REPORT

OF

UTILITIES CONSERVATION SURVEY

(INITIAL PHASE)

U. S. NAVAL ADMINISTRATION UNIT

SAIPAN, M. I.

SURVEY CONDUCTED BY

AREA PWO MARIANAS UTILITIES CONSERVATION TEAM

18 MARCH - 23 JUNE 1958

FOREWORD

The cooperation afforded all members of the survey team by the Naval Administrator, Naval Administration Unit, District of Saipan, has been wholehearted and has contributed materially to the accuracy, ease and timely consumation of the assigned team mission which is covered by this report. The willingness to assist on the part of key personnel has also been noteworthy. The members of the survey team wish to express their collective appreciation and thanks.

UTILITY CONSERVATION SURVEY
U. S. NAVAL ADMINISTRATION UNIT, SAIPAN, M. I.

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SECTION I

INTRODUCTION

1. SCOPE AND PURPOSE OF SURVEY

a. This reports the initial phase of the Utilities Conservation Program Survey of the U. S. Naval Administration Unit, Saipan, Marianas Islands. The report covers:

(1) Distribution and utilization of electricity

(2) Potable water source, distribution and utilization

(3) Electrical power generation at the Navy Hill diesel plant

(4) Steam distribution and utilization

b. The object of each area of study was to:

(1) Detect items that could be accomplished to provide the activity immediate savings.

(2) Detect items that indicate the desirability of additional study to produce savings and beneficial improvements in the utility systems.

(3) Give required management tools to facilitate analyzing plant performance by the Public Works Officer so that he may initiate corrective measures to keep the utilities operating at maximum efficiency.

c. In planning a survey of this type, the AREAPWO MARIANAS anticipated that many of the items detected would fall in the category of those requiring further study. Hence, one major objective

of this survey was to show the need for and the possible benefits to be derived from further, more complete engineering studies.

2. SURVEY METHOD

a. This survey has been accomplished by four engineers. Each has surveyed one or more of the following areas:

(1) Electrical distribution and utilization

(2) Potable water system

(3) Electrical generation

(4) Steam distribution and utilization

(5) Utility management

(6) Telephone communications

3. ADDITIONAL STUDIES

For items that require further engineering study, it is recommended that they be referred to the Area Public Works Officer, Marianas if beyond the capabilities of the activity. Within the limits of the available personnel, the AREAPWO MARIANAS will accomplish additional studies upon request. This service is available without cost by submission of NAVDOCKS Form 2038, "Engineering Service Request," in quadruplicate.

4. GENERAL

a. The U. S. Naval Administration Unit, Saipan, has the responsibility, among others, for supplying and maintaining the primary water and power systems in the Saipan district. That portion of the water system furnishing the NAVTECHTRAU SAIPAN is a responsibility of NAVTECHTRAU SAIPAN and is not a part of this report. The

primary and secondary utility systems operated by the NAVAD NAVADMINU SAIPAN were originally constructed of advance base type material during and immediately after World War II. Since that time rehabilitation and repairs have been made to keep the utility system in operation. Various types of materials and construction methods have gone into the construction and repair of the system with the consequent excessive maintenance required.

b. Electrical system. The NAVAD NAVADMINU SAIPAN operates and maintains the power generation and distribution facilities on the Island of Saipan. The island electrical system consists of a power plant with three 700 KW diesel generators and one 600 KW semi-portable diesel unit. A fifth unit of 600 KW capacity is being installed and is due to be in operation during May or June of 1958. These units generate at or near 2,400 volts (phase to neutral) with a substation nearby that steps this up to transmission voltage. In addition to the associated switchgear, the substation consists of one three phase, 60 cycle, 12 KV, 3750 KVA and three single phase, 60 cycle, 13.8 KV, 250 KVA transformers. There are four feeders. Feeders 1 and 3 are on the 12 KV system and feeder 4 is on the 13.8 KV system. Feeder 2 is not being used. The 12 KV and 13.8 systems are interconnected and looped through a 431 KVA, three phase autotransformer. There are approximately 80 miles of overhead transmission lines.

