D 1928. NO. 387

C O N T R A C T

and

SPECIFICATIONS

FOR

D R I V I N G T U N N E L

ANCHORAGE LIGHT AND POWER COMPANY, INC.

ANCHORAGE, ALASKA

CONTRACT NO. 2.

PROJECT REPORT NO. 1.

FRED. H. TIBBETTS
CIVIL ENGINEER
ALASKA COMMERCIAL BUILDING
SAN FRANCISCO

ANCHORAGE LIGHT & POWER CO.
Report No. 387
Project Report No. 1 .

CONTRACT NO. 2.

Contract and Specifications for
DRIVING TUNNEL

1 - Original - To. H. I. W.
2 - Carbon - OFFICE COPY.
3 - ")
4 - ") To H.I.W.,
5 - ") Anchorage,
6 - ") Alaska.
7 - ")
8 - "

FRED. H. TIBBETTS
CIVIL ENGINEER

DATED: SEPTEMBER 1928.

NO. 387

CONTRACT

and

SPECIFICATIONS

for

DRIVING TUNNEL

CONTRACT NO. 2

ANCHORAGE LIGHT AND POWER COMPANY, Inc.

ANCHORAGE, ALASKA.

PROJECT REPORT NO. 1.

Contract No. 1 = Local Poles

ANCHORAGE LIGHT & POWER COMPANY, Inc.

C O N T R A C T NO. 2

FOR DRIVING TUNNEL

PARTIES TO CONTRACT

1. - This contract made and entered into this _____ day of _____, 1928, by and between Anchorage Light and Power Company, Inc., a corporation organized and existing under the laws of the Territory of Alaska, the party of the first part, hereinafter called and referred to as the "Company", and _____

_____

_____

_____,

the parties of the second part, hereinafter designated as the "Contractors",

W I T N E S S E T H :

WORK TO BE DONE BY CONTRACTORS

2. - That for and in consideration of the payments hereinafter stated the Contractors agree to do and perform the following work:

Construct and complete 1800 lineal feet of tunnel, more or less, and the north approach cut thereto, including the drilling, loading and blasting of holes, mucking of the spoil and removal of the same to a neat embankment with level top at a distance from the north portal not greater than 500 feet. The Contractors shall drill plugs for support-

ing ventilating pipe, electric wires and Engineers' reference points; shall lay all track, air, water and ventilating pipes; and shall do all necessary timbering at the direction of the Engineer. The tunnel shall be driven from the North portal toward the South portal.

SUPPLIES TO BE FURNISHED BY CONTRACTORS

3. - The Contractors shall furnish all tunneling supplies as listed below and shall purchase same from the Company at the following prices:

Triple Tape Fuse	$_____	per thousand feet
Dreadnaught Fuse	_____	per thousand feet
#6 Blasting Caps	_____	per hundred
#8 Blasting Caps	_____	per hundred
40% Powder - Dupont	_____	per 50 lb. Case
40% Gelatine - Powder	_____	per 50 lb. Case
40 w. Electric Light Bulbs	_____	per doz.

ENGINEER

4. - It is mutually agreed by the parties that all the work done hereunder shall be in charge of and under the supervision and direction of the Engineer, Fred H. Tibbetts, employed by the Company to plan and supervise construction of the work, or his associate, Harold I. Wood, in immediate charge of the work.

PLANS

5. - Attached to and made a part hereof is one sheet of plans entitled "Anchorage Light & Power Company - Tunnel".

ACCURACY

6. - The tunnel and approach cut shall be built in accordance with these plans and specifications. Projections within the neat tunnel section not exceeding 0.3 foot will be permitted, provided however, that the net cross section be not less than 50.2 square feet. Any section less than 50.2 square feet shall be enlarged by the Contractors. A drain ditch shall be constructed and maintained on one side of the track of sufficient capacity to carry off all seepage water. The water surface in this ditch at all times shall be kept below the base of rail.

ALIGNMENT

7. - The tunnel shall be straight unless otherwise staked by the Engineer. The length of the tunnel shall be determined by measurement made by the Engineer along the axis of the tunnel.

GRADE

8. - The grade of the tunnel shall be 0.5 feet per 100 feet with a fall toward the North portal or as staked by the Engineer.

TIME

9. - The Contractors shall begin work on this contract immediately upon the date of signing same, and shall complete the tunnel by May 1, 1929.

PROGRESS

10. - The work shall be prosecuted by the Contractors with due diligence, and they shall make such a rate of progress as will, in the opinion of the Engineer, enable them to complete the work within the

specified time.

INCREASED RATE

11. - If it appears to the Engineer that the rate of progress made will not complete the work within the specified time, he shall so state in writing to the Contractors, and shall notify them to put on more labor or work more shifts or longer hours or use such other means as will enable the work to be finished on time. If within a reasonable time after receiving such notification from the Engineer, the Contractors still do not make sufficient progress to assure completion of the work on time, the Engineer shall have power to rent equipment, or hire men, or do anything necessary to assure the completion of the work, and to charge the cost of the same to the Contractors, the amount so charged to be withheld by the Company from any moneys due the Contractors, or that might thereafter become due the Contractors for work done under this contract.

EQUIPMENT TO BE FURNISHED BY COMPANY

12. - The Company agrees to furnish all track, track and switch ties, splice bars, rail spikes, two stub switches complete, two muck plates, air, water and ventilating pipes, all timbers for square sets (unframed), lagging, wedges, hose and couplings, and all compressed air. The Company shall install a ventilating fan and shall furnish air to the ventilating pipe after blasting and during the time when the Contractors are mucking.

The Company shall furnish in first class condition, F.O.B. cars at the power plant spur the following tools and equipment:

1 Column Bar, clamp fittings and jacks.
3 248 Leyner - Ingersoll Drills or similar drills.
1 Jackhamer Drill
4 Sets of car wheels for 2 cars.
2 Wooden car bodies.
Drill steel sharpened by Company.
Tamping Sticks
16 Short handled shovels.
8 Picks and handles.
1 Crow bar.
3 3½ lb Hammers.
2 8 lb. Hammers
2 16 lb. Hammers.
3 3½ lb. pole axes.
2 Short, one-man Cross Cut saws.
1 16' wooden straight edge.
1 24" metal spirit level.
1 24" steel carpenter square.
Feed wire, insulators, light outlets with wire guards.
2 Flexible cords 40' long.

All tools and equipment furnished by the Company will be returned by the Contractors upon completion of the work in as good condition, usual wear excepted, as when delivered to them. The tools or equipment not so delivered will be charged to the Contractors' account.

The Company will maintain suitable sleeping quarters, with steel cots and pads, heater stove, fuel, lights, and water and a shower bath for the Contractors, and will operate a boarding house and will furnish meals at 60 cents per meal per man.

WORK TO BE DONE BY COMPANY

13. - The Company will maintain and repair the drills and Jack hammer drills and will sharpen all drills and picks.

The Company agrees to obtain all necessary tunneling supplies and to sell same to the Contractors in accordance with paragraph

3 hereof.

PAYMENT

14. - It is mutually agreed that the Contractors shall receive as full compensation hereunder payment in amounts and at the rates specified below:

Item		Price
1	Approach Cut Excavation, Common @	$_____ per cu. yd.
2	Approach Cut Excavation, Solid Rock	$_____ " " "
3	Tunnel Driven @	$_____ per Lin. Ft.
4	Square Set Timbers including lagging in place @	$_____ per set.

MEASURMENT FOR PAYMENT

15. - All material excavated will be measured by the Engineer in excavation only, and will be computed to neat lines as shown on the plans or staked by the Engineer. The Engineer's measurements shall be final.

CLASSIFICATION

16. - Excavation shall be classified for payment as follows:

Common excavation will include all material not classified as solid rock, such as, sand, gravel, loose rock, soil, clay, boulders of less than 1 cu. yd. in volume, and slate, shale and disintegrated rock, which, in the judgment of the Engineer, can be quarried or removed without blasting. The use of powder will not be regarded as conclusive evidence of its necessity.

Solid rock excavation will include all rock in place and all detached masses of rock exceeding one cubic yard in volume, which, in the judgment of the Engineer, can only be removed by blasting.

PROGRESS PAYMENTS

17. - On or before the fifth day of each month during the life of this contract, the Engineer shall render to the Company and to

the Contractors an estimate of the amount of work done under this contract during the preceeding month and the value thereof. On or before the tenth day of the month, the Company shall pay to the Contractors seventy-five (75%) per cent of the value of the work done during the preceeding month, as shown by the Engineer's estimate, less amounts deducted for supplies and meals furnished and insurance premiums paid under this contract.

FINAL PAYMENT

18. - Upon the acceptance of the work hereunder the Engineer shall render to the Company and to the Contractors a final estimate of the work done hereunder and its total value, based upon the contract prices, less deductions, if any, for supplies and meals furnished and insurance premiums paid by the Company. The Contractors shall be entitled to receive payment of the remaining amount due them under this contract immediately upon acceptance of the work by the Company.

LIABILITY INSURANCE

19. - It is mutually agreed that the Company shall carry, for and on account of the Contractors, liability insurance under the provisions of the Workmen's Compensation Act of Alaska, such insurance to include the Contractors and their employees, if any, and all sums paid by the Company as premiums for such insurance shall be charged to the Contractors' account in the same manner as other expenses of the contract and shall be deducted upon final settlement.

EXECUTION OF CONTRACT

20. - IN WITNESS WHEREOF the said Company has caused its corporate name to be subscribed and its corporate seal to be affixed, and

the said Contractors have severally hereto affixed their hands and seals the day and year first hereinabove written.

ANCHORAGE LIGHT & POWER COMPANY, Inc.,

By _____
President.

By _____
Secretary.

_____.

_____.

_____.

_____.

_____.

_____.

_____.

_____.

_____.

_____.

_____.

_____.

_____.
Contractors.

1928.

No. 388

CONTRACT

and

SPECIFICATIONS

FOR

GENERAL CONSTRUCTION WORK ON EKLUTNA PROJECT

CONTRACT NO. 3

ANCHORAGE LIGHT AND POWER COMPANY, INC.

ANCHORAGE, ALASKA.

PROJECT REPORT NO. 2.

FRED. H. TIBBETTS
CIVIL ENGINEER
ALASKA COMMERCIAL BUILDING
SAN FRANCISCO

CONTRACT NO. 3

Anchorage Light & Power Co., Inc.

to

Jasper-Stacy Co.

GENERAL CONSTRUCTION WORK
ON EKLUTNA PROJECT

1 - (Orig.) F.I.Reed 10/3/28
2 - Office Copy
3 - H. I. Wood 10/3/28
4 - Jasper-Stacy Co. 10/3/28
5 -
6 -
7 - Moland 10/3/28
8 - Russell-Colvin Co. 10/3/28

FRED. H. TIBBETTS
CIVIL ENGINEER

DATED: OCTOBER 1928 NO. 388

CONTRACT

and

SPECIFICATIONS

for

GENERAL CONSTRUCTION WORK ON EKLUTNA PROJECT

CONTRACT NO. 3

ANCHORAGE LIGHT AND POWER COMPANY, INC.

ANCHORAGE, ALASKA.

PROJECT REPORT NO. 2.

ANCHORAGE LIGHT & POWER COMPANY, INC.

C O N T R A C T N O. 3

CONTRACT

FOR GENERAL CONSTRUCTION WORK ON EKLUTNA PROJECT

PARTIES TO CONTRACT

1. - This contract and agreement, made and entered into this 3rd day of October, A. D., 1928, by and between the ANCHORAGE LIGHT AND POWER COMPANY, INC., Anchorage, Alaska, a corporation organized and existing under the laws of the Territory of Alaska, the PARTY OF THE FIRST PART, hereinafter designated as the "COMPANY", and the JASPER-STACY CO., San Francisco, California, a California corporation, the PARTY OF THE SECOND PART, hereinafter designated as the "CONTRACTOR".

W I T N E S S E T H :

WORK TO BE DONE

2. - That the PARTY OF THE FIRST PART does by these presents employ the PARTY OF THE SECOND PART to furnish all labor, equipment and materials, except such labor and equipment as are

hereinafter specifically excepted, and to construct the following parts of the first development of the Eklutna Project of the COMPANY:

a. - Eklutna Lake Dam and Spillway
b. - Diversion Dam
c. - Tunnel (Excepting station labor contracted for by COMPANY)
d. - Penstock
e. - Power Plant (Excepting Hydraulic and Electric Machinery and Accessory Equipment to be purchased by COMPANY)
f. - Substations (Excepting Transformers and Substation Equipment to be purchased by COMPANY)
g. - Miscellaneous work pertaining to the Project

(7)

ENGINEER

3. - The engineer in charge of this work, designated herein as the "ENGINEER", shall be FRED. H. TIBBETTS, CIVIL ENGINEER, with offices in the Alaska Commercial Building, San Francisco, employed by the COMPANY to plan and supervise construction of the works herein specified, or his accredited representative in immediate charge on the ground.

PLANS AND SPECIFICATIONS

4. - All work done and all equipment and materials furnished shall be in accordance with plans and specifications prepared by the ENGINEER.

SUBLETTING

5. - The CONTRACTOR shall not let, underlet, assign or transfer this contract, or any interest therein, without the written consent of the COMPANY.

WORK DIRECTED BY ENGINEER

6. - All of the work herein shall be under the direction of the ENGINEER. It shall be commenced and prosecuted at such points as the ENGINEER shall consider to be to the best interests of the work. The CONTRACTOR shall, if the ENGINEER deems necessary, devote the whole or any portion of his force and equipment to the performance of any portion of the work the ENGINEER may designate. The ENGINEER shall have the right of approval or disapproval of purchases of materials, prices paid labor, and prices to be paid for outfit and equipment hereunder, and shall acquaint himself on behalf of the COMPANY with all operations of the CONTRACTOR for such purposes. The ENGINEER'S approval or disapproval shall at all times be exercised promptly so that no unnecessary delays, hindrances or excessive costs shall result to the COMPANY or the CONTRACTOR.

CONTRACTOR'S SUPERINTENDENT

7. - The CONTRACTOR shall at all times have a resident superintendent on the work who shall be authorized to receive and execute such notices, directions and instructions as the COMPANY or its ENGINEER may give.

TIME

8. - The CONTRACTOR shall begin work on this contract within ten (10) working days following the date of the signing of this

contract, and shall complete the same on or before August 1, 1929. In case of actual lost time, resulting from delay on the part of the COMPANY in furnishing rights-of-ways, machinery, labor or other things herein specified to be furnished by the COMPANY, the CONTRACTOR shall be entitled to an extension of time for completion equivalent to the actual amount of time so lost.

COMPENSATION INSURANCE

9. - The CONTRACTOR shall take out and carry Workmen's Compensation and Public Liability Insurance covering his employees on this work. If he fails to do so, the COMPANY shall have the right to maintain such insurance at the expense of the CONTRACTOR.

LIABILITY

10. - The COMPANY will not be liable for any loss or injury to any person or property through any act of the CONTRACTOR or his agents due to the prosecution of this work.

GOVERNMENT REGULATIONS

11. - The CONTRACTOR shall, insofar as he may be able, abide by all laws, rules, regulations and ordinances of any constituted public authorities.

RIGHT OF WAY

12. - The COMPANY will furnish, without cost to the CONTRACTOR, all necessary easements and rights of way for all of the works herein specified, and shall hold the CONTRACTOR harmless from any expense, delay or litigation in connection therewith.

ACCESS

13. - The ENGINEER, the COMPANY Directors, or their accredited representatives, shall have full access to any part of the work at any time during construction.

WORKMEN

14. - The ENGINEER may require the dismissal of any incompetent or disorderly workman. Upon receipt from the ENGINEER of a written request for dismissal, stating cause or causes, the CONTRACTOR will, within a reasonable time, replace such workman.

CONTRACT PRICE

15. - The COMPANY shall pay and the CONTRACTOR shall receive, in full compensation for furnishing labor, equipment, and materials, and for completing all of the work hereunder, payment amounting to full actual construction costs plus 15% for profit and CONTRACTOR'S general overhead expense, payment to be made in such manner and at such times as hereinafter specified.

CONSTRUCTION COSTS

16. - Construction costs for the purpose of computing payments due under this contract shall be deemed to include:

a. - Wages paid for all labor or services, excepting services of Mr. Jasper or Mr. Stacy, and excepting all work done at the San Francisco office of the

CONTRACTOR, but including salary of CONTRACTOR'S Superintendent on the ground at the rate of $375.00 per calender month and living expenses, commencing September 7, 1928.

b. - Purchase price of all materials and equipment purchased by the CONTRACTOR for incorporation in the work, less any discounts actually received and deducted, and actual cost of small tools ~~worn out~~ used on the job, less their salvage value, if any.

c. - Premiums on Workmen's Compensation, Public Liability, Fire and other insurance policies required.

d. - Rental of equipment and outfit at rates approved by the ENGINEER.

e. - Freight and transportation charges for labor, outfit, equipment, and materials, including moving on and off expenses, where required, and including traveling expenses of CONTRACTOR'S Superintendent to and from Alaska, but not including traveling expenses of Mr. Jasper or Mr. Stacy between San Francisco and Anchorage.

f. - Maintenance and repair supplies for outfit and equipment, as required.

g. - Operation of camps.

h. - Incidental field costs necessary for the completion of the work when authorized and approved by the ENGINEER and field office expenses including stationery, postage and telephone charges and including reasonable telegraph charges for messages from or to Alaska.

COST RECORDS

17. - The CONTRACTOR shall keep records of all work and costs thereof, and copies thereof shall be furnished the COMPANY and shall at all times be accessible to the COMPANY and its ENGINEER. The CONTRACTOR shall furnish the ENGINEER WITH DAILY FIELD REPORTS and, at the end of monthly periods, shall furnish the ENGINEER with copies of all bills incurred hereunder and certified copies of all

payrolls for work hereunder, together with a detailed bill of all construction costs.

PROGRESS ESTIMATES

18. - As soon as practicable, after receipt of the CONTRACTOR'S monthly bill, the ENGINEER shall verify or correct the same and shall endeavor to adjust any discrepancies to the satisfaction of the CONTRACTOR. He shall then render to the COMPANY and to the CONTRACTOR an estimate of the amount of work done under this contract during the preceding monthly period and the value thereof, in accordance with the terms of this contract.

MONTHLY PAYMENTS

19. - On receipt of the ENGINEER'S estimate, and within ten (10) days of submission of the CONTRACTOR'S bill, the COMPANY shall pay to the CONTRACTOR the full amount due, as shown by the ENGINEER'S estimate, as follows:

80% of amount due to be paid in cash,

20% of amount due to be paid in stock units, consisting of one (1) share of Preferred Stock and ten (10) shares of Common stock of the Anchorage Light & Power Company, Inc., each such unit to be valued at $150.00 for the purpose of making this payment.

The monthly period covered by bills, and the date of bills, estimates and payments to the CONTRACTOR, shall be so adjusted as to permit the CONTRACTOR to take advantage of discounts on materials and equipment purchased for the work.

BOND

20. - At the option of the COMPANY, the CONTRACTOR shall furnish a surety bond of the National Surety Company or other surety company of its nomination and approved by the COMPANY in such principal amount as the COMPANY may specify. The premium on the surety bond, if required by the COMPANY, shall be a part of the cost of the work hereunder.

FINAL PAYMENT

21. - This contract shall be terminated when all or substantially all of the work provided herein shall have been completed. Upon notification by the ENGINEER that the work under the contract has been completed, the CONTRACTOR with all due diligence shall proceed to close up his camps, lay off his men, and return all outfit and equipment to their yards as rapidly as possible with the object of discontinuing rentals and pay-rolls at the earliest possible date. Final bills shall be submitted as soon as possible thereafter and final estimates will be rendered and final payment made in the same manner as specified for monthly payments.

TERMINATION OF CONTRACT BY COMPANY

22. - If, at any time the COMPANY finds it necessary to discontinue ~~all~~ (general prosecution of) work on the project, the COMPANY shall have the right to terminate this contract by written notice delivered at the CONTRACTOR'S San Francisco office. Immediately upon receipt of such notice, the CONTRACTOR shall discontinue all construction work and shall proceed, as provided in Paragraph 21 above, to close up all accounts and render final bills. Final payment will be made by the COMPANY as specified in Paragraph 21, provided that, in case the COMPANY should exercise its right to terminate this contract prior to February 1, 1929, then

full final payment shall be made to the CONTRACTOR in cash and any and all stock units theretofore accepted by the CONTRACTOR as part payment hereunder shall be redeemed by the COMPANY in cash on the basis of $150.00 per unit.

TERMINATION OF CONTRACT BY CONTRACTOR

23. - If payments shall not be made as provided herein to be made by the COMPANY, or if the COMPANY breaks any of the terms of this contract, or is, in any other way in default hereunder, the CONTRACTOR shall have the option and privilege of declaring this contract at an end after ten (10) days notice, unless prior to the expiration of the said ten (10 days the COMPANY shall have completely remedied the default claimed by the CONTRACTOR to have occurred. The said notice shall state the nature of the default and its service shall be complete when filed as a pre-paid telegram at a regularly established telegraph office in San Francisco, California, addressed to the COMPANY at its regular place of business, with a copy by mail to Russell-Colvin Co., San Francisco, California. Such right of termination may be successively exercised by the CONTRACTOR whenever and as often as such default may occur and no failure to exercise such right at any time when default may occur, shall abridge in any way the right of the CONTRACTOR to avail himself of such privilege if any similar default may thereafter occur or at any time to which such default may have been continued. In case such privilege is exercised for any such default, the COMPANY shall pay all stocks or sums of money due hereunder and nothing hereunder shall interfere with or prejudice any other right the CONTRACTOR may have against the COMPANY, but it shall be a cumulative remedy in addition to other remedies that the CONTRACTOR may have by this contract or by law, for the enforcement of same or for the

recovery of any stocks or any monies due or payable hereunder, provided however, that the above right of the CONTRACTOR to declare this contract at an end shall not become effective on account of amounts of specific or particular segregated items of bills in dispute until after the same shall have been submitted to arbitration as herein provided.

ARBITRATION OF DISPUTES

24. - In the event that any disagreement or dispute shall exist or arise between the COMPANY and the CONTRACTOR as to the interpretation of this contract or any part hereof, it is hereby agreed by and between the parties hereto that the CONTRACTOR shall select one arbitrator and the COMPANY shall select one arbitrator, and a third shall be selected by the two previously selected. These three arbitrators shall meet as soon as practicable after their selection and consider the matter in dispute. Such decision reached by a majority thereof shall be binding and conclusive as to the rights of the parties hereunder and shall be terminative of the matter in dispute. Refusal or hindrance in the selection of arbitrators or material hindrance in the acts or determinations of the arbitrators by either party hereto, shall give the other party immediate right to proceed in court for the determination of the dispute in question or such right shall exist if said

arbitrators do not reach a decision within ten (10) days after the appointment of the first two arbitrators hereunder. Each party hereto shall bear the expense of its selected arbitrator and the expense of the third arbitrator together with any necessary expenses for the determination of the matter in dispute, shall be borne equally between the parties hereto.

COSTS DUE TO DELAYS

25. - Any costs of work or any costs resulting to the CONTRACTOR after actual commencement of work hereunder, resulting directly or indirectly from any of the hereinafter named causes, shall be considered as work upon which the CONTRACTOR shall receive its actual cost of such work, as cost of work is herein defined, plus fifteen per cent (15%) thereof to cover general expense. Payment in full for such work shall be made at times of other regular payments. Such causes hereinabove referred to shall be as follows:

a. - Judicial proceedings, delaying, preventing or enjoining work or its performance, or attacking the right of the COMPANY to let this contract.

b. - Delays in obtaining rights of way.

c. - Any other act, thing or cause which could have been prevented by the exercise of reasonable diligence and prudence on the part of the COMPANY.

ACTS OF GOD

26. - The CONTRACTOR shall not be responsible for any

damage, loss, cost or expense, arising out of any Act of God, the elements, or any other causes or conditions which the exercise of reasonable diligence and prudence on its part could not have prevented.

WAIVERS

27. - A waiver of any of the conditions of this CONTRACT shall not be considered a waiver of any other conditions.

EXECUTION

28. - Time is the essence of this contract.

And the said parties for themselves, their successors, executors and administrators, do hereby agree to the full performance of the covenants herein contained.

IN WITNESS WHEREOF, said parties have caused their names to be hereunto signed and their corporate seals to be hereto affixed by their respective officers hereunto duly authorized the day and year first hereinabove written.

ANCHORAGE LIGHT & POWER CO.,

By_____
Vice President.

By_____
Asst. Secretary.

JASPER-STACY CO.

By_____
Vice-President.

By_____
Secretary.

No. 414

REPORT

to

ANCHORAGE LIGHT & POWER COMPANY, INC.

on

CONSTRUCTION PROGRESS

on the

EKLUTNA POWER PROJECT

DECEMBER 1ST, 1928, TO JANUARY 4TH, 1929.

--oOo--

PROJECT REPORT NO. 3

January 15, 1929.

FRED. H. TIBBETTS
CIVIL ENGINEER
ALASKA COMMERCIAL BUILDING
SAN FRANCISCO

Anchorage Light & Power Co.,Inc.
Project Report No. 3
Report No. 414

- - - -

1 - Orig.-A.L.& Power Co.
Mailed to Wood 1/24/29
(Airmail)
2 - OFFICE COPY
3 - Russel-Colvin--1/24/29
4 - Jasper-Stacy Co.S.F.,1/24/2
5 - H. I. Wood, Reg.Mail "
6 -

FRED. H. TIBBETTS
CIVIL ENGINEER

REPORT NO. 414.

REPORT

to

ANCHORAGE LIGHT & POWER COMPANY, INC.

on

CONSTRUCTION PROGRESS

on the

EKLUTNA POWER PROJECT

DECEMBER 1st, 1928, TO JANUARY 4th, 1929.

--oOo--

PROJECT REPORT NO. 3

January 15, 1929.

TELEPHONE DAVENPORT 113

FRED. H. TIBBETTS
CIVIL ENGINEER
ALASKA COMMERCIAL BUILDING
SAN FRANCISCO, CALIF.

FRED. H. TIBBETTS
RALPH G. WADSWORTH
HAROLD I. WOOD

SUBJECT ANCHORAGE LIGHT & POWER COMPANY, INC.

January 15, 1929.

MONTHLY PROGRESS REPORT NO. 4

DECEMBER 1ST, 1928, TO JANUARY 4TH, 1929

Anchorage Light & Power Company, Inc.,
Anchorage,
Alaska.

Gentlemen:

The following is a report on the progress of construction work to January 4th, 1929, on your Eklutna Power Project:

STORAGE DAM

The spillway excavation advanced from 60% complete at the beginning of December to 97% complete on January 4th, 1929. During the month of December, 1928, 13 M.B.M. of Hemlock sheathing had been hauled by sled over the snow to the top of the divide above the Lake, and 9 M.B.M. was hauled from the divide to the spillway. The timber framing for the temporary control of the water was completed and the timbers were being set for the weir crest and weir sills. The lining of the spillway was begun toward the beginning of January, 1929.

There was very little work on the dam-fill proper. The clay material excavated from the spillway was stock-piled up-

stream from the dam, so as to be available for clay-facing on the dam at a later date.

During the Christmas holiday 17 men left the Lake Camp on December 23rd and returned December 27th, 1928. This lay-off permitted the shoeing of the stock and the repair of equipment.

DIVERSION DAM

The excavation for the mixer-bench was completed and all timber for the tramway incline was framed. The erection of this incline was made very carefully, due to the danger from ice, which made the erection very slow and hazardous; in fact, several men quit because of the danger due to the presence of ice. During the month this incline was completed except for the installation of the hoist.

No excavation was started until the beginning of January, when two shifts of men were put to work, aided by the use of electric lights.

A water supply pump was installed at the new well.

TUNNEL

The approach cut at the outlet end of the tunnel was completed during December, 1928. This cut was faced up to the tunnel and was in fine lime rock. The bottom of the cut was excavated to grade and a drainage ditch dug, and a steam line extended and placed in the bottom of the ditch to keep the ditch open. The motor and compressor were set and grouted and the compressor plant

and shop were completed. The track on the dump was graded and heavy steel placed thereon.

Mr. Charles Spalding, who had signed the original tunnel contract on September 20th, 1928, was unable to furnish bonds when the time approached for him to commence work on the tunnel. He subsequently refused to sign an amended contract in which was stipulated a 50% withhold, and he further stated that he was not interested in any way in the tunnel work. Other contractors (Warwick, Hagen, Deaner, Spadafori and Johnson) were solicited, but without success. Consequently the resolution was passed by your Board of Directors, authorizing the Anchorage Light & Power Company to drive the tunnel on a day-labor plan, plus a bonus for additional tunnel driving over 20 ft. per 3-shifts per 24-hour day.

The compressor plant was put into actual continuous operation at 4:00 P.M., January 2nd, 1929. The tunnel driving crews were only partly organized and were being broken in for efficient work under Frank I. Reed's direct supervision. By midnight, January 4th, 1929, 22.5 ft. of tunnel was driven. The rock broke nicely and no timbering was required thus far.

PENSTOCK

Ties and steel were laid and the tramway was 90% complete by January 4th, 1929.

POWER HOUSE

A detailed location of the power house site was the only work done in the field during December, 1928.

POWER HOUSE SUBSTATION

A temporary out-door framework and a temporary shed for the switchboards were erected, clear of their permanent locations. The transformers and substation equipment were unloaded and set, or erected in their temporary locations and interconnected with each other and with the transmission line. The transformers were tested by means of a Megger and were found to be perfectly satisfactory. The substation was put into service on January 1st, 1929.

TRANSMISSION LINE

The stringing of the wire and the placing of guy lines at dead ends and at end poles was completed. The guys in the transmission line straight-of-way will be placed after the ground is thawed.

Nets for 5 telephone and telegraph line crossings and for 2 railroad crossings were ordered by Mr. Horn of the Alaska Railroad before they would agree to furnish power over the line. These nets were erected and properly grounded.

The power line was given a final inspection between the power house and Birchwood on December 20th and 21st, 1928, and between Anchorage substation and Birchwood on December 30th and 31st, 1928. This latter inspection was made by dog team. At 1:40 P.M. on December 31st the power was turned on and the voltage gradually built up. This was done by special arrangement with the railroad steam plant. The voltage was gradually built up to 33,000 volts. The line held the charge well after the current was turned off, which indicated good insulation. After the power had been on at full voltage for about 10 minutes, it was then turned off and the jumpers

changed to put 2300 volts on the line for the test of the power house substation and transformer bank. This voltage was left on and the compressor was tried out. On January 1st, 1929, the connections at the Anchorage substation were again changed and 33,000 volts were impressed on the line at 1:55 P.M., after which time the power was definitely left on.

ANCHORAGE SUBSTATION

The permanent out-door assembly was completed. A temporary switch-house was built and the switchboards installed therein. The secondary feeder lines from the railroad steam plant to the substation were re-arranged on their old poles. The sub-station equipment was tested and found to be perfectly satisfactory.

HYDROGRAPHIC WORK

The records of the discharge of Eklutna River, as measured at the temporary gaging station at the mouth of the river, are reported from the field as follows:

1928			1928		
Nov. 29	-	235 sec. ft.	Dec. 14	-	235 sec. ft.
30	-	225 " "	15	-	250 " "
Dec. 1	-	225 " "	16	-	250 " "
2	-	250 " "	17	-	225 " "
3	-	225 " "	18	-	225 " "
4	-	225 " "	19	-	220 " "
5	-	220 " "	20	-	220 " "
6	-	220 " "	21	-	205 " "
7	-	220 " "	22	-	205 " "
8	-	220 " "	23	-	205 " "
9	-	220 " "	24	-	205 " "
10	-	210 " "	25	-	190 " "
11	-	210 " "	26	-	210 " "
12	-	210 " "	27	-	225 " "
13	-	210 " "	28	-	235 " "

OFFICE ENGINEERING

The work at the Engineer's office in San Francisco consisted of the design of the Power House with the most efficient assembly of the power machinery and auxiliaries therein, studies of the penstock location, preparing plans, maps and cost estimates, rendering of reports to the Federal Power Commission, checking of bills of materials ordered, rendering general construction estimates, and general correspondence in connection with the development of the project.

Respectfully submitted,

Chief Engineer,
ANCHORAGE LIGHT & POWER COMPANY, INC.

JS:VH

ANCHORAGE LIGHT & POWER COMPANY, INC.

SUMMARY OF CONSTRUCTION EXPENDITURES
TO DECEMBER 31ST, 1928*

Classification	Decimal Code	During December, 1928 Materials and Supplies	Labor	Total	Total to December 31st, 1928 Materials and Supplies	Labor	Total
KLUTNA LAKE DAM--Estimated Construction Cost = $29,970							
Riprap	261.09	$ 8.00	$ 120.87	$ 128.87	$ 8.00	$ 172.49	$ 180.49
Const. Camp	261.16	11.60	169.61	181.21	1,370.66	1,095.61	2,466.27
Boarding House	261.16	-	-	-	375.55	576.64	952.19
Dam fill	261.18	611.57	1,019.04	1,630.61	2,505.34	1,955.29	4,460.63
Excavation	262.08	635.66	4,193.01	4,828.67	4,075.27	8,185.34	12,260.61
Gates	262.14	887.75	563.50	1,451.25	1,435.72	596.50	2,032.22
Sub-total		$2,154.58	$6,066.03	$8,220.61	$9,770.54	$12,581.87	$22,352.41
DIVERSION DAM--Estimated Construction Cost = $42,080							
Excavation	263.08	$ 233.75	$3,339.77	$3,573.52	$1,448.68	$ 4,930.57	$ 6,379.25
Drilling-Grouting	263.10	-	-	-	581.68	-	581.68
Concrete	263.11	770.55	177.00	947.55	2,905.89	852.35	3,758.24
Reinforcing Steel	263.12	214.12	-	214.12	214.12	-	214.12
Const.Plant-Temp.	263.17	112.94	-	112.94	112.94	88.50	201.44
Sub-total		$1,331.36	$3,516.77	$4,848.13	$5,263.31	$ 5,871.42	$11,134.73
TUNNEL--Estimated Construction Cost = $89,320							
Concrete Plant	263.11	-	-	-	$ 91.20	$ 59.50	$ 150.70
Excavation	281.08	$ 268.87	-	$ 268.87	4,330.26	67.00	4,397.26
Const. Bldg.	281.14	-	-	-	34.00	294.12	328.12
Power	281.15	11.80	$ 63.00	74.80	11.80	63.00	74.80
Const. Plant	281.17	827.89	1,692.90	2,520.79	2,284.45	2,045.10	4,329.55
Outlet-Excav.	281.08	9.01	1,932.68	1,941.69	41.61	3,070.03	3,111.64
Sub-total		$1,117.57	$3,688.58	$4,806.15	$6,793.32	$ 5,598.75	$12,392.07
PENSTOCK--Estimated Construction Cost = $30,250							
Inlet-Concrete	291.11	$ -	$ -	$ -	$ 124.92	$ -	$ 124.92
Excavation	292.08	-	120.00	120.00	438.61	794.60	1,233.21
Concrete Anchors	292.11	421.64	59.20	480.84	717.59	67.20	784.79
Tube	292.13	515.62	-	515.62	716.08	-	716.08
Sub-total		$ 937.26	$ 179.20	$1,116.46	$1,997.20	$ 861.80	$ 2,859.00

* Does not include expenditures made for local charges direct against the Anchorage Light & Power Company at Anchorage, except for Contrac

Classification	Decimal Code	During December, 1928 Materials and Supplies	Labor	Total	Total to December 31st, 1928 Materials and Supplies	Labor	Total
POWER PLANT BUILDING--Estimated Construction Cost = $21,310.							
Excavation	251.08	$ 38.45	$ -	$ 38.45	$ 209.48	$ 193.67	$ 403.15
Concrete	251.11	268.39	-	268.39	497.97	-	497.97
Improvemts.-Land	253.	-	-	-	190.91	-	190.91
Tailrace	294.00	-	-	-	417.96	-	417.96
Sub-total		$ 306.84	$ -	$ 306.84	$1,316.32	$ 193.67	$ 1,509.99
POWER PLANT EQUIPMENT--Estimated Construction Cost = $35,940							
Turbine	311.00	$ -	$ -	$ -	$4,310.75	$ -	$ 4,310.75
Switchboard	324.00	-	-	-	520.00	-	520.00
Sub-total		$ -	$ -	$ -	$4,830.75	$ -	$ 4,830.75
POWER PLANT SUB-STATION--Estimated Construction Cost = $9,840.							
Transformers	371.00	$ 318.00	$ -	$ 318.00	$3,287.92	$ -	$ 3,287.92
Excavation	371.08	-	-	-	-	13.50	13.50
Concrete	371.11	14.60	-	14.60	198.89	42.38	241.27
Misc. Equipment	372.00	359.13	-	359.13	2,982.46	-	2,982.46
Sub-total		$ 691.73	$ -	$ 691.73	$6,469.27	$ 55.88	$ 6,525.15
TRANSMISSION LINES--Estimated Construction Cost = $65,340.							
Poles	381.00	$ -	$ -	$ -	$9,805.15	$ 303.50	$10,108.65
H.T.Cross Arms	382.00	181.74	-	181.74	3,305.91	-	3,305.91
L. T. Cross Arms	383.00	-	-	-	288.20	-	288.20
H. T. Wire	391.00	-	-	-	10,135.65	-	10,135.65
H. T. Insulators	392.00	105.69	-	105.69	3,948.39	-	3,948.39
L. T. Wire	394.00	-	-	-	879.40	-	879.40
L. T. Insulators	395.00	-	-	-	18.64	-	18.64
Sub-total		$ 287.43	$ -	$ 287.43	$28,381.34	$ 303.50	$28,684.84
ANCHORAGE SUB-STATION--Estimated Construction Cost = $11,230.							
Switchhouse	362.00	$ -	$ -	$ -	$ 80.00	$ -	$ 80.00
Transformers	373.00	318.00	42.57	360.57	3,121.32	42.57	3,163.89
Concrete	373.11	-	133.63	133.63	91.65	133.63	225.28
Misc. Equipment	374.00	363.61	570.88	934.49	3,388.42	570.88	3,959.30
Sub-total		$ 681.61	$ 747.08	$1,428.69	$ 6,681.39	$ 747.08	$ 7,428.47
RAILROAD SPUR TRACK--Estimated Construction Cost = $5,000.							
Permanent Spur	302.00	$ 100.00	$ 26.40	$ 126.40	$ 3,068.48	$ 2,011.60	$ 5,080.08

