serves to emphasize the

need for effective supervision at all levels to ensure that pesticides are applied effectively and safety standards maintained.

Length of training

Although the PP recommended one-month courses for the training of warehouse managers and pest control agents, we find this duration excessive for personnel at these levels and concur with the decision to hold courses lasting one week each, although, as stated above, effective supervision must be maintained in the future.

General comment

We not that the trainers were paid a daily fee for undertaking lecturing duties even though they lectured during normal office hours. We feel this practice has created an unfortunate precedent and should be discouraged in the future.

5. Training and crop protection proposals by the CAA and ITA

The technical branch of the CAA, with the support and assistance of the AO storage advisor, plans to hold a training course later this year for Quality Control Agents. These will be new recruits appointed to fill vacancies left by the promotion of existing personnel to more senior positions. (In view of the comments made above, we feel that promotion should not be automatic but based on tested performance). Plans are also underway to train some 200 cooperative personnel in good storage practices; participants

will be directly concerned with millet buying on behalf of the CAA.

As part of a nationwide Trogoderma eradication campaign initiated by the AO grain storage advisor, studies are underway in the CPSP rice warehouses to establish the extent of the problem and to investigate possible control procedures. These studies may involve either CAA pest control personnel or private sector companies under adequate supervision. The CPSP has no technical personnel of its own; training of their storekeepers may be undertaken by the CAA.

A study of infestation problems facing private sector traders is also proposed. A liaison is being established with the PV, the organization having authority to enter the premises of private traders, to ensure that reasonable conditions of hygiene are maintained. If traders are to be used by the CAA as a means of fulfilling its millet purchasing program, the effective control of pests in this sector will be of considerable importance.

We find that the technical training and development program being undertaken by the CAA with the support of the AO team essentially agrees with our conclusions and recommendations. We would therefore like to add our support to the concept of an integrated pest control program under the supervision of the CAA technical department.

It has been noted, however, that certain budgetary deficiencies, particularly involving transportation and the provision of pesticides, may hamper developmental operations.

Lacking funds, the ITA has no commitments in the storage training field at present and has no plans for the future.

C. Assessment of USAID Grain Storage Advisor

Although, from all CAA reports, the USAID Grain Storage Advisor (GSA) was well-liked, interested in his work, and anxious to perform his job well, his effectiveness in doing so was hampered both by poor timing and support and a lack of experience in certain matters. As indicated earlier (see section IV, Project Status), the KSU was inexcusably slow in fulfilling its responsibility to provide in-country training upon which the GSA's work depended. In addition, lack of necessary equipment during his first year of assignment prevented him from stemming the rapid deterioration of large stores of grain due to deterioration from Trogroderma attack--another circumstance that must have caused him a great deal of frustration.

It also appears that the GSA's experience, although substantial, did not immediately suit the position for which he was chosen. Factors such as initial lack of facility with French (which later improved significantly), inexperience with Africa, and lack of knowledge of AID procedures set him up for a poor relationship with USAID's Agricultural Development Office, the insuitability of his engineering and management capabilities also contributed to his failure to play a positive role in addressing project deficiencies.

D. Economic Evaluation

The evaluation team found that the USAID Grain Storage Project has accrued zero economic benefits to the Senegalese economy to date. The team's findings and explanations for the lack of economic project benefits follow.

1. Design specifications inappropriate to local conditions led to unnecessarily high construction costs. For example, large, expensive warehouse doors that would have been suitable for sophisticated U.S. equipment and trucks were not cost-effective for the Senegal warehouses.

2. Use of U.S. rather than locally-made materials of comparable quality worked against stimulating Senegal's industrial and commercial sectors. The team found that warehouses built by a German firm in Senegal and constructed solely from locally-purchased products were less costly and of higher quality than the USAID warehouses, and served to stimulating the local economy.

3. Collapse of ONCAD, the government institution charged with managing the millet stockage and marketing program. ONCAD was increasingly unable either to provide timely inputs or to market cereals profitably. Under ONCAD direction, the quality of seed stocks has deteriorated seriously in recent years... The result of this large institutional superstructure covering all agricultural enterprise, from research through marketing, productivity, diversificati or stability. The costs of the system, however,

have been susbtantial, even in terms of mismanaged credit and seed stocks alone. (USAID Senegal - Country Development Strategy FY 83, January 1981, p. 11). In 1980, following reports of graft, corruption, and general inefficiency, the agency disbanded.

4. Ineffectiveness of the CAA in taking over the millet marketing and stockage program. It appears that the CAA's commissar was neither equiped nor motivated to handle the program. Inadequate funding and poor management also cut into the CAA's effectiveness.

Through the CAA, the Senegalese government sent misleading marketing signals to millet farmers, purchased millet in a manner that exacerbated price instability, and failed to build a reserve stock of grain. The CAA also failed to purchase all millet as it had originally promised. Only about half of the 70,000 MT millet purchases promised had been transcated as of May, 1982. Of this amount, only about 16,000 MT were purchased in the period immediately following the 1981/1982 millet harvest, when prices were at their usual low. Subsequent and current purchases have created, in some cases, increased demand in localities with relatively scarce supply, such as the Fleuve Region. Moreover, rather than going towards reserve stock, all the millet purchased appears to be headed toward Niger and Chad.

As a result of the CAA's actions, the 1981/1982 millet harvest may have led to a costly overproduction of millet at the expense of time that

could have been spent cultivating other lucrative crops such as groundnuts and rice.

Specific factors in the management of the millet marketing and stockage program by ONCAD and the CAA that adversely affected the program include the following:

- Use of political influence at the expense of market prices to distribute millet;
- Failure to follow sound financial management practices;
- No mandate for self-sufficiency;
- Weak executive leadership;
- Minimal commitment to the whole millet program;
- Underdeveloped private sector to complement the central government's efforts at millet price stabilization and stockage;
- Minimal timely regional marketing data (i.e. periodic regional millet price data);
- Dearth of an information base or Senegalese consumption, savings, investment, and production patterns by region;
- Sparse and undiversified system of credit and marketing; and
- Inadequate transportation and communication systems.

5. Project Costs

Construction costs of the project to date total over $3.5 million. Recurent operating and administrative costs may now exceed $1 million annually. Moreover, because it lacks a mandate for self-sufficiency, the government's revenue from millet sales is substantially lower than the cost of purchasing millet from farmers. The government's millet distribution system, through which grain is either given away or sold substantially below cost, exacerbates this deficit.

Below is a series of rough cost estimates (in dollars) of the program per MT of grain in the late 1970's.

- Storage costs (buildings, insurance, interest, repairs, maintenance and depreciation) $14.40;
- Operating costs (insurance on grain, interest on grain, treatment fumigation, transport and handling, personel, storage losses, and other) $19.63;
- Interest on grain $11.72;
- Administrative costs of ONCAD (now CAA) $5.76

The total cost for one MT was 11,074 CFA, which, at the exchange rate of the time of the estimate (215 CFA/$1), was equivalent to $51.5., or $515,100 per 10,000 MT of grain. These estimates may have been underestimated at the time they were calculated. They relied heavily on information on groundnuts, which was more complete than data on millet, which may be misleading, as groundnuts are easier to store and

thus less expensive to maintain.

To prevent incorrect price signals from reaching farmers, these costs should be reflected in the price of millet. Often they are not, as in May 1979, when millet was sold in Dakar for around 40 CFA per kg., i.e. more than 11 CFA below ONCAD storehouse cost and thus without the margins of intermediaries (Hirsch, 1979, p.32).

These costs are substantially higher now after several years of substantial inflation. The dollar value of inflation, however, is at least in part offset by an improved position of the U.S. dollar vis-à-vis the CFA. In any case, the costs of maintaining both the warehouse and the millet stockage and marketing both the warehouses and the millet stockage and marketing program have been substantial relative to the weak Senegalese economy.

6. Project Benefits

The project may have stimulated indirect benefits such as the knowledge gained in the purchasing and marketing of millet and in grain storage and warehouse construction. The induced benefits of the project resulting from employment may also be assessed. These kinds of indirect benefits could stimulate a multiplier effect on a depressed economy. However, the team considered that these possible indirect benefits to Senegal were offset by the investment of scarce funds with negative returns where they could have been invested elsewhere at a

positive rate of return. It also concluded that although the project provided good jobs for the urban and semi-urban middle class -those involved in construction and training as well as local business interests and U.S. producers and contractors- it did not benefit the poor population of Senegal, its intended target group.

While the evaluation team did not construct an input-output model to estimate indirect benefits of the project on Senegalese output and employment, it esteemed that the negative to near zero benefits of the millet marketing and storage program (when funds supporting the CAA and earlier ONCAD's millet program might have been directed more productively toward other projects with favorable benefit/cost ratio) has probably contributed to the downward per capita income trends of the poor in Senegal.

VI. CONCLUSIONS

A. Warehouses

The use of inappropriate design criteria and large amounts of especially imported steel has led to higher building and maintenance costs. The inadequate management of these procedures is considered to be a major cause of the deficiencies described above. Nevertheless, the warehouses can meet project objectives if some improvements are carried out. Recommendations for upgrading the warehouses are described in section VII, together with procedures and design criteria for future projects.

B. Training

1. The KSU summer courses held in Kansas were not particularly appropriate for the Senegalese trainees selected. The training placed too much emphasis on bulk storage and marketing. Instruction in marketing techniques would have been more suitable for senior personnel able to influence matters of policy.
2. The KSU "Train the Trainers" course in Senegal effectively achieved (in the CAA at least) the major objective of stimulating technically sound, appropriate training at the lower levels.
3. The CAA has exhibited a responsible approach to its training obligations, and the number of storekeepers and pest control agents attending courses is well in line with project goals.
4. The CPTC proved to be an excellent location for the in-country courses because of the appropriate facilities and support provided.
5. Delays in clearing some of the project equipment through customs have been detrimental to the training program and subsequent performance.
6. The USAID Grain Storage Advisor contributed significantly to the success of the in-country training programs.
7. In order to maintain standards in the CAA, the regular supervision and testing of technical personnel at all levels will be essential in the future.

8. The technical branch of the CAA, with the support of the AO advisor, is well able to provide future technical training, provided that budgetary considerations are not limiting.

9. We have noted a lack of contact between the administrative and technical divisions, which is unfortunate, particularly when suggestions made for technical improvement are ignored by senior management.

C. Grain Storage Advisor

A more thorough analysis of the candidate's qualifications combined with a more accurate forecasting of project needs might have led AID to select a more well-suited candidate.

D. Grain Storage Program

The collapse of ONCAD and the inability of its successor, the CAA, to efficiently purchase, store, manage, and market millet in Senegal has been the major reason for the cost ineffectiveness of the project in general and of the millet program in particular. The near zero benefit to cost ratio indicates that the project has not benefited either the economy of Senegal or its urban and rural poor, who would stand to gain the most from a successful price stabilization and grain storage program.

Unless a major change in the commitment, organizational structure, funding, and management of the grain storage program occurs soon, the benefit stream appropriately discounted will not offset the substantial cost stream.

In light of Senegalese past performance and the failures of similar programs in other developing countries, the team is not optimistic about future project success or benefits. A well-managed drought relief effort might draw project benefits in the future by making good use of the project warehouses, but in the absence of a recent severe drought, the team is unable to judge the effectiveness of these warehouses in aiding drought relief efforts.

Despite the dismal performance of the millet program to date, purchasing activity began to take place in May. If the program could begin to function along the lines of a quasi-public enterprise, it could justify the substantial costs, outlined earlier, of maintaining the bureaucracy. It would then be best to eliminate the central government's program altogether and concentrate completely on providing information and infrastructure to the other participants of the millet marketing and stockage economy along the lines outlined in the recommendations listed in section VII.

VII. RECOMMENDATIONS

A. Upgrading the USAID warehouses

The recommendations below are listed in order of priority, and it is suggested that they be carried out before the end of the year.

1. Ventilation improvement

The ridge ventilators should be removed completely and he opening closed with a standard framed ridge cap (Stran Steel Plan Np. 32 18 (T) Annex 10). New ventilation should be provided at eaves level.

The opening should be 1m wide and 0.50m high and positioned as shown on SCH No. 1 and 2, Annex 10. If controllable ventilation is desired, each ventilator opening should be covered by a flap door, which can be shut firmly (SCH No. 3, Annex 10).

2. Door modifications

The existing sliding doors should be taken off. Hinged type doors should be made and installed in their place. The inside part of the lintel should be filled with concrete or mortar to prevent dust accumulation. The new doors can be smaller if desired. Large hinged doors must be strongly hung. A concrete structure should also be put in front of the doors to protect them from backing trucks (SCH No. 4-5-6, Annex 10). It is also recommended that none of the 2 000 MT warehouse doors be blocked. At this stage, the cost difference between a door and a masonry wall is not significant enough to remove that versatility. As we mentioned in the economic section of this report, the warehouse may be rented to private traders. Each store, could then be compartmentalized into six sections of about 250 MT capacity each.

3. Joints between masonry walls and frame

As was discussed last year between the contractors and the consultant (Annex 12), we recommend that in all warehouses bitumen be used to fill up the gap between the masonry wall and the steel frame to prevent accumulation of dust and pest residus (Annex 13, photo No. 11).

4. Provisional hand over

As shown in Annex 11, some work remains to be carried out by the contractor. If this work is not completed promptly, we recommend that AID/CAA hire a different contractor. In this event, the contractor's representative, accompanied by a responsible person from AID/CAA and the LBII engineer, should visit each warehouse to list all the deficiencies. We also suggest that the contractor work on one warehouse at a time, seeking final approval before proceeding to the next one. The 10 percent held over is considered to be sufficient to cover the repairs mentioned in the provisional acceptance forms.

5. Site improvement

During our evaluation, we noticed that around the warehouse corners (close to the foundations), wind erosion was causing depressions which, during the rainy season, might accumulate water. It is thus recommended that all the area around each warehouse be covered with laterite to a minimum width of eight feet, with an outward slope from the foundations. All access roads should also be covered with laterite.

6. Office and watchman housing

Each warehouse site should include an office for the storekeeper and a residence for the watchman and his family. A separate storage area for equipment, pallets, and empty sacks is also recommended.

The watchman's house should be located away from the warehouse but sited to permit him a good view of doors and site access points (Drawing SCH No. 7, Annex 10).

B. Procedures and Design Criteria for Future Projects

1. Building procedures

We suggest that an engineering consultant be hired for a feasibility study and preliminary design of the project. Following approval of the plans, he should prepare the final design, bidding documents, analysis of quotation, and, finally, supervise the construction.

The consultant must have some experience in construction design for tropical countries. For particular aspects like grain storage, an agricultural engineer should assist or be a member of the consulting team. To ensure construction management and control, it is suggested that an experienced project manager be hired for the duration of the project if the same engineering consultant is not used.

2. Appropriate design criteria and building features

Optimum design criteria differ from one country to another

and often within different areas of a country. For designers, these criteria are the keys to appropriate technology. The following is a list of recommendations for future warehouses in Senegal:

. Choose materials according to their availability in the country and the competence of the contractor for the particular technology.

. Use local materials and labor whenever possible if quality is competitive with foreign materials.

. Use side windows instead of skylights. (Glass bricks are probably ideal).

. Avoid roof insulation. We suggest using aliminium sheeting or asbestos cement roofing, although the latter, once damaged, is difficult to repair.

. Bury roof supporting columns in the warehouse walls to minimize dust accumulation and assist pest control. Finish floors with an appropriately smooth surface treatment to facilitate warehouse hygine.

. Construct doors and ventilation system as described in section A.

. Cost foundations and floor slab joints so as to minimize termite entry (SCH No. 8, Annex 10).

. Do not exceed a warehouse size of 1 000 MT. If a higher capacity is needed in the area, it should be achieved by building several units of 1 000 MT each.

Include an office and a watchman's house in the storage complex.

See Annex 7 for more guidelines on design specifications and building features.

C. Improving Training Programs

1. Executive management as a primary target group

Promote in-country training programs (courses and seminars) for executive management, heads of departments, and regional coordinators in appropriate administration and grain marketing techniques.

Total commitment by the CAA to an effective marketing program is an essential prerequisite for executive training. This goal does not seem attainable under the present Commissar, whose experience and interest lie in different fields. Training objectives should be to:

- create simple administrative and accounting systems to promote the effective and speedy interchange of information betzeen headquarters and the regions.

- encourage the decentralization of management to promote a more effective and timely intervention in local marketing channels.

- bring together the technical and administrative branches of the CAA to heighten awareness of each others' problems and needs. Administrative standing orders must take into account desirable technical goals.

All training should be organized in close cooperation with the AO food security team, and in particular, with their accountant, who has

already made positive recommendations in his own field.

2. Supervision of trained technical personnel

Ensure that the Senegalese grain storage technologist at present undergoing training at the KSU is suitably placed when he returns to Senegal in December 1982.

Since supervision is essential to maintaining standards at all levels of technical activity, this trainee might best serve in a supervisory role as technical staff inspector on his return. USAID should ensure that he be granted the necessary authority, financial support, transport, and equipment to carry out his duties effectively. The trainee should work in close cooperation with the AO team. When this project terminates, he should be able to continue to play an important role in initiating and planning suitable training programs and in identifying areas of possible future assistance.

D. Price Stabilization and Flood Stock Strategy

1. Overview

Senegalese farmers generally work a small plot of land and engage in diversified farming. They are not traditional farmers, in that they do not generally consume just what they produce. Groundnuts, the country's major cash crop, has been sold internationally for a half a century. Increasingly, fresh vegetables offer an additional source of cash for an expanding urban population. Millet, the major grain consumed

in rural areas, has become an important Senegalese commercial crop sold in markets from Dakar to regional market towns and small villages. The expansion of millet as a cash crop has been hindered, however, by an ineffective government millet program and the discouragement of alternative private marketing systems.

The success or failure of millet commercialization depends not only on rising productivity, but on the commercial and social institutions in Senegal. Evidence suggests that if the Senegalese farmer has a reasonable and reliable access to marketing facilities, market information, credit, fertilizer, seeds, and other inputs, and if he perceives that his family is the primary beneficiary of any improvements, he will respond to economic incentives in millet production. For some time, Senegalese farmers have been practicing diversified farming as a means of minimizing the impact of crop failure, providing a secure income, and reducing the labor constraint during peak planting and harvesting seasons.

To date, Senegal's government operated millet commercialization program may have even had a negative effect on the economy in discouraging private traders and sending out incorrect marketing signals. Senegalese farmers have responded rationally by not taking the government's program seriously and by not increasing substantially millet stocks for commercialization.

The basic physical and social infrastructure for successful millet commercialization exists. This potential can only be realized if the central government takes important steps to improve the efficiency of the millet marketing system. The government needs to recognize the limitations of its capabilities and profit constructively from Senegalese initiative.

The following recommendations stress improving the operation of the government's millet marketing and stockage agent, the CAA. At the same time, the CAA's posture as an all-inclusive marketing agent should be reduced to a more limited role of "trouble shooter" in effort to stabilize millet market prices. Government efforts should be channelled toward developing the base for an efficient system of private marked operators to complement a pared down but more effective public marketing system under CAA. Such a system would be more effective, realistic, and practical than the current one.

Despite dismal performance to date, the potential remains for an efficient completely self-sustaining public sector program and a complementary efficient private system. The latter, encouraged and expanded, would operate the bulk of millet marketing. Central government efforts would concentrate on providing, indirectly, a favorable commercial environment of better roads, communications, market information, storage facilities, and market standards, for the private sector.

This system would offer a better chance of stabilizing prices and providing an adequate grain reserve program than the current one, which relies heavily on the central government. The following recommendations are presented in order of priority. We have placed recommendations dealing with the CAA at the bottom of the list because of our low expectations regarding future effectiveness of the millet program.

2. General Recommendations

THE GOVERNMENT OF SENEGAL SHOULD STRESS THE TRADE ASPECTS OF THE FOOD SELF SUFFICIENCY STRATEGY AND SHIFT CURRENT EMPHASIS FROM IMPORT SUBSTITUTION TO DIVERSIFIED EXPORT PROMOTION.

Countries that have led successful development programs in the last several decades --Korea, Taiwan, Hong Kong, Ivory Coast, and Japan-- have all chosen a diversified export promotion strategy over an import substitution approach. Concurrent with this approach has been the development of a strengthening of financial bases through growth of a diversified array of credit, banking, insurance and other financial institutions and services. At the macroeconomic level, we strongly recommend a change from Senegal's current stress on food sufficiency through import substitution to export promotion. Rice, fishing, millet, as well as footwear (based on livestock hides) and textile and apparel (based on cotton) would be good candidates for initial Senegalese industrial exports based on local agricultural crops (i.e. those with important backward linkages to the Senegalese agricultural sector).

Control over money supply and prevention of an over-valued exchange rate should also be encouraged, as these factors can undermire any export efforts. To encourage saving, interest rates should be allowed to rise to their unconstrained level.

ENCOURAGE PRIVATE TRADERS

Government actions thus far have been aimed at eliminating private millet traders and placing the government agency CAA, earlier ONCAD, at the "heart of a complex administrative system, within which it intervenes essentially in matters concerning production organization, marketing, food supplies and emergency food shortage" (Hirsch, 1979, p. 3). For example, consider the following description of efforts to minize the role of private millet traders.

ONCAD has been made responsible for supplying urban areas and zones where there is a deficit for building up emergency stocks and for fighting against speculation at all levels..... ONCAD enjoys (since 1975) a monopoly for primary collection of traditional cereals. All millet producers can deliver through their cooperatives (since 1978/79) or directly to the nearest ONCAD storehouse (secco) any of their surplus cereals. In this set up, private merchants no longer, officially, play any role (Emphasis added, Hirsch, 1979, p.4).

We have no evidence from the CAA indicating that central government's attitude toward the private millet traders has changed.

The bying and selling of millet by private traders and its transport to deficit regions stabilizes millet prices and greatly complements, not hinders, government's efforts to reduce prices in millet deficit areas and increase prices in surplus areas. In spite of lack of government support and restrictive government policies, the Senegalese private trader has acted as the major stabilizing factor in the Senegalese millet market by remaining active and efficient throughout the rural sector. Recently it was determined that Kaolack (Senegal's second largest city) purportedly had 32 private traders handling betzeen 600 and 7,000 MT each of local grains (i;e; millet, maize and sorghum, but mostly millet) each year (Gilman, 1981). These private traders do not have adequate storage facilities. Existing warehouses have one or two rooms, a few meters square, and are often supplemented by space outside. Most traders have additional stores in surrounding villages, and presumably large stocks are not accumulated in Kaolack. Increased technical services and improved warehouse facilities would encourage private traders as well as lower the current losses from pests.

PROVIDE TIMELY REGIONAL MARKETING (PRICE) DATA

A key ingredient in any successful millet marketing and storage program is good marketing statistics and information. Information needed to make economically rational decisions does not now exist despite previous experience and recommendations for improvement.

> First of all... a cereals policy cannot be improvised on the basis of a good harvest, but it must above all be based on sound statistical knowledge of the supply (production), of demand (consumption) and on minimum storage capacity, enabling production to be adapted to consumption in time... Improvement of agricultural statistics and data concerning food consumption once again seems to be one of the perequisite conditions for drawing up policies for cereals in Sahel countries. (Hirsch, 1979, pp. 35-36).

Good timely regional marketing statistics provided by the Ministry of Rural Development with the technical help of USAID, together with an improved transportation and communications system would allow the CAA as well as private traders to make informed decisions. Improved marketing data would aid both public and private sector participants in millet production, marketing, and consumption to work together towards stabilizing prices. Private traders with stocks obtained after harvest could direct their buying efforts to those regions with the lowest prices and thus greatest excess supplies of millet.

