

The Proceedings of the Louisiana Engineering Society

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DOUGLAS ANDERSON, Editor.

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PRESIDENT OLE K. OLSEN

PROCEEDINGS OF THE LOUISIANA ENGINEERING SOCIETY

VOL. V

FEBRUARY, 1919

No. 1

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EDITORIAL NOTES AND COMMENT

Our New President. Mr. Ole K. Olsen was elected President of the Society at the last annual meeting. Mr. Olsen was born in Copenhagen, Denmark, in 1877, and received his early education and training in the schools of his native city. He is a graduate of the Polytechnical Academy of the same city, and since his graduation has been actively employed in the practice of engineering.

Mr. Olsen came to New Orleans in 1902 and began the practice of his profession in the employ of Mr. L. W. Brown, consult-

ing engineer. Mr. Brown was also consulting engineer for the Lone Star and Crescent Oil Company, and Mr. Olsen acted as assistant engineer for the same company. He was associated with Mr. Brown for about two years and then went into consulting engineering on his own account.

In 1906 and 1907 he began to change over into the machinery and building supply end of engineering, and gradually dropped the consulting engineering work. From this the business developed into the specialty of reinforced steel and concrete, for which Mr. Olsen is now so well known throughout this part of the country.

Mr. Olsen became a member of this Society in 1905 and has always been one of its most efficient and active workers. He has been at different times a Director, Treasurer and Vice-President of the organization. He has done excellent work in promoting the various activities of the Society in these offices and as a member of numerous special committees. It is very gratifying, therefore, to his fellow-members to have him elected to the Presidency, and we may look forward to a year of great activity and prosperity under his able direction of the affairs of the Society.

The Smoker. This annual function was pulled off this year under the guidance of one of our younger members, and it gives us great pleasure to testify here and forthwith that Mr. Walter B. Moses is some *impresario*. We always knew that he had the unusual ability of being able to sell a second-hand boiler to a man who had not quite made up his mind whether he wanted a hoisting engine or a centrifugal pump, so that it was no surprise to us when we walked into the Cosmopolitan on the evening of January 11th and saw the charming preparations which had been made for our entertainment, nor later on when we had evidence of his taste in the selection of the entertainers for the evening.

The four-page cover to the menu done in blue-print style was quite a clever cartooning of the various engineering enterprises of this community which were either in progress or in trouble. The menu itself was far better than the descriptive phrases under

each course would have led one to believe, and there was beer. Furthermore, the Cosmopolitan bar was not very far away.

The irrepressible Jimmie Robert was the "generalissimo" of the feast, whatever that may mean, and he did himself and the Society proud. Mr. Klorer, the retiring President, delivered the annual address, and those of you who were not fortunate enough to hear it then should read it carefully, for there is much in it to set us thinking concerning the present and future status of the engineer. We received a few cheerful and graceful words of greeting from the President-elect, Mr. Ole K. Olsen, the remainder of the intellectual program being shared by our invited guests, by Mr. Kokosky and by the professional entertainers, not forgetting the "Original Columbia and Victor Jazz Band."

Prominent among the invited guests were President A. B. Dinwiddie of Tulane University, Mr. Howard Eggleston of the Association of Commerce, Major Hoover and Captain Thompson of the Quartermaster Corps, U. S. A., and others.

Our Service Flag. Since the last issue of the journal the addition of one more name to our list of men in the military service brings the total to fifty-seven, this out of an enrollment of two hundred and forty-six. Out of these fifty-seven our flag now bears three gold stars emblematic of the brave men who have been called upon to make the supreme sacrifice for the honor of their country. They are Captain Arthur A. Diettel, killed at Camp Beauregard, August 6, 1918; First Lieutenant Robert W. Nolte, killed in action in France, October 9, 1918; and Sergeant David W. Weidman, killed in action in France, October 18, 1918.

In doing honor to these men the Society honors itself. We would accordingly offer this suggestion, first with reference to the three men who lost their lives—that their respective families be requested to furnish the Society with good and recent photographs of them, and that these photographs be framed in one frame and hung beneath the service flag, which should be displayed in a conspicuous position in our rooms. A permanent record should also be kept of all our members who were in either branch of the service, with their rank and the particular division to which each was assigned. In line with this second suggestion we would like to request each man who reads this to call the

matter to the attention of any of his friends who may have been in the service.

At the last meeting of the Society we had the pleasure of having a word from Major W. B. Gregory, who has just recently returned from France.

Lieutenants Stem and O'Brien are also with us again, and the daily press announces that Lieutenant Gwinn of the Aviation Corps has arrived in New York from overseas.

Captain Samuel Young, who was located during most of his service period at Camp Humphrey in Virginia is now associated with Mr. J. Frank Coleman of the Chickasaw Shipbuilding Company at Mobile, Alabama.

A High Honor for Dr. J. A. L. Waddell. The many friends of Dr. Waddell in this city and community and in our Society will be pleased to read something of the details of the great honor recently bestowed upon him in his election as a Corresponding Member of the *Académie des Sciences* of the *Institut de France*.

The *Académie des Sciences* is the principal one of the five academies which make up the *Institut de France*, and its membership is restricted to sixty-six regular members, all of whom must be citizens of France, and one hundred and sixteen corresponding members from all parts of the scientific world. The *Académie* is divided into two groups, the Mathematical Sciences and the Physical Sciences. The former of these consists of five sub-sections, Geometry, Mechanics, Astronomy, Geography and Navigation and General Physics; the latter into six sub-sections, Chemistry, Mineralogy, Botany, Rural Economy, Anatomy and Zoölogy, and Medicine and Surgery. Of these sub-sections Astronomy is allowed sixteen corresponding members, while each of the remaining ten is allowed ten such members. This excellent arrangement prevents an undue preponderance of members devoted to some single specialty or branch of science, while at the same time no new member may be elected until there is a vacancy in the special branch of science in which he has won his reputation.

For a year past there has been a vacancy in the list of corresponding members in the section of Mechanics, owing to the death of General Zaboudski of Russia, and Dr. Waddell was elected to

fill this vacancy. His selection was based upon the value to practical science of his numerous books, papers and addresses on the theory and practice of engineering, as well as upon his contributions to the development of technical education.

During its one hundred and twenty-three years of existence the *Académie des Sciences* has chosen from the United States only nineteen corresponding members, Dr. Waddell being the nineteenth. Two other members in this country are still living. Dr. George Ellery Hale of Washington, D. C., and Dr. William Morris Davis of Cambridge, Massachusetts. Asa Gray the American botanist, Professor Langley of the Smithsonian Institution and the pioneer of aeronautics in this country, Simon Newcomb, the astronomer, Count Rumford, and Henry A. Rowland, the physicist, were some of the more representative American scientists who have been corresponding members in the past.

Mr. Hogg's Paper on the Railways Situation. It had been the original intention to print advance copies of this paper and send them to the members in order to have one meeting devoted to a general discussion of this very important subject. Owing to delays in securing cuts and other material it has been decided to print it in the regular issue for this month and devote the March meeting to its discussion. Members will please bear this in mind and come prepared to discuss the paper in any of its various details or to discuss the problem in some of its phases which may not have been touched upon in Mr. Hogg's treatment of the subject.

To Engineers Returning from Service. The *Engineering World*, published in Chicago, desires us to call to the notice of our members their offer to engineers who have been in the service of our country and who are seeking employment. The *Engineering World* will give free of charge to any such engineer space in their Want Columns amounting to 30 or 40 words for the insertion of an advertisement of a position wanted. A small star will be placed at the beginning of each such Ad.

A New Trade Bulletin. A. M. Lockett & Co. have just issued a new and completely revised edition of their bulletin on

Oil Burning Apparatus, to which we have been requested to call the attention of the engineering fraternity. The bulletin is well gotten up and is illustrated with line drawings and photographic cuts. Engineers and others interested in the subject may obtain copies of the pamphlet by applying for Bulletin A. M. L. No. 103.

Salvage. The following appeal from the New Orleans Chapter of the American Red Cross is at their request published here in order to call the attention of our members to the very important matter of salvage:

"So urgent is the need for the reclamation of material of all kinds on account of the scarcity of raw materials caused by the war, and so necessary will it be for several years to come, that the salvage work of the Red Cross in New Orleans will be carried on indefinitely. The reclamation of waste materials is just as essential as a peace necessity as it was a war measure and the membership of your organization is in position to aid the Red Cross by merely carrying out the suggestion we offer below.

"We are not asking for cash donations. We want clothes—the suits your members put in the discard pile. The Salvage Department of the New Orleans Chapter, through its Red Cross Shop, is in position to sell clothing and everything of a salvable character. Your members can help us in this work by giving us say one suit of clothes in every twelve months. Ties, collars and wearing apparel in general will be accepted by the Red Cross.

"The Salvage Department is located at 617 Baronne street. Ask your members to deliver their bundles to that address. If the package is too large, tell them to phone Main 3644 and the Red Cross truck will call.

"The slogan in our campaign of reclamations is, 'Don't Waste Waste, Save It.' We not only salvage clothing, but everything else, but the most important materials to reclaim are the following:

"Paper, steel, copper, wool, iron, brass, cotton, zinc, aluminum, rubber, babbit metal, tinfoil, lead, tin and leather.

"Ask your members to bring this to the attention of their families. We need the co-operation of every woman and child in New Orleans in our effort to aid in the great conservation work advocated by the War Industries Board. With yours and their help, our campaign will be a success.

"Anticipating your favorable consideration of the above by hearty co-operation, we desire to express our warm and sincere appreciation. We beg to remain,

"Yours very truly,

SALVAGE DEPARTMENT,

"N. O. Chapter, A .R. C."



OUR ROLL OF HONOR

CAPTAIN ARTHUR A. DIETTEL, Killed at Camp Beauregard, August 6, 1918.

FIRST LIEUTENANT ROBERT W. NOLTE, Killed in action in France, October 9, 1918.

SERGEANT DAVID W. WEIDMAN, Killed in action in France, October 18, 1918.

APPLEBY, JOHN, JR.	JOUBERT, C. E.
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BATE, H. HESTER	KIRSCHNER, CHARLES
BERNARD, MERRILL	LEWIS, J. H.
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GREGORY, WM. B.	TURNER, FRANK
GREHAN, B. H.	WEISS, LEON C.
GUILLOT, A. H.	WHITE, THOMAS
GWINN, J. M., JR.	WILD, A. J., JR.
HAWKINS, EUGENE C.	WILSON, MAYBIN H.
HAYNE, H. M.	WILSON, VENNARD
HORNOT, E. M.	WOLFF, ALLAN L.
HOTARD, N. A.	WYLER, CHARLES J.
JOACHIM, J. W.	YOUNG, SAMUEL

OBITUARY

Charles William Bocage, a non-resident member of the Society, died at his home in Houma, Louisiana, August 16, 1918. He was born in Pine Bluff, Arkansas, October 19, 1862, his father being one of the oldest settlers and best known men of that part of Arkansas.

He received his early education in the schools of his native town and afterward became a student of engineering at the Rensselaer Polytechnic Institute, Troy, New York. He began practical work at the early age of seventeen and when he was nineteen years of age, he was Resident Engineer of Construction for the Cotton Belt Railroad in Arkansas. For a number of years succeeding this he was employed in Government work, in a survey of the Arkansas River, and various other projects in Illinois, Kansas and other states. In 1888 and 1889 Mr. Bocage was City Engineer of Pine Bluff. He was forced by circumstances to give up his engineering work and undertake the operation and management of a sugar plantation in Louisiana, in which line of work he was engaged until 1905. Again taking up the practice of his profession he became the Parish Surveyor of Terrebonne, and it is said that he surveyed practically every sugar plantation in the parish.

He was surveyor of the oyster beds for the Conservation Commission for eight years and thereby acquired a thorough and valuable knowledge of the coast. Mr. Bocage was a finished draftsman and was specially interested in map making, leaving among his effects at the time of his death many valuable maps and records, among them a complete official map of Terrebonne Parish.

Mr. Bocage joined the Louisiana Engineering Society in 1909 and remained a member until his death. A man of genial disposition and an efficient engineer, he leaves behind a host of friends among the people of Southern Louisiana, whom he served so well.

Lieutenant Robert Walker Nolte, resident member of the Society, was killed in France by enemy shell-fire on October 9, 1918. Lieutenant Nolte was born in Bolivar, Tenn., October 1,

1892. He was a great-grandson of General Rufus Polk Neely of Civil War fame. He received his early education at Ferrell's Military Academy in this city and was for a time a student in the College of Technology of Tulane University. He went from Tulane to the A. & M. College of Texas, from which he graduated in 1913, having specialized in Electrical Engineering. His first position was with the Electrical Construction Department of the Panama Canal and he superintended the electrical machinery when the first ship was locked through the Miraflores Lock. He subsequently engaged in electrical work in Dallas, Texas, and was Assistant Engineer for the Terminal Company, being supervising engineer of the docks at Port Chalmette. At the time that this country declared war he was in the employ of the A. & V. Railroad at Vicksburg, Mississippi. On March 5th, 1917, he received a second lieutenant's commission in the Engineer Corps of the U. S. Army and in the following May entered the Officers' Training Camp at Fort Logan H. Roots. From Fort Logan H. Roots he was assigned to the Seventh Engineers, regular army, at Fort Leavenworth, and soon received his promotion to a First Lieutenant.

Lieutenant Nolte was ordered to France in February, 1918, and upon arrival there was assigned to certain work on the "All American Road" which was built from St. Nazaire to Tours. Upon the completion of this he was sent to an Engineer Training School and the latter part of July he was ordered to report to the Second Engineers, known as Pershing's Veteran Engineers. It was said that every officer in this regiment was a seasoned soldier and fighter with the exception of Lieutenant Nolte and one other man. From the time he joined this regiment until his death he was in practically every one of the offensives in which the regiment engaged. Some extracts from a letter of his Colonel to a friend of the Nolte family indicate the esteem in which he was held:

"Lieut. Nolte came to the Second Engineers about August 1st, and at once showed special ability. . . .

"He fought with us through the battle of St. Mihiel and did very well. We next went into the Blanc Mont battle. This time we were fighting with the French about thirty miles north of Chalons, at a place called

Somme-Py. The battle here lasted ten days. For eight days the Second Engineers was in Division Reserve and at work on the roads. On the ninth day we were rushed into the line to fill a gap through which the Germans were slipping and attacking the rest of our line in the back. Lieut. Nolte's platoon was one of those put into the line, this on the evening of October 8th. The next morning he was struck by a shell fragment and taken to the Hospital. The next day I sent the Regimental Surgeon to the Hospital to look especially after him and another lieutenant who had also been killed. He returned next day and told me that both of them had died in spite of every care at the Hospital.

"He was very efficient, a noble and manly young officer, and especially commended by his battalion and company commanders.

"Please tell the parents of Lieut. Nolte that their son was beloved by his men who followed him anywhere, brave even to a fault, and especially efficient in his work. His death was a loss to the regiment, a great loss to us personally, and a great loss to our efficiency."

Lieutenant Nolte is survived by his mother, Mrs. Arthur Nolte of this city. His father, the well-known physician, died on October 23, at which time, however, he did not know of his son's death.

Lieutenant Nolte became a resident member of the Louisiana Engineering Society in 1917. He was a young man of very pleasing personality and genial disposition, and was regarded by his superiors and associates as an engineer of excellent ability.

David W. Weidman, junior member of the Society, was killed in action in France, October 18, 1918. He was born in McDonoghville, La., May 27th, 1895, and received his early education at McDonogh No. 26 and at the Jefferson High School. After graduation from High School he entered Tulane University, graduating from the Civil Engineering Course in June, 1917. Some few months after graduation he tried to enlist in the army but was rejected for some minor physical defect. In spite of this, however, he wrote directly to Washington, explaining that

he was a civil engineer and that he felt convinced that his services would be needed by the Government. Upon authority from the War Department he stood the examination a second time and was accepted. After spending a short while in training camp at San Antonio he was ordered to Washington, D. C., and from there was ordered to France. He arrived in France December 24, 1917. He was Sergeant of Company A of the Sixth Engineers at the time of his death.

Mr. Weidman joined the Louisiana Engineering Society in 1917 when he enrolled as a student member, being afterward transferred to the grade of junior member. As this account of him indicates, he had hardly started upon the practice of his profession before he answered the call of his country and made the supreme sacrifice upon the battlefields of France. He is survived by his father, Walter W. Weidman, his mother and one sister.

Gail H. Browne, non-resident member of the Society, died in New York, December 7, 1918. Mr. Browne received his early training and experience in the East and Middle West, where he was employed by various firms in the capacities of instrument man and mechanical and architectural draftsman. At the time of his death he was a member of the organization of Ford, Bacon & Davis, having been associated with them since 1905. Under their direction he had charge of the design and construction of the Memphis Street Railway power plant and of the Pine Bluff power plant for railway, electric light and water service. He was also employed upon an important report on the Chicago City Railways. In the local office of Ford, Bacon & Davis he was the chief designing engineer. In this capacity he gave special attention to the design and construction of the Grain Elevator. At the time of his death Mr. Browne was connected with the New York office of the firm in the capacity of chief designing engineer in charge of the drafting department.

Mr. Browne was an accomplished musician and was for a number of years choirmaster at Trinity Episcopal Church in this city. He became a member of the Louisiana Engineering Society in 1915 and retained his membership until the time of his

death. He was held in high esteem by his friends and associates, and Mr. George H. Davis, in speaking of his death, said: "We have sustained a very great loss. Mr. Browne was one of the important members of our organization and one upon whom we relied very thoroughly."

A. Harold Delbert, junior member of the Society, died in New Orleans, January 6, 1919. Mr. Delbert was born in this city in 1891 and received his early training at Rugby Academy. After graduation from there he entered Tulane University, graduating from the Mechanical and Electrical Engineering Course in 1914. His father, A. F. Delbert, being a prominent consulting engineer in the cane-sugar industry, young Delbert naturally went in for that line of work. He studied practical sugar making at the Audubon Sugar School, going from there as sugar chemist for the Meeker Sugar Refining Co. at Meeker, La. He gained experience in other lines of engineering by working for a time with the United States Engineers and with the Orleans Levee Board. Going back again to the sugar work he went to Cuba, where he was employed part of the time at Central Fe, a mill belonging to the J. G. White Corporation, and a part of the time with the Cuban-American Sugar Co. of New York on their Central Delicias plant.

On his return from Cuba last September Mr. Delbert joined the U. S. Navy and qualified for the Steam Engineering School at Stevens Institute. While undergoing the routine period of quarantine at the Algiers Naval Station preparatory to going to Stevens, the armistice was signed, and he applied for his discharge in order to proceed at once to Cuba for the 1919 season. He was placed upon the inactive list in order to take up his work, but he contracted a case of the prevailing influenza and died just a few days before the date set for his departure.

He was greatly interested in the gasoline engine and became quite a practical expert with both the boat and automobile types. He was fond of reading technical literature and kept up his studies after leaving college. He became a student member of the Louisiana Engineering Society in 1913, being transferred to junior membership in 1915.

Henry Lockett Hutson, resident member of the Society, died in New Orleans January 10, 1919. He was born at Americus, Ga., on December 30, 1876. He was the son of Charles Woodward Hutson and his wife, Mary Jane Lockett. His father was a college professor, occupying chairs in various Southern colleges, including the University of Mississippi at Oxford, and the A. & M. College of Texas at Bryan.

Henry L. Hutson received his preliminary education in the public and private schools where his family resided, and his college training at the A. & M. College of Texas, where he was graduated in the Mechanical Engineering Course in 1896, one of the first three in his class. He exhibited unusual talent for mechanical work in his early childhood and was a great student of engineering subjects up to the time of his death.

In 1898 he volunteered as a private in the First Regiment of the U. S. Volunteer Infantry, commanded by Colonel Riche. In 1898, after being mustered out, he entered the employ of Henry R. Worthington at the Brooklyn shops as a student apprentice and received the usual thorough training in practical hydraulic engineering given by the Worthington Company. In 1901 he entered the employ of A. M. Lockett Co., Ltd., of New Orleans, as mechanical engineer.

By reason of his ability and great loyalty to the interests of the Lockett Company he was promoted to the position of chief engineer.

In addition to his engineering skill he possessed unusual talent in business management, and together with his position of chief engineer he was the sales manager and secretary of the Lockett Company. He supervised the designing and construction of perhaps a greater number of low-lift centrifugal pumping plants of large capacity than any other one engineer in this country. By reason of this broad experience he was regarded as an authority on this class of engineering by other engineers in the Southwest.

In 1911 he married Virginia Watkins, daughter of Dr. Benjamin F. Watkins of Alabama, and is survived by her and a young son, Benjamin Watkins Hutson.

At the time of his death Henry L. Hutson was Chairman of the New Orleans section of the American Society of Mechanical

cal Engineers. He became a member of the Louisiana Engineering Society in 1911 and has always taken a very active and prominent part in its affairs. At the time of his death he was a member of the Board of Direction and Chairman of the Committee on Technical Papers.

Mr. Hutson was a man of the highest ideals both personally and professionally and he stood for these ideals in all his business dealings. Possessed of a keen intellect he took great interest in the scientific side of his engineering work and had many original ideas connected with the various problems he was called upon to handle. Major A. M. Shaw in a letter to the Society concerning the death of Mr. Hutson has this to say, a fine tribute to his high character:

"In the ten years that I have known Mr. Hutson, and this acquaintance was not only professional but also thru social and business relations, I do not recall a single direct reference which he has ever made to professional ethics, yet I do not know of an engineer (either among those connected with commercial projects or those engaged strictly in professional lines) who has been more aggressively and effectively active in raising the standards of the profession."

"Especially in view of the fact that we have usually looked to the engineers who are detached so far as practicable from commercialism to promote the ethical side of the profession, I feel that the example of such an engineer, who has been actively engaged in commercial projects during the most of his life, should serve as a valuable contribution to the efforts being made by our best men to raise our standards to a higher plane."

Cyrus T. Rayner, Jr., resident member of the Society, died at his home in New Orleans, January 20, 1919. Though born in New York in 1880, he came to this city in his infancy and was educated in the public schools here. He received his professional education at Tulane University, graduating in the Class of 1902. The greater portion of Mr. Rayner's professional practice was in connection with the problem of the Mississippi River control, first with the U. S. Engineers and later with the New Orleans Levee Board, with which he has

been connected for the past seven years. He was for four years Assistant Engineer of the Board, and three years ago he was promoted to be Chief Engineer, which position he held at the time of his death.

Mr. Rayner was a man of genial disposition and was very popular with his associates. He was a member of the Elks and of the Chess, Checkers and Whist Club. He became a member of the Louisiana Engineering Society in 1909. He is survived by his mother, Mrs. Cyrus T. Rayner, and three brothers, one of whom lives in New York, the other two being residents of this city.

PAPERS AND DISCUSSIONS

ADDRESS OF THE RETIRING PRESIDENT

JOHN KLOSER.

Delivered at the Annual Meeting, January 11, 1919.

On the occasion of our annual smoker the retiring President of this Society has an unquestioned advantage in the sense that he has a long-standing advance notice that he will be called on for an address. On the other hand, the elimination of the element of surprise—as our military friends would term it—is more than offset by your expectation of a creditable oratorical performance. The twenty previous occasions of this kind in the life of the Society have given the opportunity to twenty different retiring Presidents to address you in a manner befitting the occasion, and I find myself tonight very much in the fix of the Fourth of July orator who is expected to say something new and original on “the day we celebrate.”

I had contemplated giving tonight by way of variation a discourse on the subject of the “Resistance to Flow of Liquids Through Small Pipes,” and casually happened to mention some of the conclusions I had reached from my investigations to a certain well-known Scandinavian authority, and member of this Society, when I was surprised to learn that he held most positive opinions of his own on the subject, and was prepared to prove by personal demonstration—if necessary—here tonight, that my values for the co-efficient of friction were ridiculously low in the instance of amber-colored liquids from Milwaukee flowing through pipes the size of the human throat. I was so impressed by the vehemence of his assertions that I thought it best not to do anything that would precipitate a heated discussion that might possibly mar the joyfulness that should prevail at our gathering.

The occasion we celebrate tonight is of more significance than the usual annual celebration, inasmuch as it marks the passing of our Society from the period of youth to the period of full-fledged manhood. It is one of those occasions which, when they occur in the life of an individual, or the life of an

organization, or the life of a business, suggests itself as a proper and opportune time to "take stock" or make an inventory. I shall not go into any extended statement of that character, but content myself with giving you a very brief summary of what the Louisiana Engineering Society is tonight:

(a) We are 246 men engaged in various lines of engineering work and in allied branches; all banded together with the expressed purpose, as stated in our Constitution, for our mutual professional improvement and for the advancement of engineering.

(b) We have a library of 1,000 volumes with an annual allotment of \$480.00 to be expended in additional books and periodicals.

(c) We have a journal of our own which serves the individual members with a permanent record of our proceedings, month by month, and which is almost self-sustaining.

(d) We have at this date a cash balance of \$1,600.00 on hand, with \$1,500.00 additional invested in interest-bearing deposits and Liberty bonds.

The foregoing statement constitutes what may be termed the valuation of our physical assets: and while numerical strength and a fair degree of financial independence, such as we enjoy; are assuring conditions to any society, may we not properly ask ourselves whether or not in making progress along these lines we may be failing to accomplish all that we should accomplish for our mutual professional improvement?

The times are changing, and ideas are changing, and that idea that once prevailed that the purpose of an engineering society was limited to the receiving and discussing of technical papers with an outing or social feature occasionally to promote better acquaintanceship among the members, is giving way to the belief that the larger purpose of a society like this should be to promote the individual welfare of the members of the society.

In recent years the complaint that engineers have not been getting sufficient recognition has been heard from one end of the country to the other. It has been the dominant note in nearly every address made to engineers on the status of the profession. But the plea for recognition was not so much a

plea for recognition as it was father to the thought that adequate compensation would follow as a result of greater recognition. Insofar as compensation is concerned, the engineers have long been classed with the teachers and the clergy.

The recognition of the engineer has now come. The world war in less than six months educated the general public to the value of his services more thoroughly than the efforts of all the engineering societies could have done in a score of years. Whether the immediate problem was to build a cantonment city in less than record time, or to follow up the front line of battle with the transportation and communication facilities, or to speed up the production output with a decreased labor supply—it was always the engineer that was appealed to, in the extremity, for the solution, and who in almost every case made good.

And now after demonstrating in hundreds of ways the value of his services, what has been the material reward accorded him? I ask you has adequate compensation followed unquestioned recognition? It most assuredly has not. The twenty per cent or twenty-five per cent, and in rare instances, fifty per cent increase in pay given to salaried engineers during the past two years have not even compensated for the shrinkage in the purchasing value of the dollar. We have now in this country a "Mexican dollar" as measured by the commodities or necessities of life received in exchange for it, but employers of engineering service seem to think of it as the same old dollar we used to have seven or eight years ago.

I was much impressed quite recently in reading two "help wanted" advertisements in our morning paper, that were placed so near to each other that you could not have seen the one without noticing the other. The first told of an opportunity open to a civil engineer, preferably a college graduate, for four or five months' employment at \$150.00 per month. The second was addressed to unemployed barbers, announcing a position that guaranteed a minimum salary of \$40.00 per week. I thought at the time of the humiliation that must have come to the engineer applicant when reading these advertisements, as he realized that his four years' college course at Tulane, or other university,

had not made him superior in earning capacity to a graduate of a four weeks' course in Moler College.

I am conscious of the fact that the tone of commercialism of these remarks is disconcerting to some of the older and dignified members of the Society, who are so firmly entrenched behind the bulwarks of a lucrative consulting practice that they are out of touch with the struggling novices. But it must be recognized that the large percentage of our membership is composed of young men in salaried positions, and these young engineers of today will become the older engineers of tomorrow. It behooves us for the good of the profession to see that these young men are given adequate compensation to permit them to develop into polished, cultivated, representatives of the profession. They cannot become such if the salaries paid them are a mere living wage.

As an indication of the spirit of protest that is trying to express itself, let me cite you the fact that in this city a few months ago there was organized a Local Draftsmen Union with a membership of fifty, and which will become affiliated with the Central Trades and Labor Council. There is food for thought in this. The draftsman is usually an embryo engineer. Many a technical graduate just out of college, with the necessity of our membership are men presently engaged as draftsmen, position as the first step in his career: and many a mature and experienced engineer returns to the drafting room after he discovers that his greater talents lie in translating the undimensioned ideas of the designer into the intricate detailed drawings for the constructor. I dare say that at least fifteen per cent of our membership are men presently engaged as draftsmen, and possibly thirty-five or forty per cent are men who at some time or another of their career were engaged as draftsmen. Is it not a reflection on us as an Engineering Society that these men, who are such an important part of what we may term the engineering fraternity, should be obliged to adopt trades union methods in order to receive proper remuneration? And as it is with the draftsmen, so is it with a great number of the salaried engineers. The average engineer, young or old, feels a pride in his calling. He wants to be known as a professional man, and there is a certain repugnance or distaste in his make-up to

the idea of joining a union and resorting to union methods. Yet, unless some organization, some society, makes itself heard in his behalf by force of numbers, he will have to be satisfied with what he gets rather than with what he deserves to get.

Does not the present situation then warrant this Society—and all other engineering societies, for that matter—giving their most earnest thought and endeavor to promoting the individual welfare of such of its members as are not receiving just and adequate compensation and who probably are confronted with the temptation of abandoning their chosen vocation for other work? I must confess that I am not prepared to submit any well-thought-out plan as to how the much-desired result may be obtained, but I have a suggestion to offer which may be a step in the right direction. I believe that this Society should appoint a Committee on Salaries and Employment, made up of five or six influential members who are themselves employers of engineers, to determine a proper scale of salaries based on present living conditions and commensurate with the varying duties and responsibilities, and to whom any underpaid member may take his case and discuss it with them. If it is a meritorious case this committee should call on the employer and be prepared to show him that the salary being paid is not a fair remuneration for the duties performed and does not relatively compare with salaries paid in other less essential callings. I believe that if the employer is informed that this method of procedure is adopted by Louisiana Engineers in preference to trades union methods, his sympathetic attitude will be gained and results obtained in a quiet and dignified way and in a way that will relieve the underpaid man of the embarrassing position of sounding his own praises or trying to show that he is worth more money than he is receiving.

The personnel of such a committee must necessarily be men of judgment, and men of tact, and also possessors of a certain amount of altruism, but I do not believe there will be any great difficulty finding among the members of this Society a sufficient number of men answering to these requirements. Their work would be for the uplift of their own profession, and their reward, the gratitude of their fellow-workers to whom they had lent a helping hand. This suggestion is offered for what it

is worth toward ameliorating what I consider the most discouraging condition that faces the engineers of today, and to the correction of which the new administration can well dedicate some of its efforts.

I must not let this occasion pass without assuring you of the deep appreciation I feel for the honor of having been your President the past year. Nor must I fail to express my heartfelt thanks to the officers and committee members of the outgoing administration, and last, but not least, to the editor of our Journal for the conscientious and faithful services rendered by him, notwithstanding greatly increased personal duties.

As you know, the past year was a very trying year for all engineering societies, and ours was no exception to the rule. Out of a membership of two hundred and forty-six, fifty-seven answered our country's call, and some of these were our most active and earnest workers. Let us not forget that three of these fifty-seven never shall return. Bursting shrapnel sang their sudden requiem. The others, let us hope, will soon be coming back, and I am looking forward with pleasure to their return: to listen to their experiences; to be impressed by the recitals of their death-dealing occupations; to be regaled by their stories of their jolly adventures—both true and untrue; and to be the object of the disdainful pity they will show us who were obliged to remain behind.

SUGGESTED CHANGES IN THE OPERATION OF THE STREET RAILWAY SYSTEM OF NEW ORLEANS.

By W. T. HOGG,

Read Before the Society December 9, 1918.

At the close of a great world war chief among the reconstruction problems facing the people of New Orleans is the rehabilitation of a crippled street railway service.

The gas, electric and street railway service of New Orleans is owned and operated by the New Orleans Railway and Light Company, a subsidiary of the American Cities Company, which in turn is controlled by the United Gas and Electric Company. The New Orleans Railway and Light Company came into existence about eighteen years ago through a series of watery financial deals resulting in the consolidation of several competing street railway and electric companies and the New Orleans Gas Light Company. The result has been little more than a constant struggle to keep clear of bankruptcy while the public has hoped against hope.

To regulate the service of this utility company and similar service, a Board of Public Utilities for the City of New Orleans was created by the General Assembly of the State of Louisiana in 1916. The following extracts are taken from Act No. 36 of 1916:

"1. There shall be and is hereby created a Board of Public Utilities in and for the City of New Orleans, which Board shall be composed of the Commissioner of Public Utilities of said City, who shall be ex-officio the chairman thereof, and four other members who shall be duly qualified electors of the City of New Orleans, who shall be appointed by the Governor of the State of Louisiana."

"Said Board shall have and is hereby vested with power and authority to supervise and regulate the service rendered by all public service utilities as hereinafter defined within the territorial limits of the City of New Orleans, and to these ends shall have authority, and is hereby authorized, to fix reasonable and just rates of charge for the service and commodities supplied by such public service utilities; to establish reasonable and just standards of service and commodity supplies."

Early in 1917 the people, weary from many years of strap-hanging, appealed to the authorities for relief. They demanded that the New Orleans Railway and Light Company furnish

more cars during busy hours, or that jitneys be permitted to operate. The company, fearful of the consequences of jitney competition, agreed to spend \$500,000 for improved service.

In March, 1917, a Committee on Transportation Facilities was created by the Commission Council, composed of the Commissioner of Public Utilities as chairman, the Commissioner of Public Property, the members of the Board of Public Utilities, and one representative from each exchange and the Central Labor Council.

Messrs. James E. Allison & Co., consulting engineers of St. Louis, were subsequently engaged to survey the traffic conditions of every car line, and to make recommendations for improved service by rerouting, etc. A report was submitted to the Transportation Committee in July 1917. This report contains a mass of traffic curves for every car line, showing the number of passengers passing what was assumed to be the point of maximum load, and the number of seats furnished, during every ten-minute period between 5:30 a. m. and 11:30 p. m. The route of each line is indicated on individual maps together with suggested reroutings of many lines.

The suggested reroutings aim almost entirely at retrenchment to reduce the operating expenses of the company. The report recommended the running of additional cars to furnish 100 seats per 100 passengers during every ten-minute period of the day, and the purchase of fifty new cars similar to the type now operated on the St. Charles and Tulane Belt line.

The company has succeeded in forcing on the public a great many of the suggested reroutings, but nothing has been done to improve the character of the service; on the contrary, it has grown steadily worse.

The Committee on Transportation Facilities has under consideration the rerouting of the car lines, and has held several meetings to discuss the problem. Owing to the bankrupt condition of the company the committee has suspended its meetings until the company is financially able to carry out a rerouting program, or a change in ownership is accomplished.

This problem of juggling the present car lines to bring about an adequate, efficient lay-out is one affecting the comfort and convenience of the entire public. It should, therefore,

command the attention of all, and especially the engineers of the city, who are, from the nature of their professional work, skilled in the art of scientific analysis.

I feel sure that the members of the Louisiana Engineering Society are interested in this problem, and believe that the Society will be promoting the interest of the engineering profession as well as performing a public service if it will take up the consideration of this problem through committee work or otherwise, and submit its conclusions at the proper time to the authorities. With this in view, I have worked up a few thoughts on the subject.

The present lay-out of car lines in our city is not the result of scientific analytical studies of the geographical relations of our commercial, industrial, residential and recreative centers, but quite to the contrary, it is the result of a haphazard auctioneering of any kind of a car route that would bring forth a bid on the franchise. We all know the result — we are all paying our tribute to this wild-cat method to the tune of a penny a ride.

In some localities residents have a choice of two, three and four car lines to carry them to their destination, in others a walk of eight to ten blocks is necessary to reach the only car line. We frequently have to travel a long, circuitous route to reach a point less than half the distance away by direct route. The clumsy transfer system only aggravates the mud-dle. It is useless to dwell upon the character of the present service; we are all familiar with it. It is not what we want; It is what we are forced to put up with.

The question then is how can we work out an efficient street railway service from the present inadequate, wasteful and bankrupt system? The inevitable answer is: "Reduce the overhead." I am only able to discuss conditions that are visible to the general public, and will proceed under the following headings:

1. Rerouting the car lines.
2. Routing the cars.
3. Number of cars required.
4. The labor problem.
5. The reorganization problem.

REROUTING THE CAR LINES.

We need more running cars during busy hours, and less car lines. If we have too many car lines, which ones should be shortened or eliminated? Where should new ones be built? To solve these questions soundly without discrimination, it is necessary to adopt general principles to be applied to the solution of each individual problem.

I believe these principles may be stated as follows:

1. Adoption of a standard spacing of parallel car lines based on (a) Comfort and convenience, (b) Density of traffic.
2. Prohibiting, wherever reasonable, double track lines on streets less than 60 feet in width.
3. Routing as far as feasible on boulevards for speed and safety.

To determine the proper standard spacing of car lines, the comfort and convenience of the public should be considered first, then the resulting traffic density on each line should be studied to ascertain if the adopted spacing will cause congestion during the peak load. Generally a traffic density requiring cars at less than 30" intervals may be classed as congested.

What standard spacing should we adopt in the City of New Orleans? With a low density of population, such as we have, a very wide inconvenient spacing could be adopted and yet cause no serious congestion on the lines. It is, then, largely a matter of agreement as to how much comfort and convenience we desire, and how much we are willing to pay.

For the purpose of making a suggested plan and estimate I have assumed that a spacing of six blocks between parallel car lines would be acceptable. This would place homes in the residential districts at a maximum distance of three blocks from a car line and create two zones — a quiet zone in which residents have to walk two or three blocks to car service, and a noisy zone where residents have car service a few steps from their homes. With a spacing of six blocks, traffic will be sufficiently dense to warrant comfortable regular service during quiet hours, and very frequent service during peak loads.



MAP OF
PRESENT SYSTEM
— OF CARLINES —
CITY OF NEW ORLEANS

Dec 9-1918 W.T. Hogg

SCALE
1 MILE

- LEGEND
- PRESENT LINES
 - NEW CONSTRUCTION OUTLINED UNDER STAGE I
 - TRACKS NOT OPERATED

Based on the above spacing, with modifications to comply with principles 2 and 3, and compromising wherever advisable with the present routing, I have worked out the following routes:

[NOTE—Individual maps of each of these lines will be found at the end of this article.]

TCHOUPITOULAS LINE.

Beginning at Tchoupitoulas and Jackson Avenue down Tchoupitoulas to Race, Race to Annunciation, Annunciation to Howard to South Peters, South Peters to Canal Street, North Peters to Esplanade, Esplanade to North Rampart. Return same route, except from Canal Street to Howard via Tchoupitoulas Street. The present route above Jackson Avenue will be abandoned, as the Laurel line is less than three blocks from the river.

LAUREL LINE.

Beginning at Audubon Park, down Laurel to Louisiana Avenue, to Chippewa, Chippewa to Race, Race to Annunciation, Annunciation to Erato, Erato to Camp, Camp to Calliope, Calliope to Carondelet, Carondelet to Canal Street. Returning up Carondelet to Clio, Clio to Camp, Camp to Erato, Erato to Annunciation, Annunciation to Louisiana Avenue, to Constance, Constance to Valmont to Laurel, Laurel to Audubon Park. Routing up and down Carondelet Street in the commercial district will afford connections in both directions with the South Claiborne line, thereby giving crosstown service between Erato and Claiborne, and Erato and Annunciation, crossing every uptown line.

COLISEUM LINE.

From Henry Clay and Magazine, out Henry Clay to Coliseum, Coliseum to Peters Avenue to Camp, Camp to Canal Street. Returning up Camp to Calliope to Coliseum, Coliseum to Felicity, to Chestnut, Chestnut to Peters Avenue to Perrier, Perrier to Henry Clay, Henry Clay to Magazine.

ST. CHARLES AND TULANE BELTS.

Start Camp and Canal Street, up Camp to Calliope to St. Charles Avenue, St. Charles to Carrollton Avenue, Carrollton Avenue to Tulane Avenue, Tulane Avenue to Rampart to Canal

Street, Canal to Camp Street. The track gauge of this line should be changed from 4' 8½" to 5' 2½" to agree with the gauge of 80% of the trackage operated by the company.

DRYADES LINE.

From Louisiana Avenue and Rampart, down Rampart to Philip to Dryades, Dryades to Calliope to South Rampart, South Rampart to Canal Street, Canal Street to Ferry. Returning Canal Street to South Rampart, South Rampart to Erato to Dryades, Dryades to St. Andrew to Baronne, Baronne to Philip to Dryades, Dryades to Louisiana Avenue to Rampart.

It will be noted on the general map that the spacing between the St. Charles and Liberty lines is just six blocks, and therefore the operation of this line would appear to be a wasteful duplication. However, after consideration of local conditions, the dense negro population in the territory served by this line, and the advisability of operating a car line down South Rampart Street between Howard Avenue and Canal Street, I believe this line should remain and be rerouted as suggested. The operation of this line will materially reduce the percentage of negro passengers on the St. Charles and Liberty lines.

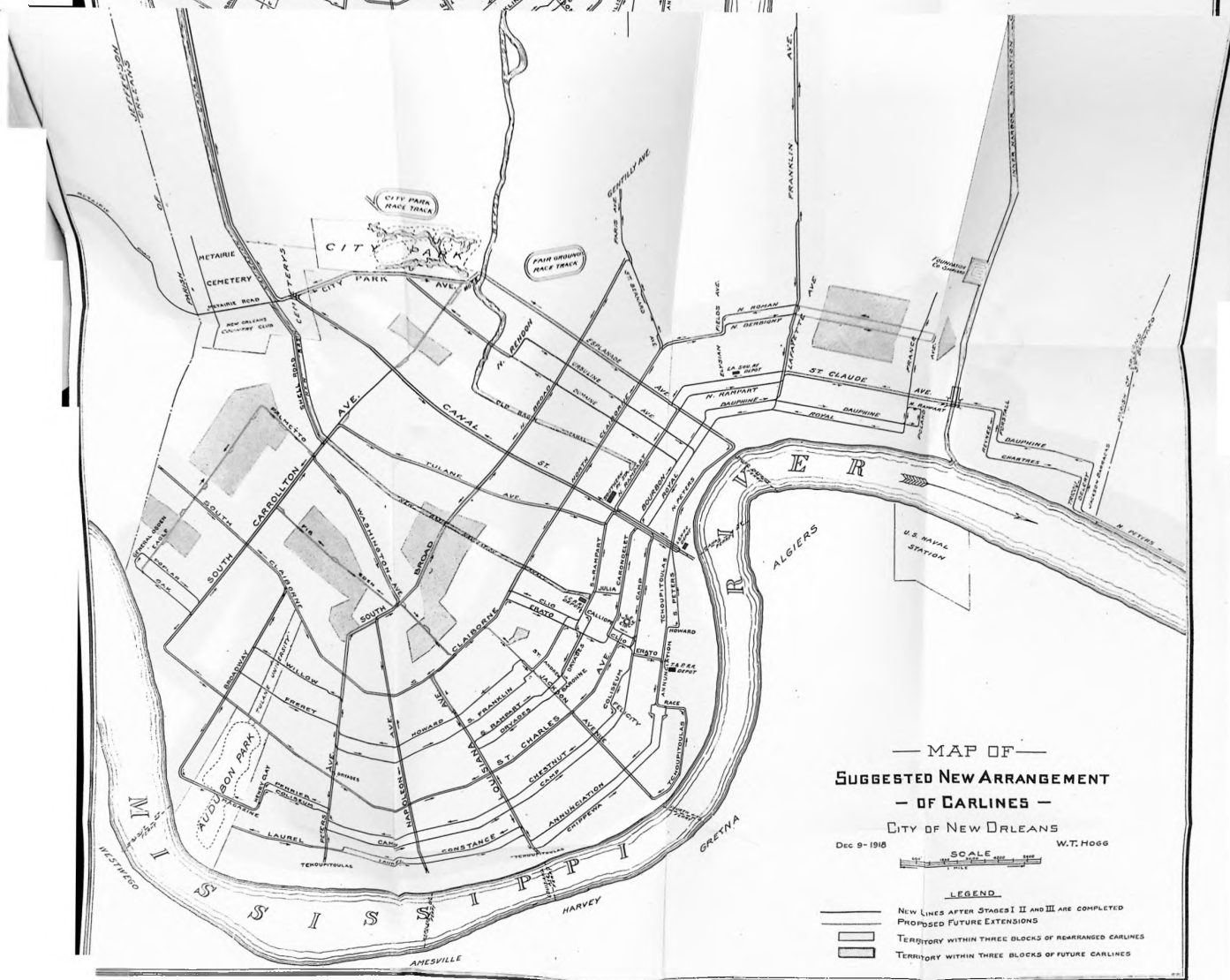
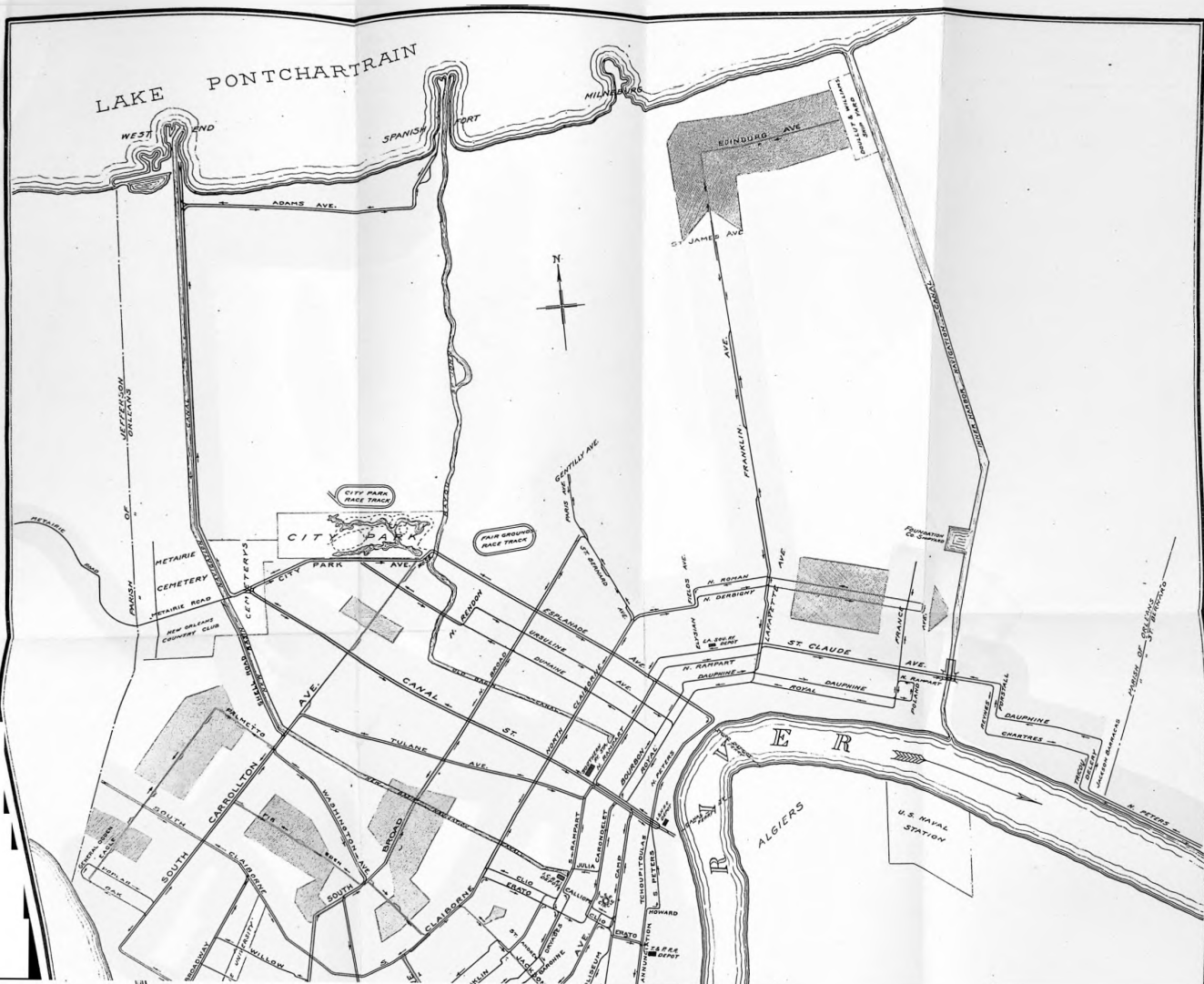
LIBERTY LINE.

Start Broadway and Freret, down Freret to Peters Avenue to South Franklin, South Franklin to Erato to Carondelet, Carondelet to Canal Street. Returning up Carondelet to Julia to South Rampart, South Rampart to Clio to South Franklin, South Franklin to Jackson Avenue to Howard, Howard to Peters Avenue to Willow, Willow to Broadway, Broadway to Freret.

I have suggested, as indicated on the individual map of this line, that it be operated, for the present, up and down Freret Street above Napoleon Avenue. When permanent track construction is undertaken on this part of the line, the tracks can be shifted to the parallel streets, Howard, South Franklin and Willow Streets, with only a slight increase in cost.

SOUTH CLAIBORNE LINE.

From upper city limits, down South Claiborne to Erato, Erato to Carondelet, Carondelet to Canal Street. Returning



up Carondelet to Julia to South Rampart, South Rampart to Clio, Clio to South Claiborne, South Claiborne to upper city limits.

CANAL AND ESPLANADE BELTS.

Start Canal and Wells Streets, out Canal to City Park Avenue, City Park Avenue to Bayou St. John to Esplanade Avenue, Esplanade to North Rampart, North Rampart to Canal Street, Canal to Wells Street.

CITY PARK LINE

Canal and Bourbon Streets, down Bourbon to Dumaine, Dumaine to City Park. Returning in Dumaine to North Rendon to Ursuline Avenue, Ursuline to Royal, Royal to Canal Street, Canal to Bourbon Street.

LAFAYETTE OR FRANKLIN AVENUE LINE.

From Canal and Bourbon, down Bourbon to Dauphine, Dauphine to Lafayette Avenue, Lafayette Avenue to Franklin Avenue, Franklin Avenue to St. James. Returning Franklin to Lafayette Avenue to Royal, Royal to Canal Street, Canal to Bourbon Street. This line would replace the present Villere line out to Gentilly Terrace. It would reduce the schedule time by three minutes between Canal Street and Gentilly Terrace, and furnish badly needed crosstown service on Lafayette Avenue. This suggested line is approximately one-half mile shorter than the present route to Gentilly.

DAUPHINE LINE.

Start Canal and Bourbon Streets, down Bourbon to Dauphine, Dauphine to France, France to North Miro (Foundation Company's shipyard). Returning in France to Royal, Royal to Canal Street, Canal to Bourbon Street.

Every alternate car might travel the above route, and the remaining cars continue down Dauphine to Poland, Poland to North Rampart, North Rampart to France, and France to Royal.

ST. CLAUDE LINE.

From Canal and Wells Street, out Canal to North Rampart, North Rampart to Lafayette Avenue to St. Claude, St. Claude to Reynes, Reynes to Chartres to Tricon to North Peters, North

Peters to American Sugar Refinery. Returning up North Peters to Delery to Dauphine, Dauphine to Forstall to St. Claude, St. Claude to Esplanade Avenue to North Rampart, North Rampart to Canal Street, Canal to Wells Street.

NORTH CLAIBORNE AND ST. BERNARD AVE. LINES.

From Erato and South Claiborne, down Claiborne to Elysian Fields, to North Derbigny, North Derbigny to Lafayette to North Roman. Returning up North Roman to Elysian Fields to North Claiborne Avenue, North Claiborne to South Claiborne and Erato. (Widen track gauge of old line.)

Every alternate car might run out St. Bernard Avenue, from North Claiborne to Paris Avenue, and thence to Paris Avenue and Gentilly Avenue. The remaining cars continue down North Claiborne on the above route.

Criticism will probably arise because the North Claiborne line is not operated into the commercial district as at present. A glance at the general map will show that a large portion of the territory served by this line is also served by the Canal Belt, the City Park and the Esplanade Belt lines, all of which run into the commercial district. However during peak loads, it might be found advisable to operate this line in two sections, running the section below Canal street in Canal street to St. Charles or Camp Street, and operating the upper section only on South Claiborne between Canal and Erato Streets.

CROSSTOWN LINES.

JACKSON AVENUE LINE.

Start Jackson and Tchoupitoulas, out Jackson to South Claiborne, South Claiborne to Washington Avenue, Washington to Broad, thence on Eden and Fig Streets to Carrollton Avenue. Return same route. (Widen track gauge of old line.)

LOUISIANA AVENUE LINE.

Start Louisiana Avenue and Tchoupitoulas, out Louisiana to South Claiborne, South Claiborne to Washington Avenue. Return same route.

NAPOLEON AVENUE LINE.

From Napoleon Avenue and Tchoupitoulas, out Napoleon Avenue to Broad, South Broad to Washington Avenue, Washington to Carrollton Avenue to Shell Road, New Basin Shell Road to Metairie Road. Return same route.

PETERS AVENUE — BROAD LINE.

Start Peters Avenue and Tchoupitoulas, out Peters Avenue to South Broad, South and North Broad to St. Bernard Avenue. Return same route.

BROADWAY LINE.

From Magazine and Henry Clay, up Magazine to Broadway, Broadway to South Claiborne. Return same route.

EAGLE LINE.

Beginning at Carrollton Avenue and Oak Street, out Carrollton Avenue to Poplar, Poplar to Eagle, Eagle to Palmetto, Palmetto to Carrollton Avenue. Returning Palmetto to Eagle, Eagle to Oak, Oak to Carrollton Avenue.

ADVANTAGES OF REROUTING.

Among the advantages of the suggested reroutings are the following:

Elimination of waste by direct routing of lines with minimum curvature and minimum duplication of service by parallel lines.

Reduction in the total round-trip miles of the lines from 255.79 to 208.79, or about 18.4%.

Reduction in the total linear mileage of road tracks from 199.7 to 177.5, or about 11%.

Elimination of wasteful, circuitous routings of many passengers through the commercial district by introduction of badly needed service crossing Canal Street at Claiborne Avenue and at Broad Street.

Establishment of the following important crosstown service:

In Lafayette Avenue from the river to Gentilly Terrace. This change will shorten the time from Canal Street to points along Franklin Avenue and Gentilly Terrace at least three minutes.

In Erato and Clio Streets from Annunciation to Claiborne Avenue.

In Jackson, Louisiana and Peters Avenue from the river to Carrollton Avenue.

Removal of tracks in the commercial district from St. Charles and Baronne Streets, giving uptown vehicles free access to the business center.

Removal of tracks from Magazine Street, giving vehicles a free passageway from Canal Street to Audubon Park.

Removal of tracks from the environments of Lee Circle.

Abandonment of the wasteful circuitous service given by the North Claiborne Avenue line between the business district and points along St. Claude Avenue.

Abandonment of the freakish routing of the Clio and South Claiborne lines three times across the same steam railroad track within five blocks.

Establishment of the most direct route between Canal Street and points along the Inner Harbor Navigation Canal by re-routing the Dauphine line.

The suggested reroutings include changes of minor importance and future extensions. The construction work necessary to complete the above described routes may be divided in the order of its importance into four stages.

Stage I might comprise only the work absolutely essential to gain the chief economic advantages of the suggested changes.

Stage II the construction of extensions to established routes that will facilitate direct routing of passengers.

Stage III standardization of trackage by widening the small mileage of steam railroad gauge track to the wide gauge comprising 80% of the mileage operated by the company.

Stage IV the building of extensions as soon as funds are available where new sections are building, especially where the extension will increase the efficiency of the whole system by introducing shorter routes between two or more built-up sections of the city.

STAGE I.

Under Stage I the following construction might be listed:

Dryades Line—

In South Rampart Street..... 0.10 miles

Liberty Line—

In Julia Street 0.06

In Franklin Street 1.24

In Howard Street 0.50

———— 1.80 “

Lafayette Avenue Line—

In Lafayette Avenue..... 0.55 “

(Rehabilitating abandoned tracks
0.45 miles)

Dauphine Line—

In France Street..... 0.55

In Bourbon Street..... 0.10

———— 0.65 “

St. Claude Avenue Line—

In St. Claude Avenue..... 0.50 “

(Widening gauge 2.7 miles of single
track.)

Total new construction..... 3.60 miles single track

This 3.6 miles of new track can be laid with steel salvaged from abandoned tracks in the old routing. In addition to this, about 40 pieces of special work will have to be moved from one point to another. On account of awkward fits, in some cases it might be found advisable to purchase new pieces. I believe \$150,000 will cover the cost of the above construction.

STAGE II.

Under Stage II the following extensions:

North Claiborne Avenue line from Canal Street to Clio Street and the Broad line from St. Peter Street to Tulane Avenue. These extensions will require approximately 1.8 miles of double track, or 3.6 miles of single track. The bridge over the New Basin Canal in Claiborne Avenue and over the Old Basin Canal in Broad Street will have to be remodeled for street car traffic. The cost of this work will approximate \$150,000.

STAGE III.

Under State III the track gauge of the St. Charles and Tulane Belts, the Jackson Avenue and North Claiborne Avenue lines will be widened. At the same time the North Claiborne line should be rerouted down North Derbigny and up North Roman between Elysian Fields and Lafayette Avenues, and the Belt lines rerouted up and down Camp Street in the commercial district instead of Baronne Street. This will necessitate the construction of about 1.5 miles of single track. The cost of these changes will be about \$300,000.

STAGE IV.

The future extensions coming under Stage IV might be listed, in the order of their importance, as follows:

1. Lafayette Avenue line from St. James and Franklin Avenues to Doullut & Williams' shipbuilding plant on the Inner Harbor Navigation Canal; 1.6 route miles, or 3.2 miles of track if a double-track line is built. This extension might be constructed in the near future by special financial arrangements.

2. Jackson Avenue line from St. Charles to Claiborne Avenues; 0.7 route miles or track miles if single-track line is built.

3. Louisiana Avenue line from Freret Street to South Claiborne and Washington Avenues; 0.36 route miles or 0.72 track miles if double-track line is built.

4. Peters Avenue line from Dryades to Claiborne Avenue; 0.87 route miles or 1.74 track miles if double track is installed.

5. Eagle line on Eagle Street from Oak to Claiborne Avenue; 0.7 route miles or 1.1 track miles (single-track line with sidings).

6. Jackson Avenue line along Washington Avenue from South Claiborne Avenue to South Broad; 0.7 route miles or 0.9 track miles (single track with sidings).

7. Broad line from Tulane to Washington Avenues; 1.0 route miles or 2.00 track miles if double-track line is built.

8. Carrollton Avenue from Canal Street to City Park Avenue; 0.83 route miles or about 1.1 track miles (single track with sidings).

9. Broad line from Napoleon Avenue and Broad Street to South Claiborne and Peters Avenues; 0.66 route miles or 1.32 track miles if double-tracked.

10. Jackson Avenue line along Eden and Fig Streets from Broad to Carrollton Avenue; 1.13 route miles or 1.6 track miles (single track with sidings).

11. Eagle line from Eagle and South Claiborne Avenue to Palmetto and Carrollton Avenue; 1.44 route miles or 1.9 track miles (single track with sidings).

I have not mentioned minor changes in routing, such as moving an established car line one or two blocks to a parallel street, as these could be carried through in connection with street paving when it is desirable to reconstruct the lines with permanent tracks.

ESTIMATED SAVING.

For the purpose of estimating the annual saving that would be gained by the adoption of the suggested routings, I have worked up a series of tables.

Table I contains a list of the new lines together with the assumed percentage of old-line traffic that will shift to each new line. Only the important car lines running into the commercial district are listed in this table.

Table II gives detailed traffic statistics showing the number of passengers that will pass the point of maximum load of each new line during every ten-minute period from 5:30 a. m. to 11:30 p. m. These figures are based on the assumed shifting of traffic enumerated in Table I, and traffic statistics of the present lines taken from the Allison Report.

Table III gives the required number of car trips (number of cars passing point of maximum loading) for every hour of the day to furnish 100 seats per 100 passengers during every ten-minute period. The seating capacity of the car on which this estimate is based is stated under the name of each line at the left of the table.

It will be noted that the minimum number of car trips per hour is arbitrarily set at 10, which gives a maximum interval of six minutes between cars.

Table IV gives the number of car hours (total number of cars running on line) required to furnish the car trips enumer-

ated in Table II. The assumed schedule time for full round trip on which these figures are based is stated under the name of each line at the left of the table. Where two figures are given the smaller is the time for short route extra cars run during peak loads. The number of car-hours has been further reduced on the longer lines by the operation of express service which will be discussed later.

Table V contains a complete list of the old and new lines showing the number of car hours per day required under each system, the number of round trip miles, and the estimated annual saving.

ROUTING THE EQUIPMENT.

There are two general methods in practice of handling the extra cars that run during peak load hours. One is to route all cars over the full route of the lines, and the other to route only about half the cars to the end of the line, and the balance over a portion of the route. Both are unsatisfactory. The former tends to equalize the loading but is wasteful as the cars run only half-loaded over the latter half of the run. The latter is economical, but unbalances the loading, as through cars pick up both short and long-haul passengers, and are overloaded, while the short route cars pick up only short-haul passengers and are lightly loaded.

The best way to solve this problem is by a scheme of routing and scheduling the cars that will separate the long and short-haul traffic so that the short-haul passengers will ride in the short-route cars, and the long-distance passengers the full-route cars. This separation of traffic may be accomplished by the introduction of fast express service for the long-haul passengers. The express car should run just ahead of the local or short-route car. When the express car emerges from the commercial district, run it through without any stops to the end of the route of the local car. Beyond this point the express cars will make all local stops. For example, the service on the Coliseum line might be divided so that patrons below Louisiana Avenue would be served by local cars running only between Louisiana Avenue and Canal Street and making all stops, while those living above Louisiana Avenue would be

served by fast express cars that would make all stops between Canal and Clio Streets, then run through to Louisiana Avenue without any stops to receive or discharge passengers. Above Louisiana Avenue the express cars would make all stops.

During peak load hours the cars pick up comparatively very few passengers after leaving the commercial district. These few could board the local cars and transfer to the express cars at the end of the short route. While a small portion of the public would be inconvenienced by the necessity of this transfer, the greater portion of the traveling public would be given rapid service, bringing them to their destination about five minutes quicker than under the present scheme.

NUMBER OF CARS REQUIRED.

The assignment of cars of given seating capacity to particular lines, as indicated in Table III, is based on the consideration of the amount of traffic carried on each line, and the number and seating capacity of the cars available. The maximum demand for equipment obviously occurs during the peak load hours. The following figures taken from Table IV show the number of each type of car required on the lines between 7:30 and 8:30 a. m., and between 5:30 and 6:30 p. m.

52-SEAT CARS.

Line.	Number of Cars Required.	
	A. M. Peak.	P. M. Peak.
Laurel	25	31
Coliseum	24	27
St. Charles	35	40
Tulane	15	23
Canal Street	22	26
Esplanade	16	21
Dauphine	17	16
North Claiborne	14	18
Total 52's	168	202

44-SEAT CARS.

Line.	Number of Cars Required.	
	A. M. Peak.	P. M. Peak.
Liberty	15	18
St. Claude	18	22
Total 44's	33	40
Total 52's	168	202
Total Large Cars.....	201	242

32-SEAT CARS.

Line.	Number of Cars Required.	
	A. M. Peak.	P. M. Peak.
South Claiborne	13	20
Lafayette Avenue	12	17
Napoleon Avenue	10	10
Metairie	2	2
Total 32's	37	49

28-SEAT CARS.

Line.	Number of Cars Required.	
	A. M. Peak.	P. M. Peak.
Echoupitoulas	10	10
Dryades	17	20
City Park	16	22
Jackson Avenue	2	2
Louisiana Avenue	4	4
Peters Avenue	4	4
Broadway	5	5
Eagle	2	2
St. Bernard Avenue.....	4	4
Broad	5	5
Carrollton Avenue	1	1
Total 28's	68	79
Total 32's	37	49
Total Small Cars Required.....	105	128

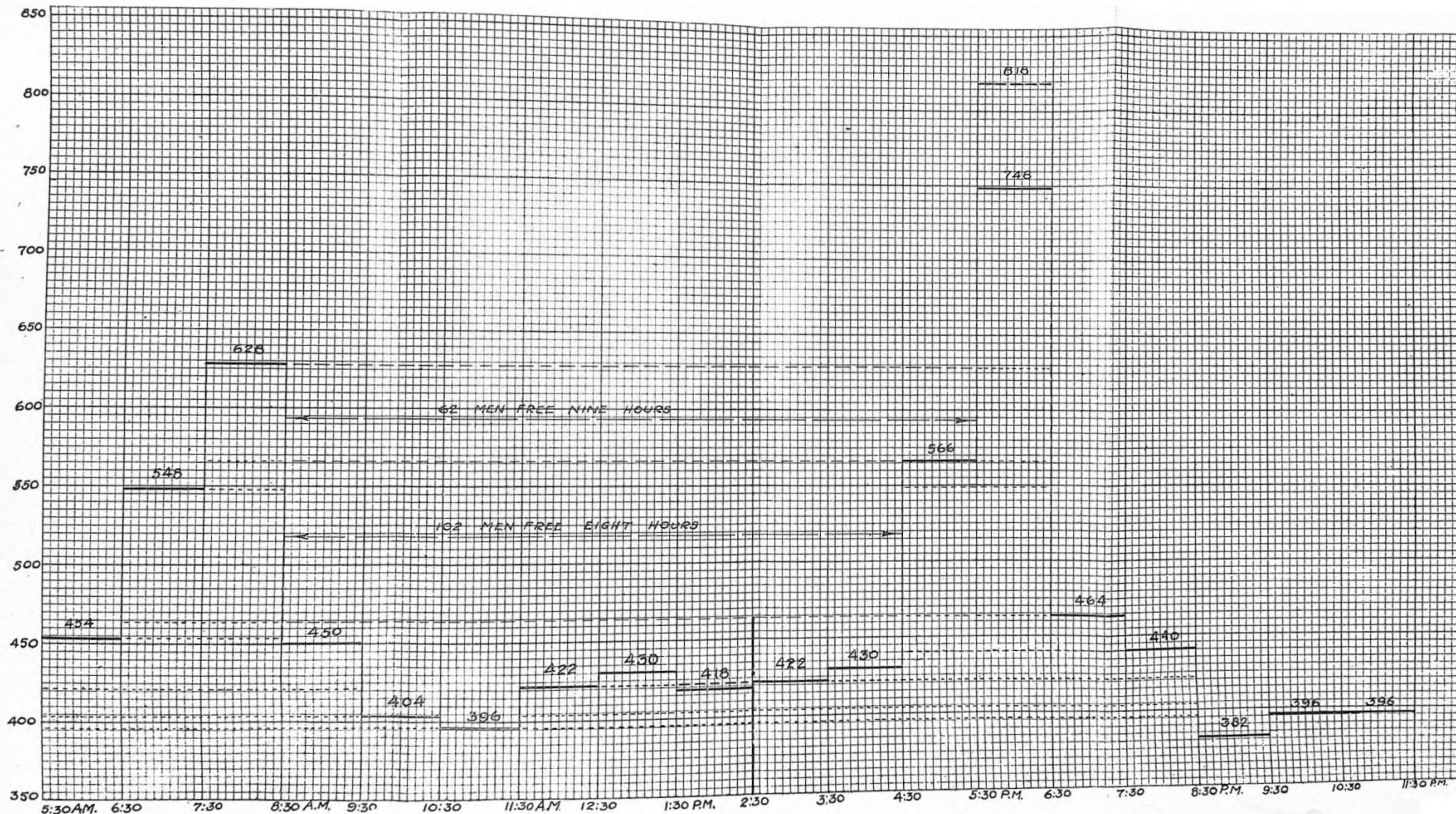
The equipment of the company at present consists of 217 large cars and 365 small cars, exclusive of 42 trailers of the type used on the Spanish Fort line. The above figures show that between 7:30 and 8:30 a. m. the company has a sufficient number of large cars to care for the traffic demands on the lines to which they have been assigned, but between 5:30 and 6:30 p. m. at least 40 additional large cars would be required. Using 28-seat cars to make up this deficiency would require 75 28-seat cars to give the equivalent seating capacity of 50 52-seat cars. This will require 35 additional car hours per day for this one-hour period, and for 312 week days will increase the annual car hours by 11,000, which is extremely small.