Classification	Decimal Code	During December, 1928 Materials and Supplies	Labor	Total	Total to December 31st, 1928 Materials and Supplies	Labor	Total
ENGINEERING DIRECTLY ASSIGNABLE							
Storage Dam	261.01	$ -	$ -	$ -	$ -	$ 96.30	$ 96.30
Storage " Spilwy.	262.01	-	-	-	-	161.70	161.70
Diversion Dam	263.01	-	33.15	33.15	-	445.95	445.95
Tunnel Intake	264.01	-	-	-	-	46.74	46.74
Tunnel proper	281.01	-	-	-	-	33.75	33.75
Penstock	29.01	-	56.30	56.30	-	101.30	101.30
Power Plant Bldg.	251.01	-	181.80	181.80	-	231.50	231.50
Power Plant Equip.-Hydro	31.01	-	-	-	-	7.50	7.50
-Elec.	32.01	-	-	-	-	7.50	7.50
Power Plant Sub-Station	372.01	-	13.20	13.20	20.00	190.20	210.20
Trans. Line	38.39	-	-	-	42.90	387.60	430.50
Anchorage Sub-Sta.	374.01	-	-	-	30.00	294.35	324.35
Sub-total		$ -	$ 284.45	$ 284.45	$ 92.90	$ 2,004.39	$ 2,097.29
MISCELLANEOUS ITEMS--to be pro-rated at the end of the construction period to the respective portions of the project benefited thereby.							
Camp at Powr.Plt.	281.16	$2,308.28	$1,074.48	$3,382.76	$ 8,939.05	$ 4,094.04	$13,033.09
B'd Ho.Supplies at above camp	281.16	2,546.51*	1,035.55	1,510.96*	1,385.36*	2,062.52	677.16
Water Supply--P.P. Camp	253.00	279.42	1,243.92	1,523.34	1,712.50	2,939.80	4,652.30
Road and Trail	301.00	-	-	-	289.53	692.35	981.88
Commissary	622.00	88.02*	-	88.02*	243.56	-	243.56
Sub-total		$ 46.83*	$3,353.95	$3,307.12	$ 9,799.28	$ 9,788.71	$19,587.99
OVERHEAD CONSTRUCTION COSTS--to be pro-rated at the end of the construction period to the respective portions of the project benefited thereby.							
Contr.Supt.-Fld.	57.00	$ 60.63	$ 69.06	$ 129.69	$ 481.79	$ 991.97	$ 1,473.76
Engineering--Field & Office	57.01	-	3,090.87	3,090.87	121.03	7,325.77	7,446.80
Legal	58.	-	-	-	85.30	-	85.30
Insurance	59.	-	-	-	-	875.00	875.00
Accounting	621.	250.67	92.45	343.12	565.95	836.69	1,402.64
Contractor's Prf.	623	1,321.00	2,649.21	3,970.21	8,171.00	5,831.21	14,002.21
Sub-total		$1,632.30	$5,901.59	$7,533.89	$ 9,425.07	$15,860.64	$25,285.71
TOTAL SEGREGATED EXPENDITURES		$9,193.85	$23,764.05	$32,957.90	$93,889.17	$55,879.31	$149,768.48

*Credits

Brought Forward $149,768.48

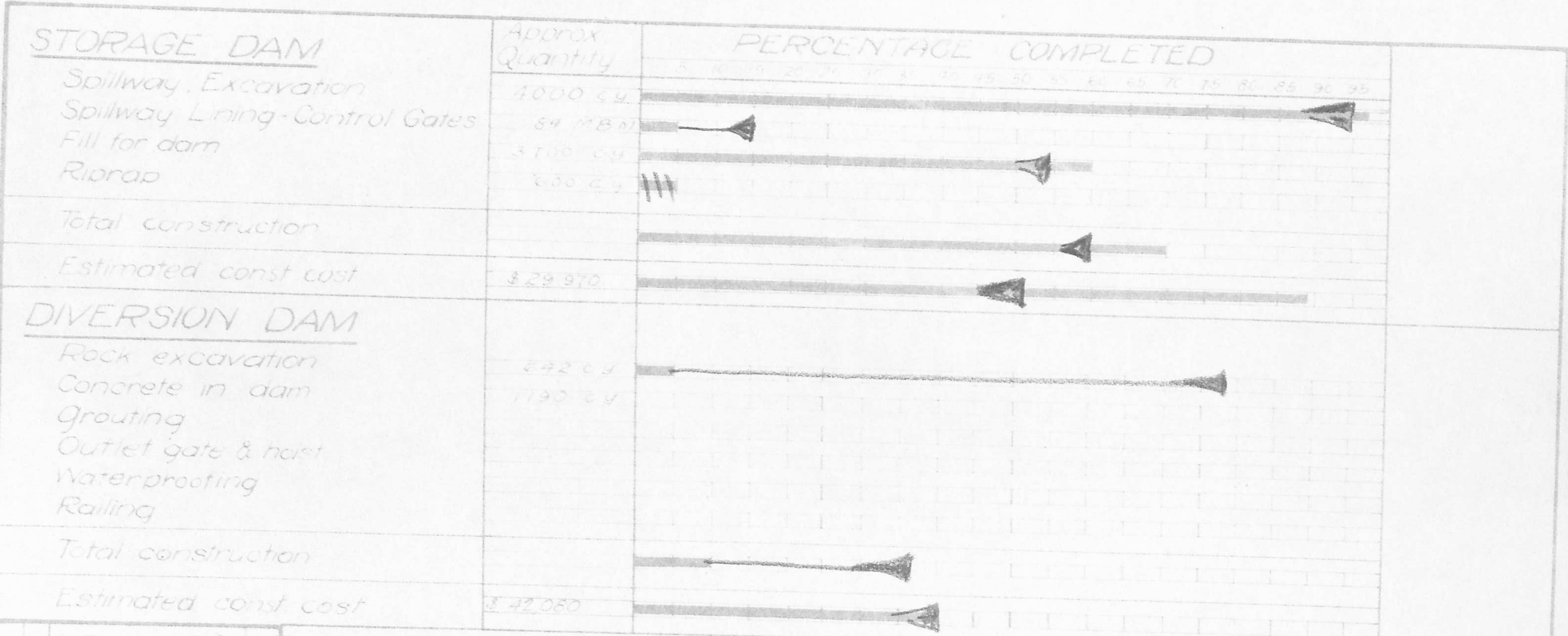
UNSEGREGATED (At date of this report)

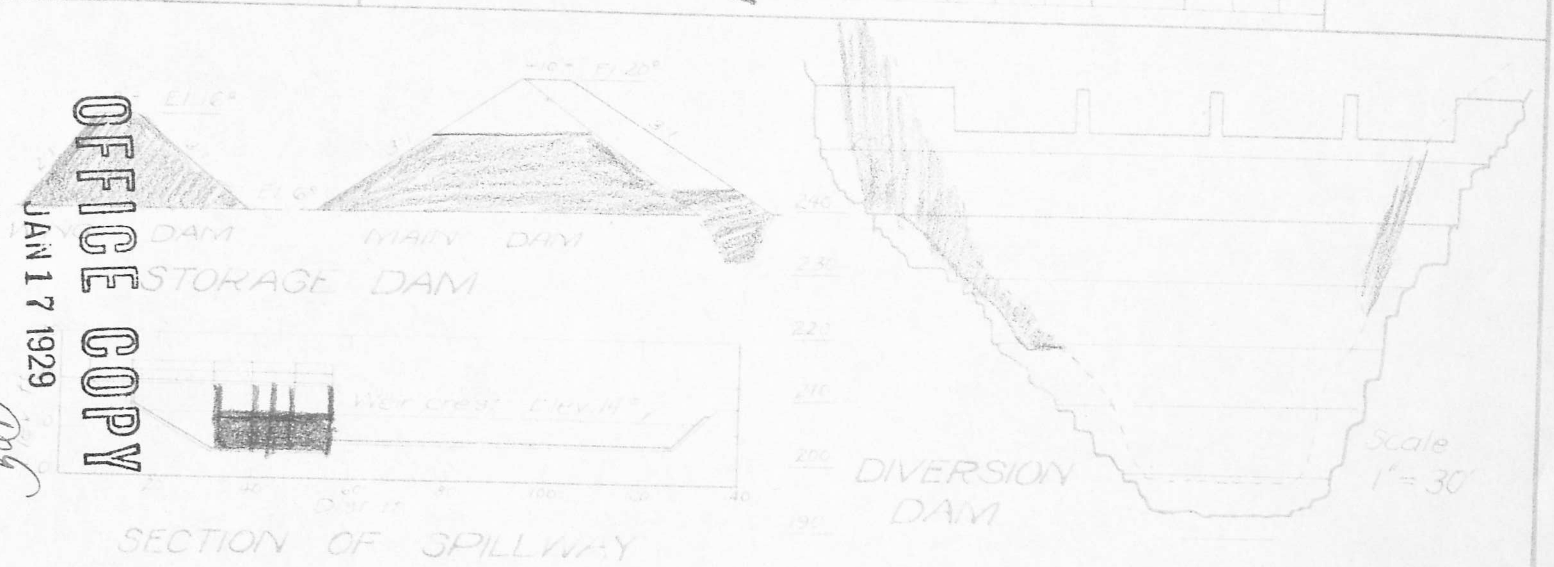
Jasper Stacy Company--Estimate No. 3--Additional Costs . .	$10,278.06
Jasper Stacy Company--Estimate No. 4--Additional Costs . .	2,914.69
Sub-total	13,192.75
GRAND TOTAL TO DECEMBER 31ST, 1928	$162,961.23*

*This summary does not include expenditures for charges made at Anchorage direct against the Anchorage Light & Power Company, except for Contract No. 1.

THIS SUMMARY INCLUDES THE FOLLOWING ESTIMATES AND BILLS

Jasper Stacy Co., General Contract	
Estimate No. 1, Nov. 5, 1928	$28,750.00
Estimate No. 2, Nov.27, 1928	12,956.62
Estimate No. 3, Dec.10, 1928	35,205.42
Estimate No. 4, Jan. 5, 1929	30,438.26
Materials Purchased, San Francisco	
Estimate No. 1, Oct. 19, 1928	2,413.58
Estimate No. 2, Oct. 19, 1928	10,629.31
Estimate No. 3, Nov. 5, 1928	7,206.11
Estimate No. 4, Dec. 5, 1928	14,080.09
Estimate No. 5, Jan. 5, 1929	1,600.00
J. R. Campbell--Contract No. 1	
Final Estimate, Oct. 21, 1928	5,539.60
Pelton Water Wheel Co.,--Hydraulic Equipment	
Estimate No. 1, Dec. 5, 1928	4,310.75
Fred. H. Tibbetts,--Engineering Cost Bills	
June, July, August and September,1928-Oct.1,1928 . .	3,089.40
October, 1928--Dated Oct. 31, 1928	1,227.53
November, 1928--Dated Nov. 30, 1928	1,442.74
December, 1928--Dated Dec. 31, 1928	1,175.50
Fred. H. Tibbetts--Engineering Fee	
On costs to Sept. 30, bill dated Oct. 24, 1928 . . .	604.05
On costs to Nov. 30, bill dated December 8, 1928 . .	1,329.03
On costs to Nov. 30, bill dated December22, 1928 . .	963.24
GRAND TOTAL TO DECEMBER 31ST, 1928	$162,961.23





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JAN 17 1929
CHECKED J.S. APPROVED [signature]
FRED H. TIBBETTS SAN FRANCISCO

TOTAL PROGRESS TO DEC. 31, 1928.

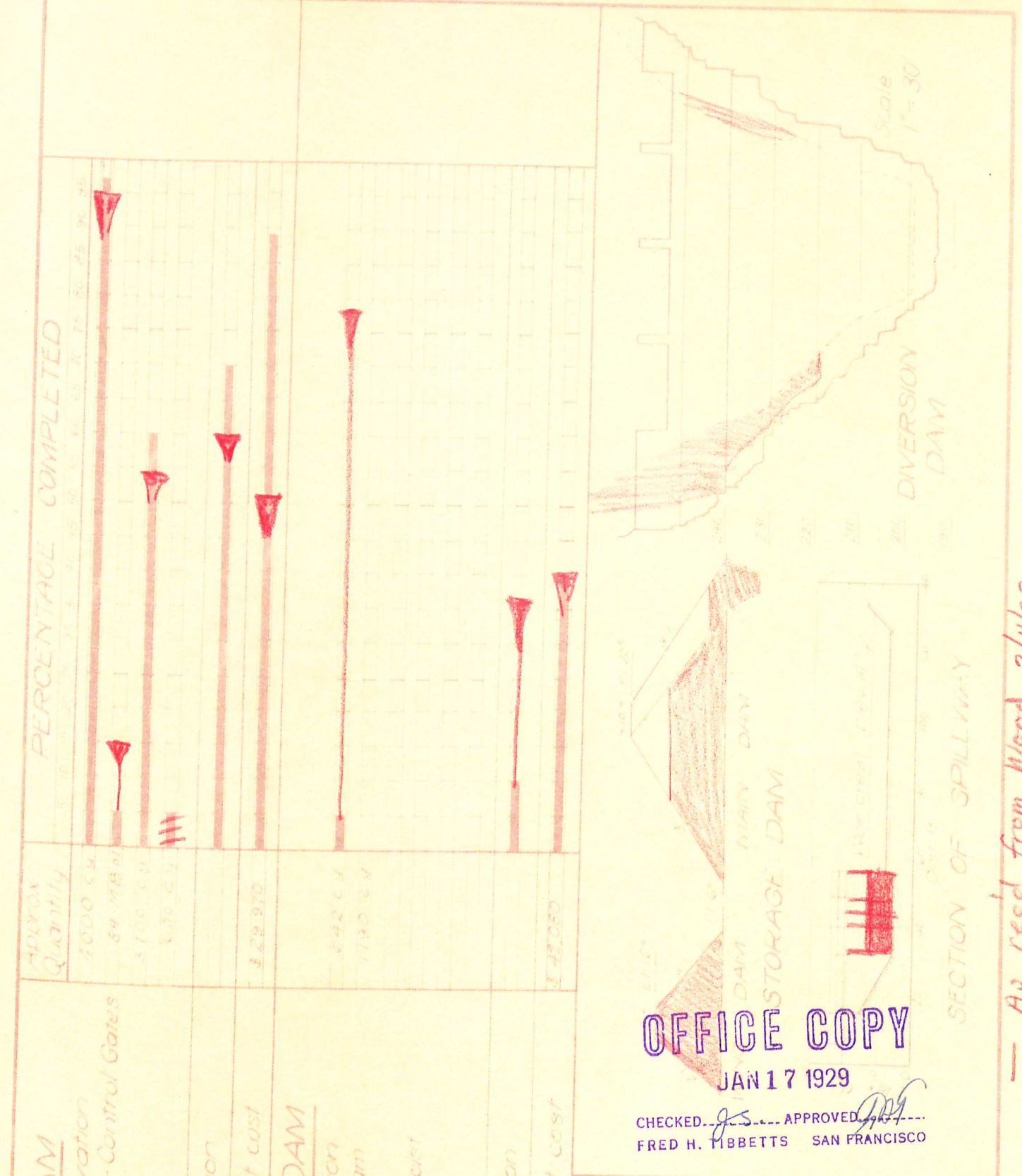
ANCHORAGE LIGHT & POWER CO.
PROGRESS CHART
STORAGE AND DIVERSION DAMS

Dec 1928
San Francisco

Fred H. Tibbetts
Chief Engineer

FILE NO 1086-D-17

— As rec'd from Wood 2/11/29



— As read from Wood 2/11/29

	Quantity	PERCENTAGE COMPLETED
TUNNEL		
Inlet Portal, Excavation	124 c.y.	
Inlet Portal, Concrete	33 c.y.	
Trash Rack	8035 lbs	
Linea Section	470 ft	
Unlined Section	1410 ft	
Total mat & const		
Est. Construction Cost	$89,320	
PENSTOCK		
Exc. inlet and trench	3180 c.y.	
Concrete - inlet and anchors	95 c.y.	
Steel pipe placing	147,500 lb.	
Butterfly valve, placing		
Total mat and const.		
Est. mat & const cost	$30,320	

As recd. from Wood 2/11/29

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JAN 17 1929

CHECKED J.B. APPROVED A.H.

FRED H. TIBBETTS SAN FRANCISCO

TOTAL PROGRESS TO DEC. 31, 1928

ANCHORAGE LIGHT & POWER CO

PROGRESS CHART

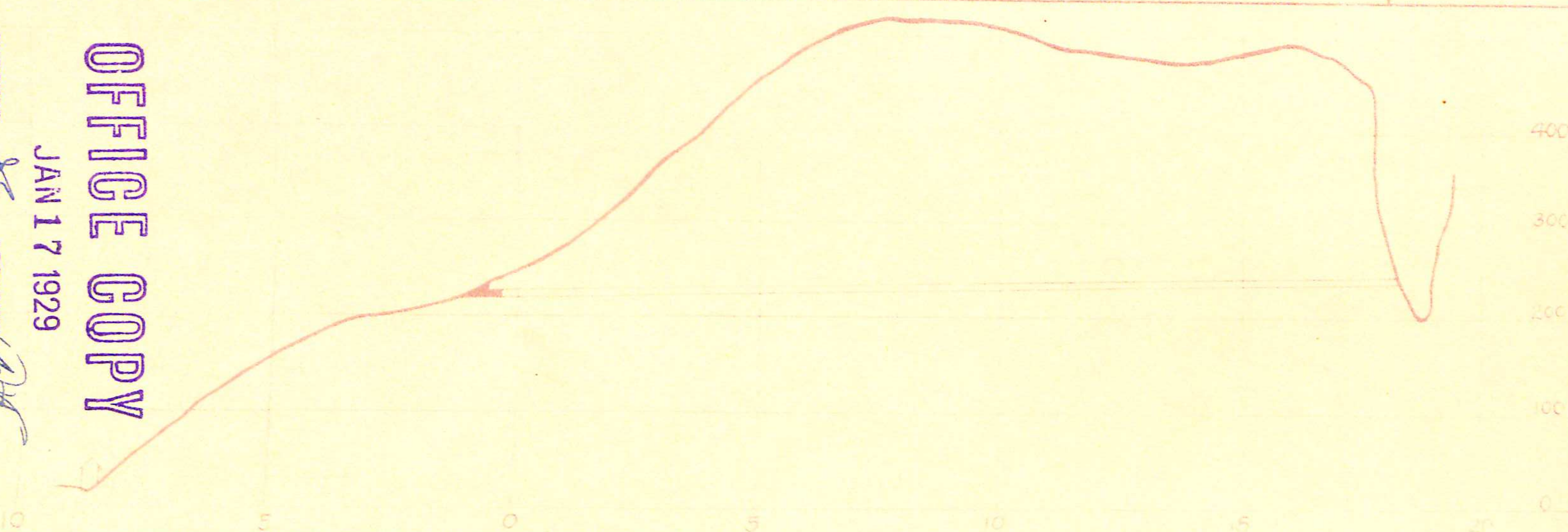
TUNNEL AND PENSTOCK

DRAWN

DEC 1928

1086-D-18

	Approx Quantity	PERCENTAGE COMPLETED
TUNNEL		
Inlet Portal, Excavation	124 c.y.	
Inlet Portal, Concrete	33 c.y.	
Trash Rack	8635 lbs	
Linea Section	470 ft	
Unlinea Section	1410 ft	
Total mat & const		
Est. Construction Cost	$ 59,320	
PENSTOCK		
Exc. inlet and trench	3,180 c.y.	
Concrete - inlet and anchors	98 c.y.	
Steel pipe placing	147,500 lb.	
Butterfly valve, placing		
Total mat and const.		
Est. mat & const. cost	$ 30,230.	



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FRED H. TIBBETTS SAN FRANCISCO

TOTAL PROGRESS TO DEC. 31, 1928
ANCHORAGE LIGHT & POWER CO
PROGRESS CHART
TUNNEL AND PENSTOCK
SHOWN
DEC 1928
F.B.
J.W.R. J.S.
W.R.
1086-D-18

As rec'd. from Wood 2/11/29

POWER PLANT BUILDING	Approx Quantity	PERCENTAGE COMPLETE
Excavation- foundation	[illegible] cu yds	
Excav - tail race channel	5300 cu yds	
Concrete- foundation	256 cu yds	
Concrete- superstructure	190 cu yds	
Tile roof	2253 sq ft	
Concrete lining tail race	1100 sq ft	
Doors and sash		
Crane- installation		
Operator's cottage		
Total construction		
Estimated material & const cost	$21,310.	
POWER PLANT EQUIP		
MATERIALS AT SITE		
Turbine		
Generator		
Switchboard and instruments		
Wire, conduits and lights		
House transformers		
Heaters		
INSTALLATION:		
Turbine 1500 H.P.		
Generator 1250 K.V.A.		
Switchboard and instruments		
Wiring conduit and lights		
House transformers		
Auxiliaries		
Total materials & install		
Estimated equip & install cost	$35,940	

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FRED H. TIBBETTS SAN FRANCISCO

As rec'd from Wood 2/11/29

TOTAL PROGRESS TO DEC. 31, 1928.

ANCHORAGE LIGHT & POWER CO.

PROGRESS CHART

POWER PLANT BUILDING

POWER PLANT EQUIPMENT

Dec 1928

San Francisco

Fred H Tibbetts

Chief Engineer

FILE NO.	DR. JR.	CK. J.S.
1086-D-19	TR. JR.	AP. [signature]

POWER PLANT BUILDING	Approx quantity	PERCENTAGE COMPLETE
Excavation- foundation	[illegible]	
Excav - tail race channel	5300 cu yds	
Concrete- foundation	256 cu yds	
Concrete - superstructure	190 cu yds	
Tile roof	2263 sq ft	
Concrete lining tail race	1130 sq ft	
Doors and sash		
Crane - installation		
Operator's cottage		
Total construction		
Estimated material & const cost	$27,310.	
POWER PLANT EQUIP		
MATERIALS AT SITE		
Turbine		
Generator		
Switchboard and instruments		
Wire, conduits and lights		
House transformers		
Heaters		
INSTALLATION:		
Turbine 1500 H.P.		
Generator 1250 K.V.A.		
Switchboard and instruments		
Wiring conduit and lights		
House transformers		
Auxiliaries		
Total materials & install		
Estimated equip & install cost	$35,970	

As rec'd from Wood 2/11/29

TOTAL PROGRESS TO DEC. 31, 1928.

ANCHORAGE LIGHT & POWER CO

PROGRESS CHART

POWER PLANT BUILDING

POWER PLANT EQUIPMENT

Dec 1928

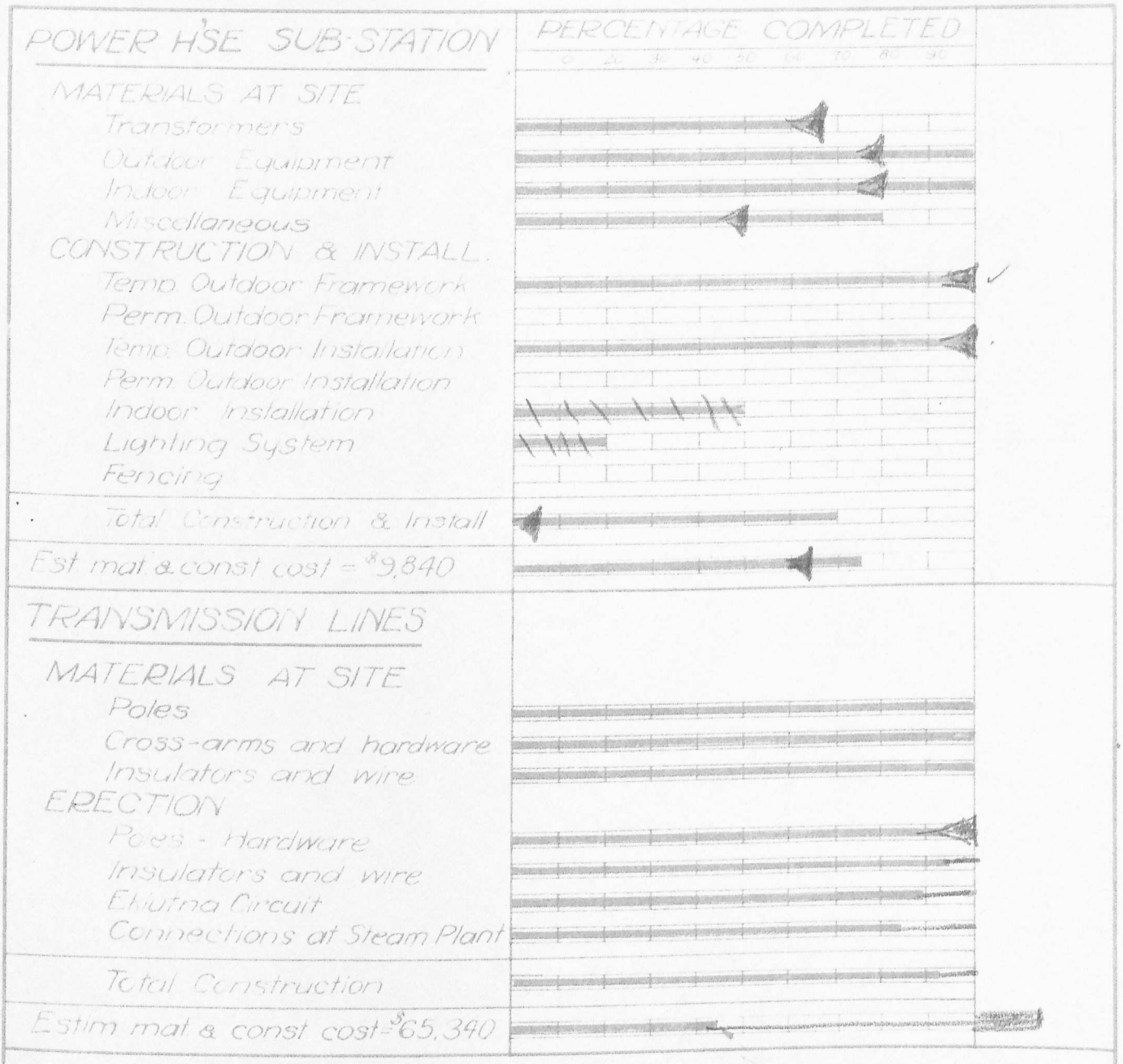
San Francisco

Fred H Tibbetts
Civil Engineer

FILE NO 1086-D-19

DR. J.R. CK. J.S.

TR. NO. AP. F.H.T.



Does not include local charges at Anchorage.

As rec'd. from Wood 2/11/29

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JAN 17 1929

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FRED H. TYBBETTS SAN FRANCISCO

TOTAL PROGRESS TO DEC. 31, 1928.

ANCHORAGE LIGHT & POWER CO

PROGRESS CHART

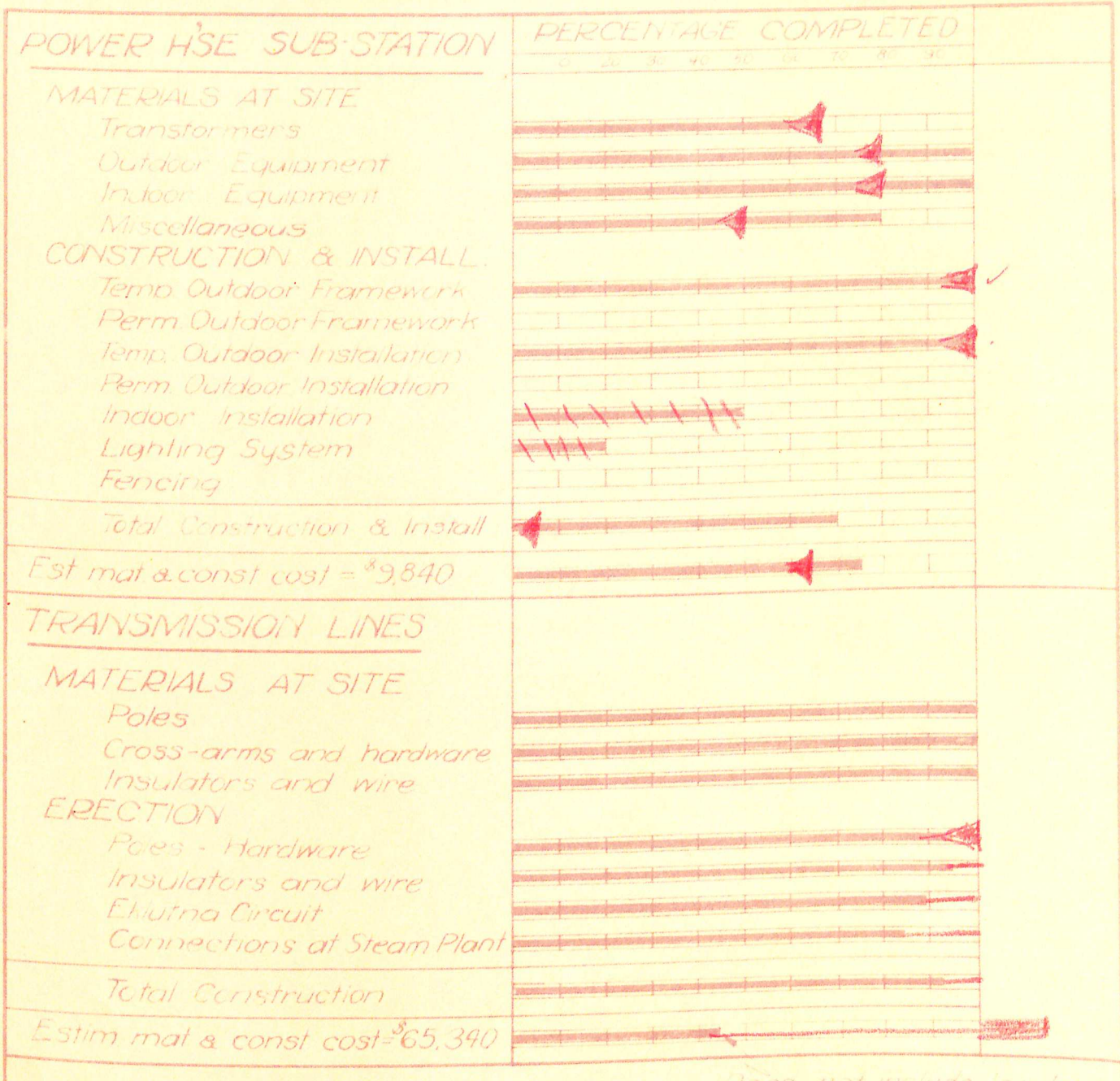
POWER HOUSE SUB-STATION

TRANSMISSION LINE

Dec. 1928
San Francisco

Fred H. Tibbetts
Chief Engineer

FILE NO.	DR. JR	CH. JS
1086-D-20	TR. JR	AP.



Does not include local charges at Anchorage

As rec'd. from Wood 2/11/29

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JAN 17 1929

CHECKED.---J.S.---- APPROVED.---J.M.---

FRED H. TYBBETTS SAN FRANCISCO

TOTAL EXPENSES TO DEC. 31, 1928.

ANCHORAGE LIGHT & POWER CO.

PROGRESS CHART

POWER HOUSE SUB-STATION

TRANSMISSION LINE

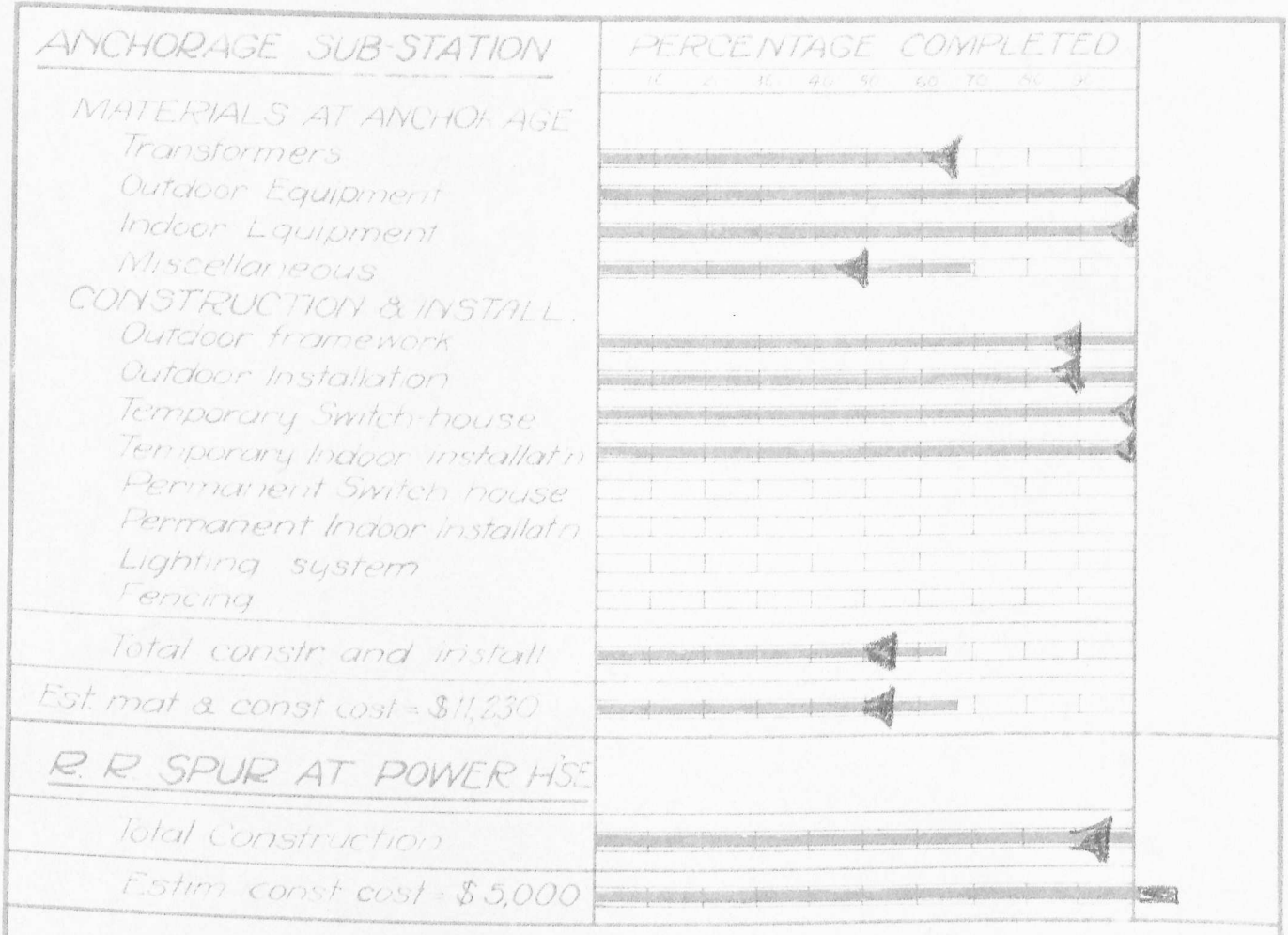
Dec. 1928

San Francisco

Fred H. Tybbetts

Chief Engineer

FILE NO.	DR. J.R.	CK. J.S.
1086-D-20	TR. J.R.	AP. J.M.



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JAN 17 1929

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FRED H. TIBBETTS SAN FRANCISCO

As rec'd. from Wood 2/11/29

TOTAL PROGRESS TO DEC. 31, 1928.

ANCHORAGE LIGHT & POWER CO

PROGRESS CHART

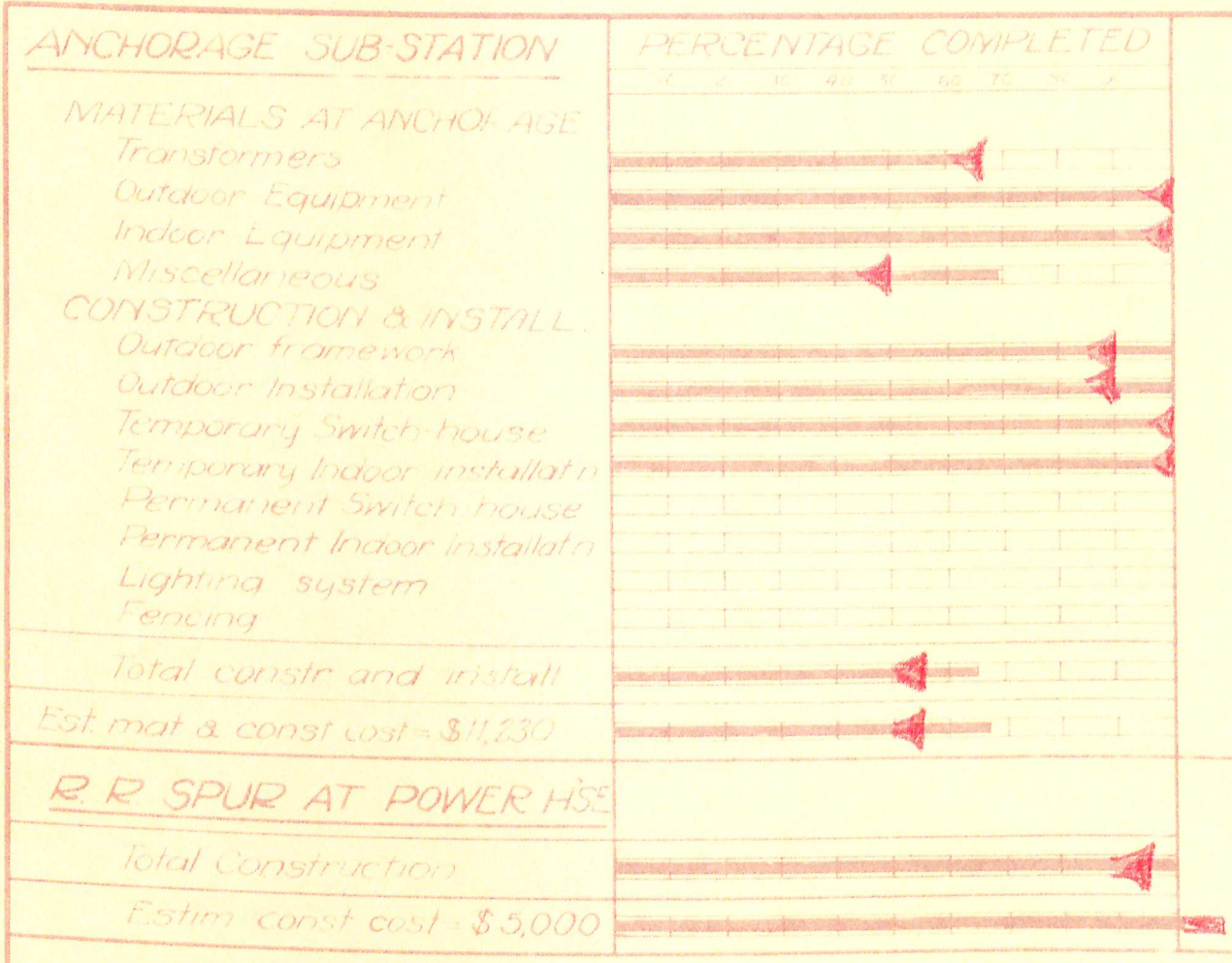
ANCHORAGE SUB-STATION

R. R. SPUR AT POWER HOUSE

DATE Dec 1928

JBR J S

1086-D 21



As rec'd. from Wood 2/11/29.

TOTAL PROGRESS TO DEC. 31, 1928.
ANCHORAGE LIGHT & POWER CO
PROGRESS CHART
ANCHORAGE SUB-STATION
R.R. SPUR AT POWER HOUSE
1086-D-21

DATE 29 No. 415

SPECIFICATIONS

FOR

FABRICATION OF RIVETED STEEL PIPE

ANCHORAGE LIGHT & POWER COMPANY, INC.

CHECKED JS APPROVED FHT

FRED H. TIBBETTS SAN FRANCISCO

PROJECT REPORT NO. 4

FRED. H. TIBBETTS
CIVIL ENGINEER
ALASKA COMMERCIAL BUILDING
SAN FRANCISCO

Anchorage Light & Power Co.,Inc.
Report No. 415
Project Report No. 4.

Specifications for Fabrication
of Riveted Steel Pipe

1 - Original--Jasper-Stacy Co.
2 - OFFICE COPY
3 -)
4 -)
5 -) Jasper-Stacy Co.
6 -)
7 -)
8 -)

TELEPHONE DAVENPORT 113

FRED. H. TIBBETTS
CIVIL ENGINEER
ALASKA COMMERCIAL BUILDING
SAN FRANCISCO, CALIF.

FRED. H. TIBBETTS
RALPH G. WADSWORTH
HAROLD I. WOOD

SUBJECT

ANCHORAGE LIGHT & POWER COMPANY, INC.
SPECIFICATIONS FOR THE FABRICATION OF RIVETED STEEL PIPE

January 21, 1929

GENERAL SPECIFICATIONS

PLATES

All plates shall be made of open-hearth steel, and shall have an ultimate strength of at least 55,000 lbs. per square inch, with an elastic limit of at least 30,000 lbs. per square inch.