The actual buying and selling procedure need not change dramatically, as long as good management principles are followed and selling prices cover costs. The private sector can work in time of excess supply to counter the downward price pressures on millet. Timely regional marketing statistics for millet would allow both sectors to determine the regions of deficit supply as reflected by high millet prices. In an effort

to make a profit, the private sector would ship the accumulating stocks to those regions with sharpest deficit as reflected by highest prices.

In addition to aiding the CAA and private traders, good marketing information will help millet consumers - the rural and urban poor - to make informed consumption and production decisions about grains in their own regions. Cooperatives and individual producers will be able to make better judgements about the real value of their product and, if necessary and economically feasible, to arrange for transport of their products to areas of highest economic return.

Scarce central government resources should not be aimed at directly controlling millet prices. Rather, better marketing data should make differential millet so that they can act in a complementary way to transfer millet from the surplus areas (with low prices) to the deficit areas (with high prices).

CREATE AN EFFECTIVE SYSTEM FOR DISSEMINATING MARKET INFORMATION

The Ministry of Rural Development, aimed by technical assistance from USAID and/or the agencies for telecommunications and information, should provide a system to disseminate market and technical information to Senegalese farmers, consumers, and traders. Regional grain and input prices should be made available to all. Because of the prevalence of transitor radios in all regions of Senegal, radio broadcasts should be an effective way to transmit agricultural information.

Senegal enjoys a relatively free press, as was evidenced by a three-part series that appeared in Le Soleil at the time of the team's visit, critiquing the Government's grain marketing program and the CAA in particular.

THE MINISTRY OF RURAL DEVELOPMENT, OR OTHER APPROPRIATE MINISTRIES, SHOULD INCREASE EXPANSION RATE OF PHYSICAL INFRASTRUCTURE

- Market Roads

An inadequate system of market roads, particularly in areas outside of Cape Verde and the Groundnut Basin, creates isolated millet production consumption pockets. Hith transportation costs prevent the transport of stocks of millet from surplus to deficit areas. The problem is particularly acute during the rainy season, when many unpaved roads become inaccesible.

- Communication System

An improved communication system would help inform decision-makers where millet prices are highest (the deficit areas) and lowest (the surplus areas). This information would allow the CAA, cooperative private traders, individual producers, the transport sector and consumers to make informed decisions that would aid in eliminating shortages and surpluses and efficiently moving grain from deficit to surplus areas. Failure to publicize prices creates and encourages local monopolies that tend to encourage market destabilizing activities on

behqlf of local traders.

- Other Infrastructure

Irrigation systems; bridges, and other physical infrastructure needed for producing and marketing all agricultural produce should be built at a faster pace.

THE MINISTRY OF RURAL DEVELOPMENT SHOULD ENCOURAGE A DIVERSIFIED SYSTEM OF CREDIT AND SAVINGS, MARKETING STRUCTURE, AND DISTRIBUTION INSTITUTIONS.

Sound investment management requires diversification. The Senegalese farmer who mixes his productive work effort between millet, groundnuts and/or other production substitutes such as rice, maize and vegetables, is well aware of this practice. In explaining the substantial rice production of the average farm in lower Casamance, Rigoulot (1980, p. 23) concluded that in spite of substantially higher prices and returns to labor in groundnut production, the farmer does not shift from rice to groundnuts because of: a) the value of rice as a wage good, b) the higher total income the farmer can generate by distributing available labor between two enterprises as opposed to specializing in one, c) the value he attaches to rice as distinct from official market price, and d) the desire to minimize the risk of crop failure by means of diversification.

In the absence of a system that encourages financial institutions, because inflation has generally been substantially higher

than interest rates from savings, the critical need for credit has been addressed effectively though at a minimal scale, by several programs.

CRS - Model Distribution Institution

One impressive program is managed by the Catholic Relief Service (CRS) 1/. This and similar programs should be encouraged by USAID, other donor agencies, and the relevant government agencies to develop a complete diversified system of interlocking financial and credit institutions to encourage production by providing critical timely inputs and storage for millet stocks and contribute to millet price stabilization.

The CRS cooperative warehouse program does at the grass roots level what CAA purports to do at the national level. Where the CAA has failed, the CRS has succeeded in the following measures:

(1) Operating on a simple but economically viable financial basis;

(2) Obtaining adequate funding; and

(3) Working within the limits of their technical and managerial capabilities.

CRS has made a major positive economic impact on productive effort in the communities where it operates.

1/ CRS officials belive that their program of village storage is working primarily because the grain is stored outside the village compound thus reducing fire risk and prevention of theft. Most importantly, the farmer can retain title to his grain but receive a cash loan - a very scarce and valuable service in rural Senegal.

The positive dynamic economic, political and social impact of communities affected by CRS contrasts sharply with the near-zero to negative economic and social impact of CAA on the Senegalese economy. Unlike the CRS program, CAA is not set up on sound management principles. CAA has the potential to be self-supporting and dynamic, but it apparently lacks the mandate, encouragement, or political will to be a viable economic entity. Plagued by lack of outside support, economic mismanagement, and consequent failure to become self-supporting, it has inadequate funds to achieve its stated goals. Even if funds were available, the enormous management requirement to meet the current desired level of operations would most likely overreach CAA's management capabilities.

Encouraging government decentralization by promoting such institutions as the CRS provides would hep support government effort to stabilize millet price and create buffer stocks. We recommend that USAID help finance the CRS program at a moderate level (subject to availability for audit).

BUILT A BETTER INFORMATION BASE

In addition to timely marketing data, better information is needed on the economy. The few studies available to us were extremely helpful in our analysis of th economy. Examples of helpful topics for future research include:

- Savings behavior and consumer preferences of rural households by region and ethnic background.

- Role of millet processing machinery (i;e; clearing, threshers, etc,) on the millet industry.
- Study comparing foreign exchange earnings and return to labor of millet to alternatives such as goundnuts, rice, cotton, livestock, and vegetables;
- Processing millet to make it more economically viable for consumption in urban and semi-urban areas (i.e. make an acceptable meal easier to prepare).

The Ministry of Rural Development, USAID, and other relevant agencies should support these studies.

CAA AND OTHER RELEVANT GOVERNMENT AGENCIES SHOULD INTENSIFY EFFORTS TO IMPROVE MILLET QUALITY CONTROL AND INCREASE USAGE OF STANDARD WEIGHTS

Directly related to improved market information is better quality control and use of standard weights and measures. More intensive millet quality control and an improved system of weights and measurements would allow for a more meaningful and useful transmission of price information, since the value of a kilogram of millet, for example, depends greatly on its quality as measured by the precentage of glumes, residues, and insect infestation on the grain.

Use of standardized weights and measures also permits easier dissemination of price information in standard units of measure acceptable and understood in different regions. A low price for a particularly poor

quality of millet in one deficit region may send an incorrect price signal to a trade surplus region. Price information is at best misleading if the units of measure are not well understood. Quality control appears to be a more serious problem in relatively remote areas.

Standardization should also be applied to bag size. We found that locally made plastic bags for millet could hold only 39 kg of millet instead of the more widely used and accepted 50 kg bags. Using standardized bags will enhance the commercialization of millet.

Improved quality control, in addition to advancing domestic commercialization of millet, also encourages international commercialization. Greater international demand at a higher price will result if the foreign buyer is more certain of the overall quality of the product.

ENCOURAGE PRODUCTIVITE ALTERNATIVE USES FOR CURRENT AND ANTICIPATED UNUSED OR UNDERUTILIZED MILLET STORAGE

1) Support Flexible Grain Management by CAA and other Agencies Dealing with Storage.

Flexibility should be practiced in storing other grains in underused millet warehouses.

The existence in Lugar of a huge quantity of rice piled in the open just ajacent to a near-empty millet warehouse because of lack of rice storage facilities underlines the need for such flexibility. More flexible grain management would reduce wastage and spoilage losses and

increase Senegal's overall grain storage capacity.

2) Consider Renting Unused Warehouses to Private Traders.

The rental could include pest control services. Such a program should begin as a small-scale pilot project.

PROVIDE CAA WITH OPERATIONAL GUIDELINES FOR GOOD FINANCIAL MANAGEMENT AND A MANDATE FOR SELF-SUPPORT

No guidelines or directives for sound financial management for a quasi-public firm appear to exist within CAA. If they do, they are not followed. As a result, the organization's management is ineffective or misdirected. CAA has the potential to become a financially self-sustaining institution if it follows the basic principles outlined below. Good business management and a realistic mandate for self-sufficiency may curtail both inefficiency and corruption. Bonuses might be considered for high performance standards.

We recommend that USAID assist CAA in obtaining the services of a financial management consultant to develop actual guidelines for operation as a self-supporting, quasi-public intitution. Mr, Jomni, USAID's marketing advisor with the CAA, migh be a useful liaison between an outside financial management consulting group and CAA.

OBTAIN GOOD EXECUTIVE LEADERSHIP WITH A STRONG COMMITMENT TO THE PROGRAM

The CAA can only be as effective as its executive managers. Failure to obtain good executive leadership at the start of any reorganization or revitalization will guarantee its continued failure to justify even reccuring costs. Executive management must understand the basic concepts of marketing and of making CAA an economically viable and self-supporting institution. Several sources indicated tha the Commissar of CAA was not commited to the millet marketing and storage program, and would prefer CAA's return to its previous more limited job of distributing donor aid grain.

CAA SHOULD NOT GIVE MILLET AWAY (i.e. DON'T MARKET MILLET AT A PRICE OF ZERO)

Grain distributions by CAA at zero price should be minimized. Free distribution of millet in areas such as the Fleuve create a major production disincentive. It may encourage overgrazing because farmers switch productive efforts away from millet/sorghum production to livestock, thus encouraging desertification in some regions. For example, farmers interviewed in the Fleuve indicated that they preferred buying millet because they could affort it. Purchasing millet would assure them a steady supply for consumption. Their means of payment was largely remunerations from relatives in urban areas and from France; as well as livestock sales.

ENCOURAGE IMPROVED HOME STORAGE TECHNOLOGY THROUGH BETTER EXTENSION SERVICES

Eighty-five to eighty-nine percent of all millet stored by Senegalese is stored on the farm. The Ministry of Rural Development should intensify use of its extension services and provide important on-the-job training for farmers. In particular, new technologies for reducing storage losses due to pests should be taught (Steinke, 1981). Because of the magnitude of on-farm storage, small improvements at the farm level can enormously enhance Senegalese millet security stock levels and contribute to price stabilization. Since traditional on-farm storage facilities will continue to be the main Senegalese reserve stock of millet, small improvements spread accross farms can have large positive returns.

REMOVE FERTILIZER SUBSIDIES

Fertilizer, primarily used for groundnut production, is currently provided to farmers at a 75 percent subsidy. Under-pricing fertilizer limits the efficiency and productivity of its use. Subsidized fertilizer makes groundnuts artificially more profitable and encourages more groundnut production at the expense of millet and other agricultural products, and thus inhibits efforts to diversify the economic structure of the economy by directing resources to the draught-sensitive groundnut sector.

PROVIDE CAA AUTONOMY AND INDEPENDENT FUNDING

Lack of funding is one critical reason for the ineffectiveness of the program. The Government of Senegal should consider giving CAA autonomy and its own budget outside of political maneuvering to increase the chances of its development into a dynamic and efficient operation. At present, the central government may not have the political strength to successfully reorganize. The millet program should be assigned a higher priority if it is to be successful.

USE APPROPRIATE DESIGN AND LOCAL-OR-AFRICAN-MADE PARTS AND SERVICES

In the future, USAID and other donor agencies should use economically appropriate designs and local parts and services, when possible, that subtantially reduce the costs of buildings, such as the 23 warehouses with 30,000 MT capacity of this project. More warehouses of the same quality construction could have been built at the same cost. Use of locally purchased materials would also accrue backward stimulants to African-Senegalese instead of American business and industrial interests. These stimulants are substantial because of their first and subsequent round impacts on the supplying industries.

ON THE BASIS OF GOOD OR BAD MANAGEMENT OF THE SYSTEM OVER THE NEXT FEW HARVESTS, EXPAND OR DIMINISH CAA'S SECURITY STOCK LEVEL AND THUS ITS ABILITY TO INTERVENE IN THE MILLET MARKET

3. Specific Recommendations

The specific recommendations for CAA outlined below will complement an expanded private marketing system. Local monopolies often exist because a locality is isolated in terms of both information and communications. Providing timely information to local private traders allows them to buy in regions of relative surplus where millet prices are low and to sell in regions where millet is relatively rare as indicated by high prices.

Improved markets, roads, information, and other infrastructure lower the costs to supplers of transmitting grain to deficit regions. Both private and public activity results in lowering the differential between high and low prices, and thus leads to a more stable system of millet prices.

Several times, we heard CAA officials indicate that information on price differences, which were often substantial at the same time between regions; should not reach the public, because the private traders could exploit the situation. This is an inaccurate notion, which should be dispelled. If the information is limited to a few, then the monopoly position can be exploited by those with the information, who can buy low and sell high. Lack of additional market trading between regions prevents adequate grain transfers from lowering the price differential between regions. If price differentials are substantial enough to make it economically justifiable to buy and transport millet (or other grains) from surplus to deficit regions, then the private sector will engage in operations that will substantially lower the price differential.

Providing more millet to deficit regions lowers its price in these regions, while buying in surplus regions raises the price that the farmers receive in these areas. If pricing information is made available to all, there is less chance for exploitation on the part of the government, large traders, or others with access to market information.

Access to information is not enough if physical infrastructure is lacking. For example, areas in East Senegal lacking paved roads, are inaccessible during the rainy seasons before the harvest. As a result, local monopoly positions will exist, even if market information is available; because neither the government nor the private sector can transport the grain at an economical cost. CAA should concentrate its "watch dog" efforts on these regions lacking infrastructure until it is established. An effective system of transportation as well as of communication will be of greatest benefit to the rural poor, who make up the majority of the Senegalese population and are considered the major target group for development projects.

The following approach for salvaging the current program of millet stockage in a manner that contributes to millet price stabilization is consistent with the above recommendations for change in millet production, storage, marketing, and distribution practices. It is also consistent with the general USAID assistance strategy for Senegal of "significant shifts in approach and emphasis" through "a carefully prepared deregulation process, carried out in stages" in which "the government (according to the Reform Plan) will assign major responsibility

for farm inputs, including credit and seed, to local cooperatives and to the suppliers. Similarly, the government under the Reform plan will encourage private enterprise in marketing. The critical objective is the establishment of an alternative to state controlled seed, fertilizer, credit, and marketing channels. Central government control over the factors of rural production in Senegal must give way to a freer, more efficient system". (USAID, 1981, p. 29).

The evaluation team presented its recommendations verbally to USAID before our awareness of the Reform Plan and USAID's country development strategy, and thus, they represent an independent assessment of the need for more emphasis on private market solutions of the need for more emphasis on private market solutions to current economic problems.

In conjunction with expanding the private sector's role as described above, we strongly recommend reducing and decentralizing the marketing activities of CAA, earlier ONCAD, to assembling and maintaining a modest stock of millet. CAA's actual procedure for buying would remain basically intact. Distribution would be at a price adequate to cover the costs of handling.

The security stock would turn over every 3 to 4 years. Active CAA intervention into marketing would be minimized to buying from cooperatives at an economically reasonable price (e.g. 50 CFA in 1982/83) immediately after harvest and selling to cooperatives before harvest when market prices are high.

The general procedure would be to purchase millet in expected grain surplus areas where prices are expected to be lowest (on the basis of past experience and current climatic conditions). The CAA would sell in regions where prices are expected to be highest. Millet would be bought on a priority basis: first, from cooperatives in traditional surplus regions; second, from other cooperatives; and finally, from private traders. Similarly, CAA's selling priority of CAA would be first, to cooperatives in traditional deficit regions; second, to other cooperatives; third, to private traders, and fourth, to tohers groups, including foreign millet deficit countries like Mauritania. SONADIS, village stores scattered throughout Senegal, may also serve as an important distribution outlet and should be placed high on the list of priority sellers.

The CAA could begin by setting a modest millet stock target of 30,000 metric tons (MT) with a three year turnaround time. Starting with a zero initial stock level, as appears to be the case after current sales to the EEC for Chad and Niger, a 30,000 MT millet stock could be purchased qt 50 CFA/kg and, at an exchange rate of 300 CFA to $ 1, would cost approximately $5 million. With a three year turnaround, at least one third of the total stock, or 10,000 MT, would be sold at the previous harvest's government buying price plus a premium for service charges, transportation costs, ect.

If a 10,000 MT turnover stock is not sold in the millet deficit region, then millet could be offered at the same price to SONADIS, other cooperatives, private traders, and finally, to foreign buyers.

All transactions would initally be in cash. If the program became successful, alternative forms of credit could be developed. In periods of extreme scarcity, more than 10,000 MT could be sold in deficit regions experiencing high millet prices.

At the beginning of the harvest, the reserve would be 20,000 MT if just the replacement stock was sold. The stock would be less if additional reserves had been sold to relieve the previous season's millet scarcity. Funds from the previous season's sale would be used to replenish the depleted millet reserve stock to the earlier 30,000 MT amount or to an appropriate new level set by Senegalese authorities. CAA would purchase millet at the previously announced price, say 50 CFA/kg, from cooperatives in regions with excess supply as reflected by lowest price per kg. If sufficient stocks were not received by these cooperatives, CAA would be directed to obtain stocks at the same price from cooperatives in other millet producing regions. If sufficient stocks were still not available, CAA would buy stocks at the same price from private traders until the target level of millet stocks is reached.

This procedure leads to a rational maintenance of millet stocks by regulating purchases and sales of millet stocks in such a way as to stabilize prices and by moderating. Upturns and downswings of millet prices. CAA's purchases of millet during periods of excess supply, immediately after the harvest, would create increased demand that would help counter millet surpluses that push prices down. In a symmetrical fashion, increased supplies of millet from sales during

periods of supply deficiency would help counterbalance the upward price pressures of inadequate supply in millet scarce regions. With good market information, CAA, through its selling operationx, can act as a watch dog, preventing private traders from exploiting local scarcities. If good, timely, market information is publicized, many private transactions will complement and reinforce the government's price stabilizing activities.

In addition to acting as a price stabilizer, this system is equitable with primary benefits directed toward the farmer producer-consumers who belong to the cooperatives. The program would also economize on the use of Senegal's most severe constraint - a qualified and motivated executive and mid-level management cadre. The program would be based on improved market statistics perimitting more informed public and private sector buying and selling decisions. This program would be complementary to a newly encouraged private sector and diversified system of cooperatives, each developing its own souce of reserve stocks and credit. Each would be operating to stabilize prices by buying low and selling high.

We recommend that the program rely on the currently existing stocks of underused German and American built warehouses, rathern than building new warehouses. Developing a market information gathering and communication system or market road construction development would be much more economically inefficient than addition to the store of underexploited warehouses. The basic 30,000 MT millet stck reserve would be stored and maintained in the centrally clustered German built warehouses in Thiès (capacity 10,000 MT), Kaolack (4,000 MT), Diourbel (4,000 MT), and

Louga (planned capacity: 4,000 MT). The 2,000 MT U.S. built warehouses of Kaolack and Thiès could bring the total capacity up to the recommended 30,000 MT. These two warehouses should be given renovation priority. The more widely dispersed American warehouses could be used as distribution points in millet deficiet areas and as intermediate assembly or grain gathering points in the grain surplus areas.

For example, Kolda in the South could act as a temporary assembly point for locally-commercialized grain from the Casamance. Assembled millet could be moved by large trucks to the more centrally located security stocks. Similarly, American warehouses in traditional deficit areas such as the Fleuve could be used to store donated grain stocks for subsequent local distribution sales during the "soudure" or hungry season before the harvest. As suggested earlier, any underused capacity might be effectively put to use:

1) under a pilot project aimed at providing better quality of private trader storage on a rental basis, and

2) on loan to other grain handling organizations, such as CPSP, for rice storage. Under any such program, we recommend that CAA monitor all warehouses in the same site to avoid cross infestation problems. The use of the centrally-located German stocks would minimize management costs, and lower transportation costs as well as improve accessibility because of their proximity to good roads. Because the German warehouses are fumegable, unlike the American warehouses, millet stored in then can be fumigated and sprayed and then locked up, thus reducing crop protection costs.

E. Use of USAID Funding

1) Current project

- Warehouse upgrading

Based on the order of priority listed in the recommendations, and estimate of the funds required to upgrade the USAID warehouses is as follows:

. Ventilation repalcement	US $ 125 000
. New doors (74)	150 000
. Concrete slab and door protection in front	100 000
. Frame masonry joints	7 000
. Site improvement	125 000
. Watchman's houses and offices	200 000
Total	US $ 707 000

- Audit of AAPC- Al Sand Inc. contract

The AAPC and Al Sand Inc. files showed that the contract included the service of two technicians for a period of three weeks in Senegal. However, an additional amount of $ 19,025 was charged to USAID for this service. For this reason and because of the high cost of materials supplied on the PIO/C 1 000 1 contract (1 016 984,94 $), we recommend an audit on the AAPC - Al Sand Inc. contract with USAID.

- Training

USAID shoud support CAA technical training program by eliminating financial constraints.

2) Future Projects

We do not recommend further investment by USAID in storage facilities on a regional basis in the near future. USAID should continue its participation in the XAA Cooperative storage program. We recommend a project evaluation before USAID proceeds with the second batch of 50 cooperatives warehouses.

VIII - 1 ACRONYM GLOSSARY

AAPC	Afro-American Purchasin Center
ADO	Agricultural Development Office
AO	Agroprogress
BS	Bachelor of Science
CAA	"Commissariat à l'Adie Alimentaire"
CAS	"Comissariat de l'Aide Sinistrée"
(F) CFA	(Francs) "Communauté Financière Africaine"
CILSS	"Comité Inter-Etats pour la Lutte contre la Sécheresse au Sahel"
CPSP	"Caisse de Péréquation et Stabilisation des Prix"
CPTC	Crop Protection Training Center
CRS	Catholic Relief Service
CV	Curriculum Vitae
DGPS	"Direction de Gestion des Projets de Stockage"
EEC	European Economic Community
FAO	Food and Agriculture Organization (of the United Nations)
FRG	Federeal Republic of Germany
FY	Fiscal Year
GDP	Gross Domestic Product
GOS	Government of Senegal
GSA	Grain Storage Advisor
IBRD	International Bank for Reconstruction and Development (World Bank)
IDR	International Development and Research Center
ITA	"Institut de Technologie Alimentaire"

KG	Kilogram
KSU	Kansas State University
LBII	Louis Berger International Inc.
MS	Master of Science
MSU	Michigan of Science
MT	Metric Ton
OMVS	"Organisation pour la Mise en Valeur du Fleuve Sénégal"
ONCAD	"Office National pour la Coopération et l'Assistance au Développement"
PP	Project Paper
PV	"Protection des Végétaux"
SAED	"Société d'Aménagement et d'Exploitation des Terres du Delta du Fleuve du Sénégal"
SEG	"Sénégalaise d'Entreprise Générale"
SONADIS	"Société Nationale de Distribution"
SONAR	"Société Nationale d'Approvisionnement du Monde Rural"
SONEG	"Société Nationale d'Entreprise Générale"
US	United States
USAID	United States Agency for International Development
USDA	United States Department of Agricutlture
VERITAS	
VRD	"Voirie et Raccord Divers" (State Works).

VIII - 2 EXECUTIVE SUMMARY OF EVALUATION

Q.I. What constraints does this project attempt to overcome and who does it constrain?

This project attempts to relieve the constraint on millet storage that prevents the Government from establishing grain reserves for drought relief and price stabilization purposes. By commercializing millet and promoting it as a cash crop (to complement groundnuts), it is also hoped to increase millet production, go some way towards attaining self-sufficiency in food grains, and thus conserve foreign exchange.

Q.II What technology does the project promote to relieve this constraints?

The project introduce a better storage technology by seeking to effectively augment existing warehouse capacity and by providing the means (through training) of managing it efficiently.