CONCLUSIONS.

To summate the physical side of the problem of rerouting, I have drawn up the following conclusions:

Out of wasteful duplication and circuitous routing in the present system, a direct efficient system can be worked out, serving equally all built-up sections of the city.

NUMBER OF CARMEN REQUIRED



LABOR DEMAND DIAGRAM

The initial capital expenditure required to stop the waste and save the people of New Orleans approximately \$500,000 annually is less than one-third of the annual saving, or about \$150,000. (This saving of \$500,000 per annum is based on requirements for adequate service.)

With efficient routing, the present equipment of the company is sufficient to furnish 100 seats per 100 passengers even during peak load hours with a reasonable degree of efficiency.

As soon as financial conditions will permit, 100 new cars of 52-seat capacity should be purchased. These cars should be equipped with master controllers to permit the operation of two-car multiple unit express trains during peak loads. This additional equipment would ease the demand for labor during peak loads. To meet this demand is the most vexing problem facing the street railway official today.

THE LABOR PROBLEM.

Thus far only the physical aspects of the problem have been discussed. Let us now consider the human side.

In almost every industry labor is employed during conventional working hours for a steady period of time. The full working forces start at a fixed hour in the morning and stop at a fixed hour in the evening. A glance at Table IV will show that the total number of car hours reequred varies from 191 for the period 8:30 to 9:30 p. m. to 374 for the period 5:30 to 6:30 p. m. As noted above, 35 additional car hours are required during the latter period, due to the shortage in large cars, which brings this maximum peak load figure up to 409 car hours. This means that 382 carmen are required during the lightest hour, and 818 during the heaviest hour. How can this variation in the labor requirement be met so that the extra men required for short periods can be given a sufficient period of employment to enable them to earn a decent living wage?

Before attempting to answer this question, let us analyze this varying demand. As indicated on the Labor Demand Diagram, 382 men can be employed for a steady period of 18 hours, whereas 190 men are required only during the maximum peak

load hour. The following analysis has been taken from the diagram :

382	Carmen required during the entire 18-hour period.
396	Carmen, or 14 additional men, required 17 hours.
404	Carmen, or 8 additional men, required 14 hours.
418	Carmen, or 14 additional men, required 13 hours.
422	Carmen, or 4 additional men, required 12 hours.
430	Carmen, or 8 additional men, required 10 hours.
440	Carmen, or 10 additional men, required 8 hours.
450	Carmen, or 10 additional men, required 7 hours.
454	Carmen, or 4 additional men, required 6 hours.
464	Carmen, or 10 additional men, required 5 hours.
548	Carmen, or 84 additional men, required 4 hours.
566	Carmen, or 18 additional men, required 3 hours.
628	Carmen, or 62 additional men, required 2 hours.
818	Carmen, or 190 additional men, required 1 hour.

The present rate of pay for carmen in New Orleans averages 40 cents per hour. A carman employed seven hours a day only on weekdays would earn \$72.80 per month. Under present conditions, I believe that this is about the minimum salary for which a man should be expected to work. If that is accepted as a working basis, those men employed for periods varying from two to six hours will not earn a decent living wage. Either they should be paid the wage for seven hours' work, while they work only from two to six hours, or they should be employed at other work during the remaining hours of a seven, eight or nine-hour work day.

The above tabulation must also be modified to accord with the twelve-hour law that requires that carmen shall be available for duty during a period not to exceed twelve consecutive hours.

Accordingly I have assumed the day divided into two periods of nine hours each. The forenoon period from 5:30 a. m. to 2:30 p. m., and the afternoon and evening period from 2:30 p. m. to 11:30 p. m.

The number of men required for various periods of time are then as follows :

FORENOON PERIOD.

396 Carmen required 9 hours; no outside employment necessary.	
404 Carmen required 8 hours; no outside employment necessary.	
422 Carmen required 7 hours; no outside employment necessary.	
430 Carmen required 5 hours; 3 hours' outside employment necessary	
for	8
450 Carmen required 4 hours; 4 hours' outside employment necessary	
for	20
454 Carmen required 3 hours; 5 hours' outside employment necessary	
for	4
464 Carmen required 2 hours; 6 hours' outside employment necessary	
for	10
Total	42

The two periods of employment, 6:30 to 8:30 a. m. and 4:30 to 6:30 p. m., occur within twelve consecutive hours, and can be served by one set of men. These will be counted with the men partially employed during the afternoon half of the day.

AFTERNOON PERIOD.

382 Carmen required 9 hours; no outside employment necessary.	
396 Carmen required 8 hours; no outside employment necessary.	
422 Carmen required 6 hours; 2 hours' outside employment necessary	
for	26
430 Carmen required 5 hours; 3 hours' outside employment necessary	
for	8
440 Carmen required 4 hours; 4 hours' outside employment necessary	
for	10
464 Carmen required 3 hours; 5 hours' outside employment necessary	
for	24
Total	68

MORNING AND AFTERNOON PERIODS.

(One Set of Carmen.)

548 Carmen required 4 hours; 4 hours' outside employment necessary	
for	84
566 Carmen required 3 hours; 5 hours' outside employment necessary	
for	18
628 Carmen required 2 hours; 6 hours outside employment necessary	
for	62
Total	164

TOTAL NUMBER OF CARMEN PARTIALLY EMPLOYED.

Forenoon Period.....	42
Afternoon Period.....	68
Forenoon and Afternoon Periods (one set of carmen).....	164
Total	274

The will be noted that 164 of these partially employed carmen are free for eight consecutive hours, from 8:30 a. m. to 4:30 p. m.

The question then arises: Can these 274 men be profitably employed at other work to fill in their idle hours? In a city the size of ours, the large number of men employed by the company alone, the city administration, and other large employing agencies, it seems plausible to assume that this problem could be worked out in a satisfactory manner.

As you have probably noted, I have not mentioned the 190 men required only during one hour in twenty-four hours. We have two universities and other educational institutions in our city. There are hundreds of ambitious men anxious to obtain a higher education; the lack of a small financial backing is their only impediment. Does it seem reasonable to state that 190 competent men could not be found willing and anxious to take advantage of this employment between 5:30 and 6:30 p. m. as a means of earning their way through college?

After this consideration of the labor problem, I am inclined to believe that there are no grounds for the present vaudeville circus that occurs twice daily when our working masses are struggling for a ride to and from their employment.

THE REORGANIZATION PROBLEM.

There is still another phase of the street railway problem to be considered:

Who should own our street railway system?

Who should operate our street railway system?

A whole volume could be written on this question and still leave much to be said. Like the problem of valuation, there are as many different opinions as there are heads. Within the scope of this paper I can only state briefly a few points.

The chief advantage of public or municipal ownership are:

Ability to borrow freely and at lower interest rates.

Return of all profits into the treasury of the people.

The advantages of private or corporate ownership are:

Incentive to economic operation through the possibility of earning increased profits.

Promotion of employees on the basis of merit rather than political expediency.

The problem, then, is to combine these four advantages by an organization — public, private, or a partnership of both — that will yield the best result.

Coming back to our own problem, the worst knot in the rope is the bankrupt condition of the company. We are carrying on a policy of watchful waiting for that long-overdue Ballard valuation report. This report will tell us that the physical property of the company (based on original cost) is less or more than the amount represents by the bonded debt. We are also hoping that the report will contain valuable suggestions on reorganization and reduction of the overhead.

The main issue, however, will still stand before us: Shall we nurse the present organization back to health? Shall we force it to change hands by foreclosure, and create a new private corporation, to operate on a single universal franchise, routes and headway of cars to be controlled entirely by the Board of Public Utilities, and excess profits to be shared with the public? Or shall the City of New Orleans purchase and operate the property through an organization similar to the Sewerage and Water Board or the Board of Commissioners of the Port of New Orleans?

The City of New Orleans is a pioneer in the experiments of public ownership. Its long line of docks, cotton warehouses and grain elevator, publicly owned and operated; its model sewerage, drainage and water systems, and soon the Inner Harbor Navigation Canal, are eloquent testimonials of the confidence of the people of New Orleans in public ownership.

The only important public utility, privately owned and operated, is our one poor relation, and truly, as Charles Lamb would say, it's "a blot on our 'seutecheon,— a more intolerable dun upon our pride,— a perpetually recurring mortification,— a triumph to our enemies,— an apology to our friends,— a

drawback upon success,—a rebuke to our rising.” The one thing most needful,—the one thing most despised. Draining ten million annually from our purse, yet a beggar at our City Hall door. Its street-car service during peak loads is a comic vaudeville on a mild June day,—a tragedy on a rainy December night.

The reroutings and consolidations suggested above, estimated to save the people of New Orleans a half-million a year, will require the running of more cars on few lines. I am very much afraid that the people will never trust the present officials of the street railway system with a promise to run more cars on fewer lines. They will cling to the conviction that less cars will be run on the lesser lines, and any move to reduce the number of lines will be bitterly opposed.

Furthermore, irrespective of what may be saved by rerouting, or how badly extensions and additional equipment may be needed, the present organization will be helpless, and the people will have to suffer until bankers and investors are willing to trust them with additional loans.

In view of these conditions there remain but two possible solutions—foreclosure and the reorganization of an entirely new company as outlined above, or the purchase of the physical property of the company and its operation by the City of New Orleans.

TABLE I.
ESTIMATED SHIFTING OF TRAFFIC FROM OLD TO
NEW LINES.

NEW LINES.

Percentage of Traffic From Old Lines Transferred to New Lines.

UPTOWN LINES.

Tehoupitoulas.....Old Tehoupitoulas, 60%.

Laurel.....Tehoupitoulas, 40%; Annunciation, 100%; Old Laurel, 70%; Magazine, 50%; Jackson, 30%.

Coliseum.....Laurel, 30%; Magazine, 50%; Old Coliseum, 100%; Prytania, 50%; Jackson, 30%.

St. Charles Avenue.....Prytania, 50%; Jackson, 40%; Old St. Charles, 100%; Carondelet, 30%; Peters Avenue, 50%.

Dryades.....Carondelet, 20%; Peters Avenue, 30%; Old Dryades, 100%.

Liberty.....Carondelet, 50%; Peters Avenue, 20%; Clio, 60%; Louisiana, 100%.

South Claiborne.....Clio, 40%; Old South Claiborne, 100%.

DOWNTOWN LINES.

Tehoupitoulas.....Old Tehoupitoulas, 100%.

Dauphine.....Levee and Barracks, 50%; Carondelet, 100%; Clio, 100%; Old Dauphine, 60%.

City Park.....Bayou St. John, 70%; Broad, 50%; French Market, 100%.

Lafayette Avenue.....Villere, 60%.

St. Claude.....Levee and Barracks, 50%; Dauphine, 40%; North Claiborne, 30%.

North Claiborne.....Broad, 30%; Villere, 40%; Old North Claiborne, 70%.

Esplanade Avenue.....Broad, 20%; Bayou St. John, 30%; Old Esplanade, 100%.

TABLE II.
NUMBER OF PASSENGERS PASSING POINT OF MAXI-
MUM LOAD DURING EVERY TEN-MINUTE PERIOD.

		UPTOWN LINES.							
		TCHOUPITOULAS.		LAUREL.		COLISEUM.		ST. CHARLES AVENUE.	
		Up.	Down.	Up.	Down.	Up.	Down.	Up.	Down.
A. M.	A. M.								
5:30—5:40.....	17	17	43	43	27	35	20	38	
5:40—5:50.....	11	18	29	68	24	35	21	52	
5:50—6:00.....	37	38	47	94	23	59	20	59	
6:00—6:10.....	52	21	85	120	39	76	55	55	
6:10—6:20.....	56	30	100	146	40	74	59	79	
6:20—6:30.....	60	57	132	158	58	95	65	110	
6:30—6:40.....	79	33	113	225	47	159	61	184	
6:40—6:50.....	68	43	104	160	50	127	56	121	
6:50—7:00.....	40	27	70	183	49	138	83	126	
7:00—7:10.....	36	30	70	199	53	155	80	129	
7:10—7:20.....	40	33	71	217	40	130	57	203	
7:20—7:30.....	35	21	68	134	45	178	60	225	
7:30—7:40.....	30	21	75	266	35	208	55	280	
7:40—7:50.....	36	21	63	243	38	312	69	346	
7:50—8:00.....	11	22	55	248	45	335	91	340	
8:00—8:10.....	18	18	58	191	51	274	88	386	
8:10—8:20.....	13	18	43	144	72	230	128	352	
8:20—8:30.....	13	11	80	182	98	240	126	382	
8:30—8:40.....	17	21	61	132	74	206	72	330	
8:40—8:50.....	11	16	55	121	62	186	104	276	
8:50—9:00.....	16	16	37	128	43	173	61	218	
9:00—9:10.....	8	12	28	47	35	120	53	229	
9:10—9:20.....	11	17	40	83	47	106	60	156	
9:20—9:30.....	14	6	50	84	58	117	67	159	
9:30—9:40.....	18	17	50	134	30	134	53	148	
9:40—9:50.....	8	9	42	85	44	80	56	147	
9:50—10:00.....	17	18	53	82	42	84	45	122	
10:00—10:10.....	7	18	57	76	50	65	84	160	
10:10—10:20.....	22	12	56	81	40	88	63	153	
10:20—10:30.....	11	15	53	82	54	85	82	113	
10:30—10:40.....	20	12	51	61	40	68	62	143	
10:40—10:50.....	20	15	59	67	48	70	79	101	
10:50—11:00.....	6	12	53	61	53	63	70	127	
11:00—11:10.....	13	13	67	63	64	54	84	123	
11:10—11:20.....	23	13	74	51	54	50	88	106	
11:20—11:30.....	11	6	70	67	66	79	77	124	
11:30—11:40.....	19	18	86	62	57	56	85	99	
11:40—11:50.....	29	12	90	66	68	70	99	112	
11:50—12:00.....	14	16	71	60	85	57	111	99	
P. M.	P. M.								
12:00—12:10.....	20	17	115	69	145	60	166	82	
12:10—12:20.....	31	14	104	63	135	74	190	113	
12:20—12:30.....	13	9	72	56	104	62	124	107	
12:30—12:40.....	25	6	75	72	98	71	133	99	
12:40—12:50.....	11	18	57	111	79	119	118	155	
12:50—1:00.....	10	12	65	95	60	143	96	163	
1:00—1:10.....	12	13	56	73	78	108	92	140	
1:10—1:20.....	12	13	67	94	82	200	92	139	
1:20—1:30.....	12	13	73	80	70	106	97	147	
1:30—1:40.....	13	12	66	83	63	105	82	166	
1:40—1:50.....	19	12	42	94	41	100	62	194	
1:50—2:00.....	11	16	65	94	67	103	99	139	
2:00—2:10.....	14	24	47	82	77	80	89	196	
2:10—2:20.....	24	15	98	58	69	100	123	148	
2:20—2:30.....	19	9	63	88	82	107	104	164	

TABLE II (Continued).

UPTOWN LINES.

		TCHOUPITOULAS.		LAUREL.		COLISEUM.		ST. CHARLES AVENUE.	
		Up.	Down.	Up.	Down.	Up.	Down.	Up.	Down.
P. M.	P. M.								
2:30—	2:40	7	13	76	105	75	118	142	129
2:40—	2:50	23	9	69	79	67	85	83	149
2:50—	3:00	12	16	85	76	100	126	114	209
3:00—	3:10	17	12	57	77	70	104	115	138
3:10—	3:20	11	22	74	113	68	116	102	162
3:20—	3:30	14	20	76	108	96	120	102	125
3:30—	3:40	19	15	86	62	91	75	129	116
3:40—	3:50	15	13	70	65	83	69	140	129
3:50—	4:00	23	11	89	77	96	96	134	182
4:00—	4:10	9	21	78	74	88	73	124	115
4:10—	4:20	11	9	80	58	108	77	198	98
4:20—	4:30	28	25	142	96	149	89	148	161
4:30—	4:40	36	18	125	74	133	71	180	96
4:40—	4:50	19	16	96	68	120	66	238	102
4:50—	5:00	38	12	147	59	167	54	230	91
5:00—	5:10	36	39	182	70	165	57	264	87
5:10—	5:20	30	60	168	158	366	112	375	134
5:20—	5:30	53	45	296	114	307	83	412	129
5:30—	5:40	65	47	319	111	318	64	438	114
5:40—	5:50	70	30	306	111	330	93	499	115
5:50—	6:00	55	42	272	73	309	57	397	83
6:00—	6:10	36	33	231	88	278	48	400	83
6:10—	6:20	36	30	248	110	295	56	418	81
6:20—	6:30	26	36	248	99	290	79	353	67
6:30—	6:40	36	15	146	58	190	55	195	68
6:40—	6:50	17	18	98	61	147	57	209	83
6:50—	7:00	20	6	127	57	103	63	125	95
7:00—	7:10	11	12	85	70	78	65	160	130
7:10—	7:20	12	14	71	90	73	91	92	134
7:20—	7:30	21	12	69	87	94	115	134	199
7:30—	7:40	11	11	71	59	72	104	81	187
7:40—	7:50	23	4	93	99	97	138	96	324
7:50—	8:00	11	12	69	108	63	137	82	281
8:00—	8:10	5	8	49	61	65	132	95	219
8:10—	8:20	4	3	56	58	60	83	79	198
8:20—	8:30	4	18	42	58	35	72	90	94
8:30—	8:40	7	4	44	31	54	43	81	90
8:40—	8:50	6	2	51	33	41	35	52	74
8:50—	9:00	6	2	33	28	36	46	60	85
9:00—	9:10	3	2	46	28	59	40	69	48
9:10—	9:20	2	4	50	20	39	25	70	48
9:20—	9:30	8	4	48	19	73	28	80	79
9:30—	9:40	5	5	55	22	54	32	76	31
9:40—	9:50	3	3	45	18	45	15	113	42
9:50—	10:00	3	12	48	25	86	19	153	26
10:00—	10:10	11	6	64	16	73	19	115	62
10:10—	10:20	5	6	49	29	52	21	125	44
10:20—	10:30	5	6	54	31	72	38	121	43
10:30—	10:40	6	3	57	33	77	23	178	37
10:40—	10:50	7	6	80	23	94	23	137	37
10:50—	11:00	2	4	56	30	87	19	138	21
11:00—	11:10	2	2	20	21	71	25	117	29
11:10—	11:20	7	6	62	27	54	23	96	19
11:20—	11:30	3	4	47	16	82	17	75	21

TABLE II (Continued).

UPTOWN LINES.

A. M.	A. M.	DRYADES.		LIBERTY.		SOUTH CLAI- BORNE.		TULANE AVENUE.		CANAL STREET.	
		Up.	Down.	Up.	Down.	Up.	Down.	Up.	Down.	Out.	In.
5:30—5:40.....		6	11	69	43	11	35	5	42	5	30
5:40—5:50.....		5	19	68	34	6	7	23	30	22	60
5:50—6:00.....		9	44	116	65	14	50	35	100	8	75
6:00—6:10.....		8	30	68	48	19	41	47	80	22	125
6:10—6:20.....		10	78	79	61	6	30	73	68	95	105
6:20—6:30.....		12	58	77	59	17	34	60	140	125	130
6:30—6:40.....		11	64	97	91	40	50	96	145	75	145
6:40—6:50.....		12	64	103	98	12	36	70	95	60	185
6:50—7:00.....		10	68	74	93	21	65	70	105	90	155
7:00—7:10.....		12	62	92	87	13	48	30	120	45	145
7:10—7:20.....		17	57	75	82	7	24	45	100	50	200
7:20—7:30.....		18	82	74	106	25	43	35	165	40	177
7:30—7:40.....		11	66	84	104	22	60	27	130	50	200
7:40—7:50.....		25	92	84	136	8	75	30	220	72	227
7:50—8:00.....		29	102	94	148	28	68	27	170	75	175
8:00—8:10.....		15	92	27	128	10	50	25	145	115	260
8:10—8:20.....		15	66	84	117	7	18	27	145	125	301
8:20—8:30.....		17	103	66	125	14	36	20	120	255	175
8:30—8:40.....		16	69	48	115	8	29	45	128	95	165
8:40—8:50.....		14	51	50	96	26	26	30	120	55	200
8:50—9:00.....		21	55	59	82	15	45	45	100	30	125
9:00—9:10.....		11	34	42	77	17	31	45	80	50	120
9:10—9:20.....		25	56	30	76	5	13	57	55	45	90
9:20—9:30.....		14	36	44	68	14	30	46	45	45	78
9:30—9:40.....		18	23	46	58	4	26	46	72	75	45
9:40—9:50.....		15	51	41	76	3	11	72	30	35	70
9:50—10:00.....		18	44	48	60	21	30	40	74	50	115
10:00—10:10.....		14	38	50	77	28	27	53	42	45	90
10:10—10:20.....		21	38	42	66	6	12	47	46	45	47
10:20—10:30.....		24	40	53	61	25	26	30	55	50	55
10:30—10:40.....		34	40	54	64	12	24	53	80	63	80
10:40—10:50.....		30	43	44	83	14	8	30	90	35	60
10:50—11:00.....		34	39	57	68	21	21	60	72	50	90
11:00—11:10.....		21	35	56	68	19	22	30	82	72	47
11:10—11:20.....		19	28	39	90	9	10	50	80	77	102
11:20—11:30.....		20	43	64	76	19	21	42	80	95	30
11:30—11:40.....		25	42	56	43	29	20	77	96	100	100
11:40—11:50.....		40	45	60	84	10	4	50	75	100	78
11:50—12:00.....		33	36	71	85	33	14	98	97	107	45
P. M. P. M.											
12:00—12:10.....		55	29	77	52	31	19	105	55	180	90
12:10—12:20.....		55	54	90	68	19	10	100	70	145	105
12:20—12:30.....		42	45	51	73	16	21	70	75	95	25
12:30—12:40.....		33	24	63	67	26	9	65	92	90	123
12:40—12:50.....		33	48	58	82	13	11	65	77	95	104
12:50—1:00.....		24	65	65	90	24	25	27	122	83	190
1:00—1:10.....		36	39	60	76	34	22	70	77	110	140
1:10—1:20.....		30	48	65	102	7	14	72	105	75	103
1:20—1:30.....		30	39	53	58	25	20	48	73	80	100
1:30—1:40.....		22	46	52	78	16	28	70	98	90	80
1:40—1:50.....		27	46	45	101	15	10	50	122	90	105
1:50—2:00.....		31	40	76	73	29	31	78	80	74	140
2:00—2:10.....		31	38	57	73	27	26	50	77	95	70
2:10—2:20.....		34	36	72	88	15	8	78	110	103	120
2:20—2:30.....		38	34	77	74	22	27	53	70	85	130

TABLE II (Continued).

UPTOWN LINES.

		DRYADES.		LIBERTY.		SOUTH CLAI- BORNE.		TULANE AVENUE.		CANAL STREET.	
		Up.	Down.	Up.	Down.	Up.	Down.	Up.	Down.	Out.	In.
P. M.	P. M.										
2:30—2:40		36	59	60	73	30	22	75	100	70	143
2:40—2:50		40	44	50	57	9	14	75	100	72	107
2:50—3:00		31	49	71	79	26	33	120	95	90	98
3:00—3:10		30	37	59	70	24	23	140	75	77	70
3:10—3:20		38	45	46	73	19	13	122	100	125	85
3:20—3:30		31	44	75	68	32	22	100	105	77	85
3:30—3:40		37	29	68	63	37	17	102	80	95	77
3:40—3:50		43	43	71	100	13	10	120	48	125	97
3:50—4:00		44	41	48	92	28	23	98	80	103	53
4:00—4:10		27	63	76	91	36	25	75	48	85	73
4:10—4:20		52	41	95	66	14	9	100	107	120	85
4:20—4:30		60	61	74	126	39	29	80	103	130	55
4:30—4:40		45	22	56	50	29	22	127	72	95	75
4:40—4:50		50	37	81	92	42	9	122	76	180	72
4:50—5:00		49	39	82	71	40	21	152	33	135	100
5:00—5:10		68	24	75	97	60	21	170	80	210	77
5:10—5:20		106	50	158	108	78	30	200	127	205	85
5:20—5:30		80	66	134	140	63	22	285	125	250	130
5:30—5:40		111	36	162	104	103	33	292	55	302	105
5:40—5:50		106	46	166	121	103	25	258	225	339	105
5:50—6:00		113	36	171	153	108	27	289	82	320	70
6:00—6:10		90	27	144	89	87	22	255	51	230	150
6:10—6:20		137	76	174	184	88	15	274	49	364	165
6:20—6:30		95	32	132	88	84	9	175	47	261	45
6:30—6:40		50	44	89	132	68	15	145	27	172	50
6:40—6:50		48	41	101	118	42	12	102	52	77	70
6:50—7:00		34	46	74	80	52	21	150	71	127	103
7:00—7:10		39	37	76	101	25	18	85	90	105	120
7:10—7:20		39	38	65	76	33	7	73	65	127	77
7:20—7:30		36	65	78	116	33	28	90	55	78	102
7:30—7:40		34	48	80	70	33	30	40	70	78	195
7:40—7:50		24	52	60	139	18	22	68	80	120	70
7:50—8:00		25	48	70	111	10	50	50	95	80	150
8:00—8:10		25	61	49	96	23	19	80	75	110	122
8:10—8:20		34	47	69	84	18	9	50	65	90	65
8:20—8:30		27	28	61	81	24	18	53	46	100	62
8:30—8:40		30	30	47	63	14	17	45	30	60	60
8:40—8:50		18	41	60	63	16	7	50	25	80	25
8:50—9:00		21	28	43	64	18	9	40	27	95	27
9:00—9:10		14	36	39	60	13	9	25	23	30	52
9:10—9:20		13	26	43	60	10	10	52	5	105	60
9:20—9:30		28	15	53	35	18	6	45	25	55	20
9:30—9:40		23	18	35	35	19	9	55	15	90	40
9:40—9:50		23	22	43	62	8	5	52	15	70	20
9:50—10:00		28	23	53	33	22	9	40	15	50	50
10:00—10:10		16	15	42	56	23	7	55	5	80	47
10:10—10:20		24	38	48	51	10	6	60	15	85	47
10:20—10:30		21	16	51	37	19	10	30	22	55	25
10:30—10:40		29	20	55	59	24	7	55	3	70	45
10:40—10:50		31	6	49	55	6	8	50	20	80	20
10:50—11:00		23	14	48	36	26	9	30	10	100	23
11:00—11:10		18	15	40	48	18	5	70	4	30	25
11:10—11:20		19	12	46	45	14	8	45	17	80	10
11:20—11:30		23	14	38	35	19	7	20	8	65	40

TABLE II (Continued).

DOWNTOWN LINES.

		DAUPHINE.		LAFAYETTE- GENTILLY.		CITY PARK.	
A. M.	A. M.	Up.	Down.	Up.	Down.	Up.	Down.
5:30—5:40.....		33	19		10	55	5
5:40—5:50.....		94	56	17	12	37	11
5:50—6:00.....		101	76	17	2	55	5
6:00—6:10.....		125	182	31	9	79	14
6:10—6:20.....		128	153	40	13	85	20
6:20—6:30.....		157	141	48	11	101	24
6:30—6:40.....		245	81	65	13	71	25
6:40—6:50.....		153	56	48	9	123	12
6:50—7:00.....		169	78	50	12	101	21
7:00—7:10.....		168	34	48	10	88	16
7:10—7:20.....		169	45	51	11	109	15
7:20—7:30.....		176	48	36	9	111	11
7:30—7:40.....		173	35	36	9	95	19
7:40—7:50.....		196	36	65	10	105	14
7:50—8:00.....		227	43	31	11	87	8
8:00—8:10.....		186	46	49	11	139	19
8:10—8:20.....		211	51	48	10	78	17
8:20—8:30.....		182	51	35	13	60	18
8:30—8:40.....		91	46	25	6	51	15
8:40—8:50.....		141	28	30	12	95	21
8:50—9:00.....		73	48	28	5	51	19
9:00—9:10.....		65	21	24	13	49	17
9:10—9:20.....		83	36	28	10	31	8
9:20—9:30.....		72	38	17	19	50	17
9:30—9:40.....		58	59	24	12	29	8
9:40—9:50.....		81	51	25	10	42	20
9:50—10:00.....		56	54	13	11	69	22
10:00—10:10.....		114	44	19	13	27	26
10:10—10:20.....		61	47	17	11	41	20
10:20—10:30.....		72	37	19	13	52	37
10:30—10:40.....		81	42	23	11	38	23
10:40—10:50.....		67	56	24	13	39	26
10:50—11:00.....		87	60	21	13	24	24
11:00—11:10.....		53	50	8	13	31	27
11:10—11:20.....		41	61	16	22	25	20
11:20—11:30.....		75	80	17	11	31	30
11:30—11:40.....		54	47	17	13	32	45
11:40—11:50.....		73	57	11	20	20	33
11:50—12:00.....		46	54	17	24	33	63
P. M. P. M.							
12:00—12:10.....		67	117	15	24	41	49
12:10—12:20.....		69	109	14	22	30	55
12:20—12:30.....		62	61	14	27	20	49
12:30—12:40.....		66	78	15	22	26	42
12:40—12:50.....		78	45	18	21	46	43
12:50—1:00.....		136	58	23	21	55	36
1:00—1:10.....		91	83	19	12	39	35
1:10—1:20.....		101	47	27	15	47	37
1:20—1:30.....		77	76	18	15	45	49
1:30—1:40.....		83	65	24	16	44	42
1:40—1:50.....		70	48	21	12	47	45
1:50—2:00.....		73	65	20	17	41	37
2:00—2:10.....		117	43	13	25	47	45
2:10—2:20.....		70	53	23	22	45	36
2:20—2:30.....		100	72	20	15	36	35

TABLE II (Continued).

DOWNTOWN LINES.

		DAUPHINE.		LAFAYETTE- GENTILLY.		CITY PARK.	
P. M.	P. M.	Up.	Down.	Up.	Down.	Up.	Down.
2:30—2:40		81	58	27	19	33	36
2:40—2:50		89	66	22	11	33	40
2:50—3:00		65	57	18	24	40	42
3:00—3:10		103	79	20	22	30	33
3:10—3:20		70	53	18	23	37	39
3:20—3:30		93	63	17	24	39	65
3:30—3:40		77	55	23	24	42	55
3:40—3:50		77	74	17	15	30	40
3:50—4:00		77	55	18	25	27	58
4:00—4:10		79	57	18	23	35	49
4:10—4:20		85	86	18	22	41	64
4:20—4:30		78	81	15	31	16	60
4:30—4:40		67	79	11	31	36	56
4:40—4:50		110	73	12	36	21	90
4:50—5:00		65	92	17	40	27	64
5:00—5:10		110	115	12	45	26	71
5:10—5:20		138	168	16	76	37	139
5:20—5:30		168	154	11	82	31	105
5:30—5:40		153	181	17	84	31	128
5:40—5:50		126	149	28	73	34	123
5:50—6:00		149	172	18	81	38	135
6:00—6:10		136	186	13	60	23	132
6:10—6:20		184	279	10	67	19	146
6:20—6:30		148	117	17	75	35	127
6:30—6:40		96	91	7	46	28	107
6:40—6:50		96	85	14	30	29	92
6:50—7:00		74	75	14	28	24	68
7:00—7:10		94	72	15	22	31	68
7:10—7:20		90	73	14	26	33	52
7:20—7:30		87	82	17	25	37	53
7:30—7:40		110	35	16	21	39	35
7:40—7:50		96	100	19	15	47	72
7:50—8:00		72	62	22	24	38	33
8:00—8:10		78	68	17	14	32	24
8:10—8:20		71	51	20	24	23	48
8:20—8:30		52	61	8	12	15	37
8:30—8:40		53	36	10	19	21	21
8:40—8:50		46	48	6	14	17	28
8:50—9:00		31	52	8	13	15	29
9:00—9:10		39	31	8	13	11	25
9:10—9:20		41	30	6	14	19	34
9:20—9:30		64	39	7	22	8	28
9:30—9:40		28	47	12	14	8	34
9:40—9:50		43	39	8	20	15	30
9:50—10:00		32	33	6	9	10	36
10:00—10:10		34	44	11	16	11	25
10:10—10:20		35	50	7	10	11	40
10:20—10:30		27	27	6	15	7	36
10:30—10:40		39	60	2	13	15	27
10:40—10:50		42	25	6	14	15	27
10:50—11:00		37	40	4	13	9	35
11:00—11:10		21	36	7	10	4	39
11:10—11:20		34	32	4	11	8	18
11:20—11:30		30	15	6	11	9	24

TABLE II (Continued).

DOWNTOWN LINES.

		ESPLANADE.		ST. CLAUDE.		NORTH	
		AVENUE.				CLAIBORNE.	
A. M.	A. M.	Up.	Down.	Up.	Down.	Up.	Down.
5:30—5:40		29	5	22	26	23	39
5:40—5:50		36	5	72	41	95	13
5:50—6:00		43	15	49	48	46	10
6:00—6:10		51	27	102	128	158	34
6:10—6:20		62	15	89	123	119	75
6:20—6:30		76	28	99	98	143	46
6:30—6:40		90	29	127	66	173	74
6:40—6:50		125	34	81	34	123	49
6:50—7:00		101	29	89	36	145	44
7:00—7:10		72	18	97	26	120	40
7:10—7:20		80	23	92	27	142	28
7:20—7:30		116	28	97	34	126	23
7:30—7:40		82	28	107	23	182	28
7:40—7:50		152	23	71	25	124	29
7:50—8:00		137	33	104	24	123	44
8:00—8:10		132	49	95	32	140	45
8:10—8:20		135	59	99	31	130	44
8:20—8:30		100	81	84	53	121	70
8:30—8:40		68	80	57	45	84	59
8:40—8:50		71	29	51	19	68	28
8:50—9:00		96	28	37	40	81	46
9:00—9:10		64	17	34	14	76	27
9:10—9:20		53	24	34	26	57	35
9:20—9:30		45	25	40	23	58	28
9:30—9:40		35	28	29	39	56	46
9:40—9:50		54	27	40	22	58	31
9:50—10:00		57	28	35	39	53	39
10:00—10:10		33	31	50	28	67	32
10:10—10:20		35	28	30	31	51	42
10:20—10:30		33	33	33	26	46	29
10:30—10:40		37	28	35	26	55	43
10:40—10:50		37	28	33	39	57	49
10:50—11:00		36	40	42	31	54	35
11:00—11:10		34	40	27	32	38	47
11:10—11:20		33	40	30	36	45	35
11:20—11:30		33	25	38	60	52	39
11:30—11:40		32	38	33	37	45	49
11:40—11:50		33	40	46	38	84	48
11:50—12:00		42	40	22	37	43	54
P. M. P. M.							
12:00—12:10		34	87	33	67	37	94
12:10—12:20		32	48	34	66	46	74
12:20—12:30		37	65	29	28	35	63
12:30—12:40		51	51	30	63	42	75
12:40—12:50		41	45	40	28	59	54
12:50—1:00		66	38	48	36	61	56
1:00—1:10		61	31	38	55	60	63
1:10—1:20		60	55	43	37	41	63
1:20—1:30		63	36	33	54	75	50
1:30—1:40		56	38	34	41	27	60
1:40—1:50		57	40	47	41	103	65
1:50—2:00		60	59	34	32	63	40
2:00—2:10		63	37	50	43	50	83
2:10—2:20		52	54	34	32	56	59
2:20—2:30		57	36	60	52	71	39

TABLE II (Continued).

DOWNTOWN LINES.

		ESPLANADE.		ST. CLAUDE.		NORTH	
		AVENUE.				CLAIBORNE.	
P. M.	P. M.	Up.	Down.	Up.	Down.	Up.	Down.
2:30—2:40		83	33	35	44	50	66
2:40—2:50		82	65	48	49	64	52
2:50—3:00		56	51	29	31	55	56
3:00—3:10		58	33	55	53	71	58
3:10—3:20		49	65	42	36	45	61
3:20—3:30		65	44	49	46	50	79
3:30—3:40		42	67	40	39	61	66
3:40—3:50		47	69	47	67	75	80
3:50—4:00		33	67	39	47	46	83
4:00—4:10		36	65	47	63	54	75
4:10—4:20		39	68	40	55	54	76
4:20—4:30		35	77	43	71	52	111
4:30—4:40		39	80	39	64	44	113
4:40—4:50		26	94	55	67	44	116
4:50—5:00		60	110	29	75	23	123
5:00—5:10		36	121	60	87	81	128
5:10—5:20		38	136	77	112	52	193
5:20—5:30		38	180	98	118	67	207
5:30—5:40		38	164	92	147	52	259
5:40—5:50		54	186	87	134	86	240
5:50—6:00		33	220	106	160	80	279
6:00—6:10		29	189	77	157	35	128
6:10—6:20		32	278	113	176	53	217
6:20—6:30		35	183	92	96	38	188
6:30—6:40		37	126	60	69	47	119
6:40—6:50		54	98	61	72	39	117
6:50—7:00		69	55	42	62	46	83
7:00—7:10		79	46	44	41	46	45
7:10—7:20		54	74	57	42	68	42
7:20—7:30		128	91	51	61	53	84
7:30—7:40		89	82	63	36	72	72
7:40—7:50		67	92	43	71	53	61
7:50—8:00		129	33	39	53	72	74
8:00—8:10		50	34	39	35	49	36
8:10—8:20		55	53	34	44	48	75
8:20—8:30		31	52	31	25	38	44
8:30—8:40		42	36	24	26	30	52
8:40—8:50		32	32	20	33	25	43
8:50—9:00		15	34	15	37	24	47
9:00—9:10		25	57	17	14	24	32
9:10—9:20		27	41	21	23	25	48
9:20—9:30		7	69	31	26	24	52
9:30—9:40		17	55	16	26	24	40
9:40—9:50		25	53	45	24	68	54
9:50—10:00		23	74	35	25	39	48
10:00—10:10		27	32	31	23	26	48
10:10—10:20		26	52	15	28	18	48
10:20—10:30		7	40	23	19	20	48
10:30—10:40		9	33	14	36	10	48
10:40—10:50		29	44	26	24	23	67
10:50—11:00		8	40	17	47	12	84
11:00—11:10		21	51	15	39	24	71
11:10—11:20		17	29	22	37	18	60
11:20—11:30		9	53	16	21	13	53

TABLE III.
CAR TRIPS.

TO FURNISH 100 SEATS PER 100 PASSENGERS (TEN-MINUTE PERIOD).

	5:30—6:30	6:30—7:30	7:30—8:30	8:30—9:30	9:30—10:30	10:30—11:30	11:30—12:30	12:30—1:30	1:30—2:30	2:30—3:30	3:30—4:30	4:30—5:30	5:30—6:30	6:30—7:30	7:30—8:30	8:30—9:30	9:30—10:30	10:30—11:30	TOTAL
TCHOUPITOULAS (28-seat car).....	15	15	10	10	10	10	10	10	10	10	10	12	10	10	10	10	10	10	192
LAUREL (52-seat car).....	15	24	27	14	12	10	12	12	10	10	12	22	33	13	12	10	10	10	268
COLISEUM (52-seat car).....	12	20	33	20	12	10	13	16	12	15	13	26	37	13	15	10	10	10	297
ST. CHARLES AVE. (52-seat car).....	12	22	43	28	18	16	17	17	21	20	20	35	50	20	26	10	17	17	409
PULANE AVE. (52-seat car).....	13	15	20	13	10	10	12	12	12	15	13	23	32	14	10	10	10	10	254
DRYADES (28-seat car).....	12	14	20	12	10	10	10	10	10	12	12	16	24	12	12	10	10	10	226
LIBERTY (44-seat car).....	13	16	19	13	10	12	12	13	13	10	14	15	23	16	14	10	10	10	243
SOUTH CLAIBORNE (32-seat car).....	10	12	13	10	10	10	10	10	10	10	10	13	20	12	10	10	10	10	200
CANAL STREET (52-seat car).....	13	21	30	18	13	12	15	16	15	13	15	22	36	16	13	12	12	12	304
ESPLANADE AVE. (52-seat car).....	10	14	16	10	10	10	10	10	10	10	10	16	26	12	10	10	10	10	214
DAUPHINE (52-seat car).....	12	20	20	10	13	12	14	14	14	14	14	13	19	14	14	10	10	10	247
CITY PARK (28-seat car).....	15	23	21	13	10	10	10	10	10	11	12	19	30	17	10	10	10	10	251
LAFAYETTE AVE. (32-seat car).....	10	13	13	10	10	10	10	10	10	10	10	13	18	10	10	10	10	10	197
ST. CLAUDE (44-seat car).....	13	13	15	10	10	10	10	10	10	10	10	14	21	10	10	10	10	10	206
NORTH CLAIBORNE (52-seat car)....	15	19	19	10	10	10	10	10	10	10	11	19	27	13	10	10	10	10	233
																			3,741
JACKSON AVE.....																			
NAPOLEON AVE.....																			
LOUISIANA AVE.....																			
PETERS AVE.....																			
BROADWAY.....	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	1,620
EAGLE.....																			
ST. BERNARD.....																			
BROAD.....																			
CARROLLTON AVE.....																			
SPANISH FORT (40 and 60-seat cars and trailers).....	2	2	2	2	2	2	2	2	2	2	2	3	3	4	4	4	4	4	48
METAIRIE (32-seat car).....	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	36
	284	355	413	295	262	256	269	274	271	274	280	373	501	298	282	248	255	255	5,445

TABLE IV.
CAR HOURS.

TO FURNISH 100 SEATS PER 100 PASSENGERS (TEN MINUTE PERIOD).

	5:30—6:30	6:30—7:30	7:30—8:30	8:30—9:30	9:30—10:30	10:30—11:30	11:30—12:30	12:30—1:30	1:30—2:30	2:30—3:30	3:30—4:30	4:30—5:30	5:30—6:30	6:30—7:30	7:30—8:30	8:30—9:30	9:30—10:30	10:30—11:30	TOTAL
TCHOUPITOU LAS (60')	15	15	10	10	10	10	10	10	10	10	10	12	10	10	10	10	10	10	192
LAUREL (75') (45')	19	22	25	17	15	13	15	15	13	13	15	20	31	16	15	13	13	13	303
COLISEUM (60') (35')	12	14	24	14	12	10	13	16	12	15	13	19	27	13	15	10	10	10	259
ST. CHARLES AVE. (60') (45')	12	18	35	23	16	16	16	16	17	16	16	28	40	16	21	10	17	17	350
TULANE AVE. (60') (35')	13	15	15	13	10	10	12	12	12	15	12	17	23	14	10	10	10	10	233
DRYADES (50')	10	12	17	10	8	8	8	8	8	10	10	13	20	10	10	8	8	8	186
LIBERTY (60') (40')	13	15	15	13	10	12	12	13	13	10	14	15	18	15	14	10	10	10	232
SOUTH CLAIBORNE (60')	10	12	13	10	10	10	10	10	10	10	10	13	20	12	10	10	10	10	200
CANAL STREET (60') (35')	13	15	22	15	13	12	16	16	15	13	15	16	26	15	13	12	12	12	271
ESPLANADE AVE. (60') (45')	10	16	16	10	10	10	10	10	10	10	10	16	21	12	10	10	10	10	211
DAUPHINE (50')	10	17	17	8	11	10	12	12	12	12	12	11	16	12	12	8	8	8	208
CITY PARK (45')	11	17	16	10	8	8	8	8	8	8	9	14	22	13	8	8	8	8	192
LAFAYETTE AVE. (35') (55')	9	12	12	9	6	6	6	6	6	6	6	12	17	6	6	6	6	6	143
ST. CLAUDE (85') (45')	18	18	21	14	14	14	14	14	14	14	14	20	22	14	14	14	14	14	281
NORTH CLAIBORNE (40')	10	14	14	7	7	7	7	7	7	7	7	14	18	9	7	7	7	7	163
JACKSON (10')	2	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	702
NAPOLEON (60')	10																		
LOUISIANA (20')	4																		
PETERS AVE. (25')	4																		
BROADWAY (30')	5																		
EAGLE (10')	2																		
ST. BERNARD (20')	4																		
BROAD (25')	5	3	3	3	3	3	3	3	3	3	3	4	4	6	6	6	6	6	71
CARROLLTON (6')	1																		
METAIRIE (30')	2																		
SPANISH FORT (90')	3																		
	227	274	314	225	202	198	211	215	209	211	215	283	374	232	220	191	198	198	4,197

TABLE V.
COMPARISON OF PRESENT AND SUGGESTED NEW
ROUTING.

ANNUAL SAVINGS.
CAR-HOURS—ROUND TRIP MILES.

CAR-HOURS FURNISHED APRIL, 1917 (ALLISON REPORT).

Daily Except Sunday.	Car-Hours.	Round Trip Miles.
Tehoupitoulas	266	15.17
Annunciation	176	9.15
Laurel	195	11.25
Magazine	321	15.57
Coliseum	192	9.60
Prytania	297	
Villere	219	20.26
St. Charles Belt.....	292	11.29
Tulane Belt	338	11.29
Carondelet	380	15.49
Peters Avenue	265	9.77
Dryades	170	5.75
Louisiana Avenue	212	8.70
Clio	225	11.64
South Claiborne	80	9.05
Canal Belt	275	8.39
Esplanade Belt	280	8.39
Levee and Barracks.....	130	10.25
Dauphine	240	11.84
Bayou St. John.....	122	5.92
French Market	112	7.48
Broad	138	7.13
North Claiborne	283	9.24
Jackson Avenue	210	6.15
Napoleon Avenue	129	16.93
Spanish Fort	60	17.09
Total	5,607	272.79
Additional car-hours required to give adequate service (Allison Report).....	350	
Total	5,957	
Deduct car-hours saved by routings abandoned since Allison Survey	400	
Total.....	5,557	

TABLE V (Continued).

CAR-HOURS REQUIRED TO FURNISH 100 SEATS PER 100 PASSENGERS (10-MINUTE PERIOD) UNDER SUGGESTED ROUTING.

Construction Stages I, II and III Completed.

Daily Except Sunday.	Car-Hours.	Round Trip Miles.
Tehoupitoulas	192	7.35
Laurel	303	11.77
Coliseum	259	9.88
St. Charles Avenue	350	10.44
Tulane Avenue	233	10.44
Dryades	186	5.80
Liberty	232	9.45
South Claiborne	200	9.86
Canal Street	271	8.39
Esplanade Avenue	211	8.39
Dauphine	208	6.73
City Park	192	6.85
Lafayette Avenue	143	6.52
St. Claude	281	13.56
North Claiborne	163	6.90
Jackson Avenue	36	1.85
Louisiana Avenue	72	2.65
Napoleon Avenue	180	9.58
Peters Avenue	72	1.86
Broadway	90	5.16
Eagle	36	1.36
St. Bernard	72	3.03
Broad	90	3.63
Carrollton Avenue	18	1.06
Metairie Ridge	36	7.35
Spanish Fort	71	17.09
Total	4,197	186.95

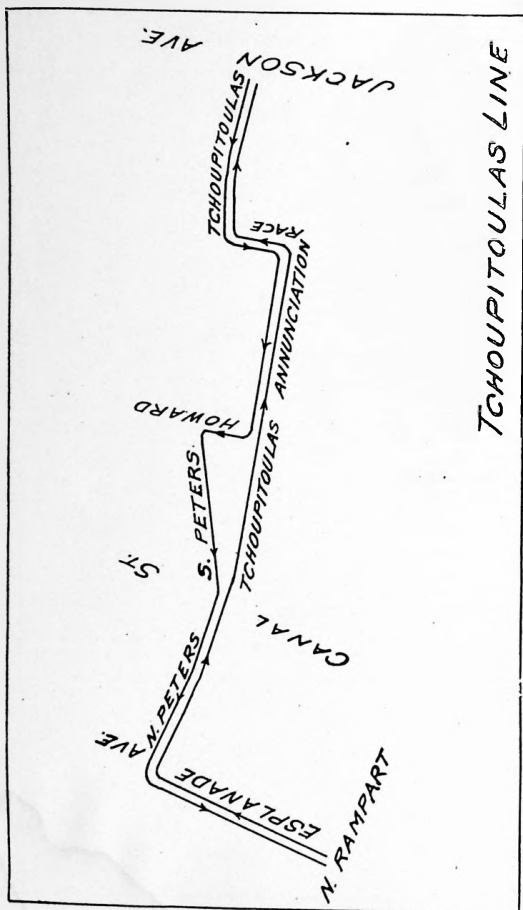
Assume cost of running car per hour (cost per car-hour), platform expense, power consumption and portion of repairs and maintenance, at \$1.00 per hour. This is the actual net cost of running the car and does not include overhead charges.

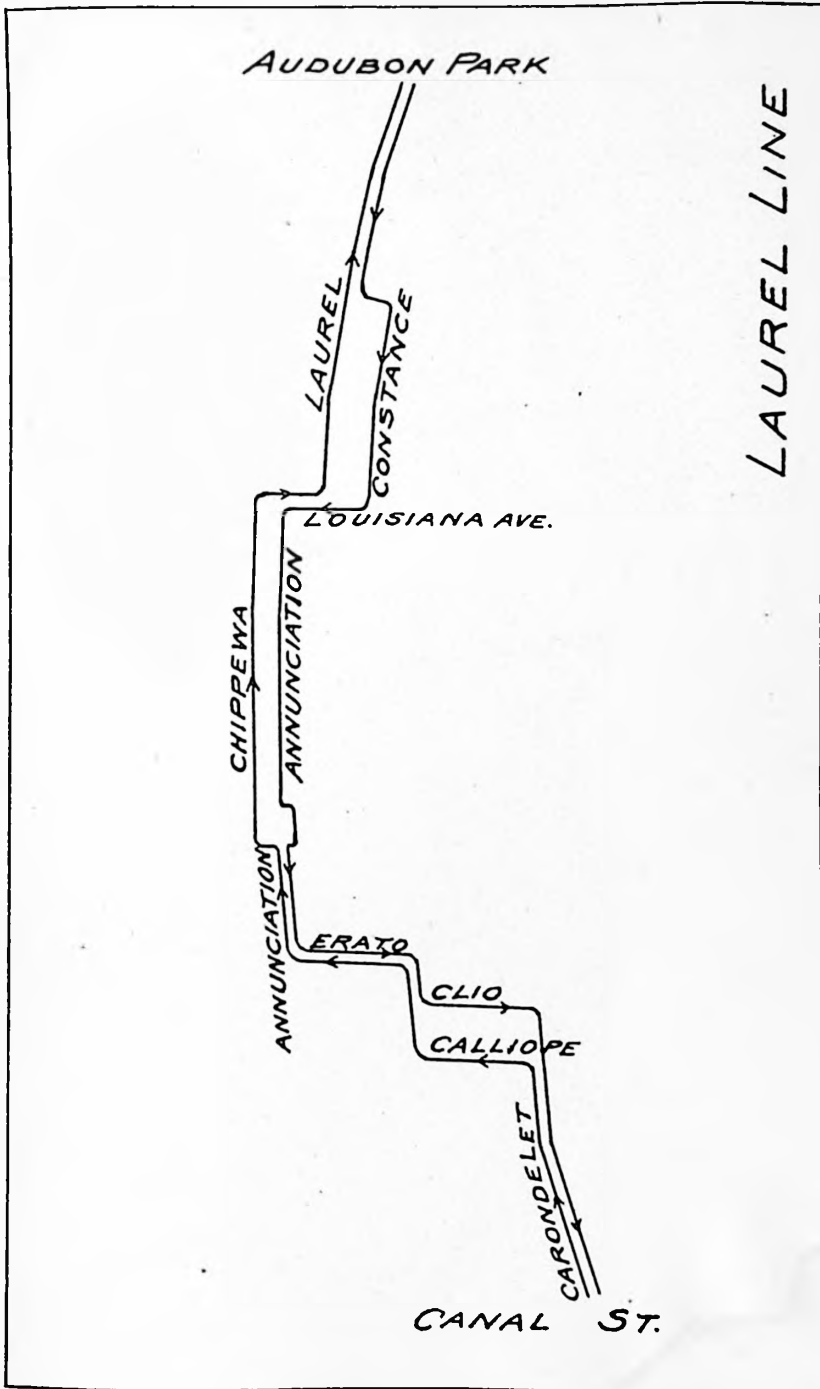
Estimated saving per day, 5,557—4,197.....1,360

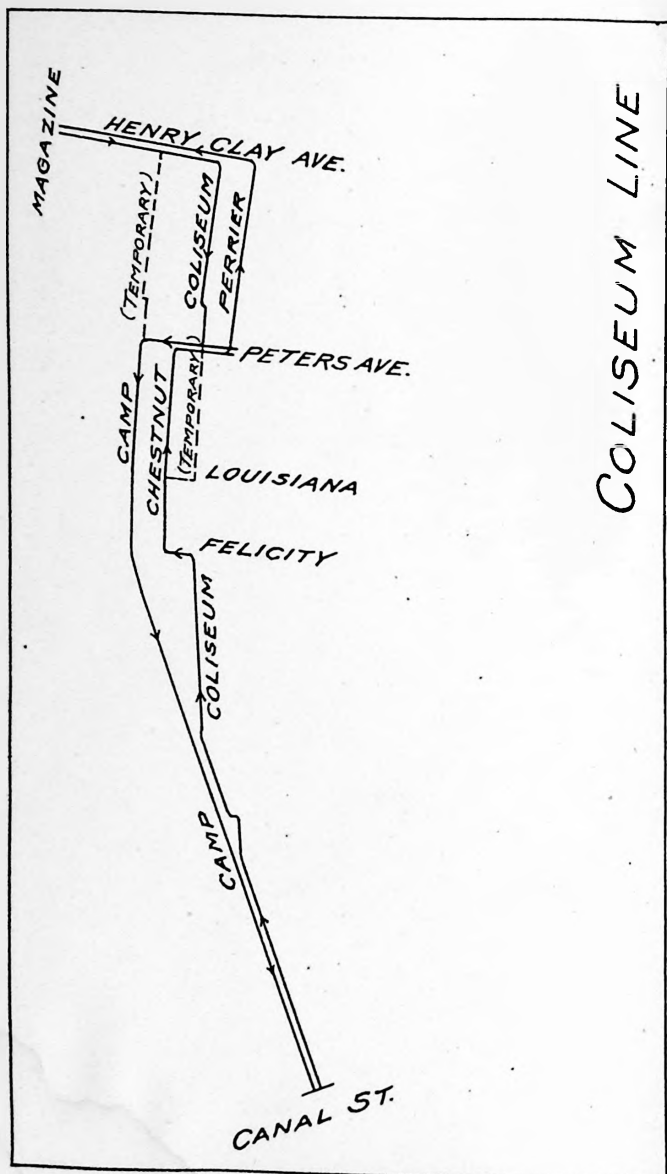
Assume Sunday saving at three-fourths this figure.....1,020

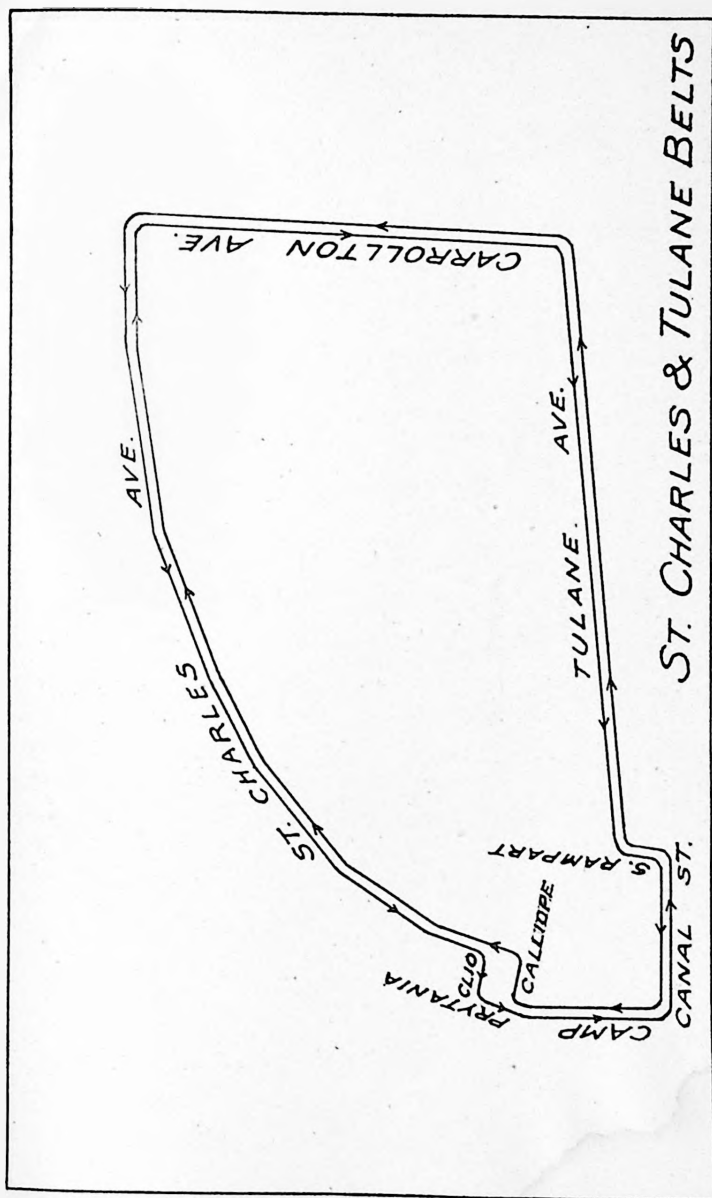
Total Annual Saving:

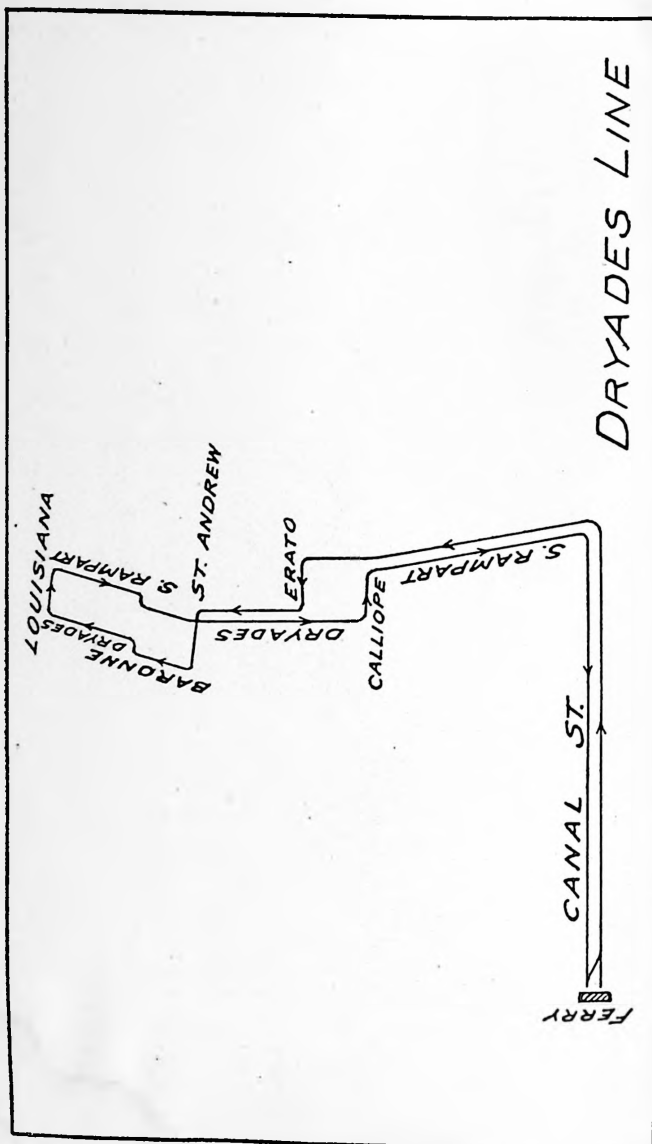
1,360 X 313.....	\$425,000
1,020 X 52.....	53,000
	<u>\$478,000</u>