All plates shall be free from laminations or surface defects, and shall be rolled to gage and not weight.

Any plate that develops defects during the process of punching, bending and riveting incident to fabrication and erection of the pipe shall be rejected notwithstanding that the same may previously have satisfactorily passed specified test.

LENGTH OF SECTIONS

The courses shall have a minimum length of 7 feet. The sections shall be approximately 25 to 28 feet in length.

JOINTS

The longitudinal joints shall be standard double riveted lap joints (detail drawings will be furnished with the contract to the successful bidder).

The girth or roundabout joints shall be standard single riveted lap joints.

All roundabout lap joints shall be constructed with the female end uphill.

Longitudinal lap joints shall point down and shall be located alternately 30 degrees to the left and to the right of the top center line of the pipe.

All joints shall form a tight fit with each other. All angular joints shall be shop closed.

All joints shall have a minimum efficiency of 70%.

ANGLE SECTIONS

At the vertical angles, the plates shall be cut and punched to the required lines for forming a small oblique angle of not greater than 3° for the 54" pipe at

the roundabout seams, and embracing as many courses as may be required to procure the total curvature, the courses being put together with the longitudinal seams staggered.

Except for the vertical angle of approximately 1½ degrees, no angle section shall consist of less than three courses.

Except for the vertical angle of approximately 1½ degrees, 2- 6"x6"x½" angle irons shall be rivetted circumferentially to the angle section (detail drawings will be furnished with the contract to the successful bidder).

The circular lap joints shall have their larger size uphill.

WYE SECTION

In forming the taper courses, the plates shall be cut and punched to the required lines along the four edges, so as to bring the pitch lines of the rivets in the roundabout seams into planes parallel with each other and at right angles to the axis of the section.

The circular lap joints shall have their larger size uphill.

RIVETS

5/8 inch steel rivets shall be used for the steel of 1/4 inch thickness, and 3/4 inch steel rivets for the steel of 5/16 inch and 3/8 inch thickness.

All shop rivets shall have an elastic limit of at least 24,000 lbs. per sq. inch in shear and 48,000 lbs. per sq. inch in bearing.

MARKING

The sections of the penstock, together with all special material, shall be carefully marked for identification in the field, in accordance with an erection diagram to be furnished by the contractor, for field use.

Two clear and distinguishable center punch witness marks shall be placed on the top outside of each section to identify corresponding rivet holes. The same rivet holes shall be further distinguishable by two clean paint marks.

All field joints shall be checked in the shop before shipment.

DIPPING AND SOIL-PROOFING

All pipe shall be thoroughly cleaned and dipped in hot asphaltum.

All exterior surfaces of pipe, angle sections, Wye, etc., shall be made soil-proof by wrapping with felted fabric, saturated with bituminous compounds so as

to make the pipe impervious to the action of unfavorable soil conditions. The felted fabric shall be wrapped spirally around the pipe and bonded to the same by hot asphaltum between the covering and the pipe. The wrapping shall be applied under a uniform tension of 50 lbs. per eighteen inches width of wrapping. The edges of the wrapping at joint connections shall be finished off by sealing with hot asphaltum.

WORKMANSHIP

GENERAL

All workmanship shall be first class and in accordance with the best American shop practice. All sections of pipe, except wye and taper connections, shall be true circles of the required internal diameters.

The Engineer's word shall be final in all cases. Poor

SHEARING

Shearing shall be neatly and accurately done, and all portions of the work exposed to view shall be neatly finished. The cuts shall be clean, without drawn or ragged edges and without splitting away from the sheared edge.

PLANING

The ends of all sections shall be properly cut to true lines.

BEVELING AND SCARFING

The edges of all plates shall be properly cut or sheared to true lines and all edges which are to be calked in the finished pipe shall be properly beveled on a plane at approximately 70 degrees with the plane of the plate. At the end of each course where the lap of the longitudinal seam occurs, the plate must be reduced in thickness by planing or hammering or both, to a fine edge to which three of the rivets of the round seam must be driven to insure tightness.

PUNCHING AND REAMING

Punched holes shall be accurately spaced, true to line, so that when plates are brought together, the holes shall exactly match.

Only the sharpest dies and punches shall be used. The diameter of the die must never exceed the diameter of the punch by more than 3/32 of an inch.

The use of drift pins will be permitted only for drawing the material together. No drifting to enlarge unfair holes will be allowed. Necessary corrections shall be made with a reamer. Poor matching of punched holes will be sufficient cause for rejection.

Rivet holes shall be punched to finished diameter without reaming, and shall be 1/16 in. greater than the rivet diameter.

The edge distances shall be at least 1.5 times the diameter of the rivet hole.

ROLLING

All plates shall be bent cold, to a true circle of the specified diameter of the pipe, as nearly as practicable, by the use of a template.

DRIFTING

No drifting to rectify unfair holes will be allowed. If holes require enlargement to admit the rivet or bolt, it must be reamed, and under no circumstances is the metal in the vicinity of the hole to be distorted or injured. The use of drift pins will be allowed only for bringing together the several parts forming a member and they shall not be driven with such force as to injure the adjacent metal.

RIVETING

The size of the rivets called for shall mean the actual size of the rivets before heating.

Before riveting, all plates must be thoroughly cleaned and freed from rust and scale. Burrs shall be removed.

Whenever possible, rivets shall be driven by pressure tools (preferably hydraulic press) of sufficient capacity to upset the metal, exerting a slow and steady pressure of not less than fifty (50) tons for rivets of 3/4 in. diameter or less, and retaining this pressure while the rivet head is being formed.

All rivets, after driving, shall completely fill the hole and have full heads concentric with the shank. No recupping nor calking of heads will be allowed. All loose, burned or otherwise defective rivets shall be cut out and replaced, great care being exercised not to injure the adjacent material, drilling out if necessary.

In order to avoid shrinkage of the rivets on cooling, it will be required that the riveting pressure be held for the following period of time on each rivet:

3/4 in. diameter rivets	25 seconds
5/8 in. diameter rivets	20 seconds

All rivets shall be cone-head rivets.

CALKING

All seams must be calked on the inside (that is, on the side on which the rivets are driven) in first-class boiler work fashion, and the inspection thereof completed before any coating is applied to the pipe. No plates shall be unduly cut by calking.

GENERAL TESTS

Certified mill tests of physical and chemical properties of the steel shall be furnished by the manufacturer.

NO.

REPORT

to

ANCHORAGE LIGHT & POWER COMPANY, INC.

on the

EKLUTNA POWER PROJECT

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PROGRESS REPORT NO. 1 -- JULY 14TH TO OCTOBER 15TH, 1928
PROGRESS REPORT NO. 2 -- OCTOBER 16TH TO NOVEMBER 2ND, 1928
PROGRESS REPORT NO. 3 -- NOVEMBER 3RD TO NOVEMBER 30TH, 1928

PROJECT REPORT NO. 5

FRED. H. TIBBETTS
CIVIL ENGINEER
ALASKA COMMERCIAL BUILDING
SAN FRANCISCO

Original Progress Reports mailed out in letter form. This bound copy of the three Reports bound only for our files.

FRED. H. TIBBETTS
CIVIL ENGINEER

REPORT

to

ANCHORAGE LIGHT & POWER COMPANY, INC.

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PROGRESS REPORT NO. 3 -- NOVEMBER 3RD TO NOVEMBER 30TH, 1928

ANCHORAGE LIGHT & POWER COMPANY

November 2, 1928.

MONTHLY PROGRESS REPORT NO. 1

JULY 14 to OCTOBER 15, 1928

Anchorage Light and Power Company,
Anchorage,
Alaska.

Gentlemen:

The following is a report on the progress of construction work on your Eklutna Power Project up to October 15th, 1928.

GENERAL PROGRESS

Prosecution of your project in the field commenced on July 14th, 1928, upon the arrival at Anchorage of Mr. H. I. Wood, Resident Engineer. Rapid preliminary surveys made by Mr. Wood during the following three weeks were reviewed by Mr. Tibbetts, in the field from August 4th to 12th, 1928, and the general location and character of the main features of the project were determined. The first actual construction commenced on September 17th, when three linemen and the general contractor's superintendent arrived on the ground and distribution of materials for the power line commenced.

The Federal Power Commission license was granted on October 12th, 1928, but definite assurance that it would be granted had been received on October 1st. On that date a general contract for construction of the

proposed storage dam, diversion dam, power house and part of the tunnel work was awarded to the Jasper-Stacy Company, San Francisco, California, and the contract was definitely executed on October 3rd, 1928. Acting on previous assurance that such a contract would be awarded them, Mr. Stacy had inspected the site of the proposed work during the week of September 16-22 and had left at Anchorage, to take charge of the anticipated work, their construction superintendent, Mr. Moland. Construction of the power line was left in charge of Mr. Reed, acting as Superintendent for your Company.

STORAGE DAM

Clearing of the dam site at the mouth of Eklutna Lake has been commenced and a camp has been established. A trail was constructed and supplies for men and teams taken in. Lumber for construction of the spillway has been ordered from a local mill.

DIVERSION DAM

Work has been started on the construction of a tramway, which will convey construction materials from the railroad, over the hill to the diversion dam site. Arrangements have been made for obtaining and handling the concrete aggregate.

TUNNEL

No active work has been commenced on the tunnel, although the tramway mentioned above will be used to a large extent to transport materials to the north portal. Negotiations are under way to award a contract for the necessary tunnel labor by the lineal foot.

J.S.

POWER HOUSE

A general construction camp has been established at the site of the power house, consisting of mess house, meat house, sleeping quarters for cooks, and tents for bunks for about 50 men. A spur track has been constructed from the main line of the railroad to facilitate unloading materials. The penstock location area has been stripped of moss.

POWER LINE

Actual construction of the power line commenced on September 17th, when the first materials and 3 construction men arrived at Anchorage. Transmission line poles, hardware and pins were ordered on August 30th, 1928. Transformers and insulators were ordered on October 1st, and wire was ordered on October 5th. Construction work was rushed as rapidly as possible under the immediate direction of Mr. Reed in order to have power for construction purposes available at the tunnel as soon as possible. On October 20, 1928, the following work had been completed:

Location survey	25 Miles
Delivery of poles and hardware	24 "
Distribution of poles and hardware	16 "
Setting poles and guys	11.7 "
Wire strung	0.5 "
Clearing	14.1 "
Percentage of job completed	Approximately 30

The total cost of the power line including engineering up to October 13th, 1928, was approximately as follows:

J.S.

Reed

Surveys, labor and local materials	$ 17,500.00
Materials purchased at San Francisco	18,726.17
Design, plans and material orders	364.50
TOTAL	$ 36,590.67

HYDROGRAPHIC WORK

Since Mr. Wood's arrival at Anchorage, regular observations have been taken on the flow of the Edlutna River, including numerous current meter measurements. It is found that the measurements agree remarkably well with the rough rating previously established. A recording water stage register was ordered for installation at this location on October 13th.

SURVEYS

Preliminary surveys were completed for the storage dam, diversion dam, tunnel and power house. The final location survey for the power line was about 90% complete. The spillway at the storage dam site had been laid out.

OFFICE ENGINEERING

The work in the Engineer's office at San Francisco consisted of preliminary cost estimates, design of the transmission line and substations, design of the storage dam, preparation of the tunnel contract and general construction contract, preparation of a system of accounts to conform to requirements of the Federal Power Commission, placing of orders

JS. RZW

for power line and substation materials, and obtaining preliminary quotations on power plant machinery. A plan of the Eklutna Lake storage dam, designated Exhibit L-1, was forwarded to the Federal Power Commission on October 18th, 1928, to accompany the original application for license.

Respectfully submitted,

Chief Engineer
ANCHORAGE LIGHT AND POWER COMPANY

RGW:VH

cc - Russell-Colvin Co.,
H.I.Wood
Jasper-Stacy Co. S.F.
Jasper-Stacy Co., P.O.Box 124, Anchorage, Alaska.

ANCHORAGE LIGHT & POWER COMPANY

November 12, 1928

MONTHLY PROGRESS REPORT NO. 2
Oct. 16 to Nov. 2, 1928

Anchorage Light & Power Co.,
Anchorage,
Alaska

Gentlemen:

The following is a report on the progress of construction work on your Eklutna Power Project up to November 2, 1928.

GENERAL PROGRESS

Construction of the power line was continued under the direction of Mr. Reed and Mr. Wood. Active work on other parts of the construction work commenced actively on October 4, 1928 under the direction of Jasper-Stacy Co.'s superintendent, Mr. G. R. Moland.

STORAGE DAM

A sled road 11 miles long was constructed to the camp at Eklutna Lake and the camp completed, consisting of a log mess house, 4 bunk tents, 4 stable tents and a blacksmith tool and storage tent. The spillway site was cleared, grubbed and stripped and excavation completed for a distance of about 30 feet at the lower end. The borrow pit from which material will be obtained for the dam was cleared, grubbed and stripped, and an approach to the fill was constructed. The rock to be used for rip rap on the surface of the dam was about 10% uncovered.

DIVERSION DAM

The tramway location lying east of the penstock line was cleared, stripped and 70% graded. A sled road was graded to the top of the hill above the canyon. A material road from the upper end of the tramway to the diversion dam site was graded. At the diversion dam site the north canyon wall was completely stripped of loose rock and earth and the same work on the south wall was about 40% completed.

TUNNEL

The camp at the power house site, which will be used as the principal base for operations at the tunnel and diversion dam and later on the power house and penstock, was well established, consisting of mess house, store room and cooks quarters, 4 bunk houses, bath house, cement shed, barn and wood shed. A water tank and tank house was 50% completed.

J.S.

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Poles were cut for framing the compressor plant, blacksmith shop and screening plant. Clearing and excavation for the powder house, compressor plant and hoist house were about 50% complete. The spur track from the Alaska Railroad was completed to a length of 1900 feet, but was not surfaced. A well for camp water supply was completed and a gas engine and pump were set up for temporary supply to the camp and crane steam boiler and pump were set up.

The portal cut was excavated for a length of 30 lineal feet. Arrangements are being made by the Alaska Railroad to re-install a turbine at their power house to supply power for driving the tunnel.

TRANSMISSION LINE

Erection of the pole line was continued from two camp. From the camp at Ohlsen siding (Mile 134½), this work has been completed to Pole 417. From the camp at Eklutna siding the 18 poles on the branch line and all but one pole on the main line between the power house and Eklutna River have been set together with 14 poles west of the river extending to Pole 554. The total number of poles set to November 2, 1928 was 447, including the 18 poles on the branch line. South of the Eklutna River insulators are being erected with the poles. The status of the work on the main line on November 2, 1928 was as follows:

Pole erection, 77% complete
Clearing, 84% complete

The total length of the main high tension line will be 139,100 feet, or 26.3 miles.

HYDROGRAPHIC WORK

On November 8, 1928 a report was forwarded to the Federal Power Commission summarizing the stream flow measurements during the past year, and outlining plans for future hydrographic work on the Eklutna River.

SURVEYS

Survey work in connection with laying out the proposed construction was continued.

OFFICE ENGINEERING

The work in the engineer's office at San Francisco consisted of designs of the diversion dam and the Anchorage sub-station; economic studies to determine the best height of dam and location of tunnel; ordering sub-station materials; preliminary plans of the power house and penstock; and checking bills for materials purchased.

Respectfully submitted,

F.H.T. acting
Chief Engineer
Anchorage Light & Power Co.

c.c. Russell-Colvin Co.
Jasper Stacy Co.(2)
H.I.Wood
Extra
RGW-EC

J.S.

ANCHORAGE LIGHT & POWER COMPANY

December 14, 1928

MONTHLY PROGRESS REPORT NO. 3
November 2 to 30, 1928

Anchorage Light & Power Co.,
Anchorage,
Alaska

Gentlemen:

The following is a report on the progress of construction work to November 30, 1928 on your Eklutna Power Project.

STORAGE DAM

A trench 8 ft. wide was excavated in the spillway to elevation 7.0 in the lower two-thirds, and to elevation 10.0 in the upper one-third of the spillway. The spoil from the trench was placed in the embankment or training wall north of the spillway. The lower portion was in sandy clay and large gravel, the upper portion in stiff clay. This trench was then used to ground sluice the frozen material which was shot from the sides. The spillway excavation was about 60% complete.

During the earlier part of the month the lake level rose from elevation 7.0 to elevation 9.0 in three days and flooded the partially constructed cut-off trench of the dam. A temporary control of the water entering the trench has now been constructed, the timber framing of which was 75% complete.

On November 28 the ground was thawing and the stock were miring. Over 2000 cu. yds. (56%) of gravel have been placed in the fill for the dam.

There were 20 M.B.M. hemlock sheathing at the spur track at the power house waiting such a time as the freezing and snowfall on the upper trail would enable the timber to be sledded to the damsite. There are 32 men and 12 head of stock in camp.

DIVERSION DAM

The stripping of all loose material on both the banks of the canyon and above the crest of the dam has been completed. The tramway from the north rim of the canyon toward the bench for the concrete plant, and the concrete plant foundation, were 80% excavated. Timbers for the tramway were 70% framed. A boiler is on the ground for the purpose of furnishing steam for power and heating of the aggregate.

The sub-structure for the gravel bunkers has been built near the power house site. A well near this site was sunk to 28 ft. when rock was en-

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countered but very little water. A new well 2 ft. x 6 ft. has been dug to a depth of 19 ft. at a point about 100 ft. north of the previous well and promises to furnish sufficient water. This water system was put into service November 25.

TUNNEL

The excavation for the compressor plant was completed, the concrete foundation constructed, the compressor itself anchored to the foundation, the building completed and the motor in the building was being tried out. The shop building was erected and the machine tools were being set. A car of powder arrived and has been safely stored in the previously completed powder house. The approach cut of the tunnel at the portal was 60% excavated.

The turbine at the Alaska Railroad steam plant has been installed and will furnish construction power which will be transmitted over the company's transmission line.

PENSTOCK

The excavation for the tramway was continued above the outlet portal of the tunnel. The excavation for 13 (43%) saddle piers, 3 ft. x 7 ft. have been completed at 27 ft. intervals, measured northerly along the slope from the approach cut of the tunnel. These piers on the average go to a depth of 7 feet to gravelly clay, 3 to a depth of 10 feet, and only one of which reached rock.

POWER HOUSE

The loose stripping at the site of the power house was completed as far as possible with the crane. The rock is badly broken with open seams. The spoil has been spread westerly from the plant ready to be shaped into a terrace to the power house floor level. The rock excavation is delayed pending the completion of the compressor plant at the tunnel to supply air for drilling.

POWER HOUSE SUB-STATION

Lumber was being sawed for the temporary outdoor frame work.

POWER HOUSE CAMP, WATER SUPPLY, ETC.

The main camp serving for the diversion dam, tunnel, power house, and penstock, was completed. This camp consists of 8 bunk houses, bath house, mess house, store room and cook's quarters, cement shed, barn, wood shed and engineer's cabin. The water tank has been completed and housed. A new well was dug as previously mentioned in this report. The steam boiler and steam pump have been set and housed. Water pipes and boxed steam lines

J.S.

have been constructed throughout the camp where necessary.

The spur track from the Alaska Railroad was completed to its final length of 2300 feet.

TRANSMISSION LINE

The clearing and pole setting has been completed and two pole setting crews were laid off. The pole setting equipment was gathered up and shipped to Anchorage or the power house camp.

Insulators and hardware were being placed on the poles, and guys were being completed as the wire was being strung. The stringing of the wire began November 14. This work is being accomplished by two crews of 12 men each, the crews working from both ends of the transmission line. This latter work was 48% complete.

ANCHORAGE SUB-STATION

The transformer foundation excavation was completed, and the concrete foundation poured on November 14. This concrete ~~pi-d~~ pad had to be housed, heated and watched to keep it from freezing as the concrete solidified. A temporary wooden building, 18 feet x 22 feet for the Anchorage switch boards and a small warehouse has been completed. The transformers were unloaded November 28. The remaining electrical apparatus has been warehoused, pending its erection. The work of the outdoor frame work was started November 29.

HYDROGRAPHIC WORK

An automatic water stage recorder was put into operation at the temporary gaging station at the mouth of Eklutna River on November 28. U. S. government levels have been carried to the stilling well of the gaging station. Eklutna River was metered on November 20 at 106.2 sec. ft., and the corresponding gage reading was 10 inches.

The records of the water surface elevation at Eklutna Lake are as follows:

November	8 - Elevation	9.00
	9 "	8.80
	10 "	8.65
	11 "	8.50
	12 "	8.50
	13 "	8.55
	15 "	8.60
	16 "	8.65

J.S.

OFFICE ENGINEERING

The work in the engineer's office at San Francisco consisted of designs of the diversion dam, sub-stations and feeders; preliminary study of the power house assembly; general ~~hydrographic~~ hydraulic studies in connection with the tunnel, penstock and turbine; ordering sub-station materials, turbine and generator; preparing plans, maps and cost estimates; rendering of reports to the Federal Power Commission; checking bills of materials ordered and rendering general construction estimates.

Respectfully submitted,

Chief Engineer
Anchorage Light & Power Co.

JS-EC

c.c. Russel-Colvin Co.
Jasper-Stacy Co., S.F.
Jasper-Stacy Co., Anchorage
H.I.Wood
Extra

SUMMARY OF CONSTRUCTION COSTS COVERED BY ESTIMATES ON FILE IN SAN FRANCISCO OFFICE

Classification	Decimal Code	During November, 1928			Total to November 30, 1928		
		Materials and Supplies	Labor	Total	Materials and Supplies	Labor	Total
EKLUTNA LAKE DAM	Est. Construction Cost = $29,970						
Riprap	261.09	-	$ 51.62	$51.62	-	$ 51.62	$ 51.62
Const.Camp	261.16	28.70	126.50	155.20	$1,359.06	926.00	2,285.06
Boarding house	261.16	-	247.50	247.50	249.55	576.64	826.19
Dam fill	261.18	1,194.38	366.00	1,560.38	1,817.38	936.25	2,753.63
Excavation	262.08	1,467.02	2,202.18	3,669.20	3,185.42	3,992.33	7,177.75
Gates	262.14	545.22	33.00	578.22	547.97	33.00	580.97
Sub-total		$3,235.32	$3,026.80	$6,262.12	$ 7,159.38	$6,515.84	$13,675.22
DIVERSION DAM	Est. Construction Cost = $44,910						
Excavation	263.08	394.48	980.62	1,375.10	744.48	1,520.37	2,264.85
Drilling-Grouting	263.10	10.00	-	10.00	410.65	-	410.65
Concrete	263.11	920.81	30.50	951.31	952.40	675.35	1,627.75
Tramway	263.17	-	-	-	-	88.50	88.50
Sub-total		$1,325.29	$1,011.12	$2,336.41	$2,107.53	$2,284.22	$4,391.75
TUNNEL	Est. Construction Cost = $89,320						
Concrete Plant	263.11	-	-	-	91.20	59.50	150.70
Exc.-powder house	281.08	484.33	-	484.33	496.33	67.00	563.33
Const.bldg.	281.14	-	-	-	34.00	294.12	328.12
Compressor plant	281.17	766.32	311.70	1,078.02	776.32	352.20	1,128.52
Shop	281.17	-	-	-	161.11	-	161.11
Outlet-Excav.	281.08	-	857.10	857.10	32.60	1,137.35	1,169.95
Sub-total		$1,250.65	$1,168.80	$2,419.45	$1,591.56	$1,910.17	$3,501.73
PENSTOCK	Est. Construction Cost = $26,160						
Inlet-Conc.	291.11	10.00	-	10.00	10.00	-	10.00
Excavation	292.08	229.00	122.80	351.80	413.14	674.60	1,087.74
Conc.Piers	292.11	10.00	-	10.00	10.00	8.00	18.00
Sub-Total		$ 249.00	$ 122.80	$371.80	433.14	682.60	$1,115.74

Classification	Decimal Code	During November, 1928 Materials and Supplies	Labor	Total	Total to November 30,1928 Materials and Supplies	Labor	Total
POWER PLANT BUILDING		Est. Construction Cost = $23,190					
Excavation	251.08	-	$ 193.67	$193.67	-	$ 193.67	$193.67
Concrete	251.11	58.55	-	58.55	58.55	-	58.55
Tailrace	294.00	-	-	-	417.96	-	417.96
Sub-total		$ 58.55	$ 193.67	$252.22	$ 476.51	$193.67	$670.18
POWER PLANT EQUIPMENT		Est. Construction Cost = $35,940					
Turbine	311.00	$4,310.75	-	$4,310.75	$4,310.75	-	$4,310.75
Switchboards	324.00	520.00	-	520.00	520.00	-	520.00
Sub-total		$4,830.75	-	$4,830.75	$4,830.75	-	$4,830.75
POWER PLANT SUB-STATION		Est. Construction Cost = $9,440					
Transformers	371.00	$2,969.92	-	$2,969.92	$2,969.92	-	$2,969.92
Excavation	371.08	-	13.50	13.50	-	13.50	13.50
Concrete	371.11	184.29	42.38	226.67	184.29	42.38	226.67
Misc. Equip.	372.00	2,623.33	-	2,623.33	2,623.33	-	2,623.33
Sub-Total		$5,777.54	$55.88	$5,833.42	$5,777.54	$55.88	$5,833.42
TRANSMISSION LINE		Est. Construction Cost = $65,340					
Poles	381.00	4,265.55	237.50	4,503.05	9,805.15	237.50	10,042.65
Pole dist.&setting	381.00	-	66.00	66.00	-	66.00	66.00
H.T.cross arms	382.00	864.61	-	864.61	3,166.66	-	3,166.66
L.T.cross arms	383.00	134.18	-	134.18	291.33	-	291.33
H.T. wire	391.00	385.74	-	385.74	10,135.65	-	10,135.65
H.T. insulators	392.00	3,842.70	-	3,842.70	3,842.70	-	3,842.70
Low T. wire	394.00	-	-	-	879.40	-	879.40
Low T.insulators	395.00	-	-	-	18.64	-	18.64
Sub-total		$9,492.78	$303.50	$9,796.28	$28,139.53	$303.50	$28,443.03
ANCHORAGE SUB-STATION		Est. Construction Cost = $10,830					
Switch-house	362.00	$ 80.00	-	$ 80.00	$ 80.00	-	$ 80.00
Transformers	373.00	2,803.32	-	2,803.32	2,803.32	-	2,803.32
Concrete	373.11	91.65	-	91.65	91.65	-	91.65
Misc. Equip.	374.00	3,024.81	-	3,024.81	3,024.81	-	3,024.81
Sub-Total		$5,999.78	-	$5,999.78	$5,999.78	-	$5,999.78
RAILROAD SPUR TRACK		Est. Construction Cost = $5,000					
Permanent spur	302.00	$495.74	$723.00	$1,218.74	$2,968.48	$1,985.20	$4,953.68

Classification	Decimal Code	During November, 1928 Materials and Supplies	Labor	Total	Total to November 30, 1928 Materials and Supplies	Labor	Total
ENGINEERING DIRECTLY ASSIGNABLE							
Storage dam	261.01	-	-	-	-	$ 96.30	$ 96.30
Storage dam spillway	262.01	-	-	-	-	161.70	161.70
Diversion dam	263.01	-	$290.00	$290.00	-	412.80	412.80
Tunnel intake	264.01	-	46.74	46.74	-	46.74	46.74
Tunnel proper	281.01	-	-	-	-	33.75	33.75
Penstock	292.01	-	45.00	45.00	-	45.00	45.00
Power plant bldg.	251.01	-	31.50	31.50	-	49.70	49.70
Power plant equip. hydro.	31.01	-	7.50	7.50	-	7.50	7.50
Power plant equip. elect.	32.01	-	7.50	7.50	-	7.50	7.50
Power plant sub-sta.	372.01	-	60.00	60.00	20.00	177.00	197.00
Trans. Line	38.39	-	49.20	49.20	42.90	387.60	430.50
Anchorage Sub-sta.	374.01	30.00	294.35	324.35	30.00	294.35	324.35
Sub-Total		$ 30.00	$831.79	$861.79	$92.90	$1,719.94	$1,812.84
MISCELLANEOUS ITEMS to be pro-rated at the end of the construction period to the respective portions of the project benefited thereby.							
Camp at power plant	281.16	$1,808.52	$1,057.49	$2,866.01	$6,447.81	$3,019.56	$9,467.37
B'd Ho. Supplies at above camp	281.16	221.15	452.98	674.13	1,161.15	1,026.97	2,188.12
Water supply-P.P. camp	253.00	958.35	1,253.88	2,212.23	1,433.08	1,695.88	3,128.96
Road and trail	301.00	60.65	208.30	268.95	289.53	692.35	981.88
Sub-total		$3,048.67	$2,972.65	$6,021.32	$9,331.57	6,434.76	15,766.33
OVERHEAD CONSTRUCTION COSTS not segregated to major construction items							
Superintendence-f'd	57.00	-	-	-	-	247.91	247.91
Engineering	57.01	-	708.10	708.10	121.03	4,234.90	4,355.93
Legal	58.00	1.00	-	1.00	1.00	-	1.00
Accounting	621.00	-	240.51	240.51	-	604.24	604.24
Commissary	622.00	64.90	-	64.90	331.58	-	331.58
Sub-Total		$ 65.90	$948.61	$1,014.51	$453.61	$5,087.05	$5,540.66
TOTAL-SEGREGATED CONSTRUCTION COSTS		$35,859.97	$11,358.62	$47,218.59	$69,362.28	$27,172.83	$96,535.11

UNSEGREGATED (at the date of this report)

Jasper Stacy Co.	Estimate No.2 - Additional Costs (Oct. 1928)	$10,289.09
" " "	" 2 - Profit and general overhead	5,439.99
" " "	" 3 - Additional Costs	10,278.06
" " "	" 3 - Temporary freight charge	366.56
" " "	" 3 - Profit and general overhead	4,592.01
	Sub-Total	$30,965.71
GRAND TOTAL TO NOVEMBER 30, 1928		$127,500.82[x]

x This summary does not include construction charges made at Anchorage direct against the Anchorage Light & Power Co.

THIS SUMMARY INCLUDES THE FOLLOWING ESTIMATES AND BILLS

Jasper Stacy Co., General Contract		
Estimate No. 1	Nov. 5, 1928	$ 28,750.00
Estimate No. 2	Nov.27, 1928	12,956.62
Estimate No. 3	Dec.10, 1928	35,205.42
Materials Purchased, San Francisco		
Estimate No. 1	Oct.19, 1928	2,459.20
Estimate No. 2	Oct.19, 1928	10,629.31
Estimate No. 3	Nov. 5, 1928	7,206.11
Estimate No. 4	Dec. 5, 1928	14,080.09
J.R. Campbell, Contract No. 1. Final Estimate, Oct.21,1928		5,539.60
Pelton Water Wheel Co., Hydraulic Equip. Estimate No.1,Dec.5,1928		4,310.75
Engineering Cost Bills	June,July,Aug. & Sept.1928-Oct. 1, 1928	3,089.40
	October 1928 - dated Oct. 31, 1928	1,227.53
	November1928 - dated Nov. 30, 1928	1,442.74
Engineering Fee applying to costs to Sept. 30, 1928, bill is dated October 24, 1928		604.05
TOTAL		$ 127,500.82

No. 418

REPORT

to

ANCHORAGE LIGHT & POWER COMPANY, INC.

on

CONSTRUCTION PROGRESS

on the

EKLUTNA POWER PROJECT

JANUARY 4th to FEBRUARY 1st, 1929

-oOo-

PROJECT REPORT NO. 6

February 15, 1929

FRED. H. TIBBETTS
CIVIL ENGINEER
ALASKA COMMERCIAL BUILDING
SAN FRANCISCO

A. L. & P. Co., Inc.
Project Report No. 6.
Report No. 418.

1 - A.L.& P.Co.,Anchorage
2 - OFFICE COPY
3 - Jasper Stacy - 2/16/29
4 - Russell-Colvin Co. "
5 - Mr. H. I. W.
6 -

No. 418

R E P O R T

to

ANCHORAGE LIGHT & POWER COMPANY, INC.

on

CONSTRUCTION PROGRESS

on the

EKLUTNA POWER PROJECT

JANUARY 4th to FEBRUARY 1st, 1929

--oOo--

Project Report No. 6

February 15, 1929

IONE DAVENPORT 113

FRED. H. TIBBETTS
RALPH G. WADSWORTH
HAROLD I. WOOD

FRED. H. TIBBETTS
CIVIL ENGINEER
ALASKA COMMERCIAL BUILDING
SAN FRANCISCO, CALIF.

SUBJECT

ANCHORAGE LIGHT & POWER COMPANY, INC.

February 15, 1929

MONTHLY PROGRESS REPORT NO. 5
JANUARY 4th to FEBRUARY 1st, 1929

Anchorage Light & Power Co.,

Anchorage,

Alaska

Gentlemen:

The following is a report on the progress of construction work to February 1st, 1929, on your Eklutna Power Project:

STORAGE DAM

The spillway excavation was completed by January 18th, and the approach channel to the spillway and to the gates was completed by February 1st. Good progress was made on the lining of the weir and by the end of January the upstream side of the weir was completely lined, and the rip-rap placed to protect the upstream toe of the weir lining. The headgate structure was 80% complete by February 1st. The sills for the lining of the spillway are being placed and held by stakes driven through the frozen ground. It is hoped to be able to thaw the bottom of the spillway by means of flowing water and to puddle the sills in place.

The quarry for the rip-rap was opened up. This quarry is located about one-half mile from the spillway along the west shore of Eklutna

Lake. The rock, which is Graywack, breaks irregularly either large or small.

The thawing of the gravel for the gravel fill of the dam was started at 1 A.M. January 31st. No work was done on the dam proper.

Several cases of "Flu" have been reported in camp.

DIVERSION DAM

The incline tramway was completed and a ladder placed between the track. This tramway is about 350 feet long. The lower end is on a station cut in the rock wall of the canyon at about elevation 280. The steam boiler for pumping and for steam heat has been set on this station. A concrete mixer has also been set up at this station, and a 300 sack cement shed over the mixer is being built. The bunkers are being built on the rim of the canyon. A hoist is being rigged for the tram. Water lines have been run for the mixer and the boiler. A gravel screening plant is also being erected.

Two shifts of men are at work on foundation and abutment excavation. This excavation has been roughed out on the north abutment from elevation 260 to 206, and on the south abutment from elevation 225 to 206. The trench in the bottom of the canyon has been widened and the spoil wheeled downstream.

The location of the diversion dam as fixed in the San Francisco office fits the ground conditions very satisfactorily.

TUNNEL

There have been 5 men on each of three shifts driving the tunnel, and the following progress has been made:

Week Ending	Feet Drilled During Week	Ave.per 24 hrs. Drilling Time	Total to end of Week
January 11th	98.5	14.1	121
January 18th	96.0	13.7	217
January 25th	72.0	14.4	289
February 1st	83.0	11.9	372

The tunnel will require about 70 feet of lining between Stations 20+10 and 19+40. This makes a total to date of 70 feet of lined section, or about 19% of that portion of the tunnel drilled to date. Three sets of timbers were set at the portal. The machinery is excellent. During the week ending January 25th, the driving was stopped at 4 P.M. January 22d by orders of Harold I. Wood, Resident Engineer, to enable the installation of ventilating ducts, blasting and light wires, and to provide drainage, to straighten the track, and to install a new timber foundation under the compressor motor. The driving was resumed at 4 P.M. January 24th after a shut-down of 2 days.

Since January 28th, Mr. Wann as superintendent has been alternating with Frank I. Reed on 12 hour shifts.

PENSTOCK

The hoist was put into service and the rollers for the cable were placed. The telephone and signal system was installed. High bents at the upper end of the tramway were erected so as to enable the dumping of gravel into sleds for transportation to the diversion dam. The stringers for the rails were set.

POWER HOUSE

Complete surveys were made of the tail-water channel from the power house to tide-water.

Several cases of "Flu" have been reported in the power-house camp, Messrs. Reed, Moland, Tuck and Carlson all having been sick at the same time.

POWER HOUSE SUB-STATION

No work was done on the power house substation. The apparatus has been in service since January 1, 1929.

TRANSMISSION LINE

The transmission line was in service without interruption up to 1:40 P.M. on January 19th when the power was turned off for 20 minutes to allow for a change of the voltage taps at the power-house camp to give 114 volts. The service was then resumed, and maintained without interruption for the period of this report. This shut-down of power did not interrupt the tunnel driving, however.

ANCHORAGE SUB-STATION

No work was done at the Anchorage Sub-station during January, 1929, the apparatus having been in service since January 1, 1929.

HYDROGRAPHIC WORK

On December 31, 1928, the Eklutna River near the gaging station became gorged with ice and froze from the bottom and sides, which had the effect of raising the water surface so that the water stage records were no longer accurate. The river at the railroad bridge was frozen over its

entire surface. It was estimated that the discharge at the gaging station on December 31, 1928 was approximately 180 second feet.

The Eklutna River was metered on January 13, 1929 at about 270 feet upstream from the diversion dam and showed a corresponding discharge of 106.2 second feet.

OFFICE ENGINEERING

The work at the Engineer's office in San Francisco consisted of the designs of the power-house structure and penstock, the preparation of a basic comprehensive report on the "Eklutna Hydro-electric Project", the preparation of detailed construction plans and maps, the preparation of specifications for the fabrication of riveted steel pipe, the rendering of progress reports and construction estimates, checking bills of materials ordered, and general correspondence in connection with the development of the project.

Respectfully submitted,

Fred H. Tibbetts
Chief Engineer
ANCHORAGE LIGHT & POWER COMPANY, INC.

JS-EC

REPORT

to

ANCHORAGE LIGHT AND POWER CO., INC.

on

CONSTRUCTION PROGRESS

on the

EKLUTNA POWER PROJECT

FEBRUARY 1ST TO MARCH 1ST, 1929

--oOo--

PROJECT REPORT NO. 7.

March 22, 1929.

FRED. H. TIBBETTS
CIVIL ENGINEER
ALASKA COMMERCIAL BUILDING
SAN FRANCISCO

A. L. & P. CO., INC.

CONSTRUCTION PROGRESS

Project Report No. 7.

1 - Orig. A.L.& P. Co. 3/27/29
2 - OFFICE COPY
3 - H. I. Wood "
4 - Jasper-Stacy Co. 3/26/29
5 - Russell-Colvin "

FRED. H. TIBBETTS
CIVIL ENGINEER

REPORT NO. 422

R E P O R T

to

ANCHORAGE LIGHT AND POWER CO., INC.

on

CONSTRUCTION PROGRESS

on the

EKLUTNA POWER PROJECT

FEBRUARY 1st TO MARCH 1st, 1929

--oOo--

Project Report No. 7

March 22, 1929

TELEPHONE DAVENPORT 113

FRED. H. TIBBETTS
RALPH G. WADSWORTH
HAROLD I. WOOD

FRED. H. TIBBETTS
CIVIL ENGINEER
ALASKA COMMERCIAL BUILDING
SAN FRANCISCO, CALIF.

SUBJECT ANCHORAGE LIGHT AND POWER CO.

March 22, 1929.

MONTHLY PROGRESS REPORT NO. 6

FEBRUARY 1ST TO MARCH 1ST, 1929

Anchorage Light and Power Co.,
Anchorage,
Alaska.

Gentlemen:

The following is a report on the progress of construction work during the month of February, 1929, on your Eklutna Power Project:

STORAGE DAM

Staking of the spillway floor sills continued and about 35% of the floor sheathing was placed during February. During a few days prior to February 5th, water was passed through the headgates to thaw the spillway floor. It was discovered that the natural ground which composed the weir readily dissolved in the water around the headgates and was carried away from under the weir lining. A cofferdam was placed across the intake channel and the gates unwatered. A steam boiler was used to supply steam for thawing the material under the weir. This thawed material was being removed and sheet piles were being driven adjacent to the downstream weir sills by the end of February. It is planned to refill the weir with a mixture of

50% silt and 50% gravel, particularly on the downstream slope which will partially be retained by the sheet piles.