Q.III What technology does the project attempt to replace?

The project seeks to provide an alternative to traditional on-farm storage and private sector trading. It attempts to give the GOS stronger controls over the marketing and price stabilization of millet.

Q.IV. Why do project planners believe that intended beneficiaries will adopt the proposed technology? What are the incentives to change?

At the inception of the project it was the stated aim of the GOS to establish a reserve stock of millet by means of local pruchases. The reasons behind this decision have already been stated in Q.I. There is a strong political incentive to stabilize millet prices and to show the population that there are adequate food stocks on hand.

Dependence on the private sector is said to encourage the exploitation of the urban and rural poor by the development of local monopoly positions which occur when millet is purchased at extremely low prices after harvest, when farmers must pay off debts, and sold at extremely high prices before the harvest when supplies are scarce.

Q.V. What characteristics do intended beneficiaries exhibit that have relevance to their adopting the proposed technology?

At the time of the project's inception, the Senegalese governmental organization, ONCAD, was perceived to have developed a "proven" capability in handling groundnut and imported grain marketing. In the light of this capability, it was believed that by removing the constraints of warehousing and trained technical and managerial staff, the commercialization of millet could proceed effectively.

Q.VI. What adoption rate has this project or previous projects achieved in the transferring of the proposed technology?

Quantitatively, project objectives were fulfilled as regards the provision of infrastructure. The planned tonnage of warehouse capacity was realized and the numbers of marketing board employees given technical training matched project aims. Qualitatively, however, there were deficiencies, particularly regarding the design of the warehouses and the standard of their construction. Although most of the training was relevant and effective some 16 percent of the technicians trained attended courses not entirely suited to their needs. However, with adequate supervision, the desired technical standards are being achieved.

The collapse of ONCAD and the inability of its successor, the CAA, to carry out an effective commercialization program despite the completion of building and training programs has led to near zero economic benefits to date. However, the potential benefits of a successful program for price stabilization alone are widely acknowledged despite the dearth of success in this field in Senegal and elsewhere.

Why have or have not intended beneficiaries adopted this technology?

This lack of success is probably due to many factors, in particular i) lack of good executive management in the CAA, ii) lack of political will and commitment to the program

(politically unpopular decisions are sometimes required), iii) inadequate funding, iv) failure to make use of the well established private sector, v) lack of timely regional marketing (price) data, and vi) inadequate transport and communications systems in some sectors of the country.

Q.VII. Will the project set in motion forces that will induce further exploration of the constraint and improvements to the technological package proposed to overcome it?

It is too early in the life of the present organization to tell if the millet security stock and price stabilization program will be successful or not. The GOS continues to stress the need for an active Government role in the program but does not appear to have the funds to support such a role. At this time, given the lack of good executive management and a mandate for self-sufficiency in the CAA, the main incentive for continuation would appear to be additional donor assistance to supplement central Government funding. Few incentives will be forthcoming based on past or present performance.

Q.VIII. Do private input suppliers have an incentive to examine the constraint addressed by the project and come up with solutions?

The private sector is hampered by a lack of market roads, storage facilities, finance, and market information. Their potential performance as a complement to government effort to stabilize millet prices and expand millet storage is

considerable. The current program discourages the private sector, which from its current scale of operations indicates that it can operate efficiently; what is required is some measure of control, not suppression.

Q.IX. What delivery system does the project employ to transfer the new technology to intended beneficiaries?

The grain delivery system is handled by regional CAA offices working through cooperatives. This year, it is estimated that about 25 percent of millet entering the marketing chain was handled in this way, though not very efficiently; the rest was in the hands of the private sector.

Q.X. What training techniques does the project use to develop the delivery system?

The project has sought to increase technical skills by means of formal or practical training courses, depending on the level of instruction. The program concentrated on middle and lower level managers, particularly those in day-to-day contact with grain stocks and warehouses. The absence of a well trained cadre of executives was not originally identified as a major constraint. It is evident now, however, that present senior management lacks the knowledge and skills necessary to organize an effective millet buying and storage program.

VIII - 3 EVALUATION METHODOLOGY

This evaluation has involved three main approaches:

(1) The study of documents, technical papers, and correspondence relating to the project under review and other inputs in the grain storage and marketing field.

(2) Discussions with participating donors, private organizations, and Government departments.

(3) Field visits to study grain storage and handling facilities in as wide a range of climatic zones as could be arranged in the time available (see Annex 5 for details).

i) Economic Aspects

No formal evaluation plan was adopted. Initially, time was devoted to the study of project reports and papers by USAID, the World Bank, MSU, and other organizations and donors who had studied the economic background to Senegal's development strategy. A thorough understanding was considered essential for an effective evaluation supported by realistic recommendations. Unfortunately, extremely relevant documents were still being identified during the third week of our mission.

As most grain reserves are held on the farm, we considered it essential to examine storage and handling at this level and indeed to consider, albeit in brief, the entire marketing chain, including cooperatives and the private sector. Prices and grain movement patterns were also investigated. In order to evaluate the potential for substituting rice and wheat with millet,

we briefly considered dietqry hqbits in Dakar and elsewhere.

ii) Warehouses

It was first necessary to understand the complex selection and construction procedures which surrounded the warehouse building program and to establish contact with the organizations and individuals concerned. Through the study of plans and other documents, we were then able to critically assess the suitability of the USAID warehouses in relation to other recently constructed storage facilities.

An evaluation table was drawn up for on-site use to ensure that all building components were examined and checked systematically to see wheter or not they conformed to the plans. Thus, design faults could be separated from construction faults and the effectiveness of warehouse design assessed in relation to climate and the needs of Senegal. The efficiency of building site supervision was also investigated.

Other storage structures inspected at central level included the FRG fumigable warehouses built for the security stock program. The effectiveness of storage at lower levels (on-farm, village, cooperative) was also studied.

After the field assessment, discussions were held with the engineers and consultants involved with the management and control of the project before and during construction. Finally, project files were reviewed to give a complete picture.

iii) Training

Guided by the PP, the KSU detailed training proposals (Pedersen and Steinke, 1977), and project files, we were able to gain an understanding of the training input planned for ONCAD technicians. Discussions were held with organizations that had been involved with training: the AO team in the CAA, the CPTC, and the ITA.

A training evaluation schedule was then prepared to establish, for each training program, its relevance to the job of the trainee, aspects found particularly useful, the appropriateness of methods of presentation and techniques used, the degree of retention of technical information, details of pre-course preparations/post course evaluations, and finally, how the trainee's approach to his job had been changed by the training he received.

As part of the assessment, we examined course timetables and technical documentation given to the trainees. We also considered the balance achieved between formal lectures, discussion periods, exercises, demonstrations, and visits.

Trainees at all technical levels were interviewed during our field excursions so that performance could be assessed in their own working environments. The general lack of grain in the warehouses of the CAA made observational assessment difficult, particularly as regards the work of the storekeepers. A further, complicating factor was that all trainees had previously received instruction from the then FAO-financed ITA, between 1970 and 1974. Most of the technicians therefore already had a significant baseline of specialist knowledge.

VIII - 4 EVALUATION PROGRAM

Week 1

The three members of the mission arrived in Dakar between April 25th and 27th 1982. On arrival, Mr. Gilman accepted the responsibility of Mission Leader.

We were first briefed by the ADO and contacts were then established with other USAID personnel. The terms of reference accepted by the mission were somewhat broader than had been previously indicated.

During initial meetings at the CAA, contact was established with the advisors of the AO/FRG food security project.

Office accommodation and supplies were made available to the mission not far from the U.S. E,bassy.

A short field trip to Thiès was quickly organized to familiarize us with the design of the USAID warehouses and the more recently constructed fumigable warehouses built by the German project. CAA technical staff trained by KSU/USAID were present in Thiès and these early discussions facilitated the drawing up of a training evaluation schedule.

In Dakar a visit was arranged to the headquarters of the CRS in Senegal. This organization has established five, village level, millet storage/credit facilities.

A considerable amount of our first week was devoted to the study of technical papers and project files identified by USAID. It is regrettable that two very recent USAID papers giving essential economic background - were not made available to us until the last week of the assignment.

Week 2

Most field trips took place during this period, either by road (using AID and CAA vehicles) or by charter aircraft. The use of air travel was appreciated by the mission as a means of saving time and ensuring that a representaive range of climatic zones could be visited.

The program was as follows:

- Tuesday, May 4th: Kaolack and Kolda (by air)
- Wednesday, May 5th: Louga, Darou Mousti, Thilmakha and Niakbène (by road)
- Thursday, May 6th: Thiès and Ndiayène Sirakh (by road)
- Friday, May 7th: Podor, Ndioum and Aere Lao (by air and road).

All trips focused on the USAID-funded warehouses but the opportunity was taken to examine grain handling and storage at all levels. As the mission was always accompaned by CAA technicians and advisors and USAID personnel familiar with local problems, useful discussions developed during the field program. Contact was made with the CAA Regional Coordinator and local technical staff in all of the regions visited.

Kaolack

Situated in the southern part of the groundnut basin, Kaolack is an important center for millet and maize production and some of the warehouses contained recently purchased grain. USAID and FRG warehouses belonging to the CAA are present on the same site. Visiting TPI experts had recently fumigated two of the FRG warehouses as part of an ongoing research project to test gas diffusion rates through the walls. In the USAID warehouse, millet purchased from the CAA by the EEC was being transferred to 50 kg woven polypropylene bags for export to Chad.

Detailed assessments of the USAID warehouses and the effectiveness and relevance of the KSU training program commenced at this time by means of personal observation and staff interviews.

In the important town of Kaolack, market traders were interviewed to establish millet movement patterns, the quantities involved and parallel market prices.

Kolda

Situated in the region of Casamance in the south of the country where the relatively high rainfall promotes a richer vegetation and good rice and groundnut production potential. We were unable to enter the USAID warehouse, and therefore could only examine the site. We attempted to visit the local cooperative center, but this was also closed.

Louga

A circular tour was made of four USAID warehouses in the northern sector of the groundunt basin.

On the road between Tivaouane and Louga, traditional millet threshing, winnowing, and on-farm storage were examined. Grain stores became less frequent as we moved north into drier areas.

In Louga we made a brief visit to the CPSP warehouse. A quantity of deteriorated rice was stacked in the courtyard and the warehouse was old and in a poor state of repair.

We approached three traders, one of whom showed some hostility at being questionned. An electrically-operated grain mill was also examined. We obtained millet prices in Louga market and at another village on the return journey for the same purpose.

We visited a cooperative store at Niakhène. Of the 200 MT of grain this buying year, only a few bags remained; buying had now cased. The storage facility was an old, galvanized stell shed. At Médina Kakhai we visited a partially constructed cooperative store and office complex, one of many at present being built from donor funds. A local farmer, some of whose land had been used for the new facility, was questioned about cropping procedures and preferences.

Thiès

A pest control demonstration by technical staff was organized for the training evaluation. Other team members visited one of the five, village-level, silo facilities established by the CRS. The silo at Ndiayène Sirakh is divided into six cells and has a total capacity of 120 MT. Discussions were held with the silo manager (in charge of three of the five sites), the secretary, the book-keeper, and the treasurer.

Podor

This is a deficit area with vegetation typical of the true Sahel. Because of the low rainfall, dry land farming of millet and sorghum is inadequate to meet the grain needs of the people. There is some production of rice on irrigated land near the Senegal river, which should increase substantially when the long term OMVS project is completed.

We examined three USAID warehouse sites and visited the market in Podor to discuss grain availability, prices, and food preferences.

The administrative leader of 21 villages was interviewed at Aere Lao. He indicated a neef for some 50-100 MT of storage capacity in five different villages to facilitate the distribution of free grain allocated annually by the CAA in this region. In the same village, we examined a small, privately-owned, diesel driven hammer mill.

Week 3

Most of our time was devoted to the assembly of da for our fina report and for a verbal presentation to the USAID Director.

We also established contact with the ITA, FAO, the World Bank, and two organizations concerned with the warehouse construction program: Louis Berger and VERITAS.

Week 4

This week was devoted to report writing.

Because of various commitments, team members left Senegal at different times between May 22nd and May 27th, 1982. A draft report was left with the ADO. Each team member has responsibility for completing his own sections, which will be forwarded to Dakar within one month.

VIII - 5 PERSONS CONTACTED

USAID

Mr. D. Shear, Director
Mr. J. Balis, Agricutlural Development Officer
Mr. L. Jepson, Assistant, Agricultural Development Office
Mr. J. Salvo, Project Manager
Mr. S. Sarr, Project Assistant
Mr. P. Rusby, Food for Peace
Mr. T. Jomni, Marketing Advisor (attached to the CAA)
Mr. B. Mosley, Resident Engineer
Mr. W. Settle, Training Officer, CPTC
Mr. M. Keita, Economist.

CAA

Mr. S. NDiaye, Commissaire
Mr. D. Niane, Project Manager (Counterpart to J. Salvo)
Mr. A. Diémé, Chef de Division Technique
Mr. T. Fall, Chef de Bureau de la Planification
Mr. A. Khouma, Chef de Bureau de la Construction
Mr. A. Dupuy, Chef de Bureau de Qualité
Mr. B. Sy, Coordinateur, Podor
Mr. B. Diouf, Coordinateur, Kolda
Mr. E. Diagne, Coordinateur, Louga.

AO

Mr. C. Herz, Project Manager
Mr. L. A. W. Hayward, Grain Storage Advisor
Mr. N. Derpmann, Engineer
Mr. Gao, Accountant.

GRS

Mr. M. CLément, Director
Mr. S. Thiam, Silo Manager.

ITA

Mr. O. Khan, Director

Mr. A. A. Thiam, Technical Director

Mr. B. Diallo, Head of Storage Section

Mr. S. B. NDiaye, Storage Technician.

MSU

Mr. R. J. Bingen, Specialist in Rural Development Administration

Mme. Bao, Agricultural Economist.

World Bank

Mr. J. Mayot, Economist.

IDRC

Mr. G. McNeil

FAO - Librarian

VERITAS

Mr. Martin

Louis Berger

Mr. V. Beas.

VIII - 6 TIME-TABLE OF EVENTS

- FAO/ITA training program for ONCAD personnel	1970-1974
- ONCAD enters grain marketing sphere	1973
- The CAA is created out of the GAS	1974
- Preliminary KSU study: "Recommendations for Grain Storage and Preservation in Senegal", (Spencer, Pfost and Pederson)	Nov. 1975
- First group of ONCAD trainees attend summer course at KSU	July 1976
- Start of pre-project activities of the AO/FRG food security programm	1976
- Senegal Grain Storage Project Paper issued	May 1977
- Project Authorization Date	July 1977
- Project Agreement Date	August 1977
- Paper presented by KSU on the "Implementation of a Gain Storage Preservation and Training Program in Senegal" Pederson and Steinke)	? 1977
- Second group of ONCAD trainees attend summer course at KSU	July 1978
- USAID Grain Storage Adivsor arrives at post	Jan. 1979
- First USAID/ONCAD Project Evaluation of the grain sotrage program	Feb. 1979
- AO Grain Storage Advisor arrives at post	May 1979
- USAID Warehouse construction agreements signed with contractors (Virmad-Soneg and SEG)	May 1979
- FRG Warehouse construction program commences	June 1979
- USAID Warehouse construction program commences	Late 1979
- Senegalese engineer returns from long-term training in the U.S.	1980
- KSU "Train the Trainers" course in Dakar	Sept. 1980
- ONCAD dissolved	Oct. 1980

- CAA assumes responsibility for cereals buying and the security stock program	Nov. 1980
- USAID Warehouses accepted provisionally from the builders (10 percent payment withheld)	Dec. 1980
- Third group of trainees attend summer course at KSU	July 1981
- CAA training courses held for Commercial Agents, Storekeepers, and Pest Control Agents	Sept. 1981
- USAID Grain Storage Advisor completes his contract and returns to the U.S.	Dec. 1981
- End-use study completed	Feb. 1982
- Project Evaluation completed	May 1982
- Senegalese Grain Storage Technologist due to return from long-term training in the U.S.	Dec. 1982
- Project Assistance Completion Date	End Dec. 1982

VIII - 7 DESIGN CRITERIA AND DESIRABLE FEATURES FOR STORAGE WAREHOUSES IN DRY TROPICAL CLIMATES

External sources:

Sections 1B, 1D, and 3 — Gracey, A.D. and Calverley, D.J.B., "Grain stores for tropical countries: outline specifications and construction details". Trop. Stored Products Int. 37, 1979, pp 25 - 30.

Section 4 — Hayward, L.A.Q., "Structural features of warehouses adapted for long term storage in dry tropical climates." Trop. Stored Products Int. 40, 1981, pp 14 - 23.

I. Design considerations

A. Design Loads

Design loads differ from one country to another and often within areas of a country. Many countries also have specific building codes with design security factors.

Major design loads to be considered are:

- Wind loads
- Live loads
- Dead loads
- Earthquake
- Dynamic loads.

The calculation and application of these loads must to be performed by experienced construction engineers.

B. Capacity

The usuable volume in a store is less than the store's gross volume because of several factors; all the space above eaves' level should be left for air to circulate and ventilate; a clear space or gangway at least 0.6 meter wide must be left between stacks of bags, and between a stack and a wall; space is also lost between bags themselves when stacked. The bulk volumes of agricultural products can vary considerably also, from about 1.3 cubic meters/tonne for beans to 2.1 m^3/t for flour and meal.

The apparently "wasted" space in gangways and headroom around and above stacks is essential for ventilation, access, hygiene, and fumigation activities.

Table 1 . Building size

Capacity tonnes	Floor area m^2	Perimeter length .m	Building size m x m
1,000	532	94	19 x 28
3,000	1596	170	28 x 57
5,000	2660	244	28 x 95

C. Shape and Structure Type

The suggested dimensions shown in Table 1 have a short perimeter for a given floor area, and thus reduce the area of side walls and length of roads around the building. However, some considerations may over-ride this criterion, for example, the configuration of the site and the main road, river or railway serving it, and the stocking pattern propount.

Depending on the dimensions, frame-type building or columns with conventional trusses can be used but some consideration should be given to the availability of materials in the country and the competence of the load contractor for a particular technology.

D. Siting of the Store

The soil load-bearing capacity is all important. Weak soils can substantially increase building costs. Some soils, eg black cotton soils, should be avoided altoghether if is possible.

Excessively wet areas, and dry areas which suffer from "flash" floods, are also difficult to build on. Areas which remain dry all the year round are desirable. Moisture permeation from the ground can be prevented by excavating drainage channels.

The long axis of stores should be oriented on an east-west axis ($\pm$ 10°) with the principal doors located on the north and the south sides.

A sloping site has to be cut into, which is expensive and requires one or more drainage trenches (cut-off drains) to be made across the slopes uphill from the store, to lead drainage water around and away from the

environs of the store, without causing soil erosion. Drains which cross the building site need sinking deep, covering with 150 mm of concrete all round the pipe, and the trench backfilled with hardcore.

Store floors need to be above ground level with surrounding ground/road surface sloping away from the walls and doors.

Access by vehicles: (a) to site, and (b) around store to doors or leadin ramps, is important and needs to be carefully considered in relation to the site. Local authorities may have planning requirements for roadways or recommendations on their construction. Widths of roadways suitable for today's trucks may be inadequate for the large trucks of the future (think 5-10 years into the future). Road turning circles and concrete "aprons" in front of doors need to be generously proportioned. The installation of a weighbridge to weigh empty and full trucks and hence avoid delays in loading/unloading will be needed in large installations.

II. Specifications and Desirable Features

A. Features Common to all Warehouses

1. Water vapor barrier in the floor if the store is low-lying, (i.e. if the water table is likely to rise into the foundations, during the rains).
2. Smooth, hard floor surface and all expansion joints filled with pitch or a similar compound.
3. Smooth painted interior walls free from buttresses and ledges with vertical roof supports buried in the wall.

4. Roof overhang equal to one third of the height of the walls to provide shade and prevent the entry of driving rain.
5. Roof securely attached because of the risk of high winds
6. A minimum of roof supporting cross beams to collect insect residues.
7. Continuous open ventilation under the eaves in the longer walls; strongly proofed against birds, and rodents (if the store is rodent proof in other ways).
8. Well compacted, laterite courtyard with adequate turning space for lorries.
9. Bollards in front of the doors to prevent damage by backing lorries (bollards must not obstruct the opening of hinged doors).
10. Adequate drainage system.
11. Separate office for the storekeeper with toilet/washroom facilities and a large window in view of the warehouse doors.
12. Guardian's quarters away from the warehouse but in full view of the doors and preferably near the site entrance.
13. Additional store-room for empty sacks and miscellaneous equipment, especially on multiple store sites.

B. Features Applicable to Security Stock Warehouses

Conventional Warehouses (non-fumigable)

1. Built sotres away from other food sources and standing grain crops.

2. Structure at least twice as long as broad to facilitate the stacking pattern.
3. Water vapor barrier in floor obligatory.
4. All doors in one of the long walls, set in every other (5m) bay.
5. Doors, double, hinged, close fitting about $2\frac{1}{2}$ high x 3 m wide; opening back to fix against the exterior walls fo the store. It is not necessary, or desirable for loories to enter the warehouse.
6. Personnel door, near to the storekeeper's office.
7. Concrete apron in front of each door (to contain spilt grain).
8. Smoothly rendered interior walls covered with two coasts of emulsion paint; diluting the first coat to reduce the risk of subsequent peeling.
9. Electric lighting (if there is power in the area) connected to the mains at the time of construction; all sockets and fittings to be water-proofed.
10. A strong fence or wall around each site.
11. Entrance gates robust and sited to facilitate circulation of lorries.
12. Ventilators proofed against birds, rodents, and insects.

III. Construction of Foundations, Floor and Walls.

The following information is for storage of bags of grain or similar material. If it is likely that the building may be used to store any commodity in bulk on a future occasion, then floor and walls will need

additional reinforcement and further professional advice should be sought.

i. Preparation of site. It is extremely important to have a firm base for foundations and floor. (A loosely compacted base will settle over time and will most likely settle unevenly. Eventually the floor or walls above are insufficiently supported and will crack. Cracks are impossible to keep clean and provide a home for insect infestation which will carry over from one consignment of stored products to the next). The organic matter in top-soil shrinks as it decays, so all top-soil should be removed from the site.

ii. Foundations. The weight of the roof is transmitted to the ground by steel columns, which rest in concrete foundations specially prepared for them. The manufacturers of the framework should be asked to give their recommendations. The sub-soil needs to be examined and identified as to type.

iii. Foundation trenches. The bottoms of trenches should be made level and firm and to the correct depth. Pockets of soft material need to be replaced with tightly packed hard material. Trenches ought not to be dug until ready for filling with concrete. If the trench bottom is softened by rain it is necessary to remove the soft layer before placing the foundation. Wet concrete should never be poured into standing water.

iv. Reinforcing. For normal flooring and walls, mild steel reinforcing bars approximately 15 mm diameter and about 2.5 m long are usually adequate.

v. Drainage. If it is wished to erect a large store using two or more basic store units side-by-side, then arrangements must be made to dispose of rainwater collecting in the gutter where the eaves meet. A calculation of likely highest hourly rainfall will be necessary to specify gutter size. Downpipes along the length of the gutter should be avoided; all downpipes should be at the ends. A convenient way to transfer water from the gutter to the downpipe is to arrange the gutter to empty into a small tank just below its end and lead the downpipe (0.15-0.20 diameter) down from a hole in this tank's base. If the tank is slightly titled, any overflow will spill away from the walls.

vi. Walls. It is best not to build masonry walls on an extension of the floor slab, but to build them up directly from a wide concrete strip foundation. Vertical columns to carry roof rafters hould have foundation pads deep, thick and wide enough for all anticipated loads and stresses. Blocks must be correctly bedded, using correct mixes for cement and concrete (see Table 3 below), and good workmanship is essential. Correct bonding is important; vertical joints need to be staggered, hollows in the blocks to be filled should be placed accurately one above the other, steel reinforcing rods should overlap by about 600 mm, and the concrete filling the hollows well compacted during filling. The inside surfaces of walls need to be rendered with a thin layer of plaster. Exterior surfaces should not be plastered but given a good cement wash (with a thin slurry of cement and water) and aterproofed with a white or light-coloured bitumen paint. A thick coating of bitumen along the bottom of interior surfaces - from below the bottom of the floor slab to about 0.3 m above final floor level will ensure a dry wall.

vii. Floor. Avoid infilling the floor area with loose earth. Never use topsoil. If infill must be used, choose stones, rubble or broken bricks and consolidate these thoroughly in layers 150-300 mm thick, using sand or fine gravel to fill in gaps between larger stones. Cover the surface with 5-8 cm of moist sand weel consolidated and beaten down firmly. Take particular care near foundations for walls and pillars. Lay the floor concrete after the roof is built. Design the final floor level to be higher than the adjacent roadway and ground levels and slope these away fro; the floor and walls. An outfall slope to doors of 50 mm in 3 m is required for both the base and the final floor surface. The final consolidated layer of sand or soil-cement (approx. 60-80 mm thick) should be treated against termites, and a damp-proof membrane (see Figure 1) of thick plastic or ployethylene sheeting laid on top. Overlap of the edges needs to be 0.5 m, with ends being brought right to walls and up the wall 0.3 m. (This membrane may be omitted if the rainfall is less than 200 mm p.a.) Thickness of the floor concrete neeeds to be at least 0.15 m thickened to about 0.20 m on the underside at the edges for additional strength. Expansion joints 10-20 mm wide (to be filled with bitumen, or mastic, later) should be left every 5 m or so, and around the bases of columns or pillars.