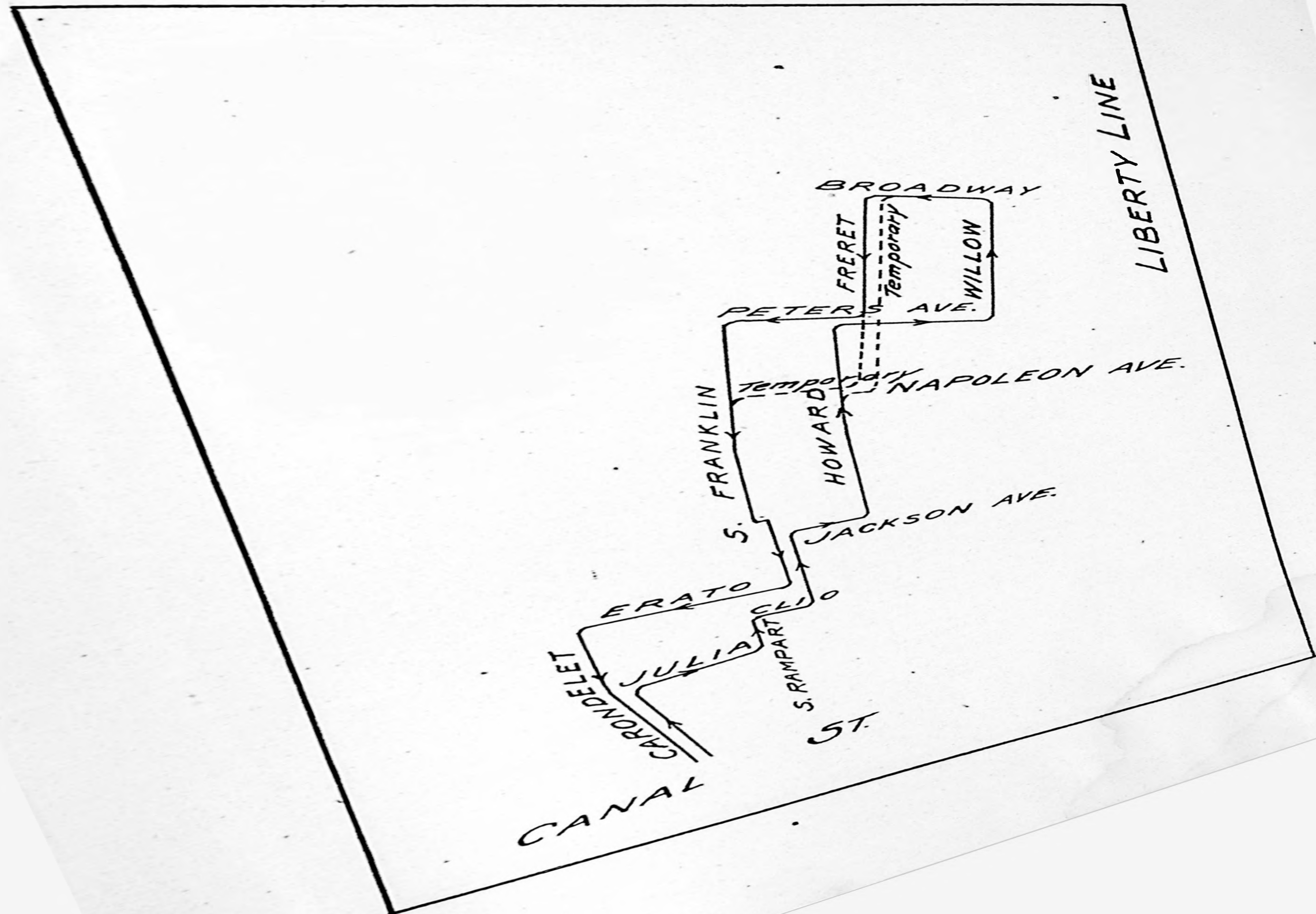


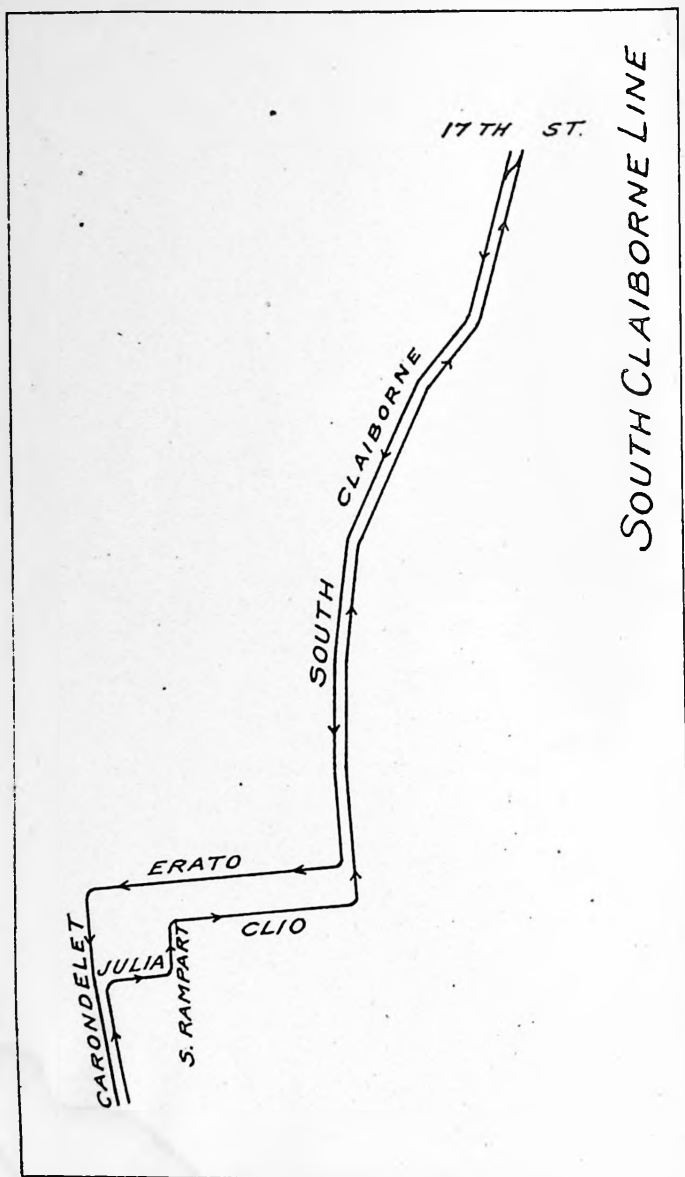


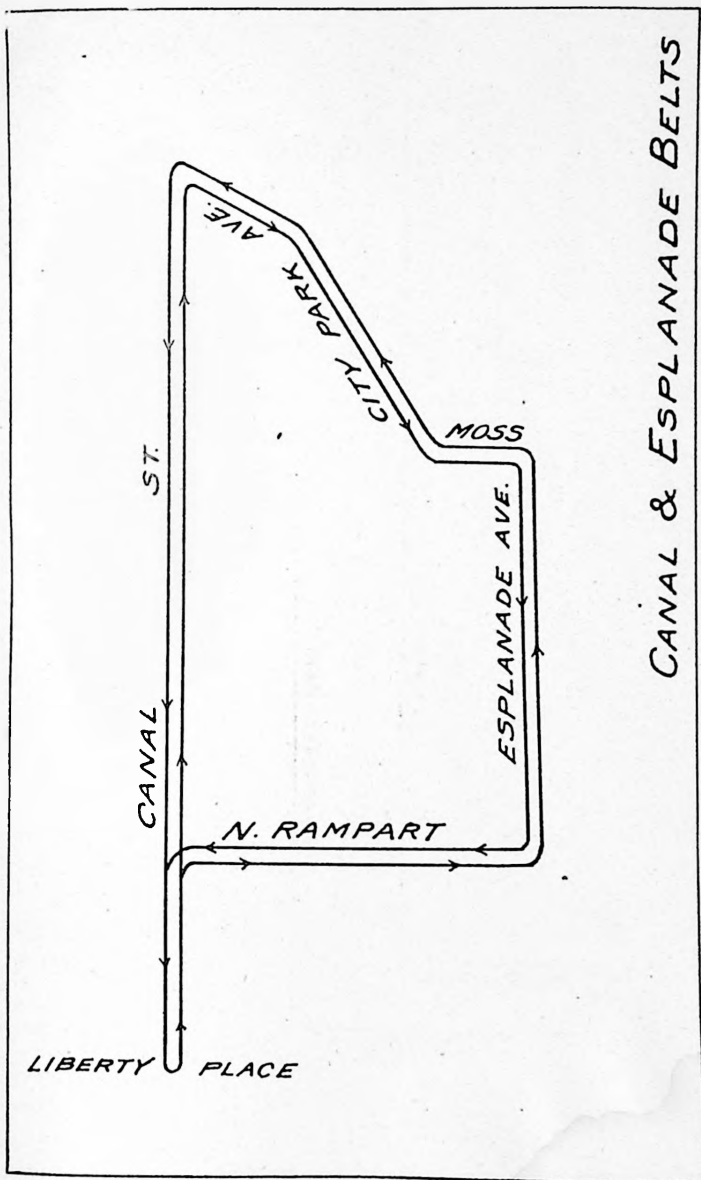


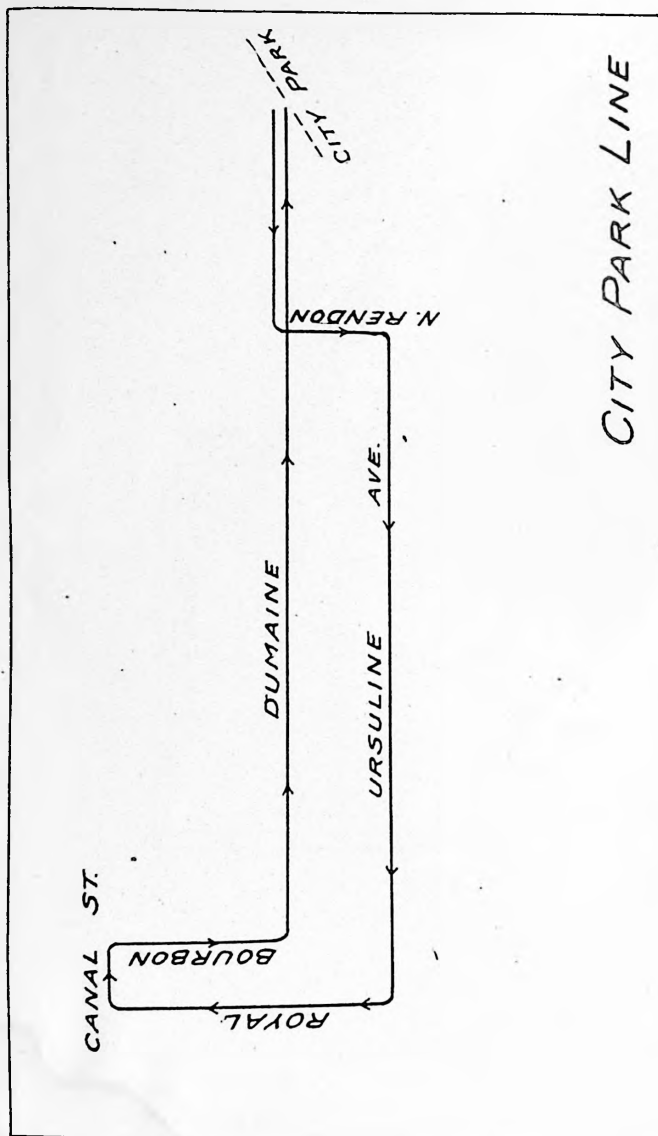


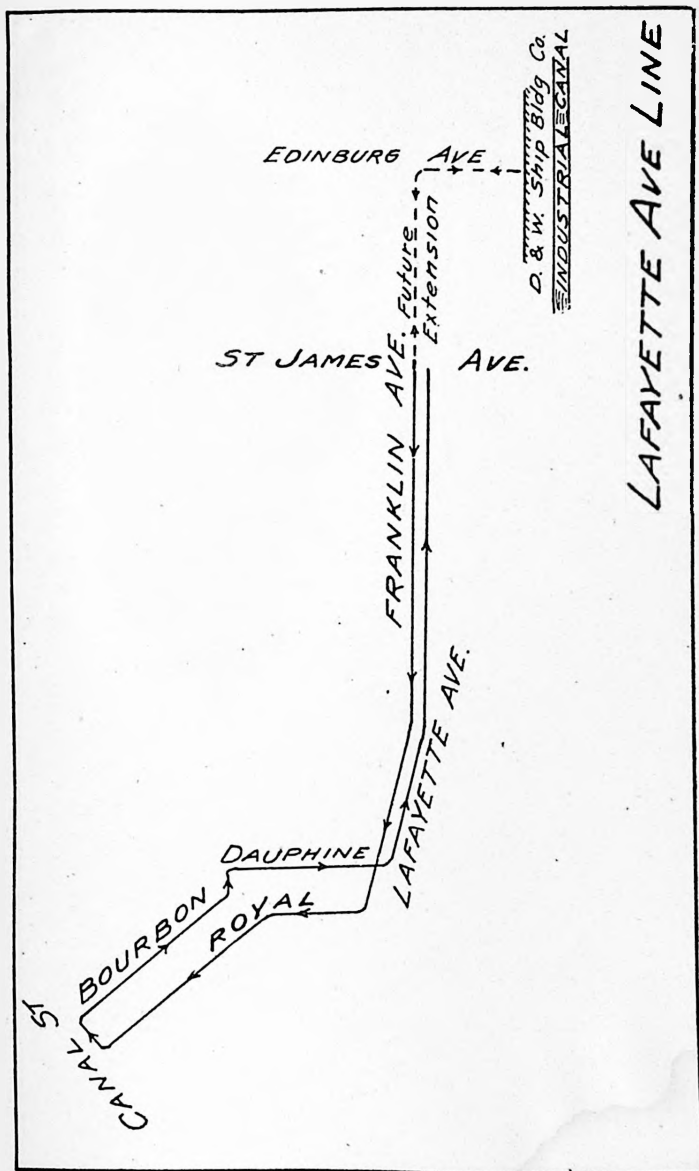


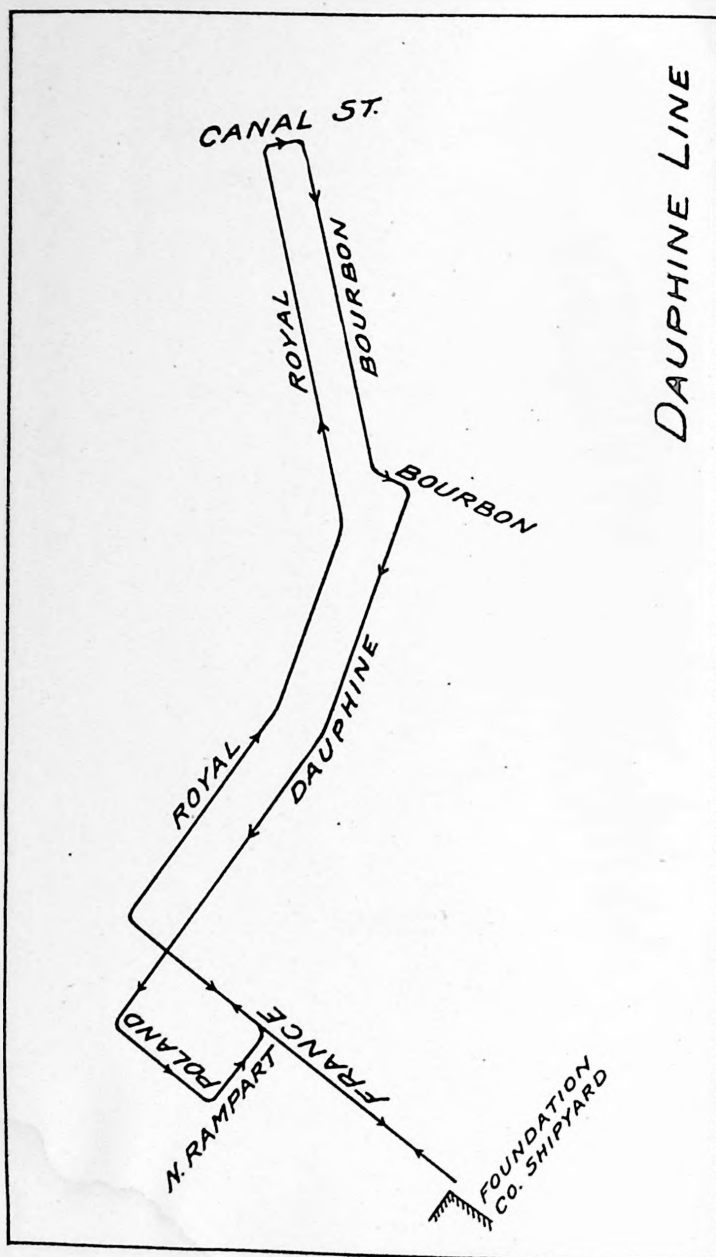


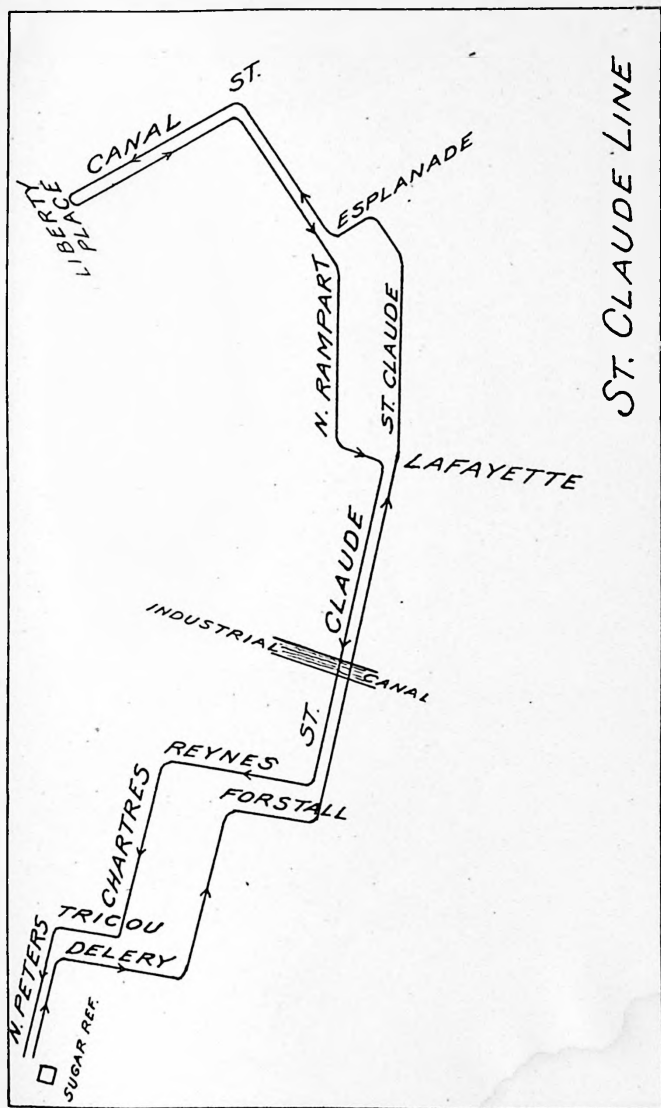


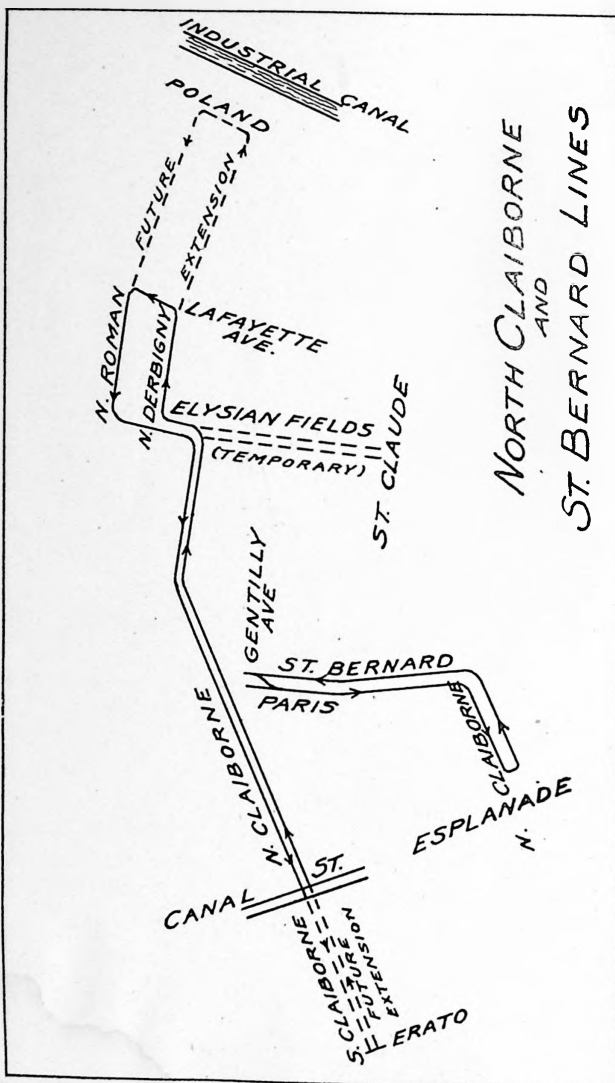


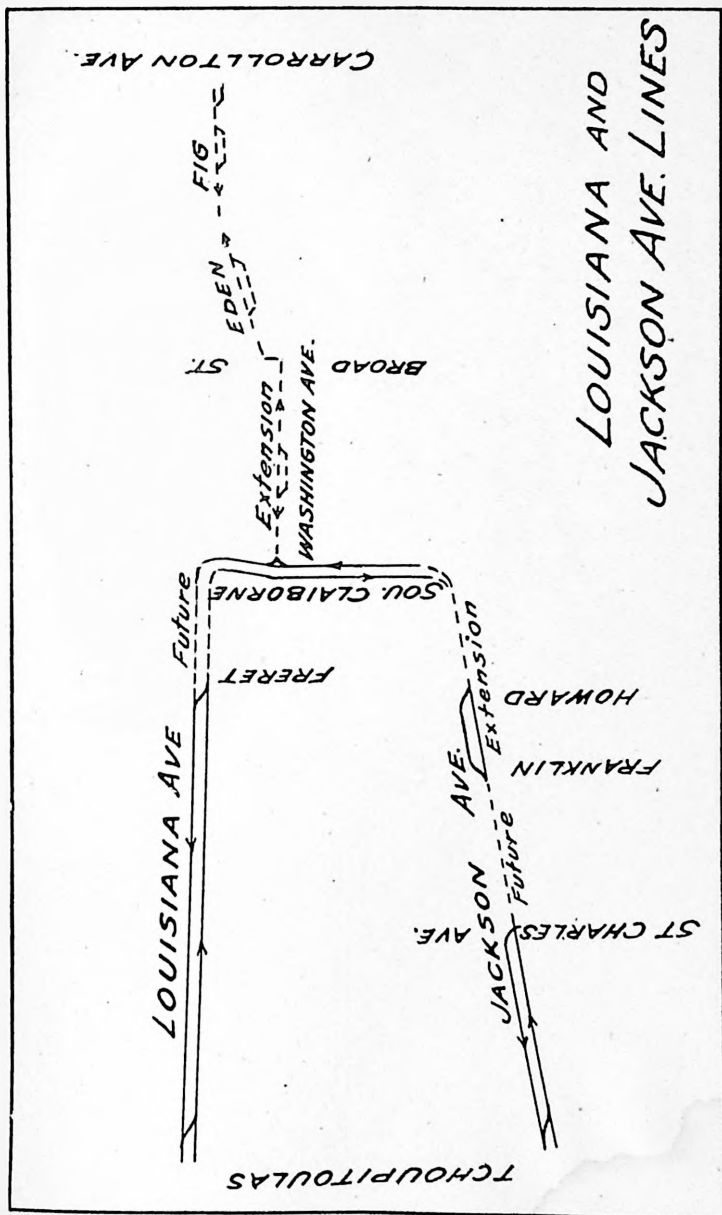


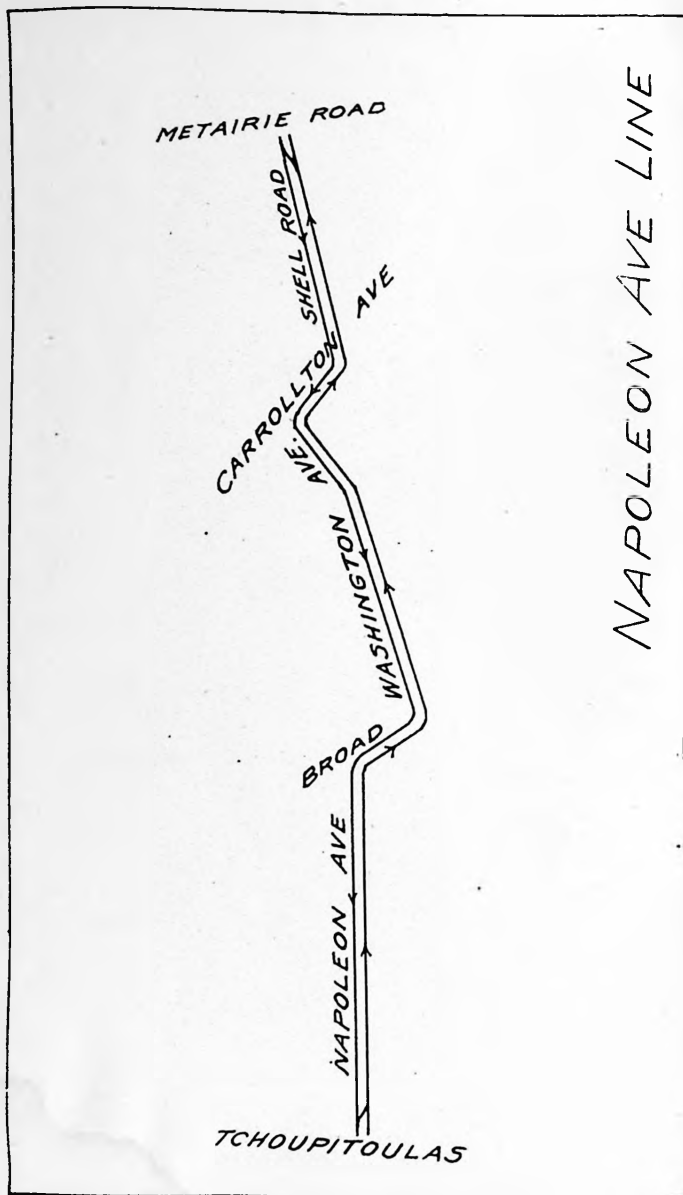


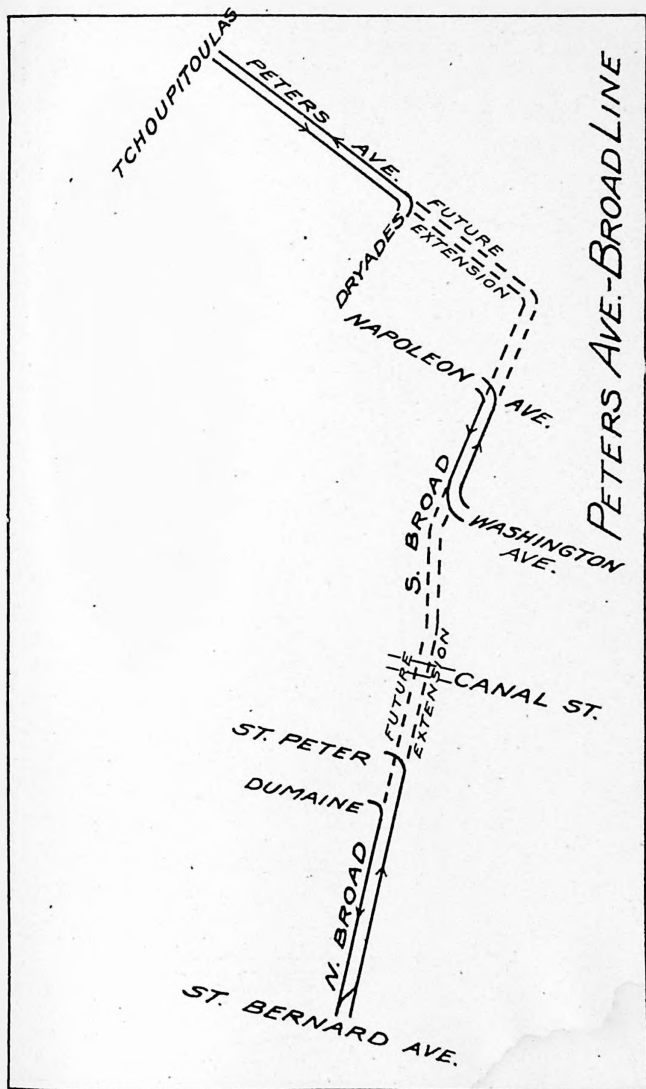


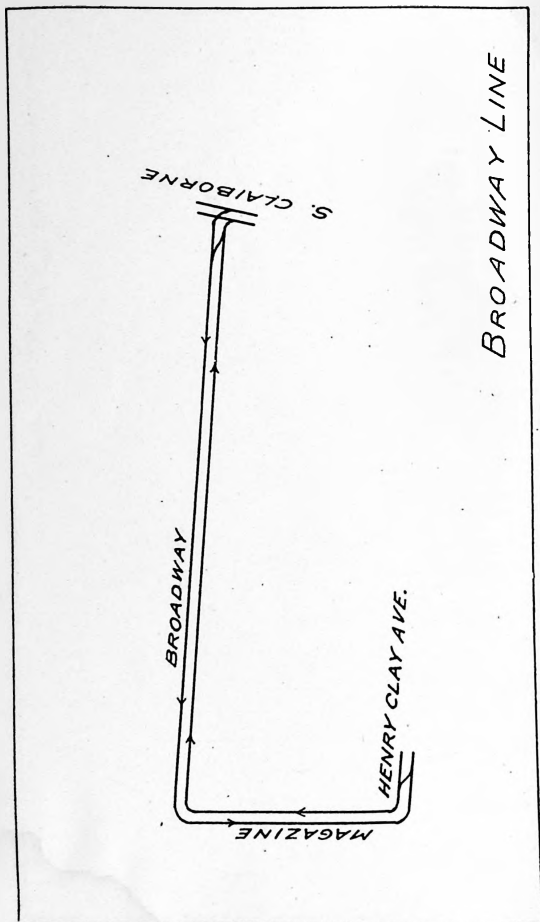


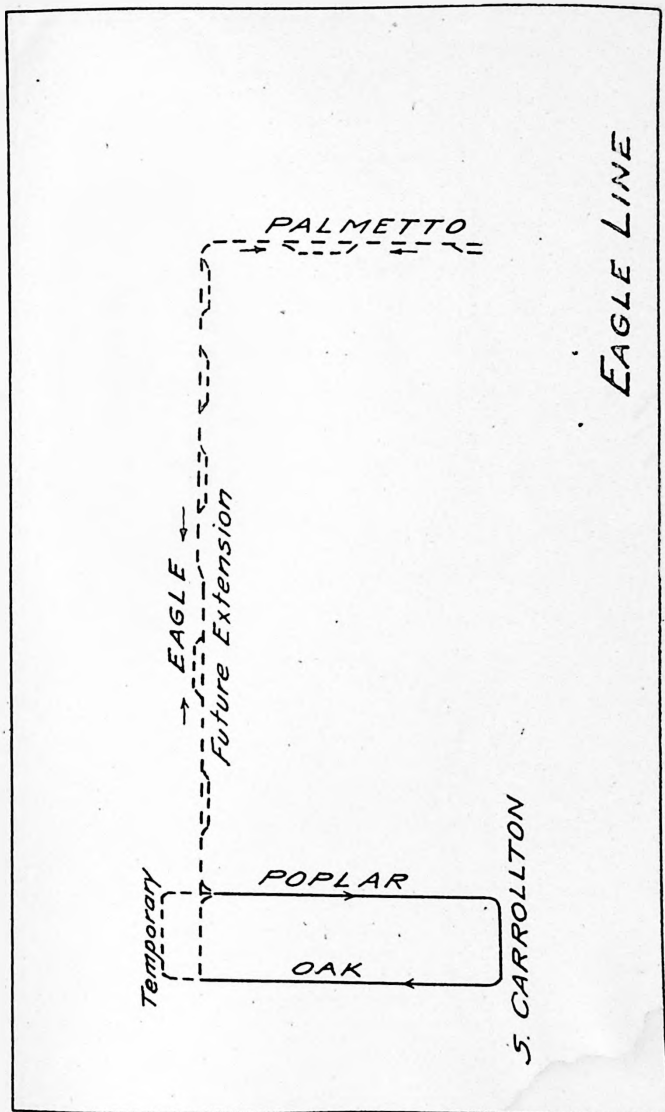


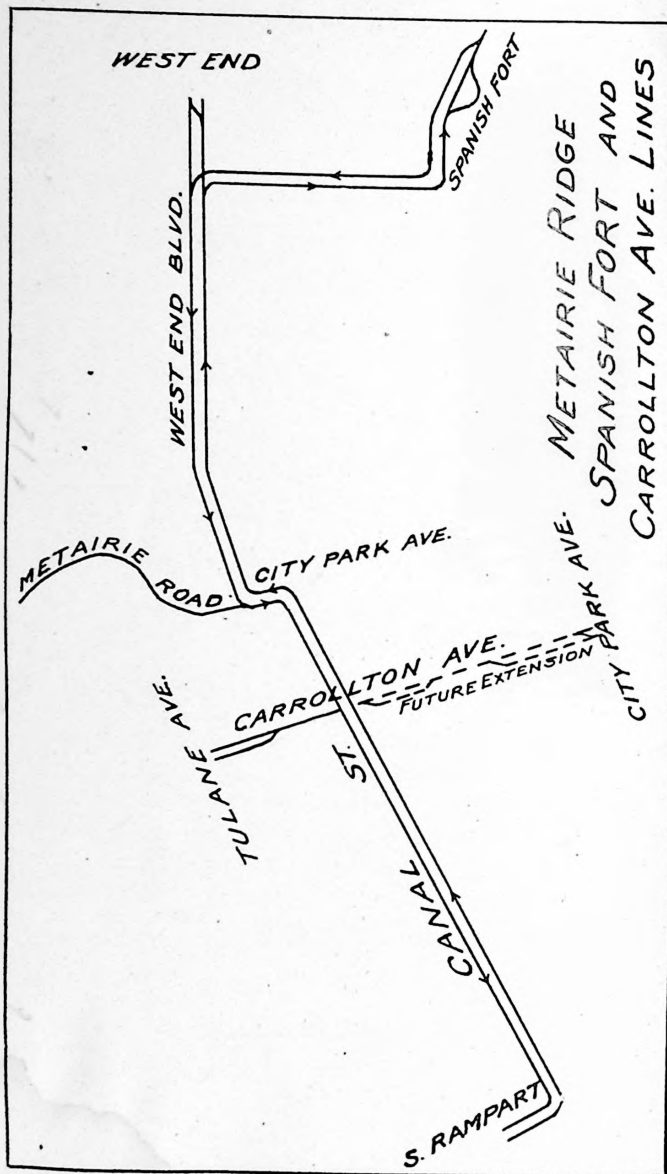












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CHAS. O. BABIN, (1917), Engineer, State Highway Department, 104 New Orleans Court Bldg., New Orleans. X

A. F. BARCLAY, (1898), (1916), Engineer Public Belt Railroad, 5670 Rosemary Place, New Orleans. ✓

JOHN S. BARRELLI, (1908), Machinery and Power Plant Equipment, 612 Godeaux Bldg., New Orleans. ✓

WADE BARNETT, (1910), Engineer, 322 Hibernia Bank Bldg., New Orleans. ✓

JAMES D. BECK, (1916), Consulting Engineer, 2331 Constance St., New Orleans. ✓

LEZIN A. BECNEL, (1916), Chemical Engineer, 1510 Arabella St., New Orleans. ✓

F. N. BILLINGSLEY, (1915), First Lieutenant, 301st Engineers, A. E. F., France. ✓

JAMES W. BILLINGSLEY, (1914), Consulting Engineer, Interstate Bank Bldg., New Orleans. ✓

A. MERRICK BLAMPHIN, (1908), Engineer in charge West End Lake Shore Park, Room 19, City Hall, New Orleans. ✓

W. P. BRANDIN, (1907), Draftsman, Public Belt Railroad, 1726 Elysian Fields Ave., New Orleans. ✓

DUNCAN BUIE, (1918), State Highway Engineer, 104 New Orleans Court Bldg., New Orleans. ✓

R. T. BURWELL, (1908), Chief Inspector, Gulf Department, Hartford Steam Boiler Inspection and Insurance Co., 629 Common St., New Orleans. ✓

C. GLENN CAPPEL, (1915), Bridge and Office Engineer, State Highway Department, 104 N. O. Court Bldg., New Orleans. ✓

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J. A. COMMAGERE, JR., (1915), Inspector, U. S. Engineers, 1800 Bayou Road, New Orleans. ✓

W. H. P. CREIGHTON, (1912), Dean of College of Technology and Professor of Mechanical and Sugar Engineering, Tulane University; Tulane University, New Orleans. ✓

HORACE E. CRUMP, (1912), Engineer, with John H. Murphy, 643 Magazine St., New Orleans. ✓

DAVID L. CULLOM, (1916), Ass't. Engineer, Board of Commissioners of the Port of New Orleans, 3629 Baronne St., New Orleans. ✓

B. N. DAVIS, (1913), Engineer and Contractor, 301 Magazine St., New Orleans. ✓

GEO. H. DAVIS, (1909), Member of firm of Ford, Bacon & Davis, 921 Canal St., City. ✓

EUGENE F. DELERY, (1915), Engineer and Draftsman, Sewerage and Water Board of New Orleans, 503 City Hall Annex, New Orleans. ✓

DONALD DERICKSON, (1912), Professor of Civil Engineering in Tulane University; Tulane University, New Orleans. ✓

- JACQUES DE TARNOWSKY, (1915), Contracting Engineer, 826 Perdido St., New Orleans.
- J. L. DICKEY, (1915), Contracting Engineer, 8004 Hickory St., New Orleans.
- M. P. DOULLUT, (1911), President Doullut & Williams, Inc., Civil Engineers and General Contractors; President Southern Lighterage and Wrecking Co., Inc.; President Shell Road Land and Improvement Co., Inc.; President Louisiana Navigation and Fisheries Co., Ltd.; Office, Lake End Industrial Canal, New Orleans.
- GEORGE E. DURR, (1917), Engineer, with General Fire Extinguisher Co., 2200 Canal St., New Orleans.
- ALLAN T. DUSENBURY, (1909), Drainage and Reclamation Engineer, 611 Hibernia Bldg., New Orleans.
- GEORGE G. EARL, (1900), General Superintendent, Sewerage and Water Board of New Orleans, City Hall Annex, New Orleans.
- JNO. T. EASTWOOD, (1901), Principal Assistant Engineer Sewerage and Water, Sewerage and Water Board, City Hall Annex, New Orleans.
- JAMES P. EWING, (1915), Ass't. Chief Engineer, care Doullut & Williams Shipbuilding Co., New Orleans.
- HUBBARD M. FEILD, (1915), Contracting Engineer, 1404 Whitney Central, New Orleans.
- EDWIN J. FISHER, (1913), Electrical Contractor, 2316 Camp St., New Orleans.
- FRANK G. FROST, (1919), New Orleans Railway & Light Co., New Orleans.
- MARCEL GARSAUD, (1905), Engineer, with Hampton Reynolds, General Contractor, Tulane Ave. and Johnson St., New Orleans.
- WILL J. GIBBENS, (1900), (1916), Member of firm of Gibbens-Finney-Gordon Co., Hardware and Mill Supplies, 213 Canal St., New Orleans.
- W. B. GREGORY, (1907), Major of Engineers, American Expeditionary Forces, France; Home Address, Tulane University.
- B. H. GREHAN, (1914), First Lieutenant 312th Engineers, 87th Division, now in France; Home Address, 3431 Prytania St., New Orleans.
- ALBERT H. GUILLOT, (1917), 325 Customhouse, New Orleans.
- ADAM J. HAASER, (1916), Purchasing Agent and Mechanical Engineer, Vaccaro Bros. Co., 517 Olivier St., New Orleans.
- FARRAR P. HAMILTON, (1915), Civil Engineer, with Creosoted Materials Co., Inc., 301 Q. & C. Bldg., New Orleans.
- CHAS. J. HARDY, (1909), Resident Engineer, Ford, Bacon & Davis, 921 Canal St., New Orleans.
- M. V. HAULARD, (1906), Supt. of Track, N. O. Ry. & Lt. Co., 4154 Iberville St., New Orleans.
- W. S. HENNING, (1919), 2025 Robert St., New Orleans.
- ROBERT R. HEPINSTALL, (1918), 1217 Peters Ave., New Orleans.
- WALTER H. HOFFMAN, (C. M.), Assistant Engineer Board of Port Commissioners, Port of New Orleans, care Chess, Checkers and Whist Club, New Orleans.
- W. T. HOGG, (1913), Concrete Designer, Inner Harbor Navigation Canal, 1545 Sixth St., New Orleans.
- NORMAN A. HOTARD, (1913), Assistant City Engineer, 235 Laverne St., New Orleans.
- THEO. O. HOTARD, (1918), Contractor, 320 Opelousas Ave., Algiers, La.
- HARRY JACOBS, (1919), 834 Ida St., New Orleans.
- ERNEST LEE JAHNCKE, (1900), President The Jahneke Navigation Co., 814 Howard Ave., New Orleans.
- PAUL F. JAHNCKE, (1907), Vice-President The Jahneke Navigation Co., 814 Howard Ave., New Orleans.
- WARREN JOHNSON, (1903), Civil Engineer, 507 Liverpool & London & Globe Bldg., New Orleans.

- CHARLES E. JOUBERT, (1909), Captain of Engineers, U. S. R.; Home Address, 838 Broadway, New Orleans.
- J. P. KEMPER, (1909), Civil Engineer in private practice, 810 Whitney Bldg., New Orleans.
- CHARLES MACDONALD KERR, (1914), Assistant State Highway Engineer, Board of State Engineers, 104 Court Bldg., New Orleans.
- FRANK M. KERR, (C. M.), Chief State Engineer of Louisiana, 213 N. O. Court Bldg., New Orleans.
- CHARLES KIRSCHNER, (1917), Junior Drainage Engineer with the Office of Public Roads and Rural Engineering, U. S. Dept. of Agriculture, Tulane University, New Orleans.
- JOHN KLOBER, (1898), Ass't. State Engineer, Board of State Engineers, 213 N. O. Court Bldg., New Orleans.
- HERMAN KOKOSKY, (1903), Member of Firm of Kokosky & Co., 614 Gravier St., New Orleans.
- EDWARD S. LANPHER, (1918), First Assistant Superintendent, U. S. Lighthouse Service, Room 320, Customhouse Bldg., New Orleans.
- G. W. LAWES, (1898), Secretary Board of State Engineers, 213 N. O. Court Bldg., New Orleans.
- ALBERT J. LEGETT, JR., (1919), Ass't. Dist. Supervisor, U. S. Shipping Board, E. F. C., 1443 Frenchmen St., New Orleans.
- J. H. LEWIS, (1908), Captain of Engineers, U. S. R.; Home Address, 1201 Q. & C. Bldg., New Orleans.
- A. M. LOCKETT, (1900), President A. M. Lockett & Co., Ltd., 533 Baronne St., New Orleans.
- GERVAIS LOMBARD, (C. M.), Ass't. State Engineer, Board of State Engineers, Board State Engineers, New Orleans.
- HENRY J. MALOCHEE, (1898), District Selling Agent for American Engineering Co., Nelson Valve Co., Vulcan Soot Cleaner Co., Yarnall-Waring Co., Northern Equipment Co., Manistee Iron Works Co., 917 Hennen Bldg., New Orleans.
- RUFUS S. MANLEY, President, Creosoted Materials Co., Inc., 301 Q. & C. Bldg., New Orleans.
- WALTER B. MOSES, (1912), Mechanical and Electrical Engineer; Vice-President Engineering Sales Co., Inc., 303 Whitney Bank Bldg., New Orleans.
- JOHN HENRY MURPHY, (1914), 1322 Felicite St., City.
- FRANK A. MUTH, (1915), Ass't. Superintendent, Lighthouse Service, 2323 Short St., New Orleans.
- CHAS. S. McFARLAND, (1903), care J. B. Camors & Co., New Orleans.
- E. B. McKINNEY, (1898), 1323 Octavia St., New Orleans.
- BERNARD S. NELSON, (1911), Engineer, with A. M. Lockett & Co., Ltd., 533 Baronne St., New Orleans.
- WILLIAM T. NEWTON, (1915), with L. F. Alexander & Co., 5923 Colliseum St., New Orleans.
- WILLIAM F. OAKES, (1918), 707 Title Guarantee Bldg., New Orleans.
- ROBERT M. O'BRIEN, (1916), Superintendent of Equipment, N. O. Ry. & Lt. Co., 5315 Camp St., New Orleans.
- OLE K. OLSEN, (1905), Contracting Engineer, 822 Perdido St., New Orleans.
- JOHN H. O'NEILL, (1916), Captain Sanitary Corps, U. S. Army, Camp Sanitary Engineers, Camp Sevier, S. C.; Home Address, 936 Arabella St., New Orleans.
- J. DEVEREUX O'REILLY, (1912), Engineer, Board of Commissioners of the Port of New Orleans, Liverpool & London & Globe Bldg., New Orleans.
- H. A. PALLFELT, (1914), Civil Engineer, Standard Oil Co. of La., 1206 Whitney-Central Bldg., New Orleans.

- ARSENE PERRILLIAT. (C. M.), Consulting Engineer and President Hercules Co., Ltd., 505 Hennen Bldg., New Orleans. ✓
- HYMAN RABINOVITZ. (1915), 2832 Baronne St., New Orleans. ✓
- ALFRED RAYMOND. (1900), General Manager, Drainage Operating Department, Sewerage and Water Board of New Orleans, City Hall Annex, New Orleans. ✓
- LYMAN C. REED. (1907), District Sales Agent, 821 Union St., New Orleans. ✓
- FRANK L. REYNOLDS. (1919), 1561 Calhoun St., New Orleans. ✓
- HAMPTON REYNOLDS. (1910), General Contractor, 1304 Carrollton Ave., New Orleans. ✓
- JOHN RIESS. (1906), Engineer and Contractor, 503 Hibernia Bldg., New Orleans. ✓
- OSCAR RIESS. (1916), Engineer, with John Riess, Engineer and Contractor, 1423 Milan St., New Orleans. ✓
- JAMES M. ROBERT. (1908), Professor of Machine Design, Tulane University, New Orleans. ✓
- EDWIN J. H. RODRIQUEZ. (1918), Zymotechnie Chemist, 143 Park Row, New Orleans. ✓
- CLARENCE H. ROBINSON. (1918), 1908 General Taylor St., New Orleans. ✓
- GEORGE C. SCHOENBERGER. (1919), Asst. State Engineer, 213 New Orleans Court Bldg., New Orleans. ✓
- ARTHUR M. SCOTT. (1915), Engineer, with Ole K. Olsen, Concrete Engineer, 822 Perdido St., New Orleans. ✓
- J. H. SEAMAN. (1912), Electrical Engineer, South New Orleans Light and Traction Co., 222 Elmira Ave., Algiers, New Orleans. ✓
- A. M. SHAW. (1910), Major of Engineers, U. S. A., Constructing Quartermaster, Mech. Repair Unit 304, Camp Normoyle, Box 752, San Antonio, Tex. ✓
- CHAS. E. SNYPP. (1911), Engineer, with Southern Cotton Oil Co., Gretna, La. ✓
- FRANK E. SPRAGUE. (1913), Second Lieutenant, Ordnance Department; Home Address, 802 Peters Ave., New Orleans. ✓
- W. L. STEVENS. (1917), Architect and Engineer, Stevensdale, La. ✓
- EDGAR L. STREAM. Chief of Engineers, Vaccaro Bros., care Vaccaro Bros. & Co., Q. & C. Bldg., New Orleans. ✓
- ALFRED F. THEARD. (C. M.), Principal Assistant Engineer in charge of Drainage, Sewerage and Water Board of New Orleans, City Hall Annex, New Orleans. ✓
- FRANK J. TRELEASE. (1916), Engineer, with Ford, Bacon & Davis, care Ford, Bacon & Davis, 921 Canal St., New Orleans. ✓
- PAUL UHLICH. (1906), 201 Baronne St., New Orleans. ✓
- GILBERT D. VON PHUL. (1916), Contracting Mechanical Engineer, 322 Hibernia Bldg., New Orleans. ✓
- FRANK H. WADDILL. (1898), Consulting Civil Engineer, 407-8 Canal Bank Annex, New Orleans. ✓
- GEORGE D. WADDILL. (1911), Junior Engineer, U. S. Engineering Office, 5219 Camp St., New Orleans. ✓
- J. D. WALKER. Newbern, Hale County, Ala. ✓
- ALFRED L. WEBRE. (1913), care E. B. Badger & Sons, 75 Pitt St., Boston, Mass. ✓
- LEON C. WEISS. (1918), 1731 Robert St., New Orleans. ✓
- THOS. M. WHITE. (1912), Second Lieutenant, Fort Casey, Washington, C. A. B. C.; Home Address, care American Creosote Works, Station B, New Orleans. ✓
- BEN WILLARD. (1900), Local Manager, General Electric Co., Maison Blanche Bldg., New Orleans. ✓

- W. HORACE WILLIAMS, (1908), Member American Society C. E.; Sec'y-Treas. and General Manager, Doullut & Williams Shipbuilding Co., Inc.; Sec'y-Treas. and Managing Engineer, Doullut & Williams, Inc., Civil Engineers and General Contractors; Sec'y-Treas. and General Manager, Southern Lighterage & Wrecking Co., Inc.; Sec'y-Treas. and General Manager, Shell Beach Land & Improvement Co., Inc., New Orleans. ✓
- C. S. WILLIAMSON, JR., (1916), Head of School of Chemical Engineering, Tulane University, New Orleans. ✓
- THOMAS L. WILLIS, (1907), City Engineer, City Hall, New Orleans. ✓
- VICTOR L. WILLOZ, (1900), Superintendent of Distribution, N. O. Ry. & Lt. Co., 201 Baronne St., New Orleans. ✓
- J. NORMAN WILSON, (1911), Ass't. Engineer, Sewerage and Water Pumping Stations Dep't., Sewerage and Water Board of New Orleans, 8237 Apricot St., New Orleans. ✓
- R. C. WILSON, (1911), Consulting Engineer, 7911 Elm St., New Orleans. ✓
- JAMES M. WOOD, (1919), 1121 Fourth St., New Orleans. ✓
- DURAND F. WOODS, (1915), Civil Engineering, Litcher, La. ✓
- W. B. WRIGHT, (C. M.), Division Engineer, Sewerage and Water Board of New Orleans, City Hall Annex, New Orleans. ✓
- JAMES A. YOUNG, (1918), 2504 Milan St., New Orleans. ✓
- HENRY L. ZANDER, (1898), Parish Engineer for Jefferson Parish, Engineer 1st and 2nd Good Roads Districts, Engineer 2nd and 5th Unit 4th Jefferson Drainage District, 821 N. Rampart St., New Orleans. ✓

NON-RESIDENT MEMBERS.

- EDWARD A. ARPIN, (1918), Florence, La. ✓
- CHAS. D. BABBITT, (1911), Private practice and real estate, Gueydan, La. ✓
- JOS. P. BERANGER, (1915), Secretary and Chief Engineer, West India Management and Consultation Co., Inc., 129 Front St., New York City, N. Y. ✓
- M. A. BERANGER, (1918), Supervising Engineer M. E., 50 Port Royal St., Kingston, Jamaica, B. W. I. ✓
- MERRILL BERNARD, (1917), Civil Engineer, Crowley, La. ✓
- JOS. M. BING, (1917), 532 W. 143rd St., New York City. ✓
- A. L. BLACK, (C. M.), 58 Sutter St., San Francisco, Cal. ✓
- EDWARD W. BRES, (1915), 1st Lieut. of Engineers, U. S. R.; Home Address, U. S. Engineers' Office, Q. & C. Bldg., New Orleans. ✓
- R. W. BRINGHURST, JR., (1912), P. O. Box 192, Alexandria, La. ✓
- JOHN CALLAN, (1918), care Oakes Club, Maryville, Tenn. ✓
- HENRY F. CAMERON, (1914), General Manager, Lake Charles Railway, Light and Water Works Co., care Lake Charles Ry., Lt. & W. Co., Lake Charles, La. ✓
- JOHN J. CHISHOLM, (1918), Woodward Iron Co., Woodward, Ala. ✓
- LEE A. CHRISTY, (1918) Captain A. S. A., Caranough Cts., 17th St. N. W., Washington, D. C. ✓
- E. H. COLEMAN, (1911), Captain of Engineers, U. S. R., Camp Pike, Little Rock, Ark. ✓
- J. F. COLEMAN, (C. M.), General Superintendent, Chickasaw Shipbuilding Co., Mobile, Ala. ✓
- JOHN DeM. CRAWFORD, (1916), 953 East Beach, Biloxi, Miss. ✓
- L. C. DATZ, (1906), Engineer Southern Properties, United Gas and Electric Engineering Corporation, 2100 First Ave., Birmingham, Ala. ✓
- JOHN J. DAVIDSON, (1918), care Avoca Post Office, Morgan City, La. ✓
- A. D'HEUR, (C. M.), Manager Fuel Oil Dep't., S. P. Co., 65 Market St., San Francisco, Calif. ✓

- LEANDER P. ELBERSON, (1911), Crowley, La. ✓
- S. WALLACE ELBERSON, (1911), Engineer, with A. M. Lockett & Co., Crowley, La. ✓
- FRANK E. EVERETT, (1914), Drainage Engineer, Franklin, La. ✓
- BENJ. HARRISON FARQUHAR, (1919), Union Sulphur Co., Sulphur, La. ✓
- CHARLES H. FENSTERMAKER, (1914), Chief Engineer, Industrial Lumber Co., Elizabeth, La. ✓
- JESSE F. FONVILLE, (1917), Magnolia, Miss. ✓
- FRANCIS T. FOOTE, (1909), Lumber Business, Kaplan, La. ✓
- LOUIS J. FORTIER, (1914), 1st Lieut., 17th U. S. Field Artillery, War Dep't., Washington, D. C. ✓
- JAMES McC. FOURMY, (1916), Manager and Engineer, C. E. Cate Estate, Hammond, La. ✓
- FRED. I. GETTY, (1915), Manufacturer of Oil Well and Water Well Supplies, Strainers, Pumps, Etc., 603 Cutting Ave., Jennings, La. ✓
- WINFIELD A. HALLER, (1913), President Haller Car and Locomotive Corp., 120 Broadway, New York. ✓
- ADOLPH E. HARTMAN, (1918), Geologist, Gypsy Oil Co., Tulsa, Okla. ✓
- EDWARD J. HENRIQUES, (1915), Principal Assistant Engineer, 612 Audubon Bldg., New Orleans. ✓
- CHARLES L. JACOB, (1911), Engineer, with Jarret-Chambers Co., Inc., Contractors, 357 West 119th St., New York City. ✓
- E. S. JARRETT, (1909), President, Jarrett-Chambers Co., Inc., Contractors, 30 East 42nd St., New York City. ✓
- XAVIER A. KRAMER, (1911), Consulting Engineer, Magnolia, Miss. ✓
- L. A. LOUSTALOT, (1913), Civil Engineer, Magnolia, Miss. ✓
- HENRY A. MENTZ, (1915), Engineer, with Xavier A. Kramer, Consulting Engineer, Magnolia, Miss. ✓
- A. ROGERS MIELLY, (1915), Ass't. Engineer, Frisco Railroad, 2101 Jefferson Co. Bank Bldg., Birmingham, Ala. ✓
- CHARLES W. OKEY, (1911), with Chickasaw Shipbuilding Co., Box 629, Chickasaw Branch, Mobile, Ala. ✓
- WM. C. OLSEN, (1914), Designing Engineer for Gilbert C. White, Consulting Engineers, Box 562, Durham, N. C. ✓
- GUY OSBORNE, (1913), Engineer, Black River Cypress Co., Sardinia, S. C. ✓
- BOYKIN W. PEGUES, (1907), Professor of Civil Engineering, Louisiana State University, Baton Rouge, La. ✓
- H. N. PHARR, (1908), Sugar Planter and Mfg'r., Olivier, La. ✓
- H. A. PHILIPPI, (1912), Civil Engineer, 213 New Orleans Court Bldg., New Orleans. ✓
- OTTO F. REISZNER, (1916), General Engineering Practice, Lecompte, La. ✓
- W. B. ROBERT, (1911), Civil Engineer, Opelousas, La. ✓
- ERNEST A. ROSE, (1915), Engineer for American Beet Sugar Co., Rocky Ford, Colo. ✓
- GEORGE H. RUGGLES, (1914), care Ford, Bacon & Davis, 115 Broadway, New York. ✓
- JOHN A. SALMEN, (1911), Vice-President, Salmen Brick & Lumber Co., Ltd., Slidell, La. ✓
- T. H. SAMPSON, (1900), Manufacturer of Sampson Process Gum Lumber, Helena, Ark. ✓
- REGINALD McC. SCHMIDT, (1915), Inspector, U. S. Engineer Office, 1023 Leontine St., New Orleans. ✓
- GEORGE SELMAN, (1908), Surveying and Engineering, Box 596, Monroe, La. ✓
- J. S. SHARP, (1915), Roadmaster, N. O. & N. E. R. R., Room 308, Ross Bldg., Hattiesburg, Miss. ✓
- HOBART D. SHAW, (1917), City Engineer and General Practice, Gulfport, Miss. ✓

- ELMER E. SHUTTS, (1918), Lake Charles, La. ✓
 FRANK SHUTTS, (1913), Lake Charles, La. ✓
 FRED N. SHUTTS, (1913), Parish Engineer, Calcasieu Parish, La., Lake Charles, La. ✓
 JOHN A. SILSBEE, (1915), 1st Lieut., S. C. N. A., Headquarters S. C. A. S., Wilbur Wright Field, Fairfield, Ohio; Home Address, 25 Battery Park, Chattanooga, Tenn. ✓
 FRED E. SMITH, (1916), Naval Engineer, care Pensacola Shipbuilding Co., Pensacola, Fla. ✓
 IRA W. SYLVESTER, (1901), Consulting Engineer, City Hall Bldg., Alexandria, La. ✓
 JOHN Y. SNYDER, (1918), Engineer, 1210-1211 Merchants Bldg., Shreveport, La. ✓
 WM. F. TRIGGS, (1914), Gueydan, La. ✓
 THOS. H. TUTWILER, (1898), President and General Manager, The Memphis Street Railway Co., Memphis, Tenn. ✓
 WM. VON PHUL, (1908), Member of firm of Ford, Bacon & Davis, Vice-President and General Manager, United Railroads of San Francisco, 58 Sutter St., San Francisco, Calif. ✓
 BUFORD E. WALKER, (1919), Pascagoula, Miss. ✓
 ALLEN E. WASHBURN, (1908), Port Eads, La. ✓
 W. S. WHITE, (C. M.), 918 Parkerson Ave., Crowley, La. ✓
 MAYBINH. WILSON, First Lieutenant, 39th Eng. Reg. U. S. A. E. F.; Home Address, Sausalito, Calif. ✓
 PEYTON W. WOOD, (1911), Sales Engineer, Buda Co., Harvey, Ill. ✓
 A. A. WOODS, (1911), Superintendent Sou. Ry. System, Hattiesburg, Miss. ✓
 SAMUEL YOUNG, (1911), care Chickasaw Shipbuilding Co., Chickasaw, Ala. ✓

ASSOCIATE MEMBERS.

- WENDELL W. ARMOUR, (1919), Louisiana State Highway Department, 1722 Prytania St., New Orleans. ✓
 R. H. BAUMBACH, (1911), Manager, Eugene Dietzgen Co., 615 Common St., New Orleans. ✓
 EDWIN C. BROWN, (1915), Sales Engineer, 8000 St. Charles Ave., New Orleans. ✓
 H. W. FLETCHER, (1914), Manager, Clyde Iron Works, 416 Carondelet St., New Orleans. ✓
 GEORGE J. GLOVER, (1916), General Contractor, 1022 Whitney Bank Bldg., New Orleans. ✓
 JULES GODCHAUX, (1899), Raceland, La. ✓
 EDWIN L. POWELL, (1914), Vice-President, American Creosote Works, Inc., V.-P., J. G. Rainwater Lumber Co.; Residence, 1531 Exposition Boulevard, New Orleans. ✓
 JOHN J. STEADHAM, (1912), Supervisor of Bridges and Buildings, N. O. & N. E. R. R., 1228 Music St., New Orleans. ✓
 F. W. STEVENS, (1909), Manager New Orleans District Sales Office, Allis-Chalmers Mfg. Co., 719 Maison Blanche, New Orleans. ✓
 J. M. VANDERVEER, (1916), General Manager, American Creosote Wks., Inc., 1229 Calhoun St., New Orleans. ✓
 STILLMAN W. WHELOCK, (1914), Manager of Sales, Carnegie Steel Co., 1030 Maison Blanche, New Orleans. ✓

RESIDENT JUNIOR MEMBERS.

- JOHN APPLEBY, JR., (1918), Co. D, Seventh W. S. Eng., A. E. F., A. P. O. 745; Home Address, 1518 Melpomene St., New Orleans. ✓
 ASHLEY CALONGNE, (1914), Engineer, with S. A. Calongne & Sons, Paving Contractors, 403 Hibernia Bldg., New Orleans. ✓

- RALPH EARL, (1913), Assistant Director of Water Purification Dept., 2142 Eagle St., New Orleans. ✓
- A. M. FROMHERZ, (1915), Civil Engineer, 310th Engineers, A. E. F., now in Germany; Home Address, 1133 Fourth St., New Orleans. ✓
- H. L. GILBERT, (1917), 7708 Sycamore St., New Orleans. ✓
- EUGENE C. GRAVELEY, (1919), 1302 Marengo St., New Orleans. ✓
- H. M. HAYNE, (1914), 3222 Prytanla St., New Orleans. ✓
- FRANK HOLT, (1915), Engineering Department, New Orleans Park Commission, 2730 Myrtle St. ✓
- E. M. HORNOT, (1912), 1st Lieut., U. S. R.; Home Address, 1526 Harmony St., New Orleans. ✓
- MAURICE F. HUNT, (1919), 1666 Tchoupitoulas St., New Orleans. ✓
- SAMUEL D. JACKSON, (1916), Estimator, A. M. Lockett & Co., Ltd., 533 Baronne St., New Orleans. ✓
- WILHELM EMIL KOCH, (1913), Civil Engineer, 2627 Coliseum St., New Orleans. ✓
- R. B. KOHNKE, (1912), Civil Engineer, with John Riess, Contractor, 818 Third St., New Orleans. ✓
- SHEPARD F. PERRIN, (1915), Mechanical Engineer, Doullut & Williams Shipbuilding Co., 3804 Chestnut St., New Orleans. ✓
- ROBERT A. PIÉRPONT, (1915), 1036 Napoleon Ave., New Orleans. ✓
- CLIFFORD HOEY STEM, (1914), Office Asst. Engr., City of New Orleans, 7933 Poplar St., New Orleans. ✓
- ANDREW J. WILD, JR., (1918), 1115 Crete St., New Orleans. ✓

NON-RESIDENT JUNIOR MEMBERS.

- GEORGE O. ALLAIN, JR., (1916), Inspector of Hulls, U. S. S. B., Hodge Ship Co., Moss Point, Miss. ✓
- G. C. BADGER, (1913), Chief Engineer, General Fire Extinguisher Co., 1511 W. 38th St., Chicago, Ill. ✓
- F. R. DUVIC, (1916), Engineer, with U. S. Engineer Office, Q. & C. Bldg., New Orleans. ✓
- WILLIAM F. EBLEN, (1916), Civil Engineer, Houston Ltg. & Power Co., Houston, Texas. ✓
- JACOB F. MULLER, JR., (1912), Engineer, United Gas & Electrical Engineering Corporation, 2100 First Ave., Birmingham, Ala. ✓
- HERBERT P. NATHAN, (1913), Flying Boat Designer, Curtiss Aeroplane and Motor Corporation; Residence, 117 Highland Ave., Buffalo, N. Y. ✓
- CARL SCHNEIDER, (1916), Assistant Engineer of Mechanical Plant, Bureau of Standards, Washington, D. C. ✓
- LUCIAN J. TROXLER, JR., Radio Department, Bureau of Steam Engineering, Navy Department, 1919 Eye St., N. W., Washington, D. C. ✓
- CHARLES SPOONER ZIMMER, (1918), 1207 Ash St., Birmingham, Ala. ✓

STUDENT MEMBERS.

- HENRY HESTER BATE, 1st Lieut., Engrs., U. S. A., Home Address, 1330 Pine St., New Orleans. ✓
- EARLE A. BERRY, 1633 Third St., New Orleans. ✓
- WALTER COOKE, 1625 Alvar St., New Orleans. ✓
- JOSEPH M. GWINN, JR., 7405 Burthe St., New Orleans. ✓
- E. C. HAWKINS, Ensign U. S. Navy; Home Address, Tulane University, New Orleans. ✓
- JOSEPH W. JOACHIM, 626 Second St., New Orleans. ✓
- JOHN A. O'BRIEN, Lieutenant, 214th Regt. Engineers, Camp Custer, Michigan; Home Address, 919 Eleanore St., New Orleans. ✓

General Fund—Results for Year 1918.

Revenues:

Dues, Membership	\$2,218.75
Entrance Fees	203.00
Sundries	31.05
Smoker	144.00

Total revenues	\$2,596.80
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Expenses:

Subscription to Proceedings	\$ 500.50
Appropriation to Library	480.00
Salary of Secretary	300.00
Miscellaneous expenses	86.16
Printing and postage	230.17
Refreshments	91.10
Smoker expenses	258.40
Losses on members in military service	361.00
Losses on members dropped	254.25
Exchange	7.25

Total expenses	2,569.33
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Net balance	\$ 27.47
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Annual Statement of Library Fund, January 1, 1919.

Revenues:

Jan. 1, 1918, Balance.....	\$708.25
Revenue from General Fund.....	480.00
Donation, A. S. M. E.....	25.00

Total revenues	\$1,213.25
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Expenditures:

Mch. 15, Tulane University Press.....	\$ 2.00
Mch. 15, Engineering & Contraction.....	3.00
Mch. 15, Municipal Engineering	2.00
Apr. 8, Amer. Society Testing Materials.....	8.80
Apr. 8, Professional Memoirs	3.00
Apr. 8, Railway Age Gazette.....	5.00
Apr. 8, Industrial Management	3.00
May 7, Tulane Press	10.20
May 7, The Electric Journal.....	1.50
May 7, The Electrical World.....	3.00
Aug. 24, The Library Bureau.....	1.20
Aug. 24, The American Architect.....	2.06
Aug. 24, Power	2.00
Aug. 24, Electric Railway Journal.....	3.00
Aug. 24, The Owen Gernon Co.....	11.50
Aug. 24, Eugene Dietzen Co.....	30.64
Aug. 24, Kokošky Co.	15.34
Nov. 20, S. D. Siler.....	5.50
Nov. 20, American Railway Eng. Asso.....	6.50
Dec. 11, General Electric Review.....	2.00
Dec. 11, Concrete	2.00
Dec. 11, Railway Maintenance Eng.....	1.00
Dec. 11, Miss Carrie Freret.....	10.00

Total expenses	134.24
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Balance in Library Fund.....	\$1,079.01
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Cash Account.

Receipts:

1918 dues	\$1,263.00
1918 entrance fees	130.00
1917 balances	432.80
1919 dues	19.50
Member reinstated	12.00
1916 balance	4.50
1918 smoker	124.00
Advertisers in Proceedings	1,201.64
Donation, A. S. M. E.	25.00
Proceedings sales	6.60
Total receipts	\$3,219.04
Deduct exchange charges	7.75
Net receipts	\$3,211.29
Add balance 1917	625.21
	\$3,836.50

Expenditures:

Total warrants this year	2,222.72
Balance January 1, 1919	\$1,613.78
Bills paid since January 1	262.54
	\$1,351.24
Add collections to date	137.34
Cash on hand January 11, 1919	\$1,488.58

JAMES M. ROBERT, Secretary.

R. J. DERBES, JR.,

Certified Public Accountant.

ANNUAL REPORT OF THE TREASURER.

Year 1918.

New Orleans, January 11, 1919.

To the President, Louisiana Engineering Society, City:

Dear Sir: As per requirements of Article No. 4 of the Constitution, I have the honor to submit the following report covering receipts and disbursements for the period January 8, 1918, up to and including January 10, 1919:

Received from Secretary—	Deposited Citizens Bank.	Deposited Bank of Orleans.	Exchange Charged.
Feb. 21, Memo. 1 to 3.....		\$311.43	\$0.30
Feb. 21, Memo. 4 to 6.....	\$ 216.01		.60
Mch. 18, Memo. 7 to 9.....		274.08	.65
Apr. 18, Memo. 10 to 14.....	371.25		.94
May 2, Memo. 15 to 17.....	186.02		.90
May 2, Memo. 18 to 21.....	286.74		.55
July 17, Memo. 22 to 24.....		269.10	.30
Oct. 5, Memo. 25 to 29.....	469.63		1.26
Oct. 11, Memo. 30 to 31.....	116.57		.30
Oct. 17, Memo. 32 to 35.....	257.54		.35
Nov. 29, Memo. 36 to 37.....		110.83	.50
Dec. 18, Memo. 38 to 39.....	172.05		.45
Jan. 6, Memo. 40 to 41.....	177.04		.65
Nov. 29, Check redeposited.....		.75	
	\$2,252.85	\$966.19	\$7.75
Total received Feb. 21, 1918, to Jan. 6, 1919.....			\$3,219.04
Less exchange			7.75
			\$3,211.29
Balance on hand, as per Treasurer's report, Jan. 11, 1918.....			625.21
			\$3,836.50

Disbursements from January 11, 1918, to January 11, 1919.

No.	Name.	Amount.
Dec. 12,	Check returned Crowley.....	\$ 1.50
1.	Tulane University Press.....	181.15
March 8,	Check returned, account closed.....	1.50
2.	Fabacher's Rathskeller	23.60
3.	Municipal Engineering	2.00
4.	Engineering & Contracting.....	3.00
5.	Ole K. Olsen.....	223.35
6.	James M. Robert.....	95.00
7.	Tulane University Press.....	59.95
8.	American Society Testing Materials.....	8.80
9.	Professional Memoirs	3.00
10.	Railway Age Gazette.....	5.00
11.	Industrial Management	3.00
12.	James M. Robert.....	32.50
13.	Tulane University Press.....	178.35
14.	Dameron-Pierson Co.	2.17
15.	M. Clay LeJeune.....	17.00
16.	Fabacher's Rathskeller	9.60
17.	The Electric Journal.....	1.50
18.	Electrical World	3.00
19.	James M. Robert.....	37.50
20.	Tulane University Press.....	332.40
21.	Frank M. Norman.....	7.88
22.	Fabacher's Restaurant	28.65
23.	M. Clay LeJeune.....	22.50
24.	Douglas S. Anderson.....	150.00
25.	James M. Robert.....	106.50
26.	Library Bureau	1.20
27.	American Architect	2.06
28.	Power	2.00
29.	Electric Railway Journal.....	3.00
30.	Owen Gernon Co.....	11.50
31.	Eugene Dietzgen Co.....	30.64
32.	Kokosky & Co.....	15.34
Oct. 28,	Check returned, account closed.....	.75
33.	Tulane University Press.....	120.20
34.	Uriah J. Virgin.....	10.00
35.	James M. Robert.....	32.50
36.	Tulane University Press.....	133.85
37.	Farish Art Store.....	.90
38.	S. D. Siler.....	5.50
39.	D. H. Holmes Co.....	11.88
40.	Fabacher's Restaurant	10.05
41.	M. Clay LeJeune.....	11.00

42. American Railway Engineering.....	6.50
43. James M. Robert.....	32.50
44. Tulane University Press.....	11.45
45. General Electric Review.....	2.00
46. Concrete	2.00
47. Railway Maintenance Engineer.....	1.00
48. Douglas S. Anderson.....	150.00
49. Miss Annie Freret.....	10.00
50. James M. Robert.....	64.50

\$2,222.72

Total receipts\$3,836.50

Total disbursements2,222.72

\$1,613.78

Check account in Bank of Orleans, Jan. 11, 1919.....\$ 940.52

Check account in Citizens Bank, Jan. 11, 1919.....673.26

\$1,613.78

Deposit on 3% Certificates, Hibernia Bank.....\$ 250.00

Deposit on 3% Certificates, N. O. National Bank.....• 250.00

Deposit on 3% Certificates, Interstate Bank.....250.00

Deposit on 3% Certificates, Metropolitan Bank.....250.00

Interest accrued on these.....15.00

Five 4% Liberty Bonds, Citizens Bank.....250.00

Coupons not deposited.....14.50

Five 3½% Liberty Bonds, Bank of Orleans.....250.00

Coupons not deposited.....13.10

1,542.60

Total balance\$3,156.38

Respectfully submitted,

OLE K. OLSEN,

Treasurer.