c. Water system. The NAVAD NAVADMINU SAIPAN operates and maintains the water production and distribution facilities on Saipan. The principal sources of water are two Maui Wells, Donney Springs,

Achugan Spring No. 1, and Radio Hill Spring No. 2. The water from these sources is fed through the system of approximately 18 miles of various size lines almost all of which are in bad condition due to advanced stages of corrosion and deterioration. This supply furnishes all potable water for the villages of Chalan Kanoa, San Antonio, San Roque, Tanapag and Oleai, as well as all naval and other governmental usage with the exception of NAVTECHTRAU SAIPAN.

d. Telephone system. There are two telephone communication systems, one a modern automatic dial system operated and maintained by NAVTECHTRAU SAIPAN and the other an older manual system operated and maintained by NAVADMINU SAIPAN. Work is in progress to combine the two systems into the automatic dial facility.

5. PROCEDURES

a. The conclusions and recommendations of each of the survey team members have been grouped and placed in the beginning of the report for easy review. In addition to the conclusions, the recommendations are divided into two groups as follows:

(1) Recommendations which can provide immediate savings when adopted.

(2) Recommendations for future engineering study that may produce savings or improvements to the utility systems.

b. The results of the survey and all recommendations were discussed with the Public Works Officer, NAVADMINU SAIPAN.

c. Quarterly progress reports made in connection with accepted recommendations are desired by AREAPWO MARIANAS with copies to the

the Chief of Naval Operations and the Chief, Bureau of Yards and Docks. The quarterly report should be continued until all the accepted recommendations are fully implemented.

SECTION II

CONCLUSIONS

1. There is not presently an adequate Utilities Conservation Program designed to impress the individual consumer with the necessity of conservation.

2. Best available information indicates that 60 KW of electrical power per hour is consumed on a continuous basis by hot lockers. It is considered feasible to eliminate a large portion of this load thereby reducing the total continuous load.

3. It was observed that the Navy maintains and operates two laundry facilities on Saipan, one for the personnel of NAVADMINU SAIPAN and one for the personnel of NAVTECHTRAU SAIPAN. The NAVADMINU SAIPAN laundry is in very poor condition, whereas the NAVTECHTRAU SAIPAN is much better equipped and more economical to operate. It is considered advisable to operate only one laundry.

4. The main diesel-generators on Saipan burn No. 1 diesel oil. The power generated by these machines is the main source of electricity for the whole Island of Saipan. It is concluded that the engines can be converted to consume less expensive Navy Special fuel.

5. By inspection, it has been established that security lighting is excessive during the dark hours. In at least one case, security lighting is never turned off. Nearly all other security lighting is turned on before sunset and remains on after sunrise.

6. It appears that the staffing of the diesel plant is excessive.

A reduction of three men at $0.50 per man hour seems possible with an annual saving of approximately $3,000.

7. Reports of unscheduled power system outages are inadequate to allow proper review and determination of corrective measures.

8. There are no spare power transformers on Saipan. The loss of one of the present transformers might seriously affect the ability of the Navy to perform its assigned mission.

9. Facility history cards giving the date of purchase, history of breakdowns, repairs and other pertinent data are not available on the various elements of the power and potable water systems.

10. The basic portion of the potable water system was built with such materials as were immediately available after capture of the Island. Subsequent repair and extensions have been made with surplus material as available. The resulting intermixture of steel pipe, galvanized iron pipe and invasion type pipe have suffered severe corrosion. A large percentage of the lines were laid directly on the ground or on low concrete block saddles with no protective paint or coating. Brush and weeds have been allowed to grow around the lines allowing condensation to remain on the surface of the pipe and aggrevate the corrosive condition.