IV. STRUCTURAL DETAILS AND FEATURES OF THE FSP STORES

Structural dimensions and loading capacity of the FSP warehouses being constructed in Senegal.

Nominal capacity (tonnes)	500	1,000
Span width (m)	14.5	14.5
Length (m)	20	40
Height (m)		
- to roof truss	4.4	4.4
- to roof ridge	5.5	5.5
Roof pitch %	17(10°)	17(10°)
Eaves overhang (m)	1	1
Cables overhang	0.62	0.62
Calculated capacity (tonnes) if loaded with 100 kg bags of millet 15 layers high	648 (1 stack, with a 1m gangway all round)	1332 (2 stacks, with 1m between and 1m all around.

Structural details of the FSP sotres

General. The siting and basic features of produce stores should conform to certain well defined conditions which have been described by Gracey and Calverley (1979) and also by B. Lutz (private communication). These conditions have been respected insofar as they are relevant to the special purpose stores under discussion.

Dimentsions and storage capacity. The units initially constructed in 'Niger, with a nominal capacity of 500 tonnes, were 10m wide x 25m lon; x4.4m high at the roof truss. The units constructed in Niger, Mauritania and Senegal during the last two years are as described in Table 1.

Structural features for particular functions

Protrection against rainwater. There are no openings at the sides of the warehouses and the main possible routes for the entry of rain are through the air vents and doors which are the gable ends. Changes of rain entering at these points are reduced by the following structural features.

i. The gable roof overhang is 0.62 m.

ii. The air vent covers are near the roof and are well-fitting when closed.

iii. The sills of the air vents slope towards the exterior of the building.

iv. Entry of rain at the top of the doors is prevented by a special metal protecting sheet in the 500 t stores and by a protruding beam in the 1000 t stores.

v. The doors are well-fitting and the central point of contract is covered with an overlapping metal flange.

vi. The ramp outside the doors slopes away from the building thus facilitating the drainage of rainwater.

In the unlikely event of the entry of any rain the stocks are protected from any small puddles by the wooden pallets.

Protection against insects, birds and rodents. A channel 5 cm x 5 cm above the floor expansion joints, filled with bitumen, effectively prevents the entry of termites. Well-fitting doors and air vent covers, together

with a continuous seal between the roof and walls, prevent the entry of birds, rodents and flying insects. There is a coarse external grill to prevent entry by birds and rodents and an inner fine screening to stop flying insects when the vents are open.

Sealing for fumigation. The structure of the buildings minimises exchange between internal and external air when the doors and air vents are closed thus facilitating effective fumigation. Final sealing is simply accomplished, in a few miniutes prior to undertaking a fumigation, by using special sealing tape to cover all joints of the doors and air vents.

VIII - 8 WAREHOUSE COSTS AND ANNUAL MANAGEMENT COST ESTIMATES

Compared Building Costs for USAID and German FRG Warehouses

USAID Warehouses (220 CFA/$US)		FRG (220 CFA$US)	
Construction: late 1979 to May 1981		Construction 80-81 (kahone)	
Theoritical capacity: 30 000 MT total		Theoritical capacity: 4 000 MT	
Effective (1) (Millet): 32 000 MT total		Effective (1) (Millet): 5 400 MT	
1. Structure Materials: 1 016 984 Roofing and ventilation.		1. Admin. Eng. Design 10% of 65 000 000 CFA	(6 500 000 CFA) 29 545 $
2. AAPC, AID and REDSO Admin. costs (evaluation)	100 000	2. VERITAS (Controls 1,5% x 65 000,000	(975 000 CFA) 4 432 $
3. Evaluated from PIO file Admin. (CAA-ONCAD)	(50 000 000 CFA) 287 000 $	3. Materials and contractor (including guardian's house and warehouse 65 000,000 CFA)	(65 000 000 CFA) 295 454 $
4. Consultants LBII 35 320 000 CFA	160 600 $	4. Roads and sites (2)	(15 000 000 CFA) 68 181 $
5. Contractors (SEG & SONEG-VIRMAUD)	(375 400 000 CFA) 1 660 600 $		
Total Costs to date	3 265 400	Total Costs:	397 612 $
Cost per MT	102,05 $	Cost per MT	73,63 $/MT

Upgrading USAID Warehouse (300 CFA/$US)

1. Ventilation	125 000
2. Doors (74)	150 000
3. Concrete slab and door protection	100 000
4. Joint Frame	7 000
5. Sites	125 000
6. Guardian Office and warehouse	200 000
Total	707 000
Total Final Cost Per MT	124,15$/MT

Data Source: AID files and evaluation

Construction 81-82 (Diourbel)
300 CFA/$US

Theoritical capacity	6 000 MT
Effective capacity	8 000 MT
1. Admin. Eng. Design	10%
2. VERITAS (controls)	1,5%
3. Materials, (contractors and site prep.) 110 000 000 CFA (including guardian office and warehouse)	366,670 $
Total Costs	414 400 $
Costs Per MT	51,60/MT

Data Source: Agroprogress files.

(1) Using the same criteria as for calculation of the effective capacity of the German warehouses. Total effective capacity of the USAID warehouses is 32,000 MT.

(2) These costs were higher than normal because it was a separate contract after warehouse construction and include a water protection infrastructures.

FOOD GRAIN RESERVE

ANNUAL COST ESTIMATES

A. FOR 10,000 MT (Assume 4 years rotation)

I.	INVENTORY COSTS		
	Grain 40 CFA + 2 CFA (bags) - 42 CFA/kg	420,000,000	
II.	STORAGE COSTS		
	Building ($36,000 ÷ 250 MT - $144/MT) $144 x 215 CFA x 10,000 MT - 309,600,000		
	Insurance 1%	3,096,000	
	Interest 6% x 1/2 of storage space used for foodgrain	9,288,000	
	Repairs - Maintenance 1%	3,096,000	
	Depreciation 20 yrs or 5%	15,480,000	30,960,000
	Per Metric Ton at CFA 215		$14.40
III.	OPERATING COSTS		
	Insurance on grain at 1%	4,200,000	
	Interest on grain at 6%	(25,200,000)	
	Treatment - Fumigation 3%	12,600,000	
	Transport - Handling 3,000 CFA/MT/4 (3,000 x 10,000 ÷ 4	7,500,000	
	Personnel - Warehouse	600,000	
	- Sanitarian	300,000	
	- Guardian	200,000	
	Storage Losses 2%	8,400,000	
	Other 2%	8,400,000	42,200,000
	Per Metric Ton at CFA 215		$19.63
IV.	ADMINISTRATIVE COSTS		
	Participation in ONCAD General Cost 4%	12,384,000	
	Per Metric Ton		$ 5.76
V.	INTEREST ON GRAIN	25,200,000	
	Per Metric Ton at CFA 215		$11.72

B. SUMMARY

I. FOR ONE MT	CFA	$
1. Storage Costs	3,098	14.40
2. Operating Costs (less Int. on Grain)	4,220	19.63
3. Administrative Costs	1,238	5.76
4. Interest on grain	2,520	11.72
	11,076	51.51
II. FOR 10,000 MT	110,740,000	515,100
III. FOR 40,000 MT	442,960,000	2,060,400

Source: USAID (Files of Lance Jepson for 1978/1979)

COST PRICE STRUCTURE OF LOCAL MILLET

	1977/78 .... in F CFA/t	1978/79	Evolution of the main headings (t)
Price paid to producers	35 000	40 000	+ 14,3
Sacks and bags	2 100	1 797,75	- 14,4
Transport	3 700	4 100	+ 25,0
Handling		525	-
Storage charges	-	864	-
Premium to weigher	4	125	-
Premium for President	1	25	-
Insurance transport of funds		17	- 73,4
Fire insurance	147	15	- 89,8
Financial charges	656	2 642	+302,7
Overhead expenses	328	486	+ 48,2
Storage losses	-	400	-
Storehouse depreciation	-	185	-
Total in round figures	42 000	51 182	+ 21,9
Homologated retrocession prices	-	46 500	-
Differential to be subsidized	-	4 682	-

Source: ONCAD
(Reprinted in CILIS, Club du Sahel
Cereals Policy in Sahel Countries, Case Study Senegal ONCAD
July 1979)

Food grain reserve

ANNUAL COST ESTIMATES 82-83

For 30,000 MT (Assume 3 year rotation)
300 CFA/$

I. Inventory Costs

Grain = 50 CFA + 2.5 CFA (bags) = 52.5 CFA/kg CFA 1,575,000,000
dt. = 300 CFA/$ (5,250,000)

II. Storage Costs.

- Building (based on German warehouse costs)
  20,000 CFA/MT x 30,000 MT
  + 600,000,000 CFA
  ($2,000,000)

Insurance 10%	CFA	6,000,000
(1) Interest - nil		-
Repairs and maintenance 1%	CFA	6,000,000
Depreciation 20 years or 5%	CFA	30,000,000
Taxes - nil		-
Total CFA		42,000,000
		(140,000)

III. Operating Costs

(2)	Insurance on grain 0.12% (min)	CFA	1,890,000
	Interest on inventory cost 6% (min)	CFA	94,500,000
(3)	Treatement-Fumigation-Chemicals only evaluated at 1000 CFA/MT in RFA warehouses)		30,000,000
(4)	Equipment - treatment		300,000
	- grain testing		
	- transport-handling 3500 CFA/MT 3500 x 30,000 : 3		35,000,000

(5) Personnel - warehouse - sanitation - guardian		
Storage - losses 1% on long term stock 2% handling losses total 3%		47,250,000
	Total	208,940,000
	US $	(696,466)

IV. Administration Costs

CAA total budget 1981 - 423,000,000 CFA

(6) Qdministration = 65% total budget		275,000,000
	US $	(916,667)

Summary

Cost per MT

	CFA	US $
1. Storage costs	1,400	4.66
2. Operating costs	6,965	23.31
3. Administration costs	9,166	30.53
Total	17,531 CFA	$ 58.50 US

Notes

(1) Interest on storage space is consider to be zero since the buildings are Foreign government grant to Senegal. The storage costs are also calculated with the average cost of the German warehouses.

(2) Insurance on grain was established at 0.12% of grain costs based on Agroprogress data.

(3) For RFA warehouses (previous year's data). In the USAID warehouses the costs of treatment are evaluated to be 50% more (1500 CFA/MT minimum).

(4) The equipment cost are based on the depreciation and maintenance of grain treatment and testing equipment.

(5) All the personnel costs are included in the CAA administration costs.

(6) This par of the CAA budget was for the buying and selling of 35,000 MT for the 80-81 millet season (source CAA and agroprogess).

Comments

It is assumed that with a higher volume e.g.: 65,000 MT, the CAA administration costs will not be directly proportional to the amount of grain. The cost on a per ton basis for 65,000 MT is evaluated at 9 to 12 CFA/kg.

VIII - 9 CAA STORAGE FACILITIES BY LOCATION AND CAPACITY

USAID Warehouses

No.	Region	Locality	Capacity in tons
1	Fleuve	Podor	2000
2.	Thies	Mbour	2000
3.	Thies	Joal	1000
4.	Fleuve	Aere Lao	1000
5.	Casamance	Koussi	1000
6.	Senegal Oriental	Kedougou	1000
7.	Diourbel	Dahra	2000
8.	Senegal Oriental	Bakel	1000
9.	Casamance	Kolda	1000
10.	Fleuve	Ndioum	1000
11.	Thies	Pissel	1000
12.	Senegal Oriental	Koumpentoum	1000
13.	Casamance	Koukande	1000
14.	Diourbel	Dara Mousty	2000
15.	Thies	Tivaouane	1000
16.	Thies	Niakhene	1000
17.	Sine Saloum	Keur Madiable	1000
18.	Louga	Louga	2000
19.	Fleuve	Thille Boubacar	1000
20.	Sine Saloum	Kaolack	2000
21.	Thies	Thies	2000
22.	Sine Saloum	Fimela	1000
23.	Thies	Thilmakha	1000

ONCAD Warehouses

	Location	Capacity (MT)
1.	Ourossogui	2,000
2.	Linguere	2,000
3.	Thilogne	1,000
4.	Dagana	2,000
5.	Kebemer	2,000
6.	Kaffrine	2,000
7.	Nioro du Rip	1,000
8.	Sokone	1,000
9.	Djilor	1,000
10.	Fatick	2,000
11.	Gossas	2,000
12.	Colobane	2,000
13.	Mbacke	2,000
14.	Diourbel	2,000
15.	Medina Saback	1,000
16.	Wack Ngowna	1,000
17.	Banbey	2,000
18.	Koungheul	2,000
		30,000 MT.

FRG Warehouses

Locations	Theoritical capacity	Total effective capacity
Kaolack (Kahone)	4 x 1,000 MT	5,400 MT
Thies	7 x 1,000 MT	9,300 MT
	6 x 500 MT	3,800 MT
Louga	6 x 1,000 MT	8,000 MT
Diourbel	6 x 1,000 MT	8,000 MT
Total	26,000 MT	34,500 MT

VIII - 10 DRAWINGS OF STORAGE FEATURES

1 - Sran steel plan 32-18 (T)

2 - SCH No 1 position of the ventilators

3 - SCH No 2 " " "

4 - SCH No 3 ventilators

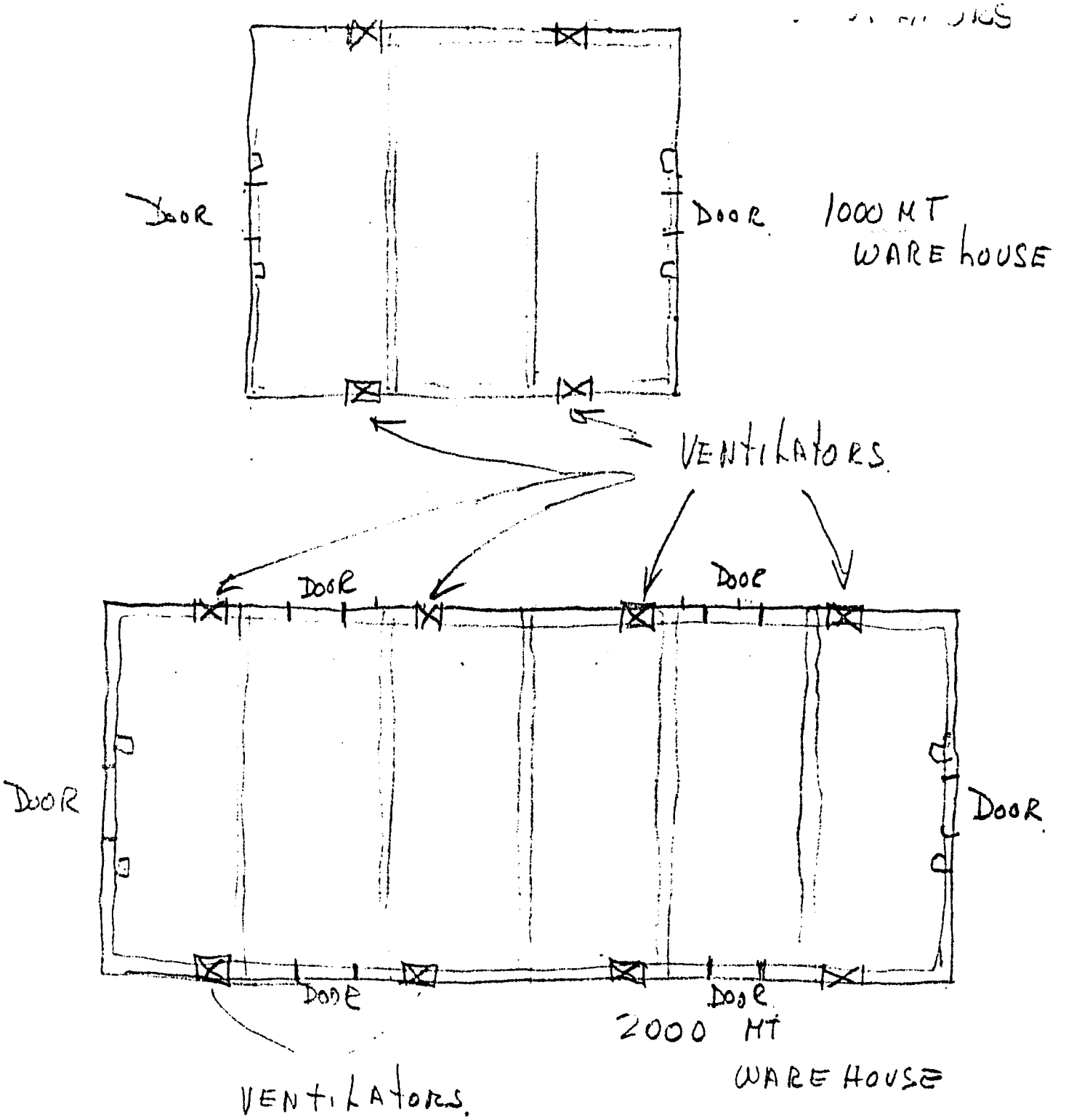
5 - SCH No 4 hinged type doors

6 - SCH No 5 " " "

7 - SCH No 6 doors protection structure

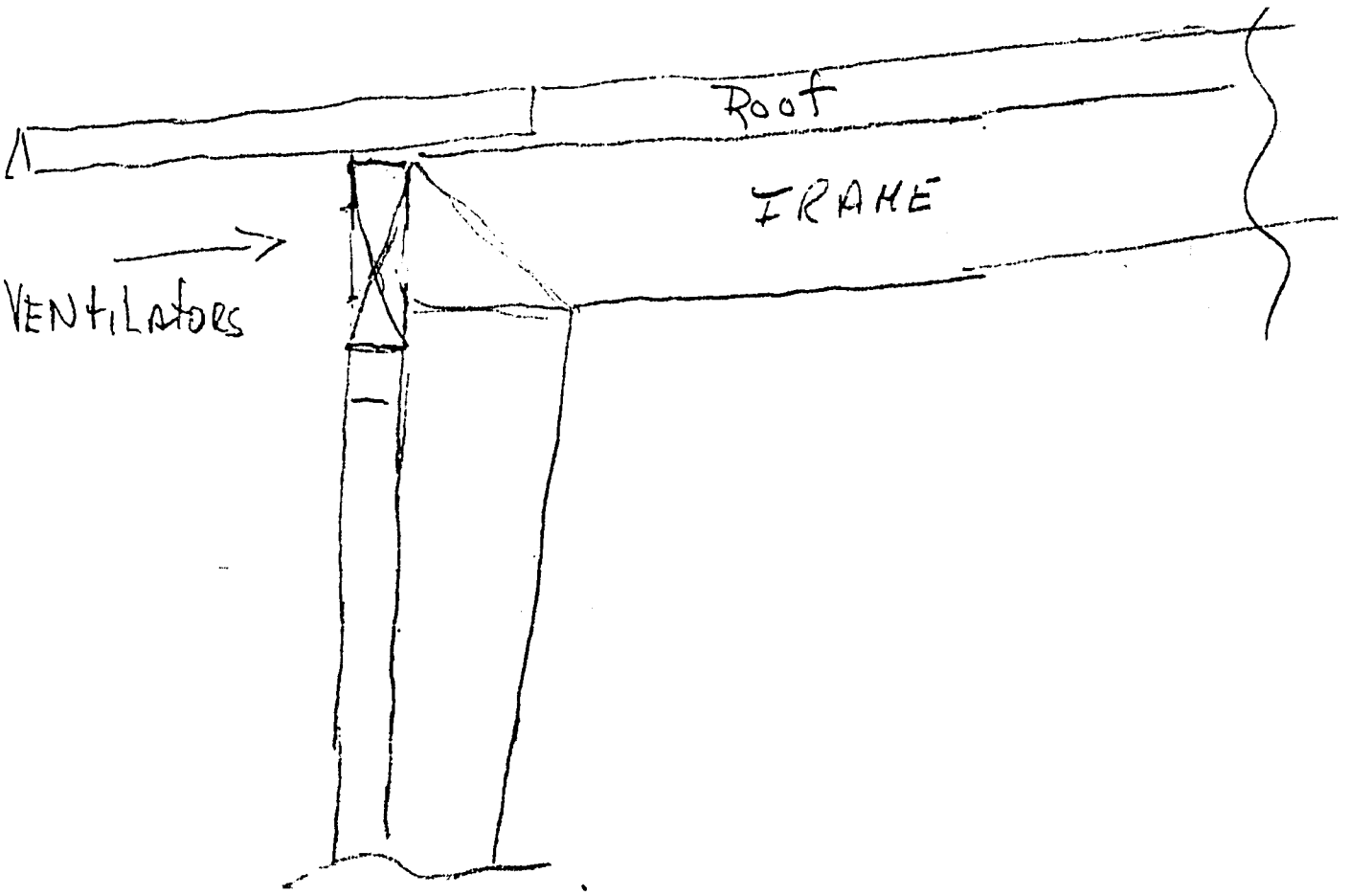
8 - SCH No 7 typical location of office and guardian house

9 - SCH No 8 floor foundations and joints.