ABRIDGED CATALOGUE OF BOOKS IN LIBRARY, JAN. 1, 1919.

Construction

Building Construction and Superintendence, Parts I and II—Kidder.
Handbook of Construction Plant—Dana.
Materials of Construction—Johnson.
Design of Walls, Bins and Grain Elevators—Ketchum.
Structure and Properties, Materials of Construction—Upton.

Concrete

Concrete, Plain and Reinforced—Taylor & Thompson.
Concrete Costs—Taylor & Thompson.
Concrete Construction—Gillette & Hill.
Concrete and Reinforced Concrete Construction—Turneure & Maurer.
Properties of Reinforced Concrete—Martin.
Reinforced Concrete Construction, Vols. I and II—Hool.
Concrete Stone Manufacture—Whipple.

Masonry

Bulletin No. 108, Am. Ry. Engs. & M. of W. Association.
Foundations for Bridges and Roofs—Jacoby & Davis.
High Masonry Dams—Morrison & Brode.
Masonry Construction—Baker.
Retaining Walls for Earth—Howe.
Subaqueous Foundations—Fowler.
Design and Construction of Dams—Wegmann.

Steel

Design of Highway Bridges—Ketchum.
Design of Steel Mill Buildings—Ketchum.
Graphical Analysis of Roof Trusses—Greene.
Influence Lines for Bridges and Roofs—Burr & Falk.
Modern Frame Structures, Parts I and II—Johnson, Bryan & Turneure.
Planning and Construction of High Office Buildings—Birkmire.
Roofs and Bridges, Parts I, II, III and IV—Merriman & Jacoby.
Steel Structures—Morris.
Bridge Engineering, Vols. I and II—Waddell.
Trusses and Arches—Greene.
Design of Steel Bridges—Zung.

Timber

The Preservation of Structural Timber—Weiss.
Structural Details—Jacoby.

Electricity

- Electric Power Plant Engineering—Weingreen.
- Elements of Electrical Engineering. Direct Currents—Franklin & Esty.
- Long Distance Electric Power Transmission—Hutchinson.
- Hydro-Electric Practice—von Schon.
- Hydro-Electric Plants—Beardsley.
- Steam Electric Power Plants—Koester.
- Principles of Land Defense—Thuillier.
- Electric Power—Player.

Gas

- Handbook of Carburetion—Browne.
- Gas Manufacture—Hornby.
- Gas Power—Junge.
- Internal Combustion Engines—Carpenter & Diedrichs.
- Valves and Valve Gears, Vol. II, Gasoline, Gas and Oil Engines—Furman.
- Handbook of Natural Gas—Westcott.
- Distribution of Gas—Hole.
- Measurement of Gases Where Density Changes—Westcott.

Irrigation and Drainage

- Engineering for Land Drainage—Elliott.
- Irrigation—Newell.
- Irrigation Engineering—Wilson.
- Practical Irrigation—Newell.
- The Conservation of Water by Storage—Swain.
- The Regulation of Rivers—Van Ornum.
- Working Data for Irrigation Engineers—Moritz.
- Improvement of Rivers—Thomas & Watt.
- Land Drainage—Parsons.

Law

- Engineering and Architectural Jurisprudence—Wait.
- Law and Contracts—Wait.
- Municipal Franchises, Vols. I and II—Wilcox.

Mathematics

- Calculus—Courtenay.
- Calculus of Finite Differences—Boole.
- Conic Sections—Drew.
- Engineering Mathematics—Steinmetz.
- Handbook of Mathematics for Engineers—Waterbury.
- Logs—Saxton.
- Logarithms—Vegas.
- Tables—Smoley.
- Mathematical Examination Questions—Christie.
- Partial Differential Equations—Airy.
- Theory of Equations—Todhunter.
- Trilinear Co-ordinates—Ferrer.

Mechanics

Analytical Mechanics—Bartlett.
Elementary Mechanics—Parkinson.
Elements of Mechanics—Nystrom.
Hydro-Mechanics—Besant.
Applied Mechanics—Fuller.
Applied Mechanics—Fuller.

Military Science

Regulations for Army of U. S., Corrected—U. S. War Department.
Technique of Modern Tactics—Bond & McDonough.
Field Service Regulations—U. S. War Department.
Studies in Minor Tactics—Department of Military A. A. Service.
Regulations of Army—U. S. War Department.
Coast Artillery Drill Regulations—U. S. War Department.
Engineer's Field Manual—U. S. War Department.
Manual of Military Training—U. S. War Department.
Fundamentals of Naval Service—Sterlin.
Fundamentals of Military Service—Andrews.

Miscellaneous

Physical Tables—Smithsonian Institution.
Corrosion and Preservation of Iron and Steel—Cushman & Gardner.
Cements, Limes and Plasters—Eckel.
History of the Jetties—Corthell.
Engineering Geology—Ries & Watson.
Engineering Mathematics—Steinmetz.
Life and Life-work of Charles B. Dudley—Am. Soc. Test. Mat.
Modern High Explosives—Eissler.
Paint Technology and Tests—Gardner.
Public Utilities—Hayes.
Investigating an Industry—Kent.
Efficiency—Emerson.
Engineering of Shops and Factories—Tyrell.
Engineering Economics—Fish.
Industrial Leadership—Gautt.
Combustion and Smokeless Furnaces—Hays.
Elements of Military Hygiene—Ashburn.
Notes on Military Explosives—Weaver.
Smoke Abatement—Chicago Association of Commerce.
American Campaigns—Steele.
Coal Tar and Ammonia—Lunge.
Lessons of the War With Spain—Mahan.
Report of Tests of Metals—U. S. War Department.
Safety in the Foundry—Alexander.
Military Preparedness and the Engineer—Robinson.
Navigation—Jacoby.
Engineer in War—Bond.

Machine Shop Work—Turner.
Wharves and Piers—Greene.
Ports and Terminal Facilities—MacElree.
Excavating Machinery—McDaniel.
Oxy-acetylene Welding and Cutting—Manly.

Pocket Books

American Civil Engineers' Pocket Book—Merriman.
American Electricians' Handbook—Croft.
Architects' and Builders' Pocket Book—Kidder.
Civil Engineers' Pocket Book—Frye.
Civil Engineers' Pocket Book—Trautwine.
Cane-Sugar Manufacturers' and Chemists' Handbook—Spencer.
Cost Data—Gillette.
Electrical Engineers' Pocket Book—Foster.
Highway Engineers' Handbook—Harger & Bonney.
Mechanical Engineers' Pocket Book—Kent.
Handbook of Chemistry and Physics—Hodgman & Coolbaugh.
Handbook for Machine Designers—Halsey.
Handbook of Construction Plants—Dana.
Concrete Engineers' Hand Book—Hool & Johnson.
Standard Handbook for Electrical Engineers.
Field Engineering—Searles & Ives.
Structural Engineering Handbook—Ketchum.

Railroads

Economic Theory of Railway Location—Wellington.
Economies of Interurban Railways—Fischer.
Field Engineering—Searles.
Freight Terminals and Trains—Droedje.
Railroad Curves and Earthwork—Allen.
Railroad Location Surveys and Estimates—Lavis.
Economies of Railroad Construction—Webb.

Roads

The Modern Asphalt Pavement—Richardson.
Roads and Pavements—Baker.
Road Preservation and Dust Prevention—Judson.
Street Pavements and Paving Material—Tillson.
Highway Engineering—Blanchard-Drowne.
Street Paving and Maintenance and Superintendence—Kidder.

Sewerage and Drainage

Elements of Sanitary Engineering—Merriman.
Handbook of Sanitation—Price.
The Separate System of Sewerage—Staley & Pierson.
Sewer and Drains—Marston.
Sewerage—Folwell.
American Sewerage Practice—Metcalf & Eddy.
Practical Methods of Sewerage Disposal—Ogden.

Shipbuilding

Practical Shipbuilding, Vols. I and II—Holms.
How Wooden Ships are Built—Estep.

Specifications

Association for Standard Paving Specifications, Fourth Annual Report.
Elements of Specification Writing—Kirby.
Engineering Contracts and Specifications—Johnson.
Specifications for Street Roadway Pavements—Whinery.
Standard Specifications—Ostrup.
Contracts, Specifications and Engineering Relations—Mead.

Steam

Economy in the Sugar Factory—Abraham Bayle.
Engineering Thermodynamics—Lucke.
Experimental Engineering—Carpenter & Diederichs.
Heating—Baldwin.
Heat Energy and Fuels—Juptner.
Machine Design—Jones.
Mechanical Engineering of Power Plants—Hutton.
Pumping by Compressed Air—Ivens.
Quick Rules for Heating and Ventilating—Baldwin.
Refrigerating Machinery—God.
Steam Electric Power Plants—Koester.
Steam Power Plants—Meyer.
Steam Power Plant Engineering—Gebhard.
Steam Power Plant Piping—Morris.
Steam Turbines—French.
Transmission Calculations—Rosenthal.
The Design of Steam Boilers and Pressure Vessels—Haven & Sweet.
Steam Boiler Economy—Kent.
Properties of Steam and Ammonia—Goodenough.
Valves and Valve Gear—Furman.
Reports on Fuel Tests and Issue of Fuel—U. S. War Department.
Experiments on Rate of Heat Transfer—Babcock & Wilson.
Modern Steam Engineering—Hiscox.
Land and Marine Diesel Engines—Supino.

Surveying

Draughtsman's Alphabet—Esser.
Free Hand Lettering—Daniels.
Principles and Practice of Surveying, Vols. I and II—Breed & Hosmer.
Topographical Drawing—Daniels.
Practical Marine Surveying—Johnson & Smith.
Military Topography—Sherrill.
Military Shething and Map Reading—Grieves.
Rapid Reconnaissance Sketching—Sherrill.

Valuation

- Engineering Valuation of Public Utilities and Factories—Poster.
- Investigating an Industry—Kent.
- Public Utilities—Hayes.
- Valuation of Public Service Corporations—Whitten.
- Valuation of Public Utility Property.—Flory.

Water Power

- Hydraulic Motors and Turbines—Bodmer.
- Hydro-Electric Development—Player.
- Hydro-Electric Plants—Beardsley.
- Hydro-Electric Practice—von Schon.
- Hydro-Mechanics—Besant.
- Water-Power Engineering—Mead.

Water Supply

- Clean Water and How to Get It—Hazen.
- Elements of Sanitary Engineering—Merriman.
- Filtration of Public Water Supplies—Hazen.
- Public Water Supplies—Turneure & Russell.
- Towers and Tanks for Waterworks—Hazlehurst.
- River Discharge—Hoyt & Grover.
- Water Filtration Works—Fuertes.

Water Supply Papers

- 35, 36, 37, 38, 39, 77, 79, 80, 81 to 111, 113 to 122, 124 to 135, 137 to 142, 163, 345 E, Prof. Paper (U. S. G. S.) 86.

The Library contains the following volumes of magazines:

- American Architect. 1909-1918. 16 vols.
- American Architect and Building News. 1898-1909. 31 vols.
- American Electrician. 1900-1901. 2 vols.
- American Machinist. 1892-1901. 7 vols.
- Brickbuilder. 1898-1901; 1910-1914. 10 vols.
- Concrete. 1908-1912; 1917-1918. 5 vols.
- Concrete-Cement Age. 1912-1915. 6 vols.
- Concrete Highway Magazine. 1917-1918.
- Concrete Index. 1913-1916. 3 vols.
- Contracting. 1916-1918.
- Descriptive Index English Literature. 1884-1891. 1 vol.
- Engineering and Contracting. 1908-1918. 19 vols.
- Engineering Index. 1892-1905. 3 vols.
- Engineering Index Annual. 1906-1916. 11 vols.
- Engineering Magazine. 1894-1916. 45 vols.
- Engineering News. 1903-1905; 1914-1917. 11 vols.
- Engineering News and American Railroad Journal. 1900-1902. 4 vols.
- Engineering News and American Railway Journal. 1894-1900. 12 vols.
- Engineering News Record. 1917-1918. 2 vols.

Engineering Record. 1898-1917. 38 vols.
General Electric Review. 1907-1912; 1914, 1916, 1918. 8 vols.
General Index to Engineering News. 1890-1899. 1 vol.
Ideal Power. 1916-1918.
Illuminated Engineering. 1911-1912. 1 vol.
Index to Engineering News. 1900-1909. 2 vols.
Industrial Engineering and Engineering Digest. 1911-1914. 5 vols.
Industrial Management. 1916-1918. 3 vols.
Iron Age. 1892-1894. 5 vols.
Journal of Franklin Institute. 1916-1918.
Mechanical World. 1889-1895. 7 vols.
Monad. 1916-1918.
Municipal and County Engineering. 1918.
Municipal Engineering. 1897-1917. 35 vols.
Power. 1893-1895; 1898-1918. 29 vols.
Power Notes. 1916-1918.
Railroad Age Gazette. 1908-1910. 4 vols.
Railroad Gazette. 1899-1904. 14 vols.
Railway Age. 1918. 1 vol.
Railway Age Gazette. 1900-1917. 15 vols.
Railway Maintenance Engineer. 1916-1917. 1 vol.
Technical Engineer. 1907. 1 vol.
Stone and Webster Public Service Journal. 1907-1918. 16 vols.
Street Railway Journal. 1908-1901; 1904-1908. 13 vols.

The Society receives regularly the publications of the following Associations:

American Engineering and Maintenance of Way Association. Manual. 1915. 1 vol.
American Engineering and Maintenance of Way Association. Proceedings. 1910-1918. 12 vols.
American Institute of Electric Engineering. Transactions. 1910-1913. 9 vols.
American Roadbuilders' Association.
American Society Civil Engineering. Index. 1867-1911. 1 vol.
American Society Civil Engineering. Proceedings. 1918.
American Society Civil Engineering. Transactions. 1898-1917. 12 vols.
American Society for Testing Materials. Index. 1898-1917. 1 vol.
American Society for Testing Materials. Proceedings. 1905-1917. 13 vols.
American Wood Preservers' Association. 1912-1914. 3 vols.
Associated Engineering Society of St. Louis. Year Book. 1917.
Association of Engineering Societies. Journal. 1916-1918.
Board of Water Supply of City of New York. Report. 1906; 1909-1917. 13 vols.
Boston Society of Civil Engineers. Journal. 1916-1918.
Brooklyn Engineering Club. Proceedings. 1903-1912; 1916-1918. 10 vols.

- Cleveland Engineering Society. Journal. 1916-1918. 3 vols.
Engineering Club of Dayton. Proceedings. 1916-1917.
Engineering Club of Philadelphia. Directory. 1916-1918.
Engineers' Society of Western Pennsylvania. List of members. 19—
Filtration Commission of Pittsburg. Report. 1891.
Idaho Engineer. 1916-1918.
International Engineering Congress. Transactions. 1916.
Journal American Waterworks Association. Proceedings and Supplement. 1916-1918.
Journal of Engineering Club of St. Louis. 1916-1918.
Journal of Engineers' Club. 1913-1914.
Maine Society of Engineers. List of members. 1915-1916.
Metropolitan Water Board. 1906-1917. 10 vols.
Metropolitan Water and Sewerage Board. Report. 1898-1917. 19 vols.
Monthly Journal of Engineers of Utah. 1917-1918.
New York Advisory Board of Consulting Engineers. 1915-1916. 4 vols.
North Dakota Engineering Society. 1916-1918.
Ohio Society of Mechanical, Electrical and Steam Engineering. Journal. 1915-1918.
Oregon Society of Engineers. Journal. 1917.
Pacific North-West Society of Engineers. Proceedings. 1915-1916.
Public Works Department of Boston. Report. 1911-1916.
Quarterly Journal of the Montana Society of Engineers. 1916-1917.
Sewerage and Water Board of New Orleans. Report.
Sewerage Commission of New York. Report. 1910-1914. 3 vols.
Society of Engineers. 1916-1918.
Texas Reclamation Department. Bulletins. 5-16.
United States Corps of Engineers and United States Army Engineers at Large. Professional Memoirs. 1910-1918.
University of Illinois. Bulletins. 1916-1918.
University of Wisconsin. Bulletins. 1898-1911. 6 vols.
Western Society of Engineers. Journal. 1916-1918.

MINUTES OF MEETINGS AND BUSINESS OF THE SOCIETY.

Regular Meeting of the Board of Direction, December 9, 1918.

The regular meeting of the Board of Direction was called to order, President Klorer in the chair and the following present: Messrs. Olsen, Barelli, Dusenbury and Robert.

The resignation of Mr. Thomas H. Means was accepted with regret.

Upon motion duly seconded the following applications approved by the Membership Committee were passed to the ballot:

Resident Members—W. S. Henning, Harry Jacobs, Geo. C. Schoenberger, James M. Wood.

Non-Resident Members—Benj. H. Farquhar, B. E. Walker.

Associate Member—Wendell W. Armour.

Junior Members—Maurice F. Hunt, Eugene C. Graveley.

There being no further business, the meeting adjourned.

JAMES M. ROBERT, Secretary.

Regular Meeting of the Society, December 9, 1918.

The meeting was called to order with President Klorer in the chair and twenty-five members and guests present. The minutes of the previous meeting were read and approved.

Resolutions upon the death of Messrs. William J. Hardee and C. H. Gillean were read and accepted unanimously by the meeting.

A letter from Mr. Gail H. Browne regarding a certificate of membership in the Society was read, and it was the sense of the meeting that the secretary investigate the cost of such a form of certificate and report his findings.

Nominations for officers were then held and the following ballots were taken:

President—Ole K. Olsen, 12; R. S. Manley, 2; J. M. Robert, 1; John Riess, 2; H. L. Hutson, 1.

Vice-President—John Riess, 15; J. S. Barelli, 1; A. M. Lockett, 1; D. S. Anderson, 1.

Treasurer—W. B. Moses, 12; A. M. Lockett, 2; O. K. Olsen, 1; A. T. Dusenbury, 1; J. S. Barelli, 2.

Secretary—J. M. Robert, 17; H. L. Zander, 1.
Director—

First Ballot—G. W. Lawes, 2; C. Williamson, 8; E. F. Delery, 1; W. H. Williams, 3; A. M. Lockett, 1; J. H. Seaman, 3.

Second Ballot—G. W. Lawes, 5; C. Williamson, 9; W. H. Williams, 2; J. H. Seaman, 2.

Third Ballot—G. W. Lawes, 8; C. Williamson, 8; J. H. Seaman, 1; Ole K. Olsen, 1.

Fourth Ballot—G. W. Lawes, 9; C. Williamson, 9.

Fifth Ballot—G. W. Lawes, 9; C. Williamson, 8.

From the above the following officers were nominated for the ensuing year:

President—Ole K. Olsen.

Vice-President—John Riess.

Treasurer—W. B. Moses.

Secretary—James M. Robert.

Director, to serve three years—George W. Lawes.

Upon motion, duly seconded and carried, it was decided to hold the Annual Smoker on January 11, 1919.

The technical exercises of the evening were then held, and Mr. William T. Hogg read a most interesting and instructive paper on "Suggested Changes in the Operation of the Street Car System of New Orleans." This paper called forth a great deal of discussion, and it was decided to make reprints as soon as possible and send advance copies to the membership for discussion at the February meeting.

Upon motion, duly seconded, it was decided to appoint a committee to seek representation of the Louisiana Engineering Society on the Transportation Committee of the Commission Council.

There being no further business, the meeting was adjourned to the usual collation.

JAMES M. ROBERT, Secretary.

Regular Meeting of the Board of Direction, January 11, 1919.

The meeting was called to order with President Klorer in the chair and Messrs. Barelli, Dusenbury, Olsen, Riess and Robert present.

Ballots for new members were opened and as a result the following men were elected to the respective grades in the Society:

Resident Members—Frank G. Frost, W. G. Henning, Harry Jacobs, Frank L. Reynolds, Geo. C. Schoenberger, James M. Wood.

Non-Resident Members—B. H. Farquhar, B. E. Walker.

Associate Member—Wendell W. Armour.

Junior Members—Maurice F. Hunt, Eugene C. Graveley.

Transfer from Student to Resident—Albert J. Legett, Jr.

There being no further business, the meeting adjourned.

JAMES M. ROBERT, Secretary.

Regular Meeting of the Society, January 11, 1919.

The meeting was called to order with President Klorer in the chair and twenty-two members and guests present. Minutes of the previous

meeting read and approved. The annual reports of the Secretary and Treasurer were read and received by the meeting. These reports are published in full in the Proceedings.

Ballots for officers for the ensuing year were then opened, and as a result of these ballots the following were elected for the year 1919:

President—Ole K. Olsen.

Vice-President—John Riess.

Treasurer—Walter B. Moses.

Secretary—James M. Robert.

Director—G. W. Lawes.

There being no further business to come before the meeting, it was adjourned to the Cosmopolitan Hotel, where the Annual Smoker took place. This event was enjoyed by all.

JAMES M. ROBERT, Secretary.

ANNUAL REPORT OF THE SECRETARY.

Year 1918.

January 11, 1919.

To the Board of Direction, Louisiana Engineering Society:

Gentlemen: As Secretary of the Society, I beg leave to submit the following report for the year 1918:

During the year the Board of Direction held seven regular and two special meetings, with an average attendance of five. The Society held nine regular meetings, with an average attendance of thirty-one; maximum, forty-nine; minimum, thirteen. Because of prevailing health conditions, no meetings were held during October.

The membership record for the year is as follows.

GRADE.	On Roll Jan., 1918.	Elected.	Reinstated.	Transferred To.	Transferred From.	Dropped.	Resigned.	Died.	January, 1919.
Honorary	1	0	0	0	0	0	0	0	0
Resident	129	8	0	3	4	8	1	3	124
Non-Resident	70	5	1	5	1	4	1	4	71
Associate	11	1	0	1	0	2	0	0	11
Non-Res., Asso.	1	0	1	0	1	1	0	0	0
Junior	19	2	1	1	1	3	0	2	17
Non-Res., Junior	10	1	0	1	1	2	0	0	9
Student	14	0	0	0	2	0	1	0	11
	255	17	3	11	10	20	3	9	244

It is with regret that we report the deaths of Mr. W. J. Hardee, Mr. Robert W. Nolte, Mr. Henry L. Hutson, Resident Members; Mr. C. H. Gillean, Mr. Gail H. Browne, Captain A. A. Diettel, Mr. C. W. Boeage, Non-Resident Members, and Mr. A. Harold Delbert and Mr. David W. Wiedman, Junior Members.

Our Society has cause to be proud of the number of its membership in active service for their country. Of a membership of 250, fifty-seven responded to the call, and a Service Flag has accordingly been hung in the Library.

Submitted separately is the Treasurer's Report, which shows a balance January 1, 1919, of \$1,613.78. Add to this checks received since January 1, 1919, \$137.34, and not yet transferred to the Treasurer, and the total is \$1,751.12. Take from this amount \$262.54, outstanding bills, and cash on hand is \$1,488.58. Dues amounting to \$361 were remitted for members in active military service.

Our investment account stands as follows: Hibernia Bank & Trust Co., Metropolitan Bank, New Orleans National Bank and Interstate Trust & Banking Co., \$250 each; Liberty Bonds, \$500; total, \$1,500.

Attached are statements showing the financial condition of the Society.

The following technical exercises were held:

Feb. 11, 1918—"Some Notes on Wireless Telegraphy," by Professor P. E. Lehde, Tulane University.

March 11, 1918—Mr. A. M. Lockett presented a paper on "The Industrial Canal," followed by an address by Mr. Walter Parker, of the New Orleans Association of Commerce, on the same subject.

April 8, 1918—"The Technical Mind and the City Plan," by Mr. Charles A. Favrot.

May 13, 1918—"Britain and the War; The Last Twelve Months," by Mr. T. F. Carlisle, the British Consul.

June 10, 1918—"The Present Situation as Relates to Introduction and Use of Natural Gas in New Orleans," by Mr. Howard Eggleston.

Sept. 9, 1918—Discussion of Mr. C. W. Okey's paper entitled "Main Drainage Channels for Reclaimed Areas of Southern Louisiana."

Nov. 18, 1918—"Fuel Conservation in Louisiana," by Mr. Leo S. Weil, of the U. S. Fuel Administration.

Dec. 9, 1918—"Suggested Changes in the Operation of the Street Car System of New Orleans," by Mr. Wm. T. Hogg.

Your Secretary desires to thank the officers and members of the Society for their kind co-operation during the year. It has been an honor and a privilege to serve you. I thank you.

Respectfully submitted, .

JAMES M. ROBERT, Secretary.

FINANCIAL CONDITION OF THE SOCIETY, JANUARY 1, 1919.

Assets:

Cash on hand.....	\$1,613.78
Membership accounts receivable.....	621.05
Advertisers' accounts receivable.....	413.28
Investments	1,500.00

Total assets \$4,148.11

Liabilities:

Library Fund	\$1,079.01
Proceedings Reserve Fund.....	1,813.99
Accounts payable	195.95

Total liabilities 3,088.95

Balance in General Fund.....\$1,059.16

General Reserve Fund.

Balance from 1914.....	\$ 165.00
Balance from 1915.....	189.15
Balance from 1916.....	377.45
Balance from 1917.....	299.49
Balance from 1918.....	27.47
	\$1,059.16

Proceedings Reserve Fund.

Balance from year 1915.....	\$ 112.20
Balance from year 1916.....	546.13
Balance from year 1917.....	568.14
Balance from year 1918.....	587.52
	\$1,813.99

Proceedings Fund—Results for Year 1918.**Revenues:**

Advertisements	\$1,375.37
Subscriptions, Membership	500.50
Sales of Proceedings.....	13.60

Total revenues	\$1,889.47
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Expenses:

Salary of Editor.....	\$ 300.00
Salary of Secretary.....	60.00
Stenographer's fee	39.50
Printing and mailing.....	723.40
Miscellaneous expense	10.75
Cancelled advertisements	168.30

Total expenses	1,301.95
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		\$ 587.52
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PROCEEDINGS OF THE LOUISIANA ENGINEERING SOCIETY

VOL. V

APRIL, 1919

NO. 2

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EDITORIAL NOTES AND COMMENT

The Local Street Railway Situation. In the February issue of this journal was published a paper by Mr. W. T. Hogg, analyzing the street railway situation from the operating point of view and setting forth certain suggestions as to rerouting the cars and redistributing the car lines. In this issue is published the discussion of Mr. Hogg's paper, this discussion being opened by Mr. L. C. Datz and participated in by a number of our members as well as by the Commissioner of Public Utilities, the Receiver of the Railway Company and several of the technical staff of the company.

It is a sign of healthy activity and progressiveness in the Society that it should devote two of its monthly meetings to a discussion of this very important topic, which has so many angles other than the purely technical or engineering, in that it involves questions of economics and civics, of city administration and of financial manipulation and responsibility. The Editor takes

the liberty of quoting a few words from a letter of Mr. E. J. Glenn, our Commissioner of Public Utilities, which bear upon this very point: "I wish to thank the Engineering Society for the opportunity to appear before it, and to assure them that it was a most helpful evening.

"If the city had other bodies which were as constructive in their efforts as the Engineers showed themselves to be, it would go a long way toward solving many of the difficult problems with which the authorities are confronted."

The entry of our country into the world war imposed very severe conditions upon the public utility corporations in almost every part of the land. Many of them, like our own Railway and Light Company, were already finding the going very difficult, and the declaration of war simply added to their burdens. Almost everything they had to purchase in order to produce the product they offered for sale, viz., electric power and the privilege of riding upon their street cars, increased tremendously, while the general public at the same time strenuously opposed any increase in the selling price of this product. The other alternative presented by these conditions was to cut down the operating expenses by carrying the same amount of traffic with fewer cars. This would naturally also raise a protest from the general public. Increased cost of operation of street railways is a problem with which we shall have to contend most probably for a number of years to come, and we shall be obliged either to pay a higher price for the service rendered or to find means of reducing the operating expenses by making some radical changes in the present methods of operation.

From the point of view of the physical conditions affecting the solution of the New Orleans Railway's problem the following stand out prominently:

1. The great area of the city, with a consequent low density of population, requiring the maintenance of very long lines of track, which cannot be used in the most efficient way.
2. Too much duplication of service on neighboring parallel streets following in a general way the longer axes of the city.
3. Too few "cross-town" lines or lines taking the shortest distances between residence and business sections.

4. The unfortunate conditions resulting from the fact that there are two different track gauges in use, preventing the interchangeable use of equipment or the shifting of traffic from line to line as occasion may demand.

5. Too few paved streets, which results in vehicular traffic, both light and heavy, following the car tracks, thus bringing about greater congestion and consequent interruption of traffic.

The natural solution of the problem resulting from these conditions involves a rerouting of existing lines, which in its simplest elements means the changing of certain lines from their present locations to others, and also the complete removal of tracks from certain streets. This is the standpoint from which the problem was principally discussed by Mr. Hogg, Mr. Datz and others.

Immediately, however, the subject of rerouting is broached there arises a storm of protest from such of the general public as feels that its sacred rights are being interfered with. The power of the ancient and never-ending franchise is invoked, injunctions are sued out and all progress is stopped. This seems to put the problem squarely up to the municipal authorities and the law-makers, and such changes must be made in the existing laws or new ones must be enacted which will enable the authorities to take up the problem as a whole and reroute the lines according to some efficient plan which shall be worked out by a fair and impartial board of experts in such manner as to serve the best interests of all parties concerned. The franchise bugaboo has too long been permitted to hinder progress in this community.

There are other points brought out by the different men who discussed this problem which are worthy of our attention and perhaps worthy of a trial in our railway system whenever it gets into a condition for trying out new schemes. And even here we come up against existing laws and ordinances.

Why should there be a stop of five minutes at the end of every run?

Why must we have two men upon each and every car when other progressive cities are operating with great success and economy the new type of car which has come to have the popular name of "safety car," requiring the use of only one man?

Why should we not put into force again the skip-stop system? As a rule the length of our blocks is so short that the skip-stop does not inflict a real hardship upon any person. We did not give this system a really fair trial here in New Orleans; it was discontinued before the people grew accustomed to it.

The general public as a rule is opposed to any innovation where it has grown accustomed to a certain kind of service, and it must be educated up to an appreciation of the advantages of the change. With persistence the general public may even be educated to an appreciation of *poor* service as recently pointed out by the Commissioner of Public Utilities. It should certainly, therefore, not be too difficult a proposition to teach the people to understand the advantages of a readjustment of conditions of routing and operation of the street railway system which would ultimately lead to better and more efficient service for the public while at the same time giving to the owners of the utility a fair return upon their investment.

It may be recalled that not long ago when the Sewerage and Water Board found itself in need of more funds to meet the increasing cost of operation, it did not ask the general public what it thought about the proposition, but simply cut down the amount of free water allowed to the property holders, which amounted virtually to an increase of about twenty-five per cent in the water rate. Strange to say, this brought forth scarcely a protest. Quite a number of our people believe that the broad road to the successful operation of our street railways and lighting lies in municipal ownership. Suffice it to say here that with existing political conditions in our American cities the majority of independent engineers hold that municipal ownership is *not* a solution of the many problems now confronting our public utilities.

Widening Our Field of Activity. A recent number of *Engineering and Contracting* contains a leading editorial entitled, "Why Engineering Societies Should Endorse Meritorious Public Works Projects." We take the liberty of reprinting the editorial here for the main idea in it is suggestive of a direction in which we might turn some of the energy of our own organization.

"Engineering societies have not hitherto considered it to be one of their regular functions to advise the pub-

lie as to appropriations for public works. Lacking such advice, and owing to the economic ignorance or indifference of legislators and city councils, there has never been an adequate annual expenditure for waterworks, sewers, streets, roads, etc.

"Ancient laws have also operated to restrict public works, yet engineering societies have seldom taken any steps to amend such laws. However, not the failure to secure rational laws, but the failure to support rational appropriations for public works, is what we wish to call attention to in this brief editorial.

"Times without number civil engineers have made expensive surveys and plans for public works projects, and have recommended construction, only to see their advice ignored by legislative bodies. Yet if engineering societies had endorsed those projects and had campaigned for them, there is little doubt that, in most instances, their efforts would have been fruitful.

"In a paper on flood control, presented eighteen months ago before the American Society of Civil Engineers, the late H. M. Chittenden said:

"The *bête noir* of the whole problem (of flood control) will be found in making the public fund available with promptness and certainty—unless indeed an entirely new system is devised for the public financing of such projects. When a competent body of experts, designated for the purpose, has reported that a project is feasible and deserving of prompt development, and has set forth in detail the grounds on which its findings are based, there ought to be confidence enough in its recommendations to receive the full support of Congress or legislatures. It is known only too well, however, that hitherto this is far from having been the case, and it is to be feared that, in this broader field of co-operation, traditional methods of delay will cause energetic co-operating interests to throw up their hands in despair. Say what we will, this is one of the drawbacks of our form of government, and the public expert can never

be sure of putting through a project until he has satisfied many whose interests therein do not relate to its merits at all. It is in these and similar intangible, yet very real, obstacles, arising wholly from human wrong-headedness, selfishness, and short-sightedness, that the problem which we have been discussing will encounter its greatest difficulties.'

"Engineering societies, both local and national, should have committees to investigate public works projects. A favorable report by such a committee should be given publicity, and the society should then actively engage in securing the necessary appropriation. To this end the assistance of chambers of commerce and other public-spirited organizations should be enlisted.

"Capital flows readily into private enterprises because of the profits that capitalists seek. Capital has to be dragged into public works because little of the profit (at best only 4 to 6 per cent on the investment) goes to the investor. Unless citizens who are directly interested in securing an improvement take action to secure an appropriation, no active effort is made in its behalf, save by public-spirited individuals or organizations. Surely engineering societies should be as public-spirited as chambers of commerce and should work in behalf of meritorious public appropriations."

The Industrial Board of the Department of Commerce. At the request of the Council of National Defense we are giving space below to the plan and aims of the above-named organization formed with the hope of bringing together the producer, the consumer and the laborer for the resumption of American trade on a wholly normal basis.

The Council of National Defense is authorized to announce the creation, by William C. Redfield, of "The Industrial Board of the Department of Commerce." This board will be charged, under the approval already given by the President to the Secretary of Commerce, with the stabilization of prices for basic materials in such a fashion as to create a firm foundation on which

the consumer can base his future purchases and the producer can form necessary production cost estimates. Its program will be supported by the Council of National Defense.

The full personnel of this board, to consist of six carefully-chosen men, will be announced as soon as acceptances have been obtained. Already it is assured that the chairman will be George N. Peek, of Moline, Illinois, formerly vice-chairman of the War Industries Board. Hugh Frayne, the labor representative on the board, was also on the War Industries Board as the representative of labor, while the official representative of the government in the new organization will be Thomas C. Powell, director of capital expenditures of the Railroad Administration.

Through proper investigation and stabilization it is expected that the foundation can be laid for the resumption of American business and for the furnishing of employment to returning soldiers and sailors—this through government purchases, the publication of fair price lists, and co-operation of the producer.

To obtain this co-operation of the producer, it is planned that the board shall call the various leaders of industry into consultation. The first of these conferences will be with representatives of industries producing basic materials, such as iron, steel, lumber, textiles, cement, copper, brick, and other construction materials.

It will be the endeavor of the board to interchange views with these representatives of industry in the fullest and freest manner possible. If these conferences result in a general agreement among the important basic industries upon proper prices and bases for prices at which sales will be made, and this agreement is approved by the board, it is believed that the announcement of this fact will induce the nation to feel justified in properly beginning a buying program.

One of the striking features of the present situation is the high price demanded for practically all articles and commodities of trade and commerce. This high price condition is undoubtedly the cause of most of the business inactivity, and therefore, also is the cause of the widespread unemployment of labor.

The law of supply and demand is really inoperative at the present time for the reason that it is found difficult, if not im-

possible, for this law to resume normal functioning, on account of the fact that at the present time the price relations between the industries producing basic essentials are not properly adjusted to efficiently meet peace time conditions.

The vital need of the situation is resumption of industrial activity to the fullest extent possible, and it should be the aim to find the wisest and most effective way to accomplish this.

It is felt that the proper basis of selling prices for the present will be found to be upon a scale considerably higher than those of the pre-war days. However, the level should be established on the lowest plane possible, having due regard to industry, labor and government. The announcement of such a plane of prices will immediately create confidence in the buying public.

It is believed that the reductions from the high prices to the proper level, so that consumers may be justified in buying, should be made at once by one reduction.

The effort should be to wholly eliminate the abnormal, unbalanced stimulation that business has had and the inflated prices that have resulted, and to start anew upon a normal level, can safely rely upon the law of supply and demand to govern future values. Such a policy adopted and announced will, it is believed, when understood by the consumer, induce at once sufficient buying to start factories, fill empty yards and warerooms, and to inaugurate the interrupted building and other programs.

Industry and labor have a mutual interest in remedying present conditions, but industry should take the first step by the reduction of prices and commodities and should require of labor as little aid as possible.

Recent Additions to the Library. The attention of our members is called to the list below, being the most recent additions to the Library of the Society:

Oil and Gas Production, Johnson and Huntley.

Law of Oil and Natural Gas, Wilkinson and Richardson.

American Petroleum Industry (2 vols.), Bacon and Hamor.

Practical Handbook for Millwrights, Swingle.

Propellers, Peabody.

Handbook for Cane Sugar Manufacturers, Spencer.
Highway Engineers Handbook, Blanchard.
Location, Construction and Maintenance of Roads,
Goodsell.
Naval Architecture, Peabody.
Computations for Marine Engineers, Peabody.
Resistance and Propulsion of Ships, Durand.
Screw Propellers (2 vols.), Dyson.
Handbook of Practical Shipbuilding, MacBride.
Handbook for Care and Operation of Naval Machinery,
Dinger.
Naval Architecture and Shipbuilding Pocketbook,
Mackrow.
Handbook of Ship Calculations, Hughes.
Naval Constructor, Simpson.
American Railway Accounting, Adams.
The Motor Truck as an Aid to Business Profits, Norton.
Mechanical and Electrical Cost Data, Gillette and Dana.
American Methods in Foreign Trade, Vedder.
Modern Management Applied to Construction, Hauer.
Principles of Railroad Transportation, Johnson and
Van Metre.
Principles of Ocean Transportation, Johnson and
Huebner.
Railroad Finance, Cleveland and Powell.
Steel Ships, Construction and Maintenance.
Acts of the State of Louisiana, 1902.
Acts of the State of Louisiana, 1906.

Pamphlets.

Petroleum and Natural Gas, L. M. Wilson.
Uniform Classification of Accounts for Gas Utilities, R.
R. Commission of Wisconsin.
Natural Gas, Its Properties, Its Domestic Use and Meas-
urement.
Kansas Fuels: Coal, Oil and Gas.
Arguments of C. H. Tyler in Behalf of the Haverhill
Gas Light Co. Against the Reduction of Rates for
Gas.

33rd Annual Report of Board of Gas and Electric Light
Commissioners of Boston, Mass.

The London Sliding Sale of Prices and Dividends as
Applied to Gas Companies.

Price of Gas and Rate of Dividends as Applied to Bos-
ton Consolidated Gas Company.

New Legislation for Gas and Electric Companies (Mass.
1917 and 1918).

Problems in Natural Gas Engineering, A. S. M. E.

Missing Books. The Chairman of the Library Committee reports the following books as missing from the Society's Library. Please look over the books in your own library and see whether by chance you may not have forgotten to return one of these borrowed books:

Fundamentals of Naval Service, Sterling.

Military Sketching and Map Reading, Grieves.

Practical Ship Building, Holmes (2 vols.).

Textbook of Field Fortifications, U. S. Army.

Navigation, Jacoby.

Motor Boats, International Correspondence Schools.

Engineering, Hiscox.

Land and Marine Diesel Engines, Supino.

Oxy-Acetylene Welding and Cutting, Estep.

How Wooden Ships Are Built, Estep.

Wharves and Piers, Green.

Land Drainage, Parsons.

Concrete Engineers Handbook, Hool.

Port and Terminal Facilities, McElwee.

Specifications for Street Railway Pavements, Whinery.

Construction Plant, Dana.

Excavating Machinery, McDaniel.

Kent's Handbook.

Kidder's Handbook.

Trautwine's Handbook.

OBITUARY.

Charles Oreste Babin, a resident member of the Society, died in New Orleans February 13, 1919. He was born in 1886 near Breaux Bridge, Louisiana, the son of Charles S. Babin, Jr., a civil engineer.

He received his early education in the schools of Lafayette and entered the Southwestern Industrial Institute at Lafayette on the day it was opened in September, 1901, graduating in one department in 1904 and in another in 1905. After a course of two years' instruction in surveying under his father he started in with the Southern Pacific Railroad as rodman, afterwards becoming draftsman in the Houston office. Subsequently he was a member of the firm of Babin & Babin, surveyors and engineers, being associated with his father, and later on he was employed as civil engineer in the construction of a section of the Frisco road from Port Barre to Franklin. He also worked for a time upon railroad construction in Florida.

At the time of his death he was engineer and chief draftsman with the State Highway Department in their New Orleans office. Mr. Babin was highly esteemed by all of his associates for his ability in his chosen profession, for his untiring industry and faithfulness and for his kindness of spirit.

He became a resident member of the Louisiana Engineering Society in 1917. He is survived by his widow, formerly Miss Edna Daigre of New Iberia, his father and one sister.

E. B. McKinney, resident member of the Society, died at his home in New Orleans, March 30, 1919. He was born in New York City, February 14, 1854. His early education was received in the schools of that city and he acquired his shop training and early engineering experience with the Delamaters Iron Works. After completing his training at these works he was appointed chief engineer of the Mexican Mail Steamship Lines, sailing to Japan and other foreign ports. In 1880 he became chief engineer of the Cromwell Line (now Southern Pacific S. S. Company), sailing between New Orleans and New York. This position he held until 1889 when he resigned to become chief engineer of one of the subsidiary companies, which later on was the

nucleus for the present consolidation known as the New Orleans Railway and Light Company. When this consolidation was effected he was made superintendent of power, which position he held until April, 1917. Since that time Mr. McKinney had retired from the active practice of his profession.

He was an able and efficient engineer, his specialty being steam power plant operation; he was popular with his associates and was held in high esteem by the men who worked under him. He was one of the early members of the Louisiana Engineering Society, having become a resident member in 1898. He is survived by his widow and one son.

PAPERS AND DISCUSSIONS

DISCUSSION OF MR. HOGG'S PAPER ON THE STREET CAR SYSTEM IN NEW ORLEANS.

By L. C. DATZ, March 10, 1919

I regret very much that I was unable to be present at the December meeting of this Society when Mr. Hogg read his paper on the suggested changes in the operation of the street railway system in New Orleans. As soon as I read press reports on it, I became very much interested, and succeeded in getting a copy of his paper, together with blue prints of his suggested rerouting, for which I am very much indebted to him.

There is no doubt in my mind that Mr. Hogg has given a great deal of good thought and work to this subject, and deserves a great deal of credit for it. I have followed it with a great deal of interest, and am glad that a paper on this subject was read before the Society. I agree with Mr. Hogg that engineers are interested in this problem, and that this Society will be performing a public service by giving consideration to this problem, and at the proper time submit its conclusions to the proper authorities. This Society is eminently fitted to take up all problems that have to do with the public good of this City and State, and in giving its thought and advice in such matters, it will become a great asset to the City and State in general. There is every reason why, on account of the make-up of this Society, its advice should be sought on all matters of a public interest.

Before I begin my discussion of Mr. Hogg's paper, I desire to preface my remarks with the statement that I believe I know conditions in New Orleans, and am familiar with the New Orleans street railway system, and am, therefore, very much interested from an individual standpoint in seeing its problems worked out to the most satisfactory solution as regards the public, and to the most practical solution as regards the Company. With this in mind, I want to assure you that what I have to say is an unprejudiced exposé of what I believe

should be done with the street car system in New Orleans to give the public of this City a system the equal of any in the country.

A little history here will not be amiss. The historical development of the lines of this Company has resulted in the construction of a great deal of unwarranted parrallel and unnecessary tracks, which Mr. Hogg so well recognizes. The operation over it is almost criminal wastefulness, a detriment to good service and to public interests, as it necessitates divided schedules on adjacent streets.

A great many years ago, most of this track was located by competing companies, and one of the main ideas of each company in locating track at that time was to get into the built-up territory as much as possible, in order to haul as many people as possible. Franchises were granted to these competing companies to lay tracks parallel to each other on adjacent streets, and, of course, without regard to a logical design of the track layout necessary to serve the public as a whole, especially at some future date as the City developed. And the City has developed. It stands to reason that a great deal of this parallel track is unnecessary, therefore, at this time.

There is really only one decision that everybody comes to when studying the traffic conditions of the street car system of this City. On the one hand: managers for years back have come to it; engineering firms employed by the Company have come to it. On the other hand: engineers employed by the City to study the situation have come to it. Commissioners themselves have come to it, and now Mr. Hogg—a totally disinterested party—strongly adheres to the same decision.

And what is this decision that everyone makes? It is simply this: Eliminate the awful wastefulness of duplicate operation caused by the franchises granted, fifty, thirty, twenty years ago; franchises that the City in its march of progress has utterly outgrown, and franchises that, therefore, do not fit conditions to-day. Look at the map of existing lines shown in Mr. Hogg's paper and you will see a mass of tracks. Above Louisiana Avenue, between Tchoupitoulas and Dryades, there are 15 streets and 16 tracks, more than a track per street.

You can ride up Constance or Magazine or Camp. all adjacent streets; or you can ride up Prytania or St. Charles or Carondelet or Baronne, all adjacent streets.

The same condition exists in other parts of the system. Think of the wasteful operation here with the Company giving more than franchise requirements on all these streets and giving all the service it can stand on each of these streets, and yet the headways are not satisfactory because the cars are necessarily spread out over all of these tracks. Think for a moment what concentration of operation over fewer tracks would do here for the good of the public. Put more cars on fewer streets is the answer that you will come to every time. Very much shorter headways will result and will more than pay the public in saving of time and annoyance for a walk of an additional block or two.

How can this be accomplished? Not by making a haphazard change in routing here, and another there, "juggling" the present car lines, as Mr. Hogg expresses it, with the result of one fellow saying: "Why, this will suit me fine!" while another man will object strongly because some old franchise says "you have got to run on certain streets whether it is to the public good or not."

The only way this system can be made what it ought to be, and to become a satisfaction to everyone concerned, it to make an ultimate plan which will serve as a goal to be reached—not done in one grand stand run across the entire field, which is impractical, impossible, and therefore out of the question, but by a number of systematic gains all leading to this goal; each advance towards this goal winning added approval from the public until, when the goal is reached and the victory won, the people will ever have cause to look back at that victory with natural pride.

But you must set this goal in advance, and you must make conditions right for the work to proceed without petty restrictions and technicalities. Such an ultimate plan of the system, and the proper revised agreement with the City to cover same, will do the trick. This brings us to the ultimate plan of the system. Mr. Hogg has suggested one. There are some very good and practical ideas contained therein, and there are some

that I think are poor from the public beneficial standpoint, and others impractical from an operating standpoint, due to existing obstacles in the way of track location.

Were we able to rub out the track system and start all over again, we would have a very different layout from the existing one, I am sure. We can't do this, of course, but we can so modify the existing system that it will give the people satisfactory service when and where it is needed. To attain this has constantly been uppermost in my mind.

After studying the situation carefully, and taking into consideration everything that Mr. Hogg has outlined, I believe the following routes will serve the public very much better:

TCHOUPITOULAS LINE.

The idea of abandoning the upper part of the Tchoupitoulas line is a very good one, not only because the Laurel line is within three or four squares from the river—and therefore could serve this territory conveniently—but because this portion of Tchoupitoulas Street should not have a car track on it for industrial reasons. The large amount of heavy vehicular traffic on this street makes satisfactory street car operation impractical. The Company had the same idea when it wanted to double track Laurel from Valmont to Louisiana Avenue, instead of replacing the single track on Constance between these limits, after it was forced to take up the old track on account of drainage canal construction.

In my opinion, the track on Constance should never have been replaced, and it was an injustice to the Company to require it to do so. I feel, however, Constance Street is too near Magazine Street; it is also a little bit too far remote as to the first up-track from the river. I have suggested, therefore, that sometime in the future a single track on Annunciation Street, between Louisiana Avenue and Valmont Street, would serve the people more conveniently who desire to go to the river front. This track, however, should not be built right away. There are more necessary changes to be made, and Constance Street should be used in the meantime.

I have shown the Tchoupitoulas line running on Louisiana Avenue. I have also run it further on Esplanade than shown

by Mr. Hogg, extending operations as far as North Claiborne. This will give an uptown and a downtown cross-town line that will connect with practically every line in the City, and will, therefore, afford excellent facilities to reach the Texas & Pacific Depot from any part of the City.

I have shown the track on Tchoupitoulas from Canal to Howard to be abandoned, and have run the line up Magazine from Canal to Erato instead. This, I find, will give much needed relief for a great deal of vehicular traffic on this street, and will bring the line a little closer in to the delivery district.

LAUREL LINE.

This line I have shown practically the same as that shown by Mr. Hogg, except that it should turn in Julia Street from Camp to Carondelet, instead of turning in and building new tracks on Calliope Street, for the reason that we should not have additional unnecessary tracks crossing St. Charles Avenue.

You will note that this will give the same transfer facilities mentioned by Mr. Hogg. I have also looped this line on Canal from Carondelet to Camp and up Camp to Erato, for the reason that stub-ending the lines on Carondelet at Canal, as suggested by Mr. Hogg, will create an awful congestion of people, street cars, and vehicular traffic here. You will note that he has suggested stub-ending three lines on Carondelet at Canal and on other streets at Canal, and it appears to me that besides the awful congestion it will invite, that the people will get better service by looping on Canal. It will also eliminate unnecessary work of the crews in switching back and turning trolleys, fenders, etc. Besides, stub-ending at Canal is not practical with the pay-as-you-enter system, and I do not think anyone wants to go back to the old method of collecting fares.

MAGAZINE LINE.

Mr. Hogg has abandoned the double track on the Magazine line from St. Andrew to Henry Clay. He has also abandoned the double track on Prytania above Calliope Street. I do not believe that it is at all wise to do this. These two double tracks are too well established. I believe that the double track on Magazine Street should be maintained, and that the line

should start at Camp and Canal, looping on Canal to Magazine, and straight up Magazine to Broadway, and out Broadway to Claiborne. It should return the same way, using Camp from St. Andrew to Canal. This would tend to upset conditions less than should we abandon this line and use the present Coliseum line instead. This change will require comparatively little new special work to put into effect.

PRYTANIA LINE.

Although the double track on Prytania Street from Joseph Street to Calliope Street is parallel very near to the St. Charles Avenue tracks, this is one of the reasons why I have suggested that this line should not be abandoned. We have in this City an excellent opportunity to install immediately an express line on the St. Charles Avenue neutral ground, which I will deal with next. This being the case, the Prytania line could better take care of the people that would want to use local traffic. The double tracks on Joseph Street, and also on Hurst Street, are, in my opinion, absolutely unnecessary, and the Prytania line should continue straight up Prytania from Joseph to Henry Clay, thence in Henry Clay to Magazine, returning on Henry Clay to and down Coliseum to Joseph, to Prytania, and thence over its usual route. This will allow the people to transfer to the Magazine line who wish to go further uptown.

This will also allow the abandonment of the single tracks on the Coliseum line on Camp Street, Chestnut and Coliseum Streets. Furthermore, the double tracks on Prytania and Magazine lines are only four blocks apart, and with shorter headways made possible, will give the people very good service. There is no justification, therefore, for another line between these two double track lines. You will note that I suggest looping the Prytania line in Julia from Camp to Carondelet to Canal, thence to Camp and up Camp. This is done so that St. Charles Street tracks from Howard Avenue to Canal may be abandoned.

ST. CHARLES EXPRESS LINE.

The present St. Charles and Tulane belt lines are pretty well established. However, the traffic conditions on these two belt lines are not alike and, therefore, they should not exist

as belts. The morning and evening peaks are different, and traffic during the middle of the day is not the same.

Added to this are the numerous delays and disarrangement of schedules, due to the openings of the bridge across New Basin at Carrollton Avenue. It is a common occurrence to have as many as four or five cars on each belt accumulate at the bridge, waiting for the closing of same, after a long tow has gone through.

The Transportation Department has had both of these problems to contend with. A great many different attempts have been made in the last five years to overcome this condition, without splitting the belts, by sandwiching extra cars in between for certain stretches of the route. Every time the problem is considered the practical solution always points to the splitting of these two belt lines and operating them as separate lines. I have, therefore, shown them as two distinct lines.

Furthermore, we can improve the service wonderfully from Carrollton Avenue to Canal by an express line starting at Carrollton and Claiborne and running to St. Charles and down St. Charles to Lee Circle, over Baronne to Canal. To avoid stub-ending at Canal, this line should loop at Common and Baronne to Rampart to Canal, thence back to Baronne.

It should run local from Canal to Lee Circle and then it should run express to Peters Avenue, making stops only at Jackson, Washington, Louisiana Avenue, General Taylor, Napoleon, Upper Line and Peters Avenue; thence, it should make opposite stops every three blocks from Peters Avenue to the terminus at Carrollton and Claiborne.

A little analysis will show that stopping every three blocks will require a maximum additional walk of only one block for people living on the Avenue between stops, or for people approaching St. Charles Avenue from the two intersecting streets between the stops. Assuming that practically the same number of people approach the avenue from each cross street, only two-thirds of the people will have this additional block to walk.

I believe that people will gladly walk this additional block to enjoy the great advantages of this express line. People desiring local traffic between Lee Circle and Peters Avenue can use either the Prytania line, as stated above, or the Dryades

line, as will be explained in the next section. There being no parallel lines conveniently near to this express line above Peters Avenue, it becomes necessary to make more stops as described. It will be music to the ears of New Orleans people to hear the conductor shout: "Change cars for the express!"

You will probably wonder why I adhere to Baronne Street for this line, instead of adopting Camp Street as suggested by Mr. Hogg. Well, the first reason is that we are confronted with a different gauge on this line. I shall treat on the change of gauge later. The second reason is that we want to keep down the number of tracks crossing St. Charles Avenue. Mr. Hogg's plan calls for a double track leading out of Calliope from Camp to St. Charles. The main reason is that the lower end of this line is too well established in my opinion to justify the change.

TULANE AVENUE LINE.

The next line to be considered, since I have suggested splitting St. Charles and Tulane Belt, is the Tulane Avenue line. This is also a standard gauge proposition which will probably have to remain a different gauge from the rest of the system indefinitely because of the Orleans-Kenner Interurban line using its tracks on Tulane and Carrollton Avenues. The Orleans-Kenner line is, of course, a standard gauge line, and it will probably never be wise to change it.

You will note that I have shown the Tulane Avenue line turning at Carrollton and Claiborne and running up Claiborne to Protection Levee. I have connected this stretch on Claiborne with the Tulane line, instead of with the South Claiborne, for the same reason of different gauge, as the Orleans-Kenner uses this stretch also. One advantage here is that through service from upper Claiborne to Canal via Tulane Avenue can be given almost immediately, since it will not have to wait for the building of a second through track on upper Claiborne. An additional siding or two as passing tracks is all that will be required, in order to give this through service.

DRYADES LINE.

The Dryades line should follow close to the present Peters Avenue line and should operate on Peters Avenue from Dry-

ades to the river until such time as cross-town Peters Avenue-Broad line (which Mr. Hogg suggests, and which I consider a very good suggestion) is built. Then the Dryades line should terminate at Dryades and Peters Avenue. You will note that I have suggested this line to operate down Rampart from Howard Avenue to Canal, looping around to Carondelet and then up Carondelet to Julia to Dryades, and up Dryades to Peters Avenue. This operation will give excellent connecting service to all railroads operating out of the Union and Terminal Stations.

I do not see any good to be gained by operating the Dryades line as suggested by Mr. Hogg. In fact, the Dryades line, as outlined herein, covers the territory of his line almost identically, and in addition, gives a through line to Peters Avenue. Furthermore, he has left an eight-block spacing above Louisiana Avenue between up-track of St. Charles and of Howard. This is too great for this built-up area.

FRERET LINE.

This line is similar to the Liberty line suggested by Mr. Hogg, except that I fail to see any reason why, with the Dryades line operating as above, a new track should be built on South Franklin all the way from Jackson to Peters Avenue. Instead of this, the continuation of the track on Freret and Howard Streets, from Louisiana Avenue to Napoleon, should be effected.

As a first change, this line should be operated as follows: Down Freret from Broadway to Napoleon to Howard to Jackson to Franklin to Erato to Rampart to Canal to Carondelet. Returning, on Canal from Carondelet to Julia to Rampart to Clio to Franklin to Jackson to Freret to Broadway. Later on, Mr. Hogg's suggestion of using Willow Street for one of these tracks from Peters Avenue to Broadway will be more justified as the number of people increase in this section between Peters Avenue and Broadway.

It may interest you to know that in connection with the agitation for a double track on Willow Street (which a great number of you may know became acute a few years ago), I made a personal investigation for the New Orleans Railway &

Light Company to determine whether there was a real need for a track on this street. The first thing I did was to eliminate everybody in the territory that had two and one-half blocks, or less, to walk from the existing street car tracks in the section bounded by Napoleon Avenue, Freret, Broadway and Claiborne Avenue. Then I made an actual count of the number of houses remaining in the section outside of the two and a half block walk area.

I found in April, 1917, that the total number was 25 single cottages, 6 double cottages, 7 bungalows and 13 two-story residences, or a total of 51 houses. Most of the single and double cottages were old. The bungalows and two-story residences were more modern and ranged in age, by estimate, from four years to a few months. I estimated the inhabitants of the single cottages and bungalows to average 5 people each; in the double cottages and two-story residences, I estimated an average of 8 people. This gave me a total of 312 people, including my friends Jimmy Roberts and A. M. Shaw, who were outside of this two and one-half blocks walk from existing car lines. The total estimate of cost of this double track on Willow Street, from Napoleon Avenue to Broadway, including all special work and paving, amounted to \$145,000. The estimated additional operating expenses to run a line on this street, which would naturally have to go to Canal Street to be of any service whatever, amounted to approximately \$47,000—not counting \$23,000 of overhead due to the original investment for interest, depreciation, etc. This made a total annual operative cost of \$70,000, besides the \$145,000 initial investment, to give an estimated number of 312 people additional car service. It is needless to say that my report was against the installation of this track.

However, I believe the time will be very much nearer to justification of a track on Willow Street after some of the numerous parallel and duplicate lines will be abandoned, and, as a second step, I would operate the Freret line one way on Willow Street, looping on Broadway from Freret. As a third step, I would suggest building two single tracks, one on Oak Street, and one on Poplar, between Carrollton and Broadway, to get to existing tracks on these two streets above Carrollton

Avenue, and to operate this line all of the way to Leake Avenue. In the meantime, I would suggest operating on Oak and Poplar Streets as a shuttle line, turning at Carrollton as shown, and allow a double transfer privilege to people using same.

The operation of the Freret line as suggested, removes the objection of operating down Magnolia Street, and gives a very decided and much shorter line to Canal Street than operating down Carondelet, as at present. The Carondelet Street tracks above Jackson and the track on Magnolia Street should be eliminated as unnecessary, which will be seen at a glance by looking at the map.

SOUTH CLAIBORNE LINE.

Mention was made of the reason of not running this line to Protection Levee in the description of the Tulane Avenue line. I would start this line at Claiborne and Carrollton Avenues, where it can conveniently transfer to the St. Charles express line and to the Tulane Avenue line, and make connections to the Orleans-Kenner Interurban line, and run down Claiborne to Erato to Carondelet to Clio to Camp to Canal. Returning on Canal to Rampart to Clio to Claiborne to Carrollton.

This will give another cross-town line from Claiborne to Camp, and will transfer to the T. & P. Station, as well as to all other lines crossing it.

CANAL AND ESPLANADE LINES.

The Canal Street end of these belts is very much heavier in traffic than the Esplanade end, giving an unbalanced condition similar to the St. Charles and Tulane Belts. It would seem, therefore, that the logical thing to do would be to split these belts also. However, the operation of the Sanish Fort-West End express line on Canal Street, and the proposed operation of a Shrewsbury express line on Canal Street to the Rampart Street stand, suggested below, will relieve the Canal Street end of the belts satisfactorily, and will allow the belts to remain as at present operated.

In connection with the operation of these two belt lines, I would make stops three blocks as suggested for the upper part of the St. Charles Avenue line. This will give the people faster

service, and would interfere less with the operation of the two Spanish Fort and Shrewsbury express lines, operating over these tracks.

CITY PARK-BROAD LINE.

Mr. Hogg suggests that the City Park line should operate in Ursuline Avenue and up Royal to Canal and down Bourbon. The suggestion of the abandonment of Burgundy and Dauphine lines below Canal Street is a very good one, as these tracks have become unnecessary, and a better delivery is made by using Royal and Bourbon Streets. Until the Broad-Peters Avenue cross-town line is built, I would operate a split line in connection with this City Park line, on Broad to St. Bernard Avenue, running every other car to City Park, and every other one to St. Bernard and Broad.

FRANKLIN AVENUE LINE.

The suggestion for the routing of this line made by Mr. Hogg is a very good one indeed. I have adopted it, although it means the building of a double track on Lafayette from St. Claude to Dauphine, which avenue is fairly narrow between these limits. The looping at Canal from Royal to Bourbon is excellent, and I agree with Mr. Hogg that this will give residents of Gentilly very much improved service without curtailing the service now being enjoyed by the Villere line, as is evidenced by the routing of the new North Claiborne line to be described further on. This makes the Villere line as operated entirely unnecessary and should, of course, be abandoned.

DAUPHINE LINE.

Mr. Hogg shows this line running out France Street to shipyards and returning on the same street. This is good, but the amount of traffic has become so great as to necessitate building a track on Tonti Street which is used as a storage track for the equipment utilized in the morning and evening to bring workmen to and from the Foundation Company's plant.

It is evident that there will have to be a return track on some street so that regular all day operation to Canal street can be effected. It appears to me that Poland Street, being

wide, probably not too near the Canal to interfere with future industries, nor with the approach of the bridge across St. Claude, could be used to good advantage as one track, and France as the other. However, I am not informed, and it may be that Poland is too close, which would require the return track to be located on some street above France, in which case the Dauphine line would have to operate as a split line, part going to Poland to serve the warehouse and other activities in that vicinity, and part operating to the Foundation Company as the return track will then be too remote from Poland Street to give the warehouse service. In the meantime, the traffic has to be taken care of in the best way possible.

ST. CLAUDE LINE.

The building of the Industrial Canal below Poland Street, and the fact that there will be but one bridge crossing it between the river and St. Claude Avenue, makes it necessary and advantageous to reroute the present Dauphine line as shown. I have used, however, the double track on Chartres Street, from Reynes to Delery, instead of using one track on Dauphine and another on Chartres Street between these lines.

While I agree with Mr. Hogg that it is objectionable to operate double tracks on narrow streets, Chartres Street is not too narrow, and I believe that a double track here offers better service than using one track on Chartres, as he suggests. I do not approve of running a track on Forstall and another track on Reynes. I suggest instead to continue the double track on Jordan Avenue one block further to St. Claude Street; turn there, crossing the bridge and connecting to the existing tracks on St. Claude and Kentucky Streets. The gauge on St. Claude will have to be changed from standard to wide to make this possible. I would suggest that the changing of the gauge below Canal Street should be done under an early stage. The new track suggested by him on St. Claude, from Elysian Fields to Esplanade, is very good, and should be built.

NORTH CLAIBORNE AND ST. BERNARD AVENUE LINES.

I believe that Mr. Hogg's suggestion of building tracks on South Claiborne from Clio to Canal and running the North Claiborne line to Erato Street is a big mistake. First, the ob-

structions are too numerous to make the building of this line practical on account of the many railroad crossings—56 in all—that will be required, and drawbridges crossing New Basin Canal. Second, because there seems absolutely no justification for giving service in that direction. A much better result can be obtained by running North Claiborne from Canal Street loop straight out to Claiborne Avenue, which would then transfer to all lines running to Canal Street from uptown.

I, also, do not look with much favor upon building tracks on Roman Street, from Elysian Fields to Lafayette Avenue. Instead, I would connect the track on Villere Street, between these two avenues, with the existing track on North Claiborne line, assuming, of course, that the narrow gauge will be changed to the wide. In order to give the people on St. Bernard and Paris Avenues better and more direct service to Canal Street than they have now, I would operate this line as a split line, running alternate cars out St. Bernard Avenue, and the others to Lafayette Avenue and Villere.

WEST END AND SPANISH FORT LINES.

These lines to remain as at present with ordinarily a 30-minute headway on this line, and with a 30-minute headway on the Shrewsbury line, described below. Schedule can be arranged to give express service on Canal Street to City Park Avenue on a 15-minute headway.

NAPOLEON AVENUE LINE.

This line to remain as at present, except to terminate at New Basin Shell Road and Metairie Road, as suggested.

SHREWSBURY LINE.

As mentioned before, this line would serve well by coming into Canal Street, splitting with the Spanish Fort express line.

JACKSON AVENUE LINE.

In order to make the St. Charles express line practical, it will be necessary to operate the Jackson Avenue line on Carondelet Street. Express lines cannot operate with any degree of success on the same tracks as local lines and, therefore, Mr.

Hogg's suggested method to operate the two classes on the same track is impractical. The Company is confronted with this difficulty in operating the Canal and Esplanade Belts and the Spanish Fort express line, resulting in the express cars dragging behind the locals. The suggested 3-block stop system on Canal-Esplanade Belt lines will improve this situation, but there should be no extension of this condition to other lines on the system.