The gravel for the main dam was thawed with fires at the borrow pit continually, and by the end of the month the gravel fill in the dam was completed. The water in the lake assisted in the thawing of the clay previously stock-piled upstream from the dam. This thawed clay was placed on the upstream face of the dam as an impervious blanket which was 40% complete by March 1st.

DIVERSION DAM

The gravel bunkers at the rim of the canyon and the gravel plant were completed by February 22nd. The installation of the hoist at the head of the Incline was completed and the hoist then used for the lowering of lumber and materials to the dam site. Drilling and excavation of the foundation continued with two shifts during February. Toward the end of February, 35 men were working 3 shifts, putting in the flume and cofferdam for diverting the Eklutna River from the dam site, and installing pipe fittings and getting ready to pour. There was 140 feet of flume in place and 100 feet additional flume to be added to the upstream end by the end of February.

TUNNEL

The following progress has been made in the driving of the Tunnel:

Week Ending	Feet Drilled During Week	Average per 24 hours	Total to End of Week
February 8th	102	14.6	474
February 15th	66	9.4	540
February 22nd	78	11.1	618
March 1st	78	11.1	696

The tunnel, so far, will require about 70 ft. of lining between Stations 20+10 and 19+40.

During the week ending February 8th, a switch was installed in the track in the tunnel. Some trouble was encountered with the steel, due to a new blacksmith being somewhat inexperienced.

During the week ending February 15th, the compressor plant was shut down at 4:30 P. M. February 11th, due to the motor burning out. A second motor was installed and started February 12th at 5:00 P.M. The second motor heated and had to be shut down several times to cool. The necessary instruments were borrowed from the Alaska Railroad and tests were made on this second motor. It was found the motor would pull intermittently its rated capacity of 100 H.P. The current was 25 amperes and the voltage was satisfactory.

Mr. McDevott, who was foreman on the Cascade Tunnel, arrived February 15th to act as superintendent on the tunnel until Mr. C. G. Jones arrives.

During the week ending February 22nd, the rock driven through was much harder and tougher to shoot. Considerable difficulty

was experienced due to improper steel sharpening and obtaining new blacksmiths. On February 21st Mr. McDevott put into effect a 5 foot round which may save some powder and certainly considerable overbreak. Some 60% powder was ordered.

PENSTOCK

Excavation for the penstock was continued by 3 men for two weeks. The contract for the fabrication of the penstock was awarded on February 12th to Montague Pipe & Steel Company of San Francisco.

TRANSMISSION LINE

The transmission line was in continuous service throughout the month, except for 3 hours on February 28th, when the power was shut off to enable repairs to be made at the Anchorage power house.

HYDROGRAPHIC WORK

The water surface at Eklutna Lake was observed to be at elevation 9.14 on February 15th, 9.35 on February 22nd, and 9.65 on March 1st. No water has passed from the lake since February 5th.

The natural flow of Eklutna River at the Diversion Dam varied between 22 and 35 second feet, depending on the weather.

The following records give the estimated discharge of Eklutna River at the gaging station:

Date	Sec.Ft.	Remarks
Dec. 28, 1928	235	Gauge 1.83 - Q from Rating Curve.
29	230	Gauge frozen and section contracted by ice.
30	220	Interpolated between Dec.28 and Jan. 13 -
31	210	flow by inspection shows gradual decrease.
Jan. 1, 1929	200	Ditto
2	195	"
3	190	"
4	180	"
5	170	"
6	160	"
7	155	"
8	145	"
9	140	"
10	130	"
11	120	"
12	115	"
13	106.2	Current Meter Measurement above Diversion Dam
14	105	interpolated between January 13 and Feb. 1.
15	104	Ditto
16	103	"
17	102	"
18	101	"
19	101	"
20	100	"
21	99	"
22	99	"
23	98	"
24	98	"
25	97	"
26	97	"
27	96	"
28	95	"
29	95	"
30	94	"
31	93	"
Feb. 1, 1929	92.7	Current Meter Measurement above Diversion Dam
2	93	Outlet closed at Eklutna Lake. The discharge
3	84	is estimated from daily Lake elevation plus
4	84	current meter measurements above Diversion
5	75	Dam. Interpolated between Feb. 1 and Feb. 13.
6	75	"
7	75	"
8	74	"
9	74	"
10	74	"
11	73	"
12	73	"

Date	Sec. Ft.	Remarks
Feb. 13, 1929	72	Current Meter Measurement above Diversion Dam
14,	72	Feb. 13 = 22.35 Sec. Ft.
15	72	Interpolated from daily Lake elevation
16	72	plus Current Meter Measurement above
17	80	Diversion Dam Feb. 13 to March 1.
18	82	Ditto
19	103	"
20	100	"
21	80	"
22	71	"
23	71	"
24	79	"
25	79	"
26	71	"
27	71	"
28	78	"
Mar. 1, 1929	70	Current Meter Measurement above Diversion Dam March 1. = 20.4 Sec. Ft.

OFFICE ENGINEERING

The work at the Engineer's office in San Francisco consisted of the designs of the power house structure, diversion dam and penstock anchors, the preparation of detailed construction plans and maps, the ordering and inspection of materials, the rendering of progress reports and construction estimates, checking bills of materials ordered, and general correspondence in connection with the development of the project.

Respectfully submitted,

Fred H. Gibbetts

Chief Engineer,
ANCHORAGE LIGHT AND POWER COMPANY, INC.

JS:VH

	Approx. Quantity	PERCENTAGE COMPLETED
STORAGE DAM		
Spillway, Excavation	4000 c.y.	
Spillway Lining - Control Gates	84 M.B.M.	
Fill for dam	3700 c.y.	
Riprap	600 c.y.	
Total construction		
Estimated const cost	$29,970	
DIVERSION DAM		
Rock excavation	642 c.y.	
Concrete	1190 c.y.	
Grouting		
Outlet gate & hoist		
Waterproofing		
Railing		
Total construction		
Estimated const. cost	$ 42,080	

TOTAL PROGRESS TO FEB. 1, 1929.

ANCHORAGE LIGHT & POWER CO.

PROGRESS CHART

STORAGE AND DIVERSION DAMS

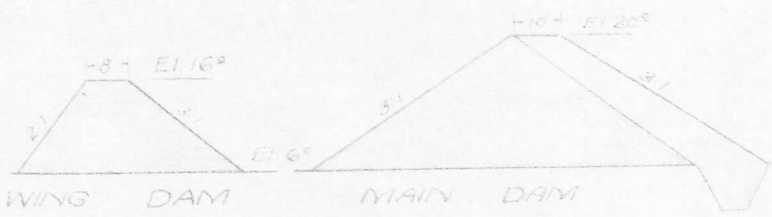
Dec 1928

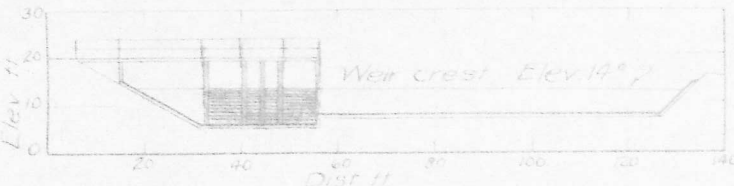
San Francisco

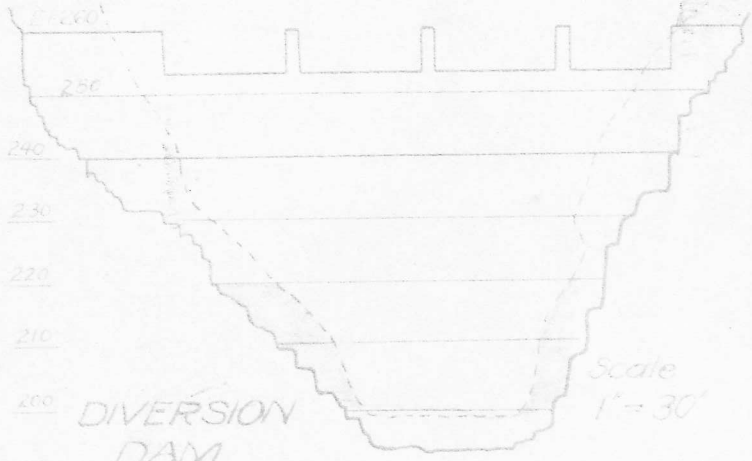
Fred H. Tibbetts
Chief Engineer

FILE NO. 1086-D-17

DR. J.D. TR. J.D. CK. J.S. APP.







	Approx. Quantity	PERCENTAGE COMPLETED
STORAGE DAM		
Spillway, Excavation	4000 C.y	
Spillway Lining · Control Gates	84 M.B.M	
Fill for dam	3700 C.y	
Riprap	600 C.y	
Total construction		
Estimated const cost	$29,910	
DIVERSION DAM		
Rock excavation	642 C.y	
Concrete	1790 C.y	
Grouting		
Outlet gate & hoist		
Waterproofing		
Railing		
Total construction		
Estimated const cost	$42,080	

TOTAL PROGRESS TO FEB. 1, 1929.

ANCHORAGE LIGHT & POWER CO

PROGRESS CHART

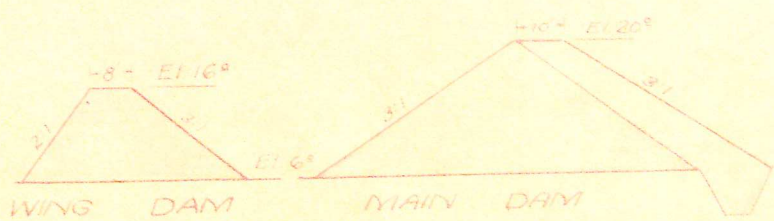
STORAGE AND DIVERSION DAMS

Dec 1928
San Francisco

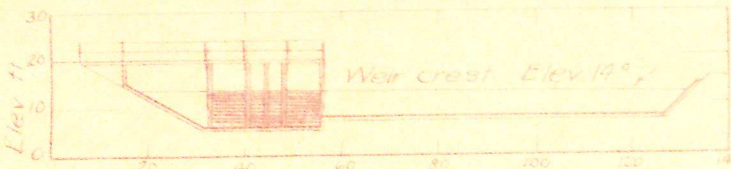
Fred H. Tibbetts
Chief Engineer

DR	TR	CK	
TP	JR	AP	

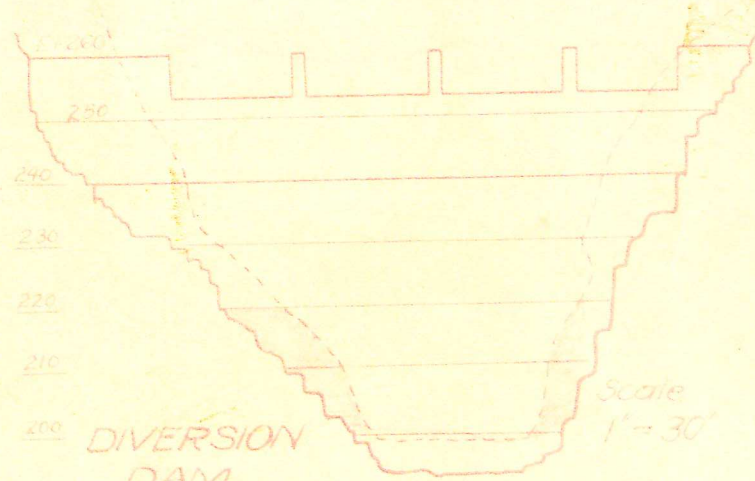
FILE NO. 1086-D-17



STORAGE DAM



SECTION OF SPILLWAY



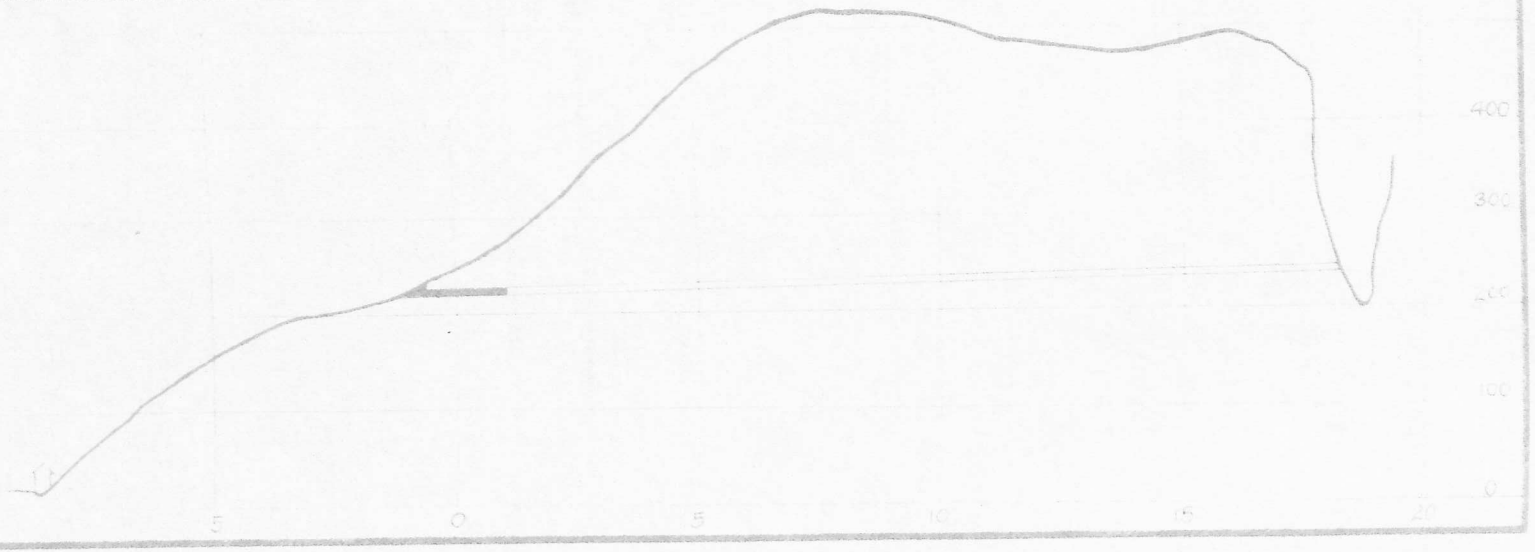
DIVERSION DAM

	Approx Quantity	PERCENTAGE COMPLETED
TUNNEL		
Inlet Portal, Excavation	124 c.y.	
Inlet Portal, Concrete	33 c.y.	
Trash Rack	8635 lbs	
Lined Section	470 ft.	
Unlined Section	1910 ft.	
Total mat & const		
Est. Construction Cost	$59,320	
PENSTOCK		
Exc. - inlet and trench	3180 c.y.	
Concrete - inlet and anchors	98 c.y.	
Steel pipe,	147,500 lbs	
Butterfly valve, placing		
Total mat and const.		
Est. mat & const. cost	$30,230.	

TOTAL PENSTOCK CO. FEB. 1, 1929.

ANCHORAGE LIGHT & POWER CO
PROGRESS CHART
TUNNEL AND PENSTOCK
SHOWN
DEC 1928

1086-D-18



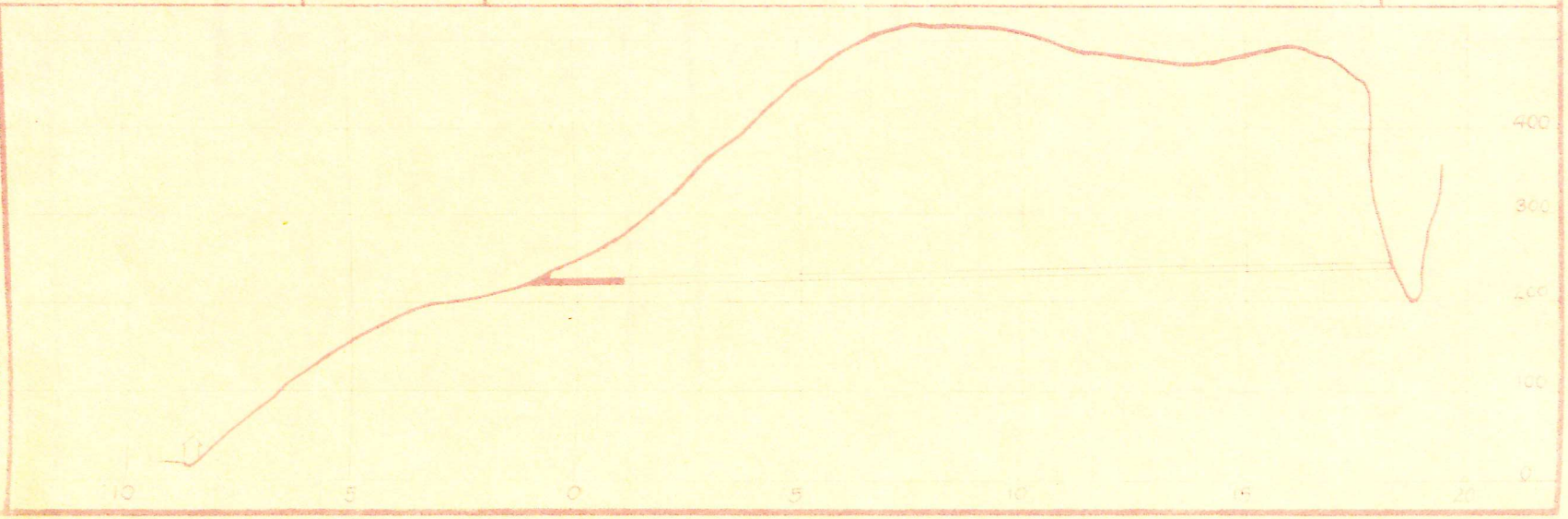
	Approx Quantity	PERCENTAGE COMPLETED
TUNNEL		
Inlet Portal, Excavation	124 c.y.	
Inlet Portal, Concrete	33 c.y.	
Trash Rack	8635 lbs	
Lined Section	470 ft	
Unlined Section	1410 ft.	
Total mat & const		
Est. Construction Cost	$39,370	
PENSTOCK		
Exc. - inlet and trench	3,180 c.y.	
Concrete - inlet and anchors	98 c.y.	
Steel pipe	147,500 lbs	
Butterfly valve, placing		
Total mat. and const.		
Est. mat & const. cost	$30,250.	

TOTAL PROGRESS TO FEB. 1, 1929.

ANCHORAGE LIGHT & POWER CO
PROGRESS CHART
TUNNEL AND PENSTOCK

1086-D-18

DRAWN DEC 1928



9

POWER PLANT BUILDING	Approx Quantity	PERCENTAGE COMPLETE 10 20 30 40 50 60 70 80 90
Excavation - foundation	345 cu yds	
Excav. - tail race channel	5320 cu yds	
Concrete - foundation	256 cu yds	
Concrete - superstructure	190 cu yds	
Tile roof	2263 sq ft	
Concrete lining tail race	1290 sq ft	
Doors and sash		
Crane - installation		
Operators cottage		
Total construction		
Estimated material & const cost	$27,310.	
POWER PLANT EQUIP		
MATERIALS AT SITE		
Turbine		
Generator		
Switchboard and instruments		
Wire, conduits, and lights		
House transformers		
Heaters		
INSTALLATION:		
Turbine - 1500 H.P.		
Generator - 1250 K.V.A.		
Switchboard and instruments		
Wiring, conduits and lights		
House transformers		
Auxiliaries		
Total materials & install		
Estimated equip & install cost	$35,340	

TOTAL PROGRESS TO FEB. 1, 1929.

ANCHORAGE LIGHT & POWER CO

PROGRESS CHART

POWER PLANT BUILDING

POWER PLANT EQUIPMENT

Dec 1928

SAN FRANCISCO

Fred H. Tibbetts
Chief Engineer

FILE NO. 1086-D-19

DR. J.R. TR. J.R. CK. J.S.

POWER PLANT BUILDING	Approx Quantity	PERCENTAGE COMPLETE 10 20 30 40 50 60 70 80 90
Excavation - foundation	345 sq yds	
Excav - tail race channel	5320 cu yds	
Concrete - foundation	256 cu yds	
Concrete - superstructure	190 cu yds	
Tile roof	2263 sq ft	
Concrete lining tail race	1350 sq ft	
Doors and sash		
Crane - installation		
Operator's cottage		
Total construction		
Estimated material & const cost	$27,310.	
POWER PLANT EQUIP		
MATERIALS AT SITE		
Turbine		
Generator		
Switchboard and instruments		
Wire, conduits and lights		
House transformers		
Heaters		
INSTALLATION:		
Turbine - 1500 H.P.		
Generator - 1250 K.V.A.		
Switchboard and instruments		
Wiring, conduits and lights		
House transformers		
Auxiliaries		
Total materials & install		
Estimated equip & install cost	$35,940	

TOTAL PROGRESS TO FEB. 1, 1929.

ANCHORAGE LIGHT & POWER CO

PROGRESS CHART

POWER PLANT BUILDING

POWER PLANT EQUIPMENT

Dec 1928

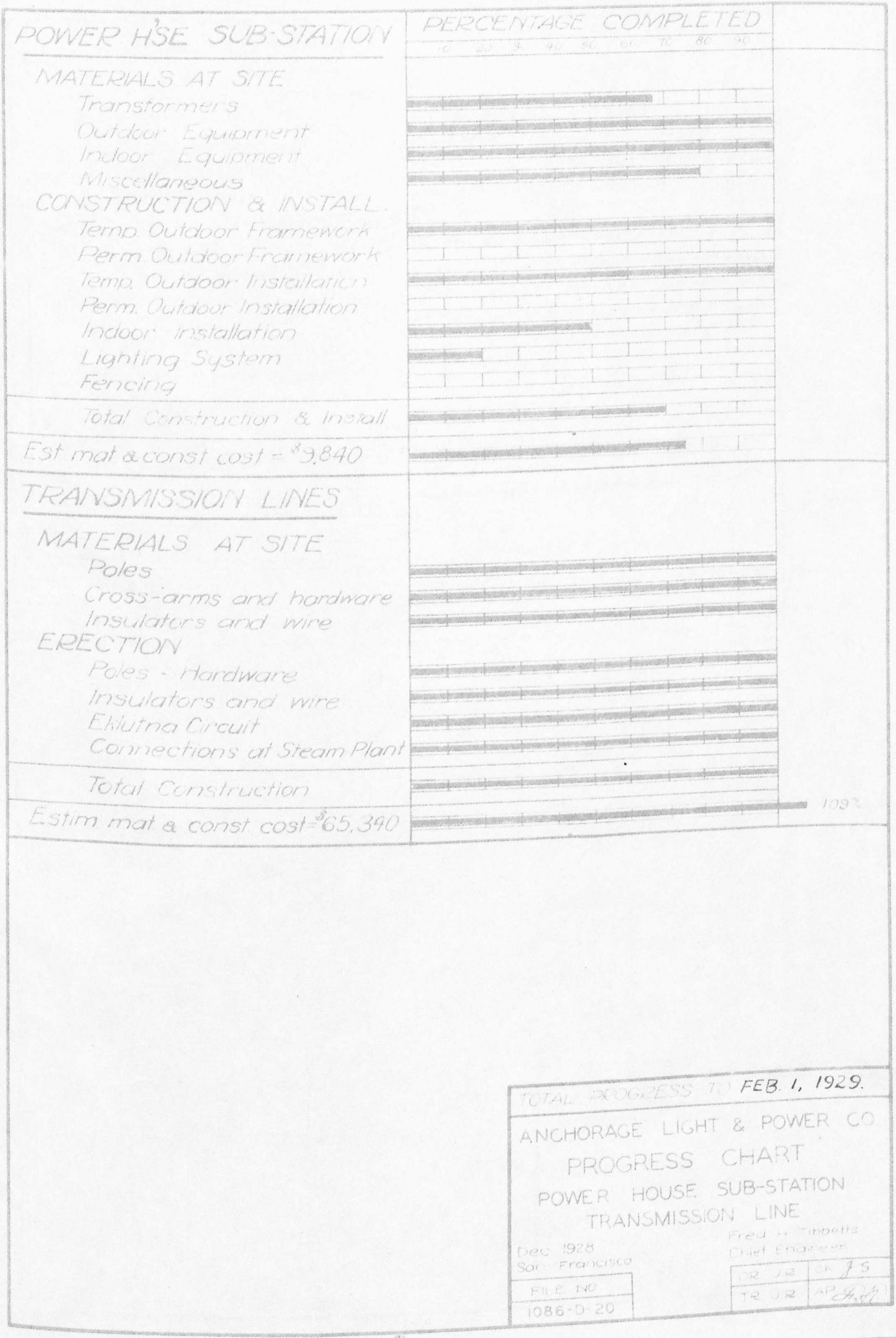
San Francisco

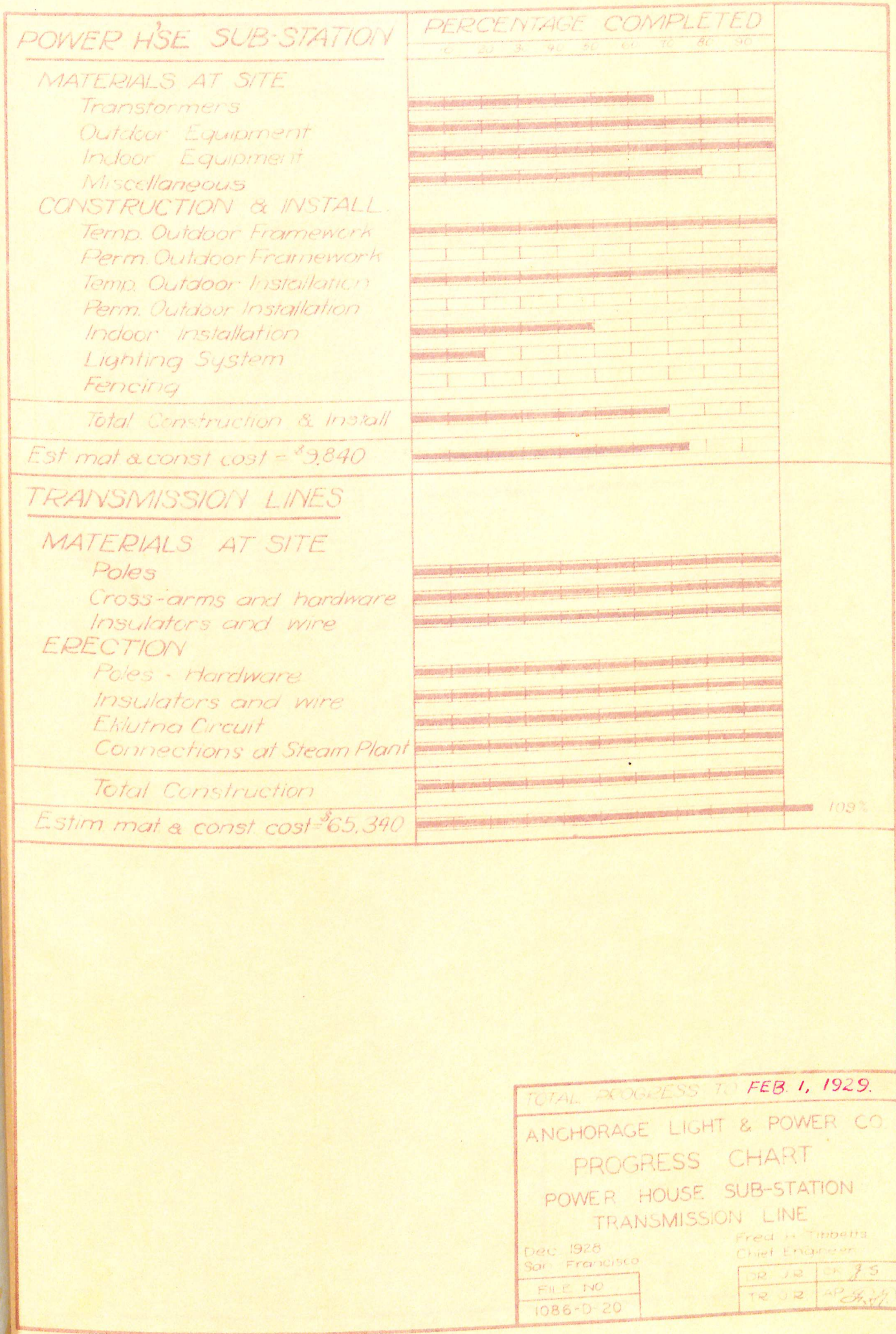
Fred H. Tibbetts
Chief Engineer

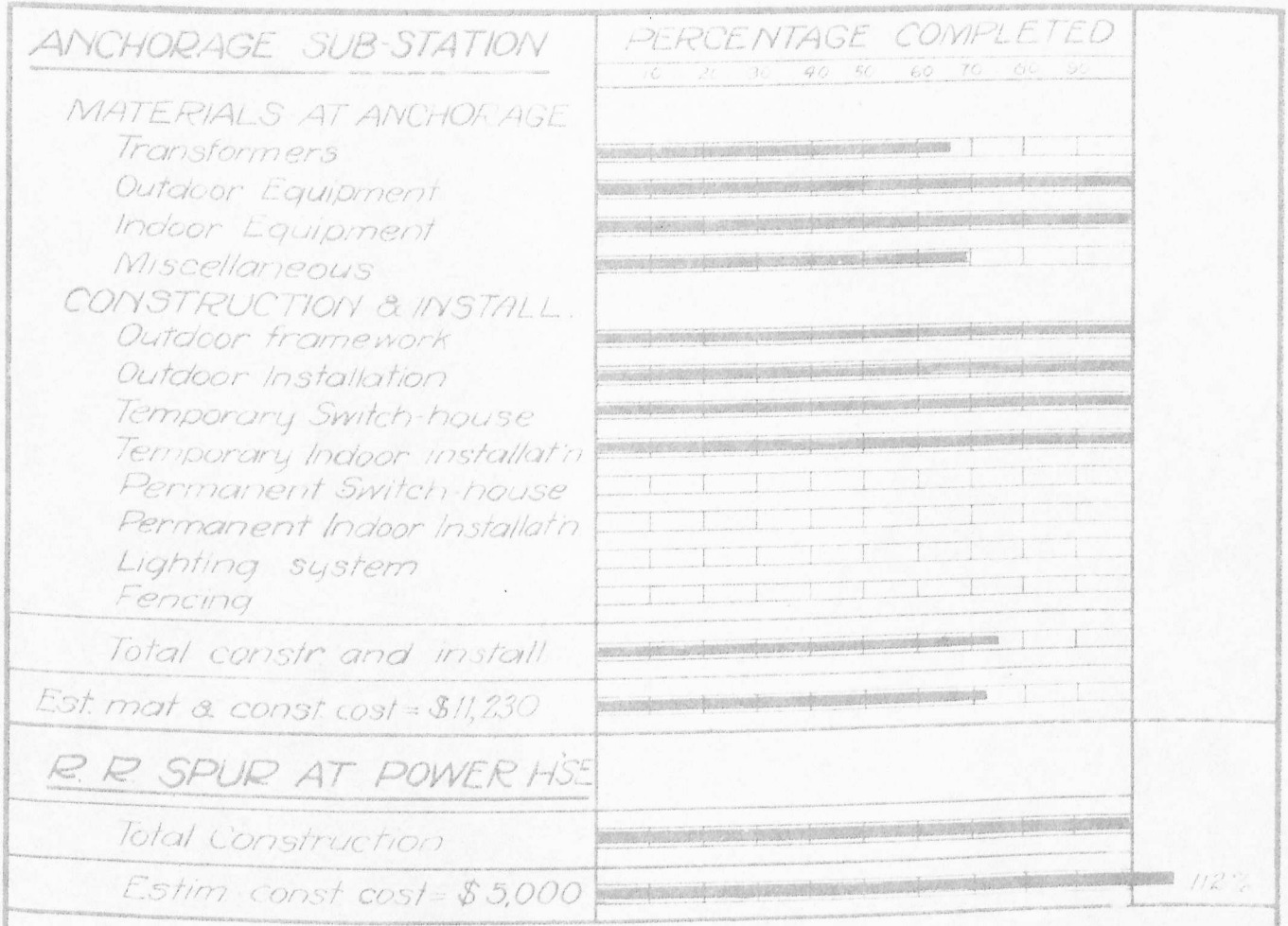
DR JR CK J.S.

TR JN AP

FILE NO
1086-D-19


POWER HSE SUB-STATION
PERCENTAGE COMPLETED
10 20 30 40 50 60 70 80 90
MATERIALS AT SITE
Transformers
Outdoor Equipment
Indoor Equipment
Miscellaneous
CONSTRUCTION & INSTALL.
Temp. Outdoor Framework
Perm. Outdoor Framework
Temp. Outdoor Installation
Perm. Outdoor Installation
Indoor Installation
Lighting System
Fencing
Total Construction & Install
Est mat & const cost = $9,840
TRANSMISSION LINES
MATERIALS AT SITE
Poles
Cross-arms and hardware
Insulators and wire
ERECTION
Poles - Hardware
Insulators and wire
Eklutna Circuit
Connections at Steam Plant
Total Construction
Estim mat & const cost = $65,390
109%
TOTAL PROGRESS TO FEB. 1, 1929.
ANCHORAGE LIGHT & POWER CO.
PROGRESS CHART
POWER HOUSE SUB-STATION
TRANSMISSION LINE
Dec 1928
San Francisco
Fred H Tibbetts
Chief Engineer
FILE NO
1086-D-20
DR JR
CK JS
TR JR
AP


POWER H'SE SUB-STATION
PERCENTAGE COMPLETED
0 20 30 40 50 60 70 80 90
MATERIALS AT SITE
Transformers
Outdoor Equipment
Indoor Equipment
Miscellaneous
CONSTRUCTION & INSTALL.
Temp. Outdoor Framework
Perm. Outdoor Framework
Temp. Outdoor Installation
Perm. Outdoor Installation
Indoor Installation
Lighting System
Fencing
Total Construction & Install
Est mat & const cost = $9,840
TRANSMISSION LINES
MATERIALS AT SITE
Poles
Cross-arms and hardware
Insulators and wire
ERECTION
Poles - Hardware
Insulators and wire
Eklutna Circuit
Connections at Steam Plant
Total Construction
Estim mat & const cost=$65,340
109%
TOTAL PROGRESS TO FEB. 1, 1929.
ANCHORAGE LIGHT & POWER CO.
PROGRESS CHART
POWER HOUSE SUB-STATION
TRANSMISSION LINE
Dec. 1928
San Francisco
Fred H. Tibbetts
Chief Engineer
FILE NO
1086-D-20
DR. J.R.
TR. J.R.
CK. J.S.
AP.



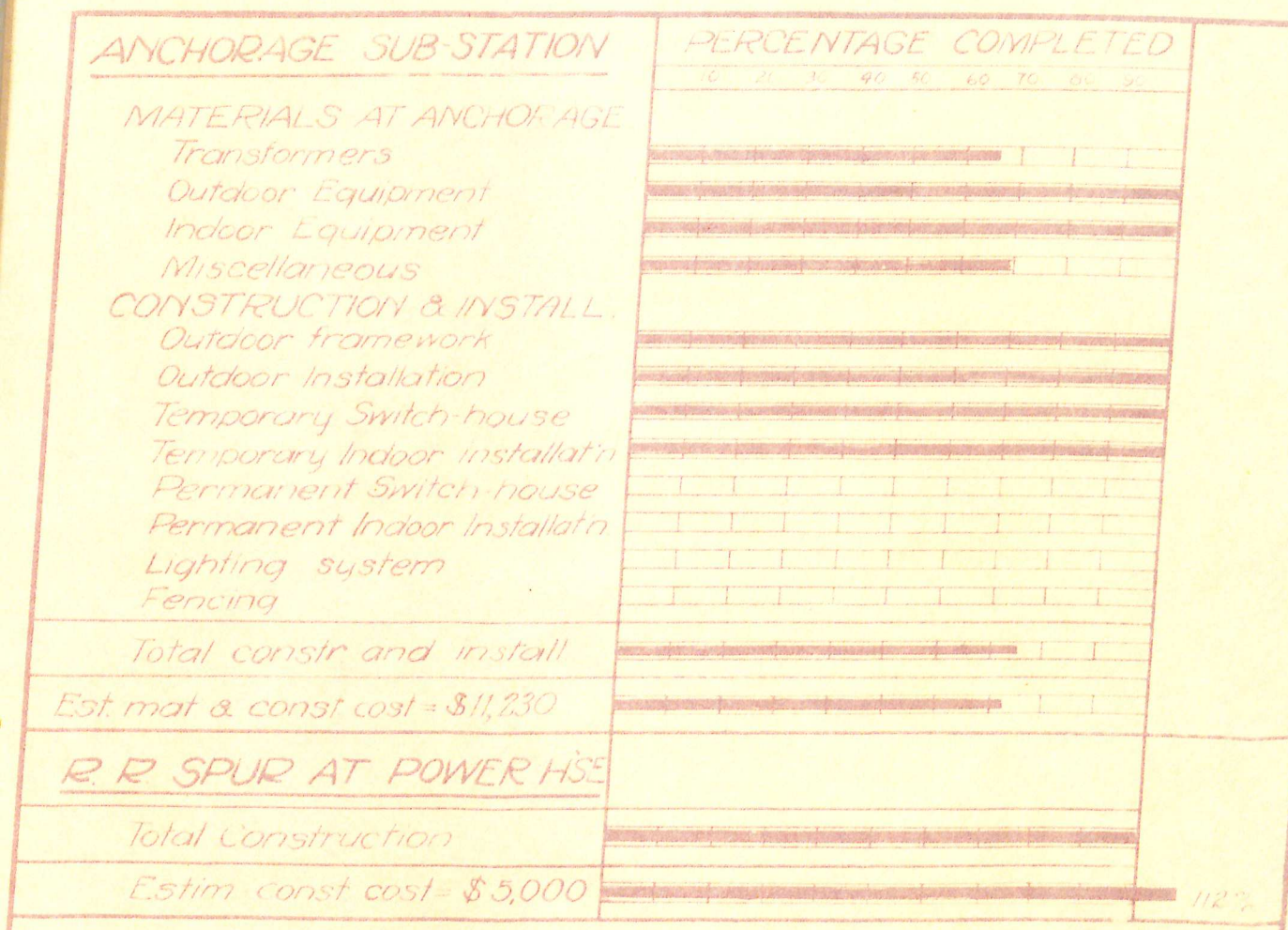
TOTAL PROGRESS TO FEB. 1, 1929.

ANCHORAGE LIGHT & POWER CO
PROGRESS CHART
ANCHORAGE SUB-STATION
R. R. SPUR AT POWER HOUSE

DATE Dec 1928

DR. O.R. J.S.

FILE NO. 1086-D-21



TOTAL PROGRESS TO FEB. 1, 1929.

ANCHORAGE LIGHT & POWER CO
PROGRESS CHART
ANCHORAGE SUB-STATION
R. R. SPUR AT POWER HOUSE

DATE Dec 28
DRAWN QBR CHK'D J.S.
1086-D-21

REPORT

to

ANCHORAGE LIGHT AND POWER CO., INC.

on

CONSTRUCTION PROGRESS

on the

EKLUTNA POWER PROJECT

MARCH 1ST TO APRIL 5TH, 1929

--oOo--

PROJECT REPORT NO. 8

April 17, 1929.

FRED. H. TIBBETTS
CIVIL ENGINEER
ALASKA COMMERCIAL BUILDING
SAN FRANCISCO

Anchorage Light & Power Co.
Report No. 424
Project Report No. 8

1 - Orig. - A.L.&.P.Co.4/20/29
2 - OFFICE COPY
3 - H. I. Wood "
4 - Dobbins "
5 - Jasper-Stacy "

FRED. H. TIBBETTS
CIVIL ENGINEER

Report No. 424.