Position of ventilators

SCH # 1



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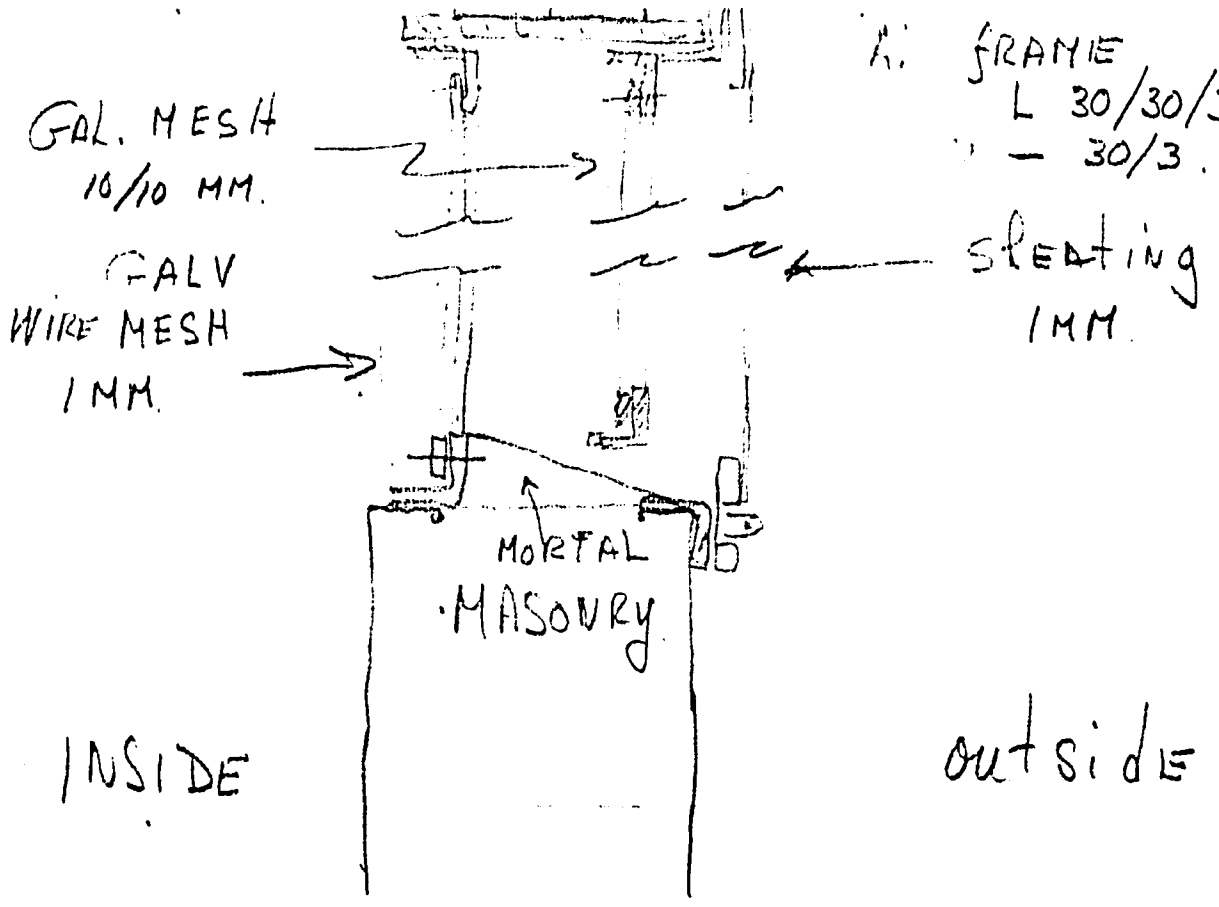
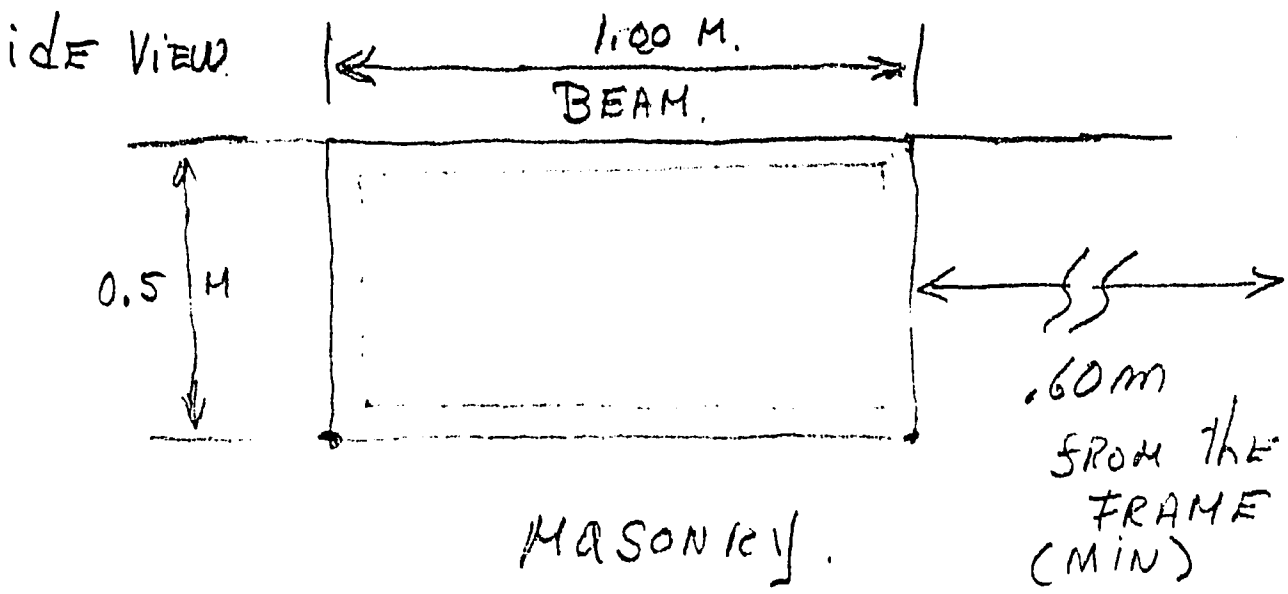
Position of the ventilators

SCH #2





VENTILATORS

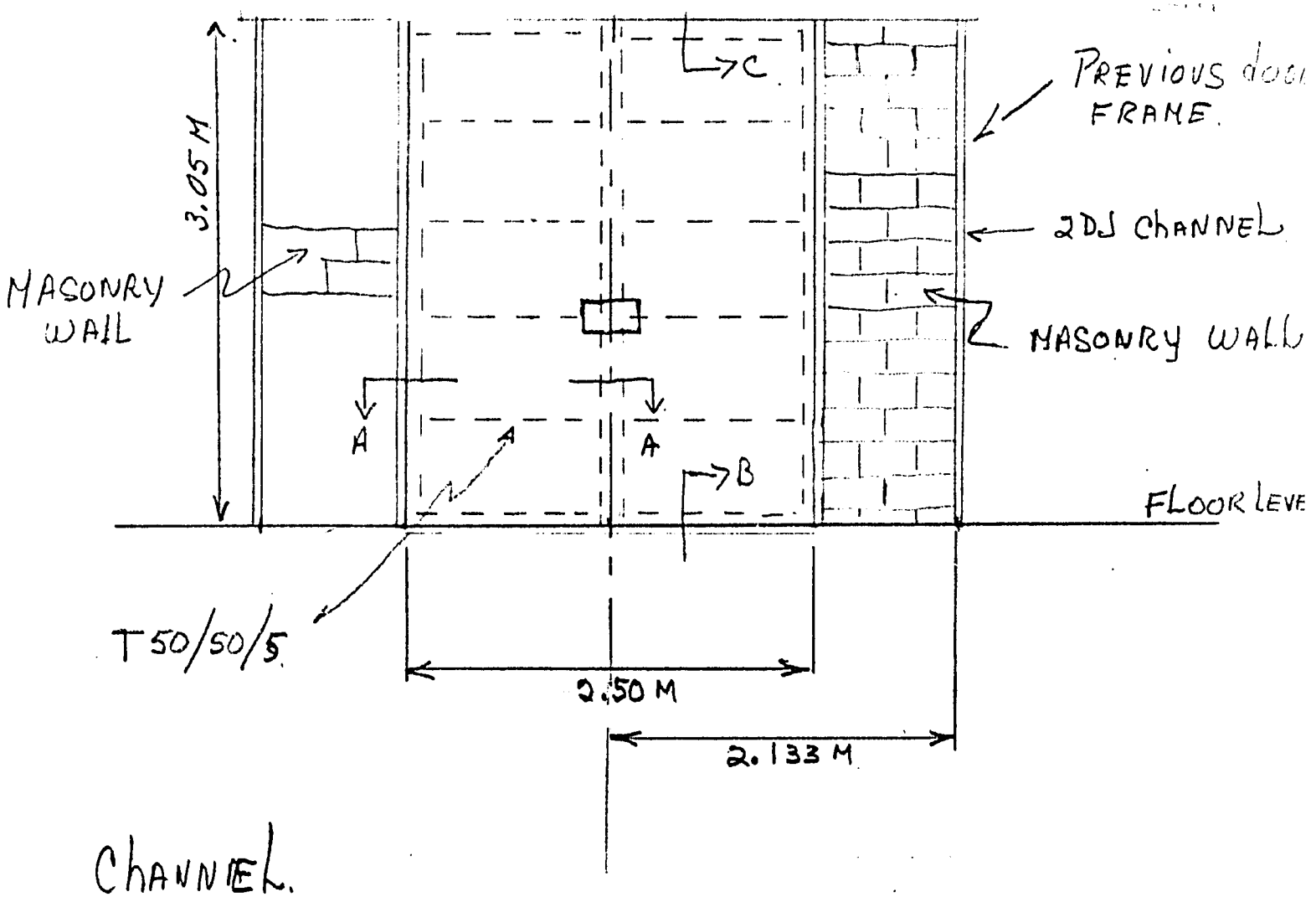
SCALE ?..

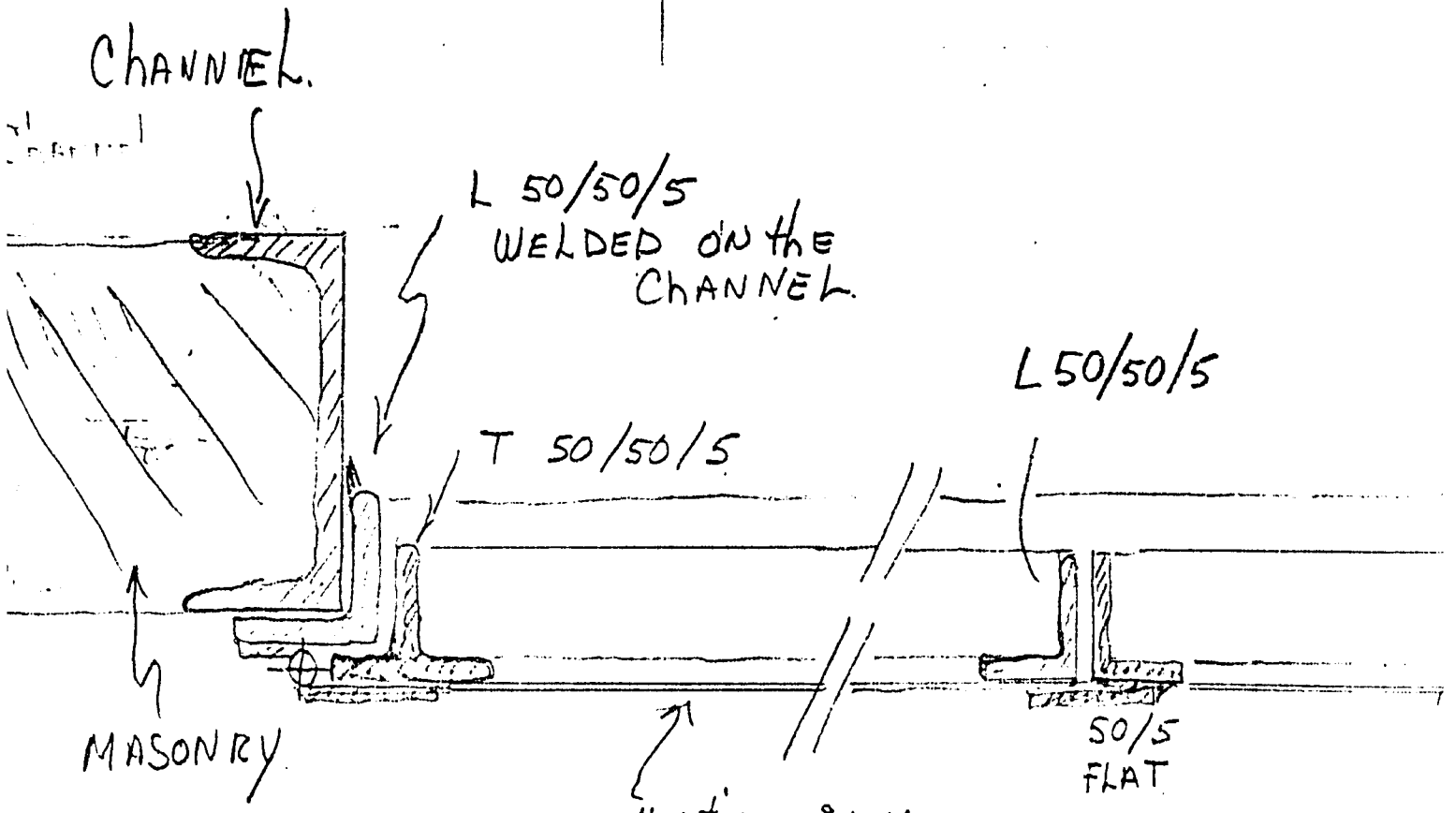
VISITE DE CHANTIERS HANGARS
U.S.A.I.D.

-o-o-o-o-o-

Mission effectuée par:Kenneth Steinke et Amadou Khouma

Visite du:3 au 7 Mars 1981

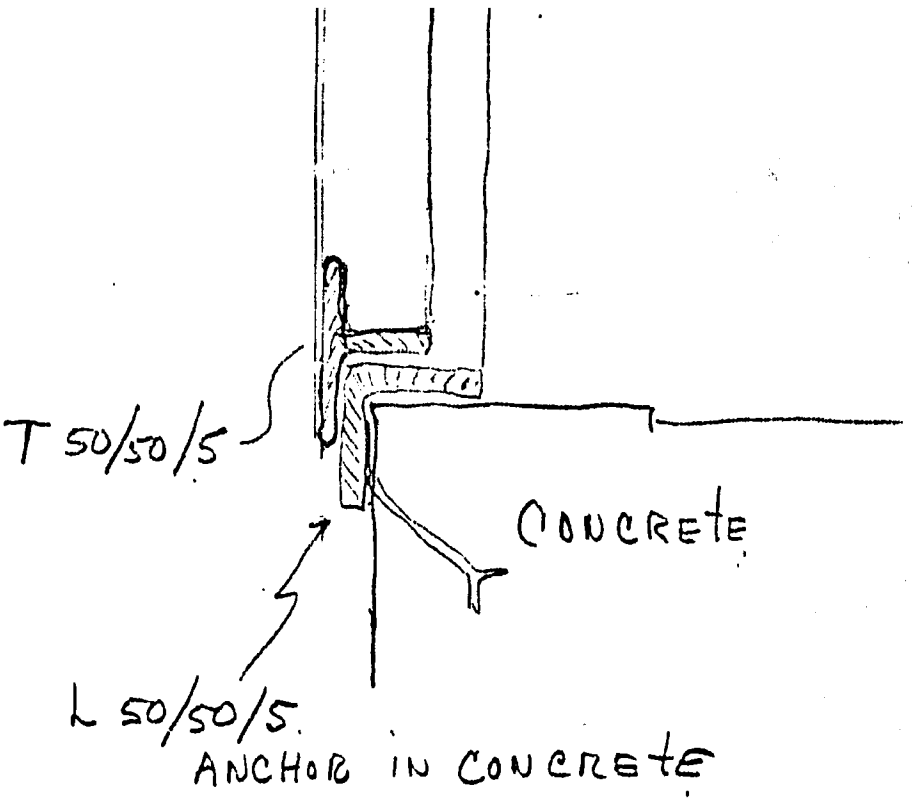




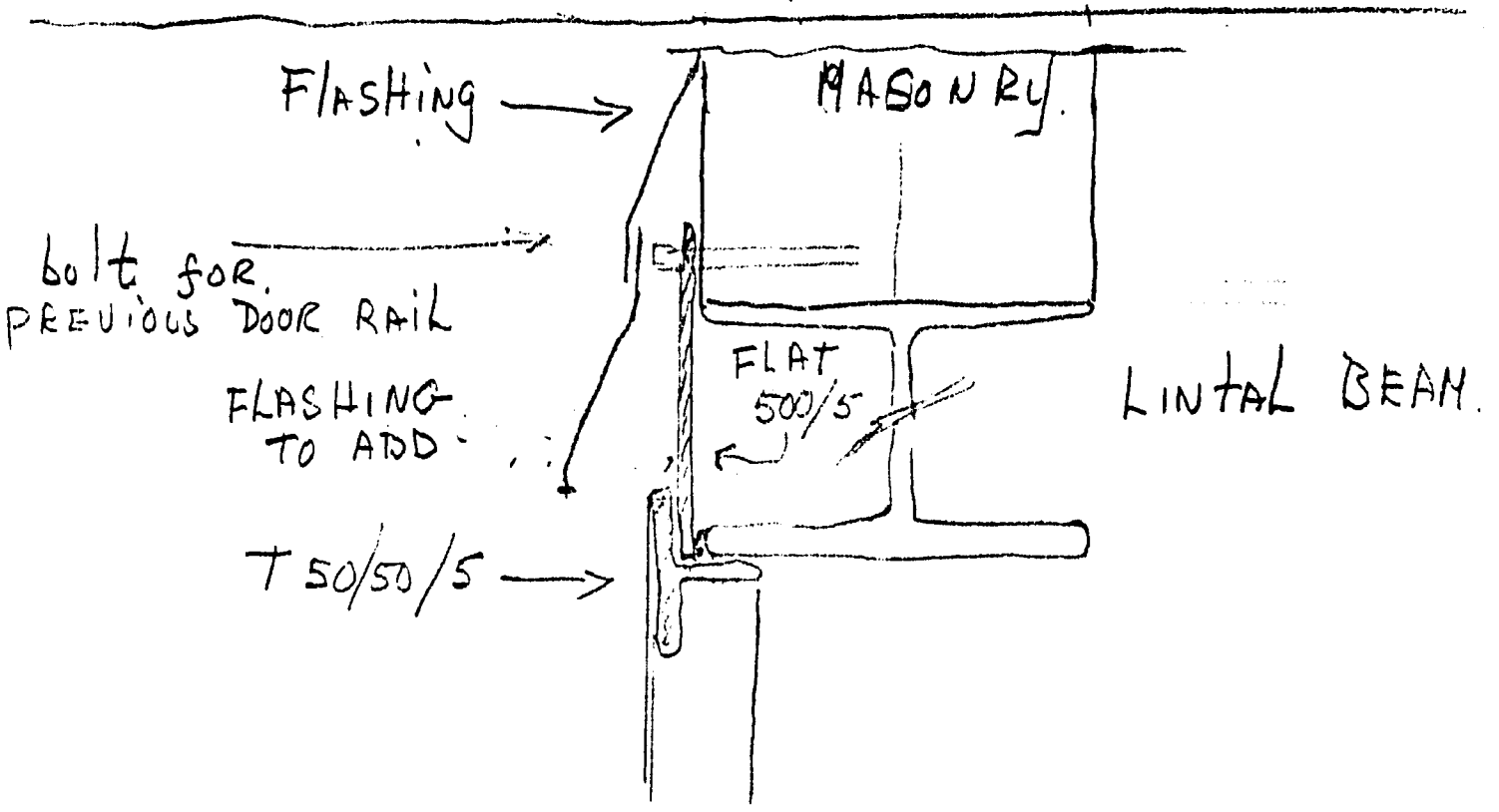
SECTION AA

HINGED TYPE DOORS

SCH #4



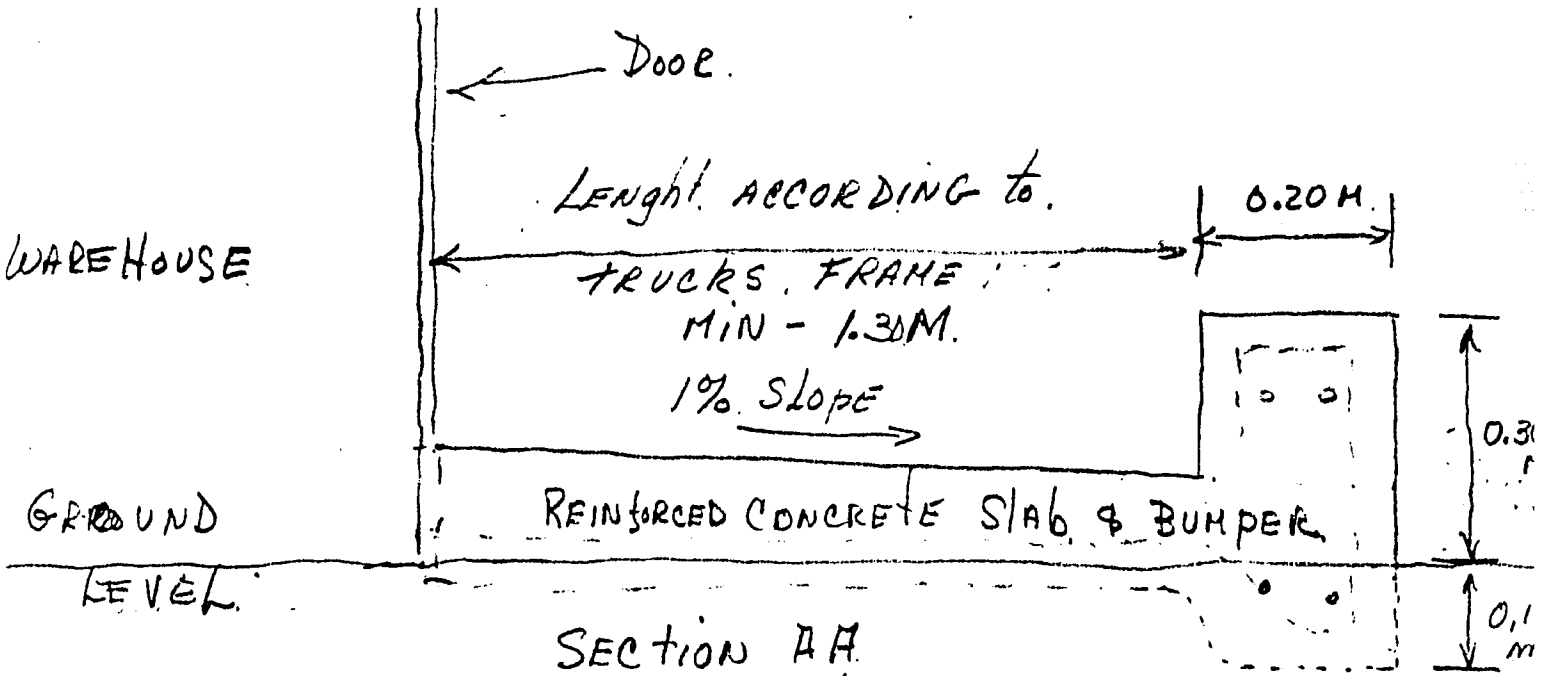
SECTION B.