Thus far we have considered changes to existing lines; we now come to extensions necessary for the future. These will mostly be cross-town lines, and Mr. Hogg has some very good ideas on the subject.

PETERS AVENUE-BROAD CROSSTOWN.

This line, as shown by Mr. Hogg, is very good. I would build and operate it, however, as a single track, with necessary sidings, instead of a double track. The necessary headways on this line would be such as not to justify the double investment for a great many years at least. Therefore, why burden annual operating expenses with additional fixed charges until the real need is felt for the double track? The extension will be rather expensive, even with single track and siding, a bridge over the Old Basin and three steam railroad tracks will have to be crossed at St. Louis and Broad. These can be crossed at grade, with necessary precautions taken for safe operation.

However, on Broad from Perdido Street to above Calliope, some ten or twelve tracks will have to be crossed in addition to the bridge across the New Basin. A viaduct here will, no doubt, be necessary. Some difficulty may also be experienced in getting around the pumping station at Broad and Melpomene. I would, therefore, suggest that the stretch between Melpomene and Perdido be not built until these obstacles can be surmounted. There is nothing in the way out Peters Avenue and on Broad to existing tracks at Napoleon. This stretch and the stretch on Broad from St. Peter to Tulane Avenue should be built ahead of the stretch in between. When these two stretches are built, the Dryades line should stop at Peters Avenue, and the Peters Avenue cross-town line should operate from Tchoupitoulas to Melpomene. The Broad line should then dis-

continue into Canal, and operate on Broad from St. Bernard to Tulane Avenue. Both these cross-town lines to transfer to all intersecting lines.

JACKSON AVENUE-WASHINGTON LINE.

This suggestion is not so good. You will notice from the map that with the extension of the Louisiana Avenue line out Louisiana Avenue to Claiborne and out Washington to Broad, that this, together with the Claiborne line running in Erato to Camp, would give practically the same service. I have shown the extension to the Louisiana Avenue line in that way. Furthermore, the section to be served by this extension will develop, while there is not much prospects to warrant development of the other.

EAGLE-PALMETTO EXTENSION.

Mr. Hogg has shown an extension on Palmetto and on Eagle to connect with the Oak and Poplar Streets loop. Eagle Street is impractical to use on account of existing Sewerage and Water Board freight track on this street, and if the extension were justified, Monroe Street, six blocks above Carrollton, should be used instead. However, the main territory it is intended to serve, as shown by Mr. Hogg as the larger red section beyond Claiborne, is not conducive to much development on account of the three main lines, namely, the Y. & M. V., the I. C. and the La. Ry. & Nav. Companies running through this space. I, therefore, did not adopt this suggestion for this extension.

EXTENSIONS TO FRERET LINE.

Mention has already been made of the extensions to the Freret line: first, one track on Willow and later two single tracks on Oak and Poplar. This will give an ideal up and down line from Carrollton to Canal.

BROADWAY EXTENSION.

Mr. Hogg does not show this, but I believe at some future time the track should be extended on Broadway from Claiborne to Fig to meet the extension on Fig Street suggested by him, and which I think will be well to make in some future

stage. I believe the track should go on Eden Street instead of Elba, to make a better curve connection with the extension of the track on Washington Avenue, which it will naturally tie to.

EXTENSION ON LAFAYETTE AVENUE.

The extension of Lafayette Avenue to Doullut & Williams shipyard, suggested by Mr. Hogg, has not been included by me. This is a special case that is now up for decision. Not being too well informed on the merits of it, I have omitted it.

CARROLLTON AVENUE CROSS-TOWN LINE.

Mr. Hogg shows a line on Carrollton Avenue from Tulane to City Park. The obstacles existing make this line impractical unless they are surmounted in some way. First, we have the open canal for most of the way. There is hardly room enough on the side next to the paving to build a track. There is a track existing here from Tulane to Canal used as a baseball siding. It is dangerously near the canal, and would not do for a main line. Then there are thirteen steam railroad tracks to cross from Conti to St. Louis. I have not shown the line for that reason.

I do think, however, that if the once-talked pass under the New Basin is built, so as to cut delays on account of open bridges, and a viaduct across the above-mentioned steam railroad tracks were then built, it would be ideal to extend the St. Charles Avenue express line all the way to City Park. The Tulane line could then stop at Carrollton Avenue. This would give a short, quick and much-desired connecting link between the two great parks of this city. I am afraid, however, that this is visionary.

EXTENSION ON ROMAN AND DERBIGNY STREETS.

I have not adopted these for the same reason that the question of adequate track capacity to serve the Foundation Company is also up for decision. The question will be settled, I believe, the other way, using France as one track and locating another one parallel to it as a return track. This will make the Roman-Derbigny tracks shown by Mr. Hogg unnecessary.

ADVANTAGES OF REROUTING.

All the advantages mentioned in Mr. Hogg's paper will be gained by the rerouting as outlined, although not the same in detail. In addition to advantages mentioned in detailed rerouting of lines, the following advantages are derived:

Abandonment of dangerous and irregular operation for about 600 feet on Canal from the L. & N. Depot to Ferry Landing. I believe that on account of the numerous delays due to trains of the Southern Pacific, L. & N. and Public Belt Railroads continually crossing Canal in this short stretch, it is the height of folly to continue this unreliable and dangerous operation to save 600 feet, or less than a two-block walk.

Relief of river side of Baronne, from Common to Canal, the looping on Common making this track inoperative. This will help the awful congestion caused by standing automobiles.

Satisfactory routing to hotels and depots.

STAGES.

The work required to put these changes into effect can be divided into stages similar to the way Mr. Hogg has done. Each stage should have some one or more definite improvements to service and conditions. The most important and necessary should, of course, be done first.

STAGE I: OBJECTS.

To give needed relief on St. Charles Street below Howard Avenue.

To remove dangerous operation in contrary direction on upper side of Howard Avenue.

To give needed relief on Tchoupitoulas from Canal to Howard Avenue.

To make St. Charles express line possible.

To put more cars on fewer streets above Canal Street.

New track work required in the order mentioned:

Julia, Camp to St. Charles.

Julia, Dryades to Rampart.

Jackson, Brainard to St. Charles.

Change gauge of Jackson.

Prytania, Joseph to Henry Clay.

Henry Clay, Prytania to Camp.

Joseph, Coliseum to Prytania.

Howard, Louisiana Avenue to Napoleon.

Freret, Louisiana Avenue to Napoleon.

Necessary new special work to put the lines above Canal Street in operation as outlined.

STAGE II: OBJECTS.

To make necessary changes in connection with bridge on St. Claude over Industrial Canal.

To give relief to Dauphine and Burgundy Streets.

To improve routing of service from Gentilly Terrace.

To give Paris Avenue and St. Bernard better service to town.

New track work required in order mentioned:

Lafayette, St. Claude to Royal.

St. Claude, Esplanade to Elysian Fields.

St. Claude, Kentucky to Jordan.

Jordan, St. Claude to Rampart.

Change gauge on St. Claude from Elysian Fields to Kentucky.

Change gauge on Claiborne from Canal to Elysian Fields.

Connect curves at Canal and Claiborne to inner tracks.

Special work necessary to operate lines as outlined.

STAGE III: EXTENSIONS.

Track required in order named:

Poplar, Carrollton to Broadway.

Oak, Carrollton to Broadway.

Willow, Broadway to Peters Avenue.

Broad, St. Peter to Tulane.

STAGE IV: EXTENSIONS.

Track required in order named:

Peters Avenue, Dryades to Broad.

Broad, Peters Avenue to Napoleon.

Louisiana Avenue, Freret to Claiborne.

Washington Avenue, Claiborne to Washington.

STAGE V: EXTENSIONS.

Track required in order named:

Fig and Eden Streets.

Broadway, Claiborne to Fig.

STAGE VI.

Annunciation between Louisiana Avenue and Valmont.

STAGE VII.

Change of gauge on St. Charles and Tulane lines necessitating third rail for Interurban.

There is no question but that the double gauge is an awful handicap and expense to operation. Equipment for one gauge cannot be used on the other.

It may be interesting to some of you to know that had it not been for the Kaiser, this gauge in New Orleans would have been unified in 1914, as an appropriation of over \$100,000 was already authorized, and the 50 new cars now on the St. Charles and Tulane Belts were already on order to come through to fit the wide gauge. The war, however, made conditions uncertain, and it was deemed wise to postpone this expenditure. The trucks were designed to take care of the standard gauge and provisions made on these trucks to change to wide gauge with a minimum of expense. All truck beams are drilled to make the change over. The wheel seats on the axle were so designed to fit either gauge, so that when the gauge is eventually changed the same axles will do.

However, a new aspect has crept into the situation in the coming of the Interurban line to Kenner, which is standard gauge, and uses Tulane Avenue and part of Carrollton Avenue to get to town, and I doubt whether it would be expedient to change the gauge above Canal Street except on Jackson, where the ties have been set to extend on one side to receive the rail in the wide position.

There is no reason, however, except that of the inevitable finances, to hinder the change of the standard gauge below Canal Street to conform to the rest of the system. Every time I am confronted with the double gauge proposition I think with regret that conditions were not changed when the roads were electrified.

In 1894 the only road that was standard gauge was the New Orleans and Carrollton Railroad, running in Baronne, St. Charles Avenue, Jackson Avenue and Napoleon Avenue, south of St. Charles. When this road acquired the Canal and Claiborne it was natural to change it to conform to the former and larger road. If the conditions would have been reversed, necessitating the Carrollton Company to change to wide, the entire system would have been one gauge.

With all this an opportunity presented itself for the other companies to standardize their gauge when they electrified, and it is to be regretted that they did not, as there is no one who will deny that it would be very much better to have the system built with 4' 8½" standard gauge than with the wide gauge.

ESTIMATED SAVINGS.

I have not had the time to go into this feature of Mr. Hogg's report. To my mind the crowded condition of the cars in the peak loads would convince one that there would have to be no less cars operated as a whole than are operated in the peak loads now.

Neither have I gone into the number of cars required for the changes outlined, nor the labor problem of keeping men supplied with nine or ten hours of work, as has Mr. Hogg. I will say that the solution suggested for employing men part of the time at running cars and at something else for the remainder is rather academic, and I am afraid it cannot be put into practice successfully.

I will trust some of these problems to the company officials to work out; I haven't the same feeling about them as expressed by Mr. Hogg.

The one regret I had after reading Mr. Hogg's paper was the unmistakable and unwarranted feeling of distrust towards local street railway operators evidenced throughout his paper and emphatically expressed in his closing paragraph. Unfortunately the attitude of many people in this city is that of this same distrust. When one analyzes the situation there is really no justification for this unfortunate attitude, as the men who have been and who are connected with the New Orleans Com-

pany are given credit (even by the newspapers of this city) for being of as high a class of men as there are anywhere.

Another trouble has been that when any improvement in re-routing was suggested by the company, that had even the slightest inkling of saving in operation to the company, even thought it meant improved service and convenience to the public—such as the Louisiana Avenue straightening out—quite a howl would be started by certain elements in the city that never had, nor seemingly will ever have, any desire to see a company make a legitimate profit on a legitimate investment.

Now, the one feature that strikes me as standing out in Mr. Hogg's paper in which he so readily admonishes the company for poor service, is the absolute failure to even mention that perhaps the awful, abnormal conditions created by the last four years of the European War had possibly something to do with it.

There is another side to the question, gentlemen, and I believe the following will convince you of this fact.

Some years ago, when a great many of us were still in swaddling clothes, we had street car transportation in this city when each car had its own powerhouse in front of it in the shape of a mule. In those days there was little taxation, little regulation, little investment and great returns on same.

Today we have equipment in New Orleans that I think I can say, without fear of contradiction, is as good as any in the country. The powerhouses and sub-stations are modern and represent millions of dollars of investment, not to mention the expensive track work and overhead systems necessary for a modern street railway. In these days we have a great deal of taxation, a great deal of regulation, a great deal of investment and little returns on same.

The price paid by the public for the product of the street car company in our youthful days was 5 cents. The price paid by the public for the product of the railway company up to October last was 5 cents. The maximum length of the possible ride in former years was between four or five miles for this 5 cents, but now you can ride at least twenty miles for the same amount of money.

Mr. Hogg has not mentioned the difficulties the company has had to meet the increased cost of labor and material. The company has paid two and three prices for copper compared with normal times; rail is more than double what it used to be; coal is two and three prices, and so on down the line. Mr. Hogg did not mention the effect of the War Labor Board's decision in raising trainmen 72 per cent and negro trackmen from \$1.60 to \$4.20 per day has had upon the company.

Mr. Hogg did not cite the fact that the company will pay some \$275,000 more to the city and state for taxes for 1918 than it paid in 1917. I will not say that the assessment of \$46,000,000 for the company is too high; recent investigation has convinced me that it is not. But I will say, without fear of contradiction, that it is relatively too high, and when compared to the total assessment of the city—\$443,000,000, as given by Mr. L. E. Thomas—it is all out of proportion. I don't think there is anyone who really believes that the N. O. Ry. & L. Co. has, including its franchises, more than one-tenth of all the taxable property in this big city of New Orleans, and should, therefore, pay more than one-tenth of all the taxes that go into the city coffers. Surely every other corporation, every factory, industry, all residences and every other taxable property in this great city should aggregate more than nine-tenths of the total.

These remarks are not intended to criticize any of the assessment-making officials. They certainly have had their fill of work getting this new basis for taxation started and deserve a lot of credit, but they are made to show that a thorough equalization of taxes has not been accomplished, and that the company suffers in abnormally high taxes thereby. It is to be hoped that the figure for total value of taxable property in New Orleans will be considerably more than \$443,000,000, which will justify a lower percentage than 75 per assessment purposes.

I have mentioned some of the big troubles. There were others, but suffice to say that under such conditions I believe you will all admit that any management of a concern would endeavor at least "to cut his suit according to his cloth," and

I believe that this is the worst criticism that you can conscientiously offer against the company at this time.

Mention is made of a report made by Jas. A. Allison & Co., Consulting Engineers of St. Louis, employed to survey the traffic conditions and to make recommendations for improved service by rerouting, etc. Mr. Hogg intimates that this report is aimed almost entirely at retrenchment to reduce the operating expenses of the company. I take issue with Mr. Hogg here. I have read the Allison report with a great deal of interest. If he will analyze the seven recommendations given as a summary in the beginning of the report he will find that this is not the case.

THE REORGANIZATION PROBLEM.

Since Mr. Hogg read his paper things have happened to ease his mind a great deal, and I guess he is now happy. The long-overdue Ballard report was finally submitted and the court now has jurisdiction over the affairs of the company. Nursing the organization back to health is, therefore, up to the Federal Receiver, and it is out of place for me at this time to venture on what the solution of the reorganization problem should be.

DETAILS OF EXISTING ROUTES.

New Orleans Railway & Light Company.

BAYOU ST. JOHN LINE.

Up Trip—On Bayou Road from Grand Route St. John to Broad to Ursuline to Dauphine to Canal.

Down Trip—On Canal from Dauphine to Burgundy to Dumaine to Moss to Grand Route St. John to Bayou Road.

BROAD LINE.

Up Trip—From Paris Avenue and from St. Bernard Avenue termini to Broad to St. Peter to Dauphine to Canal.

Down Trip—On Canal from Dauphine to Burgundy to Dumaine to Broad to Paris Avenue to St. Bernard Avenue termini.

CANAL AND ESPLANADE BELTS.

Round Trip, Canal Belt—On Canal from Delta to City Park Avenue to Esplanade to North Rampart to Canal to Delta.

Round Trip, Esplanade Belt—On Canal from Delta to North Rampart to Esplanade to City Park Avenue to Canal to Delta.

CARONDELET LINE.

Up Trip—On Royal from Louisa to Canal to St. Charles to Howard Avenue to Baronne to Philip to Carondelet to Napoleon to Freret to Broadway to Claiborne.

Down Trip—On Broadway from Claiborne to Freret to Napoleon to Carondelet to Canal to Bourbon to Esplanade to Decatur to Elysian Fields to Chartres to Louisa to Royal.

NORTH CLAIBORNE LINE.

Up Trip—On St. Claude from Kentucky to Lafayette Avenue to Urquhart to Elysian Fields to Claiborne to Canal to Baronne to Howard Avenue to St. Charles to Jackson to Tchoupitoulas.

Down Trip—On Jackson from Tchoupitoulas to St. Charles to Howard Avenue to Baronne to Canal to Claiborne to Elysian Fields to St. Claude to Kentucky.

CLIO LINE.

Up Trip—On Canal from Carondelet to St. Charles to Howard Avenue to Rampart to Clio to Magnolia to Napoleon to Freret to Broadway to Maple.

Down Trip—On Broadway from Maple to Freret to Napoleon to Magnolia to Erato to Carondelet to Canal.

DAUPHINE LINE.

Up Trip—On North Peters from Esteben to Delery to Dauphine to Jordan to Rampart to Canal to Delta.

Down Trip—On Canal from Delta to Rampart to Esplanade to Dauphine to Poland to Rampart to Jordan to Dauphine to Reynes to Tricou to North Peters to Esteben.

DRYADES LINE.

Up Trip—On Canal from Rampart to St. Charles to Dryades to St. Andrew to Baronne to Eighth to Carondelet.

Down Trip—On Eighth from Carondelet to Rampart to Philip to Dryades to Felicity to Rampart to Canal.

COLISEUM LINE.

Up Trip—On Canal from St. Charles to Camp to Henry Clay to Magazine.

Down Trip—On Henry Clay from Magazine to Coliseum to Louisiana Avenue to Chestnut to Felicity to Camp to Howard Avenue to St. Charles to Canal.

LAUREL LINE.

Up Trip—On Canal from Camp to Carondelet to Clio to Coliseum to Erato to Annunciation to Louisiana Avenue to Constance to Valmont to Laurel to Audubon Park.

Down Trip—On Laurel from Audubon Park to Louisiana Avenue to Chippewa to Race to Annunciation to Erato to Camp to Canal.

NORTH PETERS LINE.

Up Trip—On Esplanade from Villere to North Peters to Canal to Camp.

Down Trip—On Canal from Camp to North Peters to Esplanade to Villere.

LOUISIANA AVENUE LINE.

Up Trip—On Canal from Ferry to Rampart to Calliope to Franklin to Jackson to Freret to Louisiana Avenue to Tehoupitoulas.

Down Trip—On Louisiana Avenue from Tehoupitoulas to Howard to Jackson to Franklin to Erato to Rampart to Canal to Ferry.

MAGAZINE LINE.

Up Trip—On Canal from Magazine to Camp to Camp Place to Magazine to Broadway to Maple to Carrollton to Oak to Leake Avenue.

Down Trip—On Leake Avenue from Oak to Gen. Ogden to Poplar to Carrollton to Maple to Broadway to Magazine to Canal.

NAPOLEON LINE.

Outbound—On Napoleon from Tchoupitoulas to Broad to Washington to Carrollton to New Basin Shell Road to Metairie Road to Seventeenth Canal and to Shrewsbury termini.

Inbound—From Shrewsbury and from Seventeenth Canal termini to Metairie Road to New Basin Shell Road to Carrollton to Washington to Broad to Napoleon to Tchoupitoulas.

PETERS AVENUE LINE.

Up Trip—On Canal from Dryades to Carondelet to St. Andrew to Brainard to Baronne to Dufossat to Dryades to Peters Avenue to Tchoupitoulas.

Down Trip—On Peters Avenue from Tchoupitoulas to Dryades to Canal.

PRYTANIA LINE.

Up Trip—On Canal from St. Charles to Camp to Prytania to Joseph to Hurst to Audubon Park.

Down Trip—On Hurst from Audubon Park to Joseph to Prytania to Camp to Howard to St. Charles to Canal.

SOUTH CLAIBORNE LINE.

Up Trip—On Canal from Carondelet to St. Charles to Howard to Rampart to Clio to Claiborne to Carrollton Avenue.

Down Trip—On Claiborne from Carrollton to Erato to Carondelet to Canal.

ST. CHARLES AND TULANE BELTS.

St. Charles Belt—On Canal from Delta to Baronne to Howard to St. Charles to Carrollton to Tulane to Rampart to Canal to Delta.

Tulane Belt—On Canal from Delta to Rampart to Tulane to Carrollton to St. Charles to Howard to Baronne to Canal to Delta.

TCHOUPITOULAS LINE.

Up Trip—On Dumaine from City Park Avenue to Rendon to Ursulines to North Peters to Tchoupitoulas to Annunciation to Race to Tchoupitoulas to Audubon Park.

Down Trip—On Tchoupitoulas from Auduhon Park to Race to Annunciation to Howard to South Peters to North Peters to Dumaine to City Park.

VILLERE LINE.

Up Trip—On Franklin Avenue from St. James' to Lafayette Avenue to Villere to St. Peter to Dauphine to Canal.

Down Trip—On Canal from Dauphine to Burgundy to Dumaine to Villere to Lafayette to Franklin Avenue to St. James.

WEST END AND SPANISH FORT LINES.

Outbound—From Rampart Street terminus to Canal to City Park Avenue to West End Boulevard to Adams Avenue to Esplanade to Spanish Fort.

Inbound—On Esplanade from Spanish Fort to Adams Avenue to West End Boulevard to City Park Avenue to Canal to Rampart Street terminus.

PROPOSED ROUTES.

TCHOUPITOULAS-LOUISIANA AVENUE LINE.

Down Trip—On Louisiana Avenue from Freret to Tchoupitoulas to Race to Annunciation to Howard to South Peters to North Peters to Esplanade to North Claiborne.

Up Trip—On Esplanade from North Claiborne to North Peters to Canal to Magazine to Erato to Annunciation to Race to Tchoupitoulas to Louisiana Avenue to Freret.

LAUREL LINE.

Down Trip—On Laurel from Exposition Boulevard to Louisiana Avenue to Chippewa to Race to Annunciation to Camp to Julia to Carondelet to Canal.

Up Trip—On Canal from Carondelet to Camp to Erato to Annunciation to Louisiana Avenue to Constance to Valmont to Laurel to Exposition Boulevard.

Note:—Annunciation from Louisiana Avenue to Valmont to be built and used instead of Constance Street at some future time.

One block of track on Julia Street from Camp to St. Charles to be built.

MAGAZINE LINE.

Down Trip—On Broadway from South Claiborne to Leake Avenue to Magazine to Camp Place to Camp to Canal.

Up Trip—On Canal to Magazine to Leake Avenue to Broadway to South Claiborne.

Note:—This line to be extended on Broadway from South Claiborne to Fig at some future time.

PRYTANIA LINE.

Down Trip—On Henry Clay Avenue from Magazine to Coliseum to Joseph to Prytania to Camp to Julia to Carondelet to Canal.

Up Trip—On Canal from Carondelet to Camp to Prytania to Henry Clay Avenue to Magazine.

Note:—Necessary tracks on Prytania above Joseph on Henry Clay Avenue on Joseph to be built.

ST. CHARLES AVENUE EXPRESS LINE.

Down Trip—On Carrollton Avenue from South Claiborne to St. Charles Avenue to Howard Avenue to Baronne to Common to Rampart to Canal to Baronne.

Up Trip—On Baronne from Canal to Howard Avenue to St. Charles Avenue to Carrollton Avenue to South Claiborne.

Note:—Track on Common Street from Baronne to Rampart to be built.

TULANE AVENUE LINE.

Down Trip—On South Claiborne from Upper Protection Levee to Carrollton to Tulane Avenue to Rampart to Canal to Baronne.

Up Trip—On Canal from Baronne to Common to Tulane Avenue to Carrollton Avenue to South Claiborne Avenue to Upper Protection Levee.

Note:—Second track on South Claiborne between Upper Protection Levee and Carrollton Avenue to be built later.

DRYADES LINE.

Down Trip—On Peters Avenue from Tchoupitoulas to Dryades to Dufossat to Baronne to St. Anderw to Dryades to Howard Avenue to Rampart to Canal to Carondelet.

Up Trip—On Carondelet from Canal to Julia to Dryades to Peters Avenue to Tchoupitoulas.

FRERET LINE.

Down Trip—On Freret from Broadway to Napoleon to Howard to Jackson to Franklin to Erato to Rampart to Canal to Carondelet.

Up Trip—On Canal from Carondelet to Julia to Rampart to Clio to Franklin to Jackson to Freret to Broadway.

Note:—One block of track on Julia between Dryades and Rampart to be built.

Single tracks on Freret and Howard from Louisiana Avenue to Napoleon to be built at a later date.

Single track on Peters Avenue from Freret to Willow and on Willow from Peters Avenue to Broadway to be built later; this line to loop in one direction on Peters Avenue, Willow and Broadway to Freret.

Single tracks on Poplar Street and on Oak Street between Broadway and Carrollton Avenue to be built later; line then to connect with existing tracks on Poplar and on Oak Streets above Carrollton Avenue, the ultimate terminus of Freret line to be on Leake Avenue and General Ogden Street.

SOUTH CLAIBORNE LINE.

Down Trip—On South Claiborne from Carrollton Avenue to Erato to Carondelet to Clio to Camp to Canal.

Up Trip—On Canal from Camp to Rampart to Clio to Claiborne to Carrollton Avenue.

ST. CLAUDE LINE.

Down Trip—On Canal from Delta loop to North Rampart to Esplanade to St. Claude to Jordan Avenue to Dauphine to Reynes to Chartres to Tricou to North Peters to Esteben and to the American Sugar Refinery.

Up Trip—On North Peters from the American Sugar Refinery and from Esteben to Delery to Chartres to Reynes to Dauphine to Jordan to St. Claude to Lafayette Avenue to North Rampart to Delta loop.

Note:—Single track to be built on St. Claude from Esplanade to Elysian Fields, gauge of track to be widened on St. Claude from Elysian Fields to Kentucky, and tracks to be built on St. Claude beyond Kentucky and on Jordan Avenue as soon as the new bridge over the Industrial Canal at St. Claude Avenue is completed.

CANAL AND ESPLANADE BELTS.

These two belt lines to remain as at present.

BROAD LINE.

Up Trip—On Broad from St. Bernard to Ursuline to Royal to Canal.

Down Trip—On Canal from Royal to Bourbon to Dumaine to Broad to St. Bernard Avenue.

Note:—Necessary curves at Royal and Canal, Bourbon and Canal, Royal and Ursuline, Bourbon and Dumaine to be installed.

CITY PARK LINE.

Up Trip—On Dumaine from City Park to Rendon to Ursuline to Royal to Canal.

Down Trip—On Canal from Royal to Bourbon to Dumaine to City Park.

Note:—Broad line and City Park line to operate as a split line beyond Broad and Dumaine.

FRANKLIN AVENUE LINE.

Up Trip—On Franklin Avenue from St. James Avenue to Lafayette Avenue to Royal to Canal.

Down Trip—On Canal from Royal to Bourbon to Esplanade to Dauphine to Lafayette Avenue to Franklin Avenue to St. James Avenue.

Note:—Necessary tracks on Lafayette Avenue from Royal to St. Claude and necessary street connection at Lafayette Avenue across Villere to be built.

DAUPHINE LINE.

Up Trip—On France from Tonti to Royal to Canal.

Down Trip—On Canal from Royal to Bourbon to Esplanade to Dauphine to Poland to St. Claude to France to Tonti.

NORTH CLAIBORNE LINE.

Up Trip—On Villere from Lafayette Avenue to Elysian Fields to North Claiborne to Canal to Delta Street loop.

Down Trip—On Canal from Delta Street loop to North Claiborne to Elysian Fields to Villere to Lafayette Avenue.

Note:—Gauge of North Claiborne to be widened under stage to be determined later.

ST. BERNARD AVENUE LINE.

Up Trip—On Paris Avenue and Gentilly Road to St. Bernard Avenue to North Claiborne to Canal to Delta Street loop.

Down Trip—On Canal from Delta Street loop to North Claiborne to St. Bernard to Paris Avenue to Gentilly Road.

Note:—St. Bernard Avenue and North Claiborne lines to operate as one split line beyond North Claiborne and St. Bernard Avenue.

WEST END AND SPANISH FORT LINES.

This line to operate as at present.

NAPOLEON AVENUE LINE.

Outbound—On Napoleon Avenue from Tchoupitoulas to Broad to Washington Avenue to Carrollton Avenue to New Basin Shell Road to Metairie Road.

Inbound—On New Basin Shell Road from Metairie to Carrollton Avenue to Washington Avenue to Broad to Napoleon to Tchoupitoulas.

SHREWSBURY LINE.

Outbound—On Canal from Rampart to City Park Avenue to and across New Basin to Metairie Road to end of line at Shrewsbury.

Inbound—From Shrewsbury along Metairie Road to and across New Basin Canal to City Park Avenue to Canal Street to Rampart.

Note:—Connections across bridge over New Basin Canal to be installed later.

JACKSON AVENUE LINE.

Down Trip—On Jackson Avenue from Tchoupitoulas to Carondelet to Canal.

Up Trip—On Canal from Carondelet to Camp to Julia to Carondelet to St. Andrew to Brainard to Jackson Avenue to Tchoupitoulas.

Note:—Necessary tracks on Jackson from Brainard to St. Charles to be built.

PETERS AVENUE-BROAD LINE.

Single track with necessary sidings to be built on Peters Avenue from Dryades to Broad, and on Broad from Peters Avenue to Napoleon Avenue, and from Washington Avenue to St. Peters Street. When these tracks are built across town the lines should operate as follows:

On Peters Avenue from Tchoupitoulas to Broad to St. Bernard Avenue, returning the same way. When this line is put in operation the Dryades line should terminate at Peters Avenue, and Dryades and the Broad line portion on the split Broad-City Park line mentioned above should be discontinued.

Note:—In the discussion that followed the reading of my paper Mr. Hogg called attention to the fact that the proposed approach to the bridge over the Industrial Canal at St. Claude Avenue made it impractical to use Jordan Avenue, as outlined above. This being the case, I would continue the double track on Reynes to St. Claude and continue the double track on St. Claude to Reynes. I believe similar arrangements can be made for widening Reynes Street between Dauphine and St. Claude, as was done on this street between Dauphine and Chartres.

THE PRESIDENT: It is a special pleasure to the members of the Louisiana Engineering Society to see so many of our city officials here, and I take pleasure in asking Mr. E. J. Glenny, Commissioner of Public Utilities, to say a few words to us on this subject.

MR. GLENNY: Mr. President and Gentlemen of the Society: I did not come here to say anything; I came to listen and to be instructed. I have read this paper, though not as carefully as I might have done, and I believe, on the whole, that the sugges-

tions are very good. There are, however, some details which I think are impracticable. There is one suggestion, and an example given, of the Coliseum Line, running an express train or an express car starting five minutes ahead of a local car, and a little further on showing less than two minutes headway. I would like to have that explained by Mr. Hogg. Mr. Hogg states, as I understand, that it would require twenty-seven 52-seat cars to carry the crowd on the Coliseum Line, and then he wants a five-minute saving in the schedule of the express car. I think the length of that route is not more than forty-five minutes or an hour, so that there would be a car every two minutes instead of every five minutes. I do not see how that could be managed. It reminds me of a certain young lady who always took the big St. Charles car, even though a small one passes ahead of it, because the big car traveled faster than the small one.

With the arrangement of lines as proposed by Mr. Datz it appears to me that in the district between Coliseum, St. Charles Avenue, Peters Avenue and Henry Clay Avenue there would be too long a walk in order to get to a car going down town, in view of the proposed removal of the Prytania Line from Hurst Street over to Prytania Street. This would leave only three lines in the distance from Coliseum Street over to Freret Street.

Another suggestion of Mr. Hogg's of which I cannot approve is to stop certain cars at Camp and Canal, which, according to present regulations requiring a five-minute lay-over on every run, would necessitate stopping these cars there for five minutes. The suggestion of having an extra crew to take the car on as soon as it comes in would be difficult to carry into effect for the reason that each crew insists upon having the same car all the time. They will give up their special cars only when these latter have to be sent in for repairs. There would also be the further difficulty of taking care of their registers with the crews changing cars each trip.

The plan of switching back the Prytania cars on Camp Street has been tried out and it is a very dangerous practice. Passengers are getting in and out at each end of the car while at the same time the vehicular traffic is passing on both sides. It is a dangerous practice and should not be permitted.

I do not agree with Mr. Hogg's suggestion to have the cars cross St. Charles Avenue at some street higher up than Lee Circle. There is nothing worse than the present situation on Howard Avenue, it is true, with cars running contrary to traffic; but to cross from a narrow street over St. Charles Avenue, with the present vehicular traffic, is much worse than to circle the Circle. You have a splendid avenue there, whereas the other way the car would go right across St. Charles Street. The Olio car does it now, and it is dangerous; and to force other cars to do it would but intensify that condition.

With reference to the point of the working hours of the men, I doubt whether you could get 164 men to work on the cars and to loaf between 8:30 a. m. and 4:30 p. m. or seek some other form of employment during the rest of that time. I know that the Railway Company has had serious difficulty in getting the men to work at all.

One of the reasons, not generally known to the public, for the very poor service which the company has been giving is that it has so many crippled cars which it cannot get repaired. A large proportion of this repair work consists of welding and armature winding, and they cannot get the necessary skilled labor. This is due to the abnormal conditions brought about by the rulings of the War Labor Board with reference to the scale of wages for such workers.

A very important point brought out in the original paper as well as in Mr. Datz's discussion is that conditions in New Orleans are such that we have a very great track mileage in proportion to the number of cash fares. We have two hundred and odd miles of track with ninety-six million paid fares. The City of Winnipeg, I think, has 117 miles of track with one hundred and fifty million paid fares. You may see from that statement where we stand. With such a heavy overhead we must pay for it in one of two ways—more cost to ride or poorer service.

There is another serious condition in the operation of street railways in New Orleans to which I should like to call attention. We have to pour through a little narrow neck of four or five blocks, between Camp and Rampart at Howard Avenue, almost the whole traffic of New Orleans. Now as to the rerout-

ing of cars, if you wish to do it logically, on Canal Street, you must go down some street and up a street nearer the River. To take any street-car line off any street is almost impossible. Baronne Street, because of the different gauge, and Mr. Datz says that Baronne Street should keep the present gauge, can be used for only one line, the Tulane and St. Charles Belt. It is almost impossible to do it unless you use St. Charles Street for vehicular traffic. You cannot route the cars up and down in an orderly way and use any other street, and even then you have to force the issue a little by using Julia Street from Carondelet to Camp. If you obliterate Julia Street it cannot be done.

Just a word about the franchises. Do not forget that serious stumbling block in the way of efficient car service in this city, and whenever or wherever you attempt to make the slightest changes in lines you are faced with injunctions and perpetual injunctions. There is only one man who effectually solved the injunction proposition; that was Major Lee. He solved it with pick and shovel.

The use of two different gauges presents a number of serious obstacles to the efficient routing and operation of the street railways in this city, but to standardize at the present time would involve changing about 80 per cent of the tracks. This difficulty is felt in connection with the entry of interurban and suburban lines into the city, and New Orleans will never be a real town until it develops first-class suburban and interurban service. It will not suffice for such lines to come merely to the outskirts of the city and there deliver their passengers to the street-car lines; they must come into the heart of the city. And this is another reason why our gauges should be standardized. But, as Mr. Datz points out, this change is a million and a half dollar proposition, and that is just a sample of one of the many difficulties we are up against.

THE PRESIDENT: I should say, from the way Mr. Glenny has picked out these salient points, that he is a mighty good listener. I notice, amongst the other very welcome visitors here, several of the officials of the Railway Company, among them Mr. J. D. O'Keefe. We should like to have a few words from him.

MR. O'KEEFE: Mr. President and Gentlemen of the Society: I would like to say, in answer to Mr. Glenn and in relation to the condition of the equipment, that that has been the main point we have been working on for the last month. I have been receiver for about two months now, and when we first went in we found that there was a lack of armature winders, of acetylene welders, and a lack of blacksmiths. The company had made a contract with the Amalgamated Association of which Mr. Stadler was the head, and they undertook to take in machinists, armature winders, acetylene welders, and all other employees. After I had been in a week or so, I found that the members of what is known as the Metal Trades Council, which body has in it the machinists, welders, blacksmiths, etc., declined to be a party to the contract; they claimed that they had an organization of their own and that the other organization had no right to make any contract in their behalf, and they were not going to operate under the old contract. A few days later we had a conference with the Brotherhood of Electrical Workers, which takes in the power-house men, switchboard operators, etc., and they also declined to be a party to the general contract that the War Labor Board made an award upon. One organization presented what they termed their "craft rates," which were higher than the War Labor Board's rates. We felt the latter rates were high enough, as it raised the company's pay-roll \$1,400,000.00. The metal trades decided it was not high enough for them, and they presented a scale which raised the rates for machinists from about 68 cents an hour to 80 cents an hour. Had we employed the necessary welders, armature winders, etc., at the craft rates, it would have made it necessary to increase the wages of 170 men, or maybe 200, who would have wanted the 80 cents an hour which we had to pay to the armature winders and welders.

We have had, in the last month, a series of conferences, which resulted, in the last week or ten days, in a visit from one of the national representatives of the Amalgamated Association. We had the general organizer of the International Brotherhood of Boilermakers, and other representatives of blacksmiths and helpers' unions from the north, but the men refused to come together. The representative here last from the Amalgamated Association tried to get a conference with the other organiza-

tions, and after waiting on them two days he stated that he was unable to do so, and was willing to release them from the contract. This was the first time that we had a chance to modify or read a working agreement under this contract. I went to Judge Foster, and he asked for a conference with all of the men. I then invited them to come to the United States Court and let him talk to them—which they did, last Thursday or Friday. As a result of that conference the Amalgamated Association have released these other workers, and they proposed to tender us a contract in which they will put in their scale of wages for their various crafts. It is hoped that by the 16th of the month, which will be the next split in the pay-day—the pay-days being fifteen days apart—it will be possible to get the necessary welders and armature-winders and put this new scale into effect; possibly to make a new contract, or a readjustment of the old, or to in some way arrange the old contract, and after that we should get the cars repaired and in service. Mr. Glenn is right about the number of cars laid up. By reason of the fact that armature winders and welders were not available, the cars had to be laid off.

That has been the situation, and it has been a source of a great deal of worry to all of the parties operating the lines; but I have been in a position, in the last few days, to see a little daylight ahead. I hope, after we get the new scale of wages and the type of employees necessary to repair the cars, that we will be able to show some results in a short while. Of course, this system is about a year behind in deferred maintenance, and we will not catch up in very short order, although, with the necessary labor to make repairs, we hope to make a showing in the next thirty days, to show fairly good results in sixty days, and in ninety days to have the cars in about the same condition as they were eight or nine months ago, which I understand was pretty fair. Most of the trouble has occurred since that period. We can appreciate that the service has been poor, and that the lack of these cars has been very annoying; but there has been nothing else to do. The contract was made, agreed to, and the scale of wages regulated by the War Labor Board. I understand there have been about four hundred applications to the War Labor Board for modifications of their awards. Various

cities are suffering the same as New Orleans. These applications are being considered, but we are in a position where we cannot wait for the War Labor Board to modify the contract; our necessities are such that it is necessary for us to modify it ourselves. I think from now on, after we get these men to work, you will notice that there will be no other cars laid up for want of repairs, and that we will catch up in this way. I believe the people should know this. We have made no announcement to that effect because we would rather have our difficulties and troubles and say nothing until something is done; but I think it is practically done now, although the new contracts have not been signed. I believe after this that the service will be considerably improved. But the improvement will be gradual; a company that is a year or two behind in deferred maintenance will not catch up in a few weeks; but the future will see conditions better, instead of worse.

THE PRESIDENT: We are very glad to have this information from Mr. O'Keefe—information which nobody has outside of the Railway Company officials and the City officials. I am glad to see we have the press here tonight, and a good deal, I suppose, will come out in the papers. We have with us the Commissioner of Public Property, Mr. Stone, and we would be glad to hear from him.

MR. STONE: Mr. President and Gentlemen, I thank you, but I came here, as Mr. Glenny did, to listen, but I fear I did not observe as much as he did. I am very much interested in this proposition, of course, and I trust some good solution will be worked out.

THE PRESIDENT: We would like to hear something from Mr. Bleecker, to supplement the statement of Mr. Glenny. I am sure Mr. Bleecker, of the Railway Company, has gone thoroughly into it, and can tell us a good deal more on the subject.

MR. BLEECKER: Mr. President and Members of the Society: It is a great pleasure to be here with you tonight. I must confess I have not been in New Orleans long enough to be able to offer you very much constructive advice in the presence of those who have studied this problem so carefully, and I would not undertake to do that for a moment. I have read the paper and

heard the discussion with a great deal of pleasure and interest, and I am studying all the problems involved for the receiver, from a comparative standpoint, with a great deal of interest. I am particularly interested in seeing the human problem here tonight, and realize that what I heard about New Orleans, before coming here, is eminently true, and that is, that whatever is wrong about New Orleans is not made public to the outside world, but is discussed in the private family of New Orleans for solution; because one hears away from New Orleans nothing but good of the city, and it is a great pleasure to know that I am living now in a city where its problems and difficulties are discussed in the friendly and constructive manner in which it is evident they are discussed here for solution. I believe that is the best argument for the future growth and success of a community that could possibly be advanced—that where there are problems they are straightened out at home, instead of being published to the world as being impossible of solution. I believe that these deliberations, as Mr. Hogg says, are very necessary and very important, and that the more there are of deliberations of this kind the more successful will be the solution of the problems, and I hope that I may have the opportunity of listening to some more discussions of the traffic problem of New Orleans, at various times and from various bodies.

One or two details which have occurred to me, in looking over the paper and in hearing the discussion, might perhaps not be amiss. They are not specific, as applying to this problem, but are general. Still, they might possibly be applied to it. For instance, the question of the type of car in use, and the method of its operation. There is the possibility of considering, sometimes, the operation of a near-side stopping car, with a front entrance; there is the possibility of considering the modern safety car, which involves some slight changes in the method operation, but introduces a great many advantages; there is the possibility of considering the use of the pay-as-you-enter pay-as-you-leave type of car, which enables congested conditions to be overcome. In the morning passengers enter one at a time, pay as they enter, and a number of exits are thrown open when the car arrives at its destination and the passengers get off very quickly and without interruption; and at night, when the congestion starts on the

outbound trip, a number of openings are opened and passengers get in without paying fare, and as they get off they pay the fare. I do not say these types of car will necessarily solve the questions presented in New Orleans, but perhaps some modification of them, or the adoption of them in part, under certain conditions, may assist. I believe, in studying a problem such as this, it is well to bear in mind that if the medicine which is prescribed for a sick patient is to be successful and productive of results, it must be administered in doses which can be absorbed by the patient. It would be impossible, of course, for a patient to take a pill, even though it might be good for him, if it were no smaller than a baseball; it would be necessary to adopt some other kind of treatment; and consequently, the question of applying these remedies in stages, and in easy stages, should be borne in mind in the recommendation and the adoption of any plans.

I am much impressed with Mr. Glenney's remarks about the five minutes' wait at the end of every trip, and can readily see that this difficulty was not considered by Mr. Hogg, and I think rightly so, because I did not see why it was necessary for a street-car man to have a five minutes' wait at the end of every trip. I have never heard of it before, and I do not believe it is in general practice anywhere else. It means, as you know, and as I have seen in the short time I have been here, a lot of "dead" cars standing on the track, with the men sitting in them and resting, when they should be running them for the benefit of the riding public.

The possibility of the use of men for short hours on trippers is a very difficult problem, and perhaps one impossible of solution. But there are, in a great many instances, what are known as "Shop Extra Lists," where men working in the company shops, or other shops, take out trippers and assist very materially in giving the peak-load service which is inherent in the street-car service. In fact, it is inherent in practically all public utilities business, and has been recently discovered by the Government as existing in the telephone business, when the Government asks you to stay up until midnight to do your telephoning or pay a higher rate. That is a condition which faces all traffic which conforms to the use of daylight—in other words where people go

to work in the morning and go home at night—and it cannot be overcome; it must simply be met.

There are, of course, numerous other details which may be found applicable to a condition of this character, when we come to study it more minutely, but I will not take up your time with those, but I would like to say that I hope, after hearing suggestions and criticisms, from the operating standpoint, which any of the citizens of New Orleans have in mind, they will give the management of the system the benefit of those criticisms and suggestions by bringing them to our attention. If the management could have 400,000 people assisting it by constructive criticism and suggestion, it could make progress very much more readily than if those people did not advance the suggestions and give the benefit of their advice.

THE PRESIDENT: We should like to hear from Mr. R. S. Manley.

MR. MANLEY: The changes suggested by Mr. Hogg in the operation of our Street Railway system may be one hundred per cent correct. They may be fifty per cent correct, and through the various suggestions made this evening be reendered perfect. This Society has talent enough in the engineering profession to ultimately arrive at recommendations which will be most excellent and efficient.

But what will such plans avail?

What is the reception of such plans by the public? Is there not produced in every case of suggested change, a storm of protest? Must not the first step consist in the establishment of mutual confidence between the public and the Railways Company?

As I see it, the public knows that it has been hurt, but does not know how, or why; it is confused by the multiplicity of bond issues, stock issues, underlying companies, holding companies, holding companies of holding companies, and feels sure that something must be done to assuage the hurt, but being in ignorance of the structure, management, needs, difficulties, merits and demerits of this corporation, their feeling naturally results only in general hostility toward the corporation and a desire to obstruct any proposed plan put forward.

Confidence must be restored before the public can be expected to view proposals of any nature from any other standpoint than prejudice.

The public on its part must remember that, until less than twenty years ago the City of New Orleans consisted of a long narrow strip of built-up territory running along the river front, and another long narrow strip running back from the river front to the Old Basin Canal, bounded approximately by Canal Street and Esplanade Avenue. The street car service had been built up to take care of traffic in these narrow strips only. Then came sewerage and surface drainage, resulting in the reclaiming of enormously increased territory running back practically to the Lake, and bounded approximately by the river front, Carrollton, the Lake and the Barracks. The result of this situation was a sudden enormous expansion of the population into this territory not hitherto served with any of the public utilities, this territory having neither gas nor electric lights, nor street railroad service. It is true that those who moved into this territory were entitled to all of the public utilities—gas, electricity and street railways; it is true that the public utility concern was called upon to supply conveniences to the public in this newly developed territory, but it must not be forgotten that the vast expenditures for gas, electric and street railway equipment, installation, power plants and rolling stock, represented by bonds and capital stock, could not possibly be expected to bring returns from this sparsely settled territory until the passage of sufficient time to bring the income up to a point equal to expenses plus a reasonable return. Long lean years endured at a loss, demand in fairness an equal number of years of especially good returns. What sane man would have invested in a project which almost certainly meant temporary losses, without the expectation of compensating years of extra gain.

In this very same slowly developed territory, the returns on the capital investment was not, and in much of the territory, still is not adequate. A recollection of these facts is necessary in discussing the return in the way of income on the capital invested, which this public utility, under discussion, is fairly entitled to earn, and it certainly should be entitled to earn a suffi-

cient return to pay a fair profit not only for the present years, but to make up for the years during which no adequate return was possible on the capital invested.

Adopt this formula for guidance on this question of adequate return:

$$\frac{X \text{ lean years} + X \text{ fat years}}{2} = \text{a square deal.}$$

Another thought is that the public is accustomed to think of the utility corporation without human identity. The public is also accustomed to think of the utility corporation without distinguishing between the management of the corporation and the holders of securities who have no share in the management of the corporation. The security holders have advanced their funds in good faith and are entitled to full consideration at the hands of the public, for they have not been parties to any mismanagement if there has been any mismanagement, as has been charged.

Now the public should keep in mind as to the question of mismanagement past or present, as has been charged, or if there should be any mismanagement in the future, the fact that this corporation which is under discussion, is managed ultimately by a small group of men, or perhaps by one individual, or at any rate the final direction of affairs of the corporation is controlled by an individual or individuals with names. Those individuals or that individual responsible for the management of the affairs of the corporation should be held responsible to the public for mismanagement if there be any mismanagement, and should be given due credit for good and successful management if the management be good and successful.

In addition to performing fully all obligations to the public, there are two policies which may be followed in the management of a public utility such as this one. The first (and the proper) policy has for its objective the production of a proper return in the way of income on capital invested, including not only bonds or other investments, but capital stock shares. The second (and improper) policy, which has been so commonly adopted, has for its objective the handling of such public utility corporation solely for the purpose of manufacturing securities through a holding

company or a series of holding companies, for the purpose of selling those securities to the public, and not simply for the purpose of producing an income on outstanding obligations and shares of the original company. This second and improper policy can lead only to improper management of the corporation and neglect of obligations to the public.

Under the first, the proper policy of handling such a corporation as an earning or dividend producer, the public should be constantly taken into the confidence of the corporation, and it is the duty of the public, where that is done, to co-operate with the management of such a corporation; and such co-operation on the part of the public will bring the best results in the way of service to the public itself. This would involve the elimination of politics from the management of such a corporation and would bring it directly in touch with the individual public themselves.

The public should, therefore, through some permanent continuing agency, be kept advised of the successful operation of this public utility and of its failures and short-comings, but it should be given due allowance for difficulties encountered in accomplishing its purposes and for its short-comings.

But above all, this continuing agency should ascertain with certainty the names of the individuals or individual responsible for the control of the policy of the corporation and responsible for the execution of the policy of the corporation, and the names of those individuals controlling, or the name of the individual controlling, should by that public agency be always kept before the public, and the public should be advised constantly as to the particular individual or individuals who are directing the affairs of the corporation.

This should not mean any figurehead who may be put forward or any official who obeys orders of a controlling individual or individuals, who do not appear openly as the directing power. In this manner public opinion should be directed constantly to consideration, not of the mere corporation, but to the flesh and blood in the shape of individuals who direct that corporation. They should be given full credit for success and they should be criticized for short-comings. The force of public opinion thus publicly and constantly directed upon the individual or individuals

actually controlling the affairs of the corporation would inevitably produce results for the corporation and the public which could never be won by any other method.

Should not the Louisiana Engineering Society perform this function? I therefore offer the following motion:

"It is hereby resolved that in the public interest the President of the Louisiana Engineering Society be and he is hereby directed to cause through the proper committee of the Society to be inserted in the columns of the Journal from time to time the names of the controlling individual or individuals of the New Orleans Railway & Light Company, with such appropriate data on the achievements, successes, failures or short-comings, as to this committee may seem proper."

THE PRESIDENT: Is there any comment on this resolution?

MR. HOGG: I agree with that suggestion and think the resolution should be adopted. The Louisiana Engineering Society should be foremost in assisting the men who have these problems to deal with, in order to bring the Railway Company into an efficient organization. Any co-operation we can give them is the best public service we can render at the present time. I second the motion.

[The resolution was adopted unanimously.]

THE PRESIDENT: We would like to hear from Mr. A. M. Lockett.

MR. LOCKETT: I have looked over Mr. Hogg's paper on the New Orleans Railways with much interest, and wish to compliment him upon the thoroughness with which he has handled the subject. It would be presumption on my part to attempt to add anything of a technical nature or to take issue with him in any of the details of his paper, because my knowledge of the subject of street railway design and operation is very superficial. It has occurred to me, however, that I might venture to make a few remarks on the street railway situation from the viewpoint of a business man interested in the company being required to furnish the proper service on the one hand, and on the other hand in giving the officials of that company, not only a fair chance to furnish the service we want, but in addition, co-operating with them in their effort so to do.

I have known personally all of the men who have had the management of the affairs of the New Orleans Railway Company since it was organized. I know all of them were men of ability and I believe all of them to be honest. It is absurd for any one to believe that these men did not have the most earnest desire to handle this property in such a way that it would not only be profitable to the owners of their securities, but satisfactory to the citizens of New Orleans. Having the necessary ability, the desire and the opportunity, and yet not succeeding, the natural conclusion to draw is that there has been something about the conditions which made the task, if not impossible, at least beyond the ability of ordinary men. From what Mr. Hogg has said in his paper the system is badly laid out, with many unnecessary tracks which cost much money to maintain. The routing of the cars is bad, resulting in overloading at some points and underloading at others. There is insufficient equipment, and such equipment as they have is in more or less bad order.

My impression is that the troubles of the Railway Company may be enumerated as follows:

First—Due to the franchise requirements of the several lines absorbed, there are many parallel lines serving certain sections of the city, necessitating not only the operation of cars on unprofitable routes, but requiring the heavy expense of maintaining unnecessary tracks. This situation involves expense which might otherwise be avoided, overloading cars at some points and underloading at others, and consequently giving a service below that which might be given with the same equipment under proper conditions.

Second—Due to the large bonded indebtedness the net earnings of the company under these unfavorable operating conditions even in normal times did not furnish sufficient margin of profit to provide for necessary expense of maintenance of equipment in use, nor to provide additional equipment needed. This being the case in normal times, when the costs of operation advanced with the prices of labor and materials due to the war the officials of the company faced a situation impossible to handle without assistance of some kind from the outside.

Third—Due to the same reasons they were not able to pay proper wages to their employees, and not only failed to get loyal

and efficient service from those employees, but met with their enmity and active opposition.

Fourth—On account of the bad service they were compelled to give, there was created in the minds of all their patrons a high degree of ill-will, which is fatal to the success of any enterprise.

The result of all of these troubles was necessarily failure to meet their obligations, with the resultant appointment of a receiver. The question now to be decided is what is to be the outcome. If there has been official juggling with this property outside the limits of the law, the people guilty of the offense should be punished; and if what has been done was within the law, and also within the limits of good morals, the company officials should be exonerated from any blame. At the instigation of the city a careful investigation extending over a period of several months has been conducted by Mr. Ballard, and while Mr. Ballard's figures for the proper value of this property vary widely from the figures claimed by the Railway people, I do not understand that Mr. Ballard discovered any irregularities which reflect upon the integrity of the officials, and it would, therefore, seem not only useless but unfair for any further attacks against that company to be made along these lines.

Whatever may be the case with respect to the outstanding obligations of the Railway Company, it is undoubtedly a fact that the final purchasers of these securities are innocent of any offense and should receive the consideration to which they are entitled. It would seem to be the duty of all good citizens, including especially the employees of the company and the city authorities, to lend every reasonable assistance to the receiver in his efforts to put this property on a sound financial basis so as to save the holders of their securities from loss. If it be a fact that they are maintaining tracks and operating car lines not actually needed for proper service to the public, permission should be granted for abandoning those lines and discontinuing all operation of cars, not only on such lines, but in any other place in the city where the practical study of the situation indicates that the cars are not needed. It is a bold man who ventures to advocate the proposition of increased car fares, but from information presented to the public by the Railway Company at the

time they asked for increased car fares and increased rates on electricity and gas, I am of the opinion that the present rate for car fares, and possibly even higher rates, will have to be paid until prices of fuel and the other requirements of the Railway Company fall to those of normal times, if the company is to be rehabilitated. The troubles of the Railway Company may be due in part to over-capitalization, but the real basic trouble in my opinion was due to an advance in the prices of everything they had to buy and no advance in what they had to sell. No business institution could have weathered the storm of high prices through which we have passed, and are still passing, without raising their selling prices, and no big business made the attempt except the street railway companies and other public utilities which were not permitted to adopt this method of meeting their extraordinary expenses. I saw a statement in the paper this morning that thirty-one street railway systems in the United States were in the hands of receivers, which goes to show that street railway difficulties are not confined to New Orleans. The time will come, in my opinion, when the people will demand and will receive first-class street-car service here and elsewhere, and they will be willing to pay the proper price for such service.

I do not believe that wages will ever come down to pre-war figures, nor that necessary machinery and supplies will reach the pre-war level. It will cost more to operate street cars than ever before, and we must pay more if we want service. If five cents was the proper price for a ride on the street cars in the past, it is not the proper price now and never will be again if my prediction regarding wages and prices of materials should be fulfilled. The proposition of charging five cents, no more and no less, for a street-car fare is unsound in the extreme. If it is proper to charge five cents for a ride of two miles, it is too much for a ride of half a mile, and not enough for ten miles. The street car company should be permitted to charge in proportion to the service rendered.

The people of practically all the cities of this country are unquestionably in the rush hours handled like a lot of cattle, because the only way the railway companies can meet their obligations with a five-cent fare is by handling the people that way. We are not the only victims; it is done everywhere. The street

car service so far as my observation goes has never been any worse here than in the other large cities; on the contrary, it has generally been better. People seem to overlook the fact that the number of people using the cars is very much greater now than in the past. This is due not only to the increased population but to the increase in the amount of business being done and the concentration of that business in the establishments on and adjacent to Canal Street. Moreover, many people are able to pay car fares and ride now who did not ride in the past, due to their increased prosperity, and for this same reason people ride oftener than they used to. If any one will compare the traffic on Canal Street today with what it was five years ago, he will appreciate the vast increase in the number of people to be handled by the street railway facilities.

I am not in favor of public utility companies enjoying the privileges of exclusive franchises without giving good and sufficient service in consideration therefor. But on the other hand I am not in favor of withholding from such corporations the fair and just treatment to which every business institution is entitled, and if the people of New Orleans really want first-class service they should "lend a hand" to the Receiver instead of indulging in the destructive tactics which have seemed to be the popular attitude during the recent past.

THE PRESIDENT: We should like to hear from Mr. Crump.

MR. CRUMP: I believe most of the points have been already covered this evening. My remarks shall be brief. There is one thing I might suggest, and that is, if there is any time when a radical change could be made I think this is really the time to make it. Since we entered the war, we have looked on things in a broader way; we have looked more to the interests of the general public, and have, in a measure, forgotten our private interests, and I think the time has now come when we can accept a change of routes, and cease to squabble when a change is suggested; that every man will be willing to accept some comprehensive plan, when one is suggested. The actual details, of course, should be worked out by those who make a special study of the subject, and we can look at them in a broader way than from that of the individual standpoint. I think we ought to

permitted to run only in an up-direction, as on Royal and Dauphine Streets below Canal Street. With that scheme in operation, cars could stop on the down-track without blocking vehicular traffic.

My chief aim in this suggestion was to remove entirely several lines from Canal Street, where congestion is intense during peak loads. Mr. Datz brings out splendid arguments against it, and after further consideration of all the facts, I am inclined to favor the continuous loop operation even though it means serious congestion in Canal Street.

FUTURE SUBURBAN LINES.

HOW SHOULD WE PROVIDE FOR THEM?

We have at present about 200 miles of road trackage (reduced to single); 80 per cent of this is wide (5' 2½") gauge, and 20 per cent is standard (4' 8½") gauge. They should be made uniform. Which way shall we turn? Shall we spend \$300,000 to widen the 20 per cent of standard gauge, or shall we spend \$1,500,000 to reduce the 80 per cent of wide gauge to standard gauge? Apparently Mr. Glenny and Mr. Datz favor the reduction of the 80 per cent of wide gauge to standard gauge. Their reason is the probable future necessity of caring for standard gauge suburban lines. I don't agree with them.

Today, the electric suburban lines are developing more and more into freight-carrying lines. I can see no distinction between an electric suburban or interurban system and a steam railroad system. Both are performing fundamentally the same kind of service.

At present in our city, the only service that might be classed as electric suburban is that given by the Orleans-Kenner Traction Co., entering the city from the west side. The entire length of this line from the Rampart Street Terminal to the St. Charles Parish Line is 15.9 miles; it is little more than an extension to a city line. It has neither freight house nor passenger shed; it receives and discharges its passengers and freight in the public street.

Now let us assume this company has extended its line to Hammond, La., or McComb, Miss., and carrying on a freight, passenger, express and mail business. I don't think that is at all vis-

ionary. Let us also assume that the terminals of the Illinois Central Railroad have been electrified. What will be the difference between the character of service given by the Orleans-Kenner Traction Co. and the Illinois Central Railroad Co.?

Now surely no one would recommend that the local trains of the Illinois Central R. R. should operate in Tulane Avenue on our local trolley tracks, yet we argue that the wide gauge of 80 per cent of our trolley tracks should be reduced to standard gauge to accommodate future suburban service. Why this discrimination? Are we going to permit the Orleans-Kenner Traction Co., or any other suburban traction system to operate freight trains on our local trolley tracks?

If we are going to develop a healthy system of electric suburban lines caring for freight, passenger, express and mail service, I believe two terminals must be provided, one on the east and the other on the west side of Canal Street. These terminals should provide elevated tracks part of the way, and independent surface tracks the balance of the distance to the junction with the private tracks of each company. These terminals will have to be at least partially municipally-owned, and operated probably under lease by a private corporation, with provisions that will insure fair treatment to all independent lines using the terminal.

I believe the 20 per cent of standard gauge track should be widened to agree with the 80 per cent of wide gauge. I believe \$300,000 should be expended for this change, and not \$1,500,000 for the opposite change.

I trust that this discussion will not be the last on this important subject. Engineers and Engineering Societies are realizing more and more their opportunity and public duty in the study and solution of civic problems of a technical nature for which they are especially fitted. I believe the Louisiana Engineering Society will not be fulfilling its duty, and the purpose of its existence, if it fails to devote a proper proportion of its meetings to papers and discussions on technical civic problems.

MINUTES OF MEETINGS AND BUSINESS OF THE SOCIETY.

Meeting of the Board of Direction, February 10, 1919.

The meeting was called to order with President Olsen in the chair and Messrs. Lawes, Riess, Moses and Robert present.

Upon motion unanimously carried, Professor C. S. Williamson, Jr., was elected to the Board of Direction for two years to take the place of Mr. Henry L. Hutson, deceased. Upon motion duly seconded and carried, Mr. R. T. Burwell was elected to the Board of Direction for one year, to take the place of Mr. John Riess, who has been elected to the Vice-Presidency.

Upon motion duly seconded, the following bills were approved for payment:

Tulane University Press, printing for Smoker	\$39.00
Tulane University Press, ballots, membership and annual, etc.....	30.75
U. L. Virgin, flowers, Messrs. Hutson and Rayner.....	20.00
Fabacher's Restaurant, refreshments	8.10
Herman Hustedt, shelves	7.50
Library Bureau	5.05
Electric Railway Journal, subscription	3.00
Miss Freret, salary	10.00
J. M. Robert, salary and incidentals	32.50
J. M. Robert, cash advanced.....	15.00
Palfrey-Rodd-Purcell Co., set of books.....	17.25
R. J. Derbes, auditing and opening books.....	50.00
Walter B. Moses, Smoker expenses.....	134.75
	\$372.90

Upon motion duly seconded, Mr. Frank Holt was reinstated to membership as of January 1, 1919. It was decided to make one more effort to get the dues of before dropping him. Upon motion duly seconded, it was decided to drop from the rolls if his arrears were not paid before March 1st.

Upon motion duly seconded, the following changes in membership were ordered:

Samuel Young, from Resident to Non-Resident.

E. C. Brown, from Non-Resident Associate to Associate.

J. S. Sharp, from Resident to Non-Resident.

There being no further business to come before the meeting the same was adjourned.

J. M. ROBERT, Secretary.

Regular Meeting of the Society, February 10, 1919.

The meeting was called to order with President Olsen in the chair and 40 members and guests present. The minutes of the previous meeting were read and approved. Letters of appreciation from the families of deceased members were read to the meeting.

The technical exercises of the evening were then proceeded with and Major A. M. Shaw gave a most interesting discourse on the Construction Division of the Army. The paper called forth considerable discussion, which was greatly appreciated by all. An interesting feature of the meeting was the presence of Major W. B. Gregory, one of our members, who had just returned from France. Upon motion a vote of thanks was tendered Major Shaw for his interesting discourse.

There being no further business, the meeting was adjourned to the usual collation.

J. M. ROBERT, Secretary.

Regular Meeting of Board of Direction, March 10, 1919.

The meeting was called to order with President Olsen in the chair and the following members present: Messrs. John Riess, W. B. Moses, R. T. Burwell, C. S. Williamson, Jr., G. W. Lawes, James M. Robert. Upon motion duly seconded, it was decided to rent a bank box in which to place the valuable papers of the Society.

Upon motion duly seconded, it was decided to credit dues to all members who have been in the army, such credit to be for the time in which they were in service. This motion supersedes the motion of December 10, 1917, in which dues for military members are remitted commencing January 1, 1918.

Upon motion duly seconded, Mr. J. J. Bulliung was reinstated to Resident Junior Membership, to take effect April 1, 1919. Upon motion duly seconded, Mr. Frederick D. King, Jr., was reinstated to Resident Membership, to become effective April 1, 1919. Upon motion duly seconded, Mr. Shirley C. Braselman was reinstated to Student Membership, to take effect April 1, 1919. The report of the Secretary was read and approved.

Upon motion duly seconded the following applications approved by the Membership Committee were ordered to the ballot:

Resident Members—Edward W. Burgis, Marshall G. Findley, Ferdinand G. Hummel, Ferd L. Larue, Andrew S. Montz.

Transfer from Junior to Resident Member—Frank L. Holt.

Non-Resident Member—Herman H. Holloway.

Upon motion duly seconded, the following applications were also ordered to the ballot if approved by the Membership Committee:

Resident Members—Leonhardt W. Benz, Eugene Unsworth.

There being no further business to come before the meeting, the same was adjourned.

J. M. ROBERT, Secretary.

Regular Meeting of the Society, March 10, 1919.

The meeting was called to order with President Olsen in the chair and 56 members and guests present. The minutes of the previous meeting were read and approved. Resolutions upon the deaths of Mr. Gail H. Browne and Mr. Henry L. Hutson were read to the Society.

“Whereas, Gail H. Browne, an esteemed member of the Louisiana Engineering Society, died on December 7, 1918, at his home in Glen Ridge, N. J., and

“Whereas, in his death this Society has lost an able, upright member, respected and admired by all, and shares with his family the great loss which has been sustained.

“Therefore, be it resolved, That the members of the Louisiana Engineering Society place themselves on record as expressing their deep sense of loss in the death of their friend and colleague, and extend to his family their deep sympathy in the loss which has been sustained, and

“Be it further resolved, That, as an evidence of the sincere sympathy and wishes of condolence of this Society to his family, a copy of these Resolutions be spread upon the Minutes of the Society and published in the official journal, and that a copy be sent to the family of the deceased.”

FRANK J. TRELEASE, Committee.

JAMES M. ROBERT, Secretary.

Resolutions of Louisiana Engineering Society on the death of Mr. Henry L. Hutson:

“Whereas, Divine Providence has brought to an end the life of our much-esteemed fellow-member, Henry L. Hutson, and

“Whereas, this Society desires to place upon its records some manifestation of its appreciation of this loss,

“Be it resolved, That in the death of Henry L. Hutson the engineering profession in general, and the Louisiana Engineering Society in particular, has sustained a great loss.

“Mr. Hutson was an engineer of unusual ability, a man of high moral character, who numbered as his friends all of his associates. He was modest and unassuming, yet forceful and persistent in the accomplishment of any task which he undertook. He was conscientious in the discharge of all of his duties—professional, civic and domestic—and was the type of man we can least afford to lose.

“This Society desires to express its profound regret, and to extend to the family of Mr. Hutson its deepest sympathy.”