REPORT

to

ANCHORAGE LIGHT AND POWER CO., INC.

on

CONSTRUCTION PROGRESS

on the

EKLUTNA POWER PROJECT

MARCH 1ST TO APRIL 5TH, 1929

--ooo--

Project Report No. 8

April 17, 1929.

TELEPHONE DAVENPORT 113

FRED. H. TIBBETTS
RALPH G. WADSWORTH
HAROLD I. WOOD

FRED. H. TIBBETTS
CIVIL ENGINEER
ALASKA COMMERCIAL BUILDING
SAN FRANCISCO, CALIF.

SUBJECT ANCHORAGE LIGHT AND POWER CO.

April 17, 1929.

MONTHLY PROGRESS REPORT NO. 7

MARCH 1st TO APRIL 5TH, 1929

Anchorage Light and Power Co.,
Anchorage,
Alaska.

Gentlemen:

The following is a report on the progress of construction work during the month of March, 1929, on your Eklutna Power Project:

STORAGE DAM

Driving of the sheet piling in three rows along the rear slope of the Weir was completed by the middle of March. This work was slow due to the frozen condition of the weir material and the small capacity of the steam boiler. The clay and gravel backfill in the weir was then completed. A thorough bond has been made between the west end of the weir and the dam. Ice was cut away from the floor of the spillway and, during March, all of the sills were completed. A few of the sills, however, are not yet entirely staked to the ground. Progress was made on the spillway lining, the lining being placed first on the east side of the channel and then on the west side, and was probably about 90% complete by April 5th.

The clay facing on the dam was completed. Probably about 25% of the riprap had been hauled ready to place on the face

of the dam. This riprap is placed only as fast as the water rises.

There were 33 men and one team on the storage dam payroll on April 5th.

DIVERSION DAM

The upstream coffer dam was made tight only with considerable difficulty, due to boulders in the stream and also due to ice conditions. 240 feet of flume was completed. This flume carries the diverted streamflow past the dam site.

The excavation of the foundation in the creek bed progressed until a hard polished surface of the bedrock for the full width of the river was exposed. The excavation was then carried an additional 2 feet into this bedrock to insure excellent foundation conditions. This excavation was kept unwatered by means of a pulsometer.

One man was kept busy thawing the gravel pit in the tail water channel near the gravel plant. The gravel plant was made ready for service. On March 29th, 33 cubic yards of concrete were poured. This was the initial pour and the temperature ranged between 64 and 68 degrees.

An additional steam boiler was installed on the Station to help in supplying steam for pumping, thawing ice, and in heating water and aggregate. After a period of extremely cold weather a second pour of concrete of 50 cubic yards was made on April 4th. This second pour completed the foundation block to

elevation 200.5 for the full width of the bottom of the canyon. The delay of this second pour was caused by the cold spell, necessitating all of the available stream being used in maintaining the heat in the first pour and also for pumping and for thawing the aggregate in the canyon bunkers.

Gravel was being stock-piled at the screening plant by the end of March.

TUNNEL

The following progress has been made in the driving of the tunnel:

Week Ending	Feet Drilled During Week	Average per 24 Hours	Total to End of Week
March 8	91	13.0	787
15	72	10.3	859
22	67	9.6	926
29	82	11.7	1,008
April 5	97	13.9	1,105

The tunnel, so far, will require about 70 feet of lining between Stations 20+10 and 19+40.

During the week ending March 8th the rock remained tough and hard to shoot. 60% powder was used in the center holes. The 5-foot round previously instigated was abandoned as only three rounds were possible. Mr. Wann was relieved from the tunnel supervision to go on to the carpenter work at the diversion dam.

During the two weeks ending March 22nd the work was carried on with two shifts. The rock encountered was of a

less tough formation than that of the week preceding. A new exhaust fan was ordered. Only 40% powder was required during these two weeks.

During the week ending March 29th a three-shift basis was again adopted on March 27th. The new exhaust fan and a 10 H.P. electric motor were installed on March 26th. Mr. Reed reported, however, that this fan was different from that which had been ordered, and hence was not satisfactory.

During the week ending April 5th three shifts were at work. The rock was alternating from quartz to shale, but requiring no lining. The formation is badly broken so that it changes between rounds. There were 22 men on the tunnel payroll on April 5th.

PENSTOCK

400 feet of the tramway was ballasted with the gravel stripped from the gravel pit. The tramway was completed and put into service. Excavation for the penstock to an average depth of 5.5 feet was continued during March. This excavation exposed bedrock particularly between Stations 27+20 and 28+20.

The air line for drilling and for the operation of air tools was installed.

100 tons of steel pipe was approaching Reed, Alaska, by April 5th.

TRANSMISSION LINE

The transmission line was in continuous service during March, 1929.

HYDROGRAPHIC WORK

The water surface at Eklutna Lake rose steadily from elevation 9.65 on March 1st to 10.30 on March 31st. No water has been released from the lake since February 5th, 1929.

The natural flow of Eklutna River between the lake and the diversion dam has been metered as follows:

March	1	20.4 second feet
	9	18.96 " "
	21	12.88 " "
	29	18.18 " "

The following table gives an estimate of what the discharge of Eklutna River would have been had no storage been provided at Eklutna Lake, the total flow being the natural flow into the lake plus the natural flow of the river between the lake and the diversion dam:

Date	Total Flow--Sec.Ft.	Date	Total Flow--Sec.Ft.
March 1	70	March 17	53
2	68	18	52
3	68	19	52
4	66	20	49
5	60	21	48
6	58	22	47
7	57	23	47
8	57	24	48
9	57	25	48
10	56	26	50
11	56	27	52
12	55	28	54
13	55	29	56
14	54	30	56
15	54	31	56
16	53		

OFFICE ENGINEERING

The work at the Engineer's office in San Francisco consisted of the designs of the Power House structure, Diversion Dam and Penstock Anchors, the preparation of detailed construction plans, the ordering and inspection of materials, the rendering of progress reports and construction estimates, checking bills of materials ordered, and general correspondence in connection with the development of the project.

Respectfully submitted,

Fred H. Tibbetts

Chief Engineer.
ANCHORAGE LIGHT AND POWER CO.

JS:VH

	Approx. Quantity	PERCENTAGE COMPLETED
STORAGE DAM		
Spillway, Excavation	4000 c.y.	
Spillway Lining - Control Gates	84 M.B.M.	
Fill for dam	3700 c.y.	
Riprap	600 c.y.	
Total construction		
Estimated const cost	$29,970	170%
DIVERSION DAM		
Rock excavation	642 c.y.	
Concrete	1790 c.y.	
Grouting		
Outlet gate & hoist		
Waterproofing		
Railing		
Total construction		
Estimated const cost	$42,080	129%

TOTAL PROGRESS TO APRIL 1929

ANCHORAGE LIGHT & POWER CO.

PROGRESS CHART

STORAGE DAM & DIVERSION DAM

Dec 1928

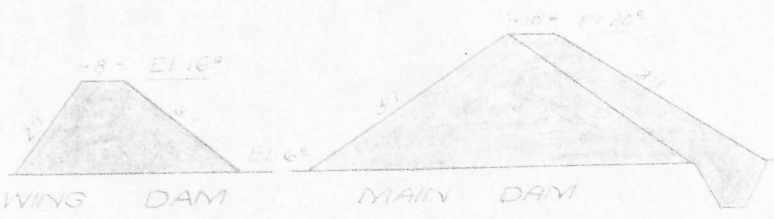
San Francisco

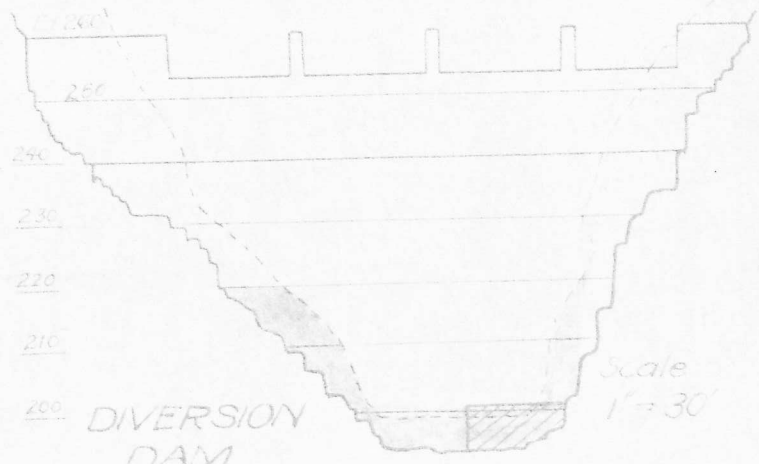
FILE NO. 1086-D-1

CHECKED

APPROVED

FRED H. TIBBETTS, SAN FRANCISCO





	Approx. Quantity	PERCENTAGE COMPLETED
STORAGE DAM		
Spillway, Excavation	4000 c.y.	
Spillway Lining - Control Gates	84 M.B.M.	
Fill for dam	37,10 c.y.	
Riprap	630 c.y.	
Total construction		
Estimated const cost	$ 29 970	170%
DIVERSION DAM		
Rock excavation	642 c.y.	
Concrete	1190 c.y.	
Grouting		
Outlet gate & hoist		
Waterproofing		
Railing		
Total construction		
Estimated const. cost	$ 42,080	129%

TOTAL PROGRESS 76 APRIL 1929

ANCHORAGE LIGHT & POWER CO

PROGRESS CHART

STORAGE DAM DIVERSION DAM

APR 29 1929

Dec. 1928

San Francisco

FILE NO. 1086-D-17

CHECKED

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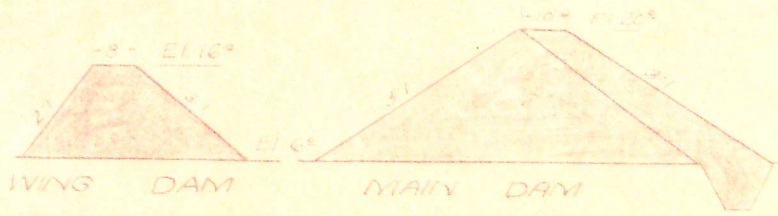
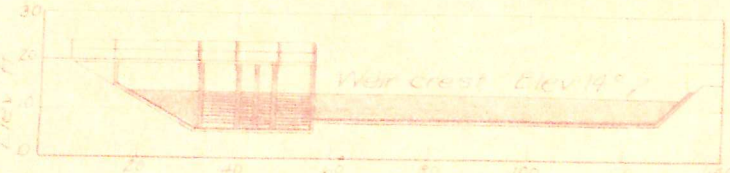
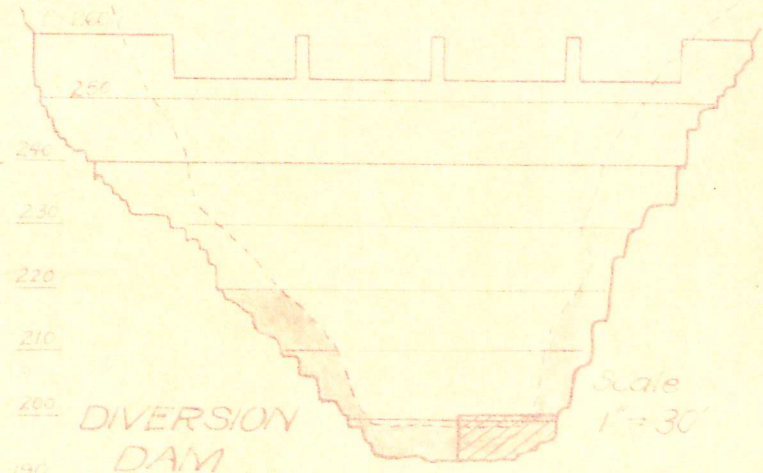
FRED H. TIBBETTS SAN FRANCISCO

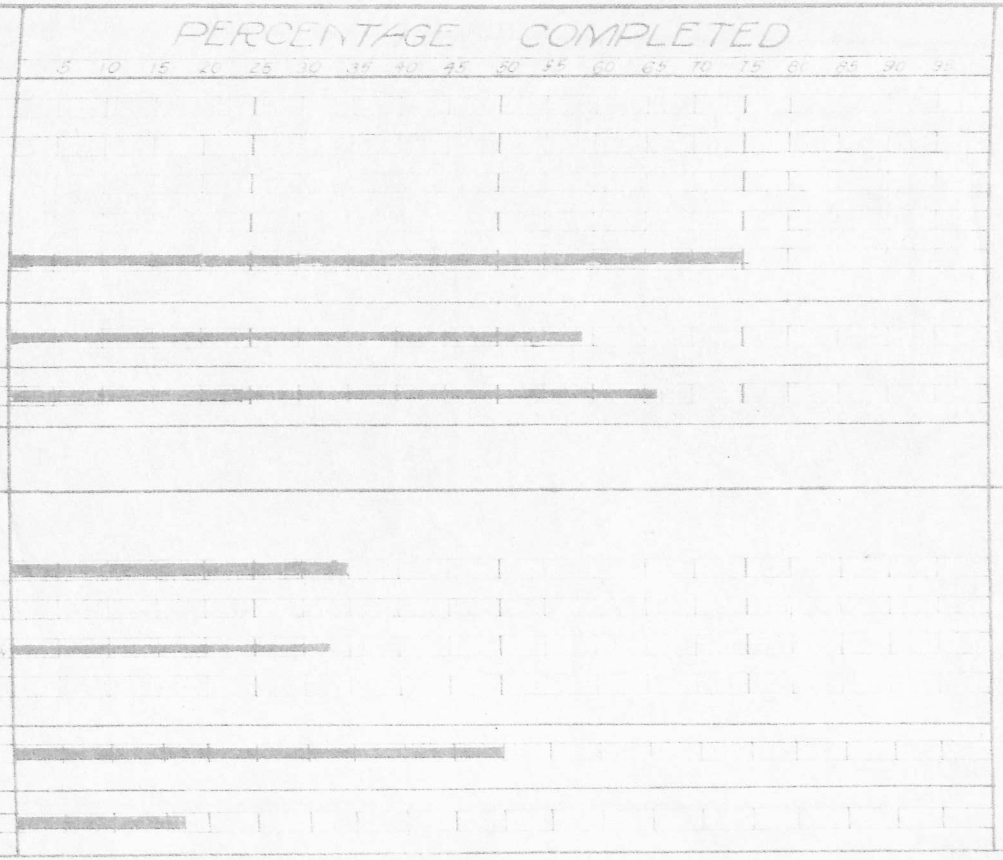


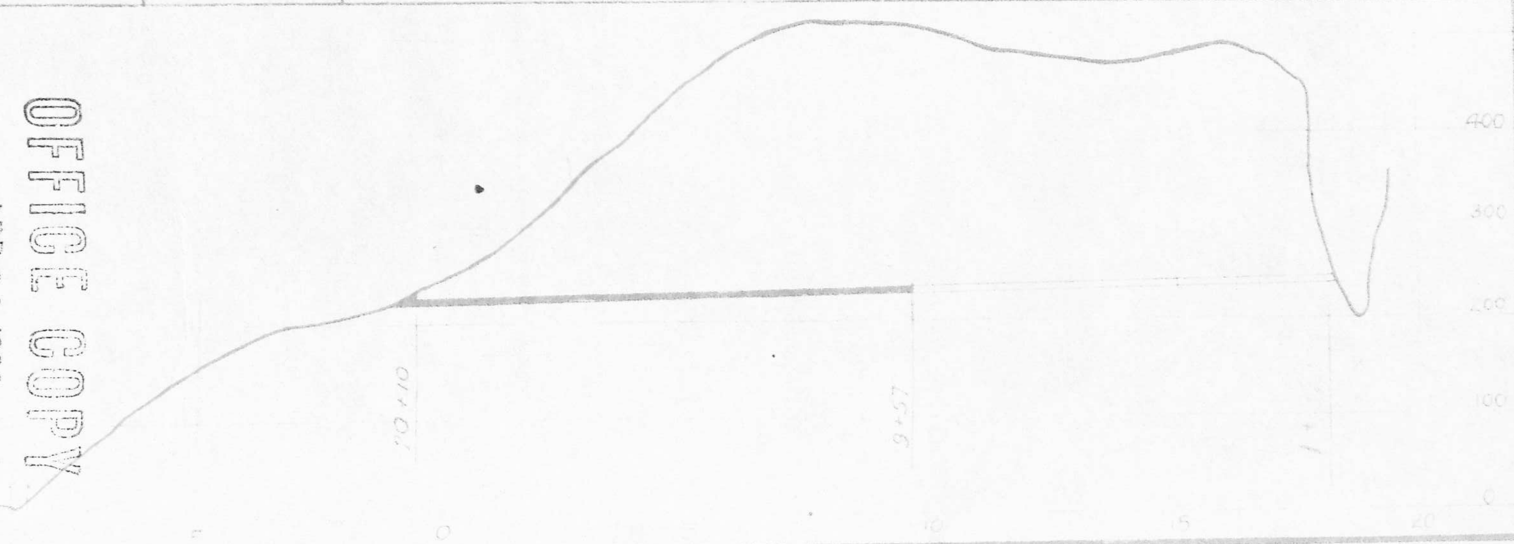




ANCHORAGE LIGHT & POWER CO.
PROGRESS CHART
TUNNEL AND PENSTOCK

Item	Approx. Quantity
TUNNEL	
Inlet Portal, Excavation	124 c.y.
Inlet Portal, Concrete	33 c.y.
Trash Rack	8635 lbs
Lined Section	470 ft
Unlined Section	1410 ft
Total mat & const	
Est. Construction Cost	$89,320
PENSTOCK	
Exc. inlet and trench	3,180 c.y.
Concrete inlet and anchors	98 c.y.
Steel pipe	147,500 lbs.
Butterfly valve, placing	
Total mat and const.	
Est. mat & const. cost	$30,250





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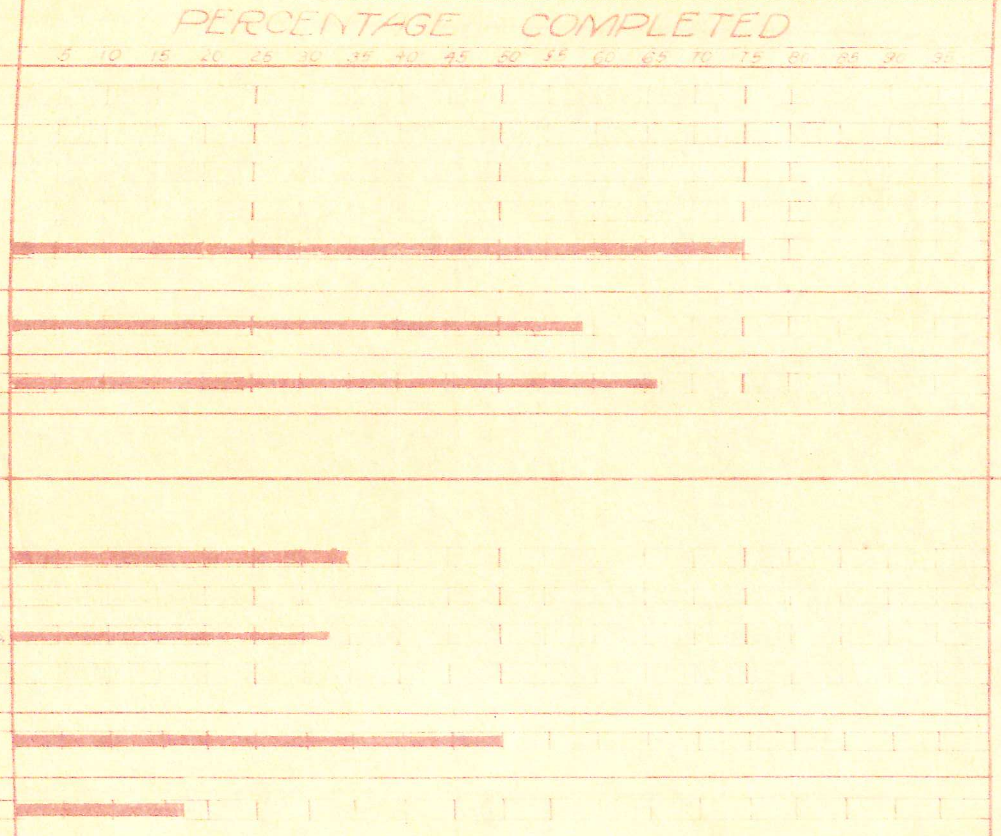
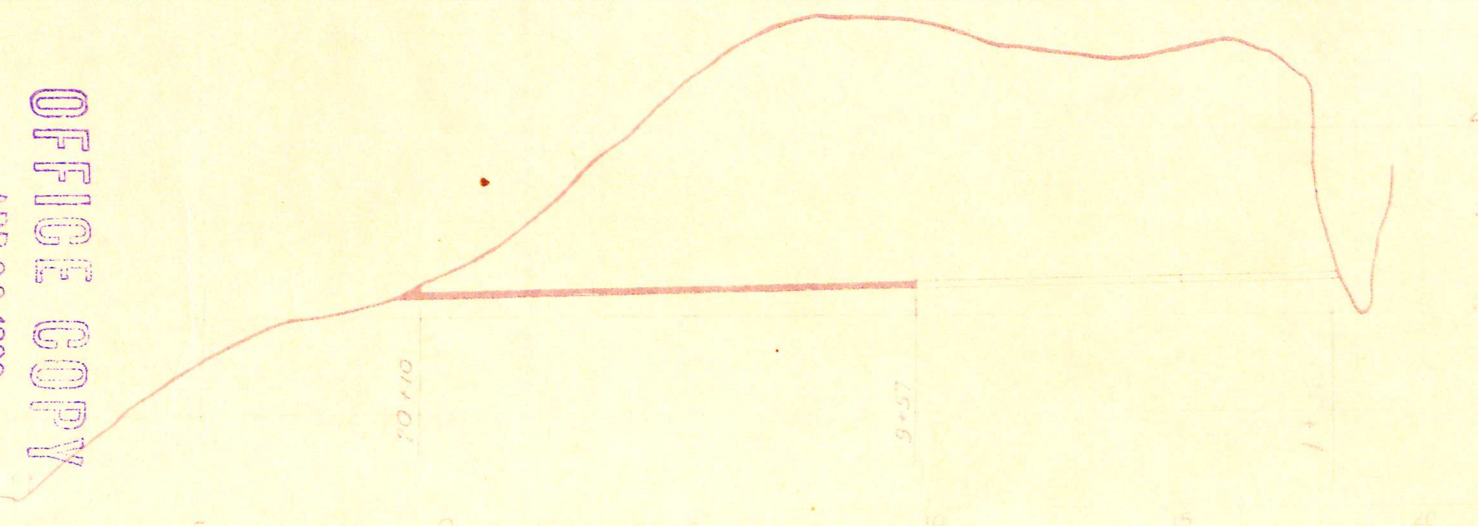
APR 23 1929
CHECKED J.B. APPROVED
FRED H. TIBBETTS SAN FRANCISCO

TOTAL PROGRESS TO APR 1st 19..
ANCHORAGE LIGHT & POWER CO.
PROGRESS CHART
TUNNEL AND PENSTOCK
DEC 1928
1086-D-18

	Approx Quantity
TUNNEL	
Inlet Portal, Excavation	124 c.y.
Inlet Portal, Concrete	33 c.y.
Trash Rack	3635 lbs
Lined Section	470 ft
Unlined Section	1410 ft
Total mat & const	
Est. Construction Cost	$59,320
PENSTOCK	
Exc. inlet and trench	3,180 c.y.
Concrete inlet and anchors	98 c.y.
Steel pipe	147,500 lbs.
Butterfly valve, placing	
Total mat and const.	
Est. mat & const. cost	$30,250.





ANCHORAGE LIGHT & POWER CO
PROGRESS CHART
TUNNEL AND PENSTOCK

SHOWN

DEC 1928

1086-D-18

[illegible]

POWER PLANT BUILDING	Approx Quantity	PERCENTAGE COMPLETE 10 20 30 40 50 60 70 80 90
Excavation - foundation	748 cu yds	
Excav - tail race channel	3530 cu yds	
Concrete - foundation	256 cu yds.	
Concrete - superstructure	190 cu yds	
Tile roof	2203 sq ft	
Concrete lining - tail race	1750 sq ft	
Doors and sash		
Crane - installation		
Operators cottage		
Total construction		
Estimated material & const cost	$ 21,310.	
POWER PLANT EQUIP		
MATERIALS AT SITE		
Turbine		
Generator		
Switchboard and instruments		
Wire, conduits and lights		
House transformers		
Heaters		
INSTALLATION:		
Turbine - 1500 H.P.		
Generator - 1250 K.V.A.		
Switchboard and instruments		
Wiring, conduits and lights		
House transformers		
Auxiliaries		
Total materials & install		
Estimated equip & install cost	$ 35 940	

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APR 23 1929

CHECKED J.S. APPROVED A.D.F.

FRED H. TIBBETTS SAN FRANCISCO

TOTAL PROGRESS TO APRIL 1, 1929

ANCHORAGE LIGHT & POWER CO

PROGRESS CHART

POWER PLANT BUILDING

POWER PLANT EQUIPMENT

Dec 1928

San Francisco

Fred H. Tibbetts

Chief Engineer

FILE NO. 1086-D-19

DR. J.S. CK. J.S.

TR. J.S. APR. A.D.F.

POWER PLANT BUILDING	Approx Quantity	PERCENTAGE COMPLETE 10 20 30 40 50 60 70 80 90
Excavation - foundation	2415 cu yds	
Excav - tail race channel	5970 cu yds	
Concrete - foundation	256 cu yds	
Concrete - superstructure	190 cu yds	
Tile roof	2263 sq ft	
Concrete lining - tail race	1780 sq ft	
Doors and sash		
Crane - installation		
Operators cottage		
Total construction		
Estimated material & const cost	$21,310.	
POWER PLANT EQUIP.		
MATERIALS AT SITE		
Turbine		
Generator		
Switchboard and instruments		
Wire, conduits and lights		
House transformers		
Heaters		
INSTALLATION:		
Turbine - 1500 H.P.		
Generator - 1250 K.V.A.		
Switchboard and instruments		
Wiring, conduits and lights		
House transformers		
Auxiliaries		
Total materials & install		
Estimated equip & install cost	$35,940	

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APR 23 1929

CHECKED J.S. APPROVED A.D.F.

FRED H. TIBBETTS SAN FRANCISC

TOTAL PROGRESS TO APRIL 1, 1929

ANCHORAGE LIGHT & POWER CO

PROGRESS CHART

POWER PLANT BUILDING

POWER PLANT EQUIPMENT

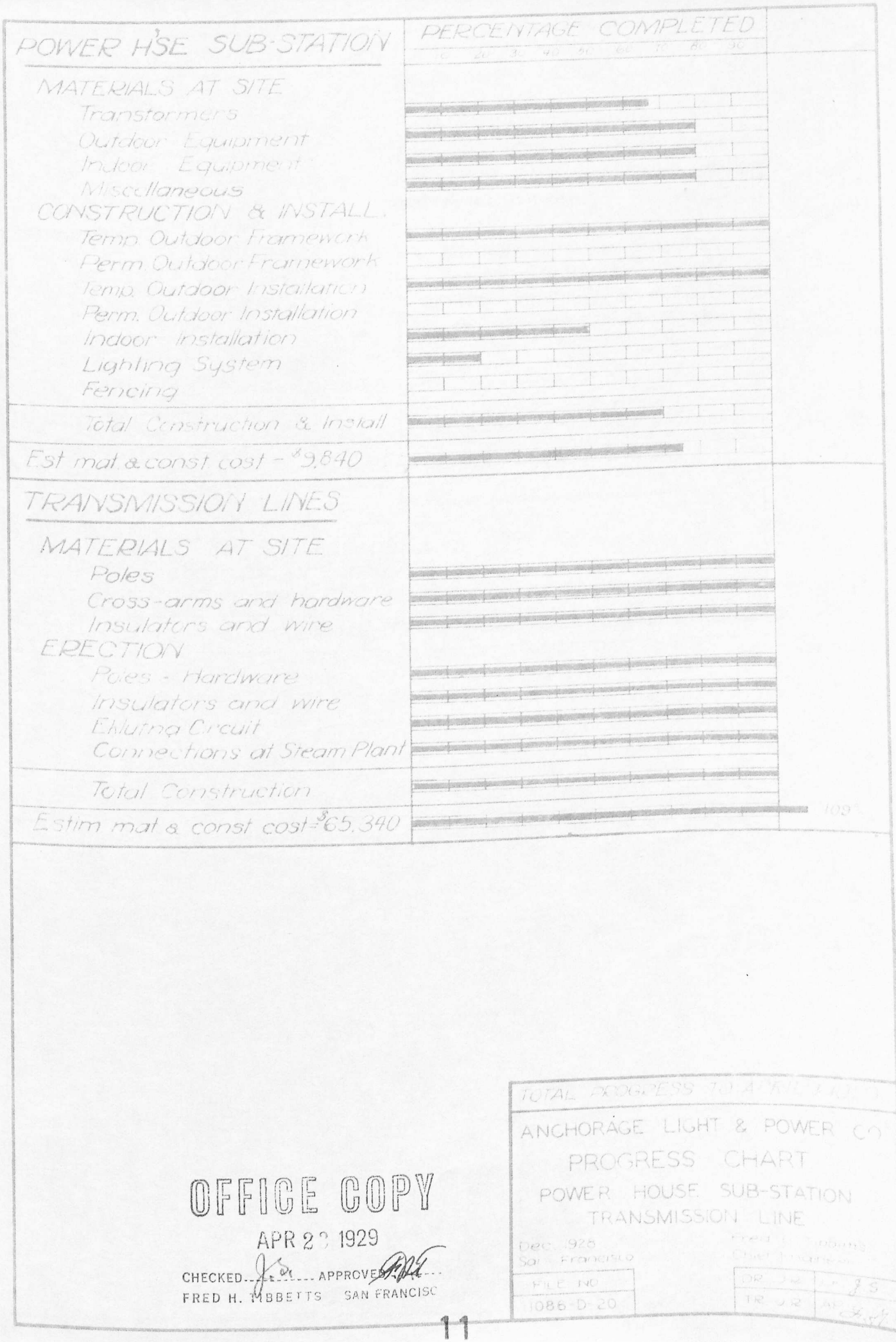
Dec 1928

San Francisco

Fred H Tibbetts

Chief Engineer

FILE NO	DR. JN	CK J.S.
1086-D-19	TR. JN	APP A.D.F.



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APR 23 1929

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FRED H. MBBETTS SAN FRANCISC

TOTAL PROGRESS TO APRIL 1 [illegible]

ANCHORAGE LIGHT & POWER CO

PROGRESS CHART

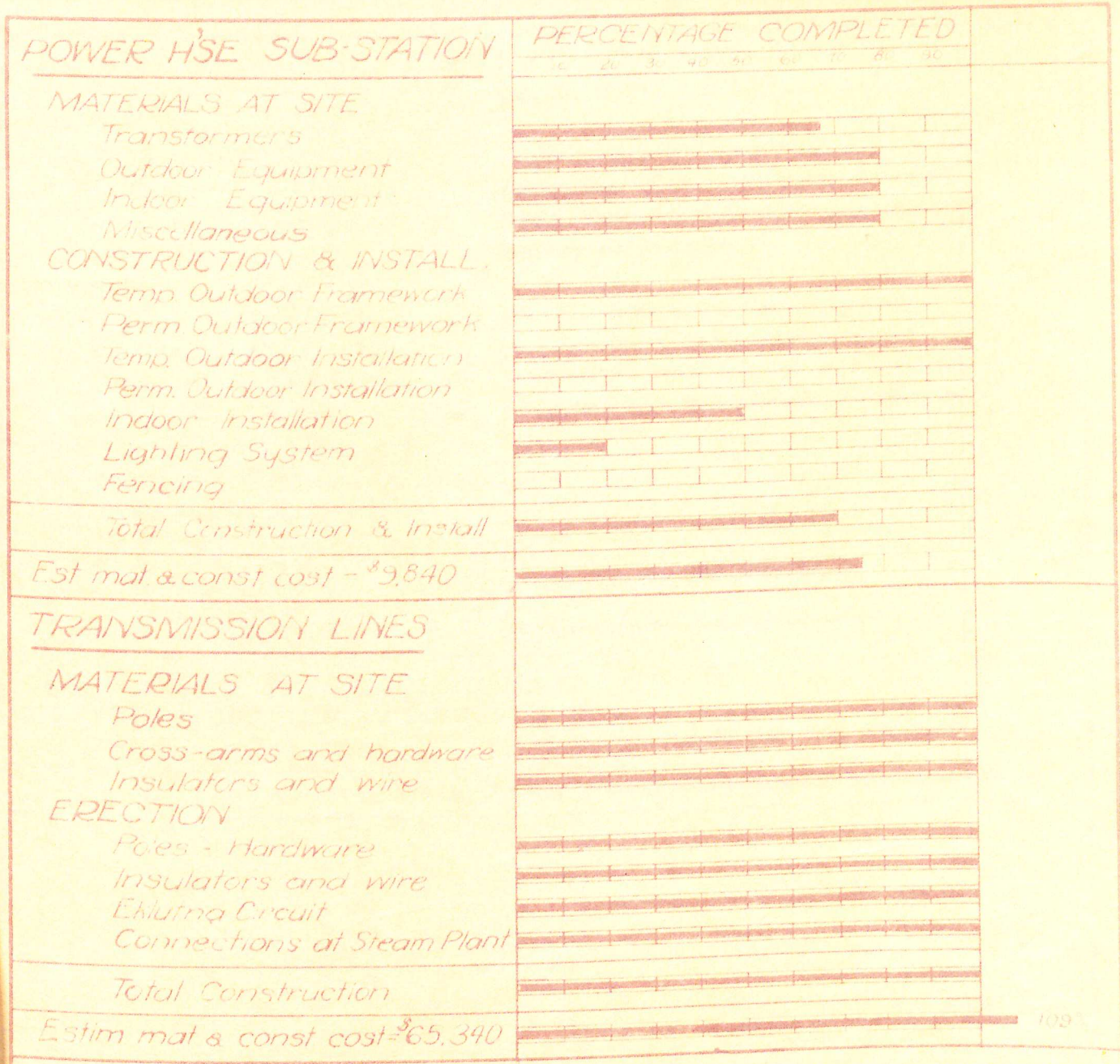
POWER HOUSE SUB-STATION

TRANSMISSION LINE

Dec. 1928

San Francisco

FILE NO.	DR. J.R.	T. S.
1086-D-20	TR. J.R.	A. Ast.



TOTAL PROGRESS TO APRIL 1929

ANCHORAGE LIGHT & POWER CO

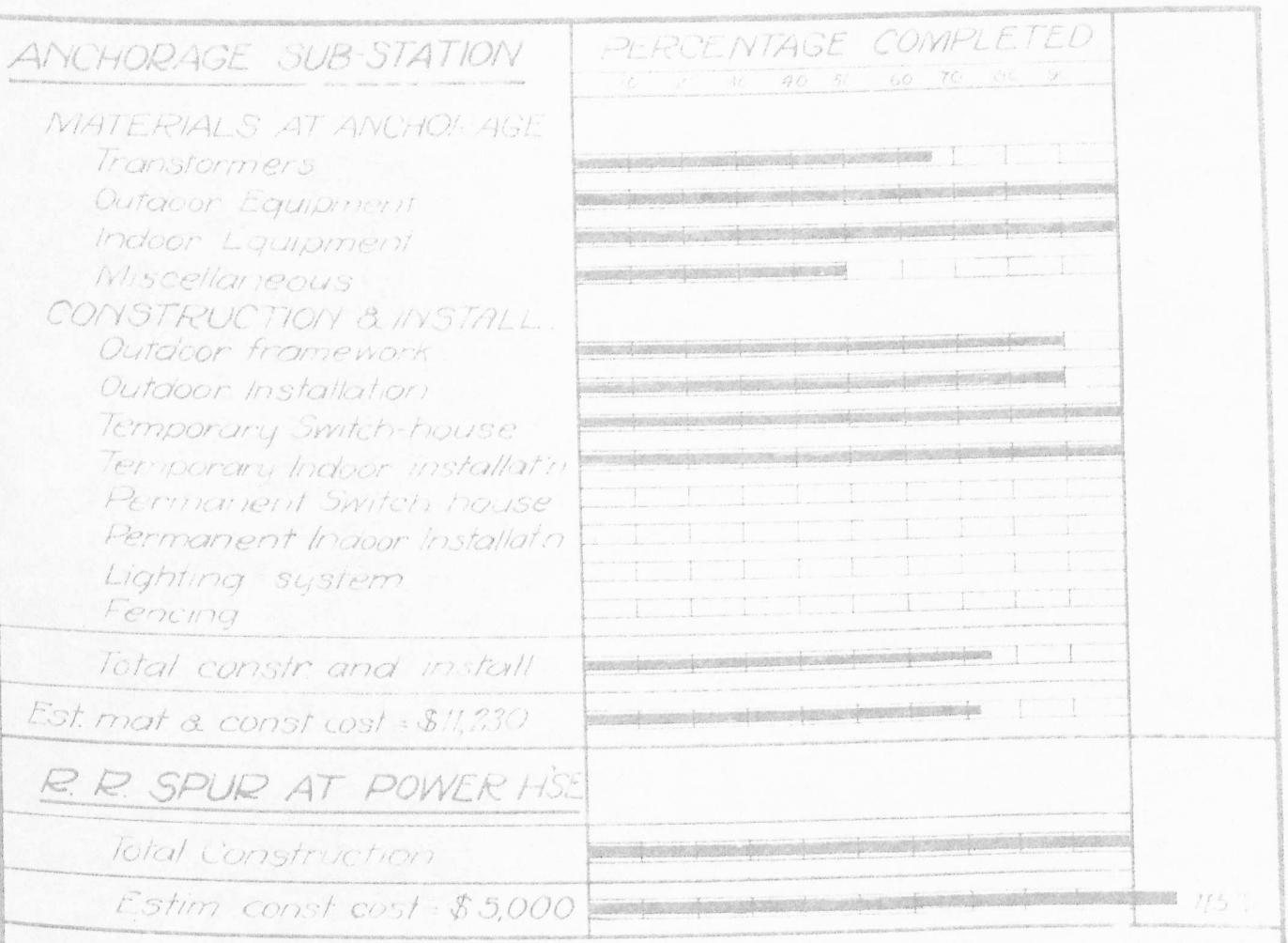
PROGRESS CHART

POWER HOUSE SUB-STATION
TRANSMISSION LINE

Dec. 1928
San Francisco

Fred H. Tabbetts
Chief Engineer

FILE NO	DR. J.M.	T. J.S.
1086-D-20	TR. J.R.	AP. A.S.T.