SECTION C. (REF to ASI 1007 P 3 OF 4
E 3 OF 5

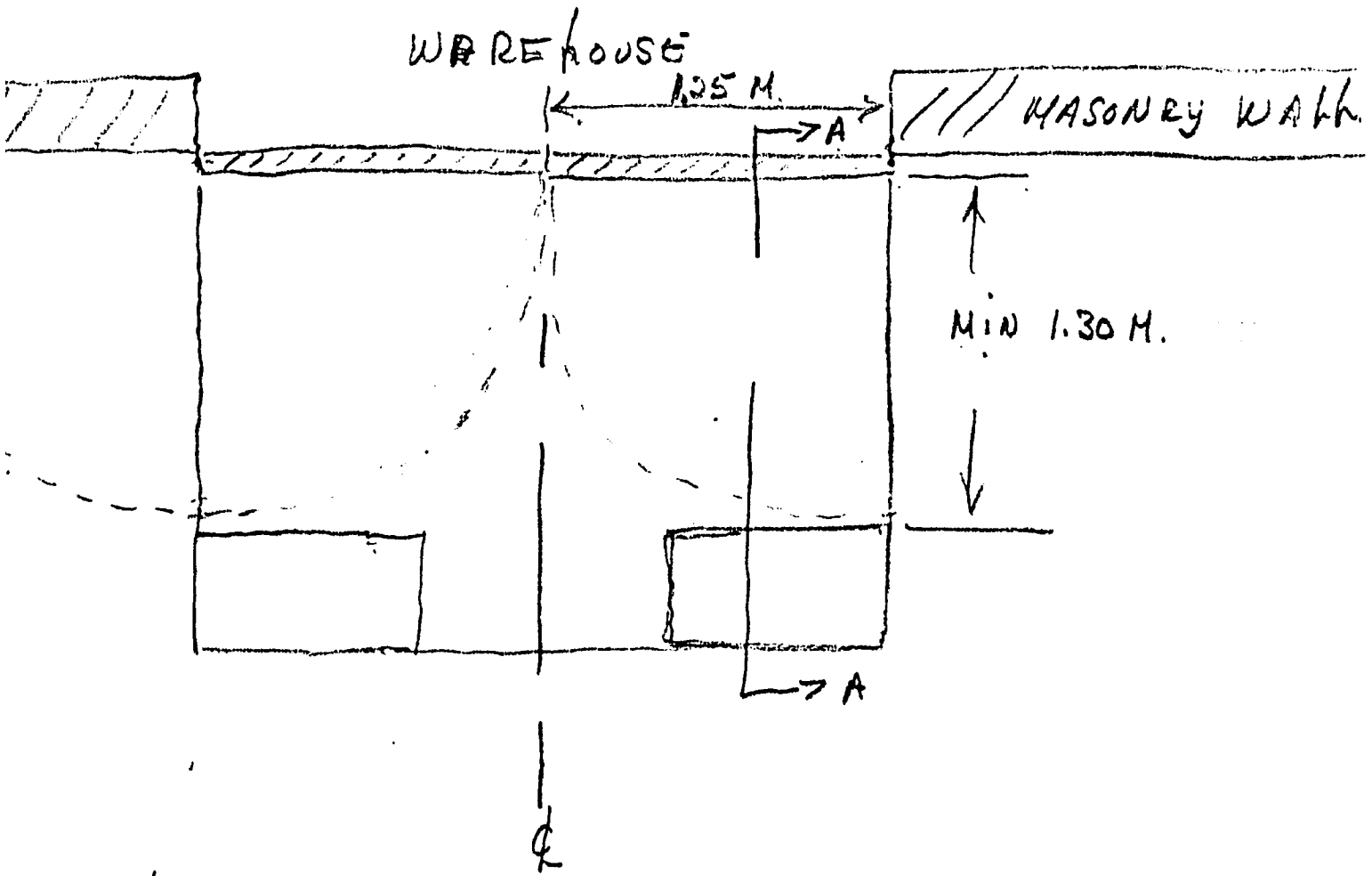
HINGED TYPE DOORS.