A. M. LOCKETT,

Of Committee on Resolutions.

Upon motion duly seconded, a resolution requiring the endorsement of the Society was offered by Professor Gregory for the first reading. This resolution is as follows:

“Resolved, That the Louisiana Engineering Society hereby endorses the bill introduced by Mr. Caldwell, on February 4, 1919, in the House of Representatives at Washington, providing that certain machine tools be lent to trade and technical schools.

“In our judgment the scope of this bill should be increased to include pumps, gasoline and electric motors, gasoline-electric generator sets, and any other engineering scientific apparatus originally provided for war, but not needed by the Government at present.

“Schools should be allowed to choose such equipment as fits their needs. We are not in favor of forcing any material on schools that will not be of practical utility.”

There being no further business, the technical exercises of the evening were held. The principal speaker of the evening was Mr. L. C. Datz, who gave a most interesting and entertaining discussion on Mr. Hogg's paper on the New Orleans Street Railway System. This paper was very much discussed by Messrs. Hogg, O'Keefe, Lockett, Crump, Brown, Willis, Glenn, Stone and Manley. Upon motion duly seconded, the following resolution introduced by Mr. Manley was carried:

“It is hereby resolved, That in the public interest the President of the Louisiana Engineering Society be and he is hereby directed to cause through the proper committee of the Society, to be inserted in the columns of the Journal from time to time the names of the controlling individual or individuals of the New Orleans Railway and Light Company, with such appropriate data on the achievements, successes, failures or shortcomings as to this committee may seem proper.”

The discussion lasted until a late hour and was very instructive to those who were present.

There being no further business the meeting was adjourned to the usual collation.

J. M. ROBERT, Secretary.

regard the Railways Company as an organization which is at least trying to serve our best interests, as Mr. Lockett said. The Company is working in the interest of its stockholders, but it is also working for the public interest. No report that has been brought forward has shown otherwise but that they are doing their very best, and I think we should all put out shoulders to the wheel and help them along.

THE PRESIDENT: Gentlemen, we have with us one more gentleman from the New Orleans Railway & Light Company, Mr. Nelson Brown, the Manager of the Railway Department. We would like to hear a few of the troubles that Mr. Brown is up against, in addition to what we have already heard.

MR. BROWN: Mr. President and Gentlemen: I do not think there is much that I can say. I think the gentlemen who have been heard from have covered the ground very well. Mr. O'Keefe explained some of the troubles, and so have Mr. Bleecker and Mr. Glenny. But I want to speak about the disabled cars, for the benefit of those who did not know we had so many of them. I can take you out there and count 67 lying "dead" since we had a fire some time back. We have broken trucks and armatures—about 140 armatures—at the Carrollton Barn, which we are unable to use. The War Labor Board, as Mr. O'Keefe explained, made it almost impossible for us to get welders. We have one man, paying him 38 cents an hour (the regular wage for a welder is 80 cents). This man is working for us because he likes us and has been in our employ a long time. To weld our chine shop in this city, and we have him working at night, after motor frames we managed to get a man who is working in a machine finishes his day's work. We pay him \$1.50 an hour. In that way, we keep some of our cars on the road. We have a few armature winders, but the War Board has fixed the rate so far below what they get elsewhere that we cannot keep them here.

I cannot help emphasizing what Mr. Datz said about short-belted cars at Canal Street; I think that is the ideal solution. I cannot approve of the stub-ending of cars at Canal; it would be a great danger, and also a great hindrance. The five-minute standing time that we are obliged to provide for the men at the end of the line is a very serious obstacle in the way of efficient

operation. If we had the use of the cars that now are standing still at the end of the lines for this five-minute period, we would have enough cars to handle the traffic. That is the reason why cars are so heavily crowded, because we have to provide for this, and our disabled cars make it impossible to keep our full schedules. I think Mr. Datz's plan of having the Jackson Avenue Line go through Carondelet Street and short-belt at Canal a very excellent one. It makes possible an uninterrupted service to and from the Gretna Ferry, which is very essential.

As to the lower section of the city, the supplying of service to take care of the Industrial Canal is a big point. We do not know how much activity there will be there. The lines we have there now are well patronized, and we are working that out. I do not know whether two lines will take care of it, or whether it will be necessary to have three. But there are a great many people employed there at the present time; I think the warehouse people have 6,000 now, and the Foundation people I think about 1200. The warehouse people are working with a night force of 1,000 men, going on at 4:30 in the afternoon and quitting at 12:30 at night, and we have to find the means to handle them all. Since we have inaugurated a train service to take care of the peak down there we are able to handle it very nicely. We have a few things to work out on the train service, but that is the ideal way of handling movements of that kind.

I do not much fancy using Canal Street both ways. I prefer using it one way, between Rampart and the river. When we get our plans worked out we expect to route the train from Canal and North Peters, and, coming back, to use Esplanade, North Peters, and Canal to the barn. That will take the cars only one way on Canal, where they now go both ways. With three cars coupled behind it takes pretty nearly a whole block. When we get our labor difficulties straightened out, and the cars in shape—which we are working hard to do—I think we will see some improvements here; and if we can get some of these suggested schemes into operation, such as more cars on fewer lines, and the adoption of some skip-stop system, I think everybody will see that the service is better, and everybody will be mutually benefited,

THE PRESIDENT: Gentlemen, we still have the City Engineer to hear from. We should like a word from Mr. Willis.

MR. WILLIS: The subject has been so well covered by the various discussions of the paper that I do not think there is much that I could add. I have been particularly impressed, though, with the rerouting plan, in that it would seem to eliminate unnecessary mileage, and by so doing would also eliminate unnecessary street-car crossings. As I recall, from Mr. Hogg's paper, there are something like 22 miles of track which would be actually eliminated from the present mileage, and, in that event, we would save about 335 street-car crossings, which are not only dangerous, but difficult to maintain.

Another feature that appealed to me was the possibility of relieving a very undesirable congestion on Canal Street and in that vicinity. The routing of so many cars around Canal Street—that is, practically throughout the entire length of the business section—not only interferes with the operation of street-cars, as far as schedules are concerned, but materially interferes with the operation of vehicles and with pedestrian traffic. I presume you have all noticed the increasing traffic on Canal Street, and it is only a question of a short time until a very difficult problem is going to present itself. Now I noticed that two or three speakers mentioned the matter of stopping cars at Canal and switching back. That would be a great mistake, because the congestion now, even with routing the cars through, is too great.

Again it occurs to me that some plan should be devised to allow traffic to reach Canal Street through some other channel than the section between Rampart and Camp. I have always believed—though it may appear a little visionary—that a viaduct over the Illinois Central track and the New Basin Canal, on the line of Claiborne, will be necessary to a final working out of our traffic problem, not only street car, but vehicular traffic as well. This is increasing daily, and under present conditions it must pass through a narrow neck between Rampart and Camp.

Another matter that appealed to me was the opening up of some streets to Canal, particularly above Canal Street, on which there would be no street-car tracks. Now, we have had considerable complaint from business interests in the vicinity of the river front in regard to congestion and lack of good pavements. Those

are conditions which we want corrected, and which we will correct; but we cannot give satisfactory service, that is, we cannot get satisfactory service, as far as heavy traffic is concerned, on a street where there is a car track. The tendency of heavy traffic is to move slowly, and it generally follows the street-car track. It would therefore be a great improvement in the rerouting plan to have a car-track eliminated, say, from Tchoupitoulas Street, for heavy traffic, and from St. Charles Street, for medium and light traffic, and, as has been suggested, from Dryades. We have, below Canal Street, Decatur and Chartres, both of which serve their purpose, and we should have in the vicinity of Rampart Street one or two streets serving the same purpose; and I think if a plan of rerouting could be put through that would meet these conditions, we would have made a great step forward.

MR. HOGG: (submitted in writing) At the March meeting of the Society, it was not possible for me to properly answer Mr. Datz's carefully prepared discussion on my paper. It is now my intention to answer Mr. Datz's reply to my criticisms of the service as then given, and to discuss Mr. Datz's suggested scheme of rerouting the car lines. I shall also take up several points raised by Mr. Glenny, Mr. Brown and Mr. Willis, respectively.

DOES MR. DATZ CORRECTLY STATE HIS POSITION?

Mr. Datz makes the following statement: "I believe I know conditions in New Orleans, and am familiar with the New Orleans Street Railway system, and am therefore very much interested from an individual standpoint, in seeing its problems worked out to the most satisfactory solution as regards the public, and to the most practical solution as regards the Company. With this in mind, I want to assure you that what I have to say is an unprejudiced exposé of what I believe should be done with the street-car system in New Orleans to give the public of this city a system the equal of any in the country."

It might be advanced that Mr. Datz, employed to study and work for the private interests of the Company concerned, is not in a clear position to express an unbiased opinion on this problem. A brief comparison between Mr. Datz's and my scheme of routing I believe, will clear Mr. Datz of such a charge. His scheme will

be more costly to operate, and to my mind there cannot be the slightest doubt of Mr. Datz's sincerity in working up a plan which in his opinion "will serve the public very much better."

But there is another big point to be considered. We must not forget that through the voluntary concession of the Commission Council, we are taxing ourselves a penny a ride to keep the street car service in existence. The Commission Council has further offered to permit charges for service that will yield a return of 7 per cent on what it considered to be the true valuation of the Company's physical property and intangibles. This stand of the Commission Council as representatives of the people, places the burden of the operating expenses of the Company on the people, and the more we block efforts for higher efficiency and economy, the more burden we are placing on our own shoulders. Mr. Datz, or any other railway official, in coming out with a scheme of rerouting calculated to reduce the operating expenses of the Company, is not only seeking the welfare of his Company, but far more, is seeking to lighten the financial burden that is now carried by the people of New Orleans.

PUBLIC DISTRUST OF OFFICIALS.

Mr. Datz makes the following comment: "The one regret I had after reading Mr. Hogg's paper was the unmistakable and unwarranted feeling of distrust towards local street railway operators evidenced throughout his paper and emphatically expressed in his closing paragraph. Unfortunately, the attitude of many people in this city is that of this same distrust."

I fail to find in my paper the unmistakable and unwarranted feeling of distrust towards local street railway operators that Mr. Datz claims is evidenced throughout and emphatically expressed in the closing paragraph. I do find a few brief statements of well-known historic facts, and a few sharp criticisms of the service as then given, but I do not consider such statements as evidence of an unwarranted and unmistakable feeling of distrust. In cutting down the number of cars and crippling the service, Mr. Datz remarks that the management was simply endeavoring to "cut the suit according to the cloth," but Mr. Datz seems to forget that the first and foremost function of a street

railway organization is to give the public adequate street-car service.

The emphatic statements in the closing paragraphs of my paper are nothing more than an expression of my personal view of public opinion. A similar view of public opinion was emphasized in a very practical way by Judge Rufus E. Foster when he subsequently declined to appoint any member of the official family of the Company as its Receiver, and strange but true, the Receiver in turn, apparently found it inadvisable to select a General Manager from among the old officials, but searching far and near, finally selected a man from the well-known firm of Stone and Webster.

THE ONE OUTSTANDING FEATURE.

Mr. Datz declares: "Now, the one feature that strikes me as outstanding in Mr. Hogg's paper in which he so readily admonishes the company for poor service, is the absolute failure to even mention that perhaps the awful, abnormal conditions created by the last four years of the European War had possibly something to do with it."

True, that may be considered an omission—but there was another terrible omission—I absolutely failed to mention that the Commission Council had voluntarily granted the Company, in spite of severe public opposition, a 30 per cent increase in Gas and Electric rates, and a 20 per cent increase in carfare; and I also failed to mention that figures were published by the local press to show that these increases would meet the increased operating expenses resulting from the wage increases granted by the War Labor Board, and the high prices paid for coal, rails, copper, etc., which Mr. Datz charges that I omitted in my paper.

THE REORGANIZATION PROBLEM.

Mr. Datz also makes the following statement: "Since Mr. Hogg read his paper, things have happened to ease his mind a great deal and I guess he is now happy. The long overdue Ballard report was finally submitted, and the Court has now jurisdiction over the affairs of the Company."

How happy I am over the receivership is very questionable, but I will say that Public Opinion has eased temporarily with

the changes subsequent to the opening of the receivership. The people of New Orleans have extended their good will to the Receiver, and they are noted for their easy-going patience and toleration. Mr. O'Keefe has very wisely selected a representative of the successful firm of Stone & Webster for his General Manager.

THE ALLISON REPORT.

The following statement is taken from Mr. Datz's paper: "Mr. Hogg intimates that this report is aimed almost entirely at retrenchment to reduce the operating expenses of the Company. I take issue with Mr. Hogg here. I have read the Allison report with a great deal of interest."

I take issue with Mr. Datz on this point and will quote the statement in my paper to which Mr. Datz is referring: "The suggested reroutings aim almost entirely at retrenchment to reduce the operating expenses of the Company. The report recommended the running of additional cars to furnish 100 seats per 100 passengers during every ten-minute period of the day, and the purchase of fifty new cars similar to the type now operated on the St. Charles and Tulane Belt Line."

Does my statement quoting Mr. Allison's recommendation for additional car service to furnish seats for all, and the purchase of fifty new modern cars sound like an intimation that his report aimed almost entirely at retrenchment? I said the suggested *reroutings* aimed at retrenchment, but these suggestions are only a small part of the Allison report.

Mr. Datz proceeds to advise me as follows: "If Mr. Hogg will analyze the seven recommendations given as a summary in the beginning of the report, he will find that this is not the case."

In answer, I will say that I read these seven recommendations the first time I opened the pages of the Allison Report, that I was very favorably impressed with them, and that I fail to see what relation these recommendations have to my statement that the *reroutings* suggested aim almost entirely at retrenchment. I believe these recommendations deserve a place in this discussion, and I am going to quote them.

SUMMARY OF RECOMMENDATIONS.

(Allison Report.)

1. We recommend as essential the adoption of a new franchise covering the whole city, and of such provisions as are set forth in the body of our report.

2. We recommend the adoption, as soon as practically possible, of the rerouting of cars, with a view of simplifying the service, and of improving the conditions of congestion on Canal Street.

3. We recommend the purchase, by the Company, of fifty new modern cars of at least 52 seats capacity each, and the installing of such cars as soon as practical.

4. We recommend that the net saving in operating expenses resulting from the rerouting and more efficient operation, be divided on some equitable basis between the Company and an expenditure in increased service during the peak-load hours.

5. We recommend the prohibition of Jitney Service as detrimental to the best interests of the community as a whole.

6. We recommend the adoption of a practically universal transfer system.

7. We recommend a greatly improved Owl Car Service.

THE CONSTRUCTIVE SIDE OF THE PROBLEM.

As engineers, however, we are by far, more interested in constructive as opposed to destructive criticism. We are, therefore, mainly interested in the working out of a sound and thorough reconstruction plan that will eventually attain for us an efficient, financially healthy street railway system. We come now to the constructive side of the problem.

THE REROUTING PLANS.

A COMPARATIVE STUDY.

Mr. Datz agrees with portions of my rerouting scheme, and disagrees with others. The most striking contrast between the two plans, as I view them, is this—Mr. Datz believes in double tracks whether in pavements on streets with heavy vehicular traffic, or on streets too narrow to permit vehicles to park in front of stores or residences. I believe, except where boulevards are

available, that 'single-track lines give better distribution and permit operation on narrow streets not likely to attract a large amount of vehicular traffic. For example, our plans for the upper section between St. Charles Avenue and the river, differ radically. Mr. Datz calls for double tracks in street pavements on Prytania and Magazine Streets. My plan removed tracks from these streets to give freedom to vehicular traffic, and placed single tracks on Camp and Chestnut or perhaps Coliseum, which streets are not likely to attract a large amount of vehicular traffic, and consequently will give the greatest freedom to street-car traffic. The one interferes with the other, and I believe they should be separated as far as feasible.

Then again, Mr. Datz apparently persists in placing double-track lines on streets less than 60 feet in width. Double tracks on narrow streets prohibit the parking of vehicles on the side of the track, and I regard this condition as a violation of the rights of residents. Under that condition a street is little more than a private right-of-way for the street-car line. I believe the saving of an additional set of poles and guys, which is apparently Mr. Datz's aim, is a minor consideration.

In the upper or west section of the city, between St. Charles Avenue and the river, Mr. Datz suggests three car lines, the Laurel, Magazine and Prytania. My plan called for only two car lines, the Laurel and Coliseum. The spacing between these two lines averages less than six blocks, between six and one-half blocks above Peters Avenue and three blocks below. Similarly, between the St. Charles and Coliseum Lines, the spacing averages six blocks above Peters Avenue and five blocks below. Mr. Datz suggests a rather irregular and closer spacing, requiring an additional car line.

EXPRESS SERVICE ON ST. CHARLES AVENUE.

Mr. Datz recommends operating the St. Charles Avenue Line as an express line below Peters Avenue. This is a very good suggestion. It would require the operation of the Dryades Line to Peters Avenue instead of cutting it off at Louisiana Avenue, as I suggested, but car hours saved on the St. Charles Line from express operation will offset this additional cost and will be more satisfactory, I believe, from the standpoint of public service.

By routing the Coliseum Line up Coliseum and down Chestnut instead of Chestnut and Camp Streets, as I suggested, and similarly, the Dryades Line up Dryades and Down Baronne, as Mr. Datz suggests, the spacing between these two lines will average less than six blocks, and will, therefore, permit the operation of express service on St. Charles Avenue without violating the six-block spacing between local lines, which I have assumed would be acceptable. This lay-out would save the operating costs of an additional car line as required by Mr. Datz's plan.

MAGAZINE LINE OR COLISEUM AND BROADWAY LINES.

The continuation of service on the major portion of the present Magazine Line is recommended by Mr. Datz. He suggests the operation of a single continuous car line from Canal Street to Broadway and Claiborne Avenue. I have separated this service, recommending the operation of two lines, the Coliseum below Henry Clay Avenue and the Broadway Line above. I suggested separate lines because the traffic below Henry Clay Avenue would require large cars, whereas the long stretch above this point could be taken care of very well with small cars. I believe Mr. Datz is a bit inconsistent here; he recommends the division of the St. Charles-Tulane Belt on account of considerable difference in traffic, but calls for continuous service on the Magazine Line under traffic conditions far more contrasted.

I believe, however, after detail deliberation, it will be found advisable to route the Coliseum Line out Henry Clay Avenue to St. Charles Avenue to give through connection with the St. Charles Line. In that event, the Broadway line should start at Perrier and Henry Clay Avenue, or probably continue out to St. Charles Avenue with the Coliseum line.

FRERET OR LIBERTY LINE.

Between the Dryades and South Claiborne lines both plans call for one car line. Mr. Datz suggests a line called the Freret, and I suggested the Liberty, centering on Liberty Street. In suggesting the Liberty line, my aim was to equalize the spacing between the St. Charles and South Claiborne lines above Louisiana Avenue, as I recommended cutting off the Dryades line at Louisiana Avenue. But if the Dryades line will operate to

Peters Avenue to permit express service on St. Charles Avenue, the Freret or Liberty line should be moved closer to the South Claiborne, and I agree with the route Mr. Datz has suggested, up Freret and down Howard between Eighth Street and Napoleon Avenue, but believe this arrangement should extend eventually to Peters Avenue. Between Eighth Street and Jackson Avenue, this line should operate as a double-track boulevard line on Howard Street, the up car running on Howard from Jackson Avenue to Eighth Street, and the down car on Howard from Eighth to First Street, thence on Howard Place, Philip and Franklin Streets to Jackson Avenue.

Mr. Datz suggests a future extension to this line above Broadway on Oak and Poplar Streets, to connect with the present service on these streets above Carrollton Avenue. This is a logical suggestion, but I did not include it in my plan, as residents in this section fought against this extension when it was suggested some time back by the Company. However, if the needs of the community at large require this through service, I believe it should be given in spite of local protests.

THE JACKSON AVENUE LINE.

Mr. Datz suggests routing the Jackson Avenue line down to Claiborne Avenue, and locates it on Carondelet Street. If this is carried out and the other suggestions of Mr. Datz for the section below Jackson Avenue, we will have single tracks on Magazine and Camp Streets, and double tracks on Prytania, St. Charles, Carondelet and Dryades Streets, a spacing almost as close as we have at the present time.

I don't think there is justification for this close spacing. Table III in my paper calls for 37 large cars on the Coliseum, 50 large cars on the St. Charles, and 24 small cars on the Dryades line during the heaviest peak hour. This indicates that double tracks on Camp, St. Charles and Dryades Streets would be adequate for the present requirements. When the traffic on these lines increases about 25 per cent, I believe an additional double-track line, on Prytania or Carondelet Street, should be operated, but only as a relief line during peak loads. To operate double-Canal Street instead of making it a cross-town line out to South

track lines at present on Magazine, Prytania, St. Charles, Carondelet and Dryades Streets during an 18-hour day would be very wasteful.

JACKSON AVENUE—GRETNNA FERRY SERVICE.

Mr. Brown brings out a good point in his discussion regarding the connection between the Gretna Ferry and the Commercial District. Mr. Brown argues that uninterrupted service is very essential, and offers that as a strong reason for routing the Jackson Avenue line down to Canal Street. This point deserves serious consideration. We should, however, not lose sight of the fact that the Tchoupitoulas line passes the Gretna Ferry and traverses the front section of the Commercial District, and that the Laurel line, which serves practically the same section of Canal Street as the proposed Jackson Avenue line would serve, is just three and one-half blocks from the ferry.

The Jackson Avenue line, while it is one of the shortest in the system, it is nevertheless one of the most important. Before any change is made in the present routing, a detail traffic survey should be made to determine the amount of traffic originating in the vicinity of the Gretna Ferry, and what percentage rides into the Commercial District. Detail studies should be carried out to ascertain what portion of this traffic would be inconvenienced by the necessity of transferring in the event that the Tchoupitoulas or Laurel line would not serve, and the Jackson line routed out to South Claiborne Avenue: what percentage will be served better by routing out to South Claiborne, and what will be the probable traffic on this line between St. Charles and South Claiborne Avenues.

LAUREL LINE ON CALLIOPE STREET.

Mr. Datz suggests routing the Laurel line down Camp Street to Julia and thence out to Carondelet Street instead of routing out Calliope Street as I suggested. That is the logical route. My suggestion to run out Calliope Street was due to an oversight of the available route on Julia Street.

A SINGLE TRACK ON MAGAZINE OR TCHOUPITOULAS STREET.

In the commercial section, Mr. Datz's plan frees Tchoupitoulas Street and I have freed Magazine Street for vehicular traffic. Tchoupitoulas will probably prove to be the best for the concentration of vehicular traffic, but we should remember that this section requires street-car service. Routing up Tchoupitoulas Street is already several blocks from the river, and if we push this line two blocks farther away by routing up Magazine Street, there will be a space of six to eight blocks between the river and the first up-bound car line. For that reason, I believe the single track should remain on Tchoupitoulas and be removed from Magazine Street.

THE ST. CHARLES AVENUE LINE ON CAMP OR BARONNE STREET.

Mr. Datz disagrees with my plan to route the St. Charles Avenue line up and down Camp Street in the commercial section, and recommends maintaining the present route on Baronne Street. Three reasons are given—the difference in gauge, the danger of crossing St. Charles Avenue roadway to reach Camp Street, and the long-established route on Baronne Street.

The first reason is sound if it is considered advisable to continue the standard gauge on St. Charles Avenue. It is difficult to maintain pavements in car tracks with only one gauge, and I am sure no one would recommend a double-gauge track on Camp Street. However, if it is necessary to accommodate the Orleans-Kenner suburban line with standard gauge on Tulane and Carrollton Avenues, I fail to see a serious objection to a double gauge track here, as the entire stretch is on boulevards. As far as I have studied the problem, I believe the gauge of the St. Charles Avenue line should be widened to agree with the other uptown lines.

The danger of crossing St. Charles Avenue should be balanced with other phases of the problem. Mr. Datz is wrong in stating that I call for a double-track line on Calliope Street. It is too narrow; I recommended single tracks on Clio and Calliope Streets. The danger of a car coming out of Calliope into St.

Charles Avenue could be lessened considerably by the purchase and clearing of one or two pieces of property. At Clio Street the car turns from the boulevard in full view of approaching vehicles. There is, however, one weak point here—the motorman would not see the approaching vehicles. Now, if the belts are split, as Mr. Datz recommends, it will be necessary to loop the St. Charles line at Canal Street, and I can see no objection to turning the down-bound car out Calliope or Howard Avenue to Carondelet Street. In either case, the car turns in full view of approaching vehicles and both the driver and motorman face each other.

I fail to agree with the third reason advanced by Mr. Datz. If we are going to argue that the Baronne Street end of this line is too well established, we might as well use the same argument against every change proposed, as almost all the present routes have been established a lifetime.

My main reason for suggesting the Camp Street route was to compromise with the present service out Canal Street to the river. Mr. Datz recommends cutting this service off entirely, and suggests a loop out Common to South Rampart Street to Canal and back to Baronne Street. If he can succeed, good! I am not fascinated with the Camp Street route, but believe it is the only compromise the public will accept.

CANAL AND ESPLANADE BELT LOOP. TCHOUPITOULAS AND LAUREL LOOP.

The suggested routing of the Canal-Esplanade Belt in both plans agree with the present routing. However, if it could be arranged to operate this line as a loop such as I suggested for the St. Charles-Tulane Belt; that is, continue on Esplanade Avenue to North Peters, and up and down North Peters, instead of North Rampart Street, I believe the public would be served better, congestion on Canal Street relieved, and a substantial saving gained.

Such a change would eliminate the necessity of operating the Tchoupitoulas line below Canal Street, as suggested in both plans. The Tchoupitoulas line could then loop in Canal Street with the Laurel line, a very desirable arrangement.

ST. CLAUDE LINE.

Both plans agree on the route of this line above Poland Street, except for reverse operation on St. Claude and North Rampart between Esplanade and Lafayette Avenues. Mr. Datz's suggestion to operate from St. Claude to Dauphine on Jourdan Avenue will be impossible, as the incline of the St. Claude Avenue approach to the canal lock will begin at Reynes Street. I have suggested a single track on Reynes Street to Chartres, and a single track on Forstall to Dauphine Street. Reynes Street is about 46 feet wide between property lines, which is too narrow for double-track operation.

Below Reynes Street, Mr. Datz's plan calls for a double-track line on Chartres Street, while my plan requires single tracks on Dauphine and Chartres Streets. He claims that Chartres Street is not too narrow for double-track operation. I don't think Mr. Datz is aware that Chartres Street in this section is just 45 feet wide between property lines.

NORTH CLAIBORNE AVENUE LINE.

My suggested line on South Claiborne Avenue between Clio and Canal Streets is condemned by Mr. Datz as a big mistake. Mr. Willis does not agree with him. One of the advantages of my suggested rerouting plan as outlined on page 33 of the February *Proceedings* is the "Elimination of wasteful, circuitous routing of many passengers through the commercial district by introduction of badly needed service crossing Canal Street at Claiborne Avenue and at Broad Street." Mr. Datz apparently claims there is no justification for this saving. I don't think he has given this point sufficient thought. The extremely slow movement of cars in the congested Canal Street loop makes it desirable to keep down their number to a minimum. To accomplish this, through traffic should be diverted, as far as feasible, to through routes that avoid this congested loop. I believe Claiborne Avenue is an ideal location for such a through route.

It is true that 56 railroad crossings is a serious obstacle, but I believe traffic congestion between South Rampart Street and the river will soon warrant an expenditure for a viaduct or tunnel along the line of South Claiborne Avenue. Mr. Willis brings this point out in his discussion.

Below Elysian Fields Avenue, I recommended routing down North Derbigny to Lafayette Avenue, and up North Roman Street. Mr. Datz disagrees and prefers a double track on North Villere, a street too narrow to permit vehicles to park on the sides of the double tracks. North Villere Street is just three and one-half blocks from the service of the St. Claude Avenue line. Back of North Villere, this section is built up for a stretch of eight to ten blocks. I recommend single tracks on North Derbigny and North Roman Streets to give the residents of this section car service I believe they are justly entitled to.

CARROLLTON AVENUE LINE.

My suggestion for a short connecting line on Carrollton Avenue, between Tulane Avenue and City Park is not included by Mr. Datz in his proposed plan. He mentions the open canal and thirteen steam railroad tracks as obstacles warranting its omission.

The open canal is an obstacle at present, but as this canal is only a minor branch in the drainage system, a comparatively small culvert could replace it. This culvert would be a little less than a mile in length, and I believe it should be constructed in the near future for other reasons than street-car service. Below Orleans Street, or about one-third of the total distance, there is no canal.

I do not consider the thirteen railroad tracks a serious obstacle, as this line is short and does not form an important part of the system. A delay caused by train switching would be only a local inconvenience. I do not see immediate need for a viaduct here as this route cannot be compared with the importance of through routes across the main portion of the city along the lines of South Claiborne Avenue and South Broad Street.

EAGLE LINE.

Mr. Datz also omitted this line in his plan. It is true the Sewerage and Water Board maintains a freight switching track on Eagle Street, and for that reason it might be impracticable to operate a single-track line on that street. But Mr. Datz's suggestion to operate on Monroe Street is impossible, as this street is cut off by the Water Purification Plant between Spruce and

South Claiborne Avenue. Eagle Street is the only open passage through this plant which extends from Leonidas Avenue to the upper city limits, and for that reason I suggested it. If it is found impractical to operate through this passage, it will be necessary to operate on Leonidas Street, five blocks from Carrollton Avenue.

The section above Carrollton Avenue between Oak and South Claiborne Avenue is thickly settled, and is entitled to street-car service. The stretch between South Claiborne and Palmetto or Washington Avenue, I regard as a future probability to be constructed only when this territory has been settled sufficiently to warrant car service.

THE SUGGESTED PEAK-LOAD EXPRESS SERVICE.

Both Mr. Glenn and Mr. Datz condemn this suggestion as impractical. Let us assume cars are operated at present on the Coliseum line on a two-minute headway during the afternoon peak. Every car drags along, stopping at almost every corner throughout the entire length of the up-bound trip. In the lower part of the route, cars are usually filled far exceeding their seating capacity, while already at Louisiana Avenue many cars are carrying less than their seating capacity, which is wasteful.

It does not require much thought to arrive at the conclusion that a substantial saving in men and equipment would be gained if a practical scheme of separation could be developed so that passengers bound for points below Louisiana Avenue and those for points above would travel in separate cars. With such a scheme in operation, cars carrying the lower passengers could switch off at Louisiana Avenue and return to Canal Street for another load.

To accomplish this saving, I suggested operating cars in pairs. Instead of one car leaving Canal Street every two minutes, a pair of cars, operated separately, would leave every four minutes. The first car would be labeled "*Express*," and would make all stops to Clio Street, then run through to Louisiana Avenue, making no intermediate stops. Above Louisiana Avenue this car would make all stops. The second car would be labeled "*Local*," and would make all stops to Louisiana Avenue, then return to Canal Street.

At Clio Street the local car of one pair would be about three minutes ahead of the express car of the next pair. The express car could then make three minutes' quicker time between Clio Street and Louisiana Avenue, before it would be blocked by the local ahead. If it is able to save more than three minutes' running time, it will have to drag behind the local car for a few blocks. This, I believe, is the point that Mr. Glenny and Mr. Datz have in mind when they condemn the scheme as impractical.

If a few passing tracks can be arranged at intervals of about six blocks, this undesirable feature could be almost eliminated. These passing tracks will be used only in the event that an express car is dragging behind a local and is ready to pass the local as soon as the latter runs into the passing track. If the express car is more than 500 feet behind the local car, no stop will be made; the express car will have to remain behind until the next siding is reached. Under that scheme passengers on the locals will not be subjected to exasperating waits to permit express cars to pass, and vehicular traffic will not be blocked.

But even if these sidings are not feasible, I don't believe the public will condemn a plan of operation that will save them two or three minutes' running time, even though the express car has to drag for a few blocks behind a local. It will not be perfect service, but it cannot be denied that quicker service is improved service. I believe there are three advantages to this proposed scheme—

1. Uniform and efficient loading of cars through a practical separation of long and short-haul passengers.
2. Saving in men and equipment at the time both are most needed by short-routing of about 30 per cent of the cars.
3. Quicker service for long-haul passengers.

STUB-ENDING IN CARONDELET AND CAMP STREETS.

This phase of my suggested plan was disapproved by Messrs. Datz, Glenny, Brown and Willis. In suggesting this point I had in mind the removal of car tracks from St. Charles and Baronne Streets. With vehicular traffic concentrated on those streets, it would be possible to restrict it on Carondelet and Camp Streets between Common and Canal. Vehicles might be

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EDITORIAL NOTES AND COMMENT

A National Public Works Department. At a meeting in Chicago, April 23 to 25, of delegates from all the principal engineering societies of the country, there was launched a movement of far reaching importance to the engineering profession and to business activities allied thereto. It is a movement to have established a Federal Department of Public Works.

The meeting was attended by delegates from seventy-four organizations, with a membership totalling over one hundred thousand men. In addition, there were seven members from the Engineering Council and three members of the National Service Committee of the Engineering Council. The Louisiana Engineering Society sent as its delegate Major W. B. Gregory, and Mr. A. M. Lockett went also as a member of the National Service Committee.

At the last meeting of the Society Major Gregory made a statement outlining the work accomplished at the Chicago meeting, the essential points of which are restated here for the benefit of our members who may not have heard the statement. The matter is of such great importance that every member of the engineering profession should be informed of the aims and plans of the men who are back of the project.

The conference was called by the National Service Committee of the Engineering Council, and J. Parke Channing, as Chairman of the Engineering Council, made the introductory speech, outlining the purpose of the conference.

He called attention to the fact that there have been a number of such conferences in the past, but that their plans have come to naught, principally through lack of united and consistent support from the engineers, architects, builders and constructive thinkers of the country.

The last few months have created new conditions and emphasized new necessities to the extent that if we are to take our rightful place among the nations of the world and rise to the top in the great economic war which is to follow the other great war just ended, we can afford to "tolerate only those methods and policies that are most efficient, most businesslike and most purposeful, and must tear asunder from those which, however old and revered, are but the expedients of a former time inadequately expanded to render present-day service."

"Our Government has become the greatest industrial plant in all history—investigating, surveying, building and operating—and its various functions are being conducted with practical independence one with another, and with so little coördination and with so complete a lack of common purpose that practically the only occasions when the various elements become conscious of each other is when they overlap and attempt to crowd each other off the map; that any private or corporate business conducted according to the methods of the Government would speedily become bankrupt, and would deserve such fate. There are twelve Federal organizations engaged in making surveys, more than a score in chemical investigations, some of them competing and quarreling for preference under the same departmental roof. In the Congressional Directory there are

listed twenty-nine bureaus and agencies of the Government engaged in construction of one or another kind. Four Government departments are engaged in fuel tests, while four Government bureaus are maintaining coast fleets, each independent of the other, in the same waters, and engaged in work that has so many points of contact that not one person in twenty realizes that they are separate. These are only a few illustrations of a condition which can be tolerated by no considerate person.

"We have come together, each qualified in his own line, to render service to the people, to point out the wastes and extravagances, the chaos and inefficiencies, and to offer some sane and practical solution to the country—so practical and so self-evident that it will carry its own conviction. To do this it will be necessary for each delegate to bear an open mind, and, while expressing freely the convictions that are his, to take part in that mutual concession which alone can bring concerted action among full-grown men."

The conference went into permanent organization with M. O. Leighton, Chairman, and E. S. Nethercut, Secretary. For the purpose of furthering the passage of a bill to create the Department of Public Works, three committees were named: Executive Committee, Committee on Text of Bill, and Campaign Committee. Major Gregory was named a member of the Campaign Committee.

It was further resolved that the conference be known as the **ENGINEERS, ARCHITECTS AND CONSTRUCTORS CONFERENCE ON NATIONAL PUBLIC WORKS.**

A resolution was passed unanimously that the conference recommend to the public and to Congress that legislation be enacted covering the following principles:

1. That the services and bureaus of the National Government having to do chiefly with matters of engineering and architecture, be grouped in one department to be known as the Department of Public Works.
2. That the Department of Public Works comprise those works which are built and operated for the use of the public.

3. That the Department of Public Works be made available when desirable for the performance of special engineering and architectural work for the use of other Government bureaus.

4. That there be a systematic classification and organization of engineers, architects and other employees whose status shall be such that they may be recruited and maintained on merit.

The Committee on the Scope of a Department of Public Works reported to the effect that the establishment of the new department should be accomplished by grouping those Government bureaus, services, commissions and activities of a predominant engineering or architectural character into what is now the Department of the Interior, and thereafter designating it as "The Department of Public Works."

This Committee found that among the bureaus, services and activities which logically belong to a Department of Public Works, are the following:

A Bureau of Public Roads.

The United States Reclamation Service.

The Alaskan Engineering Commission.

The Construction Division of the U. S. Army.

A Bureau of River, Harbor and Canal Work, including such functions as are now exercised by the Mississippi River Commission, and the California Debris Commission.

A Bureau of Architecture.

A Bureau of Surveys, including the Coast and Geodetic Survey.

A Bureau of Mines.

The Geological Survey.

The Forest Service—at least until the same is divorced from the supervision of water powers and road building.

The Bureau of Standards.

The attention of the conference was also called to the very great importance of complete topographic maps of the country in the economical planning and construction of a large proportion of engineering works. The Federal and State Governments

are now entering upon a program of highway construction which constitutes the greatest engineering project ever undertaken by the Government. This highway construction, as well as many other public and private undertakings, depends for its economical accomplishment upon the type of information which is furnished by the topographical maps such as have already been made for certain sections of the country. However, these maps have been completed for only about 40% of the whole area, and the present rate of progress, if continued, will require about 80 to 100 years to complete the maps for the whole of the United States. A resolution was passed to the effect that these facts be presented to the President and Congress, and that they be urged to make adequate provision for the completion of the topographic map of the United States in the shortest possible time, compatible with requisite accuracy.

The task is a large one but also one most worthy of being pushed to a successful conclusion. Quoting from an article in the *Engineering News-Record* of May 1: "Fortunately, the project is one on which it is easy to unite. No selfish, no local, no partisan interest is served. The public good alone is the issue—and it recommends itself no less to other patriotic citizens than to engineers, architects, chemists and their allied workers. Therein, in fact, lies the solid reason for its success—that the public at large can be won to its support. The project is now at hand. There is no turning back. Success alone can be the end of the endeavor."

The Country Club Supper Dance. Our new President is a firm believer in the promotion of the social side of an organization such as ours. To which spirit we are primarily indebted for the very enjoyable affair held at the Country Club the evening of May 2. We were given the exclusive use of the dining room on the west terrace, and we danced in the ball room. Dancing was the feature of the evening, for we danced between the courses of the very delectable supper spread for our enjoyment, and then, after supper, continued the dancing into the wee sma' hours. Mr. Olsen has hinted that he proposes to pull off some more social affairs before he goes out of office; it is certain that we all sympathize with the movement, and if it

were not contrary to the constitution, we would make certain that Mr. Olsen should be elected for another term. We would like, however, to stipulate that whenever and wherever the next function is held, it be managed by the same very efficient committee which had this one in charge, viz.: Messrs. Walter Moses, A. T. Dusenbury and H. A. Pallfelt. This is our tribute to the efficiency and good taste of the committee.

Streets for Vehicular Traffic. There can be no disputing the fact that New Orleans is now feeling more seriously than ever before the need of certain streets free from car lines for the exclusive use of vehicles, one or more for light traffic and pleasure vehicles, and one or more for heavy traffic and trucking. The logical places for the heavy traffic streets are near the river front and near the navigation canals, while the light traffic should be given the most available street or streets in between these two districts. The Railway Company is anxious to relocate and rearrange its tracks accordingly, and the general public is anxious for the change. The difficulty in the situation is to decide upon the streets from which the tracks shall be removed. Here one comes up against the question of private interests, and private interests may usually be counted upon not to take a broad view of the question.

The Louisiana Engineering Society believes in placing itself upon record with reference to this important question, and the following resolution has passed its first reading:

Whereas, the steady development of our port, and our manufacturing and commercial establishments, is creating more and more congestion in the movement of vehicles over the streets of the crowded commercial district; and

Whereas, the thoughtless development of our present street railway lines has left not a single street free for vehicular traffic to move in and out of the commercial sections above Canal street;

Be It Resolved, that the Louisiana Engineering Society deems it imperative to the future growth of our city that at least two streets leading up or west from Canal street be freed from street railway tracks, and be reconstructed, one for the con-

centration of light, pleasure vehicular traffic, and the other for heavy commercial truckage.

Be It Further Resolved, that St. Charles street, the logical connecting link between the St. Charles avenue and Canal street boulevards, be devoted to pleasure vehicular traffic, and Magazine or Tchoupitoulas street, to heavy commercial truckage.

Jackson Square. Instead of the usual "technical" exercises, the May meeting of the Society was given over to the presentation of a paper on Jackson Square by Professor J. S. Kendall of Tulane University. The paper was listened to with great interest by the members present, and it is being printed in this issue in order to bring it to the attention of all our members. We have a special interest in the Square and its historical associations for the reason that our headquarters have been located in one of the buildings for several years past. There is a stronger reason than this, however, why the Society should take an interest in Jackson Square and all that concerns it, and that is in the fact that it will be the center and focus of a movement started not long since, to preserve and develop that immediate portion of the city as an historical and art center.

The Louisiana Engineering Society has always taken pride in lending its cooperation in all measures looking to the future development of the city. While not primarily concerned with history or art, still the broad-minded engineer of to-day realizes that in all future municipal and public engineering projects, the esthetic side is going to demand more and more consideration. The time is rapidly passing in this country, young as it is, when historical monuments and buildings will be permitted to be destroyed in order to accommodate the often unreasonable demands of material improvements. On the contrary, the engineer will be called upon to so design his improvements and new structures that they will fit in harmoniously with such existing structures and areas which have a special historical or artistic value.

Our thanks are due Professor Kendall for the time and trouble he has taken in the preparation of the paper, and we are specially glad to be able to preserve it among the records of the Society.

What the Engineers Did in the Great War. Elsewhere in this issue is published a short paper by Major W. B. Gregory, describing some of the work he was called upon to do in his official capacity of Major of Engineers, A. E. F. As most of us know, Major Gregory joined the Reserve Corps of Engineers before this country went to war, and soon after our declaration of war against Germany, he was called for service abroad. He spent over a year in France, being located at Engineer Headquarters in Tours, where he was engaged in the work almost entirely of designing and installing pumping plants for the various needs of the army.

It may be of interest to supplement Major Gregory's account of the work in his special line by some data which have just been received from the office of the Chief Engineer, A. E. F., telling in a brief summary what was actually accomplished by the engineers. The complete statement is reproduced herewith:

A FEW FACTS AND FIGURES ON ENGINEER ACCOMPLISHMENT IN FRANCE.

The Engineer organization in the form it had assumed when hostilities ended, consisted essentially of the following four main branches or divisions under the Chief Engineer, A. E. F., whose headquarters were at Headquarters, S. O. S., Tours: (1) Assistant to the Chief Engineer, A. E. F., at G. H. Q.; (2) Division of Construction and Forestry; (3) Division of Military Engineering and Engineer Supplies; (4) Division of Light Railways and Roads.

Of all the technical services of the American Expeditionary Forces the Engineer Department was the largest. On 11 November, 1918, there were under the direct command or the technical supervision of the Chief Engineer, A. E. F., 174,000 Engineer Troops, distributed as follows:

Character of Service—	Officers and Men.
With Armies.....	86,400
Miscellaneous (including troops in training, at schools, shops, etc.....)	18,500
Construction (in the Services of Supply under the Di- vision of Construction and Forestry).....	43,000
Forestry	18,500
Supplies	7,600

Total Engineer Troops under C. E., A. E. F.....174,000

In addition, there were engaged on road and construction work in the A. E. F., mainly under the supervision of the Division of Construction and Forestry, about 34,500 troops of other arms of the Service, 34,000 civilians and 15,000 prisoners.

In addition to the work of the Engineer Troops operating with the Armies, which maintained lines of communication, built bridges, fought as infantry, conducted camouflage, searchlight, flash and sound ranging, water supply activities and many other special functions, the Engineers up to the end of the year 1918 (unless otherwise noted), accomplished the following results in the A. E. F.

DIVISION OF CONSTRUCTION AND FORESTRY.

SHELTER FOR TROOPS: A total of 15,039 Barracks were erected, which represented 285 miles of Barracks placed end to end.

HOSPITALIZATION: Space for 280,000 beds provided, of which 145,913 represented new construction. New construction was equivalent to 7,700 Hospital Barracks, 20x100 feet, which represented 146 miles in wards.

PORTS: Docks for ten vessels were constructed at Bassens. These were 4100 feet long and were equipped with switching facilities, warehouses, etc. For three months the average daily tonnage discharged at American Bassens was 3700 tons. Docks at other ports for the use of seagoing ships were completed or partially completed when work was stopped by the armistice. Eighty-nine berths, totalling 7 miles, were either built or acquired from the French.

LIGHTERAGE: Dock 750 feet long at St. Louis was completed; 84 lighters and 7 derrick barges were constructed.

RAILROADS: 947 miles of standard gauge railroad (most of it in yards) were completed, approximately the distance between Chicago and New York; 6 mile cut-off at Nevers requiring a bridge across the Loire River, 2,190 feet long, was built.

STORAGE DEPOT WAREHOUSES: Covered storage space constructed 21,972,000 square feet, or 500 acres, providing space for 90 days reserve supplies for 2,120,000 men.

REMOUNT DEPOTS AND VETERINARY HOSPITALS: Remount space was provided for 39,000 animals and veterinary hospital space for 23,000 animals.

WATER SUPPLY AND SEWERAGE: Much work was done to give pure water to troops. Supply of water for many large cities was chlorinated under Engineer control. Four million gallons per day were developed by artesian wells in Bordeaux region. Pipe for sewerage in the Mesves Hospital project alone required 28 miles, and for water supply the same amount. Large municipal water supply developments were made at Brest and St. Nazaire.

REFRIGERATION: Refrigeration plant built at Gievres with daily capacity of 5,200 tons of meat and 375 tons of ice. Three other plants built.

BAKERIES: Mechanical bakeries to produce 500,000 pounds of bread every 24 hours were constructed at Is-sur-Tille. Construction of bakeries of 80,000 pounds capacity in three other cities was stopped by the armistice.

POWER PLANTS: Electric power was obtained from existing sources and by new construction in the form of central stations and transmission lines.

OIL AND GAS STORAGE: By construction of tanks at seacoast, storage was provided for 150,000 barrels. Sixty-nine 300-barrel tanks and one hundred fifty 150-barrel tanks were manufactured for distributing stations. Seventeen complete storage stations, including pumps, were put in operation.

FORESTRY: 81 mills were in operation in October. The total production to Dec. 1 was: 198,564,000 feet b. m. of lumber; 2,728,000 standard gauge ties; 923,560 narrow gauge ties; 1,739,-

000 poles and pit props; 892,200 steres of fuel wood, 38,200 pieces of piling. The fuel wood, if corded, would extend 375 miles.

ROADS: Maintenance and repair of 300 miles of road and 90 miles of new roads in the S. O. S., exclusive of Advance Section, was accomplished.

DIVISION OF MILITARY ENGINEERING AND ENGINEER SUPPLIES.

ENGINEER SUPPLIES: From March to December 31, 1918, the total tonnage of Engineer supplies received from the United States was 1,496,489; total tonnage received from all sources 3,255,121. On 11 November, 1918, total covered space occupied by Engineer supplies was 764,000 square feet; total open space occupied 14,352,000 square feet. Nine storage depots were maintained.

Repair shops were operated to care for Engineer supplies. Shops made 100 firing platforms for 75 mm. guns, 30 pontoon wagons, 100 500-gallon water tanks, and completed more than 2000 orders before armistice.

CEMENT MILLS: Seven cement mills were operated by Engineer troops, producing 55,000 tons or 315,000 barrels of cement during five months operation. Concrete pipe amounting to more than 100 miles was made for A. E. F. use.

DIVISION OF LIGHT RAILWAYS AND ROADS.

LIGHT RAILWAYS: Total tonnage handled up to Feb. 1, 1919, was 860,652 tons, of which 166,202 tons was ammunition. In one week 10,600 tons of ammunition were handled. In six nights 23,135 soldiers were carried. The daily net tonnage handled in October, 1918, was 8100 tons. In one week 10,700 tons of rations were handled. At the time of the armistice 2240 kilometers of light railway were in operation, of which 1740 kilometers had been taken from the Germans, the balance newly constructed or rebuilt. On November 11, 165 locomotives and 1695 cars were available for use. In five hours 135 men laid 14,200 feet of light railway track. Ten shop buildings, 70,000 square feet total area, were constructed at Abainville; 125 acres occupied by shop project; 2300 cars erected; 140 locomotives repaired.

An appreciation of the services of the Engineers is contained in the following letters from the Commander-in-Chief:

20 February, 1919.

Major General Wm. C. Langfitt,
Chief Engineer, A. E. F.

My Dear General Langfitt:

As the activities of our army in France draw to a close, I desire to express to you, and through you to the officers, enlisted men and civilian personnel of the Engineer Department, my appreciation of their loyal and energetic work, which contributed so greatly to our success.

The various units attached to combat troops distinguished themselves at all times in the assistance which they rendered. The Division of Construction and Forestry, with limited resources at its disposal and under conditions of extreme severity, more than met the many demands made upon it. The Department of Light Railways and Roads furnished the indispensable link between the railheads and the front lines for the transportation of troops and supplies, and for the evacuation of the sick and wounded. Its record in the construction and operation of light railways and roads has seldom been equalled.

The many other services of the Engineer Department, connected with the acquisition and distribution of engineer supplies, particularly those needed for combat operations, were so conducted that our forces never lacked for any essential.

The Engineer Department has made a proud record for itself, and it gives me pleasure to express to you my sincere thanks and admiration, and that of your comrades of the American Expeditionary Forces, for its splendid achievements.

Sincerely yours,

JOHN J. PERSHING.

28 March, 1919.

Brigadier General Edgar Jadwin,
Director, Construction & Forestry,
Through Chief Engineer, American E. F.

My Dear General:

Now that hostilities have ceased, it gives me great pleasure to thank you, and through you, the officers and soldiers of your organization, for the splendid work you have accomplished.

The Division of Construction and Forestry required the services and unselfish efforts of experts in many lines of skilled endeavor. It is a source of deep pride and satisfaction that numbers of this type of men responded readily, and through their invaluable assistance you attained the highest goal of achievement.

The supply and shelter of troops was one of the most responsible tasks that befell any organization. Although operating in a foreign country, under conditions and circumstances vastly dissimilar to those accustomed to, you met successfully each and every demand.

You, and the officers and men of your organization, labored in almost every department in France, often in isolated detachments, working under arduous conditions of service and making countless sacrifices. Yet they withstood all hardships and difficulties, surmounted all obstacles and kept tenaciously at their important tasks. Such tireless energy, actuated as it was by a high sense of duty, deserves the commendation of all.

The vast projects wisely planned and boldly executed by you and your efficient personnel, the thoroughness and celerity with which you labored, the splendid coöperation maintained throughout, especially among the highly trained men of affairs who gave their best to the common cause, the keen foresight displayed in preparing for emergencies and the many sacrifices made are worthy of the highest American traditions.

In the name of the American Expeditionary Forces, I thank them one and all and send them the appreciation of their comrades and their Commander-in-Chief.

Sincerely yours,

JOHN J. PERSHING.

PAPERS AND DISCUSSIONS

PUMPING MACHINERY USED BY THE SERVICE OF SUPPLY OF THE AMERICAN EXPEDITIONARY FORCES IN FRANCE.

By W. B. GREGORY,

Major of Engineers.

Read before the Society, April 14, 1919.

The Water Supply Office of the Headquarters Lines of Communication was first located in Paris, where it continued until January 13, 1918, when it was removed to Tours. There were changes in nomenclature during the war and finally the office was under the Headquarters Service of Supply, Service of Utilities, Department of Construction and Forestry.

The work included all the water supply problems except those at the front, which were under another closely coöperating office at the headquarters of the Chief of Engineers, A. E. F.

The writer was assigned to duty in the Water Supply Office late in October, 1917, shortly after arriving in Paris, and continued the work until the end of the year 1918, when he left Tours en route to the United States. During this time he was largely responsible for the general policy regarding pumping machinery. The following information on the scope of the work is based on a report submitted by an assistant, Oscar G. Goldman, First Lieutenant of Engineers.

On the entry of the United States into the world war, and on the despatch of troops to France, the question of the water supply became of great importance. This included the supplying of camps, hospitals, as well as the railroads, in many cases necessitating the development of new supplies, in some of increasing the already existing French supply, while in others, simply assuring the French supply.

The necessity of the immediate delivery of the water to the point in question meant the development of the nearest supply, either by the sinking of deep wells or by developing the supply from the nearest stream or canal.

This necessitated the use of pumps, the type depending upon the supply utilized and the elevation to which the water had to be delivered. Another feature affecting the pump installation was the size of discharge main available, it being necessary in many cases to install two discharge mains, as the size of pipe for a single line was not available.

Expected pump needs were estimated in a general way in regard to type, quantity of water to be pumped per minute, and head against which the pumps were to operate. Pumps were tabulated and placed on order in the United States and supplied on monthly priorities, the number requested being estimated according to expected use.

The pumps were placed in two main classes, namely, centrifugal and piston. Several other types were also ordered, such as deep well, steam, and air lift pumps. The following was the general list of pumps placed on order in America.

Centrifugal Pumps.

200 GPM.....	40 ft. head
100 GPM.....	75 ft. head
200 GPM.....	75 ft. head
100 GPM.....	150 ft. head
200 GPM.....	150 ft. head
350 GPM.....	250 ft. head

Piston Pumps.

50 GPM.....	150 ft. head
60 GPM.....	175 ft. head
100 GPM.....	200 ft. head
40 GPM.....	460 ft. head
175 GPM.....	460 ft. head

Pending the delivery of the pumps from America, orders were placed with several French pump manufacturers for immediate use. Also, where special pumps were required, they were obtained from French sources.

With the French manufacturers were placed orders for the following centrifugal pumps:

	50 ft. head
	100 ft. head
100 GPM.....	150 ft. head
	200 ft. head

	50 ft. head
	100 ft. head
200 GPM.....	150 ft. head
	200 ft. head
	250 ft. head

	50 ft. head
	100 ft. head
	150 ft. head
350 GPM.....	200 ft. head
	250 ft. head
	300 ft. head

Piston Pumps.

22 GPM.....	260 ft. head
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	60 ft. head
44 GPM.....	100 ft. head
	130 ft. head

At the beginning of the war, the pumping machinery used by the American Army was either sent to the depot at Gievres or to Is-sur-Tille and from there shipped to the various jobs. Later it was decided to concentrate all this material at Gievres for distribution.

Nearly all requisitions for pumps were handled by the Water Supply Section of the Division of Construction and Forestry, and as each one was filled, a card index was kept showing the type of pumps shipped and also the conditions under which they were to be operated. The pumps thus sent out were later tabulated and in this way a fairly good estimate was arrived at, showing the pumps needed or which could be required, as well as the number of each such type, assuming of course that the future demands would be similar to those of the past. The result of this tabulation is given below:

26 Piston Pumps per month

50 Centrifugal Pumps per month

These were tabulated as to specific pumps used, as shown below:

Centrifugal Pumps.

15	150 GPM.....	100 ft. head
7	225 GPM.....	100 ft. head
15	225 GPM.....	150 ft. head
13	150 GPM.....	200 ft. head

Piston Pumps.

15	60 GPM.....	175 ft. head
4	25 GPM.....	300 ft. head
3	50 GPM.....	300 ft. head
4	100 GPM.....	300 ft. head

Of the last item under centrifugal pumps, namely, 13 150 GPMx200 ft. head, 3 were used in series with another pump, thereby requiring it to be the reinforced type. The ordinary French pump was built to stand a static pressure of 200 feet, while in the reinforced type, castings were made for a static head of 500 feet.

Not many steam pumps were used for water supply work, as it was almost impossible to obtain boilers. Those of the smaller capacities were used by the Forestry Section for boiler feed pumps as a standby to injectors in the operation of the sawmills, and practically all of these were of American make. In several cases triplex pumps were used as boiler feed standbys, when steam pumps were not available.

In several of the deep wells, air lift installations were made, in many cases of the ordinary type. In some cases a special air working cylinder was installed, known as the Weber Subterranean Pump, thereby making it possible to force the water directly into the supply tank, located at a higher elevation and a considerable distance from the well. Direct connected, gas driven air compressors were used, mounted on wheels, with a capacity of 90 cubic feet of free air per minute, against a head of 100 pounds per square inch.

The majority of the pump installations were belt driven. At first fiber belting was furnished, but due to the high belt velocities, it was found very difficult to keep the lacings from cut-

ting through the holes. Later, leather belting was furnished and no further trouble was experienced.

Belt velocities on French installations usually varied between 4100 and 4500 feet per minute, with a few cases as high as 4875 feet per minute. These velocities were not considered high by the French manufacturers and a statement made by the Rateau Company of Paris was that they usually designed for belt velocities of between 4900 and 5700 feet per minute, for war installations.

Wherever electric power was available, it was desirable to install electric motor driven pumps. This was not always possible, as electric motors and apparatus were very difficult to obtain in France, and those from the United States had not been received until late. When American motors were available it was not always possible to use them, due to their lower speeds. Many of the French motors supplied ran at 2850 RPM full load speed, while others were rated at 1425 RPM. The electric motors obtained from America had a speed of about 1000 RPM, and with the difficulty of obtaining pulleys, it was almost impossible to use them with the French pumps.

For railroad water supply, the usual installations consisted of gasoline engines, belt driven, pumping units. In most cases these plants consisted of two or more units, an extra unit being installed as a standby. Where electric power was available, but found to be unreliable, gas engine standby units were installed, not of the total capacity of the entire plant, but of such capacity as to have a certain percentage of water available.

The gas engines used for most of the installations were of the high speed automobile type. The French engines had a range of speed from 1200 to 1500 RPM, while those of the stationary type had a range of 600 to 1000 RPM.

The French manufacturers claimed these high speed engines had been in continuous service, being used by the armies of England and France throughout the period of the war, and had given good service, yet whenever possible, the heavy duty, or low speed American made gas engines were used.

Having thus far discussed in general terms the type of pumps and power used by the American Army along the lines of communication, a few installations will now be explained, more or

less in detail, which may be considered typical or of special interest.

The number of trains, including freight and troop, passing over the roads, having increased many times that before America entered the war, it became necessary to increase the railroad water supply, and in some cases install new watering stations.

One of these pumping stations was located at Foecy, Department of Cher. This plant contained two centrifugal pumps made by the Rateau Company, Paris, of the PFP-28-R type, belt driven by Chapuis-Dornier automobile type, 15 H. P. gasoline engine, with 4" leather belting. The amount of water required was 140 gallons per minute against a total head of 150 feet, the discharge was through two 4" cast iron pipe lines, length of about 4300 feet. The water was discharged into a 50,000 gallon railroad water tank, and supplied to the locomotives through two 10" standpipes.

The centrifugal pumps were single stage, diffuser type, running for the condition mentioned above, at 1890 revolutions per minute and requiring about 10.5 horsepower at the shaft.

At Perigueux, Department of Dordogne, the pumping station located on the Dronne river consisted of two Dumont centrifugal pumps, direct connected to 15 H. P. Chapuis-Dornier gasoline engines. Each pumping set really consisted of two pumps bolted together on the same shaft, with special fittings, so that they could either be operated in series or parallel. Operating in series at 1300 revolutions per minute, each pump would supply 264 GPM against a head of 98 feet, while in parallel the pumps would deliver 528 GPM against a head of 49 feet. In this station these pumps were operated in series. The water was supplied to a 100,000 gallon concrete reservoir through a 6" discharge line of about 700 feet length, and then through a 10" line of about 1000 feet to the reservoir. This 10" line was also used as the supply line to two 10" standpipes for supplying water to the locomotives.

For hospital supply, the pumping station usually contained more pumping units than that installed for railroad purposes.

At Allerey, Department of Saone et Loire, the maximum amount of water needed was figured at 460,000 gallons per day, the hospital being one of 10,000 beds with a crisis expansion to

20,000. Test wells were sunk in a gravel pit located about 8500 feet from the extreme end of the hospital and it was at first expected to get all the water from this location by sinking an additional well about 200 feet from the first. Two centrifugal pumps of the PFP-28 type, single stage, made by Rateau Company, Paris, rated at 189 GPM against a head of 207 feet, running at 2100 RPM, belt driven by 20 horsepower Charron automobile type gas engines, were installed. Later it was determined that the needed amount of water could not be obtained from the two wells, and it was decided to install another station on the Saone river, about 2200 feet from the wells. In this station two Rateau centrifugal pumps of the PFP-28-R, single stage type, were installed, rated at 150 GPM against a head of 200 feet, running at 2160 RPM, belt driven by a 30 horsepower Bignan automobile type gasoline engine.

The water was pumped to a 100,000 gallon concrete reservoir through a 6" cast iron main, as far as the hospital, and from there on through an 8" main, which was part of the hospital distributing system, with a length of 5500 feet. In each station the pumps were to be operated so as to give 190 GPM against a head of 200 feet. This necessitated speeding up the pumps of the station located on the river to about 2300 RPM.

At Joue-les-Tours, Department of Indre et Loire, a 2000 bed hospital was erected. Here the water was pumped from an 8" well about 600 feet deep by means of compressed air to a 11,000 gallon storage tank at about 85 feet above the top of the well. A Weber Subterranean Pump was used. The amount of water delivered was about 100 GPM through a 4" main about 300 feet long, the compressor used being one of the Chicago Straight Line, 15 H. P. gasoline engine driven type, rated at 90 cubic feet of free air per minute at 100 pounds per square inch. The cylinder was set at about 265 feet from the top of the well. When the well was not operating the water stood at about 25 feet, but as soon as the pump was started the water level receded to about 50 feet from the surface of the ground. The starting pressure was about 125 pounds per square inch at the well, while the running pressure dropped to about 108 pounds per square inch.

In another deep well, driven about 25 feet from the other, to a depth of about 500 feet, an ordinary nozzle type air lift was installed with a 2" discharge, and a 1½" air line. The air was supplied from a gasoline engine belt driven Worthington compressor, rated at 30 cubic feet of free air per minute against a pressure of 100 pounds per square inch. A rough test showed that about 20 GPM could be obtained at the tank, and it was proposed to use this installation as a standby.

Bassens, located near Bordeaux, was one of the ports developed by the American Army. The works there consisted in building new wharves, railroad yards, camp sites, as well as a large refrigerating plant.

The supply for the docks, railroad yards and camps was supplied from two artesian wells. At the first well, two direct connected, electric driven, 26 H. P. centrifugal pumps, of the PFP-28-S type, were installed for 395 GPM against a head of 130 feet, running at 1430 RPM. The "S" type pumps are two single stage pumps bolted together on the same shaft.

At the second well, two PHIP-20 direct connected, electric driven, single stage centrifugal pumps were installed, rated at 395 GPM against a head of 130 feet at 2800 RPM.

The distributing system consisted of 8" and 6" universal cast iron pipe. The first station was located almost 8000 feet from the docks, the discharge main being of 8" diameter, while the second was about 5000 feet distant, the discharge main consisting of 6" pipe.

For the refrigerating plant, the pumping station was situated on the banks of the Garonne river, and consisted of three direct connected, electric driven, single stage centrifugal pumps of the PFP-36 type rated at 500 GPM against a head of 160 feet, running at 1430 RPM, the motor being 36 H. P. The discharge line was 12" cast iron Bell and Spigot pipe with a length of about 3000 feet.

The elevation of the water level varies about 21.5 feet between extreme high and low water, and it was therefore necessary to set the pump in a concrete pit about 9.5 feet deep, so that at extreme low water the suction lift would be about 13 feet.

The pumps used at Bassens were among a large number especially designed for each condition by the Rateau Company, Paris.

JACKSON SQUARE.

By JOHN S. KENDALL.

Read before the Society, May 12, 1919.

If we examine the maps of French and Spanish New Orleans, the most conspicuous feature of the topography of the city as there delineated is a square of ground on the river front, exactly midway between the upper and lower extremities of the city. This spot, originally called the Place d'Armes, continues to the present time, under the name of Jackson Square, to serve much the same purposes as a place of public resort that it did in the primitive days of the city. The Place d'Armes was intended at first as a parade-ground for the local troops, and, incidentally, as a park for the use of the civil portion of the population. In time it became the center of the community life. There were held almost all of the great gatherings of the people. There took place the principal events in the history of New Orleans—which means, in the whole Mississippi Valley—down to a relatively recent period. It therefore is keeping well within the fact to say that, considering its area, age and uses, there is no equal space of land in the whole United States that is so interesting to the student of our national history.

It is not my purpose in the present paper to describe all of the important episodes which the old Square has witnessed. Any such attempt would require a large volume. All that I can hope to do is to present a few of the most salient incidents in this long, eventful history. And, as it is impossible to think of the Place d'Armes without including the buildings that look down into it—the Cathedral, the Cabildo, and the Presbytery, on one side, and the two long rows of red brick residences which perpetuate the name of Michaela de Pontalba on two others—it is necessary for me briefly to indicate their part, too, in the drama of our municipal history.

The Place d'Armes came into existence when about the year 1720, Pauger laid out the future metropolis. This was done by order of Bienville, then Governor of the Province of Louisiana. We can imagine what New Orleans looked like at that time, for two years later, when Pere Charlevoix visited

the spot, he found a mere, struggling encampment of about 200 persons, habiting in huts on the bank of the river; and if, at this time, the prospect was dismal, it must have been even more so at an earlier date. The Square was, then, scarcely more than a name—a bare plat of weed-covered ground. By 1728 its appearance had undergone little alteration:

“It was of the same rectangular figure it has to-day; larger only by the width of the present sidewalks; an open plat of coarse, native grass, crossed by two diagonal paths, and occupying the exact middle of the town front. Behind it, in the mid-front of a like apportionment of ground reserved for ecclesiastical purposes, where the St. Louis Cathedral now overlooks the square, stood the church, built, like most of the public buildings, of brick. On the church’s right were the small guardhouse and prison, and on the left the dwelling of some Capuchins. The spiritual care of all that portion of the Province between the mouths of the Mississippi and the Illinois, was theirs. On the front of the square that flanked the Place d’Armes above, the government house looked out on the river. In the corresponding square, on the lower side, but facing the river and diagonally opposite the Capuchins, were the headquarters of the government employees. The grounds that faced the upper and lower sides of the Place d’Armes were still unoccupied, except for cordwood, entrenching tools, and a few pieces of parked artillery, on one side, and a small house for issuing rations on the other.”