11. Water piping above groundis supported by concrete saddles at close intervals with no provisions for expansion or contraction which has caused the pipes to dislodge from the saddles. In many cases the pipes have completely jumped the saddles or upset them and the mains are lying directly on the ground.

12. Underground mains of invasion type steel pipe or plain steel pipe are laid with little or no coating or wrapping for protection against corrosion. These pipes are now in an advanced state of deterioration. Leakage is very bad in almost all lines.

13. Recently established maintenance procedures are correcting the brush growth problem and replacing the displaced saddles. The above-ground lines are being painted with aluminum paint to reduce thermal expansion and contraction. These measures are excellent but are too late to correct or cure the existing conditions.

14. The well pumps installed at Maui Wells No. 1 and No. 4 are in poor condition and require considerable maintenance. Complete failure of the units is imminent.

15. There is no existing map showing the accurate location or correct sizes of all water lines.

16. Various water lines laid through the villages have been installed with no regard to sanitary conditions nor in accordance with any code. There are possibilities of cross connections of poluted and potable water.

17. There are almost no fire hydrants in the heavily populated villages and it is doubtful if sufficient water or pressure is available to handle fire flow.

18. Water storage facilities are not sufficient to maintain any prolonged disruption of supply, especially in the southern populated area. The south portion depends entirely on the one million gallon Isley Reservoir.

19. It is doubtful that the potable water system can be kept in operation for more than eighteen months even with the most intensive maintenance. The slightest jolt or bruise along most of the pipe causes rupture. Scale seems to be holding a large percentage of pipe together.

20. Investigation of the rehabilitation of the eight million gallon Japanese reservoir appears to be desirable in order to provide sufficient storage capacity for all Island needs.

21. It was observed that a very large percentage of water outlets were leaking to a considerable degree.

22. NAVTECHTRAU SAIPAN has an automatic telephone exchange which was installed as the single exchange for the Island. This automatic exchange has adequate capacity to include all present known users on the Island. Cable is being installed to connect all NAVADMINU SAIPAN subscribers and villages to the automatic exchange.

23. The present plans are for all U. S. Government activities to be connected to the central automatic exchange as well as a few of the Insular Government Offices.

24. It was noted that water and power metering facilities are not available to permit adequate review of production quantities versus costs. Therefore, the survey team has not completed NAVDOCKS Test Form 205 or 205A. Furthermore, it is not considered advisable for an activity of this size to expend the time and money necessary to complete NAVDOCKS Form 205A, but should instead use a modified NAVDOCKS Form 205.

25. The boilers at the galley and at the hospital are badly scaled but failure is not imminent due to the maintenance being performed. This maintenance, of course, is time-consuming and expensive but is considered necessary under the operating conditions. Water treatment by chemical means is not safe in this case because the steam produced is being used directly in cooking operations. Therefore, the only other practical method of treating feedwater would be through double effect distillation. This is not considered practical due to low operating pressures. Some of the heavy scale could be removed by an occasional acid clean and in this case is considered the least objectionable of all the courses open.

SECTION III

RECOMMENDATIONS FOR IMMEDIATE ACCOMPLISHMENT

One purpose of this survey is to indicate areas where savings may be realized immediately upon implementation of certain recommendations. It is the desire of the survey team to point out that although minor savings may be effected through better efficiency of management and utilization of Public Works functions and utilities services large and long range savings may not be realized without investment of considerable funds. The serious state of disrepair of all utilities systems precludes the maintenance and operation of these systems at optimum efficiency.

It is recommended that the following items be put into effect as soon as possible, or as soon as funds are available for their accomplishment.

1. A Utilities Conservation Program be instituted by the NAVAD NAVADMINU SAIPAN and provisions be made for policing on a continuing basis.

2. An Island-wide inventory of hot locker heating elements be made with the intention of reducing any considered excessive. Assuming a 25 percent reduction in hot locker load, a yearly saving of $1,000 can be realized. This is based on an average cost of .0175 per KWH.