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APR 23 1929

CHECKED J.S. APPROVED

FRED H. TIBBETTS SAN FRANCISC

TOTAL PROGRESS TO APRIL 1 1929

ANCHORAGE LIGHT & POWER CO

PROGRESS CHART

ANCHORAGE SUB-STATION

R. R. SPUR AT POWER HOUSE

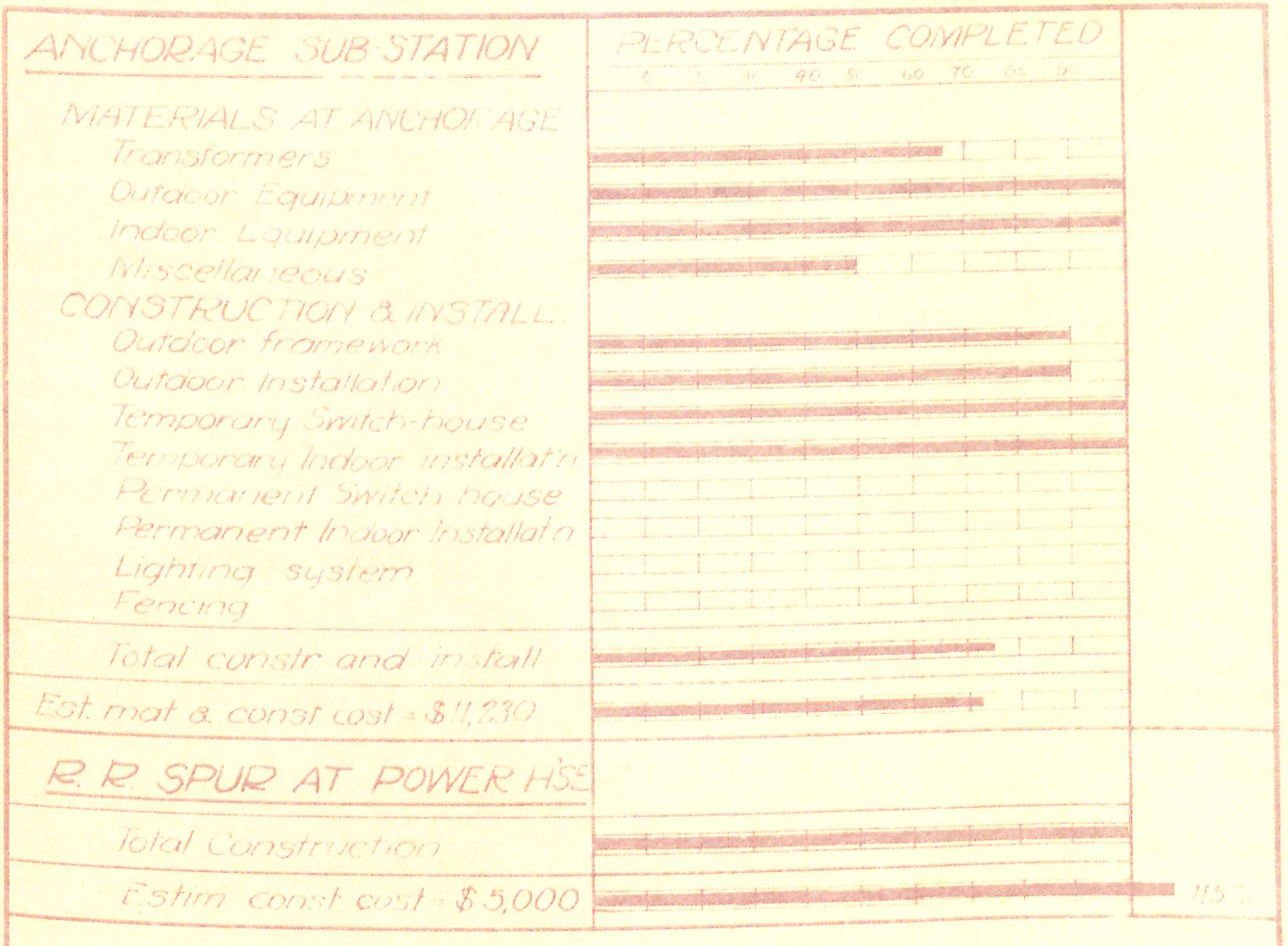
DATE Dec 1928

DRN OBR J.S.

TRD N

1086-D-21

CK AVE



TOTAL PROGRESS TO APRIL 1929

ANCHORAGE LIGHT & POWER CO
PROGRESS CHART
ANCHORAGE SUB-STATION
R.R. SPUR AT POWER HOUSE

DATE Dec 1928

1086-D-21

OFFICE COPY

APR 29 1929

CHECKED J.S. APPROVED A.H.T.

FRED H. TIBBETTS SAN FRANCISC

REPORT

to

ANCHORAGE LIGHT AND POWER CO., INC.

on

CONSTRUCTION PROGRESS

on the

EKLUTNA POWER PROJECT

APRIL 6TH TO MAY 9TH, 1929

(Monthly Progress Report No. 8)

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PROJECT REPORT NO. 9

May 27, 1929.

FRED. H. TIBBETTS
CIVIL ENGINEER
ALASKA COMMERCIAL BUILDING
SAN FRANCISCO

Anchorage Light & Power Company
CONSTRUCTION PROGRESS
REPORT NO. 8.

Report No. 428,
Project Report No. 9.

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1 - ORIGINAL-A.L.&.P.Co.5/29/29
2 - OFFICE COPY
3 - H. I. Wood - 5/29/29
4 - Russell-Colvin Co. 5/29/29
5 - Jasper Stacy C o. "

FRED. H. TIBBETTS
CIVIL ENGINEER

Report No. 428

R E P O R T

to

ANCHORAGE LIGHT AND POWER CO., INC.

on

CONSTRUCTION PROGRESS

on the

EKLUTNA POWER PROJECT

APRIL 6TH TO MAY 9TH, 1929

(Monthly Progress Report No. 8)

--oOo--

Project Report No. 9

May 27, 1929.

CHECKED RSW APPROVED F.H.T.
FRED H. TIBBETTS, CONSULTING ENGINEER

TELEPHONE DAVENPORT 113

FRED. H. TIBBETTS
CIVIL ENGINEER
ALASKA COMMERCIAL BUILDING
SAN FRANCISCO, CALIF.

FRED. H. TIBBETTS
RALPH G. WADSWORTH
HAROLD I. WOOD

SUBJECT ANCHORAGE LIGHT AND POWER CO.

May 27, 1929.

MONTHLY PROGRESS REPORT NO. 8

APRIL 6TH TO MAY 9TH, 1929

Anchorage Light and Power Co.,
Anchorage,
Alaska.

Gentlemen:

The following is a report on the progress of construction work during the period from April 6th to May 9th, inclusive:

STORAGE DAM

The overflow weir was completed by April 12th and the placing of the riprap on the up-stream face of the dam was completed on May 5th. The lining of the spillway channel had been completed except for the upper portion of the westerly side. The placing of riprap on the back water dam was commenced.

The force engaged on this work was reduced on April 12th to 10 men and one team, and was further reduced on April 16th to three men and one team.

During the first half of April the Lake level remained at elevation 10.5. On the 15th one opening of the spillway gate was opened about 4 inches to pass approximately 25 second feet. On April 21st the opening was increased to 6 inches, making the outflow

about 40 second feet. The gate was closed on April 24th and all flashboards above the water surface were removed. Between April 24th and April 27th the remaining flashboards were gradually removed, the opening being finally entirely clear by 4:00 P.M., April 27th. The outflow at that time was about 248 second feet.

DIVERSION DAM

Pouring of concrete continued throughout the period. The amounts poured each week were as follows:

Week ending April 12th	- 86 cu. yds.	- Total to date	169 cu. yds.
" " " 19th	- 80 " "	- " " "	249 " "
April 20th to 25th	- 156 " "	- " " "	405 " "
Week ending May 2nd	- 185 " "	- " " "	590 " "
" " " 9th	- 215 " "	- " " "	805 " "

On May 9th the concrete had been brought to the elevations shown below for the four sections of the dam lettered consecutively from the north abutment:

Section "A" to Elevation 240

Section "B" to Elevation 245

Section "C" to Elevation 235

Section "D" to Elevation 230

The sluice gate was installed during the week ending May 2nd. The temporary diversion flume was completely removed during the week ending April 19th.

TUNNEL

The tunnel progress during the period was as follows:

Week Ending	Feet Drilled During Week	Average per 24 hours	Total to End of Week
April 12th	55	7.9 Ft.	1160 Ft.
April 19th	93	13.3 "	1253 "
April 20th to 25th	71	14.2 "	1324 "
May 2nd	65	9.3 "	1389 "
May 9th	70	10.0 "	1459

The reduced progress during the first week was due to a shutdown from 8:00 A.M., April 6th, to 3:00 P.M., April 8th, to permit the crew to attend the Murphy funeral. On April 23rd a 2 - 8-hour shift schedule was put into effect.

The rock formation remained hard throughout the period and will require no lining.

PENSTOCK

By the end of the period the major portion of the penstock pipe had been received. 14 sections (about 27 ft. each) were in place and 10 sections were riveted. The trench was about 80% completed. A portion of the excavation was done by sluicing with water obtained from natural run-off and tunnel drainage.

POWER HOUSE

The excavation for the power house was completed and forms for the footings were constructed, placing of reinforcing steel

for the foundation was commenced and the concrete mixer and run-ways were in place.

TRANSMISSION LINE

The transmission line was in continuous service during the period.

HYDROGRAPHIC WORK

The gates at the Eklutna Lake dam remained closed from April 6th to April 15th, during which period the water surface rose from Elevation 10.3 to 10.5. During this period the flow of the River was measured at the diversion dam by rating the diversion flume. Between April 15th and April 27th the gates at the storage dam were opened and the water surface elevation was drawn down to Elevation 9.5 by May 5th.

The following measurements were taken by current meter:

March 29th	Flow at Diversion Dam--Lake closed				-	18.2	sec.	ft.
April 15th	"	"	"	" --Lake passing 25 sec. ft.	-	39.0	"	" *
April 19th	"	"	"	"	-	39.8	"	"
April 23rd	"	"	"	"	-	53.7	"	"

The estimated discharge at the Diversion Dam site was estimated daily for the month of April as follows:

* Estimate only.

Date	Sec. Ft.	Remarks
March 29, 1929	18.2	Gates at Lake Closed
30	16.0	ditto
31	15.0	"
April 1	14.0	"
2	14.0	"
3	14.0	"
4	14.0	"
5	14.0	"
6	14.0	"
7	14.0	"
8	14.0	"
9	14.0	"
10	14.0	"
11	14.0	"
12	14.0	"
13	14.0	"
14	14.0	"
15	39.0	One gate at Lake open 4 inches,
16	39.0	passing 25 s.ft. ±
17	39.0	ditto
18	39.0	"
19	39.8	"
20	53.7	One gate at Lake open 6 inches,
21	53.7	passing 40 s.f. ±
22	53.7	ditto
23	53.7	"
24	98.0	Began to open gates gradually
25	148.0	ditto
26	198.0	"
27	248.0	Gates completely opened
28	248.0	ditto
29	248.0	"
30	248.0	"

OFFICE ENGINEERING

Engineering work in the San Francisco Office consisted of completion of designs for the power house, diversion dam and penstock; preparation of plans for the gate house and transition structure at the outlet of the tunnel; ordering and inspecting materials; rendering progress reports and construction estimates; checking bills, and miscellaneous office work in connection with general supervision of the project.

Respectfully submitted,

Engineer,
ANCHORAGE LIGHT AND POWER CO.

RGW:VH

	Approx. Quantity	PERCENTAGE COMPLETED
STORAGE DAM		5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95
Spillway, Excavation	4000 C.y.	
Spillway Lining - Control Gates	84 M.B.M.	
Fill for dam	3700 C.y.	
Riprap	630 C.y.	
Total construction		
Estimated const cost	$29,910	20%
DIVERSION DAM		
Rock excavation	642 C.y.	
Concrete	1190 C.y.	
Grouting		
Outlet gate & hoist		
Waterproofing		
Railing		
Total construction		
Estimated const cost	$ 42,080	21%

APPROVED
CHECKED
FRED H. TIBBITTS, MANAGER

OFFICE COPY

TOTAL PROGRESS TO MAY 1, 1929

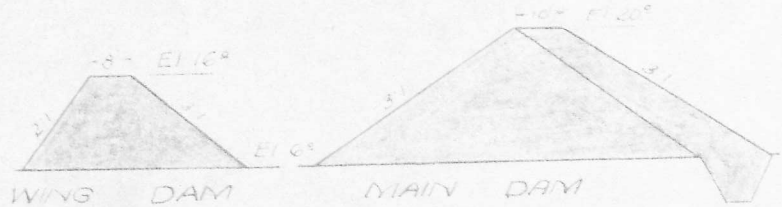
ANCHORAGE LIGHT & POWER CO.

PROGRESS CHART

STORAGE AND DIVERSION DAMS

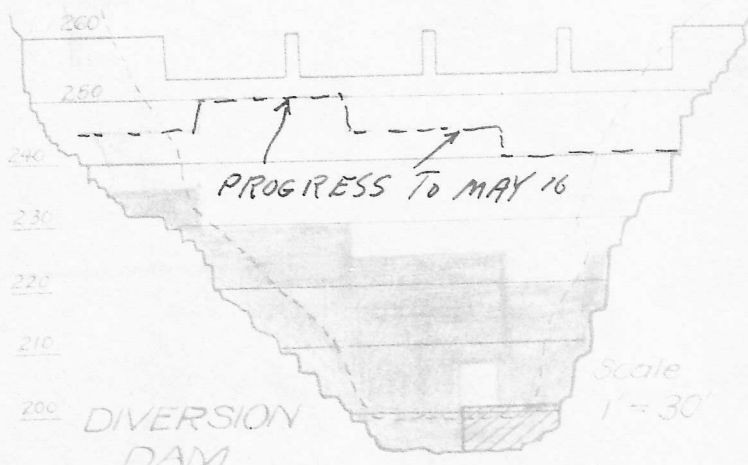
Dec. 1928
San Francisco

FILE NO. 1086-D 17



STORAGE DAM

SECTION OF SPILLWAY



DIVERSION DAM

Scale 1" = 30'

STORAGE DAM	Approx. Quantity	PERCENTAGE COMPLETED
Spillway, Excavation	4000 C.Y.	
Spillway Lining - Control Gates	84 M.B.M.	
Fill for dam	3700 C.Y.	
Riprap	630 C.Y.	
Total construction		
Estimated const cost	$29 910	209%
DIVERSION DAM		
Rock excavation	642 C.Y.	
Concrete	1190 C.Y.	
Grouting		
Outlet gate & hoist		
Waterproofing		
Railing		
Total construction		
Estimated const cost	$ 42,050	21%

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95

OFFICE COPY

CHECKED ..... APPROVED .....
FRED H. TIBBETTS SAN FRANCISCO

TOTAL PROGRESS 70 %

ANCHORAGE LIGHT & POWER CO

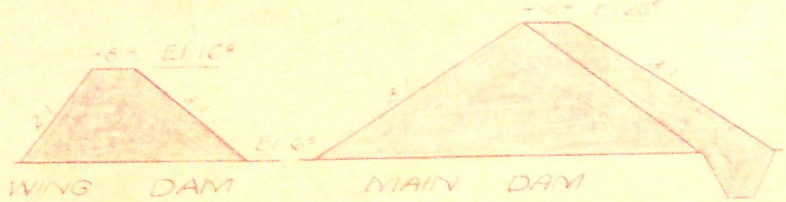
PROGRESS CHART

STORAGE AND DIVERSION DAMS

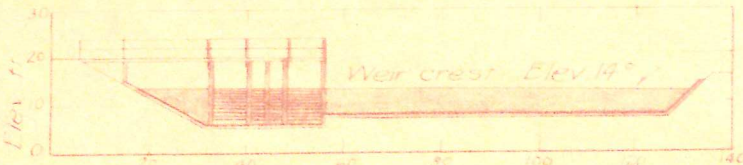
1929

Dec. 1929
San Francisco

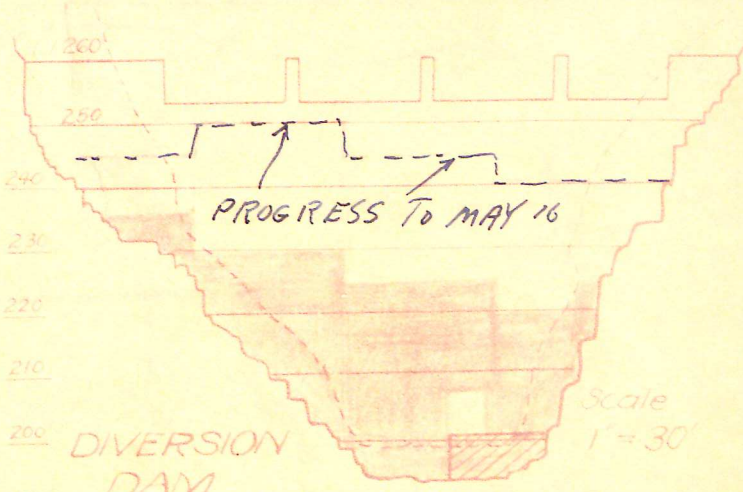
FILE NO.
1086-D 17



STORAGE DAM

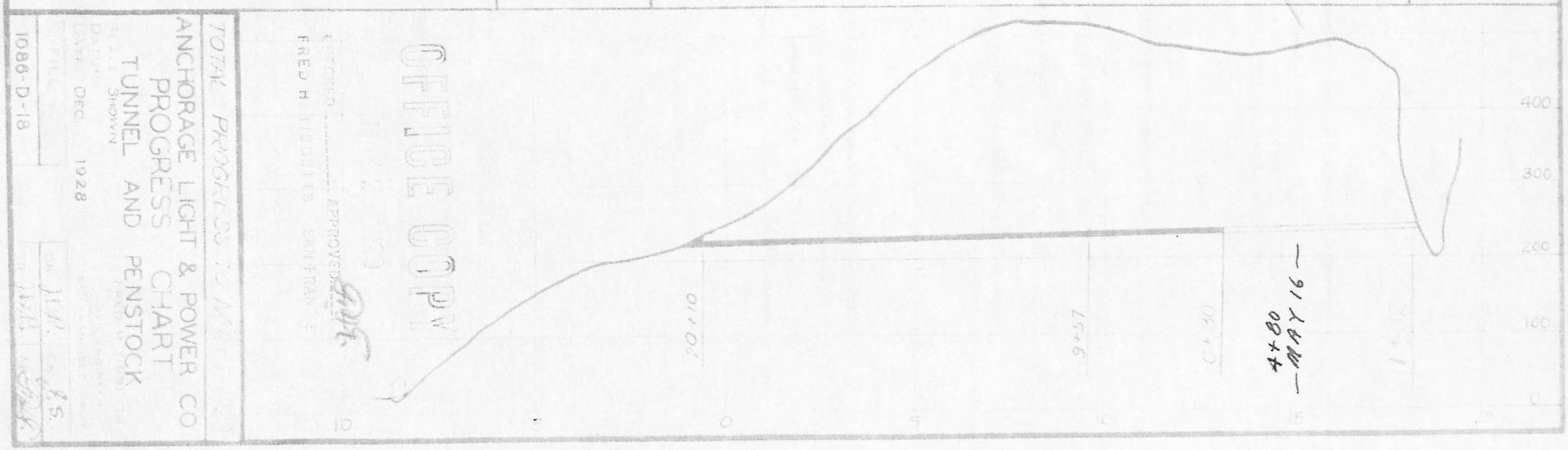


SECTION OF SPILLWAY



DIVERSION DAM

	Approx Quantity	PERCENTAGE COMPLETED 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95
TUNNEL		
Inlet Portal, Excavation	124 c.y.	
Inlet Portal, Concrete	33 c.y.	
Trash Rack	8635 lbs	
Lined Section	100 ft.	
Unlined Section	1578 ft.	
Total mat. & const.		
Est. Construction Cost	$59,320	
PENSTOCK		
Exc. - inlet and trench	3,180 c.y.	
Concrete - inlet and anchors	98 c.y.	
Steel pipe,	147,500 lbs	
Butterfly valve, placing		
Total mat. and const.		
Est. mat. & const. cost	$30,250.	



	Approx. Quantity	PERCENTAGE COMPLETED
TUNNEL		5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95
Inlet Portal, Excavation	124 c.y.	
Inlet Portal, Concrete	33 c.y.	
Trash Rack	3635 lbs.	
Linea Section	100 ft.	
Unlinea Section	1778 ft.	
Total mat. & const.		
Est. Construction Cost	$89,320	
PENSTOCK		
Exc. - inlet and trench	3,180 c.y.	
Concrete - inlet and anchors	98 c.y.	
Steel pipe,	147,500 lbs.	
Butterfly valve, placing		
Total mat. and const.		
Est. mat. & const. cost	$30,250.	

TOTAL PROGRESS 100%

ANCHORAGE LIGHT & POWER CO
PROGRESS CHART
TUNNEL AND PENSTOCK

DATE DEC. 1928

1086-D-18

CHECKED _____ APPROVED _____

FRED H. TOWLE, SAN FRANCISCO

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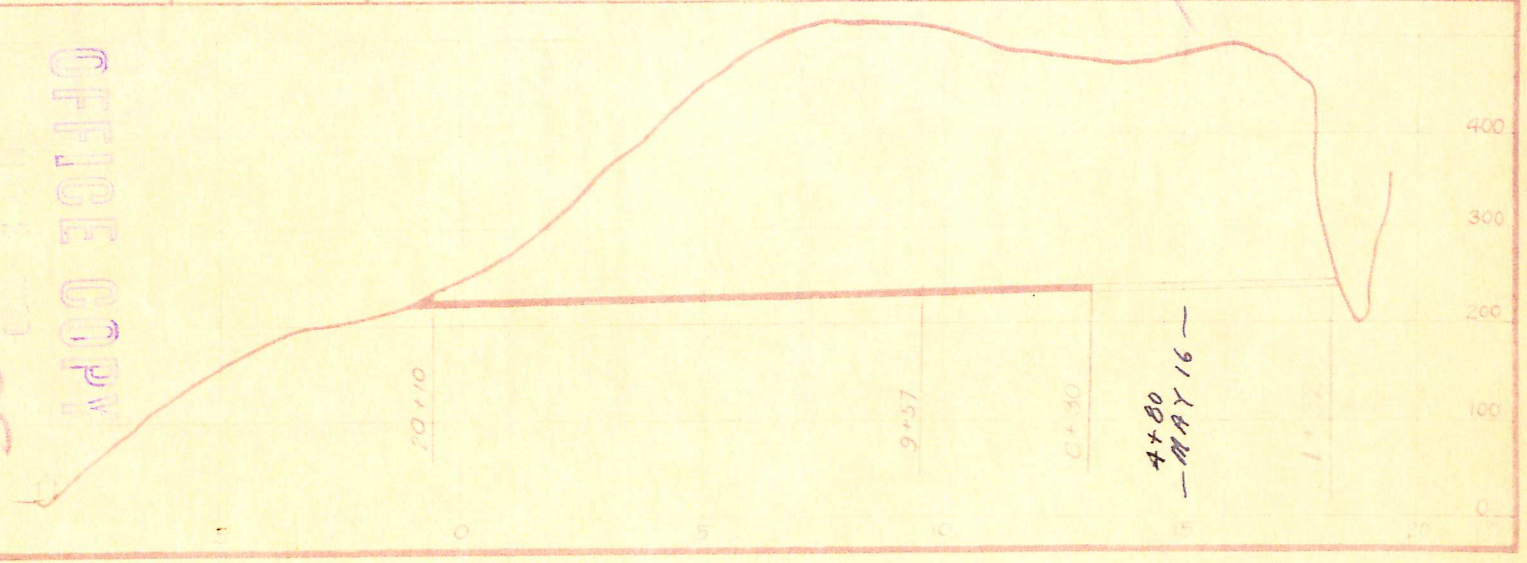


POWER PLANT BUILDING	Approx Quantity	PERCENTAGE COMPLETE 10 20 30 40 50 60 70 80 90
Excavation- foundation	112 cu yds	
Excav.-tail race channel	5320 cu yds	
Concrete - foundation	256 cu yds	
Concrete - superstructure	90 cu yds	
Tile roof	2263 sq ft	
Concrete lining tail race	1155 sq ft	
Doors and sash		
Crane - installation		
Operators cottage		
Total construction		
Estimated material & const cost	$ 7,310.	
POWER PLANT EQUIP.		
MATERIALS AT SITE		
Turbine		
Generator		
Switchboard and instruments		
Wire, conduits, and lights		
House transformers		
Heaters		
INSTALLATION:		
Turbine 1500 H.P.		
Generator 1250 K.V.A.		
Switchboard and instruments		
Wiring, conduits and lights		
House transformers		
Auxiliaries		
Total materials & install		
Estimated equip & install cost	$ 32,940	

FRED H

TOTAL PROGRESS TO [illegible]

ANCHORAGE LIGHT & POWER CO.

PROGRESS CHART

POWER PLANT BUILDING

POWER PLANT EQUIPMENT

Dec 1928

San Francisco

Fred H. Tibbetts

Chief Engineer

FILE NO.	DR. JR	CK. J.S.
1086-D-19	TR. JR	AP.

POWER PLANT BUILDING	Approx Quantity	PERCENTAGE COMPLETE 10 20 30 40 50 60 70 80 90
Excavation - foundation	348 cu yds.	
Excav - tail race channel	5920 cu yds.	
Concrete - foundation	250 cu yds.	
Concrete - superstructure	90 cu yds.	
Tile roof	2263 sq ft.	
Concrete lining tail race	1200 sq ft.	
Doors and sash		
Crane - installation		
Operators cottage		
Total construction		
Estimated material & const cost	$ 27,310.	
POWER PLANT EQUIP.		
MATERIALS AT SITE		
Turbine		
Generator		
Switchboard and instruments		
Wire, conduits and lights		
House transformers		
Heaters		
INSTALLATION:		
Turbine 1500 H.P.		
Generator 1250 K.V.A.		
Switchboard and instruments		
Wiring, conduits and lights		
House transformers		
Auxiliaries		
Total materials & install		
Estimated equip & install cost	$ 36,940	

TOTAL PROGRESS TO DATE

ANCHORAGE LIGHT & POWER CO

PROGRESS CHART

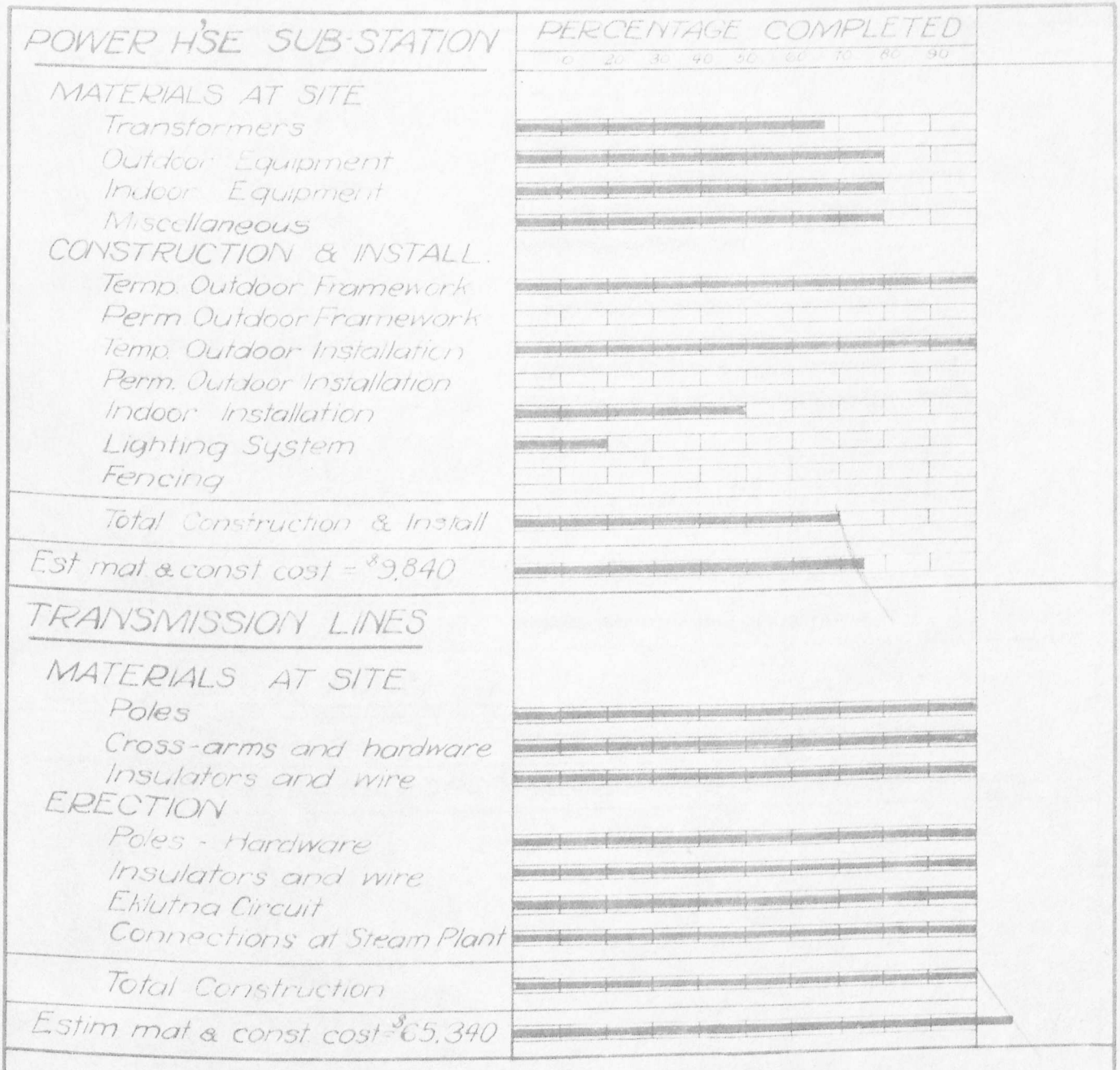
POWER PLANT BUILDING

POWER PLANT EQUIPMENT

Dec 1928

Fred H Tibbetts
Chief Engineer

FILE NO	DR JR	CK J.S.
1086-D-19	TR JR	AP



TOTAL PROGRESS

ANCHORAGE LIGHT & POWER CO.

PROGRESS CHART

POWER HOUSE SUB-STATION

TRANSMISSION LINE

Dec. 1928.

San Francisco

Fred [illegible]

Chief Engineer

FILE NO.	SR J.R.	CK J.S.
1086-D-20	TR J.R.	AP [illegible]

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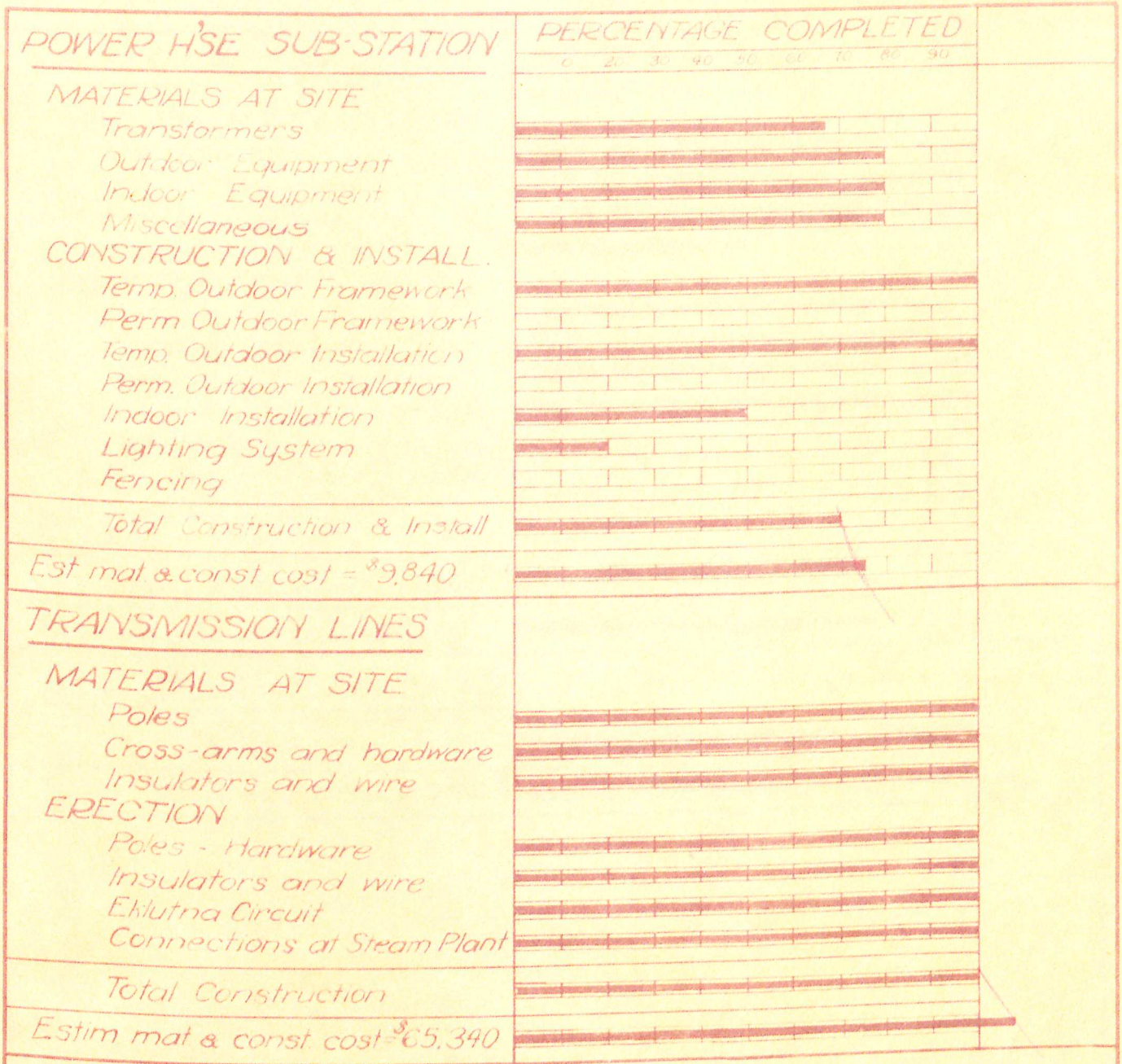
CHECKED ..... APPROVED

FRED H. [illegible] SAN FRANCISCO



TOTAL PROGRESS

ANCHORAGE LIGHT & POWER CO.

PROGRESS CHART

POWER HOUSE SUB-STATION

TRANSMISSION LINE

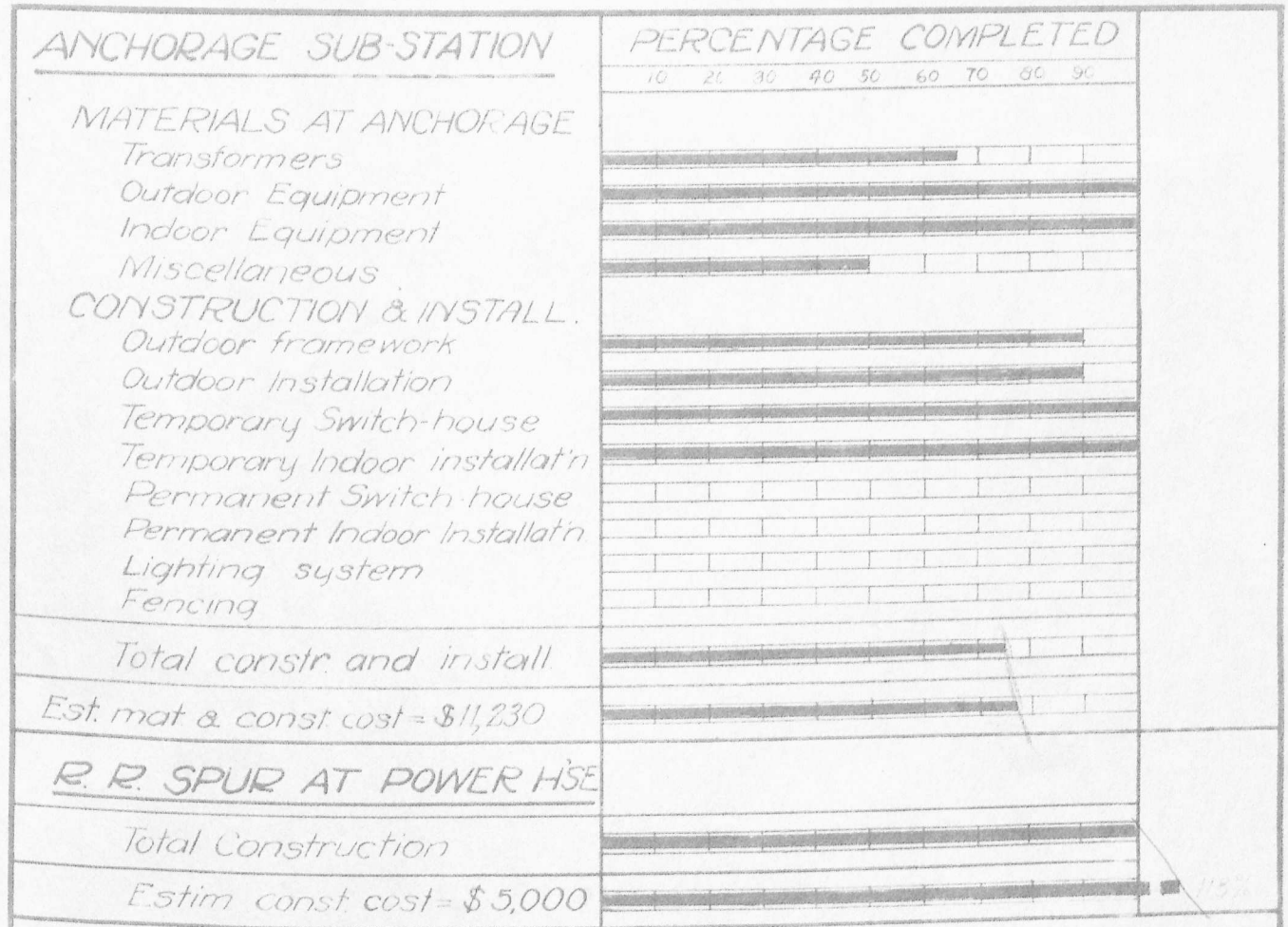
Dec. 1928

San Francisco

FILE NO.