From this humble beginning the Place d’Armes of a century later was a notable evolution. We have a description of its appearance in 1828 which is worth quoting:

“In the center [of the city] was a public park, surrounded by an iron railing, erected on a granite coping. The enclosure had originally consisted of a fancy wooden frame, the gates being flanked by imitation cannon, cut out or carved from the same material. . . . A triple row of sycamore trees encircled the grounds, and the weeds were allowed to grow rank and tall, except where wide swarths had been cut by pedestrians on their way to the markets, the church, or the public buildings. Immediately in the rear, occupying the whole space from St. Peter to St. Ann, stood the City Hall, the Cabildo of the Spaniards—

the Court House, once the habitation of the jolly monks, and the Cathedral . . . The facade of the square—that towards the river—was perfectly open, there being no railroads in those times to obstruct the view or breezes of the Mississippi with their unsightly freight depots. Each of the lateral streets, St. Peter on the upper and St. Ann on the lower sides, was covered with a block of buildings, built of bricks between posts, uniform in size and construction, two stories in height, with small projecting balconies. These buildings were used as stores, the families of the occupants usually living upstairs. They were in a great measure used for the sale of tropical fruits, the trade being mostly controlled by hardy Austrians and Slavonians—a thrifty and peaceable race. At the corner of St. Ann and Chartres was a popular cafe, where, besides all the paraphernalia of a modern barroom, coffee, chocolate, or tea, steaming hot, were served on small tables to customers immersed in the mysteries of dominoes. The same was the Cafe del Aguila. Across the street was the low-roofed, Spanish-tiled building kept by Benito Durán, surnamed Valiente, where the purest Mayoreca was always to be had. There were also here and there . . . the establishment of an ingenious watchmaker . . . a hardware store, a restaurant, a gunsmith's store, and a barber-shop; but fruit seemed to be the staple commodity in that quarter. Along the iron railings on the opposite side were to be seen booths for the sale of oranges, bananas, ice cream, peanuts, ginger beer (*bière douce*), cooled in large tubs, and the inevitable 'estomac mulatre' (ginger cake), as highly prized by the urchins of that generation as they are at present. Lining the river, small huts were erected along the water-front for the sale of oysters by the wholesale or on the half-shell. These establishments were well patronized by families and respectable society, for the luggers engaged in the trade were wont to tie to the posts opposite the markets with their daily loads of fresh and luscious bivalves. On Sunday afternoons the scene around the square was more than picturesque. Greek ice cream vendors in tasseled fez; Choctaws reeling drunk in Father Adam's costume, a well-worn diaphanous blanket being substituted for the historical fig-leaf; mulatresses decked with gaudy-colored tignons; children in holiday attire romping over the

weeds in innocent glee; spectacted gentlemen sporting their gold-headed walking sticks; groups of city guards in gala uniforms and with formidable cutlasses; fashionable loungers—the dudes of that period, discussing the rival claims of Calvé or Bamberger—the favorite prima donnas of the Opera—all these commingled together and in incessant motion, offered the ever-varying and dissolving views of the kaleidoscope.”

Of many important historical events of which the Place D'Armes was the scene in the early years of the history of New Orleans, I can only refer to the romantic episode of the arrival of the “filles a la cassette” in the winter of 1727-28; the various assemblies of regular and volunteer troops which met there preliminary to setting off on expeditions against the Natchez, the Yazoo, the Choctaw and the Chickasaw Indians between the years 1729 and 1739, and the pathetic reception of the Acadian exiles, driven from their homes by the British in 1765. Three incidents, however, are too important to be passed over with a mere mention. These are the three transfers by which the Province of Louisiana became, successively, Spanish, French again, and finally American.

It was in 1769 that the first of these transfers took place. It was in that year that the Place D'Armes had the doubtful pleasure of witnessing the arrival of O'Reilly. O'Reilly was the Spanish governor sent to suppress the disorders in the colony due to the irregularities in the manner of its transfer from France to Spain. There had been what amounted to a revolt among the colonists against Spanish authority; and now the leaders of the movement were destined to pay severely for their temerity. In the meantime the Spanish functionary arrived in his frigate, and landed at the Place D'Armes. It was on the morning of August 18th. The drums beat in the barracks in the city, the troops, royal and militia, marched from the barracks to the square and formed facing the river. “Count O'Reilly,” says the historian, “in all the pomp of representative majesty, heralded by music, preceded by silver maces, and followed by a glittering staff, descended the gang-plank from his ship to the levee, and, advancing to Aubry, the French governor, presented his credentials from the king of Spain and his orders to receive the colony.

Three thousand Spanish soldiers filed after him from the other vessels to the levee and formed on the three sides of the square. The credentials were read aloud to the citizens assembled, an anxious, nervous crowd. Aubry, after a proclamation releasing the colonists from their allegiance to France, presented the keys of the city to O'Reilly. The French flag was lowered, the Spanish vessels saluted with their guns, the soldiers fired off their muskets and shouted 'Viva el rey!' The French guards were relieved by Spanish guards. The French and Spanish officers then in procession crossed the open space to the Cathedral, where a Te Deum was celebrated."

The Spanish domination lasted in Louisiana not quite forty years. At the end of that time the Place D'Armes was called on to witness two impressive ceremonies—the first on November 30, 1803, when New Orleans became a French city again; and the second, seventeen days later, when it ceased to be French and became American. The former ceremony was scheduled to be one of great brilliancy, but the preparations were made in ignorance of the fact that the new French regime was to be of the briefest. The news that the province had been sold by Napoleon to the United States arrived only a short time before the day of the transfer. The spirits of the colonists were accordingly much dashed. The celebration which was elaborate, though uninteresting, took place "with troops drawn up in line on the Place D'Armes, and with discharges of artillery. Salcedo, the Spanish governor, fitly typifying, in his infirm old age, the decaying kingdom which he represented, delivered to Laussat, in the hall of the cabildo, the keys of New Orleans; while Casa Calvo, splendid in accomplishments, titles and appearance, declared the people of Louisiana absolved from their allegiance to the King of Spain. From the flagstaff in the square the Spanish colors descended, and the French took their place, and the domination of Spain in Louisiana was at an end."

The transfer of Louisiana to the United States followed on December 20th. "At sunrise the gay folds of the tricolor spread in the breeze from the top of the flagstaff," in the Place D'Armes. "It was noted as a good omen that, instead of the rain and clouds that had attended both Spanish ceremonies, the day dawned

clear and bright. A faultless sky shone overhead. At nine o'clock the militia mustered and marched into the Place D'Armes, and the crowd began to mass in the streets. A cannon shot signalled that the American troops had left their camps and were marching towards the city. A salute of twenty guns from Fort St. Charles announced that they were passing through the Tchoupitoulas gate, and being admitted to the streets of the city. At noon the column made its appearance in the Place D'Armes. General Wilkinson and Governor Claiborne, the American commissioners, on horseback at the head, were followed by a detachment of dragoons in red uniform, four pieces of artillery, cannoneers, two companies of infantry, and one of carabineers. The troops formed in a hollow square opposite the French and the local soldiery. The commissioners, dismounting, proceeded to the Hotel de Ville, as the Cabildo was now called, where they were received by the officers of the municipality, the French commissioner, and his suite, and a large and notable assembly of guests." The actual formalities of transfer carried out in the Cabildo. In the meantime, in the square, "rose the great flagstaff, bearing that flimsiest of fabrics and strongest of symbols that ever held the hearts of mortals to a coign of earth. About the staff were grouped the military, a vivid spot of steel and color, and around them, and as far as the eye could see, human faces. . . . At the appearance of the commissioners [upon the balcony of the Cabildo] the tricolor began to flutter down, and the great new flag, the Stars and Stripes, to mount the staff. When they came together they paused a moment. A cannon shot was fired, and every gun in the city from fort, battery and ship, answered in salute; the bands played; the Americans shouted. The rest of the crowd looked on, silent. When the reverberations died away the Stars and Stripes were waving from the top of the staff. After an inaugural address by the American governor to the 'Louisianians, my fellow-citizens,' there was a review of the troops, and the American companies defiled out of one side of the square, and the French out of the other."

The next great event which occurred in the Place D'Armes was the ovation given there by the citizens of the city to General

Jackson, after the battle of New Orleans. Jackson entered the city on January 20, 1815; the public celebration followed three days later. A triumphal arch was erected in the middle of the Square, and lines of young girls extending from its base to the Cathedral door, scattered flowers upon the victor as he and his staff passed between them to the Cathedral, where a *Te Deum* was sung in thanksgiving for the victory. "At the Cathedral door stands the Abbe Dubourg in full canonicals, at the head of his priests. He . . . addresses a speech to Jackson, praising him for his victory, but reminding him of the Giver of all victories, to which Jackson replies modestly and humbly. He is led through the crowded church to a seat of honor before the brilliant high altar, the gallant Battalion d'Orleans, in full uniform, files into the aisles, the majestic *Te Deum* rises from the organ and the choir. At night the whole city is illuminated, and festivities hold the hours till dawn."

A quarter of a century later Jackson was again given an ovation in the Place d'Armes. This event is of special interest to us, because it was during this visit that was laid the corner-stone of the monument which stands to this day in the center of the Square. This ceremony took place on January 13, 1840. "A procession formed at the State House, in Canal street, between Baronne and Dryades, composed of the military, State and city officials, the police, representative citizens, and General Jackson and his suite in barouches. Proceeding down Canal street and through Royal street to Esplanade, the procession moved up Conde street to the Place d'Armes, a fine band of music playing appropriate national airs. At the Square a temporary platform had been erected, and upon this General Jackson was seated, while the ceremony of laying the corner-stone was being performed. The Catholic Bishop, in his pontificals, and the clergy of the Cathedral, in their robes, assisted and chanted hymns during the dedication. Before laying the corner-stone, the Rev. Father Anduzé read a brief address first in French and then in English, and the oration was delivered by Counsellor Barton. Immediately after the ceremony, the old soldier took the river steamboat Vicksburg, and started on his journey home."

The statue of Jackson, which now crowns the granite pedestal in the center of the square is the work of the sculptor, Clark Mills, and was unveiled in 1856. What was known as the Jackson Monumnet Association was organized January 11, 1851, and induced the Legislature to pass an act in 1852 appropriating \$10,000 with which to erect the statue. In making this appropriation the legislators went on record that it was made "in testimony of the gratitude of Louisiana, and to commemorate the achievements of the hero, to whose military genius and patriotic devotion in the hour of her darkest peril she owes the triumph which preserved her chief city from capture by an invading foe, and which illustrates the brightest page of her history." The statue was shipped early in December, 1855, with the idea that it would reach New Orleans in time to be placed in position and dedicated on the anniversary of the battle, but contrary winds delayed the vessel, and she did not reach port till January, too late to allow the programme to be carried out as originally formulated.

The ceremony, however, took place on the 9th of February, 1856. A vivid description of this interesting event is found in a contemporary newspaper: "Business was in a great measure suspended and the streets literally swarmed with the population in holiday attire. The military, firemen, the local societies, and other civic bodies turned out in full uniform and regalia, with banners and music, under the leadership of General Tracy, and formed into a procession which actually seemed interminable. This procession once under way, the wide-scattered multitude began to concentrate in the direction of Jackson Square, and when, at noonday, the concentration had come to a focus, the square and its vicinity formed a spectacle such as was never before seen in New Orleans and probable will not again be seen for many a year. . . . It is estimated that the falling of the canvass from the statue was witnessed by at least 25,000 people.

"Those of the spectators who must have enjoyed the spectacle most and who were themselves not the least interesting part of the spectacle, were the veterans of 1815, those who shared the glory of him to whom they were now paying posthumous honor. They had the place of honor in the procession, and were assigned

an honorable position in the Square. The colored veterans of the same famous occasion, were also out, headed by their fellow-veteran, the incomparable drummer, Jordan Little.

"Upon a platform appropriately decorated in front of the statue, the ceremony of the inauguration took place. Ex-Mayor Crossman, president of the monument association, introduced L. J. Sigur, Esq., to the multitude as the orator of the day. Mr. S. made an appropriate address, reviewing the life of his hero as warrior and as the chief of a great people, and was interrupted by the frequent applause of those who were able to hear him. When he concluded, a man by the pedestal pulled the string, the canvass fell, and the bronze figure of the warrior, upon his rampant war steed, glittered in the light of the sun. Instantaneously a deafening cheer arose, and the hats of the multitude were raised aloft, the various bands of music joined in a chorus of the most inspiring music, and a salute of 100 guns, given with cannon on the levee, awoke the echoes far and near. Subsequently ex-Mayor Crossman introduced Clark Mills, Esq., the designer and builder of the statue, to the assemblage, which he addressed. . . . Mr. Mills was loudly cheered. After that General Plauche stepped forward, and announced that the ceremonies were at a close. Subsequently the venerable Bernard Marigny addressed the multitude in French, in a very spirited and appropriate manner, and came off with vociferous applause. A large portion of the crowd remained in the Square for hours, admiring and criticising the statue." That night a banquet was given at the St. Charles Hotel, at which Clark Mills and a number of local celebrities were present, and addresses were made which the ingenuous chronicler of the event regrets he had not space to report in detail.

Across the western end of Jackson Square the visitor sees a row of buildings, each of which has its own claim upon his attention. These are the Cathedral, the Cabildo and the Presbytery.

The Cathedral of St. Louis, as we know it today, is the second structure to occupy the spot. The site was chosen by Bienville himself, when, 1718, he selected the location of his future capital. We probably owe the actual determination of

the spot to Pauger, when he located also the boundaries of the Place d'Armes, but to Bienville belongs in all likelihood, the idea of making the church the central feature of the city plan. The first place of worship was, however, very humble. When, in January, 1722, Pere Charlevoix visited New Orleans, he found a shed, behind the shabby storehouse belonging to the Company of the West, which was used as a chapel, and was the only thing in the way of a church in the embryo town. This primitive edifice was blown down in a hurricane later in that year, and was replaced, two years later, by a brick building. This was known as the Parish Church. It was put in charge of the Capuchin Fathers. To this order was committed the spiritual government of the city, although the Province of Louisiana was under the direction of the Bishop of Quebec.

The Parish Church lasted for 62 years—that is, till 1788. During that period it had its share in all the historic events which occurred in or around it—either looking calmly down upon the colonial armies preparing for battle with the Indians, or beholding the transfer of government which was attended with so many sensational events in 1768. Among its curates probably the most beloved was Father Antonio de Sedilla, known to the French-speaking population of New Orleans as Pere Antoine, whose service began in 1785 and ended with his death, at the age of ninety, in 1829. Pere Antoine came to New Orleans originally in 1779. He is remembered in connection with an attempt to introduce the Inquisition into Louisiana. This attempt was frustrated by the action of Governor Miro. But the odium of participation in it which attaches to Pere Antoine seems only partially justified. There can be no question that he was merely carrying out the orders of his superiors when, in 1789, he presented his letters to the Governor, and prepared to take up his duties as head of the Holy Office in the province. Castellanos, who has treated this curious affair in considerable detail, in his book on old New Orleans, makes out a strong case for the good priest, and puts most of the blame on Miro, whom he accuses of downright treachery in arresting Pere Antoine and expelling him from the colony without any form of trial. But the good father soon returned. We hear no more of Inquisitions

and inquisitors, and that he won the unreserved affection of his parishioners is shown by the fact that his death was deplored as a public calamity, and that it was said that he had officiated at fully one-half of all the christenings, marriages and funerals celebrated in the city during the latter period of his ministry. He was interred under the floor of the Cathedral, before the altar of St. Francis; but in 1851 his bones were taken up and removed to the St. Louis Cemetery.

Pere Antoine was curate in 1788, when the church was burned in the great conflagration of that year. This fire is one of the most important events in the early history of New Orleans. I may, therefore, be pardoned if I digress a moment to speak of it in some detail. It broke out on Good Friday, as a result of negligence on the part of Don Vicente José Nuñez, the military treasurer, who had a private chapel in his home in Chartres street, near St. Louis. In honor of the day candles were left lighted before the altar while the family was busy elsewhere, with the natural result that some of the ornaments caught fire, and the house was speedily in a blaze. The flames spread. A high wind was blowing from the south. Within two hours the best part of the town was in ashes. "The people were helpless to stop it. The best of the residences, all the wholesale stores fell before it. It swept around the north end of the plaza, broadening at every step. The town hall, the arsenal, the jail—the inmates of which were barely rescued alive—the parish church, the quarters of the Capuchins—disappeared. In the morning the plaza and the levee were white with tents, and in the smoldering path of the fire the naked chimneys of 856 fallen roofs stood as its monuments. The buildings along the immediate river front still remained; but nearly half the town, including its entire central part, lay in ashes." It seems that the merchants of the city carried supplies of powder, which by exploding, helped greatly to spread the conflagration. The property lost was valued at nearly \$2,600,000. Governor Miro showed good sense as well as energy in his measures of relief. The victims were tenderly cared for in his own house, which had escaped the general ruin. The surrounding country was called upon for help. Permits were given to vessels to import food

from abroad, and in this way, as well as by strict economies with the government stores, which, happily, were not destroyed by the fire, he managed to feed his people till relief arrived from Havana and Santo Domingo. In spite of his efforts, however, one-sixth of the citizens are said to have died as a result of privations and exposure.

What we still have of colonial New Orleans survives from the city as it was reconstructed after this fire, and after a similar disaster in 1784. "So shingles and thatch and cypress boards had cost enough," observes the historian. "From this time the tile roof came into general use. As the town's central part filled up again, it was with better structures, displaying many Spanish-American features—adobe or brick walls, arcades, inner courts, ponderous doors and windows, heavy iron bolts and gratings . . . balconies, porte-cocheres, and white and yellow lime-washed stucco soon stained a hundred colors by the sun and rain. Two-story dwellings took the place of one-story, and the general appearance, as well as public safety, was enhanced."

There dwelt in New Orleans at this time a certain Don Andrés Almonaster, who, after the Spanish fashion, added to his father's name that of his mother, and rounded out a stately appellation with the words "y Rojas." He had come to Louisiana at the beginning of the Spanish domination, served as "escribano público," or notary public, made a fortune, became an "alcalde," then "alferez real," and was looked on as one of the most distinguished citizens of the town. He was in middle-age when he reached the city; he was past sixty when he was married, in 1787, in the Parish Church, to a beautiful Creole girl, Louise de LaRonde. A year later, after the great fire, standing amidst the smoking ruin of the city, he had, what Miss King happily calls "an inspiration." He offered the municipal authorities to rebuild the schoolhouse, which had been established in 1772; then he undertook to rebuild the Parish Church, which he did at a cost of \$50,000; and finally he replaced the Charity Hospital with a handsome building that cost \$114,000. We shall see, later, that he also undertook other building operations under contract with the local authorities. What interests us now is the new church. Completed in 1794, it has survived, with some changes,

to the present time. Originally, there were two round towers, one at either end of the facade. In 1814 bell-shaped turrets were placed upon these towers, from designs by the architect, Latrobe. The belfry was added in 1824 by Leriche. In 1850 the collapse of one of the towers led to the discovery that other portions of the building were in danger. The task of repair was entrusted to Pilié, the city surveyor. The facade was rebuilt in 1851 in accordance with this person's plans, the roof was largely reconstructed, and the sanctuary and vestries were added, thus bringing the edifice into its existing form. A few years ago the sinking of the foundations of the church led to extensive repairs, which were completed in 1918, but nothing was done to change the appearance of the venerable building. I should add, to complete this hasty account of the Cathedral, that it was advanced to this rank on its completion by good Don Andrés, in 1794, Louisiana and Florida having then just been made a bishopric separate from Havana.

Don Andrés had a daughter, Micaela, who inherited a fortune which, even in our days, would be regarded as large, and which, in her times, was fabulous. In 1811 she married Joseph Xavier Celestin Delfair de Pontalba, son of an old French nobleman, who under the French domination had been commandant of the Côte des Allemands, and whose title came to him through the favor of Napoleon. The young couple went to live in Paris. That city was Mme. de Pontalba's home down to her death in 1874. She revisited New Orleans in 1849, and is credited with then having induced the municipal authorities to beautify the Place d'Armes with flowers and shrubbery, and helped with her admiration for "Old Hickory," to bring about the change in name by which the Square was rebaptized in honor of Jackson—as well as being largely instrumental by generous contributions to the fund in setting up the bronze statue of the old general. She inherited the property on the upper and lower sides of Jackson Square, and it was at this time that she caused the two long rows of brick residences still called by her name to be constructed. These buildings were speedily occupied by prominent people, and Jackson Square was for a long time the social center of the city.

ARTICLE VII.—Admission to Membership.

(Amended March 12, 1906; April 12, 1909.)

Section 1. An applicant for admission to membership in the Society shall make a statement in writing of candidate's professional experience, which shall be in the form prescribed by the Board of Direction.

The applicant shall give at least three references, who shall be Members in good standing, who shall each on request of the Secretary sign or forward a letter to the Board of Direction, stating the extent of his knowledge of the applicant and his qualifications, and certifying that he knows the applicant personally and believes him to be a proper person to be admitted to membership in the Society. The Board of Direction shall determine as to the applicant's eligibility to the grade of membership applied for, and shall have issued to all Members whose address is known, a ballot for all new applicants for membership in any grade, or for transfer from one grade to another, which ballot shall contain a concise statement of the record of each applicant, and the names of his endorsers. Members voting in the negative should furnish the Board of Direction any information in their possession concerning the applicants. The ballots shall be letter ballots in form prescribed by the Board of Direction. Five negative votes shall exclude from election. In case of exclusion, no record shall be entered upon the minutes, but the candidate shall be notified. The Board of Direction shall, upon receipt of letters from not less than eight members, requesting a reconsideration of the ballot on any excluded candidate, and stating the reasons for such request, consider these requests, and if deemed sufficient, shall order a new ballot in the same form as the first, and the second ballot shall be governed by the same rules as the first.

Sec. 2. Honorary Members shall be proposed by at least ten Members and shall be elected only by unanimous vote of the Society. A person elected as an Honorary Member shall be promptly notified thereof by letter. The election shall be cancelled if an acceptance is not received within three months after mailing of said notice.

ARTICLE VIII.—Privileges.

All the rights of the Society shall be common to all the grades of membership except those of voting and of holding office, which shall be confined to Members and Honorary Members.

All persons elected and duly qualified whose address on the records of the Society is in the Parish of Orleans, shall be defined as Resident; and those whose address is beyond the limits of this Parish shall be defined as Non-Resident.

ARTICLE IX.—Amendments, Endorsements.

Any amendment to this Constitution may be made by a two-thirds vote of the Members present and voting cast in favor of such amendment in its final form at each of two successive meetings, due notice of such

amendments having been sent to each Member with the notices of the meeting.

No proposition which includes the Society's endorsement shall be passed except in the same manner as prescribed for amendments to the Constitution.

BY-LAWS.

(1.) **Meetings.**—Regular meetings of the Society shall be held on the second Monday of each month at 8 o'clock P. M., unless otherwise provided by a vote of the Society at a previous meeting.

(2.) **Order of Business.**—The following order of business shall be observed at all regular meetings, unless set aside by a vote of Members present:

- 1st. Reading of the minutes of the previous meeting.
- 2nd. Business and reports of committees and officers.
- 3rd. Technical exercises—to begin not more than a half-hour after the meeting is called to order.
- 4th. Unfinished business.

(3.) **Special Meetings.**—The President may call meetings of the Society when he deems it expedient, and shall be bound to do so at the written request of ten members, stating the purpose of such meeting, and no business shall be transacted at such meeting except that stated in the notice thereof.

(4.) **Election of Officers.**—(Amended March 13, 1899; April 13, 1908).—Officers shall be elected by letter ballot at the annual meeting of the Society. The members present at the December meeting who are entitled to vote, shall, by written ballot, nominate one member for each office, each nomination to be made by a majority of the votes cast. The candidates receiving the least number of votes to be dropped after each ballot, until one shall have received a majority of the votes cast. Within six days thereafter the Secretary shall mail to each Member of the Society a list of the nominees, showing the offices for which they are nominated, also providing a blank space under the name of each nominee in which voters may write another name should they so desire.

This list, to count as a vote, shall be returned to the Secretary at least four days before the annual meeting, and each shall be enclosed in two envelopes, the inner one containing the ballot being blank, the outer one having upon it the signature of the member voting. The nominees upon the list whose names are not scratched shall be the ones voted for. In case of a tie, the members present at the annual meeting shall elect the officer.

(5.) **Directors.**—It shall be the duty of the Directors, from time to time, to audit the accounts of the Secretary and of the Treasurer.

(6.) **Board of Direction.**—The Board of Direction shall have power to order all ordinary or current expenditures of funds of the Treasury; shall provide for the exercises of the meetings; shall consider all appli-

cations for membership and submit such as it approves to the Secretary for ballot; shall examine all papers submitted with reference to their fitness for presentation to the Society and for publication, and shall make a general report at each annual meeting. To perform these duties it shall be authorized to appoint Committees of its own members, and to delegate to them such of its powers as it may deem fit; provided, however, that any action of a Committee unfavorable to any Member, or applicant for membership, shall be reported to the whole Board for final action.

(7.) **Temporary Members.**—The Board of Direction may at its discretion admit to the Society, for a term not exceeding one year, members of other Engineering Societies, who are temporarily residing in or near New Orleans, on the payment of annual dues only. Temporary members shall have all rights of Members, except the privilege of voting.

(8.) **Resignation.**—Any Member whose dues have been fully paid for the current year may withdraw from the Society by notifying the Secretary. Any person so resigning his membership may, at the discretion of the Board of Direction, be reinstated without again paying the entrance fee.

(9.) **Forfeiture of Membership.**—(Amended April 8, 1907).—Ten months after the annual meeting, the Secretary shall notify Members who have not paid any dues for the current year that unless the same are paid before the next annual meeting their membership in the Society shall cease; and Members who are in arrears for any part of the dues shall be denied the privilege of voting at the annual meeting, and should same not be paid within sixty days, their membership in the Society shall cease. The Board of Direction may, however, at its discretion, reinstate such persons on the payment of all arrears.

(10.) **Expulsion of Members.**—Upon the written request of five Members (not of the Board of Direction) that for cause stated any Member be expelled, the Board of Direction shall consider the matter, and if it deems best, shall advise the Member that his resignation will be accepted. He shall, however, have the right to demand and receive a copy of the charges against him, and shall have a reasonable time to present a written defense.

The Board of Direction may then pass finally upon the matter; and if the resignation has not been tendered or a satisfactory defense made, may, by an affirmative vote of five of its members, expel the Member, in which case he shall be notified and his name shall be at once dropped from the list of Members; provided, that he shall have the right of appeal to the Society at large.

(11.) **Amendments.**—Any Amendment to the By-Laws may be made by a two-thirds vote at any regular meeting; provided, it has been proposed in writing at a previous regular meeting, and due notice thereof has been sent to each member with the notice of the meeting.

MINUTES OF MEETINGS AND BUSINESS OF THE SOCIETY.

Special Meeting of the Board of Direction, April 5, 1919.

A special meeting of the Board of Direction of the Louisiana Engineering Society was held April 5, 1919, at 1:00 P. M., at the office of Mr. John Riess, Hibernia Bank Building.

Messrs. Olsen, Laws, Burwell, Riess, Klorer and Moses were present. Mr. Moses was appointed temporary Secretary on account of the absence of Mr. Robert.

A notice of the Engineering Council regarding meeting to be held in Chicago on April 23 was read, and also four letters from the Engineering Council asking our representation at the meeting.

Mr. John Riess read an abstract of the program to be carried out at the Chicago meeting, which was followed by discussion.

Upon motion by Mr. Klorer, seconded by Mr. Riess, the following resolution was offered:

"That the Society endorse the meeting of the Engineering Council to be held in Chicago, April 23-26; that the President be authorized to appoint a delegate to this convention, delegate's expenses to be paid by this Society; that a committee appointed by the President draft the proper resolutions to present before the next regular meeting of this Society giving necessary authority to delegates to represent the Louisiana Engineering Society."

The motion was carried and the President appointed Messrs. Klorer and Riess to draft the proper resolutions.

The meeting adjourned.

WALTER B. MOSES,
Acting Secretary.

Regular Meeting of Board of Direction, April 14, 1919.

The meeting was called to order with Mr. John Riess in the chair, and Messrs. Williamson, Barelli, Klorer, Lawes, Moses, Burwell and Robert present.

Forty-nine ballots for new members were opened and as a result, the following men were elected to membership in the Society:

Resident Members—Leonhardt W. Benz, Edward W. Burgis, Marshall G. Finley, Ferdinand G. Hummel, Ferd. L. Larue, Andrew S. Monz, Eugene Unsworth.

Transfer from Junior to Resident Member—Frank L. Holt.

Non-Resident Member—Herman H. Holloway.

A communication from the Association of Commerce relative to a Clean-Up Campaign, was laid on the table.

The status of Mr. Glenn G. Cappel was changed from Resident to Non-Resident Member.

The report of the Secretary was read and received and the bills ordered paid.

Upon motion, the following members were dropped from the roll for non-payment of dues:

There being no further business to come before the meeting, the same was adjourned.

J. M. ROBERT, Secretary.

Regular Meeting of the Society, April 14, 1919.

The meeting was called to order with forty-four members present and Vice-President Riess in the chair. Mr. Olsen came in afterwards and assumed the chair.

Professor J. H. Clo, President of the Academy of Sciences, was granted the floor and explained the campaign the Academy of Sciences is making for the eradication of the Argentine ant in this city. Upon motion, duly seconded and carried, a committee was appointed to draft a suitable resolution.

Mr. Riess then explained that the Board of Direction had discussed the question of the Director of the new Delgado Trade School. Mr. George W. Lawes read the following resolution, which was seconded and adopted by the meeting:

"Whereas, the selection of a Superintendent for the Delgado Trade School is soon to take place;

"Be It Resolved, that it is essential in the opinion of the Louisiana Engineering Society, that this position should be filled by an engineer graduated from some recognized engineering or technical school; and

"Be It Further Resolved, that this resolution be forwarded as a request from this Society to the Board of Commissioners of the Delgado Trade School for its consideration."

The resolution on the Caldwell Bill requiring the endorsement of the Society, was read for the second time, the first reading having been on March 10. Upon motion, duly seconded, the resolution was adopted at the second reading.

With reference to a meeting of the Engineering Council, to be held in Chicago, April 23-25, 1919. Mr. John Riess read the following resolution, which was seconded and adopted:

"Whereas, the Board of Direction, after due deliberation, has accepted the invitation extended by the Engineering Council (joint organization representing the four large technical societies in national affairs), and had selected a delegate to represent the Louisiana Engineering Society at the National Conference of Engineering Societies on the Establishment of a Department of Public Works, to be held in Chicago, April 23-25, 1919;

"Be It Resolved, that the action of the Board is hereby approved and authority is given said delegate to vote as the representative of the Louisiana Engineering Society on all resolutions requisite and necessary to further the movement as launched, together with such other matters of interest to the Engineering profession as may be brought before this conference.

"Be It Further Resolved, that it is the sense of this meeting that our delegate consider himself uninstructed and is requested to vote as his reason will dictate after an open discussion of the matters to be brought before this conference."

Motion to refer a communication from the Michigan City Chamber of Commerce to Professor Gregory was adopted.

Upon motion, duly seconded, the Secretary was instructed to write letters of thanks to Mrs. A. C. Bell, Mrs. W. J. Hardee, and the Local Section A. S. M. E. for offers of additions to our Library.

The technical exercises were then proceeded with and Professor Gregory read a very interesting story of his work in France, entitled "Pumping Machinery Used by the American Army in France."

After the technical exercises, Mr. Riess brought in the following resolution, which was seconded and adopted by the meeting:

"Whereas the New Orleans Academy of Sciences has launched a movement, the purpose of which is to invoke Federal, State and City aid in ridding this section of the Argentine ant;

"Be It Resolved, That the Louisiana Engineering Society voices its approval of the campaign as launched, and promises its co-operation and support, and tenders its services as an organized body in any manner which it might be deemed useful."

There being no further business to come before the meeting, same was adjourned to the usual collation.

J. M. ROBERT, Secretary.

New Orleans' first City Hall overlooked the Place d'Armes, and existed down to 1788, when it was destroyed in the great conflagration of that year. A contract was then made by the municipality with Andrés Almonaster y Rojas—the same who erected the Cathedral—for the erection of a new building on the same site. This structure was completed in 1794, and is that which we know today as the "Cabildo." Like all the public buildings erected in Spanish times, it was very solidly and carefully constructed. The bricks, which are of half the thickness of those ordinarily used today, were laid in shell-lime mortar. This made walls so substantial that, a few years ago, when it was necessary to enlarge one of the rooms, it was only with great difficulty that the old wall was pierced, even with modern steel tools. The stair was of stone, with very easy risers, and, if we may trust an inference from a statement in Mr. Zacharie's paper on the subject, many of the original cypress window and door facing are still in place, hardened by the years almost to the strength of iron.

In Spanish times the building was known as the "Principal." The word "Cabildo," which we now apply to the structure itself, meant originally the Municipal Chapter, or local governing body, created on Don Alejandro O'Reilly, in 1769, when he took over the Province of Louisiana on behalf of the Spanish King, Charles III. This body held its meetings in the "Sala Capitular," or chapter hall. The members were known by titles which sound very quaint in modern ears. There were, first, the "Alcaldes," or judges; then the "Alferez Real," or Royal Standard Bearer, whose duty it was to carry the royal standard at all ceremonies; the "Principal Alcalde Provision," who was judge of offenses committed outside of the city; the "Alguazil Mayor," or chief sheriff, the "Depositary General" the Receiver of Fines, the "Attorney General Syndic" and the "Escribano," or clerk. The Attorney General Syndic did not prosecute; his duty was to prepare or draft the laws. The duty of the "Escribano" was that of secretary to the Cabildo.

These functionaries met around the Council Board, taking their seats in accordance with a very strict order of precedence, as carefully adjusted as if they were in the king's palace in

Madrid, instead of in a tiny colonial town. The duties of these officials included that of visiting the prisons, and these were very conveniently situated for that purpose immediately in the rear of the building, with dungeons, which, it is said, extended out under the gardens of the adjacent Cathedral. The Cabildo met every Friday, as provided in O'Reilly's ordinance. As far as its judicial functions were concerned, the Cabildo was governed in part by the cumbersome regulations of the Council of Indies, and in part by the ordinances set up by O'Reilly. These latter recognized a variety of "fueros," or privileges, granted to various classes in the population. The holders of these "fueros" might demand a trial of their causes either before a military or an ecclesiastical tribunal, as they chose; and thus a privileged class was built up. In addition, persons of noble birth, the military, the municipal and other civil officials, lawyers, physicians, women and certain other individuals were exempted from imprisonment for debt. Blasphemy was, however, punished by cutting out the tongue and confiscating the property of the offender.

The Cabildo building had originally a flat tile roof, surrounded by a balustrade. The arcade of the ground floor was repeated in a sort of loggia on the second floor. In 1851 the present Mansard roof was added, making the building, as Cable pointedly remarks, "more outlandish, but not more beautiful." At this time, also, the arches of the loggia were filled with windows, and the space thus enclosed was cut up into offices. Fortunately, the beautiful wrought iron balconies were preserved, and may still be seen. At the same time the sculptures on the pediment were executed. When the Supreme Court relinquished the use of the building, in 1910, some small changes were made to adapt the structure to the requirements of the State Museum, the historical section of which now occupies the premises. But, on the whole, the building survives unchanged from Spanish times.

Many impressive events have taken place in and around the Cabildo building. The ceremonies connected with the transfer of the Province of Louisiana from Spain to France, and from France to the United States, in 1803, took place in it. The "sala

capitular'' saw the first Protestant church service held in Louisiana. Bishop Chase, in his memoirs, alludes with deep feeling to the sermon which he preached on this occasion. In 1825 Lafayette was lodged here, the rooms being fitted up with furniture and ornaments loaned for the purpose by the leading citizens of New Orleans. When, in 1836, the city was divided into three municipalities, the building became the administrative headquarters of the first municipality. In later years, when it ceased to be used for administrative purposes, the Supreme Court was established here, and many a celebrated trial has been fought out to a dramatic finish by the great lawyers of a past generation in the room where the Louisiana Historical Society now holds its peaceful sessions.

And it has seen its share of hard fighting, too. The stout old walls lend themselves admirably to military purposes. In 1857, when party spirit ran high in New Orleans, and the city was divided into separate armed camps by Know Nothingism, the American Party seized the Cabildo building and held it for some days as a basis of operations and headquarters. The leader on this occasion was Major P. G. T. Beauregard, afterwards famous as a general of the Confederate army. Again, in the bitter contests of Reconstruction Days, the building was the center of a series of riotous occurrences. In 1874, when the citizens revolted against radical misgovernment, a sharp encounter took place in Canal street; when the hated government forces were compelled to retreat to the Cabildo as to a safe fortress. Throughout the night of September 14-15 the embattled people surrounded the building, preparing to attack it early the following morning. Fortunately, a protracted struggle was averted by the surrender of the garrison. In January, 1875, similar scenes were enacted in this historical structure, when the citizens, once more rising against their oppressors, planned to seize the Cabildo as the initial step in a great movement to overthrow the Republican State Government. The government troops held the Cabildo. A furious sally made in the direction of Chartres and St. Peter street brought on a hot fight, in which considerable blood was shed. But the time was not ripe; the movement failed, and Radical government was not brought to an end in Louisiana till

some years later. When General Nicholls was made Governor of Louisiana, and proclaimed from the balcony of the old St. Patrick's Hall that he meant to see the Radical regime brought to an end, a dramatic sequel ensued, which involved the Cabildo building. For among Governor Nicholls' first acts was the appointment of a new Supreme Court. The Chief Justice was Mr. Manning. Escorted by Sheriff Handy, the members of the court proceeded to the Cabildo to install themselves and take up their official duties. Mr. Manning ascended the bench. The "Sala Capitular" was filled with legal notables. The Republican Attorney-General stood at the bar of the court. His armed retainers fill the rest of the building. But outside, in the streets, the people stand waiting for a signal to storm the building and sustain the newly-appointed court. It was a tremendously dramatic scene. But happily the Radical police did not venture to interfere, and the court proceeded quietly to business. It was thanks to its success in securing in this manner control of the legal machinery of the State, that the new Democratic government was put in a position where no process of law from any hostile source might interfere with the administration, as had been the case on a previous memorable occasion.

Since then the old Cabildo building has seen several important occasions, but they have all been of a peaceful kind. Such were the reception to President McKinley, in 1901, and the celebration of the centennial of the cession of Louisiana to the United States, in 1903. It is now rounding out its proper destiny as the State Museum, a depository of the relics of Louisiana history, and is properly in the care of a board of curators appointed by the Governor, thanks to the intelligent management of which the venerable building has in this last incarnation lost nothing of its interesting character.

On the lower side of the Cathedral stands the Presbytery. This building occupies the site selected at the foundation of the city for the use of the Capuchin monks. The first house built for these good priests was a large, plain, wooden building of the plantation type. Naturally, considering the character of its occupants, there is little history connected with this building. It perished in the fire of 1788. A new structure was then

erected by Don Andres Almonaster, under a contract with the city. In 1794 it received under its roof the illustrious Don Luis de Penalvert y Cardenas, the first bishop of New Orleans, who arrived with two canons to take over the spiritual affairs of the town. The building was torn down, and the present structure erected in 1811, by the "marguilliers" of the Cathedral. It was expressly designed to be a court building, and in fact was leased at once for the use of the civil courts. Later on, the property was sold to the municipality for the sum of \$53,000. The courts retained possession down to the year 1910, when they were transferred to a new courthouse building, on Royal street. Their place was taken by the Natural History and Industrial Departments of the State Museum.

In bringing this paper to a close, I am conscious that it sketches very incompletely the history of Jackson Square and its environs. Enough has been said, however, to indicate the claims which the neighborhood has upon remembrance. Whenever a native of New Orleans thinks of the city, it must be with some idea in his mind of that old Square, where so much of the history of the town has been enacted, and of those grave and stately buildings that have looked down so long into those precincts and of the strange events which they have witnessed there.

CONSTITUTION AND BY-LAWS OF THE LOUISIANA ENGINEERING SOCIETY.

(By order of the Board of Direction, the Constitution and By-Laws of the Society are printed here in full.)

PREAMBLE.

The members of the Louisiana Engineering Society, in accordance with their Charter, and for the effectual execution of the design of their institution, do establish and ordain the following Constitution and By-Laws for the government of said Society.

CONSTITUTION.

ARTICLE I.—Objects.

The objects of this Society are, the professional improvement of its members, the encouragement of social intercourse among Engineers and men of practical science, and the advancement of Engineering; and for the promotion of these objects, stated meetings of the Society shall be held, and a library formed for the use of its members.

ARTICLE II.—Membership.

(Amended June 11, 1900; May 13, 1907; April 12, 1909.)

Section 1. The members of this Society shall be designated as Members, Associate Members, Junior Members, and as Honorary Members. Members and Honorary Members elected from the rolls of the Society shall have the right to vote and to hold office.

Sec. 2. A member shall be a Civil, Military, Naval, Mechanical, Mining, Electrical, or other Professional Engineer, a Surveyor, an Architect, or a Marine Architect.

He shall be, at the time of admission to membership, not less than twenty-one years of age, and shall have been in the active practice of his profession for not less than three years. Graduation from a school of Engineering of recognized reputation shall be considered as equivalent to two years active practice. The performance of the duties of a Professor of Engineering in a technical school of a high grade, shall be taken as an equivalent to an equal number of years of active practice.

Sec. 3. An Associate Member shall be a person who, by scientific acquirements or practical experience, has attained a position in his special pursuit qualifying him to co-operate with Engineers in the advancement of professional knowledge and practice, but who is not eligible to membership. He can be transferred to the grade of Member when qualified to become so under Section 2 of this Article.

Sec. 4. A Junior Member shall be not less than eighteen years of age. He shall have had active practice in some branch of Engineering

for at least two years, or he shall have graduated from a school of Engineering of recognized standing. He shall state in his application for membership that he intends to become or to continue to be an Engineer. He shall, after three years, be transferred to the grade of Member if qualified to become so under Section 2 of this Article.

Sec. 5. Honorary Members shall be chosen only from persons of acknowledged eminence in some branch of Engineering or of the Sciences related thereto. There shall not be more than Five Hundred Members at any one time.

ARTICLE III.—Officers.

(Amended March 13, 1899; March 12, 1906; May 11, 1908.)

Section 1. The officers of this Society shall be a President, a Vice-President, a Secretary (who shall also act as a Librarian), a Treasurer and Four Directors, who shall constitute the Board of Direction in which the government of the Society shall be vested, and who shall be the Trustees.

Sec. 2. These shall be elected by letter ballot, by a majority of votes at the annual meeting of the Society, and shall hold office until their successors are qualified. The President shall be ineligible for immediate re-election. A Director shall be elected annually for a term of three years, except at the first election of Directors, when they shall be elected for terms of one, two and three years respectively. The retiring President shall be a member of the Board of Direction for the year following his term as President.

Sec. 3. Any vacancy occasioned by resignation or otherwise shall be filled by the Board of Direction until such time as a letter ballot for such vacancy is taken.

ARTICLE IV.—Management.

Section 1. The President shall have general supervision of the affairs of the Society. He shall preside at meetings of the Society and of the Board of Direction, and shall be ex officio member of all Committees. He shall deliver an address at the annual meeting.

The Vice-President shall preside at meetings in the absence of the President and shall discharge the duties of the President in case of a vacancy in the office.

Sec. 2. The Board of Direction shall manage the affairs of the Society, and shall act upon all applications for membership, take measures to advance the interests of the Society, and generally direct its business. The Board of Direction shall make an annual report at the annual meeting, transmitting the reports of the Secretary, the Treasurer, and of other officers and of Committees.

Sec. 3. The Secretary shall be a member of the Society. He shall issue all proper notices, and shall keep a full record of all the transactions of the Society and of the Board of Direction. He shall also conduct all correspondence appertaining to his office. He shall be custodian of the

property of the Society. He shall acknowledge all donations. He shall issue warrants on the Treasurer for all bills approved by the Board of Direction, and deliver them to the parties to whom they are due; said warrants to be signed by himself and the President. He shall, on the election of any member, inform him thereof in writing. He shall notify the members of all meetings through the public prints or otherwise. He shall perform all other duties which may from time to time be assigned to him by the Board of Direction, and shall be exempt from annual dues during his term of office.

Sec. 4. The Treasurer shall receive all moneys from the Secretary, and shall deposit the same in the name of the Society in such depository as may be selected by the Board of Direction. He shall pay all warrants signed by the Secretary and President when accompanied by the approved bill for the payment of which said warrant has been drawn. He shall make an annual report, and such other reports as may be prescribed by the Board of Direction.

ARTICLE V.—Meetings, Quorum.

Meetings of the Society shall be held at such times as may be prescribed by the By-Laws. The regular meeting on the second Saturday in January shall be the annual meeting for the election of officers and for the hearing of all annual reports. Eight members shall constitute a quorum for the transaction of business.

ARTICLE VI.—Dues.

(Amended May 13, 1907; May 11, 1908.)

The Entrance Fee and Annual Dues shall be as follows:

	Entrance Fee.	Annual Dues.
Resident Members.....	\$10.00	\$12.00
Non-Resident Members.....	10.00	6.00
Resident Associate Members.....	6.00	10.00
Non-Resident Associate Members.....	6.00	5.00
Resident Junior Members.....	3.00	5.00
Non-Resident Junior Members.....	3.00	3.00

The Entrance Fee shall be payable on admission to the Society.

The Annual Dues shall become due for the ensuing year on the first day of January and shall be paid quarterly in advance.

It shall be the duty of the Secretary to notify each member of the amount due for the ensuing year at the time of giving notice of the annual meeting. Persons elected shall be charged with dues beginning with the quarter of the year in which they are elected. A person transferred from one grade to another shall pay the difference in Entrance Fee between the two grades, and his Annual Dues shall be that of the higher grade.

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DOUGLAS ANDERSON, Editor.

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LOUISIANA ENGINEERING SOCIETY

OFFICERS FOR 1919

President, OLE K. OLSEN, 822 Perdido Street.
Vice-President, JOHN RIESS, 503 Hibernia Building.
Secretary, J. M. ROBERT, Tulane University.
Treasurer, WALTER B. MOSES, 636 S. Peters Street.

DIRECTORS.

R. T. BURWELL, 629 Common Street.
C. S. WILLIAMSON, Tulane University.
G. W. LAWES, 213 New Orleans Court Building.
JOHN KLOER, 213 New Orleans Court Building.

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E. Wheeler Carr
B. S. Nelson

On Library

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The headquarters of the Society are in the State Museum
Building, Jackson Square.

All business communications should be addressed to J. M. Robert, Secretary,
P. O. Station 20, New Orleans, La.

PROCEEDINGS OF THE LOUISIANA ENGINEERING SOCIETY

VOL. V

AUGUST, 1919

No. 4

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EDITORIAL NOTES AND COMMENT

Garbage Disposal. At the June meeting of the Society Mr. Willis, City Engineer of New Orleans, presented a very interesting paper upon this subject, treating it, however, from a somewhat broader point of view, that of Refuse Disposal.

This subject has long formed a favorite one for argumentation by both the layman and the engineer. One reads in the daily papers at intervals of some wonderful plant in England in which the refuse of the town is used for fuel and serves to generate the necessary electricity for lighting the whole town; or that such and such a city disposes of its garbage so efficiently as to make a profit out of it rather than an expense. The question very naturally arises as to why New Orleans cannot do something of the same thing. A careful analysis of any of these projects will usually show that they are not so utopian as the newspaper accounts would indicate, and that our local conditions are so very different from theirs as to preclude the adoption of the same schemes here.

This statement, however, is not intended as an excuse nor an attempt to explain away the fact that this city has never had an effective method of disposal of its refuse, the principal portion of which comes under the heading of what one usually understands as *garbage*. It is not an inspiring sight to see our gaudy blue mule carts of the two-wheel variety making their slow way through our most attractive residence streets, at times so overloaded that on almost every block they drop contributions of their delectable cargoes, or leaving behind them a trail of incense rivaling the best (or worst) efforts of our perfume factories over the river, and lacking, as a rule, the tightly fastened canvas cover, which Mr. Willis says have given most satisfactory results in this country. It would almost seem as if in the eyes of our city officials the great virtue of this trinity of negro boy, open cart and patient mule consists in the fact that individually and collectively they are so simple that they never get out of order, and this reduces to a wonderful degree the labors of the official responsible for maintenance of equipment.

The trial given to a special form of closed vehicle for garbage collection and removal in this city a few years ago, and referred to above by Mr. Willis, has always seemed to the writer a rather inadequate one, and the statement that the equipment could not be maintained on account of careless handling by the employees of the department would appear to be an argument in favor of hiring more competent men for this sort of work rather than for scrapping a lot of good equipment. Doubtless the careful housewife who tries to do her part and co-operate with the city in this work often has this same thought when she sees one of these garbage operatives slam her new patent closed-top garbage can to the ground from the top of his cart, and thus render it forever ineffectual by bending it all out of shape. Small wonder she soon gets careless herself and leaves the top off entirely, to the delight of the ubiquitous stray dog and goat, who are really quite important factors in the problem of garbage collection in our city.

It would seem to be feasible to devise a system of collection which would obviate the necessity of transferring the garbage from can to cart in front of the residence. A standard form of

receptacle could be used of such shape that a large number of them could be carried economically on a wagon; when the operator picks up a full receptacle he could at the same time leave a cleaned empty one for the next day. It often happens that the empty cans with portions of the garbage still sticking to them become, in the hot sun, more offensive than the garbage itself. The only additional labor involved in this scheme would be in the cleaning of the receptacles, but the cost of this would be more than compensated for by the gain in sanitary conditions. Here again would crop up the old bugaboo of *maintenance*, but the time has come when New Orleans must get away from the conditions and methods of an overgrown village and realize that in all municipal undertakings of this character the largest part of the problem usually is maintenance.

This is one of the lines along which this Society may be of great assistance in helping to educate not only the people, as Major Shaw points out, but the municipal authorities and officials as well.

As to the disposal of garbage, there are many methods, from the simplest one of dumping into low places or swampy areas, the method now used in New Orleans, to the most complicated and refined methods of incineration, reduction and utilization. The citizens of New Orleans hope some time to see the most practicable of these latter methods applied here. As Mr. Willis points out in his conclusion, it is necessary to have data as to the average character of the refuse content in order to determine what method shall be adopted, and tests are now in progress to secure these data.

Prof. Williamson offers the suggestion that the reduction or utilization of garbage and refuse has never been made a financial success for the reason that very few scientific men or engineers have ever really taken up the problem.

The National Public Works Department. In the June issue of the *Proceedings* we published an account of the conference in Chicago on this important matter. In order that our members may keep informed as to progress being made, we are reprinting

here some information on the subject furnished by the Engineering Council National Service Committee:

Washington, June 25.—Far-reaching changes in the executive machinery of the federal government are proposed in bills introduced in each house of Congress to-day. The federal Department of the Interior will become the Department of Public Works, if the legislation propose is enacted. The main idea is to assemble all engineering activities of the Government in one department.

Such bureaus of the Interior Department as are non-engineering in character are to be placed under the jurisdiction of appropriate departments, while engineering bureaus from other departments are to be included in the Department of Public Works. The bill proposes that the Patent Office is to be removed from the Interior Department and placed under the Department of Commerce. The Bureau of Pensions is assigned to the Department of the Treasury. The Bureau of Education goes to the Labor Department. The Bureau of Indian Affairs also is transferred to the Department of Labor, with the proviso that the engineering and construction work and the land and mineral surveys now performed under the direction of the Bureau of Indian Affairs are to be prosecuted under the Department of Public Works. St. Elizabeth's Hospital and the Freedman's Hospital in this city are assigned to the Treasury Department. Columbia Institution for the Deaf and the Howard University go to the Bureau of Education, under the provisions of the bill.

On the other hand, the Department of Public Works is slated to absorb the Supervising Architect's Office of the Treasury Department; the Construction Division, River and Harbor Improvement, Mississippi River Commission, and California Debris Commission of the War Department; the Bureau of Standards and the Coast and Geodetic Survey of the Department of Com-

merce; the Bureau of Public Roads and the Forest Service of the Department of Agriculture.

The bill provides that the Secretary of Public Works "shall by training and experience be qualified to administer the affairs of the Department and to evaluate the technical principles and operations involved in the work thereof." The measure excepts from the foregoing provision the Cabinet officer who is at the head of the Department at the time of the passage of the bill.

Four Assistant Secretaries, each to be paid \$7,500 per annum, are provided and their duties outlined. One Assistant Secretary is to have administrative jurisdiction over all matters of engineering design and construction. Another is to have charge of architectural design and construction. The third is to have jurisdiction over all scientific work and surveys, while the fourth Assistant Secretary is to be in immediate charge of all land and legal matters. The Assistant Secretaries are charged with the duty of co-ordinating and bringing into efficient relationship all the activities of the department so that it may be harmoniously and efficiently administered.

An important feature of the bill is the proviso: that engineer officers of the U. S. Army detailed on non-military work are to be assigned by the Secretary of War to like duties under the new department, for not over two years. This enables the Secretary of Public Works to make gradual transfer of improvements and instrumentalities to civil administration without detriment to public interest. Members of the Corps of Engineers may, under the direction of the Secretary of Public Works, be detailed by the Secretary of War to temporary duty in the new department for such instruction, training and experience as is desired.

The bill, which was introduced in the upper House by Senator Wesley L. Jones, of Washington, and in the lower House by Representative Frank C. Reavis, of Nebraska, follows:

A BILL
TO CREATE A DEPARTMENT OF PUBLIC
WORKS AND DEFINE ITS POWERS
AND DUTIES

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled:

SECTION 1. That the name of the executive department now designated as "Department of the Interior" be changed to the name "Department of Public Works," and that the head thereof shall continue to be a member of the Cabinet under the official designation "Secretary of Public Works," to be chosen and confirmed as in such case now provided by law, except that when the present occupant shall vacate that office all subsequent occupants shall by training and experience be qualified to administer the affairs of the Department and to evaluate the technical principles and operations involved in the work thereof.

SECTION 2. That all the powers, functions and duties, executive and administrative staff, personnel and property, and all bureaus and other instrumentalities now vested in, a part of, or belonging or subordinate to, the Department of the Interior, be in like manner and to the same extent continued in the Department of Public Works, except as hereinafter provided.

SECTION 3. That the following bureaus and other instrumentalities now subordinate to the Department of the Interior shall, with all their functions, personnel and property and all boards, commissions or agencies pertaining thereto, be transferred as herein specified:

A. The Patent Office to the Department of Commerce:

B. The Bureau of Pensions to the Department of the Treasury.

C. The Bureau of Education to the Department of Labor.

D. The Bureau of Indian Affairs and the Board of Indian Commissioners to the Department of Labor, PROVIDED; That the engineering and construction work and the land and mineral surveys now performed by, or under the direction of, the Bureau of Indian Affairs shall be prosecuted under the Department of Public Works.

E. The St. Elizabeth's Hospital and the Freedman's Hospital, to the Public Health Service, Department of the Treasury.

F. The Columbia Institution for the Deaf and the Howard University, to the Bureau of Education, Department of Labor.

SECTION 4. That the following bureaus and other instrumentalities now subordinate to the departments in each case designated, with all their functions, personnel and property, and all boards, commissions or agencies pertaining thereto be transferred to the Department of Public Works:

A. The Supervising Architects' Office, now subordinate to the Department of the Treasury.

B. The Construction Division of the United States Army, River and Harbor Improvements, the Mississippi River Commission and the California Debris Commission, now subordinate to the Department of War: PROVIDED; That the engineer officers of the United States Army detailed to the non-military duties having to do with River and Harbor Improvements, the Mississippi River Commission, and the California Debris Commission, shall be detailed by the Secretary of War to like duties under the Department of Public Works for such period, not exceeding two years, as the Secretary of Public Works may find necessary to make gradual transfer of said improvements and instrumentalities to civil administration without detriment to the public interest; that upon such transfer to civil administration, said engineer officers of the United States Army shall be returned to military duties, and PROVIDED

FURTHER; That for the purpose of acquiring instruction, training and experience, members of the Corps of Engineers, United States Army may, with the consent and approval of the Secretary of Public Works, be detailed by the Secretary of War for temporary duty under the Department of Public Works, and shall be assigned by the Secretary of Public Works to such duties as may be deemed best adapted to the purposes of such detail.

C. The Coast and Geodetic Survey, and the Bureau of Standards, now subordinate to the Department of Commerce.

D. The Bureau of Public Roads and the Forest Service, now subordinate to the Department of Agriculture.

SECTION 5. That all officers of the United States Army attached to the Department of Public Work shall retain their military rank and succession and receive the compensation, commutation and emoluments provided by law in the case of Army officers of the same rank not detached from regular army service.

SECTION 6. That pending further action by Congress all personnel, appointments, tenure and compensation under the Department of Public Works shall, except as otherwise provided herein, continue under the laws now in force in the several bureaus and other instrumentalities retained in or transferred to said department under this Act.

SECTION 7. That there shall be four Assistant Secretaries of Public Works appointed by the President with the advice and consent of the Senate, each of whom shall be specially qualified by training and experience for the particular services over which he may have jurisdiction, and who shall be removed from office only for inefficiency and for conduct detrimental to the service, on charges duly made and adjudicated in accordance with law in such case provided, or for age or physical or mental impairment, and that each of said

Assistant Secretaries shall be paid a compensation of \$7,500 per annum; that said Assistant Secretaries of Public Works shall be included within the scope of any civil service retirement laws now or hereafter enacted by Congress and the regulations thereunder; that one Assistant Secretary shall have administrative jurisdiction over all matters of engineering design and construction by whatever bureau or other instrumentality of the Department performed; that one Assistant Secretary shall have administrative jurisdiction over all architectural work and construction, by whatever bureau or other instrumentality of the Department performed; that one Assistant Secretary shall have administrative jurisdiction over all scientific work and surveys, by whatever bureau or other instrumentality of the Department performed; that one Assistant Secretary shall have administrative jurisdiction over all land and legal matters, by whatever bureau or other instrumentality of the Department performed; that said four Assistant Secretaries shall, under the direction of the Secretary of Public Works, co-ordinate and bring into efficient relation all of the functions included in this section to the end that the work of the Department shall be harmoniously and most economically performed and administered.

SECTION 8. That all acts or parts of acts inconsistent with the terms of this Act are hereby repealed, and the Secretary of Public Works is authorized to perform any and all such acts and to make such rules and regulations as may be necessary and proper for the purpose of carrying the provisions of this Act into full force and effect.

Removal of Car Tracks From St. Charles Street. On its final reading the motion offered by Mr. W. T. Hogg was unanimously passed and the Louisiana Engineering Society placed itself upon record as favoring the removal of the street railway tracks from St. Charles Street and also from either Magazine or

Tchoupitoulas Street, so that one of the latter could be used for heavy trucking and the former for light traffic.

At the last meeting a member of the firm of Beekman & Co. appeared before the Society, representing the merchants of St. Charles Street, and made an urgent protest against any action looking to the removal of the tracks from that street. It was pointed out to him, however, that the Louisiana Engineering Society was not an organization of the same sort as the Association of Commerce, but that its interest in the problem was a purely technical one, and from the engineering point of view St. Charles Street was the only logical one to convert into a street for vehicular traffic alone. It is to be hoped that the Mayor and Commission Council will soon take this question up actively and have passed the necessary ordinances providing for the removal of the tracks. All parties, with the exception of the merchants on the street, seem to agree that it is the proper thing to do and should be done promptly. The statement has been made that all the property *owners* are against the move, but this has also been denied on the other hand.

This question is simply another illustration of the fact that New Orleans is outgrowing its big village ideas and must adopt the progressive and aggressive methods of the large city which it is destined to be.

PAPERS AND DISCUSSIONS

REFUSE DISPOSAL.

By THOMAS L. WILLIS, City Engineer.

Read before the Society, June 9, 1919.

The subject assigned to me was "Garbage Disposal," but I have taken the liberty of changing the title to "Refuse Disposal," for the reason that we consider garbage as one of the classes of refuse rather than the combination of the various classes, and I understood that this paper was to cover the matter of municipal waste or city refuse disposal.

The problem of collecting and disposing of the waste materials of large cities is clearly a complicated one. It involves the removal daily of many tons of matter which has been discarded by the individual as worthless and which quickly becomes offensive unless disposed of promptly. The average garbage can contains materials of all sorts, varying in character from day to day and season to season, and usually charged with a large amount of water, which must be removed before it can be satisfactorily treated. Any value that it may possess depends upon its being susceptible to treatment on a large scale and in an economical manner.

It has only been during recent years that a serious attempt has been made to study this subject and to work out practicable methods of solution from both the sanitary and economical points of view. In small cities and communities, where there is little crowding of population and the sanitary requirements are not stringent, the problem is not difficult, but with the concentration of a large number of people within limited areas and the resulting increase in waste production, the necessity for conservation of valuable by-products and a more rigid enforcement of the needs of sanitation makes the problem much more complex. While it must be recognized that the adoption of a waste disposal system embraces economic questions of considerable importance to the community, still the true measure of effective waste disposal should not be in the financial gains to be realized, but rather in the more important returns of civic cleanli-

ness and improved public health. The objections to refuse disposal plants which are so common in many cities can usually be traced to a disregard of the principles which make odorless and sanitary disposal possible. As a result the mere rumor that disposal plants are to be placed on certain sites is sufficient to arouse a storm of protests, and any definite attempt to locate plants on any particular site usually leads to lawsuits and injunction proceedings. It is not likely that this natural prejudice against a very unsavory article will ever be entirely overcome, but the unusual amount of attention now being devoted to ways and means of disposing of city refuse and the increasing tendency to give more careful study to city sanitation and cleaning has resulted in some progressive development which removes the greatest objection to plants of this kind.

The first steps towards a modern means of refuse disposal appear to have been taken by England, where destruction by fire was accepted as the best method. The high temperature necessary to destroy the waste organic matter in a sanitary and inoffensive way offered the further possibility of utilizing the heat for steam production. This practice was later followed in many American cities with varying degrees of success, but it was generally recognized that our refuse contained much material of value, and American cities, as a rule, have been inclined to favor methods which would afford an opportunity to recover these valuable by-products.

This led to the installation of reduction plants and hog farms for the disposal of organic waste, usually by private companies, but in some instances municipalities found the business profitable where conditions were favorable and markets close at hand. Reduction and feeding, however, left all the other kinds of refuse still unprovided for, and other means had to be devised for their disposition. This resulted in the utilization plant to recover the economic value in rubbish by sorting, and the destruction of unsalable material by incineration. At the present time all of these systems, as well as burial and dumping, are in use in this country, and in many places the various methods are combined with good results.

In order to arrive at the best means of disposal for any community, a study must be made of the conditions found in that

particular locality and the subject treated from both the hygienic and economic viewpoints. Consideration must be given to each class of waste as to its liability to cause nuisance and transmit disease and practicable methods must be worked out for its collection and disposal in the most efficient and economical method.

Municipal refuse usually includes about seven different classes of waste, which may be briefly described as follows:

Garbage consists of rejected animal and vegetable matter and comes largely from homes, restaurants, hotels and markets. It is a form of waste which easily ferments and quickly becomes offensive, if not properly handled. Its commercial worth is dependent upon its value as a food for hogs, its oil and grease content and the value of the residue for use as a fertilizer base. The amount of grease in garbage varies from one to four per cent by weight of raw garbage, probably averaging in normal times about three per cent in the United States. In Europe, where conservation has been developed to a greater degree, it rarely exceeds one per cent. A representative average analysis in Eastern and Northern cities under normal conditions is about as follows:

Moisture	70%
Tankage (fertilizer)	20%
Grease	3%
Bones	2%
Rubbish	5%

Rubbish is made up principally of inorganic materials such as wood, rags, paper, metals, bottles, straw, sweepings and trade waste. If collected separately from garbage it is usually dry, bulky, and contains a high percentage of combustible matter. It usually contains many articles of value, provided those articles are sorted and properly prepared for the market. It has been the custom in many large cities to allow the picking over of rubbish dumps from which salable articles have been collected and no doubt sold at a profit. In fact, a number of large cities in this country and abroad have found it profitable to install plants for the recovery of the value in rubbish.

Ashes usually form a large part of the waste of municipalities in the northern climates, and the unburned coal contained

in them is often an important factor in determining the best system of waste disposal. In the southern climates, and particularly in cities where gas is used as a fuel, ashes are of no great consequence. They probably constitute less than ten per cent of the total refuse collected and the small amount of unburned coal is of little value. This estimate does not include power plant ashes, which are usually disposed of by the plant producing them.

Dead Animals, when removed by the municipality, are usually classed as garbage and treated in the same manner. Their value lies in the recovery of grease, hides, bones and tannage. The high percentage of grease and bone and the commercial value of certain kinds of hides, make dead animals particularly desirable to a reduction process.

Manure also constitutes but a small percentage of the total waste of a city, and on account of the demand for fertilizer at the present time, is readily disposed of for that purpose.

Street Sweepings and *Night Soil* must also be included as an essential part of the refuse of a large city, but the methods for the disposal of both of these materials are fairly well established. Street sweepings are usually dumped in low places as filling, and night soil is discharged into the sewers and disposed of in the same manner as regular sewage.

Municipalities are also called upon to provide means for the disposal of trade waste, which includes paper, sweepings, boxes, and similar articles from stores and shops, metal and leather clippings from factories, and such other waste materials as may result from the business operation of a city. Where the amount of trade waste is large, the producer is usually required to deliver the material to the disposal plant, where it is classified as rubbish and treated in the same manner as household waste.

COLLECTION.

One of the most important tasks in caring for the waste of a large city is collection and transportation.

In the majority of European cities where modern equipment has been installed, the vehicles are so constructed as to require the loading of the refuse from the garbage can into the collec-

ing grease, tankage, etc., the material which is to be collected at longer intervals may be taken to less expensive plants, which may be located in various parts of the city, thus securing economy in collection. This material, which for convenience will be called trash, will not create a nuisance in unloading, and if high temperature incinerators are used, there should be no nuisance resulting from the burning. The "trash" would have a higher fuel value and it is probable that it could be burned with little, if any, additional fuel.

There is a great deal of popular literature written on the subject of garbage disposal. This often refers to a certain plant in New York City where the disposal of refuse is by incineration. This plant produces a great deal of power, which suffices for operating and lighting the plant, and even for lighting one of the principal bridges across the river. People wonder why that cannot be done in other places.

It is in just such things as that that such an organization as ours can prevent some fool enthusiast from trying to put something over. That particular plant is located right in the heart of the downtown section of the city and the waste is very largely composed of paper and other combustible material, with a very small percentage of vegetable and animal waste. It has no bearing whatever on a city of this nature.

We have an especially difficult problem here in the collection of garbage. I don't know of a city where the cost of collection per ton is higher than here in New Orleans. We cover a very large area per capita and we have not the improved streets that many other cities have, and we must expect a high cost of collection.