SCN # 5



SECTION AA

CONCRETE DOOR PROTECTIONS



CONCRETE

DOOR PROTECTIONS

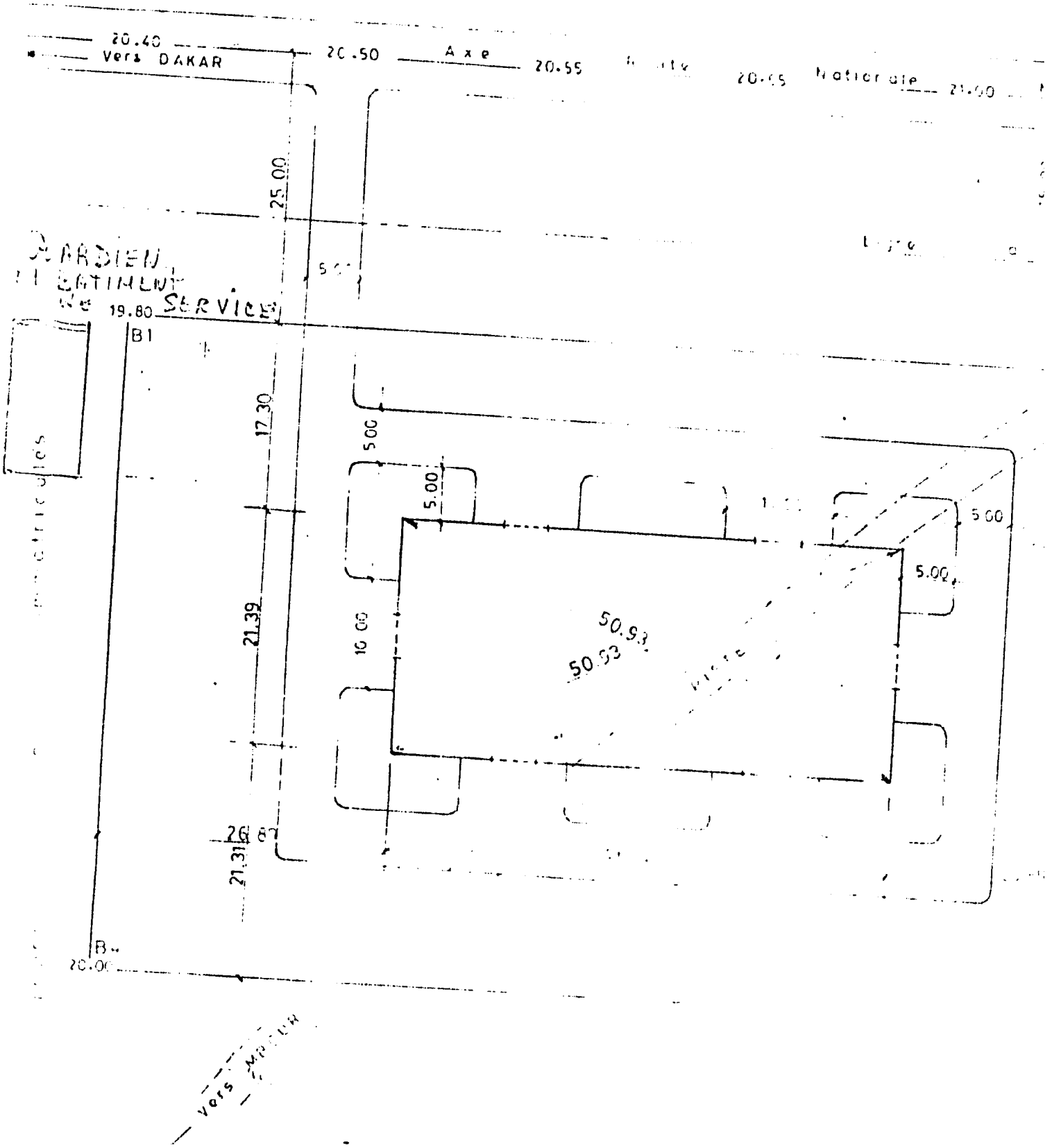
SRH - 6

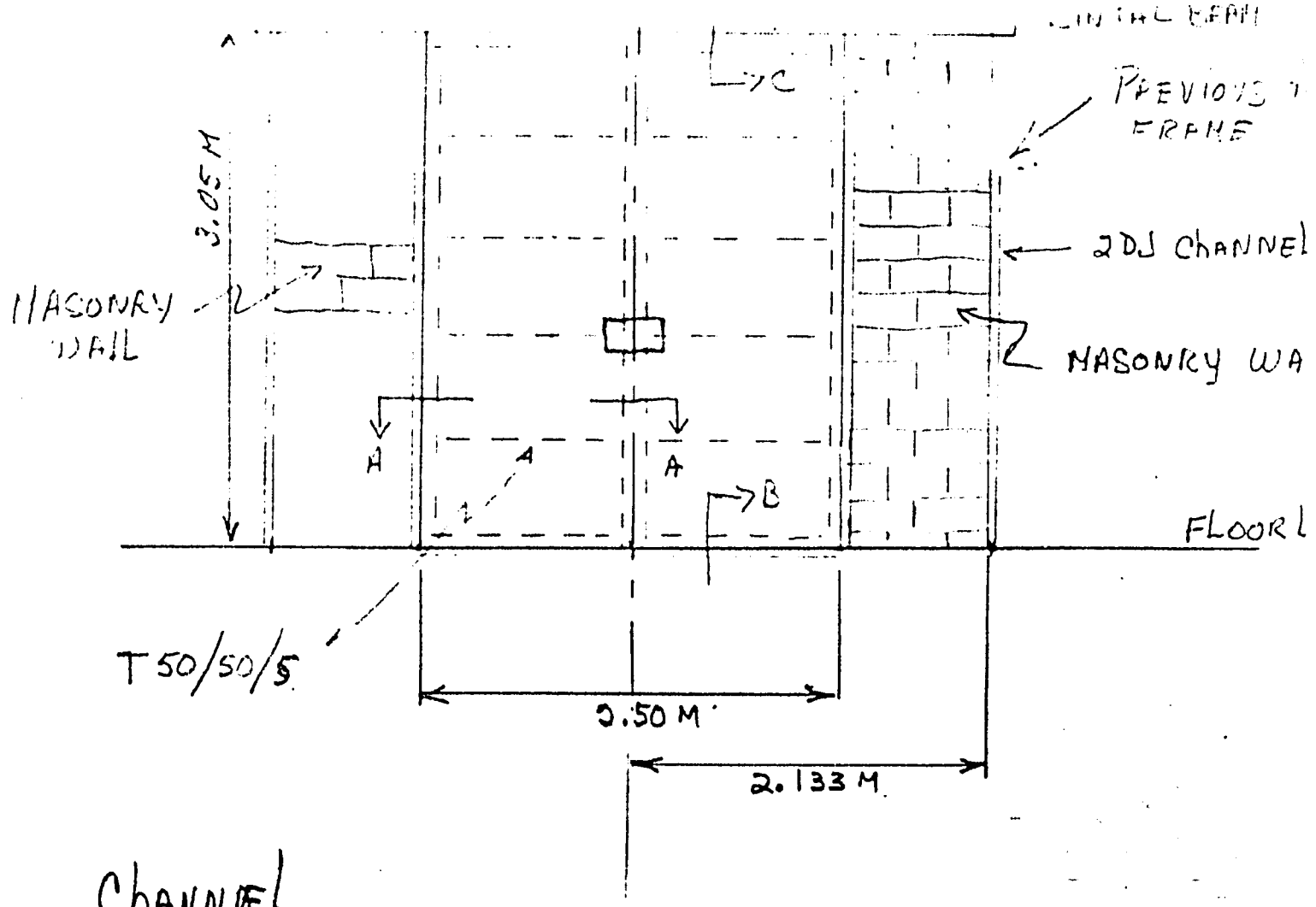
...2

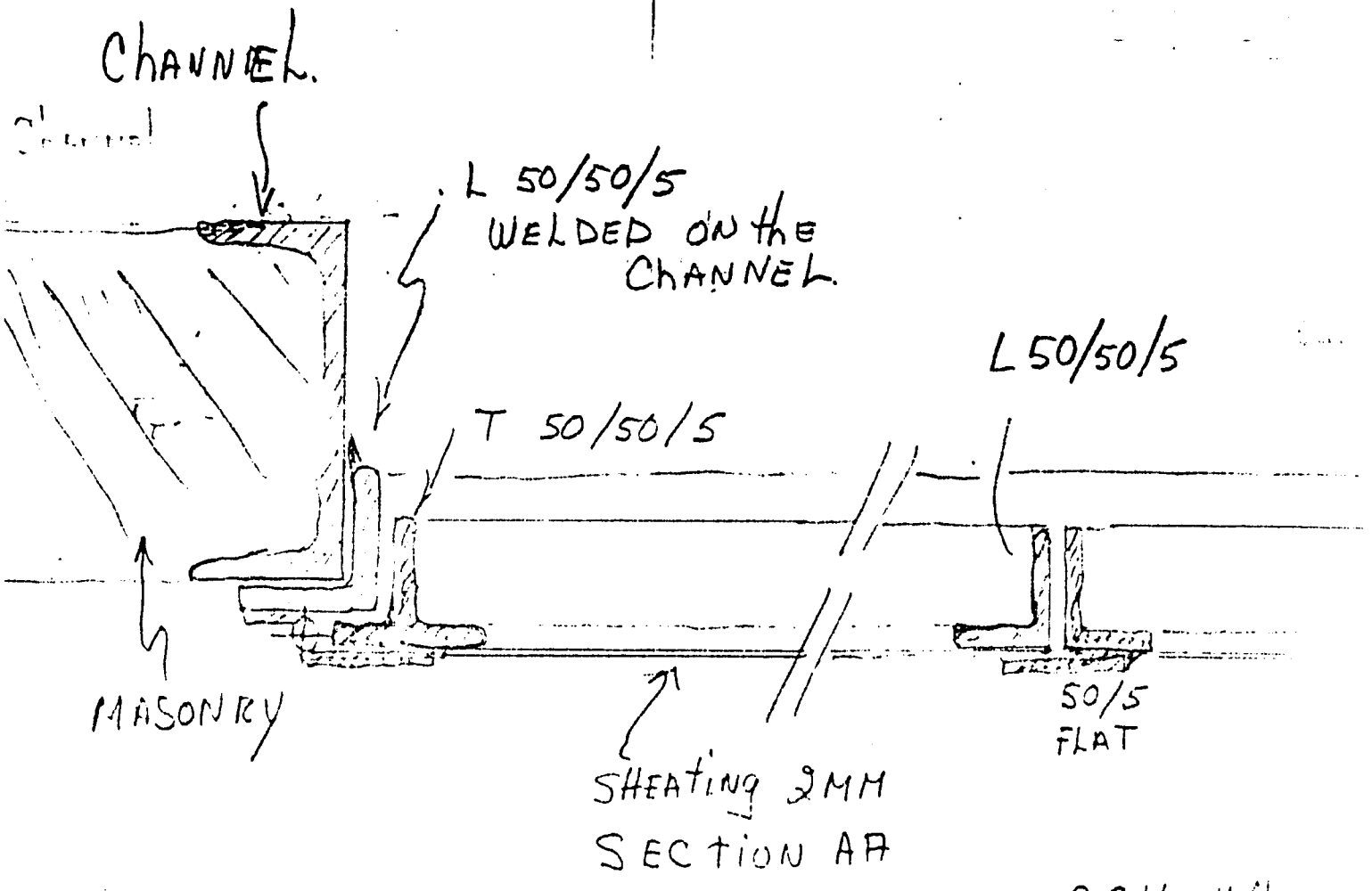
With Louis Berger

MBOUK

Terrains non immatriculés



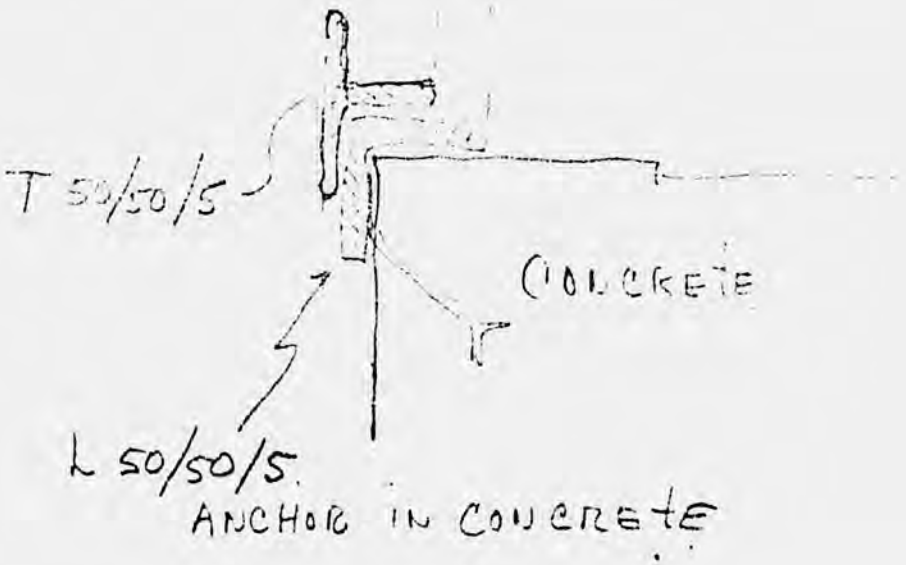




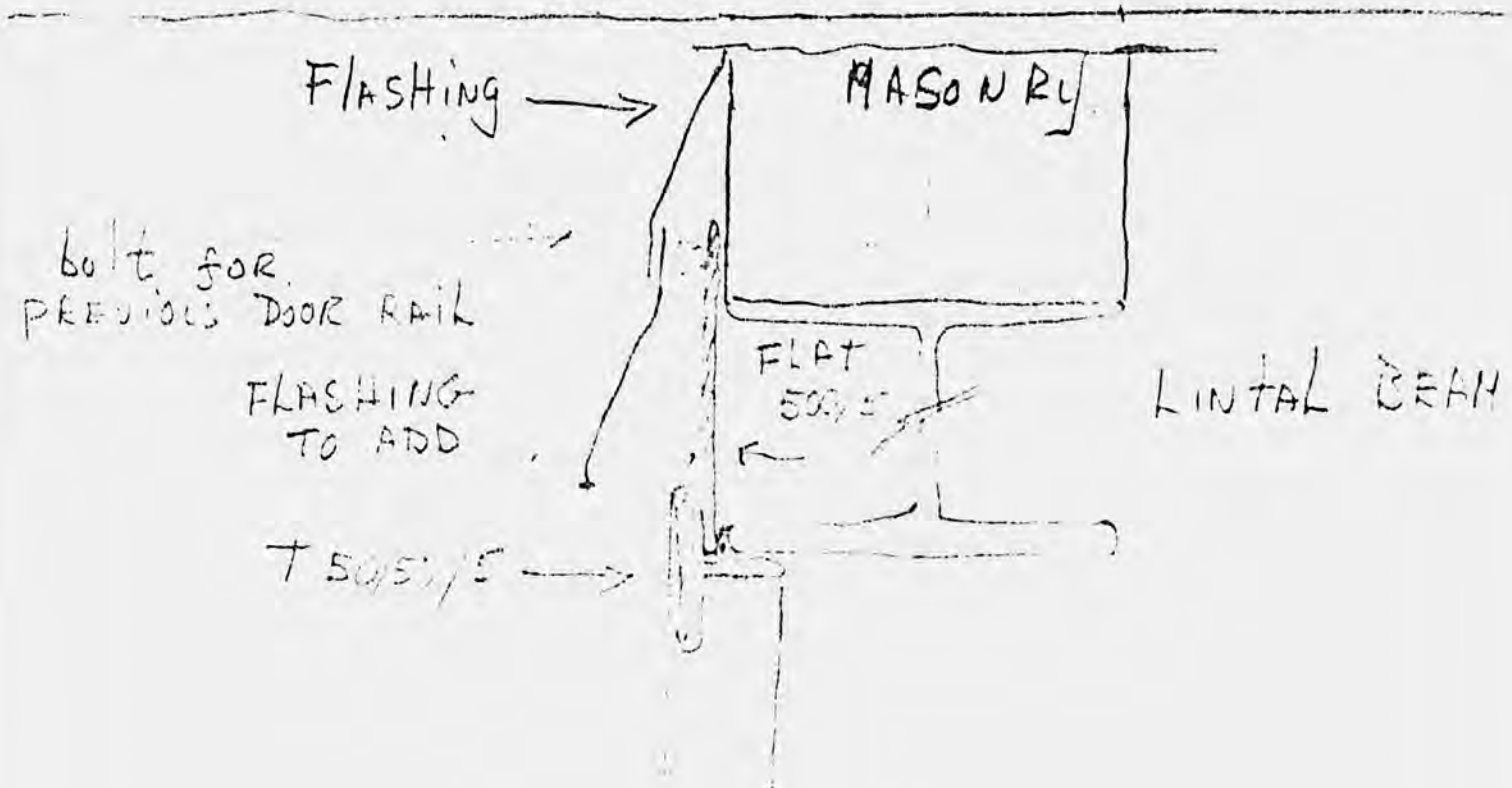
SECTION AA

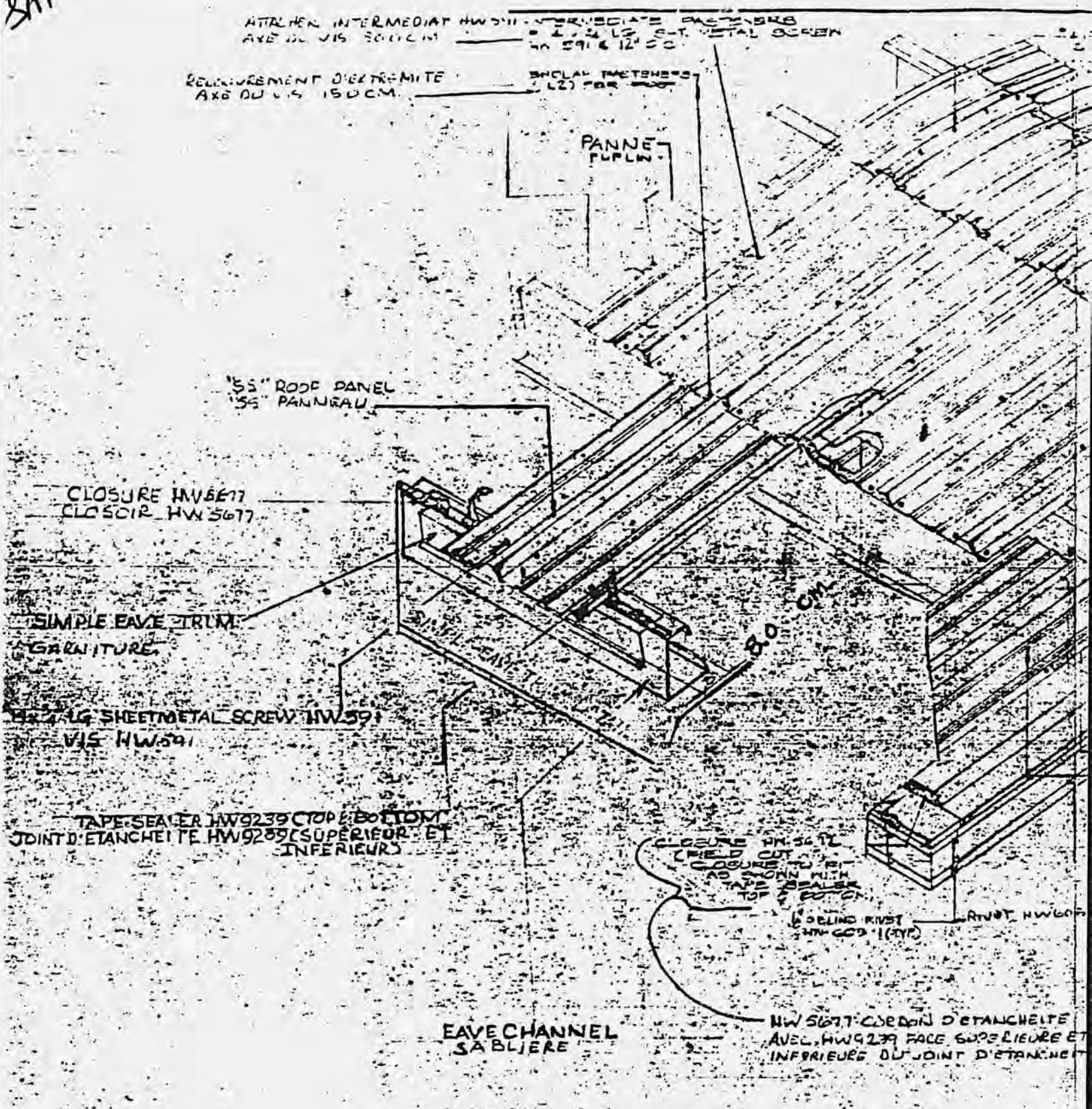
HINGED TYPE DOORS

CCH AA

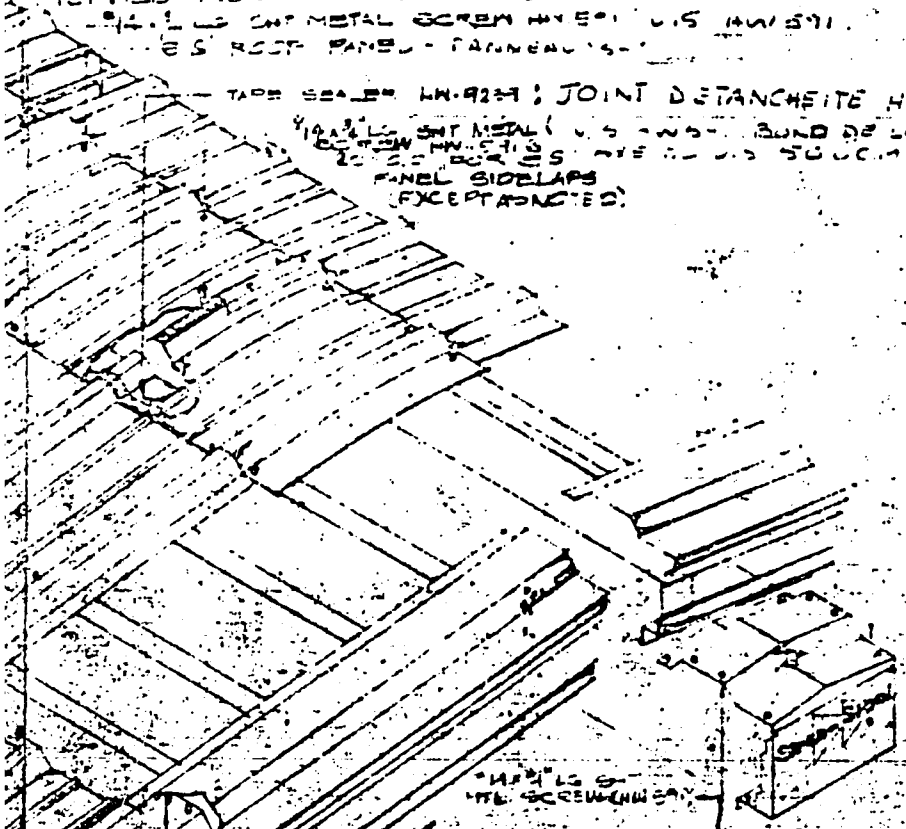

T 50/50/5
CONCRETE
L 50/50/5.
ANCHOR IN CONCRETE

SECTION B


FLASHING
MASONRY
bolt for
PREVIOUS DOOR RAIL
FLASHING
TO ADD
FLAT
500 x
LINTAL BEAM
T 50/5/5


ATTACHEN INTERMEDIAT HW 5611
AXE DE VIS 50 CM
RELEVEMENT D'EXTREMITE
AXE DU VIS 150 CM
PANNE
PURLIN
"55" ROOF PANEL
"55" PANNEAU
CLOSURE HW5677
CLOSOIR HW 5677
SIMPLE EAVE TRIM
GARNITURE
#12 x 1" LG SHEETMETAL SCREW HW 591
VIS HW 591
TAPE SEALER HW9239 (TOP & BOTTOM)
JOINT D'ETANCHEITE HW9239 (SUPÉRIEUR ET INFÉRIEUR)
CLOSURE HW 5677
(FIELD CUT
CLOSURE TO FIT
AS SHOWN WITH
TAPE SEALER
TOP & BOTTOM)
BLIND RIVET
HW 609 1 (TYP)
RIVET HW 609
EAVE CHANNEL
SABLIERE
HW 5677 CORDON D'ETANCHEITE
AVEC HW 9239 FACE SUPÉRIEURE ET
INFÉRIEURE DU JOINT D'ETANCHEITE

ERECTION DE



RAKE DETAIL
DETAIL BANDEAU

E PANNEAU DE TOIT "SS"

VIII - 12 MINUTES OF CONSTRUCTION MEETINGS, CORRESPONDENCE, AND REPORTS.

- Meeting No. 47
- Meeting No. 48
- Meeting No. 49
- SONEG-VIRMAUD Quotation for frame masonry joints.

LOUIS BERGER INTERNATIONAL, INC.

B.P. 3114
DAKAR
TEL. 21 41 80

CONSTRUCTION DE HANGARS DE STOCKAGE DE CEREALES

FINANCEMENT USAID

COMPTE RENDU N° 47 DE LA REUNION DU 23 MARS 1981

PRESENTS :	MAITRE D'OEUVRE	: MDR/CAA	:	MM. FALL, KHOUMA
	MAITRE D'OEUVRE DEL.	: L.B.I.I.	:	MM. COUSIN, YAHYA
		USAID	:	Mr. STEINKE
PRESENTS ENTREPRENEURS		: SONEG	:	MM. MELVE, TAUZIN
		VIRMAUD	:	Mr. FERRARIS
ABSENTS EXCUSE		: SEG	:	Mr. KHANE

DISTRIBUTION :	CAA	:	5 ex	SEG	: 1 ex.
	LBI	:	3 ex	SONEG	: 1 ex
	USAID	:	3 ex	VIRMAUD	: 1 ex

Soit 14 exemplaires

1. - CHANTIER DE LA SEG

1.1 - Avancement des Travaux

Niakhène et Thilmakha

Locaux terminés sauf les inscriptions

Dahra

Enduit : la reprise est en cours
Voirie : ne reste que le compactage
L'entrepreneur avisera le contrôle dès la finition de la reprise de l'enduit pour examen.

Observations

Le Maître d'Oeuvre met en demeure l'entrepreneur d'intervenir rapidement pour effectuer les réparations suivantes :

Darou-Mousty

L'une des portes latérales est décrochée, les seuils demandent reprise.

Thilmakha

La porte arrière ne ferme pas, le battant gauche n'étant pas à l'équerre, le dallage demande d'être nettoyé de toutes les traces d'enduit.

Les aérateurs ne fonctionnent pas normalement.

Niakhène

Le dallage demande d'être nettoyé, les joints du dallage sont à traiter au deldrin. La fissure du long des murs arrière demande d'être fermée par un filet d'asphalte.

2. - CHANTIERS DU GROUPEMENT SONEC ET VIRMAUD

2.1 - Avancement des travaux

Le Fleuve

T. Boubacar : voirie est terminée entièrement
tôles fermés
peinture terminée

Podor : Dallage et joints terminés
voirie implantée exécution en cours
peinture : reste une couche à faire (

NDiqume : duit terminé - Peintu... reste une couche sur les deux pignons

Voirie : implantée mais exécution suivra.

Néré-Lao : De même que N'Diqume
Un maçon est sur place pour satisfaire les observatio formulées par le Maître d'Oeuvre, qui consiste à ferme parfaitement les ornières du mur derrière les poteaux.

Monsieur FERRARIS se rendra au Fleuve après demain le 25 pour finir les portes au Fleuve.

La date des réceptions des escales de la région du Fleuve sera fixée ultérieurement

Sine Saroum

Kahone : Voirie en cours

Mbour : L'Entrepreneur reconnaît la nécessité de retoucher rapidement la partie de la voirie située vers la route avant la saison des pluies pour éviter le risque d'endommager le stock qui se trouve à l'intérieure. Puis d'achever le compactage.

Kédougou : Voirie à compacter

Montage des portes et dernières finitions

Bakel : Escale terminée

Date de réception sera fixée ultérieurement

REMARQUES GENERALES INTERESSANTS LES LEVEES DE RESERVE

Kolda et Kounkané : des fissures verticales sont apparentes des deux côtés des trois travées du mur principal droit sont à reprendre d'une manière efficace.
Pour les autres remarques prière de se reporter aux P.V. de réception Provisoire.

Diendé : Le Maître d'Oeuvre fait remarquer qu'il manque une seconde couche de peinture sur les murs intérieurs.

Koupentoum : Le bâtiment est fissuré sur tout son périmètre à la hauteur de la sablière.

L'entreprise se propose d'envoyer une équipe dans une semaine pour faire face à la situation à partir de la semaine prochaine.

En ce qui concerne la liste des travaux à faire dans le Sine Saloum et ailleurs pour assurer les levées de réserves formulées lors de la Réception Provisoire, l'Entreprise est invitée de se reporter aux P.V. de réception et de vérifier partout le bon fonctionnement des portes.

REMARQUES D'ORDRE GENERAL

Le Maître d'Oeuvre fait remarquer à l'Entreprise que l'avancement des travaux réalisés dans la région du fleuve n'a pu être mené à sa fin que grâce à la réalisation de ceux-ci en région.

L'entreprise est priée de fournir le décompte des révisions et réactualisations des prix.

Le décompte définitif ne sera accepté qu'après finition totale des travaux et des levées de réserves. Le Maître d'Oeuvre demande au Bureau de Louis Berger International, de faire une étude de renforcement des portes de manière d'augmenter la sécurité.

Prochaine réunion le 6 Avril à 16h.

VISITE DE CHANTIERS HANGARS
U.S.A.I.D.

Mission effectuée par:Kenneth Steinke et Amadou Khouma
Visite du:3 au 7 Mars 1981
Motif de la mission:Situation et état d'avancement des travaux.
Lieux visités:K. Madiadel,Diende,Kolda,Koumkané,Kédougou,Koumpentoum,Koungheul et Kahone.

I SITUATION ET AVANCEMENT DES CHANTIERS

1. Etat d'avancement

1.1 - Dans l'ensemble tous les hangars sont terminés à 100 à l'exception de celui de Kédougou où les travaux de peintu et de posé des portes ne sont pas encore exécutés.

1.2 - Les voiries ne sont pas terminées sur la presque totalité des hangars.Il reste le compactage de la latérite tout autour des bâtiments.

2. Situation

2.1 - Le coulissements des portes est trés difficile dans l'ensemble des batiments;

2.2 - Les joints de dallage des magasins de la Casamance et de Kédougou n'ont pas reçus une couche de bitume.

2.3 - K. Madiabel:Les portes ne sont pas peintes.

2.4 - Diendé:Il manque une seconde couche de peinture sur les murs intérieurs

2.5 - Kolda:Des fissures verticales sont apparentes sur tout l'épaisseur des trois travees du mur gouttereau droit (vue la route).

2;6 - Kounkane:La situation est similaire à celle de Kolda.

2.7 - Kedougou:Les travaux de peinture ne sont pas exécutés, portes sont livrees sur le chantier mais elles ne sont pas montées.Le couverture est mal posée le long du mur gouttereau droit (vue de la route),des traces d'eau sont visibles sur l panneaux d'isolation.

2.8 - Koumpentoum:Le batiment est fissuré a la hauteur des l grinés et sur tout son perimètre.

2.9 - Kahone:La voirie est en cours d'exécution.

II OBSERVATION

- Le lot N° 1 du magasin de Keur Madiabel a subi un traiteme au phostoxin le 28/2/81,les bâches qui ont servies au trai tement sont perforées et même déchirées à certains endroit Cette façon de fumiger n'est pas économique etant donné qu les bâches ne sont assez étanches pour retenir le produit. Elle constitue également un tres grave danger pour les per nes qui peuvent se trouver à l'intérieur ou aux environs d magasin.
- Le mil stocké à K. Madiabel est d'environ 600 Tonnes.Le st est divisé en lots répartis comme suit:

Lot N° 1 . 251,375 T.

Lot N° 2 257,007 T;

Le reconditionnement est en cours pour ce qui doit constit le lot N° 3

LOUIS BERGER INTERNATIONAL, INC.
B.P. 3114
DAKAR

Tél. 21 41 80

CONSTRUCTION DE HANGARS DE STOCKAGE DE CEREALES
FINANCEMENT USAID

COMPTE RENDU N° 48 DE LA REUNION DU 7 AVRIL 1981

PRESENTS

MAITRE D'OEUVRE	: MDR/CAA	: M. FALL
MAITRE D'OEUVRE DEL:	LBII	: M. YAHYA
	USAID	: M. STEINKE

PRESENTS ENTREPRENEURS

:	SEG	: M. KANE
	SONEG	: M. MELVE
	VIRMAUD	: M. VIRMAUD

DISTRIBUTION

CAA	: 5 ex	SEG	: 1 ex
LBII	: 3 ex	SONEG	: 1 ex
USAID:	3 ex	VIRMAUD	: 1 ex

Soit 14 exemplaires

1. - APPROBATION DU COMPTE RENDU PRECEDENT

Le compte rendu n° 47 est lu en séance et est approuvé par les participants.

2. - AVANCEMENT DES TRAVAUX (Chantiers SEG)

2.1 - Niakhene

Le Maître d'Oeuvre rappelle à l'entrepreneur de finir l'étanchéité des portes le plus rapidement possible. De terminer les inscriptions au mur d'entrée.

2.2 - Thilmakha

La porte arrière ne ferme pas. le battant gauche n'étant pas à l'équerre, de remettre celui-ci dans sa position convenable, le dallage demande d'être nettoyé de tous les résidus du chantier, les aérateurs ne fonctionnent pas normalement , demandent être revus.
Peinture : reste une couche à l'intérieure.

2.3 - Darou Mousty

La porte latérale décrochée sera reprise prochainement, les seuils sont repris.

2.4 - Dahra

Enduit : la vérification du contrôle a été faite le Samedi 11 Avril. L'entrepreneur est autorisé de reprendre les travaux de peinture après quelques jours d'arrosage de l'enduit repris.

OBSERVATIONS : Le Maître d'Oeuvre demande à l'entrepreneur de finir rapidement les travaux d'étanchéité de toutes les portes. De présenter un devis pour la mise en place du joint bitumineux entre poteaux et murs.

3. - CHANTIERS DU GROUPEMENT SONEC-VIRMAUD

Le Fleuve

T. Boubacar : terminée

Podor : voirie implantée, exécution suivra.

Ndioume : voirie exécution en cours.

Agré-Lao : voirie exécution en cours.

La réception des ...s du fleuve sera fixée entre le 21 et le 25 ~~Août.~~ Avril

Sine Saloum

Kahone : voirie en cours. Finir les retouches des seuils, une porte déposée au sol a été sérieurement endommagée par un camion du service.

Kédougou : voirie à compacter
Le monteur de l'entreprise VIRMAUD se rendra sur place le 8 Avril pour le montage des portes et dernières finitions.

Kolda et Kourkané : Reprise des fissures mentionnées dans le précédent P.V.

Diendé : le Maître d'oeuvre fait remarquer qu'il manque une seconde couche de badigeon intérieur.

Koupentoum : réparation de la fissure mentionnées dans le précédent P.V.

REMARQUES ET OBSERVATIONS D'ORDRE GENERAL

Le Maître d'Oeuvre demande à l'entreprise d'établir un devis pour la mise en place du joint.bitumineux entre poteaux et mur.

L'Entreprise est tenue de faire une demande de réception provisoire des escales déjà terminées en casamance.

Le Maître d'Oeuvre met en demeure l'entreprise de terminer les travaux de levée de R.P. dans les quinze jours à venir.

En ce qui concerne le matériel loué par l'entreprise à la SENBAT et employé au Flouve sa location, sa réparation et son rapatriement seront pris en charge par le Maître d'Oeuvre pour le compte de l'entreprise. Faire un inventaire à ce sujet.

Prochaine réunion aura lieu le Mardi 21 Avril à 17h.

LOUIS BERGER INTERNATIONAL, INC.
B.P. 3114
DAKAR
TEL. 21.41.80

CONSTRUCTION DE HANGARS DE STOCKAGE DE CEREALES

FINANCEMENT USAID

COMPTE RENDU N° 49 DE LA REUNION DU 21 AVRIL 1981

PRESENTS	MAITRE D'OEUVRE	: MDR/CAA	: MM. NIANE, DIEME, FALL, KHOUMA
	MAITRE D'OEUVRE DEL.	: LOTI	: MM. BEAS, YAHYA
		USAID	: M; STEINKE
PRESENTS ENTREPRENEURS:		SONEG	: MM. MELVE TAUZIN
		VIRMAUD	: FERRARIS
ABSENT NON EXCUSE		SEG	

DISTRIBUTION	CAA : 5 ex	SEG	: 1 ex
	LOTI : 3 ex	SONEG	: 1 ex
	USAID : 3 ex	VIRMAUD	: 1 ex

1. APPROBATION DU COMPTE RENDU PRECEDENT

Pour le paragraphe concernant la SENBAT (§ Remarques et observation d'ordre général) il convient de compléter l'article comme suit :

"... le matériel loué par l'entreprise à la SENBAT... sera pris en charge par le Maître d'Oeuvre pour le compte de l'entreprise conformément aux engagement de la régie partielle des chantiers du Fleuve. Les factures de la SENBAT seront payées à la condition que la SONEC les approuve..."

Sous réserve de ce complément le compte rendu n° 48, lu en séance, est approuvé.

AVANCEMENT DES TRAVAUX - CHANTIERS SONEC-VIRMAUD

2.1 - Région du Fleuve

Podor : sans changement (voirie implantée, pas encore d'exécution).

Ndioum, Aéré Lao : voirie pratiquement terminée : reste réglage de mise en forme. tous les chantiers du fleuve sont considérés par l'entrepreneur comme réceptionnables (voir § 5 ci-après : réception provisoire).

2.2 - Région du Sine-Saloum

Kahone : voirie faite à 60% environ : à terminer impérativement pour la fin du mois au plus tard. Seuils à refaire - RAPPEL

Koupentoum : aucune des reprises demandées par le Maître d'Oeuvre n'a été faite (voir § 4 ci-après : constat de carence)

Kédougou : terminé.

2.3 - Région de la Casamance

Diende : la couche de badigeon intérieure actuelle est refusée. L'entrepreneur doit passer une nouvelle couche.

Kolda, Foukaré : des fissures inacceptables sont apparues dans ces bâtiments (l'une d'elle est même traversante). L'entrepreneur est mis en demeure d'effectuer les réparations nécessaires pour la fin de la semaine compte-tenu des nombreux rappels qui lui ont été faits (voir § 4 ci-après constat de carence).

3. - REGLEMENTS

Le Maître d'Oeuvre confirme à l'entrepreneur qu'il doit lui fournir tous les indices (photocopies des journaux officiels) impliqués dans les formules d'actualisation et de révision des prix.

4. - CONSTAT DE CARENCE

L'attention de l'entrepreneur a été attirée à maintes reprises sur l'importance de fournir des bâtiments étanches aux rongeurs et dépourvus de fissures ou trous qui sont des nids à insectes.

Malgré plusieurs rappels et les réserves formulées lors des réceptions provisoires partielles les travaux de réparation n'ont pas été partout entrepris. L'entrepreneur a alors été mis en demeure par le Maît d'ouvrage d'effectuer ces réparations conformément aux clauses et délais du marché :

Il constate aujourd'hui que ces travaux n'ont pas été faits et en particulier sur les sites de Kouponloum, Kolda et Koukané et établi donc par la présente : un constat de carence de l'entrepreneur. Celui-ci présent accepte les faits.

En fonction de quoi le maître d'ouvrage se substituera (encore une fois) à l'entrepreneur et fera exécuter ces travaux à la charge de l'entrepreneur défaillant.

5. - RECEPTION PROVISOIRE

Le programme des dernières receptions provisoires partielles est le suivant :

T. Boubacar, Podor, Ndioum, Aéré Lao, Bakol : du 27 au 29 Avril 1981

Kédougou : suivant disponibilité du moyen de transport. (avion privé) en pricipe prévu le 8 Mai.

Le procès verbal de réception provisoire sera établi et daté au plus tard 8 jours après la dernière réception provisoire partielle. En ce qui concerne la levée des réserves formulées sur chacun des sites lors des réceptions provisoires partielles, conformément aux stipulations du marché, l'entrepreneur avait deux mois pour effectuer les travaux correspondants.

Il doit donc adresser, par écrit, au Maître d'Oeuvre tous les travaux qu'il a exécuté depuis que les réceptionsprovisoires partielles ont été prononcées.

Faute de quoi ces réserves seront entièrement reportées dans la réception provisoire et les mesures coercitives appliqués immédiatement dès que le délai de deux mois sera écoulé. (à partir de la date de la réception provisoire partielle).

SOUSC VIRMAUD

B.P. 1098

Dakar

Ets R VIRMAUD
Route de Rufisque
B. P. 1098 DAKAR

O N C A D
Direction des projets

DAKAR

DECOMPTE N° 1 et DEFINITIF

Suivant ordre de service N° 1 et devis du 10 Décembre 79

Travaux exécutés à 100 % au 10 Décembre 79

1°) Reprise soubassements de 10,00
Drainages

2°) Panneau couverture

3°) Fronton tôles pliées

4°) Contreventement

5°) Aérateur statique (voir note)

6°) Portes coulissantes

7°) Reprise des antirouille

8°) Reprise divers ouvertures tôles

HANGAR 1000 T	16 x 364.375		5.828.000
HANGAR 2000 T	7 x 728.500		5.099.500
Hors droits, taxes, T.V.A.			10.927.500

Règlement décompte par chèque ordre de VIRMAUD Lekur

Ets R.VIRMAUD
Route de Rufisque
B.P. 1098 DAKAR

SOCIETE NATIONALE D'ENTREPRISE GENERAL

S O N E G

Société Anonyme au Capital de 50.000.000 Francs C.F.A.
SIEGE SOCIAL : GRAND DAKAR
B.N.D.S. 80.701 — S.G.B.S. 1.110.003-2
B. P. 3393 — R. C. DAKAR 7.545-B — TEL. : 21-21-22 et 22-22-82

Dakar, le 14 Avril 1981

N/Réf. : n° 1257/81/LM/MS.
V/Réf. :

MONSIEUR LE DIRECTEUR
MDR/CAA - DE LA GESTION
DES PROJETS DE STOCKAGE
CEREALIERS.

-DAKAR-

OBJET/ : DEMANDE DE PRIX

BORDEREAU D'ENVOI -

Monsieur le Directeur,

Veuillez trouver ci-joint suite à votre demande du 7 Avril 1981, nos meilleurs prix pour l'Etanchéité des poteaux de hangars au droit des murs.

Dans l'attente de notre proposition, vous en souhaitant bonne réception, veuillez agréer Monsieur le Directeur, l'expression de notre considération distinguée. -/-

LE DIRECTEUR TECHNIQUE :

10 Avril 198

N°1293/81/...

OBJET : ... DE DEVIS
0-0-0-0

... LE ...
... DES
... DE STOCKAGE CEREALIERS
...

Monsieur le Directeur,

Suite à votre demande du 7 Avril 1981, veuillez trouver ci-dessous nos meilleurs prix pour ce travail à faire.

Devis descriptif hors marché, pour ... de ... au droit des poteaux de fermes contre les murs.

Mise en place de papier goudronné (échantillon).

Devis forfaitaire par poteau .... 12.000 FCFA
plus une indemnité Kilomètrique par hangard de 50 F
soit par exemple (...OUR (65K X 50) = ... FCFA
)...(7..K X 50) = 35.000 FCFA

Espérant que ce devis soit à votre convenance, veuillez agréer Monsieur le Directeur, l'expression de notre considération distinguée. -/-

LE DIRECTEUR TECHNIQUE :

...

VIII - 13 PHOTOGRAPHS.