1086-D-20

CHECKED ..... APPROVED



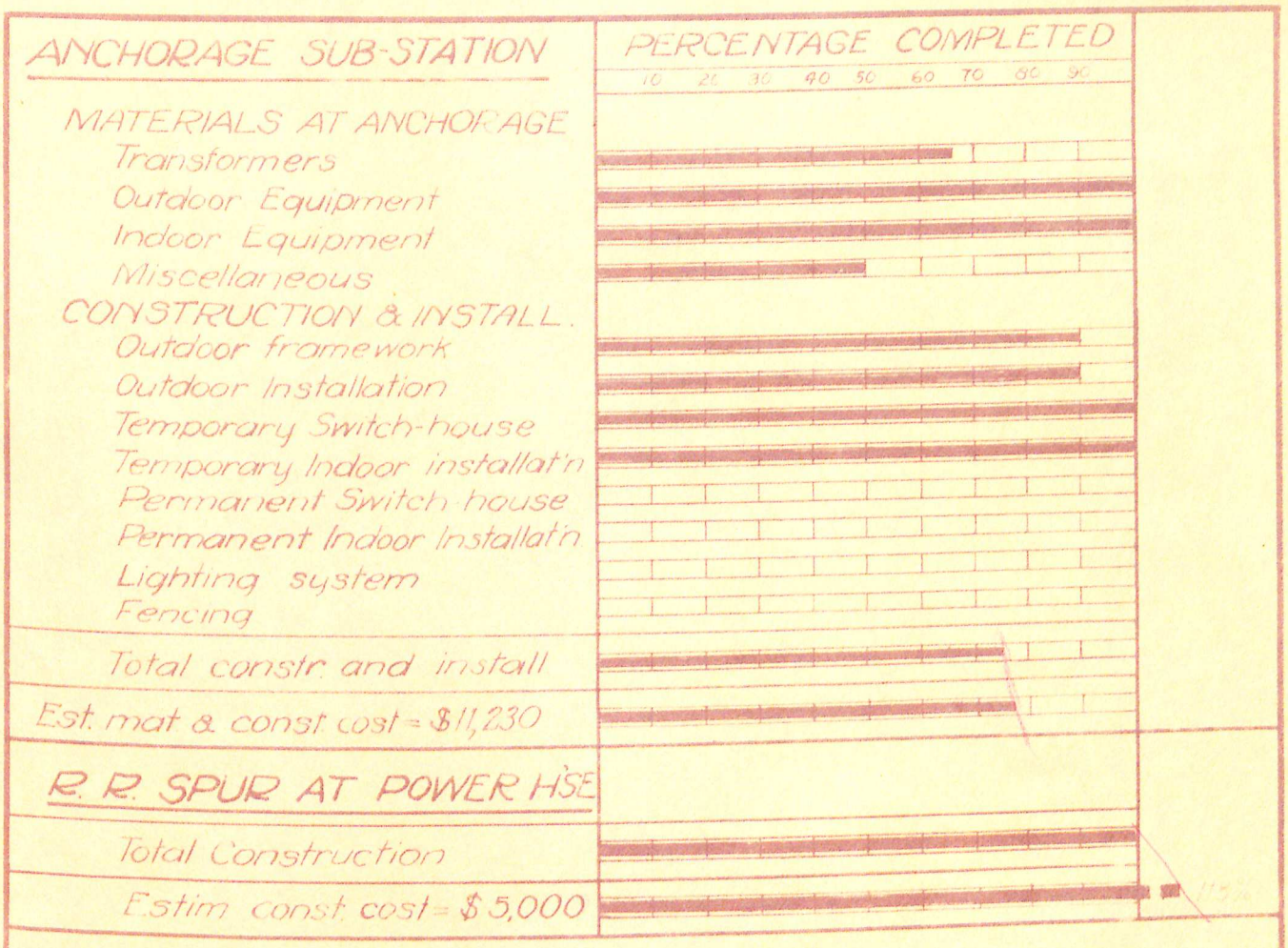
TOTAL PROGRESS TO MAY 1928

ANCHORAGE LIGHT & POWER CO.
PROGRESS CHART
ANCHORAGE SUB-STATION
R. R. SPUR AT POWER HOUSE

SCALE
DATUM
DATE Dec 1928

FILE NO.
1086-D-21

DR. OBR
TR. OBR



TOTAL PROGRESS TO MAR. 1929

ANCHORAGE LIGHT & POWER CO.
PROGRESS CHART
ANCHORAGE SUB-STATION
R. R. SPUR AT POWER HOUSE

FRED H. TIBBETTS
CIVIL ENGINEER
SAN FRANCISCO

SCALE
DATUM
DATE Dec 1928

FILE NO. 1086-D-21

DR. OBR CK. J.S.
TR. JSR CK. [illegible]

REPORT

to

ANCHORAGE LIGHT AND POWER CO., INC.

on

CONSTRUCTION PROGRESS

on the

EKLUTNA POWER PROJECT

MAY 10TH TO JUNE 20TH, 1929

(Monthly Progress Report No. 9)

--oOo--

PROJECT REPORT NO. 10

July 17, 1929.

FRED. H. TIBBETTS
CIVIL ENGINEER
ALASKA COMMERCIAL BUILDING
SAN FRANCISCO

Anchorage Light & Power Company
Monthly Progress Report No.9
on CONSTRUCTION PROGRESS
Report No. 431
Project Report No. 10
July 17, 1929.

1 - Original-H.I.Wood 7/18/29
for A.L.& P. Co.
2 - OFFICE COPY
3 - H. I. Wood - 7/18/29
4 - Russell Colvin Co. 7/19/29

FRED. H. TIBBETTS
CIVIL ENGINEER

Report No. 431.

REPORT

to

ANCHORAGE LIGHT AND POWER CO., INC.

on

CONSTRUCTION PROGRESS

on the

EKLUTNA POWER PROJECT

MAY 10TH to JUNE 20TH, 1929

(Monthly Progress Report No. 9)

--oOo--

Project Report No. 10

July 17, 1929

TELEPHONE DAVENPORT 113

FRED. H. TIBBETTS
RALPH G. WADSWORTH
HAROLD I. WOOD

FRED. H. TIBBETTS
CIVIL ENGINEER
ALASKA COMMERCIAL BUILDING
SAN FRANCISCO, CALIF.

SUBJECT ANCHORAGE LIGHT AND POWER CO.

July 17, 1929.

MONTHLY PROGRESS REPORT NO. 9

MAY 10TH TO JUNE 20TH, 1929

Anchorage Light and Power Co., Inc.,
Anchorage,
Alaska.

Gentlemen:

The following is a report on the progress of construction work during the period from May 10th to June 20th, inclusive:

STORAGE DAM

The dam, including riprap on the backwater dam, was entirely completed by May 16th. Two men continued work on the removal of the slide and the replacing of lining on the westerly side of the spillway channel.

On May 14th the lake level was at elevation 9.5 with all gates and flashboards open. The lake level was at elevation 11.6 on June 17th. The gates were closed only during the time work was being done on the spillway channel lining.

DIVERSION DAM

The pouring of concrete was entirely completed. The amounts poured each week were as follows:

Week Ending	Poured during Week	Total to Date
May 16th, 1929	182 Cu. Yds.	987 Cu. Yds.
May 23rd, 1929	172 " "	1160 " "
May 30th, 1929	88 " "	1248 " "

The concrete around the gate was poured and the gate stem brackets were being set during the week ending June 6th. The gate stem was being placed and the timber gate for closing the opening in the dam was completed during the week ending June 20th.

INTAKE

The intake structure was completed but not stripped.

TUNNEL

The tunnel was completed except for the last round which will be removed only after the flashboards are set at the intake. The last 50 feet was driven slowly, using as little powder as possible because of the short distance to the dam.

The tunnel progress was as follows:

Week Ending	Feet Drilled During Week	Average per 24 hours	Total to End of Week
May 16th	71	10.2 Ft.	1530 Ft.
May 23rd	77	11.0 "	1607 "
May 30th	72	10.3 "	1679 "
June 6th	67	9.6 "	1746 "

PENSTOCK

The excavation for the trench and for all piers was completed. The Wye anchor and Anchor No. 7 were poured. Water was put in the penstock to the air valves at Station 23+75. All the shop seams were caulked and painted. The 68 in. pipe was hauled to the portal.

POWER PLANT

The forms for the building to the bottom of the crane rail beam and the concrete foundation and floor have been completed. Installation of the turbine, generator, and electric conduits for heat and light was started.

TRANSMISSION LINE

The transmission line was in continuous service throughout the period.

HYDROGRAPHIC WORK

The gates at the Eklutna Lake Dam remained open except during work on the spillway channel.

Determinations of the discharge of Eklutna River at the mouth of the canyon were made daily during the month of May, as follows:

Date	Sec. Ft. Flow	Remarks
May 1, 1929	248	Calculated at Diversion Dam
2	270	" " " "
3	290	" " " "
4	315	" " " "
5	335	" " " "

Date	Sec. Ft. Flow	Remarks
May 6, 1929	360	(Ice in stilling well at mouth
7	360	(of canyon thawed and gauge in-
8	360	(stalled May 6th. Records here-
9	360	(after obtained at mouth of Canyon.
10	335	
11	325	
12	325	
13	300	
14	300	
15	290	
16	290	
17	308	
18	245	
19	275	
20	255	
21	250	
22	265	
23	250	
24	205	
25	270	
26	275	
27	220	
28	225	
29	420	
30	210	
31	420	

JASPER STACY CO. CONTRACT

At 4:00 P.M., June 18, 1929, the Jasper Stacy Co. general construction contract was terminated by mutual consent, the major portion of the work included thereunder having been completed. The management of the remaining work was assumed by the (c) Company's Chief Engineer, with Mr. H. I. Wood, Resident Engineer, in immediate charge.

OFFICE ENGINEERING:

Engineering work in the San Francisco Office consisted of completion of designs for the power house, penstock, and diversion dam;

preparation of plans for the power house, penstock and tunnel outlet; ordering and inspecting materials; rendering progress reports and construction estimates; checking bills and miscellaneous office work in connection with general supervision of the project.

Respectfully submitted,

Fred H. Tibbetts asw

Chief Engineer,
ANCHORAGE LIGHT AND POWER CO., INC.

	Approx. Quantity	PERCENTAGE COMPLETED
STORAGE DAM		
Spillway, Excavation	4000 c.y.	
Spillway Lining - Control Gates	84 M.B.M.	
Fill for dam	3750 c.y.	
Riprap	600 c.y.	
Total construction		
Estimated const cost	$ 29,970	209
DIVERSION DAM		
Rock excavation	642 c.y.	
Concrete	1190 c.y.	
Grouting		
Outlet gate & hoist		
Waterproofing		
Railing		
Total construction		
Estimated const cost	$ 42,080	225

OFFICE COPY

CHECKED Rsul APPROVED
FRED H. TIBBETTS SAN FRANCISCO

TOTAL PROGRESS TO 1929

ANCHORAGE LIGHT & POWER CO

PROGRESS CHART

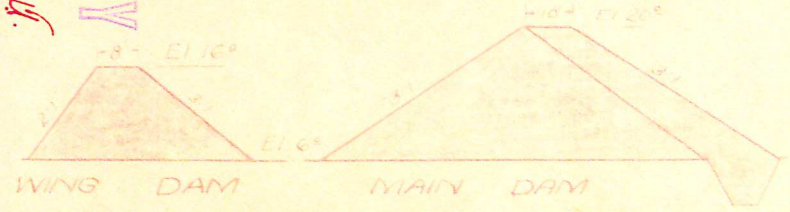
STORAGE AND DIVERSION DAMS

Dec 1929
San Francisco

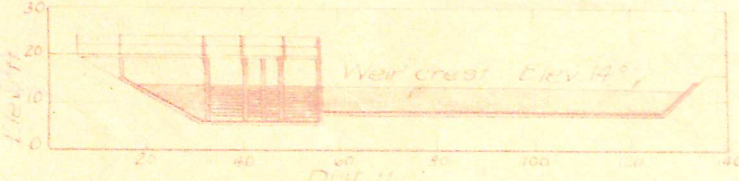
FILE NO. 1086-D-17

DR. E.
TR. G.
AP.

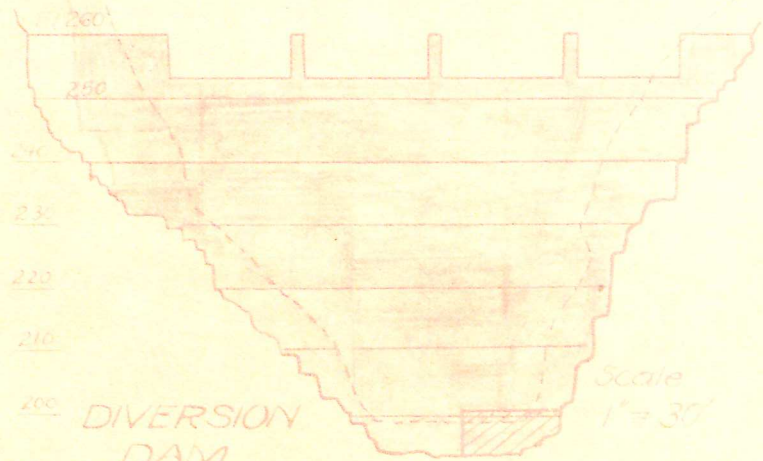
Fred H. Tibbetts
Civil Engineer



STORAGE DAM



SECTION OF SPILLWAY



DIVERSION DAM

	Approx Quantity	PERCENTAGE COMPLETED
STORAGE DAM		
Spillway, Excavation	4000 c.y.	
Spillway Lining - Control Gates	84 M.B.M.	
Fill for dam	13700 c.y.	
Riprap	600 c.y.	
Total construction		
Estimated const cost	$29,970	209
DIVERSION DAM		
Rock excavation	642 c.y.	
Concrete	1190 c.y.	
Grouting		
Outlet gate & hoist		
Waterproofing		
Railing		
Total construction		
Estimated const cost	$ 42,080	225

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FRED H. TIBBETTS SAN FRANCISCO

TOTAL PROGRESS TO 1/1/1929

ANCHORAGE LIGHT & POWER CO

PROGRESS CHART

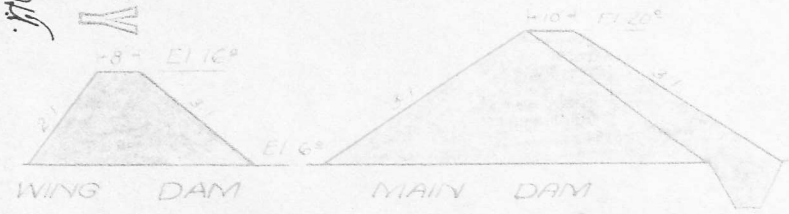
STORAGE AND DIVERSION DAMS

Dec 1928
San Francisco

Fred H. Tibbetts
Chief Engineer

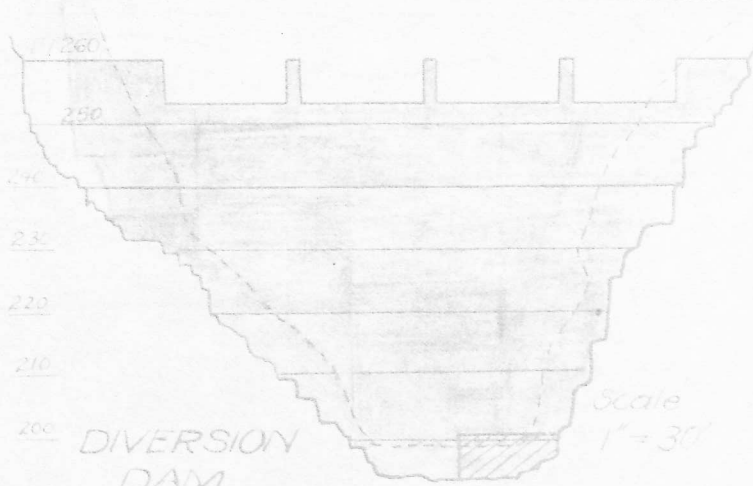
DR	CK
TR	AP

FILE NO
1086-D-17



STORAGE DAM

SECTION OF SPILLWAY



DIVERSION DAM

	Approx Quantity	PERCENTAGE COMPLETED
TUNNEL		5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95
Inlet Portal, Excavation	124 c y	
Inlet Portal, Concrete	33 c y	
Trash Rack	8635 lbs	
Linea Section	100 Ft	
Unlinea Section	1778 Ft	
Total mat & const		
Est Construction Cost	$59,320.	
PENSTOCK		
Exc - inlet and trench	3,180 c y	
Concrete - inlet and anchors	98 c y	
Steel pipe,	147,500 lbs	
Butterfly valve, placing		
Total mat. and const.		
Est. mat. & const. cost	$30,250.	

8

TOTAL PROGRESS 72

ANCHORAGE LIGHT & POWER CO.
PROGRESS CHART
TUNNEL AND PENSTOCK
SHOWN
DEC 1928

1086-D-18

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FRED H. TIBBETTS SAN FRANCISCO

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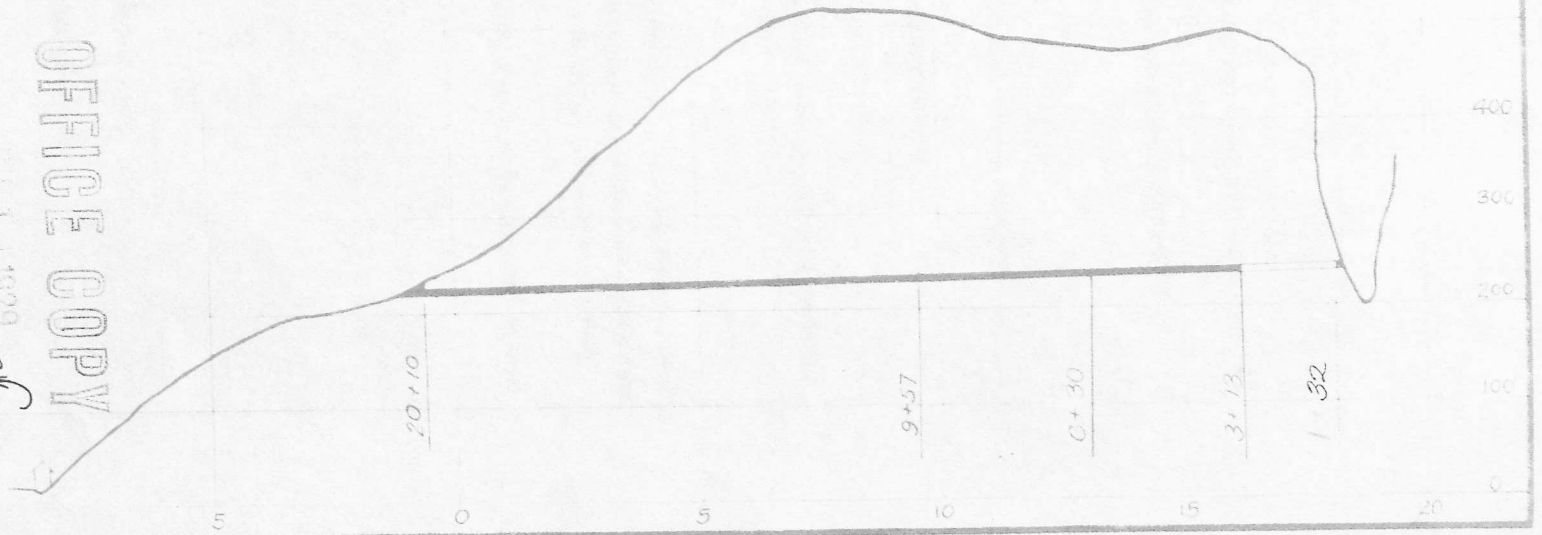
DEC 1 1928



	Approx Quantity
TUNNEL	
Inlet Portal, Excavation	124 c y
Inlet Portal, Concrete	33 c y
Trash Rack	8635 lbs
Linea Section	100 ft
Unlinea Section	1178 ft
Total mat & const	
Est Construction Cost	$59,320
PENSTOCK	
Exc - inlet and trench	3,180 c y
Concrete - inlet and anchors	98 c y
Steel pipe,	147,500 lbs
Butterfly valve, placing	
Total mat. and const.	
Est. mat. & const. cost	$30,250.

PERCENTAGE COMPLETED

5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95

CHECKED [illegible] APPROVED [illegible]
FRED H. TIBBETTS SAN FRANCISCO

TOTAL PROGRESS TO DATE

ANCHORAGE LIGHT & POWER CO
PROGRESS CHART
TUNNEL AND PENSTOCK
SHOWN DEC 1928

1086-D-18

POWER PLANT BUILDING	Approx Quantity	PERCENTAGE COMPLETE 10 20 30 40 50 60 70 80 90
Excavation - foundation	148 cu yds	
Excav - tail race channel	5320 cu yds	
Concrete - foundation	256 cu yds.	
Concrete - superstructure	190 cu yds	
Tile roof	2263 sq. ft.	
Concrete lining - tail race	1130 sq. ft.	
Doors and sash		
Crane - installation		
Operator's cottage		
Total construction		
Estimated material & const cost	$21,310.	
POWER PLANT EQUIP.		
MATERIALS: AT SITE		
Turbine		
Generator		
Switchboard and instruments		
Wire, conduits, and lights		
House transformers		
Heaters		
INSTALLATION:		
Turbine - 1500 H.P.		
Generator - 1250 K.V.A.		
Switchboard and instruments		
Wiring, conduits and lights		
House transformers		
Auxiliaries		
Total materials & install.		
Estimated equip & install cost	$35,940	

TOTAL PROGRESS TO JULY 1, 1929

ANCHORAGE LIGHT & POWER CO

PROGRESS CHART
POWER PLANT BUILDING
POWER PLANT EQUIPMENT

Dec 1928
San Francisco

Fred H. Tibbetts
Chief Engineer

FILE NO	DR JR	CK J.S.
1086-D-19	TR JR	AP

POWER PLANT BUILDING	Approx Quantity	PERCENTAGE COMPLETE 10 20 30 40 50 60 70 80 90
Excavation - foundation	148 cu yds	
Excav. - tail race channel	5320 cu yds	
Concrete - foundation	256 cu yds.	
Concrete - superstructure	190 cu yds	
Tile roof	2263 sq. ft	
Concrete lining - tail race	1100 sq. ft	
Doors and sash		
Crane - installation		
Operator's cottage		
Total construction		
Estimated material & const. cost	$21,310.	
POWER PLANT EQUIP.		
MATERIALS: AT SITE		
Turbine		
Generator		
Switchboard and instruments		
Wire, conduits, and lights		
House transformers		
Heaters		
INSTALLATION:		
Turbine - 1500 H.P.		
Generator - 1250 K.V.A.		
Switchboard and instruments		
Wiring, conduits, and lights		
House transformers		
Auxiliaries		
Total materials & install.		
Estimated equip & install cost	$35,940	

TOTAL PROGRESS TO JUNE 1 1929

ANCHORAGE LIGHT & POWER CO.

PROGRESS CHART

POWER PLANT BUILDING

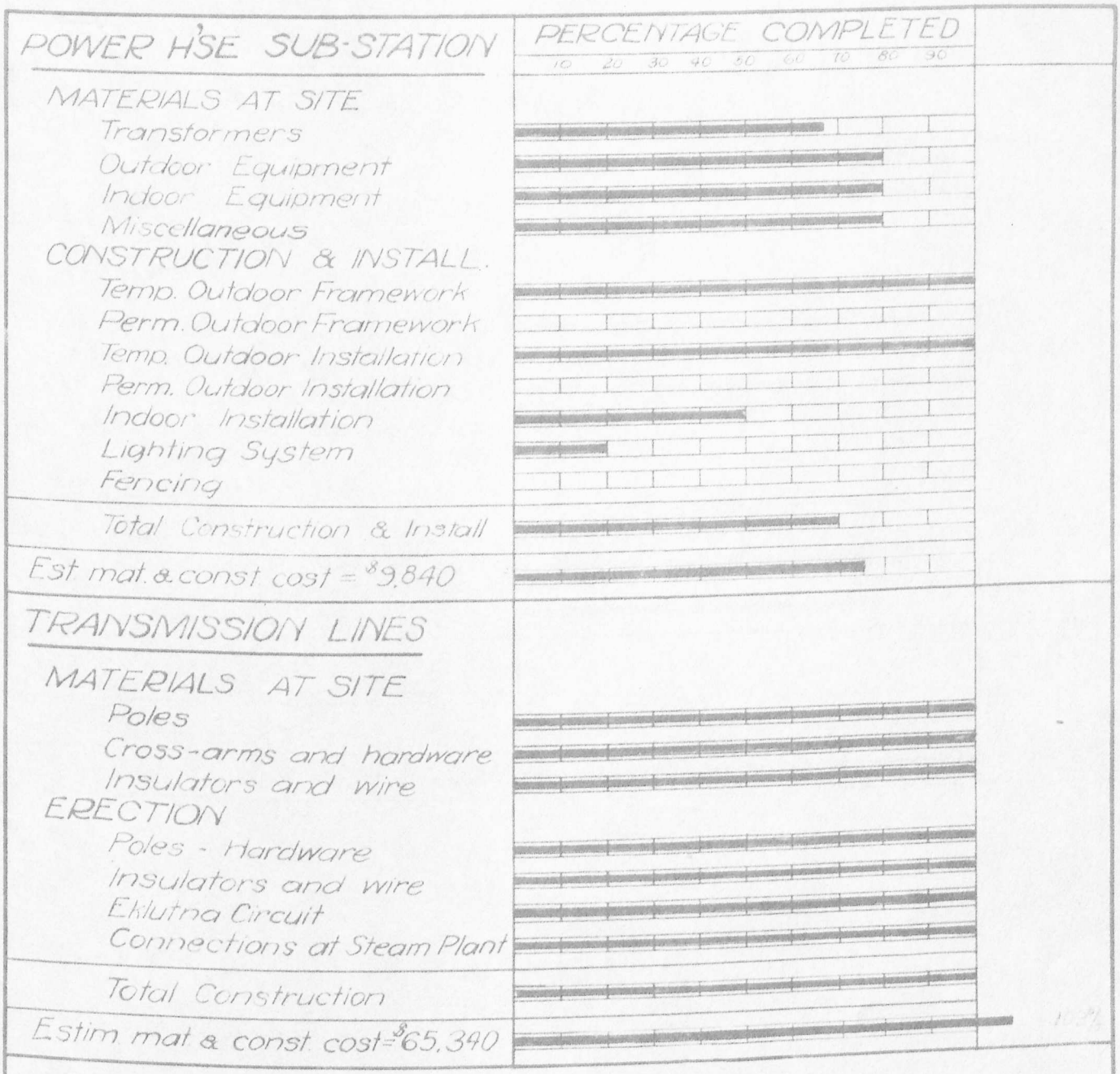
POWER PLANT EQUIPMENT

Dec 1928

San Francisco

Fred H. Tibbetts
Chief Engineer

FILE NO	DR. JR	CK. J.S.
1086-D-19	TR. JR	AP.



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FRED H. TIBBETTS SAN FRANCISCO

TOTAL PROGRESS TO JUNE 1, 1929

ANCHORAGE LIGHT & POWER CO.

PROGRESS CHART

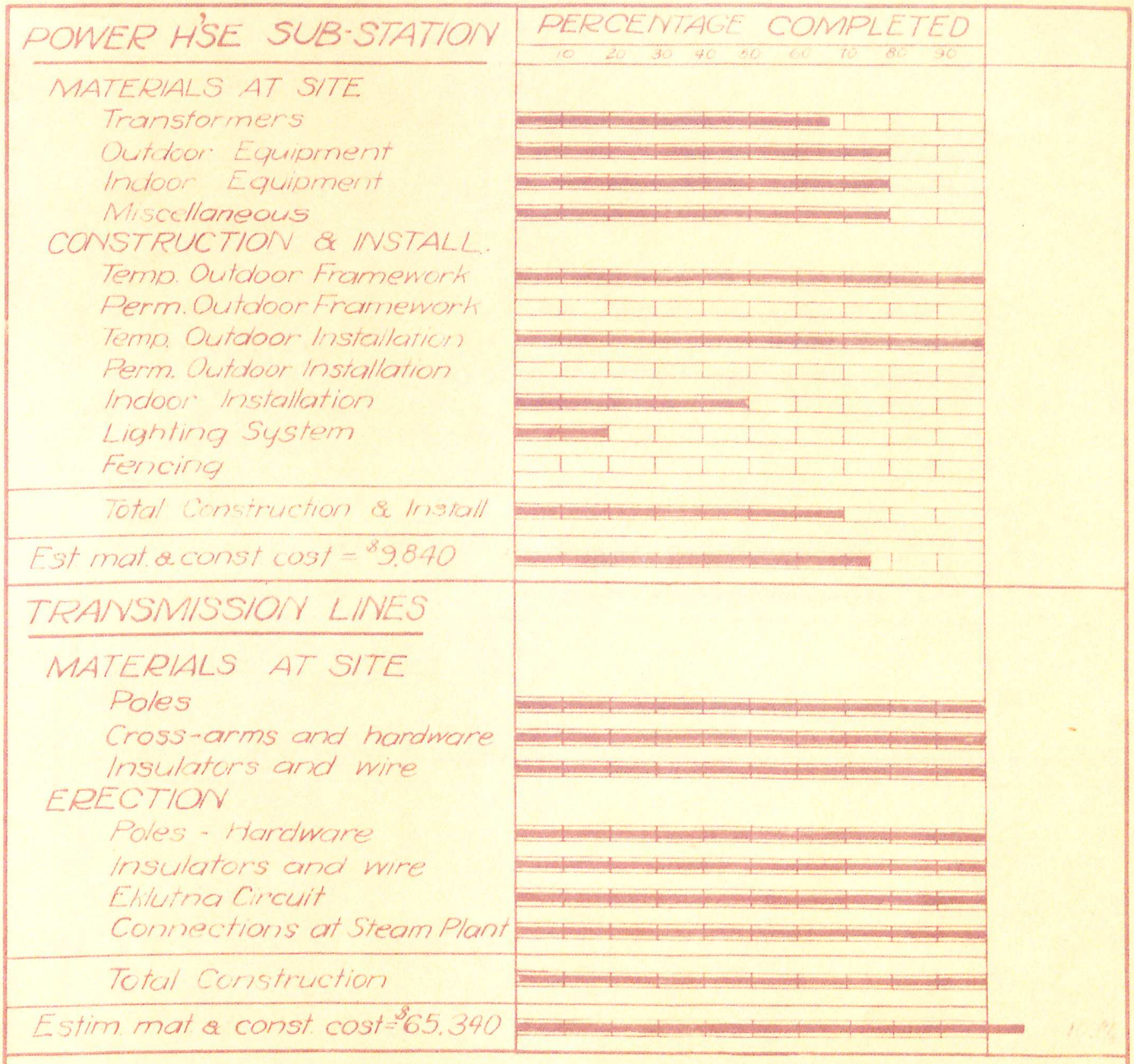
POWER HOUSE SUB-STATION

TRANSMISSION LINE

Dec. 1928
San Francisco

Fred H. Tibbetts
Chief Engineer

FILE NO.	DR. J.R.	CK. J.S.
1086-D-20	TR. J.R.	AP.



TOTAL PROGRESS TO JUNE 1, 1929

ANCHORAGE LIGHT & POWER CO.

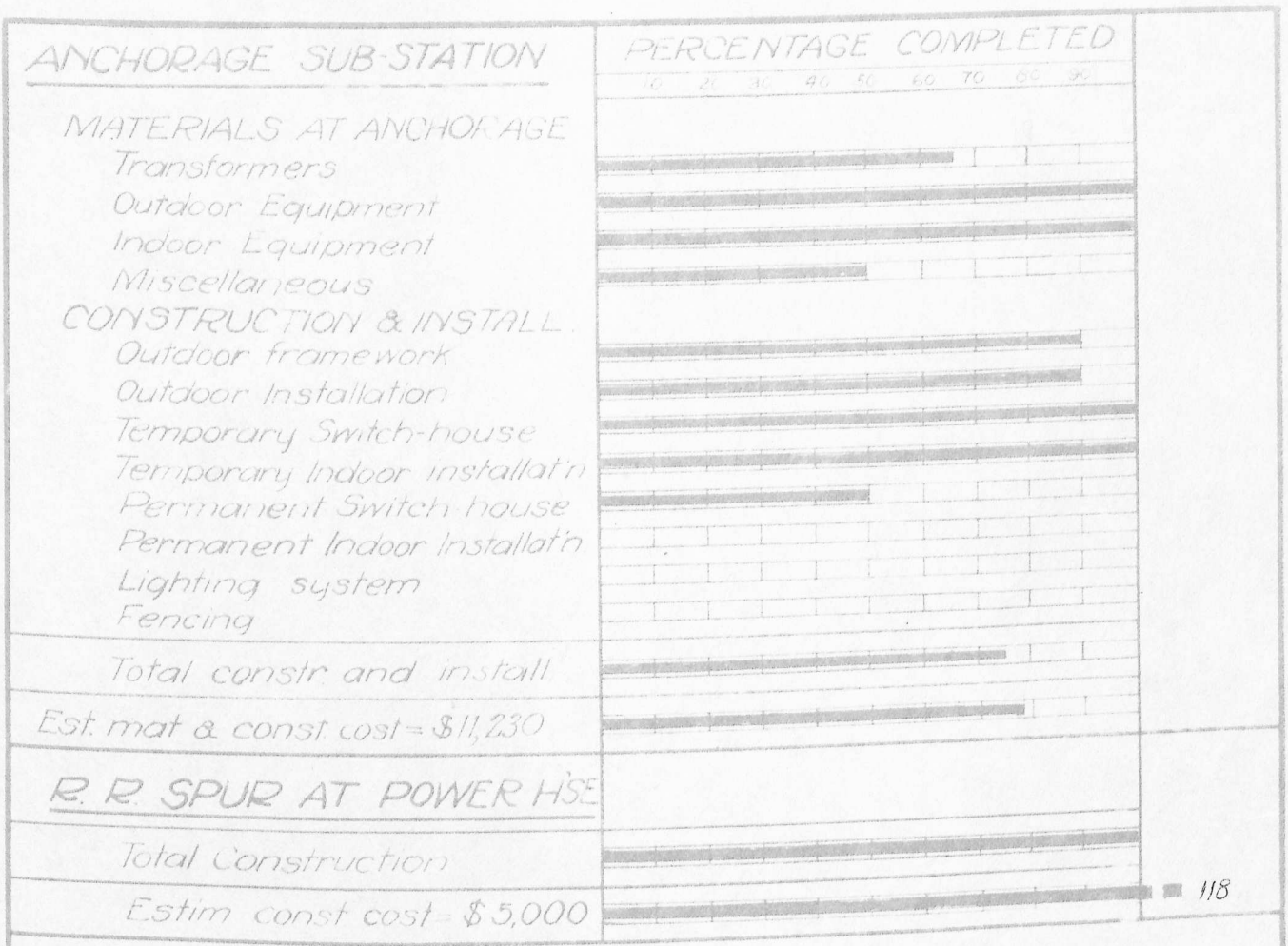
PROGRESS CHART

POWER HOUSE SUB-STATION
TRANSMISSION LINE

Dec. 1928
San Francisco

Fred H. Tibbetts
Chief Engineer

FILE NO.	DR J.R.	CK J.S.
1086-D-20	TR J.R.	AP G.H.T.



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JUL 1 1929

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FRED H. TIBBETTS SAN FRANCISCO

TOTAL PROGRESS TO JULY 1929.

ANCHORAGE LIGHT & POWER CO.

PROGRESS CHART

ANCHORAGE SUB-STATION

R.R. SPUR AT POWER HOUSE

DRAWN ..... TRACED .....

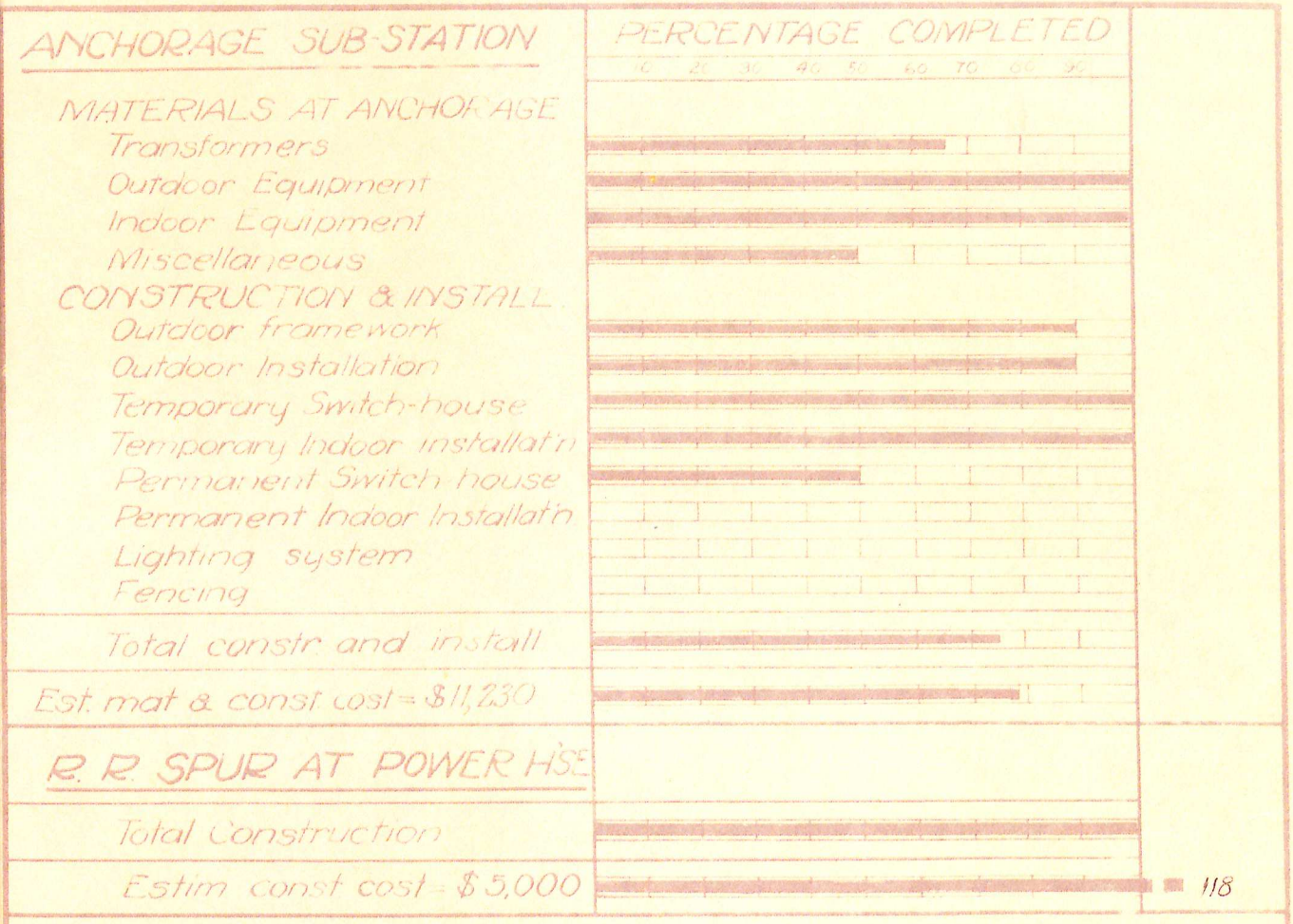
DATUM .....

DATE Dec 1928 CHECKED .....

DR. WR. J.S.

FILE N. 1086-D-21

TR. WR. J.S.



TOTAL PROGRESS TO JULY 1929.

ANCHORAGE LIGHT & POWER CO
PROGRESS CHART
ANCHORAGE SUB-STATION
R.R. SPUR AT POWER HOUSE

DATE Dec 1928

FILE NO. 1086-D-21

No. 484

REPORT

to

ANCHORAGE LIGHT & POWER COMPANY OF ALASKA

on

PROPOSED CITY OF ANCHORAGE DIESEL PUMPING PLANT

PROJECT REPORT NO. 11

January 20, 1934

FRED. H. TIBBETTS
CIVIL ENGINEER
ALASKA COMMERCIAL BUILDING
SAN FRANCISCO

PACIFIC GAS AND ELECTRIC COMPANY

NUMBER | OFFICE OF SALES DEPARTMENT | DATE ISSUED

E-14-33

SALES BULLETIN

April 12, 1933

For the information of:—Division Managers, District Managers, Local Agents and Divisional Sales Organizations

GENERAL MEASURES FOR MEETING ENGINE COMPETITION

For several years we have been experiencing an increasing amount of competition from manufacturers of Diesel and other internal combustion engines. During the past year or more, this competition has been very severe. As this competition has developed, we have endeavored to spread information that would be helpful in combating the installation of isolated plants. We believe this bulletin will be very helpful and will be useful as a model for the preparation of data that may be submitted to our consumers.

Customer Contacts

The formulating of a plan whereby regular visits to the larger power consumers will be made by the local district representatives and the division management officers should develop a better understanding of the problems that are confronting both the power company and the consumer. Efforts should be made to establish close and favorable relations with both the present ocnsumer and the prospective consumer. It is our belief that the assignment of a responsibility of contact to a certain block of consumers will be helpful. The frequency of visits shall depend upon the size of the customer and the class of business.

Manufacturers' Organization Contacts

Various salesmen and manufacturer's representatives are continually calling on power customers and are in a position to know what is going on in the various plants. We should, therefore, continue to cultivate this type of contact in an effort to obtain information on projects that are not ordinarily discussed directly with the power company. This type of contact in the past has been very helpful.

Consumer Analysis

The total group of industrial consumers supplied by the company lend themselves to the following general classifications. The seriousness of each case is indicated.

1. Existing consumers with low annual load factor. (Not serious.)
2. Industrial consumers with very high annual load factors, who are in a favorable position for the purchase of fuel oil (or natural gas). (Serious if well financed.)
3. Industrial concerns requiring a large amount of processed steam in conjunction with their manufacturing. (Very serious.)
4. Industrial concerns now generating part of their energy requirements and purchasing some power. (Expansion of isolated plant possible.)