3. Arrangements be made for all the laundry from NAVADMINU SAIPAN to be taken to the NAVTECHTRAU SAIPAN laundry. The NAVTECHTRAU SAIPAN laundry has ample capacity and personnel to handle the additional

work. This change will result in the reduction of two Saipanese employees plus the saving of approximately 600 barrels of fuel oil per year. Discontinued use of this laundry may result in an immediate saving of approximately $5,000 per year.

4. A detailed study of all security and other night lighting be made at all facilities, installations, and quarters. It is also recommended that a minimum requirement be established and put into effect. With the possibility of saving 25 percent, based on $0.0175 per KWH an annual saving of approximately $500 may be realized.

5. Records of all unscheduled power outages be maintained.

6. An individual record card be maintained for each transformer. The card should show complete service history, repair and maintenance costs, and other pertinent data.

7. The immediate implementation of all water and power improvements as listed in the FY 1960 Military Construction Program Project 417-U-3082 and the NAVADMINU SAIPAN Special Projects is of paramount importance. If both complete projects cannot be accomplished, the immediate and urgent needs are as follows:

a. Water

(1) Replace 6" and 8" mains from the Public Works Area along West Coast Highway and Texas Road to valve box 10 with 12" cement-lined C.I.P.

(2) Replace the twin 8" steel and the 12" and 18" cement asbestos pipe lines running from valve box 10 to Isley Reservoir with 12" cement-lined C.I.P. This will joint with the 12" cement-

lined C.I.P. at valve box 10 mentioned in paragraph a. above.

(3) Install meters at all sources of supply. This will enable the Navy to determine the exact amount of water produced.

(4) Install meters at all points of distribution to the civilian population. This will enable the Navy to determine the exact amount of water sold to the villages and to establish a basis for computing costs for an equitable return. This is estimated to be about $19,000 a year over the flat rate now in force.

(5) Install automatic chlorinator system at Maui Well No. 1. This will reduce work of the operator now requiring about two hours per day, saving about $350 per year.

(6) Install loops and fire hydrants in the major villages of San Antonio, Chalan Kanoa, Oleai, Tanapag and San Roque. The above is not a part of Project MA-3082 but is considered absolutely essential for connections of existing highly unsafe, unsanitary, and deteriorated piping. No direct saving can be realized by this recommendation, but a large fire could cause tremendous loss of life and property.

(7) Intensive preventive maintenance to correct the leaking faucets and domestic valves prevalent throughout the entire area, particularly in the residential areas. Actual determination of this leakage is not possible but is estimated to be about 4,000 gallons per day or $300 per year.

(8) By a very conservative estimate approximately 10 percent of all water pumped is lost through leaks in the existing lines.

At the present pumping rate this would be about 61,500 gallons per day or a saving of $4,500 per year, when corrected.

b. Power

(1) Replace existing water cooling tower.

(2) Install water softening equipment to treat cooling water make-up.