PHOTO 1: Floor and wall joints
Dirt collecting around pilers (columns)

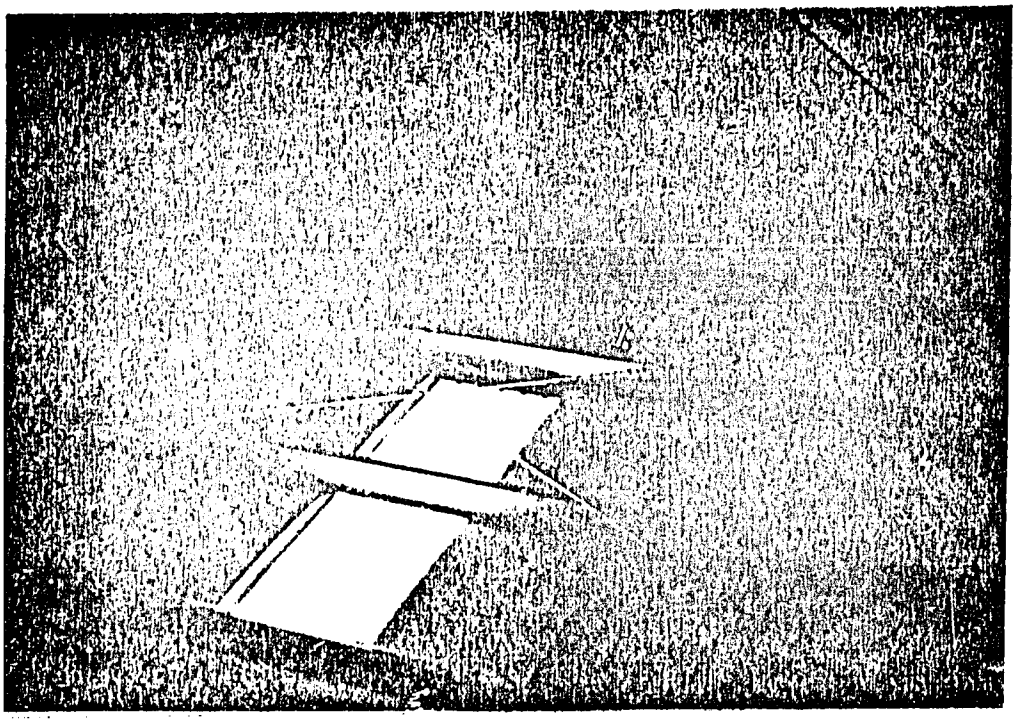


PHOTO 2: Skylights and roof insulation

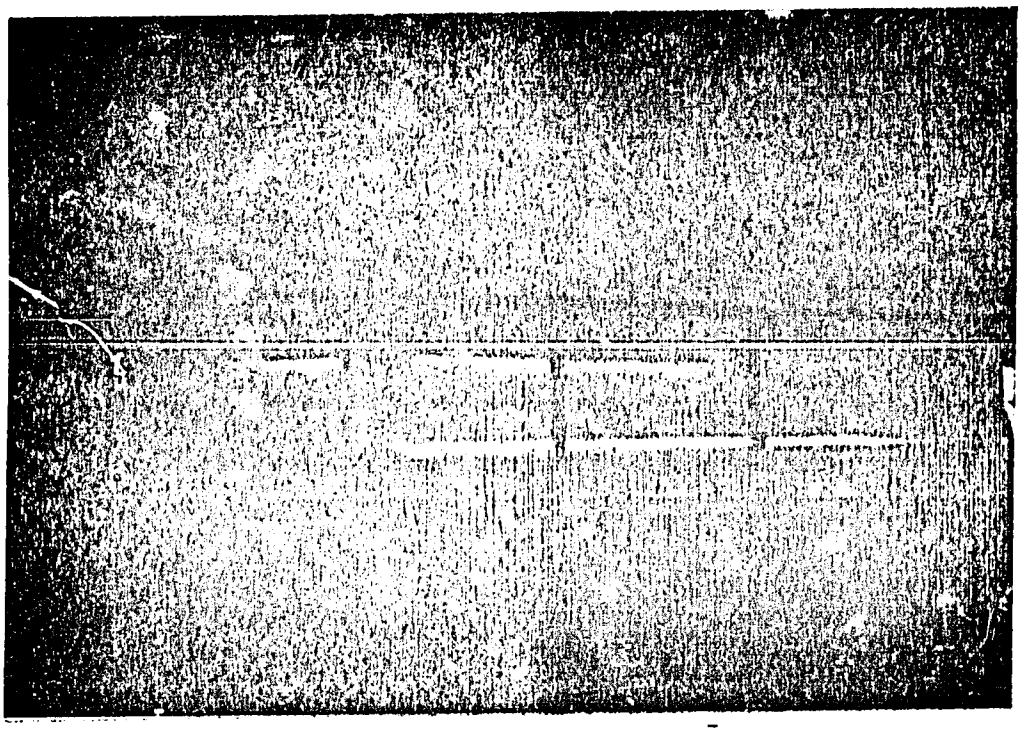


PHOTO 3: Closed crest ventilators

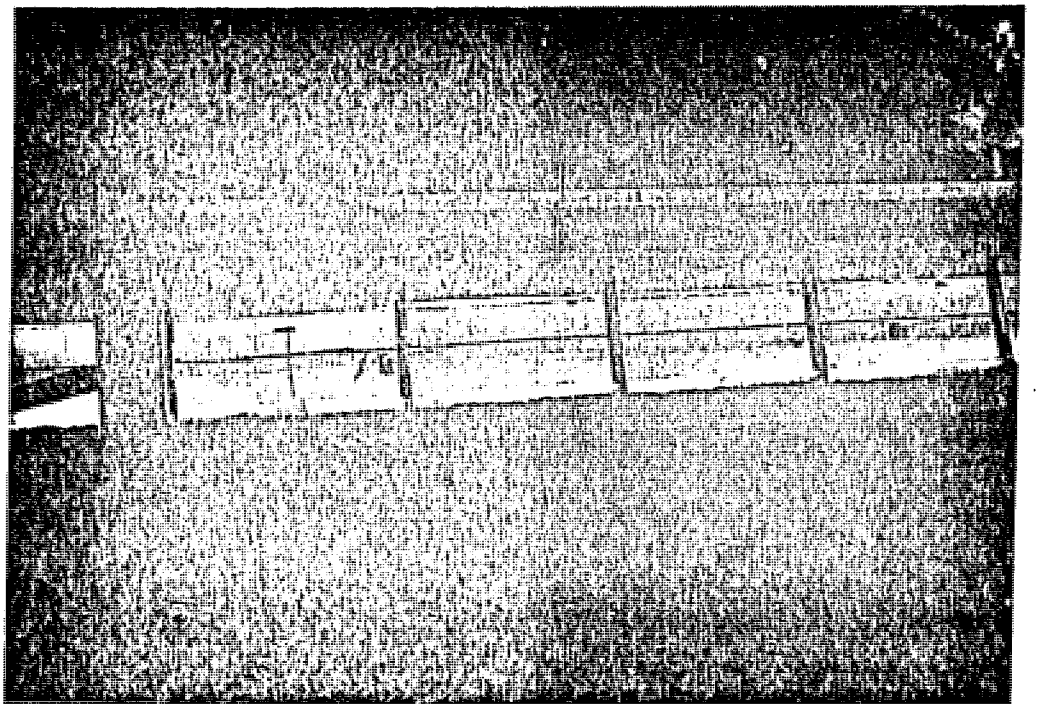


PHOTO 4: Inadequate ventilators installation

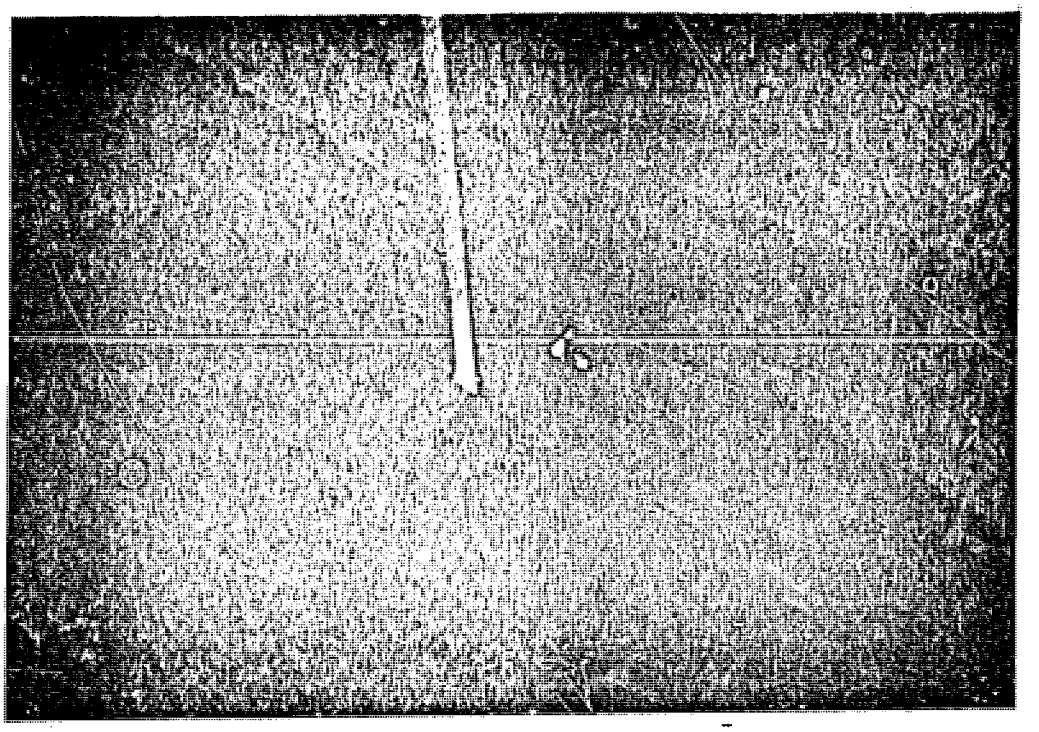
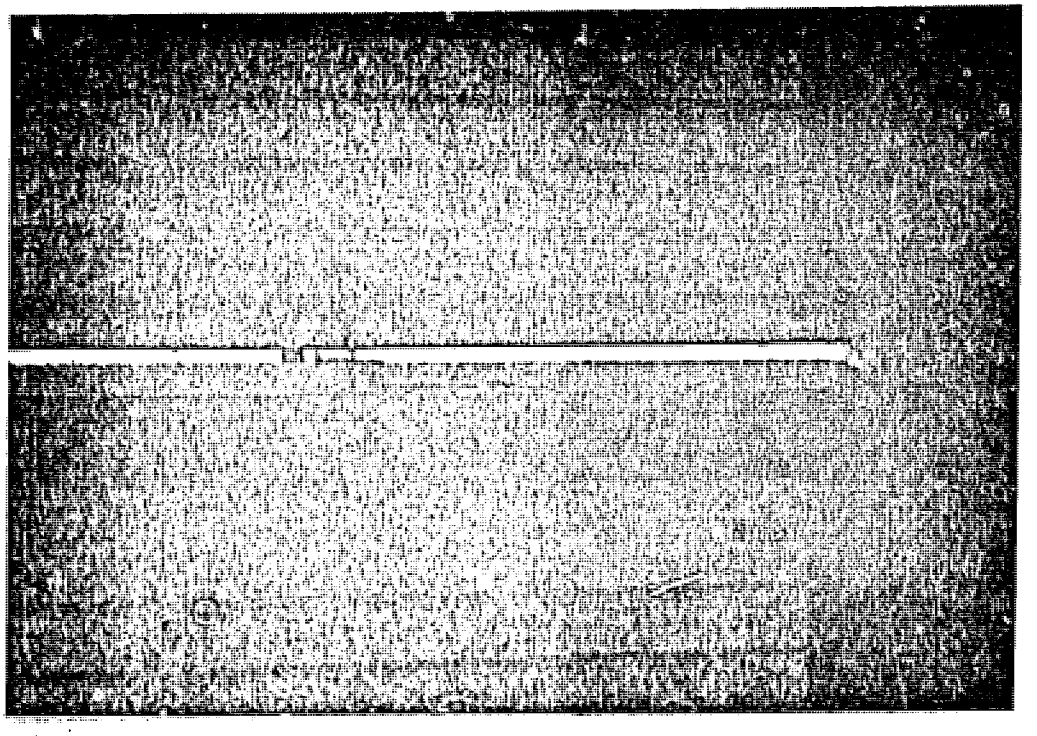


PHOTO 5: Reverse bottom door channel
Dust and water collecting hazard



HOTO 6: Closed Door

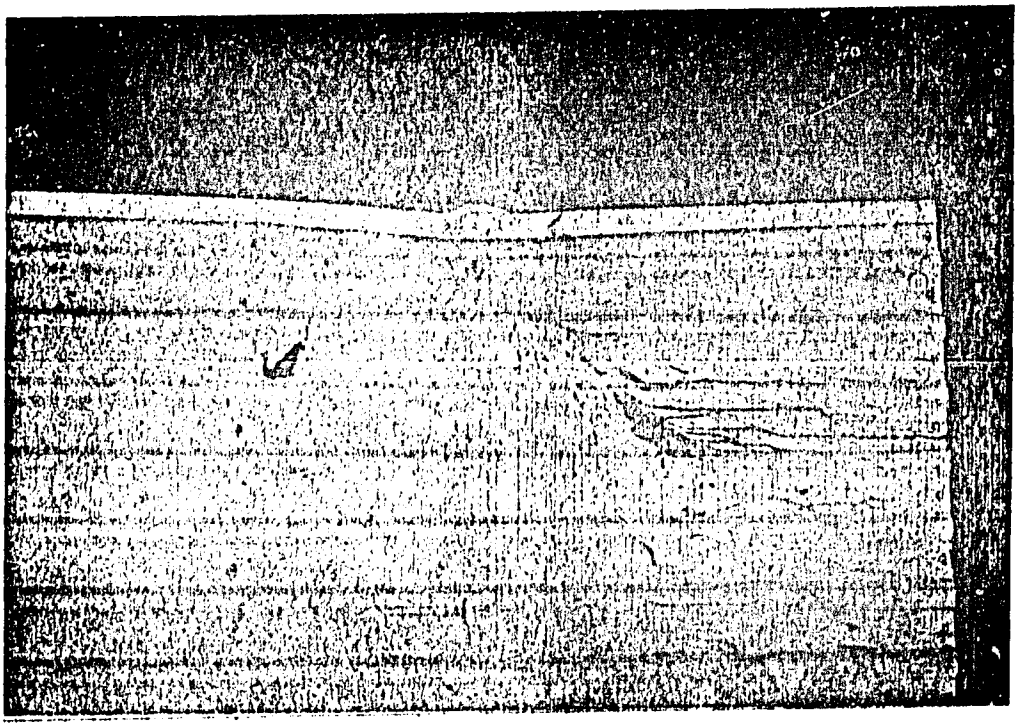


PHOTO 7: Damanged door bytruck backing in

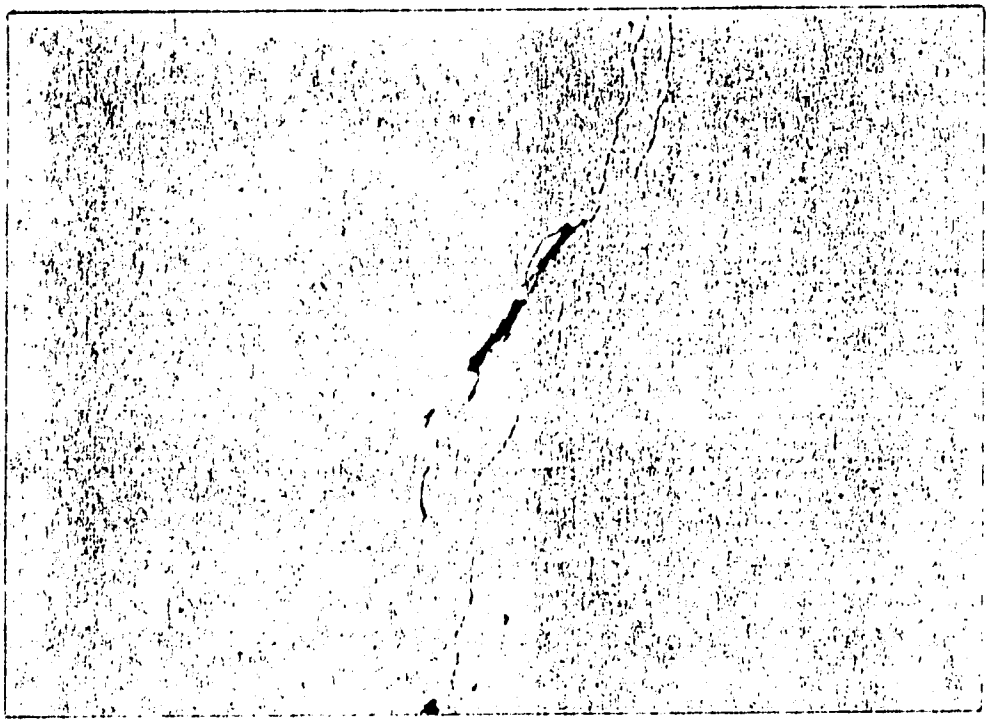


PHOTO 8: Cracks in concrete wall

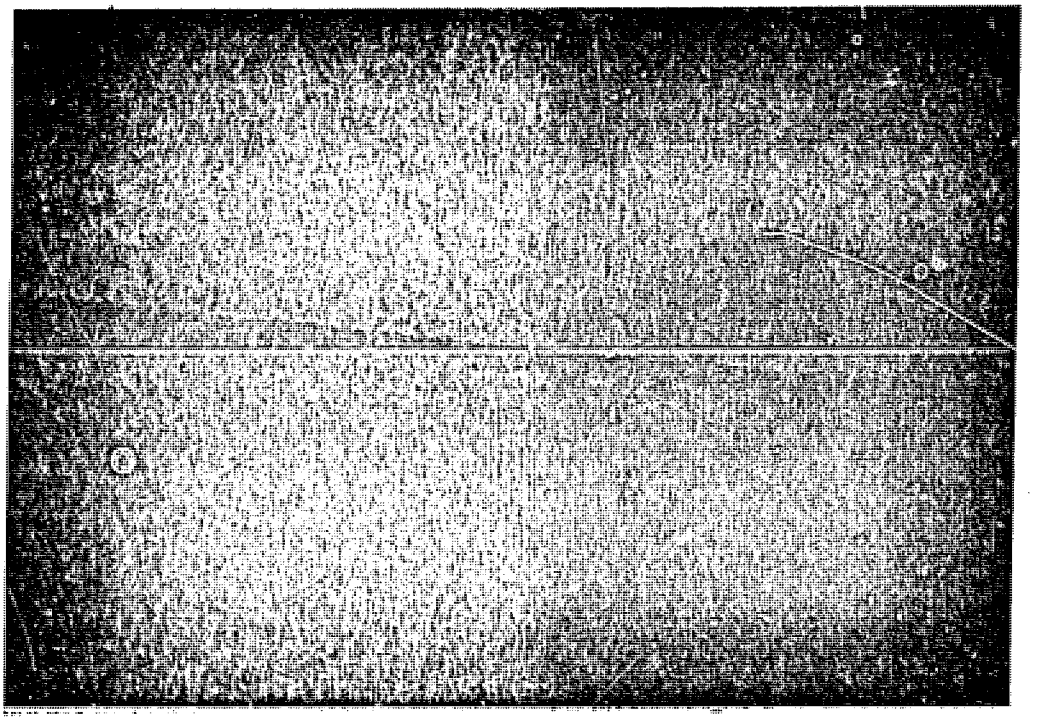


PHOTO 9: Floor finish and expasnion joints

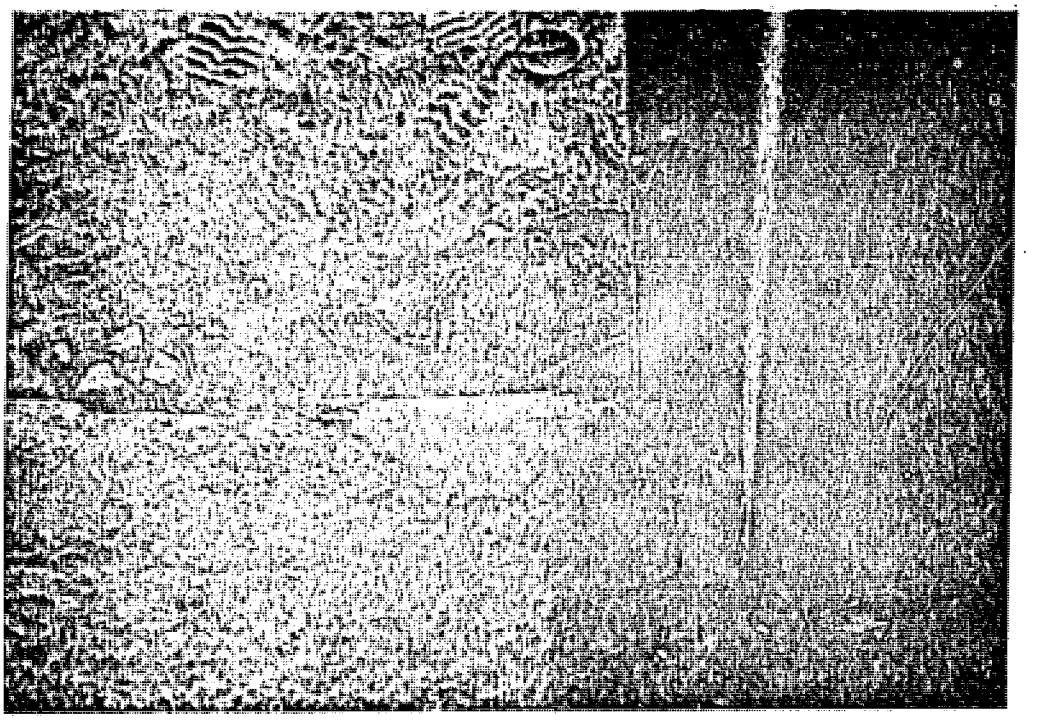


PHOTO 10: Floor finish near the door opening

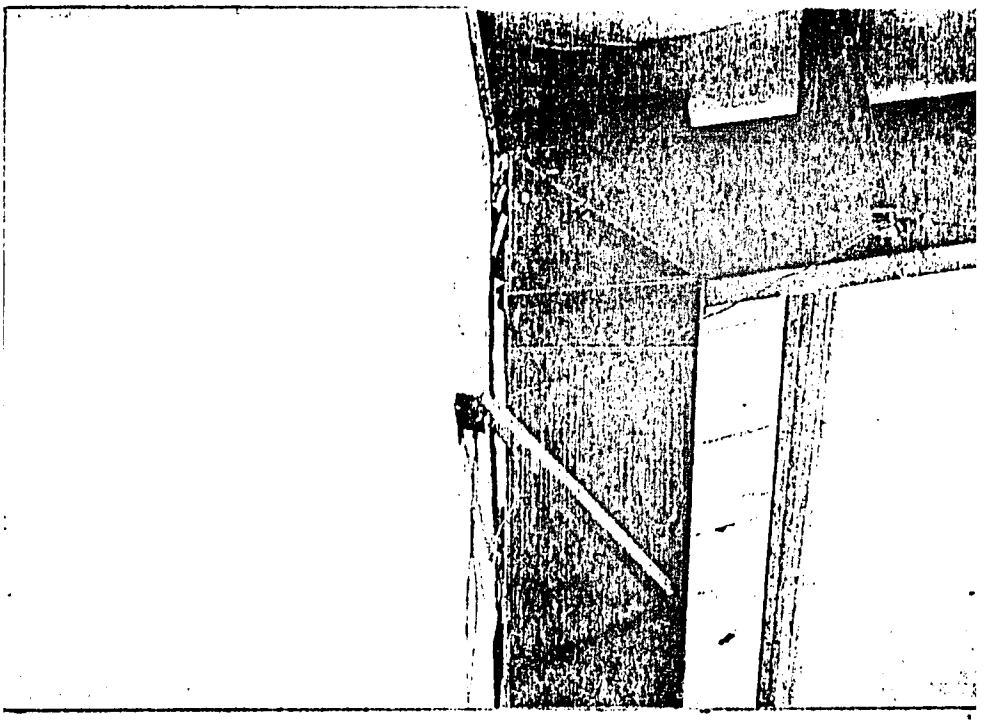


PHOTO 11: Joint between column and concrete wall

VIII - 14 REFERENCES

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