5. Industrial concerns now generating their own power. (Contact for purchased power.)

By breaking down our list of consumers into the previous classifications, we feel that we shall be in a better position to combat the efforts of equipment salesmen to establish isolated plants in these various industries.

It should always be remembered that the holding of the utility's present customers is most important. The installation of generating equipment in the plant of an existing consumer sets a very bad precedent and the news is soon spread throughout the industry.

SALES PLANS FOLLOWED BY ENGINE MANUFACTURERS

In former years there were very few engine manufacturers making regular calls throughout our territory. During the past month, however, this condition has changed and we now find an increasing number of calls being made by salesmen from steam and Diesel engine manufacturers. At the present time these men are intelligent and in some cases very skilled engineers. They do not in many cases make definite statements against the power company, but they do lend a very sympathetic ear to consumer discussions and are always willing to criticize the company's method of operation, bills, forms of rates, etc.

Their first move is generally to take the consumer's power bills for a 12-months' period and make a statement as to the total amount the consumer pays the power company in a 5 or 10-year period. The next step is to make a direct comparison between the cost of an amount of fuel for the production of the same amount of power. By omitting any statement concerning additional operating costs and the necessary fixed charges on the new equipment, there is a large apparent saving available.

The salesman will then make the claim that the customer could buy and install generating equipment and pay for it in a few years out of the money he is now paying the power company. Statements are made that in one case the consumer has a bunch of receipted bills, and in the other case he will have installed and paid for a certain amount of generating equipment. The consumer is told that even though he should return to the power company as a consumer he has not paid out any more money. Today we find that very few of our consumers keep accurate accounts of their operating costs and fixed charges. Because of these facts, these previous statements are considered sound by the consumer.

The next move on the part of the engine salesman is to sell the consumer on the fact that the apparent savings are possible, and to build up a feeling in the consumer's mind that he, too, is smart enough to operate his own plant. The salesman then states that he will agree to take the consumer's note at 6 per cent interest covering the cost of installing the generating equipment. A contract is drawn up based upon apparent savings, but definitely states that the consumer agrees to pay to the engine company a definite sum of money per month over such period of time until a total definite sum is paid. In the meantime this note is a definite mortgage upon the property of the consumer and is drawn up in such legal terms that it will hold in the present-day courts. Changed operating conditions

may entirely eliminate the apparent savings, but they do not eliminate the requirement that the consumer must pay a certain definite sum of money per month. We have recently had a case where the consumer was unable to make the apparent saving and refused to make payments to the engine company. Recent court action has been decided in favor of the engine company.

Utility's Method of Meeting This Competition

To date in practically all cases we have been successful in combating this type of competition. In doing so, it is very essential that we secure as much data on the engine company's proposal as possible. A very accurate and detailed analysis that parallels the rough pencil analysis on the part of the engine salesman will in most cases defeat this type of competition. The following plan may be helpful in preliminary discussions with the consumer:

I. Prepare a statement for the consumer of the cost of electric service for the previous year. Sell the consumer on the fact that he should compare the present cost of power and light as rendered by the company with other services, such as labor and materials used in manufacturing his product. In most cases the consumer will find that the cost of electric service is a very small percentage of his total operating cost. It is best to eliminate discussions on the form and type of rate.

II. A pencil analysis may then be made which compares the customer's total yearly bill for electric service with the true yearly cost for an engine. At this point in the discussion, it is wise to use what we shall refer to as the "subtractive method." We should select those definite items of cost which have been purposely omitted by the engine company in their discussion, and should leave the items of fuel and lubrication until the last in order that we may show what a small percentage of the total operating cost these items may be.

The above method of analysis may be initiated by setting up the actual cost of electric service over the past 12-months' period. The engine company's estimate of total installation cost is used if it is a fair estimate, but it is very important to determine whether or not all equipment has been added that will be necessary for the production of duplicate service. In many cases the cost of foundations, buildings, piping, and certain wiring has been omitted in preliminary figures. It will be remembered at this point that it is very important for the power salesmen to keep in touch with present-day equipment prices.

III. In making an analysis under this method, subtractions will be made from the original power company's annual bill in the following steps:

(a) First, 6 or 7 per cent interest, based on the installation cost as decided upon.

(b) Then from this remaining sum, subtract a sum for insurance and taxes, which is generally between 2½ and 3½ per cent of the installation cost.

(c) The next step will be to establish maintenance figures on the number of dollars per horsepower per year, which depend upon the total hours of operation. An inspection of data developed by the A.S.M.E and agreed to by most engine manufacturers places the annual maintenance and repair item at figures between $1.25 and $1.75 per horsepower per year, depending upon load factor. Many companies use a maintenance and repair cost at 2 per cent of the installed cost of the equipment. In most cases this figure is not accurate because it does not take into consideration annual load factor. It will be low in most cases.

It is well to discuss the fact that although repair parts may cost $1.00 or $2.00, it sometimes requires loss in production and costs for their installation which amount to several dollars. When the maintenance costs are thus computed to the customer's satisfaction, they are then subtracted from the remaining amount.

We are now experiencing competition from a new type of light-weight, high-speed Diesel engine. In most cases this new type of engine has a lower investment cost, but because of its high speed of operation, also has a shorter life.

One good argument to prove to the consumer that this new engine will have a short life is to make a direct comparison with the operation of a truck engine. If one of these engines operating a 900 r.p.m. were placed in the average truck, it would develop a speed of approximately 21 miles per hour. It this engine were to operate in the truck as it is commonly required to operate on a stationary set-up, it would travel 190,354 miles per year, or a total near 2,000,000 miles over its 10-year life expectancy. It will also be very easy, by this comparison, to convince the prospective purchaser that such an engine will require a complete overhauling at very short intervals and will also require a considerable amount of maintenance, probably at least $3.00 per horsepower-year. This same analysis can be made on the slower type speed of engine and will easily justify the maintenance figures mentioned in this report.

From the remaining sum, subtract the maintenance and repair costs.

(d) At this point it will be well to discuss the consumer's method of operation and be sure that the consumer is informed on the true meaning of load factor and how changes in load factor affect the total fuel and lubricating oil consumption. In many cases we find the engine salesman selling the consumer upon the fact that his equipment will normally operate with a load factor that is near 60 or 70 per cent. An inspection of the actual hours of operation and the load required at any one time will show the consumer that there will be many hours of the day when the generating equipment will be burning fuel

merely to develop the mechanical losses of the engine and generator. An inspection of the load curves for various engines, as produced by the engine manufacturer, will bear out these facts and it is entirely satisfactory to use the fuel consumption curves of the manufacturer for the various load factors during the operating period. After these data have been developed, it is evident that there will be a large increase in both fuel and lubricating oil requirements over those figures proposed by the engine builder.

By this time, in most cases the proposed purchaser is beginning to realize that there are many items of actual cost that have not been mentioned by the engine salesman and the engine salesman has not presented accurate figures on fuel and lubricating oil costs.

To estimate the fuel oil requirements, one must first determine the size (kw. or kv-a. capacity) of the unit, or units, that must be in operation to handle the maximum demands which occur.

The total kilowatt-hours as purchased must be increased by about 4 per cent to take care of station and auxiliary losses (water pumping, fuel handling, lighting, etc.)

The next step is to determine the annual capacity factor in per cent, based on station capacity = $\frac{\text{Kw-hrs. required}}{\text{Kw. capacity x 8,760 hours per year.}}$

The fuel oil consumption curve as developed by the American Society of Mechanical Engineers, and based on 330 engines totaling 190,768 hp., will be used.

A.S.M.E. OIL CONSUMPTION DATA ON DIESEL ENGINES

Fuel Oil		Lubricating Oil	
Annual Capacity Factor	Gross Kw-hr. Per Gal.	Annual Capacity Factor	Gross Kw-hr. Per Gal.
10 per cent	2.50	10 per cent	200
20	4.50	20	300
30	6.50	30	460
40	8.00	40	600
50	9.40	50	760
60	10.25	60	920
70	11.00	70	1,090
80	11.50	80	1,240
90	11.70	90	1,400

1 HP = 52.3 Kw.

The use of a number of individual units will allow the generating plant to operate on a high station capacity load factor, but will also increase the capital investment.

NATURAL GAS ENGINE DATA

Running Plant Capacity Factor	Direct Connection Cu.Ft. Gas Per Hp. Hour	Electric Generation Cu.Ft. Gas Per Kw.Hr. (80% P.F.)
10 per cent	-	-
20	23.00	26.0
30	17.00	23.2
40	13.00	19.0
50	11.00	16.0
60	10.00	14.0
70	9.25	12.8
80	8.80	12.0
90	8.50	11.4

The lubricating oil requirements may be computed by finding the total horsepower-hours of engine operation and allowing 2,000 horsepower-hours per gallon of lubricating oil.

From the remaining sum, now subtract the fuel and lubricating oil costs.

(e) At this point in the discussion, it is well to have a definite understanding as to the labor costs associated with the operation of an isolated plant. This may require the addition of more manpower or may require the substitution of the existing labor with a new high-class operating man that will cost a sum of money in excess of the present labor cost. In cases where it is impossible to sell the consumer on the addition of more manpower, it may be possible to increase the maintenance cost due to the hiring of outside help for the installation of new parts when necessary. At this point it will also be well to discuss miscellaneous operating costs, such as cooling water, waste, supplies, etc.

Now subtract labor and miscellaneous items.

The records developed by the American Society of Mechanical Engineers during the past few years show very reliable data on the actual operating conditions. The data are prepared in such a manner that direct comparisons can be made for most any type of plant.

EXAMPLE OF ENGINE SAVING ANALYSIS

Engine Manufacturer's Plan

Based on the maximum demand for energy requirements on a certain industrial plant, the manufacturer has recommended the installation of one 500 kv-a., 80 per cent power factor, Diesel generating unit.

The total installed cost has been estimated near $45,000.

Present power costs (12 months)		$ 21,918
Cost to operate a Diesel plant		
Fuel Oil	$ 9,800	
Lubricating oil	720	
Maintenance, repairs	850	
Operating costs	$11,370	11,370
		$ 10,548
Labor equivalent of 1 man per day		1,800
Apparent annual saving		$ 8,748

By this analysis it is apparent that the engine will pay for itself in slightly over 5 years.

Mention will then be made that the engine should remain in first-class shape for at least 10 years.

Power Company Analysis

Cost of present electric service			$ 21,918
Cost of electric plant - $45,000 (500 kw.)			
(a) Interest @ 6%		$ 2,700	2,700
			$ 19,218
(b) Taxes and insurance 2½%		1,125	1,125
			$ 18,093
(c) Maintenance $1.50 Hp-Year		850	850
			$ 17,243
(d) Fuel and lube oil			
Fuel oil	$10,080		
Lube Oil	1,008	11,088	11,088
			6,155
(e) Labor costs - Attendance ½ man per 8-hour shift		2,700	2,700
Net Saving			$ 3,455

Initial investment $45,000

Net Savings 3,455

Time to pay for plant with no depreciation considered is thirteen (13) years.

With the entire investment retired in 10 years at 6 per cent interest, the annual amount to be set aside would equal $3,410.

It is apparent that this amount would wipe out any anticipated annual saving.

Comment on Utility Company's Method of Analysis

It is to be noted that the analysis has been worked down to an annual net savings figure which, when divided into the installation cost, gives the number of years required to pay for the engine. In most cases this figure represents several years, during which time further rate reductions may be put into effect that will seriously affect and enlarge this figure.

This method of handling the matter of engine life cuts out any need for discussion of depreciation, which to the average layman is a technical and theoretical figure and is not readily grasped. It is much better in most cases to picture to the man the number of years he must operate under perfect conditions to have saved enough money to off-set the capital investment.

It is well at this time to prepare data showing the trend of rate reductions which took place beginning in the year 1921. The application of a given block of kilowatt-hours and demand to the rate schedule now in effect will show a reduction of approximately 20 per cent in the cost of energy when compared with the schedule in effect in 1921. It is our belief that this general trend of rate reduction will be continued for many more years.

It is to be pointed out to the consumer that, in accepting the engine manufacturer's proposal, instead of making a definite saving for several years he is really guaranteeing to pay to the engine company a definite sum of money. The present industrial depression and the decreased amount of manufacturing can easily be pointed to as something that might happen at any time. Our present consumers are able to decrease their electric service and in some cases eliminate it entirely. Should the same consumers be operating an isolated plant, the fixed charges would continue and it would be necessary to operate generating equipment at a reduced load factor which is very inefficient.

In most cases the service developed in an isolated plant can in no manner be compared with central station service. This utility has spent millions of dollars in generating equipment and transmission lines to the extent that the likelihood of any failure in power service is very remote. To closely approximate the continuity of service as delivered by the P.G. & E. Co. would require the installation of dual units of generating equipment. This procedure would increase the capital investment to the point where it could not be justified. The consumer must be sold upon the point that the Company is delivering a service rather than a block of kilowatt-hours for a certain sum of money.

General Arguments in Favor of Purchased Power

The best arguments in favor of purchased power can be built up on the fact that the continuity of service is generally the most important item in the plant. In many plants there are hundreds of dollars of labor per hour dependent upon the power supply. A short breakdown in an isolated plant can easily wipe out the anticipated annual savings. It is also very important to point out that in most cases the investment of a sum of money in the business equivalent to the cost of an isolated plant would show a larger return on the investment. One major reason for the present economic condition is due to, too many plants trying to earn a fair rate of return on too much capital investment. Those plants purchasing outside service are today able to decrease their outside purchases and decrease their operating costs.

Other arguments in favor of the purchase of central station power can be built up on the fact that additional energy requirements can be purchased on a moment's notice and with no increased capital investment for generating equipment on the part of the consumer. The flexibility of service enjoyed with purchased power and the efficiency with which it can be utilized is seldom enjoyed in an isolated plant.

Customer Energy Consumption Analysis

Today we find many industries giving closer attention to their production costs than ever noted before. With decreased consumption, some industries are at the present time experiencing increases in their unit power costs. It is, therefore, important that the power salesman contacting these industrial consumers must be familiar with the present trend and must be very sympathetic in his dealings with the consumer. In many cases we have ben able to convince the consumer that his power costs are in line, by an analysis of his plant operations. Some preliminary studies have been made where in it is possible for the power company representatives to study and recommend the shifting of certain operations that vitally affect the consumer's maximum demand and in turn vitally affect the unit cost per kilowatt-hour of power.

In many cases it is possible for the power company salesmen to cooperate with equipment manufacturers and recommend the installation of new equipment, such as new pumps with increased efficiency, capacitors that will increase power factor and new methods of material handling whose costs will be less than the cost of generating equipment and will show large returns on their investment.

Conclusion

The General Office Sales Organization is in a position to deal directly with a large number of equipment manufacturers and representatives and they are able to secure up to the minute information on most any type of equipment. We are always glad to be of service to the Divisions. Assistance will be given on all jobs when requested by the divisions.

APPROVED:

H. M. CRAWFORD

GENERAL SALES MANAGER

H. N. CARROLL

MANAGER ELECTRIC SALES

WHP:EZ

General Arguments in Favor of Purchased Power

The best arguments in favor of purchased power can be built up on the fact that the continuity of service is generally the most important item in the plant. In many plants there are hundreds of dollars of labor per hour dependent upon the power supply. A short breakdown in an isolated plant can easily wipe out the anticipated annual savings. It is also very important to point out that in most cases the investment of a sum of money in the business equivalent to the cost of an isolated plant would show a larger return on the investment. One major reason for the present economic condition is due to, too many plants trying to earn a fair rate of return on too much capital investment. Those plants purchasing outside service are today able to decrease their outside purchases and decrease their operating costs.

Other arguments in favor of the purchase of central station power can be built up on the fact that additional energy requirements can be purchased on a moment's notice and with no increased capital investment for generating equipment on the part of the consumer. The flexibility of service enjoyed with purchased power and the efficiency with which it can be utilized is seldom enjoyed in an isolated plant.

Customer Energy Consumption Analysis

Today we find many industries giving closer attention to their production costs than ever noted before. With decreased consumption, some industries are at the present time experiencing increases in their unit power costs. It is, therefore, important that the power salesman contacting these industrial consumers must be familiar with the present trend and must be very sympathetic in his dealings with the consumer. In many cases we have ben able to convince the consumer that his power costs are in line, by an analysis of his plant operations. Some preliminary studies have been made where in it is possible for the power company representatives to study and recommend the shifting of certain operations that vitally affect the consumer's maximum demand and in turn vitally affect the unit cost per kilowatt-hour of power.

In many cases it is possible for the power company salesmen to cooperate with equipment manufacturers and recommend the installation of new equipment, such as new pumps with increased efficiency, capacitors that will increase power factor and new methods of material handling whose costs will be less than the cost of generating equipment and will show large returns on their investment.

Conclusion

The General Office Sales Organization is in a position to deal directly with a large number of equipment manufacturers and representatives and they are able to secure up to the minute information on most any type of equipment. We are always glad to be of service to the Divisions. Assistance will be given on all jobs when requested by the divisions.

APPROVED:

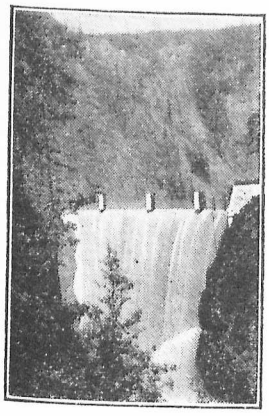
H. M. CRAWFORD

GENERAL SALES MANAGER

H. N. CARROLL

MANAGER ELECTRIC SALES

WHP:EZ



Anchorage Light and Power Co., Inc.

Anchorage, Alaska

REPORT

to

ANCHORAGE LIGHT & POWER COMPANY OF ALASKA

on

PROPOSED CITY OF ANCHORAGE DIESEL PUMPING PLANT

Project Report #11

January 20, 1934

TELEPHONE SUTTER 5728

MEM. AM. SOC. OF CIVIL ENGS.
MEM. AM. INST. OF ELEC. ENGS.

FRED. H. TIBBETTS
CIVIL AND
CONSULTING ENGINEER
ALASKA COMMERCIAL BUILDING
SAN FRANCISCO, CALIF.

SUBJECT ANCHORAGE LIGHT & POWER COMPANY

January 20,1934

Mr. Frank I. Reed, Pres.,
Anchorage Light & Power Co.,
Anchorage, Alaska.

Dear Sir:

A request was received from you on September 21,1933 for an analysis of the City of Anchorage's proposal to substitute a Diesel Engine pumping plant for municipal water supply for the present electric pumping plant supplied with power by your company.

This report has been delayed from time to time pending the submission of additional data from Anchorage and the collection of additional information here.

CONDITIONS OF SERVICE

The city of Anchorage obtains its municipal water supply from a well using two 75 H. P. motors, and 5" Worthington Centrifugal pumps each with a 6" suction, a 5" discharge and normally rated at 750 gallons per minute with a 210 ft. pumping head.

The average amount of water pumped per month for the last fourteen months is about 15,000,000 gallons or about 500,000 gallons per day. The average total cost to the city for power and operation labor and incidentals is about $1,200 per month.

Further information supplied by you on October 31 is reproduced in the appendix to this report.

SIZE OF PROPOSED PLANT

You will note that the manufacturers of the Diesel Engine plant proposed, have based their figures on a 70 H.P., 1 cylinder Fairbanks-Morse engine. For continous heavy pumping

duty, it is not believed that this size engine is sufficient for reliable service. In machinery of this type a considerable margin of power is highly desirable. To be comparable in reliability with a 75 H. P. motor, a Diesel Engine of approximately 100 H. P. should be used. This larger size of engine would increase the installation cost about $2,500.

ESTIMATED COST OF DIESEL PUMPING PLANT
OF 70 H. P. AS PROPOSED BY THE MANUFACTURER
(NOTE THAT 100 H. P. SHOULD BE USED IN THE WRITER'S OPINION)

FIRST COST OF DIESEL PUMPING PLANT

ENGINE & FUEL TANK:

1-70 H. P. F.M Diesel Eng. f.o.b. Seattle	$4996.00	
Frt. Seattle-Alaska 13 tons	325.00	
1-10,000 gal. fuel tank f.o.b. Seattle	410.00	
Frt. Seattle-Alaska 3 tons	75.00	
1590' 2" galv. oil Line, laid @ $0.50	750.00	
TOTAL	6556.00	
10% Supervision, Contingencies & spare parts	655.60	
TOTAL cost of Engine, etc.delivered at Anchorage	$7211.60	$7211.60

ERECTION OF PLANT:
Concrete foundations;fuel,exhause, and circulating water piping;enlarging house;placing equipment;etc.

Materials	$ 250.00	
Local Hauling,about 25 tons @ $1.50	37.50	
Local labor, 60 man days @ $7.00	420.00	
F. M. Expert, 60 days @ $10.00	600.00	
Transp. & Expenses of Expert $150 plus $280	530.00	
Enlarging pump house	1200.00	
TOTAL	3037.50	
10% for Supervision,Incidentals & Contingencies	303.75	
TOTAL COST of Installation	$3341.25	$3341.25
TOTAL COST ENGINE, INSTALLED		$10249.10

New Pump:

1-5" Pump without board bearing for rope drive	700.00	
Frt. Seattle-Alaska 1 ton	25.00	
Foot valve,suction pipe,valves,etc.	125.00	
Freight	500.00	
TOTAL	855.00	
10% for Incidentals,Supervision,Contingencies	85.50	
TOTAL COST NEW PUMP	$940.50	940.50
TOTAL COST OF PLANT INSTALLED		$11189.60

All of the major items in the above estimate were determined from local quotations and the weights and consequently the freight charges are accurately known. It is believed that this estimate is entirely reliable and that the plant can be installed for this cost.

This estimate is not far from the manufacturer's estimate of $9,321 exclusive of the cost of an additional pump to accompany the engine.

ANNUAL COST OF OPERATION

MANUFACTURER'S ESTIMATE

You will note that in the proposal made to the City the costs of operation make no allowance for depreciation, insurance, annual overhauling, standby electric service, etc.

FUEL OIL

Operating conditions are unfavorable for a Diesel Engine. Under conditions existing at Anchorage, it seems to be the practice to start pumping when the storage level in the tank has fallen to about one-half capacity, thus requiring starting and stopping every two hours or so. A Diesel Engine operates efficiently only when really warmed up. Short operating periods alternating with periods of idleness, especially in a cold climate, would seriously interfere with economy of fuel consumption.

It is herein estimated that the quantity of fuel oil required would under the operating conditions at Anchorage be about 30% more than estimated by Fairbanks-Morse. This would indicate oil consumption in the neighborhood of nine gross K. W. hours per gallon.

The cost of fuel oil at Anchorage has also been increased to 12¢ per gallon, which is about the present going price. The price of fuel oil undoubtedly shows a tendency to rise in the immediate future and, therefore, if the proposed plant were installed the city might presently find its fuel cost materially higher than herein estimated. On the other hand, the city is protected by contract against a rise in price of electric power for pumping. The recent world-wide tendency is for power rates to decrease in the future because of improved technique in the manufacture and operation of electric power plants.

LUBRICATING OIL

Because of unfavorable operating conditions on this proposed installation, the annual consumption of lubricating oil has also been increased in about the same ratio as the increase in fuel oil. A slight increase in price has been made also in line with present market trends.

ANNUAL OVERHAULING

Under the most favorable conditions, maintenance charges on heavy Diesel Engines are moderate if the engines are continually in expert hands. The proposed installation at Anchorage, however, will operate under unfavorable conditions, starting and stopping frequently in a severe climate. It will also be far from the base of supplies so it will be difficult to get repair and replacement parts and extras. It seems certain that the cost for replacements and annual overhauling will be somewhat more than would be expected under more favorable conditions near large manufacturing centers.

DEPRECIATION

The unfavorable operating and climatic conditions of the proposed installation are such that the average life of the Diesel Engine is estimated at ten years. Under the best of care engines of this type may have a life of fifteen years and under indifferent and unfavorable conditions, they may become valueless in as short a period as five years. Depreciation has been herein estimated on the basis of a ten year average life.

LABOR COSTS

Continuous attendance would be absolutely required for the proposed installation in order to insure the physical safety of the city against such an emergency as a general conflagration. It seems quite impracticable to assume as was done in the manufacturer's estimate, that two men one at $150 and one at $200 would be sufficient.

This estimate provides for three operators, two at $150.00 per month and one at $200.00 per month. This would make it possible to give each man an occasional day of rest, to allow them to work somewhat less than twelve hours per day and also to give each attendant a week or two vacation annually. It is of supreme importance that reliable attendants always be present at the plant ready to start at any emergency.

STANDBY ELECTRIC SERVICE

The city apparently proposes to maintain the present electric pumping plant intact for emergency service, keeping its two units at all times in condition to instantly operate. This is a wise policy. It is the uniform practice of all public utility corporations to make a service or standby charge for motors connected and at all times ready for operation, even though they be not regularly operated. This is necessary becuase the power company must make the investment and pay the fixed charges on generating capacity sufficient at all times to carry the load. Operating personnel is also required for the same purposes. In California territory the "standby charge" for this purpose is about $1.00 per H. P. per month. Even though power costs are much higher in Alaska than in California where the rates are regulated by a Public Utility Commission, this same standby rate has been used in this estimate. If the city should be unwilling to pay such a standby charge, then safety would require a complete duplicate installation of the Diesel plant and even then provisions for an emergency would not be as certain as if the electric pumping machinery were left intact.

ELECTRIC PUMPING

During the annual overhaul it would be necessary to shut the Diesel Engine plant down and to pump water with the present electric motors. The present estimate for electric energy is based upon a total aggregate loss of time for the Diesel Engine for all purposes including overhauling, of but fourteen days per year.

INTEREST ON INVESTMENT

In annual costs there has been included 4% per year on an estimated additional expenditure by the City of $11,000.

SUMMARY OF ANNUAL OPERATING COSTS

The following table shows a summary of the foregoing items of annual operating costs.

ANNUAL COST OF OPERATION -PROPOSED DIESEL ENGINE PLANT

Fuel Oil; 18,200 gals. @ 12¢	$ 2160.00
Lubricating Oil 132 gals. @ 75¢	99.00
Replacements & annual overhaul	400.00
Standby electric service charge @ $1.00 per horse power per month	1800.00
Cost of electric pumping during overhauling period, 1/2 month @ $800.00	400.00
Interest on investment, 4% on $11,000.00	440.00
Depreciation, life of 10 years	1119.00
Fire Insurance @ 1% per annum	112.00
Labor one man @ $200.00 per mo.	2400.00
" two men @ $150.00 per mo.	3600.00
Relief labor @ 1/12th the above	500.00
Total Annual Cost Diesel Pumping Plant	$ 13,030.00
Cost Per Month	$ 1,086.00

The average cost shown above of $1086 per month shows no saving over the present electrical pumping plant, even though no allowance has been made for increased heating costs of the larger pumping plant. Under Alaskan climatic conditions, this might be a substantial addition to annual costs. If maintenance and repair bills for heavy Diesel Engines are kept within reasonable bounds, it will be necessary to maintain more uniform temperatures during the winter, than required for electric machinery, especially if the Diesel Engine is frequently stopped.

There can be no guarantee that repair bills and maintenance and even fuel oil costs may not in the future be materially higher than shown in this estimate. Power rates, however are guaranteed under existing contracts with a likelihood of being lowered when contracts are renewed.

As the proposed Diesel Plant offers no probability of any financial saving and no guarantee that it will not cost materially more, the electric plant should be greatly preferred because of its increased simplicity and reliability and decreased depreciation costs.

12.

AUTOMATIC ELECTRIC PLANT

The present operating costs of the city pumping plant may be reduced by the installation of additional machinery which will make the electric pumping automatic. A considerable decrease in power consumption would be affected if a new 3" pump were installed directly connected to a new 40 H. P. motor. This unit would have materially higher efficiency than the present units which must be frequently started and stopped. It would have a capacity of about 30,000 gallons per hour or 720,000 gallons per day. It would be operated much more continuously than any of the present machinery. With the present storage tank the new unit would alone be able under normal conditions to take care of the present water consumption at Anchorage.

Three float switches should be installed in the present water storage tank, each switch being connected to one of the three motors which would be in service if the new pump was installed. The connection between the float switches and the motors should be made through the medium of a four conductor lead and steel armored cable buried underground. The life of this cable would be practically indefinite and could not be affected in any way by storms so that it would furnish most reliable service between the float switches and the pumps. The proposed float switches would be entirely automatic in their operation and are very reliable in service. One switch would be set so that the smallest pump would start automatically at any

13.

time when the water level had fallen say 2 ft. in the tank. A second switch would be set to start one of the existing 75 H. P. pump installations when the water surface had fallen an additional 5 ft. in the tank. The third switch would be set so that the third pumping unit would start automatically whenever the water level had fallen still another 5 ft. in the tank. Thus at any time when the tank was about one-half empty all three motors would be running, discharging into the tank under such circumstances over 1,000,000 gallons of water per hour.

In order to make automatic operation through means of float switches possible, it would be necessary to install automatic compensating starters for each motor in the pump house, properly connected to the float-switch circuits.

Aside from their automatic control of the water level the switch controls would have the further advantage that they could be connected through ordinary lighting circuits to colored lights located at any desired points in the town, and so arranged that whenever a float switch started a motor, a corresponding signal light would show this condition, in the power house say, or in the headquarters of the Fire Department, or wherever the information was desired. A series of three Such lights would at all times show the approximate level of the water in the tank as well as giving the information as to how many motors were running at that particular instant. This would be a very valuable as well as a very convenient feature which could be obtained at very slight additional expense.

Arranged as suggested, the operation of the pumping plant would be entirely automatic and would require no attendance whatever except an occasional visit to replenish lubricating oil in the motors and to make routine inspection. The estimated cost of the additional equipment required for this installation is $3403. made up as follows:

1	3" pump & 40 H. P. motor	$658.00	
	Frt. on same	30.00	
800'	4 conductor cable-600v (F.O.B.Anchorage)	253.60	
3	Chain type float switches	100.80	
2	75 H. P. Auto compensators (Including transformers)	1094.02	
1	40 H. P. Auto Compensator (Including Transformers)	537.60	
	Frt. from Seattle	100.00	
	TOTAL cost equipment	$2774.02	$2774.02

Cost of Installation

Labor	$150.00	
Local hauling	20.00	
Extra pipes and valves	50.00	
Pump & Motor foundation	100.00	
Cost of installation	320.00	320.00
Sub Total		$3094.02
Add 10% for Supervision and contingencies		309.40
TOTAL cost		$3403.42

ANNUAL OPERATION COST - CITY PUMPING PLANT
AUTOMATIC ELECTRIC OPERATION

The estimated cost of operating the pumping plant for the city if made automatic as herein proposed, is based upon the use of the same amount of energy at the same unit price as at present. The proposed new pumping plant would be about 12% more efficient than the one now in service and should effect an annual saving of about 10% in energy. The estimate also includes $50.00 per month for labor which should be ample to care for an occasional inspection and replacement of lubricating oils. In addition to this there is included one man at $150. per month for three months per year to care for necessary heating during the coldest weather. A similar charge does not appear in the operating cost of the proposed Diesel plant because the necessary engine attendants for the Diesel plant could also attend to such heating.

OPERATING COST - AUTOMATIC PLANT

ANNUAL COST

Electric Current	$ 9600.00
Labor-oiling & inspection	600.00
Labor heating	450.00
Interest @ 5% on $3400	170.00
Depreciation (15 yr. life)	226.00
Insurance	34.00
Repairs & Lubricants	150.00
TOTAL COST OPERATION	$11,230.00
COST PER MONTH	935.83

It seems obvious that by making the present pumping plant automatic in operation, substantial savings can be affected over the present arrangement or the proposed Diesel pumping arrangement. The type of equipment proposed is of the highest character and should be absolutely reliable in service. The writer has installed similar automatic pumping equipment for continuous heavy constant use which has now been satisfactorily operating for ten years or more without difficulties of any nature and under much more trying conditions than would exist at Anchorage.

17.

CONCLUSIONS

A proposal has been made to substitute for the present electric pumping plant for the water supply for the City of Anchorage a new Diesel Engine plant. Arguments for such a substitution are based upon a comparison of minimum operating costs of the Diesel plant with the present power bills for the City pumping.

A true comparison should include interest and depreciation on the additional expenditures, increased labor costs, increased maintenance and repair costs and cost of standby electric power service. It should also recognize the unfavorable operating conditions inherent in a discontinuous load and severe climatic conditions. A larger engine than proposed should be used. Estimates of fuel consumption should not be based upon a proposed test run but should be based upon actual unfavorable operating conditions which would also unfavorably effect the life of the machinery and the cost of overhauling and repairs. The remoteness of Anchorage from the manufacturing centers is a disadvantage in securing replacements and repairs.

It should be recognized that in the future, operating costs of a Diesel Engine may prove greater than would be shown by an analysis based upon present conditions because of probable rising costs of fuel oil, engine repairs, and parts and even labor. The price of electric power is guaranteed against a rise for a considerable period under existing contracts and the trend of power

costs has been downward for many years.

The present costs of electric pumping for the city water supply may be materially lowered by making the pumping plant automatic at some increased cost.

RECOMMENDATIONS

To meet the threatened competition and loss of business it is recommended that the Anchorage Light & Power co., having a surplus generating capacity at present, propose to the City of Anchorage a new contract based upon pumping an aggregate water supply averaging 500,000 gallons per day or say 182,500,000 gallons per year at a flat cost of $900 per month including energy cost and all labor required to deliver water into the city's storage tank. If the annual amount of water pumped exceeds the basic figure, then an adjustment should be made at the end of the year prorating the total annual cost.

Arguments in favor of such a proposal would be:

(a) A substantial reduction to the city in the cost of its water supply, the credit for which could be allowed to those who started the agitation for the Diesel plant.

(b) Removal for the city of the uncertainties inherent in estimates of future operating costs of a Diesel Engine plant due to rising costs and the cumulative effect of unfavorable operating conditions.

(c) Removal of the uncertainty of the indeterminate costs of the proposed Diesel Engine installed.

(d) Greater certainty, reliability and simplicity inherent in electric machinery as compared to Diesel Engines.

(e) Availability of funds which might be used to pay the cost of the proposed Diesel pumping plant for other City purposes.

(f) Protection of the large local interests of the Power Company.

(g) Removal of a substantial threat to the power company's income which might cripple its ability to make further extensions desirable for this community.

(h) As the proposed Diesel Plant offers no probability of any financial saving and no guarantee that it will not cost materially more, the electric plant should be greatly preferred because of its increased simplicity and reliability and decreased depreciation costs.

Very respectfully submitted,

Fred H. Tibbetts

Chief Engineer,
ANCHORAGE LIGHT & POWER COMPANY

A P P E N D I X

PERTINENT INFORMATION RECEIVED FROM ALASKA

ANCHORAGE LIGHT & POWER CO., INC.

By R. S. Bragaw

Sept. 21, 1933

At present they are using a 75 H. P. motor, 6" suction, 5" discharge, 210 foot pumping head, normally rated at 750 gallons per minute. We have obtained figures from the city showing the average gallons of water pumped per month for the past 14 months be to 15,000,000 gallons with an average cost to the city of approximately $1,200.00 per month.

ANCHORAGE LIGHT AND POWER CO., INC.

Anchorage, Alaska

R. P. Bragaw, Secretary

October 31, 1933

SUBJECT: Study of Anchorage Pumping Plant

1. The landed cost of fuel oil specified for use of Diesel engine will be 12¢ per gallon f. o. b. storage tank.

2. Present capacity of water storage tank: 100,000 gallons. It is necessary to start the pumps about every 2 hours, or when the water is down to about 50,000 gallons.

3. Type of Diesel engine on which city council have received bids:

70 HP, Model 32, D14 - 1 cylinder Fairbanks-Morse-
300 revolutions per minute-
Bore & stock 14 x 17-
Length 10'9",
Width 8',
Head room 16'5",
Net weight 21,000 pounds,
Price, f.o.b. Seattle, $4,996.00

4. Guarantee of duty upon test: Consumption of approved fuel oil; full load, 42 pounds per brake H. P. per hour, half load 49 pounds per brake HP per hour; 3/4 load 44 pounds per brake HP per hour. These rates are subject to a tolerance of 3% and are based on operation at altitude up to 2,000 feet above sea level.

4.(cont'd.)Standard temperature 68 degrees Farh. and on a heating value of fuel of not less than 19,000 high value BTU per pound.

5. Installation cost: Fairbanks-Morse agreed to supply a supervisor of installation from Seattle with expenses paid and rate of pay $10.00 per 8 hours. Any delay caused by city rate will still apply.

6. Railroad fuel oil tank car capacity 6,500 gallons.

7. Storage tank capacity necessary for fuel oil? We believe 10,000 gallons necessary. Cost of such tank?

8. The distance from railroad track to pumping plant about 1300 feet.

9. Fuel oil will have to be pumped from railroad to storage tank.

10. No pump is furnished with engine under bid of Fairbanks-Morse and present plant will be kept intact as stand-by- pump.

11. Diesel engine specification cost for 4 gallons oil consumption per running hour. 1 gallon lubricating oil at 65¢ per gallon for each 28 hours running time.

12. V belt type of drive specified from engine to pump.

13. Present rate of electric energy now supplying city under contract with A. L. & P. Co., 4¢ per KWH.

14. Under present system it is necessary to heat water in sump. This is done by operating a boiler, during cold weather months, and running live steam into the sump water. A rise of about 3 degrees in temperature is the result. Coal consumption under present method about 150 tons at $6.00 per ton.

15. Our present revenue from City for pumping water will average about $750.00 per month.

16. The average temperature where the pipe line and storage tank will be located ranges from zero to 20 below with an extreme temperature of about 38 degrees below.

The present pumping plant building will have to be enlarged to take care of the Diesel plant; a cement foundation placed for the engine; and the addition will be about 15' x 20'. This will be lumber construction and insulated for cold weather.

It will be necessary to transport approximately 15 tons of freight from the railroad tracks to the pumping plant site. A chain hoist, tools and erecting equipment will also have to be transported to the plant site.

It will be necessary to devise means of heating the oil before running through pipe line to the storage tank.

PROPOSAL OF FAIRBANKS-MORSE CO.,

Anchorage Alaska
October 28, 1933

Memorandum Relative to Proposed Installation of Diesel Power for Pumping Plant for City of Anchorage

Cost of Proposed Diesel Plant

Proposal of Fairbanks, Morse & Co. covers the furnishing of 1 Diesel Engine Unit, together with suitable equipment for connection to present Pump, as specified therein, for a total price, f. o. b. dock at Seattle, of $4,996.00

Additional Costs

Freight, Seattle to Anchorage, 26,000 lbs. (approx.) @ 25.00 per ton, ...	325.00
Cost of Installation, estimated at	2,000.00
Cost of suitable storage tank and pipe line from Railroad to Pumping Plant, estimated at	2,000.00
Total Estimated Cost, based on proposal submitted,	$ 9,321.00

Cost of Operation of Above Plant, based on guaranteed performance. (as set forth in proposal of Fairbanks, M. & Co.)

Per Month: Fuel Oil, 1200 gal. @ 8¢	96.00
Lubricating Oil, 11 gal. @65¢	7.15
Labor Cost, estimated at	350.00
Total Operating Cost of Proposed Installation, per month,	453.15

Cost of Operation of Present Plant, based on average costs for period April 1 to September 30, 1933, as shown by City records:

Electric Energy, per month,	801.33
Labor,	300.00
Total Operating Cost under present installation, monthly,	$ 1,101.33

Saving to be Effected under proposed Installation, per month:

Present Operating Cost, as above,	1,101.33
Proposed " " " "	453.15
Net Saving, per month.....;	$ 648.18

Remarks

The above Operating Costs are based upon an average pumping time of 300 hours per month, which is slightly more than the average monthly time for the six months ended September 30, 1933.


CITY
PUMP STATION