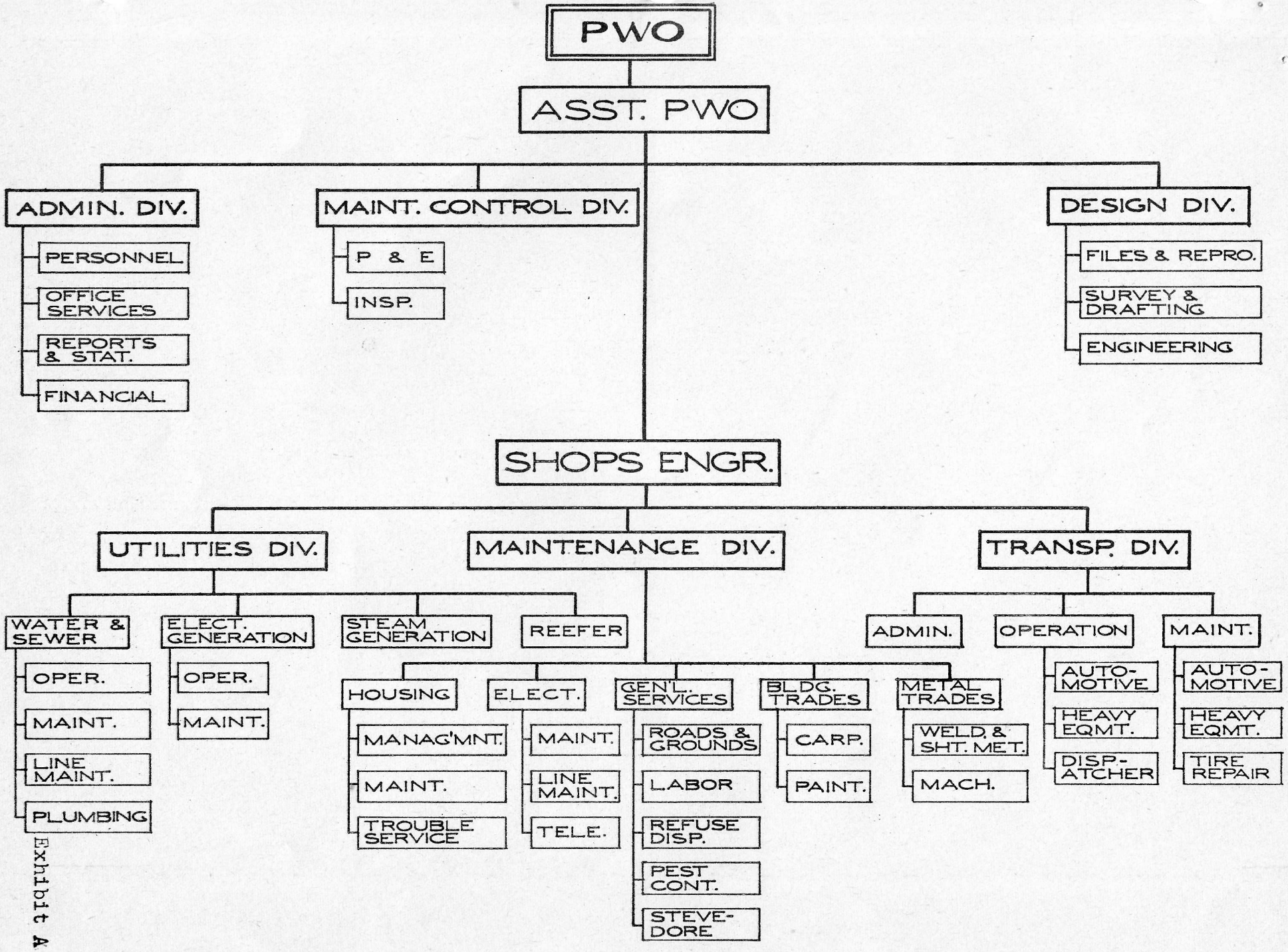
(3) Replace existing 12 KV distribution transformers with 13.8 KV transformers.

(4) Overhaul and modify diesel engines to burn Navy Special Fuel Oil.

8. All subscribers of telephones, including indigenous population, be connected to the automatic exchange. Continued use of the old manual switchboard would require an operator on each shift on a 24 hour basis. An annual saving of $5,000 may be realized by elimination of these operators.

9. Immediate steps be taken to install meters and maintain records sufficient to complete NAVDOCKS Test Form 205 monthly. NAVDOCKS Test Form 205 should be modified to allow produced quantities and associated costs to be entered in the appropriate columns.

10. Boiler operation and maintenance practices now in effect should be continued with few changes. An acid clean should be given each boiler every six months and blowdown should be conducted every eight hours.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OFFICE SERVICES
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FINANCIAL
MAINT. CONTROL DIV.
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SHOPS ENGR.
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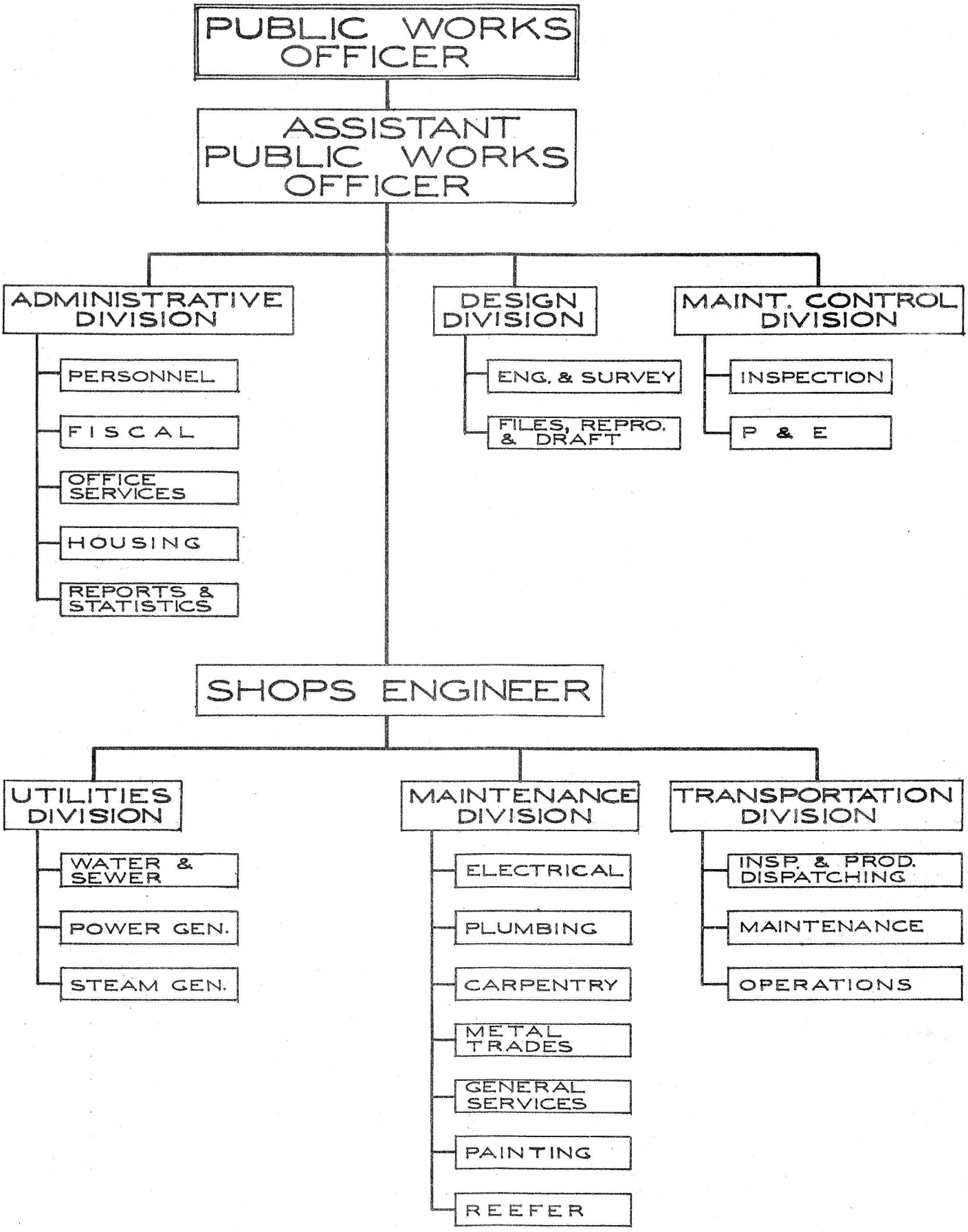
TIRE REPAIR

Exhibit A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INSP. & PROD. DISPATCHING
MAINTENANCE
OPERATIONS

Exhibit B