Mention was made of the increase in value which is placed on tankage resulting from the reduction plants. That result is partly from education and partly from a difference in the nature of the product. The modern method of treatment, as the paper stated, is securing a larger percentage of grease. Anyone who has used fertilizers or has studied the question of fertilization, knows that grease worked into the soil is harmful to plant life. As the fertilizing value of tankage at its best is not particularly high, it is not strange that its use was limited before modern methods for grease extraction were developed.

MINUTES OF MEETINGS AND BUSINESS OF THE SOCIETY.

Regular Meeting of the Board of Direction, May 12, 1919.

Meeting was called to order with President Olsen in the chair and the following members present: Messrs. Williamson, Klorer, Lawes, Riess, Moses, Robert.

The following applications were ordered to the ballot subject to the approval of the Membership Committee: Messrs. Arthur H. Brown, Robert Morrison, Solomon Finkelstein, Floyd Hamilton.

Upon motion, duly seconded, Mr. was dropped for non-payment of dues. Messrs and were held over pending a further attempt to collect their dues.

A letter from the Bureau of Education of the Department of the Interior was referred to Mr. F. P. Hamilton, chairman of the Professional Welfare Committee.

The financial report of the Secretary was read and bills ordered paid.

There being no further business to come before the meeting, the same was adjourned.

JAMES M. ROBERT, Secretary.

Regular Meeting of the Society, May 12, 1919.

The regular meeting of the Society was called to order with President Olsen in the chair and 31 members and guests present. The minutes of the previous meeting were read and approved.

A letter from a committee of the Engineering Societies in New York was read to the meeting and referred to the Professional Welfare Committee, as was also a letter from the Department of the Interior, Bureau of Education.

A report from Major Gregory was heard concerning his visit to the meeting of the Engineering Council in Chicago. This report was very interesting.

The technical exercises were then proceeded with, and Professor John S. Kendall, of Tulane University, gave a most interesting talk on the History of Jackson Square. A few questions were asked at the close of the talk, and upon motion Professor Kendall was tendered a vote of thanks.

Mr. W. T. Hogg introduced the following resolutions requiring the indorsement of the Society:

“Whereas, the steady development of our port, and our manufacturing and commercial establishments, is creating more and more congestion in the movement of vehicles over the streets of the crowded commercial district; and,

Whereas, the thoughtless development of our present street railway lines has left not a single street free for vehicular traffic to move in and out of the commercial sections above Canal street;

Be It Resolved, That the Louisiana Engineering Society deems it imperative to the future growth of our city that at least two streets leading up or west from Canal street be freed from street railway tracks, and be reconstructed, one for the concentration of light, pleasure vehicular traffic, and the other for heavy commercial truckage.

Be It Further Resolved, That St. Charles street, the logical connecting link between the St. Charles avenue and Canal street boulevards, be devoted to pleasure vehicular traffic, and Magazine or Tchoupitoulas street, to heavy commercial truckage."

The motion was carried at this meeting to introduce these resolutions, and, according to the rules of the Society, must again be put to a two-thirds vote of those at the next meeting before being finally adopted.

There being no further business to come before the meeting, the same was adjourned to the usual collation.

JAMES M. ROBERT, Secretary.

Regular Meeting of the Board of Direction, June 9, 1919.

The meeting was called to order with President Klorer in the chair and the following present: Messrs. Burwell, Klorer, Moses, Riess, Williamson, Robert.

Ballots for new members were opened. There were 64 formal ballots, 1 scratched, and one with a question mark on it. As a result of this ballot, the following were elected to the respective grades of membership:

RESIDENT MEMBERS—Arthur H. Brown, Robert Faget.

TRANSFER FROM STUDENT TO RESIDENT—Earle Albert Berry, Shirley C. Braselman, Allan L. Wolff.

NON-RESIDENT MEMBERS—Robert Morrison, Floyd Hamilton, Thomas Baker Smith.

TRANSFER FROM NON-RESIDENT JUNIOR TO NON-RESIDENT—William F. Eblen.

ASSOCIATE MEMBER—Albert A. Keither.

JUNIOR MEMBERS—Solomon Finkelstein, Alex H. McComiskey, Jr.

TRANSFER FROM STUDENT TO JUNIOR MEMBER—Charles J. Wyler.

Upon motion it was decided to change the status of Mr. John H. O'Neill from RESIDENT to NON-RESIDENT, if he so desires.

The application of Mr. Andrew W. Jackman was ordered to the ballot, provided it is approved by the Membership Committee.

A communication from the Chairman of the Library Committee was read, but no action was taken.

There being no further business, the meeting was adjourned.

JAMES M. ROBERT, Secretary.

Regular Meeting of the Society, June 9, 1919.

The meeting was called to order with President Olsen in the chair and 40 members and guests present. The minutes of the previous meeting were read and approved. Upon motion, duly seconded and carried, the matter of an outing, somewhat on the order of a picnic, was referred to the Outing Committee.

Upon motion of Mr. John Klorer, duly seconded, the President is to appoint a committee of three members to ascertain if it is advantageous for the Society to affiliate with the American Society of Engineers, and to report at the next regular meeting.

Upon motion, duly seconded, it was decided to take the summer recess during July and August.

The technical exercises of the evening consisted of a paper on "Refuse Disposal," by Mr. T. S. Willis, City Engineer. The paper and the ensuing discussion were very interesting.

A letter from Mr. Peyton W. Wood, concerning the street railway situation, was read and received by the meeting.

There being no further business, the meeting adjourned to the usual collation.

JAMES M. ROBERT, Secretary.

Special Meeting of the Society, June 16, 1919.

The meeting was called to order with President Olsen in the chair and 34 members present. This meeting was called for the purpose of considering the following resolution and amendment thereto with a view of endorsing one:

Resolution by Mr. W. T. Hogg:

"Whereas, the steady development of our port, and our manufacturing and commercial establishments, is creating more and more congestion in the movement of vehicles over the streets of the crowded commercial districts; and

Whereas, the thoughtless development of our present street railway lines has left not a single street free for vehicular traffic to move in and out of the commercial section above Canal street.

Be It Resolved, That the Louisiana Engineering Society deems it imperative to the future growth of our city that at least two streets leading up or west from Canal street be freed from street railway tracks, and be reconstructed, one for the concentration of light, pleasure vehicular traffic, and the other for heavy commercial truckage.

Be It Further Resolved, That St. Charles street, the logical connecting link between the St. Charles avenue and Canal street boulevards, be devoted to pleasure vehicular traffic, and Magazine or Tchoupitoulas street, to heavy commercial truckage."

Amendment Offered by Mr. H. J. Malochee:

"Whereas, the steady development of our port and our manufacturing and commercial establishments is creating more and more congestion in the movement of vehicles over the streets of the commercial district; and,

“Whereas, the development of our street railway system, under the competitive system, has placed double tracks on these streets, fostering traffic in both directions and causing serious congestion as well as great danger to life and limb; and,

“Whereas, these conditions allow and foster the parking of both private and public vehicles on either side of the street, causing further congestion;

Be It Resolved, That the Louisiana Engineering Society deems it imperative that all streets from Camp street to Rampart street, both inclusive, should be reconstructed and made one-way streets, following generally the successful system established below and partially above Canal street; and,

Be It Further Resolved, That the one-way system should be extended to all cross streets between Canal street and Howard avenue, with the possible exception of Poydras street.

Be It Further Resolved, That Magazine or Tchoupitoulas street be reserved for heavy trucking to the exclusion of all other traffic.

There was considerable discussion which lasted until a late hour. When finally a vote was taken the amendment was lost by a vote of 3 to 12. The original resolution of Mr. Hogg was then adopted with a vote of 12 to 3.

There being no further business to come before the meeting, the same was adjourned to the usual collation.

JAMES M. ROBERT, Secretary.

Recent Additions to the Library.

Engineers' Handbook—Reed.
Civil Engineering—Mahan.
Flow of Water—Kutter.
Floating School—McAllister.
Elevators—Fallings.
Building and Flying an Aeroplane—Hayward.
Machinery's Handbook.
Roads and Pavements—Spalding.
Handbook for Superintendents of Construction—Richey.
Engineer's Pocketbook of Reinforced Concrete—Heidenreich.
Handbook for Heating and Ventilating Engineers—Hoffman.
Mechanical Engineers' Pocketbook—Marsh.
Diesel Engines—Chalkley.
Naval Architecture—Attwood.
Shipbuilding Made Easy—Rogers.
Civil Engineers' Handbook—Trautwine.
Concrete—Trautwine.
Steam Boiler Economy—Kent.
Architects' and Builders' Handbook—Kidder.
Compressed Air Plant.—Peele.
Mining Engineers' Handbook—Peele.

Handbook of Logging—Bryant.
 Machinery Pattern Making—Dingey.
 Architectural Engineering—Freitag.
 Fire Prevention—Freitag.
 Fireproofing of Steel Buildings—Freitag.
 De-Pontibus—Waddell.
 The Law of Contracts—Wait.
 Methods of Textile Chemistry—Dannerth.
 Steel and Its Heat Treatment—Bullens.
 Mechanics of Internal Work—Church.
 Hydraulic Tables—Williams & Hazen.
 Pumping by Compressed Air—Ivens.
 Handbook of Hydraulics—King.
 Reinforced Concrete Design Tables—Thomas and Nichols.
 Practical Ship Production—Carmichael.
 Elements of Wood Ship Construction—Curtis.
 Relief From Floods—Alvord.
 Public Utility Rates—Barker.
 American Engineers Behind the Battle Line of France—Tomlin.
 Railway Estimates—Lavis.
 Handbook of Rock Excavation—Gillette.
 Business Law for Engineers—Allen.
 Highway Engineers' Handbook—Harger & Bonney.
 Hydraulics—Daugherty.
 Passenger Terminals and Trains—Droege.
 Wood and Other Organic Structural Materials—Snow.
 Handbook of Cost Data—Gillette.
 Sound, Light, Electricity and Magnetism—Ballantyne.
 Electricity and Magnetism for Engineers—Pender.
 Modern Shipbuilding Terms Defined—Pease.
 Industrial Good Will—Commons.
 Office Administration—Schulze.
 General Lectures on Electrical Engineering—Steinmetz.

Pamphlets.

Calculation of Flow in Open Channels—Houk.

tion vehicle without exposure of the contents. These refined methods are desirable and should be adopted where practicable, but vehicles of this kind are usually quite complicated and it is generally decided that the advantages gained are more than offset by the difficulty of maintaining them in good condition. The careless manner in which equipment of this kind is usually handled by inexperienced workmen makes it necessary to use a collection vehicle of substantial construction and as free as possible from mechanical complications. In climates where the percentage of ashes and dust is small is is not likely that exposure of the refuse while loading will prove objectionable, particularly if reasonable care is exercised. It is important, however, that some provision be made to cover the load while in process of collection and during its transportation through the streets, and experience in this country seems to indicate that a canvas cover well fastened gives the most satisfactory results.

Domestic or household waste consists largely of garbage and rubbish and may be collected separately or together, as the method of final disposal may require. Where destruction by incineration is in use, a mixed collection is most desirable, since the rubbish and ashes tend to envelop the more offensive matter and assist materially in its destruction. This mixed collection also has an advantage in that it requires only one type of collection vehicle and one receptacle, and requires less care on the part of the housewife. While there is no great difference in the cost of a mixed and separate collection, it is generally conceded that a mixed collection is the cheapest. It is also the easiest and therefore the most popular.

METHODS OF DISPOSAL.

There are at the present time about six well-defined methods by which all of the various classes of refuse may be safely treated: Dumping on Low Lands, Burial, Feeding, Incineration, Reduction, and Utilization.

Probably the oldest and no doubt the most common of these methods is dumping in low lands as filling. This means of disposal is the easiest and cheapest of the various methods, and often results in the building up of large areas of low lands which could not be economically reclaimed in other ways. But

the practice of dumping all classes of waste, including garbage, cannot be endorsed as being sanitary, unless the entire mass is covered with earth in such a way as to prevent the breeding of flies and the escape of objectionable matter. This is often impracticable and usually increases the cost to a point where disposal in this way is not feasible.

Burial is best adapted to the disposal of garbage and street sweepings. When garbage is buried in shallow trenches or plowed under in thin layers, it will disintegrate and be taken up by the soil, and after three or four years will show no resemblance to its original state. This method, if properly carried out, cannot be considered unsanitary, but usually requires more land than can readily be devoted to that purpose.

FEEDING.

Feeding garbage to hogs is also a common method of disposal. It had the endorsement of the U. S. Food Administration, and the high price of pork at this time makes the use of garbage for feeding purposes unusually attractive. It was recently stated at a meeting called by the U. S. Food Administration in Chicago that it costs approximately \$2.30 per ton to dispose of garbage by feeding, and that each ton of garbage yielded \$7.96 worth of pork, leaving a net value of \$5.66 per ton. It was also stated that 25 pounds of hotel or restaurant garbage will make a pound of pork, making the garbage worth about \$12.80 per ton. If the garbage is collected daily, properly separated and fed while fresh, there can be no reasonable objection to this method, but unless a very careful separation is made, extraneous matter, which is injurious for feeding, may be put in the garbage can and finally reach the hog farm. Coffee grounds, broken glass, lye, soap, washing powders, dish water, paper, rags, sweepings, ashes and similar wastes are injurious to hogs, and yet it is almost impossible to keep the garbage entirely free from these materials.

There is much to be said on this subject and it is possible that the conversion of garbage into pork will become quite common when more is known about the best methods of feeding, selecting and housing hogs fed in this manner. It is generally admitted, however, that the feeding of garbage requires very

careful attention both for protection of the animals and to prevent the farm from becoming a nuisance.

INCINERATION.

Incineration, or destruction by fire, usually forms an important part of any modern disposal system, and is probably the method which gives the best assurance of the destruction of all disease germs and of all organic matter which might be subject to decomposition. It has the advantage over other methods in that the different classes of waste can be disposed of by one process, thus allowing a mixed collection. Incineration seems to give the best results in cities where the refuse contains a large percentage of ashes. Ashes usually contain a considerable amount of unburned coal, which not only tends to improve burning conditions by preventing matting of the waste, but adds materially to its fuel value.

The difficulties of burning garbage and miscellaneous waste without offense and without undue expense are apparent. It is needless to say that many different types of furnaces have been devised and a vast amount of labor has been put into the design and construction of refuse furnaces in an endeavor to meet the many requirements for burning this class of material. It is well known that to burn any solid fuel properly there must be certain relations between the size of the openings in the grate upon which the burning is done, the depth of the fuel on the grate, the kind of fuel, the draft required at the grate, and the size of the flue opening. To burn a gaseous fuel, similar relations arise. In the design of a furnace for the burning of refuse, conditions arising from the burning of both solid and gaseous fuel must be met in the most pronounced form. Garbage is not in condition to burn until the water it contains has been evaporated or otherwise removed. It contains a large amount of volatile matter which is distilled off in the drying process and which may become offensive unless consumed at a very high temperature. To be successful, a furnace for the destruction of refuse must meet the following requirements:

1. Be so designed that the mass of waste materials can be prepared for burning by the removal of the moisture either by

preliminary drying before burning or by the evaporation of the moisture during the burning process.

2. Raise all products of distillation, including evaporated water and air introduced into the furnace in the process of feeding and stoking, to a temperature that will prevent the escape of objectionable odors in the chimney gases. This is usually fixed at not less than 1000 to 1200 degrees F.

3. Completely destroy and reduce to an innocuous clinker all materials of a combustible nature.

4. Be so constructed that the continued introduction of wet materials upon a hot grate will not result in excessive repairs.

5. Be as free as possible from mechanical complications and not require an excessive amount of labor for its operation.

A wide difference of opinion as to how these requirements could best be met has resulted in the development of three distinct types of furnaces, the crematory, the incinerator, and the high temperature destructor. The crematory, which is simple in design, consists usually of a brick furnace of the Dutch oven type, with or without a combustion chamber as the designer deems best. The waste materials are usually dumped directly on the burning grate, and the effectiveness of the burning operation is dependent to a great extent upon the care with which the material is introduced into the furnace and the manner in which it is stoked. It is not customary in this type of furnace to provide either induced or forced draft fans, although preheated air is sometimes supplied to the grates by other means. There is usually quite a wide variation in temperature during the burning process, depending on the character of the refuse and the method of operation. No attempt is made to utilize the escaping heat for the generation of steam, and the only by-product is the clinker, which usually amounts to about twenty-five per cent of the material consumed.

The incinerator is usually somewhat more complicated in design and the use of forced and induced draft and preheated air is quite common. Most furnaces of this type are equipped with combustion chambers where obnoxious gases are collected and burned, and where there is likely to be any difficulty in maintaining sufficiently high temperature, provision is made for

auxiliary fires in the combustion chamber. On account of the higher and more uniform temperature, the gases may be utilized for the production of steam, which oftentimes provides enough power for operating forced and induced draft fans and for the generation of electricity for light and power in the plant.

The high temperature destructor is usually quite elaborate in design and by the use of various appliances for the control of charging, stoking and draft, very high temperatures can be secured. This type of furnace probably offers the best opportunity for the production of steam for commercial use, but where this value is to be recovered the location of the plant should be convenient for the reception of the refuse and for the sale or delivery of surplus steam to a plant capable of using it to advantage. Charging and clinkering are usually done by mechanical means, but in some plants of recent design, feeding by hand, similar to firing a coal furnace, has been adopted as the most practicable. These furnaces are built with both the continuous and the cellular grate, the preference seeming to be on the side of the continuous grate, on account of the manifest advantage of a continuous fire in the destruction of a material having a very low fuel value.

REDUCTION.

Reduction has as its basis the breaking down of the organic matter in the garbage by cooking, or other treatment, and the extraction of the grease and oil by the means of solvents. It embraces three fundamental steps: the removal of water, the separation of the grease and oils from the remaining mass, and the recovery and treatment of the tankage or fertilizer. The first step, the removal of moisture, would be quite simple if it were not for the fact that water in garbage is retained in both mechanical and chemical combination. Mechanically combined water can be squeezed out under pressure, or by centrifugal force, but when chemically combined, it does not readily yield to those processes unless released from its chemical affiliation by changing the chemical nature of the solid.

After the moisture has been removed, the grease and oils are extracted by means of solvents and the residue, or tankage, prepared for use as a fertilizer by screening and grinding.

The development of reduction processes has been gradual, and, in its first stages, no attempt was made to use the tankage as its value as a fertilizer had not been established. The object at this time was to recover only the grease freed by pressure in a manner similar to that used by rendering plants. This resulted in the loss of considerable grease which had not been released from the tankage by the pressing operation. As the demand for grease increased and the value of the tankage became apparent, a desire for more complete extraction of the oils followed. Drying of the tankage by means of heat was then added to the operation, and the remaining grease extracted by percolating a solvent through the dried mass. In many plants, the carrying out of these various steps, oftentimes in a very crude way, and with inadequate and improperly designed equipment, was inefficient and wasteful and offered every opportunity for the escape of odors. In fact, while it is generally admitted that the operation of reduction and rendering plants in a sanitary and inoffensive way is possible, still, as a business proposition, it does not pay to be too particular about odors.

The various solutions offered for the many problems which present themselves in the garbage reduction industry, have resulted in the development of three fairly well defined processes: the Digester process, the direct Drying process, and the Dehydrating process. In general these processes are similar, but in the details of operation, are quite different.

THE DIGESTOR PROCESS.

The Digester system proceeds at once to break down the complex organic solids by cooking. The raw garbage is placed in tanks or digestors, where it is subjected to steam under pressure, for a period of from 6 to 10 hours, depending upon the character of the material. The cooking process is continued until the mass is reduced to such a condition that the greater part of the chemically combined moisture has been released and the grease freed from its cellular envelopes. The solution is then pressed out and the tankage left behind. A considerable quantity of grease is pressed out with the liquid and is later recovered by evaporation. The tankage, which still contains moisture, is then dried by steam or fire, and the grease extracted with naphtha or other

solvent, finally leaving the tankage in a condition to be ground and screened for fertilizer purposes.

DIRECT DRYING PROCESS.

In the direct drying process the garbage is dried by means of direct heat or steam instead of by the use of a press. The raw mixture is first broken up in a hammer mill, and then either passed through revolving driers, where any free moisture is evaporated by direct heat, or is placed in a steam-jacket drier, where similar results are secured. The mass is then percolated with solvent to extract the grease, and the tankage redried for use as fertilizer.

While this method requires less operations than the digester process, and is consequently cheaper, it has the disadvantage of more loss of grease and tankage in the drying process, and presents more difficulties in controlling the large volume of offensive gases which are given off.

DEHYDRATING PROCESS.

The dehydrating process, the most recent development in garbage reduction, is based on the principle that a liquid heating medium constantly circulated through a mass of material to be reduced, more quickly and effectively breaks down the complex organic solids and releases the moisture and fats held in combination. Naturally a liquid circulating through a mass of fibrous material will convey heat to all parts more uniformly than could be accomplished by direct heating, where the tendency is to char or harden the particles at points where the heat is applied. The process follows closely the well-known principle of frying out grease in a bath of liquid fat, the liquid bath serving the double purpose of releasing the fats and acting as a heat conveyor for the evaporation of moisture from the garbage. Since a volatile solvent would perform the same general functions as grease, and its use would be necessary for the final extraction of grease, the dehydration methods use a solvent bath as the heat-conveying medium and as the grease extractor.

Briefly, this process consists of mixing the material to be treated with a solvent capable of dissolving the grease and oils, and by means of steam, raising the temperature of the mass to

a point where the solvent and water pass off as a vapor. These vapors are then condensed to their original form and the resulting liquids, water and solvent, separated. The solvent is returned to the storage tanks for re-use, and the water discharged into the sewer. After the water is removed by this means, the grease is extracted by percolating a solvent through the mass, and the combined grease and solvent drained off and separated. The residue is then steamed free from any remaining solvent and prepared as a fertilizer.

While this method is somewhat complicated in its operation, and the equipment costly, it has the advantage that the entire process of reduction is carried out in a closed circuit, and the garbage is not exposed from the time it enters the reducer until the operation is completed. The only vent for the whole system of reducers, condensers, separating tanks and storage tanks is on the final storage tanks for solvent, and all gases passing off at this point are treated to recover the last traces of solvent. In fact, the loss which would result from the escape of solvent vapors is one of the best guarantees that leaks in pipe lines and reducers will not be allowed to exist for any length of time.

But any reduction process only takes care of garbage or organic waste, and leaves the rubbish to be disposed of by other means. This may be done either by wasting in low places, by burning, or by utilizing the salable materials.

UTILIZATION.

Utilization, or the process by which all valuable articles are sorted from the rubbish and prepared for the market, and the unsalable matter destroyed by incineration, is employed in many cities to advantage. In a plant of this type the mixed rubbish is discharged into a storage bin, from which it is raked onto a conveyor which passes through the sorting room to an incinerator. As the waste materials pass through the sorting room, experienced pickers collect all valuable articles, such as bottles, tin cans, metals, rags, paper, etc., which are later prepared for the market by the process best suited to the material. Rags, the various grades of paper, and tin cans, are baled, and the other materials sterilized and placed in bins. Unsalable rubbish is left on the conveyor and is carried to the incinerator. The

machinery for a plant of this type is costly, but with a fair market for the salable materials, an intelligently operated utilization plant should yield some revenue and not prove objectionable from the sanitary point of view.

SANITATION.

In considering the various methods of waste disposal, the controlling factor in the selection of collection systems and disposal plants should be sanitation and freedom from nuisance.

Odors and nuisances resulting from the burning of refuse may arise from improper handling of the raw garbage, incomplete combustion, burning at too low a temperature, and the creation of dust. Similar objections resulting from reduction may be traced to improper handling of the raw garbage, odors given off by the cooking and drying process when not confined, and uncleanness due to the nature of the material. Probably the greatest source of odors arising from reduction come from the exposure of hot material to the atmosphere so that steam vapors escape. Feeding and utilization also have their sources of nuisance in the creation of odors, dust and possible infection.

It, therefore, becomes the first duty of any designer of disposal systems, irrespective of the method, to satisfactorily overcome these sanitary objections. To obtain these results, collection equipment should be designed so as to prevent leakage and escape of odors, easy to clean and sterilize, and as free from mechanical complications as possible. Disposal plants should be built in units, so as to permit one or more parts to receive attention and be repaired without closing down the entire plant. The building and equipment should be so constructed that any dust or dirt that may accumulate can be easily seen and promptly removed by hosing and washing. In many plants the desire to reduce operating costs has resulted in the use of open conveyors and various types of hoisting buckets, which gives every opportunity for the escape of dust and objectionable odors. The nature of garbage is such that unnecessary handling should be avoided. This may be accomplished by eliminating storage pits and open carrying devices and dumping directly from the collection vehicle into the furnace or other disposal unit. This method is somewhat more costly and requires a well-balanced

system of collection and disposal, but it has the great advantage that the garbage is disturbed only at the time of collection and of final disposal. The slight odor arising from the raw garbage, when properly confined and carefully handled, is seldom noticeable beyond the plant, if at all, and this possible objection may be largely overcome by a system of ventilation and exhaust fans which will draw the air from the buildings and feed it either into the incinerator or into the steam furnaces.

COST AND EARNINGS.

In considering the various factors that enter into this problem, however, the element of cost must not be overlooked, because upon final cost will largely depend the selection of the most suitable process for any particular locality, provided the sanitary requirements can be met.

In arriving at the cost of any method of disposal, it is necessary to examine into and estimate the cost of collection and transportation in connection with the disposal plant. It might be found that one method was much cheaper than another and apparently quite advantageous until the costs of collection and transportation are included in the estimates.

For systems where it becomes necessary to collect garbage separately from the other waste, or where ashes and manure must be kept out of the rubbish so as not to interfere with the recovery of salable articles, the collection system becomes more complicated and generally more expensive. Where no separation is necessary, the collection may be made at one time, in one type of vehicle, and on a schedule that is usually more easily followed at the home.

Another factor of considerable importance in the final cost of any system is the number of plants and their location. It is, of course, apparent that a large number of plants properly located will reduce the length of haul and decrease the cost of collection, whereas a large central plant reduces the cost of administration and operation and obviates the necessity of finding suitable locations for plants against which there is considerable popular prejudice.

Where the recovery of by-products is considered, a large plant is almost necessary on account of the high cost of building

small units separately, and the economies to be effected by concentrating the various operations. The commercial value of steam from an incinerator or destructor is dependent upon its being produced uniformly and in large quantities. The oils, grease, fertilizer, bones and hides, the by-products of reduction, cannot be economically produced except in large plants, conveniently located for the reception of raw materials and the delivery of the finished product. In like manner, utilization, feeding, and even dumping, may or may not pay, depending upon the care with which the plant is located and the conditions under which it operates.

Therefore, to arrive at a correct estimate of the final cost of a complete disposal system, it is essential that we know the cost of each operation from the point of origin to final disposal of the finished product, and credit against this amount any revenues to be derived from the use or sale of by-products resulting from the operation of that particular system.

CONCLUSION.

It therefore follows that the best method of disposing of the waste of any community can only be determined after a careful study of the local conditions. In southern climates, where the refuse contains a high percentage of moisture and a small percentage of unburned coal, general incineration does not yield as high a return in steam as is oftentimes claimed. Prior to the war the amount of grease contained in the garbage and the character of the tankage compared favorably with that found elsewhere, but at the present time, the most important question before southern cities about to embark in a refuse disposal enterprise is to determine as far as possible to what extent our food wastes have been affected by conservation and how long the lessons taught by the war will be remembered.

Tests run for a period of a year in 1915 to determine the character and amount of waste in this city, showed that our refuse contained enough grease and other valuable materials to insure the profitable operation of a reduction and utilization plant. A similar but shorter test is now in progress, to ascertain just what changes, if any, have taken place in our refuse, and

what method of disposal may be safely adopted that will meet all the requirements of good sanitation and at the same time return to a new cycle of usefulness, any economic values that our waste may contain.

DISCUSSION.

PROFESSOR WILLIAMSON: Mr. Chairman, Mr. Willis has so thoroughly covered the subject as to the methods employed, I feel that before we start any discussion of the paper, we should offer him a vote of thanks for the able paper that he has delivered to us. I desire to say that I was impressed with the fact that he included in his paper all waste disposal, because we often think of garbage disposal and sewage disposal as the only two material disposals which we have in a city, whereas he brings out the fact of other things which have to be taken into consideration, such as city sweepings, etc. I don't know that I have any particular phase of the problem to discuss, except this: I would like to mention that out of twenty-nine or thirty cities in the states which are carrying on garbage reduction, all except three, or possibly four—I am not certain about St. Louis—employ the cooking method, and this is probably one reason why garbage disposal has received the non-commendation of residents that it has. In the cooking process which he described, the objectionable odors are generated to a very much greater extent than in the Cobwell process which he also described (though he did not call it by that name), and in the straight drying process. New York City, I believe, employs the Cobwell process—I believe New York, Los Angeles and New Bedford employ the same process. New York is still operating their plant without creating a nuisance—that is, without one that has to be shut down, though they had considerable trouble at one time.

Now, in the cooking process, there are two things to be taken into consideration: One is the nuisance created by reason of the odors released by breaking down under pressure the organic constituents, and the second very important consideration, from an economic aspect, is the fact that the fats resulting from the cooking process are very much less valuable. They run higher in fatty acids, which are very objectionable to a soapmaker, and

the starches and sugars are broken down so as to render the garbage offensive after the material is released. So that there are two aspects— the aspect of creating a nuisance, and the aspect of being really not an economic proposition from the standpoint of quality of resultant material.

I have collected a few figures which I think might be of interest. Within the last two or three years, there were twenty-nine cities turning out a value of \$11,500,000.00 worth of products, of which there were 70,000,000 pounds of grease and 175,000 tons of fertilizer. The City of New York handles 320,000 tons of raw garbage a year and turns out 19,200,000 pounds of grease, valued at about two and a half millions of dollars, at war prices. It turns out 64,000 tons of tankage, valued at about a million dollars. The grease has been quite an important problem from the standpoint of glycerin. Out of this New York garbage plant we were able to obtain during the war 1,340,000 pounds of dynamite glycerin. Before that, the grease was worth only about five cents a pound, but it rose quite rapidly on account of the war. And, also, they were able to turn out the equivalent of 150,000 cakes of soap.

The recovery of grease now may not be as important as it was then. The soapmakers were up against it then for grease which they could use for soapmaking, and I am satisfied that there was more attention paid to garbage disposal during those two years for the reasons of the necessity for glycerin, the demand for greases for soapmaking, and the demand for fertilizer materials.

MR. DUSENBURY: I would ask if there are any cities disposing of their refuse at a net profit.

MR. WILLIS: One city claimed to have been disposing of it at a profit up to the time of the war, and I think probably it is still doing so, though I have not seen the recent reports. The city of Columbus, Ohio, has its municipally owned plant. I presume there are quite a number of cities disposing of their garbage at a profit, but the contractor is getting the profit. Columbus, Ohio, has a municipal plant and it was making \$2.00 a ton on garbage before the war. During the war, the prices of grease and tankage were quite high. Grease was selling as high

as 12 cents at one time, and tankage \$16.00 a ton. That is far above the normal price. At the present time, grease is only worth $4\frac{1}{2}$ cents a pound, and tankage about \$10.00 to \$12.00 a ton. So that the margin of profit depends on the care with which the plant is operated, if you are to have a wide margin of profit, and the price you are able to get for your material. Ordinarily, I think the grease will be nearer $3\frac{1}{2}$ or 4 cents than it will be 8 or 10 cents, but Columbus, Ohio has been making some profit on their plant at normal prices, but never enough to take care of the cost of collection, however. I don't believe there is any city that has paid the entire cost of garbage disposal by any system of reduction, but they have helped to take care of it.

MR. MALOCHEE: Mr. President, I rise to second the motion of Professor Williamson as to a vote of thanks for Mr. Willis. And with regard to the question of municipally-owned plants making money, I wanted to find out whether any amortization charges were made against those plants that are claiming to make money, as well as interest charges on the investment. We hear a great deal about these municipally-owned plants making money, but when we come down to the actual facts in the case, they are losing money, because they are charging no interest and are putting away no money to take care of changes in construction and improvements in machinery and all that sort of thing.

PROFESSOR WILLIAMSON: As to the loss of money in operating a garbage disposal plant: garbage disposal by any of the processes has been, up to the present, mainly a swill man's process. Nobody wanted to fool with it except the swill man, and no large amount of science has been introduced. I offer that as possibly an explanation. What I mean by this is that there are some valuable products in garbage that have never been completely recovered, or recovered in such a way as to be in the best condition for subsequent use, and it has been largely due to the fact few men of scientific training wanted to work at the process or research on it. No engineer or chemist wants to work with foul-smelling materials if he can help it. It has just gone along that the swill man was the only one who cared to handle it.

MR. DUSENBURY: What is the present method of garbage disposal in the City of New Orleans to-day?

MR. WILLIS: At the present time, the City of New Orleans is dumping everything, except in Algiers. In Algiers, we have a small incinerator, a very successful incinerator, in fact. It has been in operation now about three years, and we still have to have our first complaint—our first real complaint. We did have a complaint when it was first installed. The brick work was not quite dry, and we put in a slow fire to dry out the brick work, and we got a complaint right away that the garbage was smelling pretty badly. Other than that, we have had no complaint.

The reason that we put in an incinerator in that suburb was because we could not handle it in any other sanitary way. The bringing of garbage across the river was undesirable, so we considered Algiers as a suburb to be taken care of separately, and incineration was found to be the only feasible way to handle its refuse. All the garbage on this side of the river is dumped in various places. The large dump is out on Florida Walk and the Northeastern Railroad track. I assume most of you know where it is. But that is the method we are using now.

MAJOR SHAW: Mr. Chairman, I would like to answer Mr. Malochee's question in regard to the one particular plant at Columbus, Ohio. I saw an analysis of cost up to and including the year 1916, and these figures did include all of the charges which an engineer would use in computing the cost of operating and maintaining a plant. As I recall it, it did not cover the cost of collection, which practically none of these reports do cover, because I don't think these has ever been a city which has expected to make a profit on the handling of the waste, including the cost of collection. That is something that has to be done under any method of disposal.

I want to apologize for speaking on a subject that I have had no recent opportunity for studying, though a few years ago I did make a special study and report to the Association of Commerce, which report, I think, was carefully pigeon-holed, as have been some other reports we have heard of in this city. I don't think it has ever seen the light of day. At that time I

reached a slightly different conclusion from that of Mr. Willis, which was the cost of collection under the separate system is greater than the cost of collection under the combined system. Now, his statement is probably true if we consider that the trash is to be handled in the same way or collected on the same schedule as the garbage. I took a hypothetical case and worked it out on a basis of daily collections of garbage, which I think is necessary in New Orleans. The matter which was not susceptible to rapid decay I assumed would not be collected more frequently than twice a week, or possibly once a week. The separation of household waste is something which is very difficult to control in any community, and I believe even more so, for some reason, in New Orleans.

At one time, New Orleans attempted a separate system, and I know from observation at that time that the authorities were not able to keep the housekeepers up to the regulations and it didn't work out successfully, and I doubt if it could be made to do so without the backing of the entire community; and that, by the way, is one of the ways in which an organization of this kind can be especially valuable. I do not believe that the Louisiana Engineering Society can go into the question of waste disposal, certainly not with enough thoroughness to be of material assistance in advising the authorities as to the best method, but I do believe that after the authorities have made a careful study and decided on a system, which may require a change of action on the part of the householders or the people of the entire city, I believe that an organization of this kind can back up the authorities and be of assistance in seeing that those regulations are carried out. If it is found wise to use a separate system, it will require education of the entire city, and this Society is in a position to assist in the systematic plan of education which should be undertaken. I believe that is one of the proper functions of an organization of this kind.

The separate system of collection makes it possible to secure some of the advantages of the multiple disposal plants (which make for economical collection) without losing all the advantages of a highly efficient central plant. If only the garbage is to be taken to a central plant for reduction, for the purpose of secur-

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EDITORIAL NOTES AND COMMENT

Lubrication of Aero Engines. In a paper contributed to the September meeting of the Society, Mr. W. M. Davis, oil expert, of Houston, Texas, presented to the members some very interesting information concerning the methods of storing and handling gasoline and lubricating oils in the various aviation fields in this country. He also explained the method of reclaiming the used lubricating oils, and pointed out that many of the aviators preferred this reclaimed oil for their engines to the fresh oil.

A very interesting portion of the paper has to do with the question of the use of castor oil as a lubricant for aero engines. All of us will remember quite clearly the great stir made in the press of the whole country over the absolute necessity for the production of large amounts of castor oil for this purpose.

Farmers were urged to plant the castor bean and produce the greatest possible crops of same to be converted into the much-needed oil.

As might have been expected, this was all that was necessary to put the petroleum oil men on their mettle, and from the account of their accomplishments, given in the latter portion of Mr. Davis's paper, it would appear that they succeeded in proving that for all aviation lubrication the petroleum products were equally as good, if not better, than the castor oil.

It is even suggested that the castor oil program was permitted to go on as a sort of camouflage for the purpose of deceiving the enemy, the idea being that the Germans would reason somewhat as follows:

"The United States must have castor oil; they have an improperly designed engine which is giving trouble, else they would not consider this necessary; with an improperly designed engine they cannot compete with Germany; depending on a newly organized industry and uncertain weather for their supplies of beans will cut down their operation and naturally their production."

Meanwhile the Lubrication Department was sawing wood and working out the specifications of the Liberty Aero Oil, which was soon in use at all the aviation fields, and the newspapers were permitted to go ahead and boom the castor oil program to their heart's content.

Increase in efficiency is the constant aim of the student of industrial and engineering problems, and the proper lubrication of machinery is one of the most important phases of this general problem. It is of interest to note in this particular connection a statement from Mr. Davis in a recent letter to Professor Gregory. He states that the company with which he is connected has recently discovered that it is costing them a very large sum to lubricate the machinery in the oil fields, and that the cost of repairs to this machinery was very great on account of inefficient lubrication. On account of Mr. Davis's connection with the Lubrication Division of the Army, he has been given the problem of studying out and reorganizing the methods of

lubrication of the machinery in these oil fields in order to put it on a more efficient basis and reduce the cost and waste.

Mr. Davis's paper is published in this issue of the *Proceedings*.

Please Take Notice. The Louisiana Engineering Society has taken upon itself the task of compiling a complete war record of the members of the Louisiana Engineering Society and other members of the Engineering Profession resident in Louisiana who are not members of this Society. We are endeavoring to obtain a complete record of every service rendered by engineers contributory towards the winning of the war, whether said service was of a military or non-military character, or whether performed before or during the war.

Major A. M. Shaw, late of the Engineering Corps, has been charged by the Society with the onerous duty of carrying out this plan, and has willingly undertaken the task.

Now, what we want you to do is this:

First. If you performed any service contributory to winning the war, fill in the enclosed blank and return it in the enclosed self-addressed envelope **IMMEDIATELY**.

Second. If you know of any engineers in your locality who have performed some service contributory to winning the war, will you not consider it your duty to see that they fill in their blanks, and see that they send them in immediately?

Third. If you know of any engineer who has not received a blank, won't you consider it your duty to see that he gets one and fills it in? If you will send us his name and address, we shall gladly forward the blank, or will forward you as many blanks as you want for distribution.

It is going to be a big task to get everybody's record, omitting no one. To complete this task will require the heartiest co-operation of everyone, without exception. We know we can count on YOUR co-operation.

Some Additional Comment on the Re-routing Problem. The following letter to President Olsen sets forth the findings of Mr. Billingsley and his committee with regard to certain phases

of the question of re-routing the street-cars. It came to the editor too late for insertion in the August issue, so it is printed here in order that we may have a complete record of the Society's contributions towards the solution of this much-discussed problem:

July 7, 1919.

Mr. Ole K. Olsen, President,
Louisiana Engineering Society, City.

Dear Sir:

You recently asked me to appoint a committee to examine and pass upon the merits or demerits of a certain plan of street-car re-routing in the district of the uptown side of Canal Street. To assist me in an examination of this plan, I appointed Mr. W. T. Hogg, Mr. John Klorer, Mr. Henry Malochee, and Mr. John Riess. The plan submitted to us marked Exhibit "A," and accompanying this report is predicated upon the assumption of removal of street-car tracks on St. Charles Street, from Lee Circle to Canal Street, and also predicated on the removal of car tracks on Tchoupitoulas Street, in the wholesale commercial district.

Our committee has met and has carefully considered the scheme of re-routing presented. I will state at the outset of this letter that the plan of re-routing, in general, meets with the approval of this committee; however, there are some minor changes which we would suggest, and some recommendations that we would make, looking towards the most successful operation of the plan under consideration. The following paragraphs will summarize our conclusions:

1. The proposed plan will mean that one street (namely, Tchoupitoulas St.), in the wholesale district, will be free of street-car tracks,—thus permitting trucking and hauling in the wholesale district to have the use of an up-and-down-town street, free of car tracks. There is no need of elaborating on the self-evident benefits of a street devoted entirely to trucking.

2. The proposed plan will also mean the elimination of car lines from an up-and-down-street (namely, St. Charles). The present increasing of traffic congestion in the retail and downtown commercial district easily shows the necessity of an up-and-down-town street devoted entirely to automobile and light vehicular traffic. The present congestion in our downtown section is obstructive to the movement, both of automobile traffic and of street-car traffic, and the providing of a single street free from car traffic will undoubtedly facilitate the operation and movement of both kinds of traffic.

3. The scheme of re-routing, in general, contemplates practically no changes in the present movement of cars, except in that district lying between Canal Street and Lee Circle. There is very little change in the lines from Lee Circle to the Carrollton District. The changes which have been suggested have been made with the view of avoiding traffic congestion in the downtown business district.

Practically all of the car lines have been grouped into three zones of operation, in which counter-current traffic is eliminated as much as possible. These three traffic zones might be better described as three non-intersecting loops. A study of the accompanying map will give a better idea as to the freedom of car movement in these loops than is possible by means of any word description.

The proposed plan does not contemplate any change in the operation of the St. Charles and Tulane belt lines. The routes of practically all of the other uptown lines which reach Canal Street will be somewhat modified. Although all of these lines will reach Canal Street and will have a movement along Canal Street, still this movement is restricted to as few blocks as possible, utilizing the outside track on the uptown side of Canal Street. This plan will undoubtedly relieve a lot of congestion at present existing on Canal Street.

4: As a matter for further consideration, we suggest that it would be a good idea to consider handling

the Tulane and St. Charles Belt cars on the uptown inside track instead of on the uptown outside track, as is now done. The reason of this is to avoid undue congestion on the uptown outside track, which track will handle all of the loop-line cars above referred to.

5. The proposed plan fairly well balances up the car movements on the main up and down town streets utilized, namely, Magazine, Camp, Carondelet, Baronne, Dryades, and Rampart. In other words, re-routing has been made in a way not to unduly load up one street with more than its reasonable share of traffic.

6. We would like to call attention to the fact that the present plan would probably result in congestion of loading cars at the Canal Street stops, due to the fact that they are practically confined to few loading points. This condition can be relieved by permitting of loading passengers at points other than the Canal Street stops. In this connection, we would suggest that the district between Canal and Poydras Streets be considered as the neutral loading and unloading zone. Upon this consideration, passengers can get on or off the cars any place in this zone, regardless in which direction the car is moving, upon the payment of one fare. This would mean that in the evening a passenger could get on the car going down to Canal Street at any point between Canal and Poydras Streets after the car had started on its return trip uptown without the payment of additional fare.

7. We note the proposed plan provides for the Tchoupitoulas and Laurel Cars on their uptown trip turning out to Annunciation Street at Erato Street. It seems to us that if these two lines reach Annunciation Street via Poydras Street, we would somewhat better serve the wholesale district.

8. Inasmuch as under the proposed plan, Magazine Street would be a one-way street, we would suggest that it might be well to connect Camp Street track with the Magazine Street track by means of a cross street

line at some point between Canal Street and Howard Ave. Such connection would be very useful in case of a fire in the wholesale district in facilitating the movement of traffic and avoiding traffic congestion.

CONCLUSION.

We have not been so much concerned with examining the details of the re-routing scheme presented, but rather have considered the main and salient features. The practical operation of this system will, no doubt, suggest minor operating changes. The plan, as a whole, has no serious defects, and undoubtedly should relieve, to a considerable extent, traffic congestion in the downtown district, and at the same time create a condition whereby the general public should secure better street-car service in the downtown business district.

Respectfully submitted,

(Signed)

JAMES W. BILLINGSLEY, Chairman;
W. T. HOGG,
JOHN KLOSER,
H. J. MALOCHEE,
JOHN RIESS.

A Kindly Courtesy. The President of the Society has received a very courteous letter from Mr. C. C. Friederichs, President of the New Orleans Teocalli of the Order of Ancient and Modern America, extending to the Louisiana Engineering Society the use of their Council Chamber free of charge at any time, with the exception of their regular meeting night, which is Friday.

As stated in the letter, this room is equipped with an up-to-date moving picture machine and a stereopticon with lantern slide and opaque projection attachments. Their operator would also be available to assist us at any time we cared to make use of these facilities.

The letter further states that they are prompted in extending this courtesy to us on account of the interest our Society has always shown in the civic affairs of this city and community.

We take this opportunity of giving expression publicly to our very great appreciation of this courtesy, and to state that we, on our part, will always be glad to extend to the New Orleans Teocalli any of the facilities of our organization which may be of service to them.

The Louisiana Engineering Society stands always ready to lend its influence and the facilities of its organization in any cause which it feels is for the good of the city.

Annual Meeting of the National Drainage Congress. Mr. John A. Fox, Director of the National Drainage Congress, requests us to call to the attention of our members and of the engineering profession in general in this part of the country the fact that the Eighth Annual Meeting of the National Drainage Congress will be held at the Planters Hotel, St. Louis, November 11, 12, 13, 1919.

It is hoped that many of our members may be able to avail themselves of the opportunity of attending this meeting. The matters to come before the Congress should be of great interest to us, as it is concerned with the development of the natural resources of our country and the protection of the public health by preventing and remedying such unfortunate conditions as may be caused by the existence of swamp lands and as may follow the floods of our rivers.

Are You This Kind of an Engineer? In connection with the program being carried out for the establishment of a National Public Works Department of the Government, Mr. Leighton, Chairman of the Conference, submits this interesting opinion of engineers, as expressed by a certain public man, high in authority. He said to Mr. Leighton, concerning the project for the establishment of such a National Department of Public Works:

"Your task is appalling. You have been elected to lead engineers into a political reform. They are the most unresponsive citizens that we have. Your organization has a praiseworthy purpose, but if it were sponsored by almost any other group of reputable men than engineers, there would be more promise of success. If

your organization succeeds, I believe you will find that it will not be the engineers who have carried through. Their aloofness and indifference in all matters outside of their own professional sphere are among the unexplainable things in our political life."

In the first place, is this true? If it is true, then the remedy should be not hard to find. We believe that the members of this Society have already realized that there are elements of truth in this, and we are awakening to the necessity of assuming our proper responsibilities in the political life of this city and state.

The National Public Works Department. In two previous issues of this journal we have called attention to the activities of the Conference on National Public Works. This Conference has established a State Campaign Committee here under the chairmanship of Major W. B. Gregory, the other members of the committee being F. T. Foote, of Kaplan; J. L. Henning, of Lake Charles; L. W. Stubbs, of Shreveport; W. Whipple, of Conclare, and George J. Glover, Moise Goldstein, Walter B. Moses, Ole K. Olsen and Arsene Perrilliat, all of New Orleans. To co-operate with this committee in its campaign of publicity, we are publishing here, and shall continue to print from time to time, items of interest bearing upon this question and other such news items as may be sent out by the general committee. The following statements, each under its appropriate heading, will be of interest to the men who are keeping up with the activities of the Conference:

THE COAST AND GEODETIC SURVEY.

ACTIVITIES.

The work of this Survey is to survey and chart the coast lines and the waters of the United States and its possessions; make studies and prepare tables and charts of tides and currents; to provide an accurate triangulation control of the interior of the United States; to establish precise level stations; and to make magnetic surveys for the determination of true declination.

The surveying and charting of the coast waters is done from seagoing vessels, positions being located by the ordinary meth-

ods of triangulation. Profiles of the sea bottom are taken by soundings with lead and line, and these soundings are accurately platted in order that a navigator may, by taking check soundings, locate the position of his ship. This work is being done on both the Atlantic and Pacific coasts, in the Philippine Islands and in Alaska. Reefs and other obstructions to navigation are located by the wire-rope drag. This drag is a wire cable supported at thirty feet under water and towed by a power launch. The charts of the waters of the Pacific coast and of Alaska are entirely inadequate, as wreck after wreck of seagoing vessels each year testifies, and there is an immense amount of this work still to be done. This charting of the coast lines and waters is the major activity of the Survey. It is strictly an engineering work, and is done by and under the supervision of engineers.

The next activity of the Survey in importance is the providing of horizontal and vertical control points throughout the interior of the country. This work is of the highest importance, as it provides bases from which all surveys should be started. It is so far in a very incomplete stage, and the result is endless confusion in map-making. Some of the other Government agencies engaged in map-making are the Corps of Engineers, the Geological Survey, the Land Office, the Bureau of Indian Affairs, the Forest Service, the Boundary Commission, the Bureau of Roads and Rural Engineering, Bureau of Soils, the Reclamation Service and the Hydrographic Survey of the Navy. Unless these other agencies start from the control furnished by the Coast and Geodetic Survey, their results require constant adjusting in order that they may be in any way co-ordinated. This providing of a primary control, which is the work of the Coast and Geodetic Survey, is engineering work of the highest importance, and is done by and under the direction of engineers.

The remaining functions of the Survey's work, viz.: the preparing of charts of tides and currents and the making of magnetic surveys, require only a small proportion of the staff and efforts of the Survey. The work is done by engineers, astronomers and other purely technical men. An analysis of all the activities of this government Survey shows the work to be entirely technical work, and that a vast proportion of it is engineering work in the strictest sense. The entire activities of this

bureau could well be co-ordinated with the other map-making activities of the Government, and effect thereby a desirable increase in the amount of the work done and a better co-ordination of the Government's mapping activities.

The history of this Survey shows that it has been under the Treasury, Navy and Commerce Departments, and that it is now following out a general policy laid down in 1843 while it was subordinate to the Treasury Department. Its early years were marked by many changes of policy and of authority, and by little effective work. The survey of the coasts was first authorized by Congress on February 10, 1807. Broad plans for the conduct of the survey were made by F. R. Hessler, a scientist of Swiss birth, and the Treasury Department was made responsible for carrying these plans out. Precision instruments were not available in this country, and had to be secured from abroad. This, together with the war with Great Britain, in 1812, delayed all work on the survey until 1816.

The Survey had barely begun its work when Congress, on April 14, 1818, repealed so much of the statute as authorized the employment of other than army and navy officers in the Survey.

The War Department made no surveys, and the work of the Navy Department was quite unsatisfactory, and so, on the recommendation of the Secretary of the Navy and of others, this Survey was given back to the Treasury Department by Congress in July, 1832, and the law of 1807, with broader powers, was re-enacted.

The Survey remained under the Treasury Department only two years, and in March, 1834, was again transferred to the Navy Department, under whose jurisdiction it remained for a similar period, and then was again given back to the Treasury Department, where it remained until July 1, 1903. It was then placed under the Department of Commerce by Act of Congress, approved February 14, 1903.

In 1843, while this department was still under the Treasury Department, and the question of retransferrence back to the Navy Department was being discussed, the President appointed a board to formulate and develop a plan for a permanent organization of the Survey. The report of this board was approved

by the President on April 29, 1843, and the work of the Survey has ever since been modeled on the lines then laid down. After the adoption of this report until the war with Spain, in 1898, nearly one-half of the vessels of the Survey were manned and officered by the navy, but since that time civilian officers and employees of the Survey have officered and manned all vessels.

Congress legalized this procedure in 1900 by inserting in the appropriation for the Coast and Geodetic Survey a provision "to man and equip" the vessels of the Survey.

The name, "Coast and Geodetic Survey," was authorized by its use in Sundry Civil Appropriation Act, approved June 20, 1876. It has led a vagrant sort of life, being shuffled from one department to another, and never being entirely at home in any of them.

ALL SURVEYS SHOULD BE CO-ORDINATED.

The results of the Survey's work are made use of by commerce, by railways, by land-owners of every kind, and by all enterprises whose primary investigations require the use of maps.

The putting of all of these surveys, whether by land or by sea, under the Bureau of Public Works, would insure a comprehensive mapping plan, the use of consistent scales and legends on all maps, and would bring together a permanent corps of skilled surveyors, who would be capable of mapping the interior of the United States with such exactitude as would make their results of unlimited value in time of peace, and in war their maps would be the basis of all war operations, even as the French maps were recently.

Instead of twelve independent bureaus making surveys, each without liaison with the other eleven bureaus, there would be one central department planning and conducting this work, weighing the comparative needs of different sections and so directing the efforts of the department that the greatest good to the greatest number would result.

These maps, under a unified control, would be made with sufficient detail and exactness to cover the most particular needs. The information once gathered, it would be comparatively simple to adapt it for any special purpose whether it be war, industry, or commerce.

There is no work that this Survey does that does not fit in well with the work planned for the Department of Public Works. It is essentially an engineering work, and consequently belongs in the National Department of Public Works, together with the other engineering activities of the Government.

PUBLIC WORKS DEPARTMENTS IN OTHER COUNTRIES

Those who urge the creation of a National Department of Public Works in the United States are merely contending that our affairs should be managed in the way which practically all the modern world, except this country, has found necessary. Without going into details concerning the various laws of foreign countries, it will be of interest to mention their names and the general characteristics of their public works departments.

CANADA.

A Ministry of Public Works presiding over the Department of Public Works, with a suitable staff of deputies, engineers, architects, etc., has control over rivers, harbors, and all hydraulic works, roads, bridges, public buildings, telegraph lines and surveys.

AUSTRALIA.

A parliamentary committee of nine constitutes a standing committee of public works.

NEW ZEALAND.

Has the most comprehensive public works' code in existence, presided over by a Minister of Public Works, whose powers include lands and eminent domains concerning the same; roads, surveys, bridges, ferries, rivers, railways, drainage, water supply, mining, water power and irrigation.

FRANCE.

A Ministry of Public Works covering roads and traffic regulations, river and maritime navigation, water power, drainage, irrigation, railroads, mines, public buildings and public monuments.

SPAIN.

A Ministry of Public Works covering roads, railways, waters, rivers, canals, ports, mining and forestry.

ITALY.

A Department of Public Works having jurisdiction over buildings, roads, rivers, harbors, water-power, drainage, dykes, ferries, railroads, telegraphs, and telephones, postal affairs and transportation. It is of interest to note that this Department of Public Works was, by royal decree of April 27, 1900, set up by a division of the Department of the Interior in much the same way as is now proposed for the United States by the Engineers, Architects and Constructors' Conference on National Public Works.

NORWAY.

A Department of Public Works—made by division from the Department of the Interior—with jurisdiction over highways, rivers, railroads, fire insurance, harbors, postal affairs, technical schools and surveys.

PRUSSIA.

A Ministry of Public Works with jurisdiction over coasts, harbors, lighthouses, merchant marine, waterways, public buildings, railroads, highways, monuments, postal service, telegraphs and telephones, rivers, lakes, canals, drainage and hydraulic works.

ARGENTINA.

A Department of Public Works embracing all enterprises and works concerning means of communication, hydraulic works, all construction—either of architectural or other nature, including public buildings, monuments, churches, prisons, barracks, arsenals, forts, shipyards, lighthouses, roads, bridges and all hydraulic and sanitary matters.

BRAZIL.

A Department of Communication and Public Works having jurisdiction over railroads, highways, interior navigation, ports, rivers and canals, water supply, water-power and surveys.

CHILI.

A Department of Industry and Public Works having jurisdiction over all communications by land, river and sea, the utilization and distribution of waters, public buildings, mines, surveys and mappings.

PERU.

A Department of Public Works—formerly a part of the Ministry of the Interior—having jurisdiction over irrigation, hygiene, mines, schools, patents and trade marks, water and state railways.

ENGLAND.

The Commisisoners of Works and Public Buildings have control over the lands and buildings of all kinds belonging to the Government, while rivers and harbors and their appurtenances are under the jurisdiction of the Board of Trade. This is the only modern government of any size, except the United States, in which all government activities of this kind are not concentrated under one jurisdiction.

Detailed information concerning the public work laws of any of the countries above mentioned can be secured on application to the Washington office of this Conference.

SUPERVISING ARCHITECTS OFFICE.

TO WHAT DEPARTMENT DOES IT BELONG?

The Supervising Architect's Office—now subordinate to the Department of the Treasury—is charged with the design, construction, care, operation and repair of Federal buildings which are devoted to miscellaneous Government purposes.

The 1918 Report of the Supervising Architect's Office listed these buildings, now completed and occupied or authorized, to the number of 1680, the construction cost alone of which was \$228,584,378.95. Included in this list of buildings are post offices, custom houses, courthouses, quarantine stations, marine hospitals, assay offices, appraisers' stores, immigrant stations, treasury, sub-treasuries, wharfs, barge offices, jails, sanitariums, exposition buildings, monuments and mints.

In the Sundry Civil Bill, now before Congress, are appropriations for carrying on construction work in 120 different cities and towns, the amounts so authorized, including those set aside for purchase of sites, being approximately \$7,300,000.

The amounts involved range from \$7,000 for a post office at Front Royal, Virginia, to \$849,000 for a building in Honolulu.

The office has two well-defined activities: One, "design and construction"; the other "The care, operation and repair of buildings now completed." The principal department expenditures are as follows:

DESIGN AND CONSTRUCTION FOR PERSONAL SERVICES.

Supervising Architect; foremen draftsmen; architectural draftsmen and draftsmen at rates of pay from \$840 to \$2,500 per year. Computers and estimators at rates ranging from \$1,600 to \$2,900 per annum.

Structural engineers and draftsmen at from \$840 to \$2,500 per year. Mechanical, sanitary, electrical, heating and ventilating and illuminating engineers and draftsmen at rates of pay from \$1,200 to \$2,400 a year, \$176,500.

Supervising superintendents, superintendents, junior superintendents and inspectors, at rates of pay from \$1,600 to \$2,900 per year, \$205,650.

Contingencies of every kind and description, \$489,050.

For the design and construction activities of this office then, \$870,000 are required. The personnel consists of strictly technical men and embrace every phase of architecture and engineering. This office conducts more building operations than any other organization in the United States.

So far, the activities discussed have been purely technical ones, and there is no apparent reason why they should be performed under other than a technical bureau.

The second phase of the activities of this Bureau comprise "Care, Operation and Repair of Public Buildings." The appropriation provides for this service:

For personal services in connection with care, operation and repair of all public buildings (except as hereinafter provided) including assistant custodians, janitors, watchmen, laborers, and charwomen, engineers, firemen, elevator conductors, coal passers, electricians, dynamo tenders, lampists and wiremen, mechanical labor force in connection with said buildings, including carpenters, plumbers, steam fitters, machinists, and painters, \$3,650,000.

This work is engineering work; the men employed are members of the engineering trades. There is still no apparent reason for placing this work under a cabinet officer whose chief concern is with the finances of the Nation.

The other funds provided for this Bureau are as follows:

For Furniture and Carpets and Repairs of same; for gas and electric fixtures and repairs of same, \$555,000.

For Operating Supplies—For fuel, steam, gas for lighting and heating, water, ice, lighting supplies, electric current, telephone services, removal of ashes and rubbish, snow and ice, cutting of grass and weeds, washing towels, etc.; for miscellaneous tools and appliances required in operation of mechanical equipment, \$2,300,000.

The work of this office, then, is straight architectural and engineering work; its personnel are members of technical professions and trades; its interests are technical interests. It is not a financial bureau, but an architectural and engineering one, and belongs, not to the Treasury Department, but in the Department of Public Works, where it will include in its functions all other architectural-engineering work of the Government, and thereby co-ordinate all such Federal activities under a common authority.

VIEWS OF PROMINENT MEN ON THIS SUBJECT.

GEORGE F. SWAIN: * * * It is admitted by most thoughtful men, I think, that the present is a crucial time for democracy. With the destruction of Prussian autocracy, a great increase in democracy throughout the world is sure to follow. It is claimed, however, by many thoughtful students of history and government, including a number of eminent historians, that democracy is not, and cannot, be efficient and economical. It is most important, I think, for this country, as the leading exponent of democracy in the world, to show that this claim is not true, but that a democratic government may be administered as efficiently, as economically, and as much in the interests of the people, or even more so, than an autocratic government, and that where the people rule they can so direct affairs that the public business may be conducted without waste, extravagance, or inefficiency.

There is no doubt, however, that the affairs of the United States Government are not now conducted in a way which conduces to efficiency and economy. That government is the greatest industrial concern in the world, spending more money and engaging in more works of an engineering character than any other organization in existence. Efficiency and economy call for business methods, with concentration of responsibility and the leadership of men who are accustomed to deal with such problems, and who will deal with them not in a military or autocratic spirit, but in a way to promote co-operative effort, good feeling and team work. At the present time, the engineering or technical work of the United States is distributed among a number of departments overlapping each other, unco-ordinated with each other, with divided authority, in many cases in rivalry or competition with each other, each seeking appropriations for its own work without reference to the work of other departments of an engineering character.

CHARLES T. MAIN: * * * There are now many agencies of the Government engaged in work which can be classed under the general heading of Engineering, Architecture and Construction, many of which are working without any special regard to one another, their efforts running in parallel lines and oftentimes overlapping.

These activities should be combined into one department, so that the work in all of the various branches shall be consistent, that the duplication of effort may be reduced to a minimum, and that the information or knowledge gained in one branch may be available for other branches.

With the formation of such a department, each project of importance can be carefully studied by itself and in its relation to other problems of a similar nature, and those which are fundamentally right and essential could be carried out first, those of lesser importance and local problems being left for later consideration and possibly rejection. There would be the elimination of personal and local schemes, which are expensive and unmerited. More careful estimates would be prepared of all worthy projects, and a budget system for the department established which would result to the country a considerable saving of money now expended on minor or useless projects. * * *

CALVERT TOWNLEY: * * * It seems rather obvious that the present method employed by the Federal Government in constructing public works is unbusiness-like and if paralleled by a corporation would result in heavy losses. Where, as in this instance, very large sums of money are annually expended, it is one of the A B C's of modern practice to create a suitable organization with a competent head to direct it. I understand that the Federal Government does no such thing, but that the construction of public works is parceled out under various captions spread through numerous departments, and therefore is working under many heads, each not only entirely independent from every other, but to a large extent ignorant of what every other is doing.

A. M. HUNT: * * * The benefits to accrue to the nation through the gathering together in one department of the engineering and construction activities of the Federal Government, which are now scattered among a number of departments and bureaus, seem too obvious to require extended argument.

That proper co-ordination of these various activities must inevitably lead to increased efficiency in the planning and execution of public works is practically the universal testimony of those who have the right to speak by reason of familiarity with such matters. * * *

HORACE V. WINCHELL: * * * I favor the establishment of a National Department of Public Work, because I believe in efficiency, economy, national progress and development.

Efficiency requires co-ordination of effort and the application of intelligent study in planning and in performance.

Economy means the avoidance of duplication and wasted effort and the construction of works which will function properly and endure.

National progress is a *sine qua non* to national life. Stagnation means decay and death. Development of our resources, our opportunities, our industries and our national spirit can best be fostered by centralization of control and unification of guidance by scientific department heads.

ATTITUDE OF THE GENERAL STAFF.

The most important event which we have to record is a statement by Mr. Roger Black, ex-colonel, Corps of Engineers, U. S. Army, and a son of the Chief of Engineers, made at a discussion of the project for a National Department of Public Works, before the American Society of Civil Engineers, in New York, on September 17. He stated that the General Staff of the Army now holds the view that the Corps of Engineers would be benefited by relieving it of river and harbor improvements, thereby enabling the members of the corps to devote their entire time to military problems. Colonel Black found himself totally opposed to these views, and gave it as the cause of his resignation from the army.

The General Staff's opposition to the continuance of the Corps of Engineers in river and harbor work will certainly modify the effectiveness of the opposition which that corps has been making to our proposal to include river and harbor work in the Department of Public Works. It will be remembered that the opposition of this corps has been considered one of the greatest difficulties to be overcome in the creation of the Public Works Department. It is particularly fortunate from our viewpoint that the General Staff should come to this decision at this time, as it thereby confirms the views which large numbers of engineers have long held.

While the Jones-Reavis Bill takes away river and harbor improvements from the Corps of Engineers, it provides that engineer officers may be detailed to duty under the Department of Public Works. This provision will permit the Corps of Engineers receiving a much more diversified and useful civil experience than is now available to them.

In time of war the first duties of the Corps of Engineers are on the lines of communication, and involve road construction, repair and maintenance, bridge building and the construction of earthworks. Under the Department of Public Works all of this experience may be had. River and harbor work provides it to a much less extent. We believe, therefore, that the Corps of Engineers will find on further consideration that the Jones-Reavis Bill, instead of being antagonistic to their interests, really in-

creases their field of usefulness and should receive their support rather than their hostility.

The American Association of Engineers. At the request of the Special Committee appointed by President Olsen, we are presenting their report upon the question of our affiliation with this Association. In this connection is also presented the statement issued by the American Association, setting forth its purposes and objects. This is a very important matter, and needs the careful consideration of all our members before it is formally passed upon. It is to be recalled that about five years ago we withdrew from an association of engineering societies, it being the feeling at that time that we could make better use of our funds from membership dues by having them entirely under our own control rather than sharing them with this other association. Whether experience has demonstrated the wisdom of this move or not is for us to decide. While the objects of this Association are somewhat different from the former one with which we were affiliated, there is still involved the question of turning over a portion of our income to that organization in the form of dues for our members.

New Orleans, La., Sept. 8, 1919

The President and Board of Directors,
Louisiana Engineering Society,
New Orleans, La.
Gentlemen:

At a meeting of the Society, held June 9, 1919, a motion was passed appointing a committee of three members to ascertain if it is desirable for the Louisiana Engineering Society to affiliate with the American Association of Engineers. Your committee begs leave to report that the American Association of Engineers is a large, virile national organization, with an active membership of more than six thousand. Its particular object is to raise the standard of ethics of the engineering profession, and to promote the economic and social welfare of engineers, leaving the advancement of engineers along technical lines to be supplied by the present national and local societies.

While it proposes to achieve its objects through a strong and numerous organization, it does not propose to do so in the manner followed by labor unions, but rather by the application of intelligent publicity methods.

The cost to the Society of becoming identified with this national organization would be dependent on the action of the Board of Directors of the American Association of Engineers, but it is believed that their action will be similar to that in the case of the Oregon Chapter of the A. A. E., in which the annual dues of \$12.00 were divided in the ratio of 2/3 to the Oregon Chapter, and 1/3 to the National Organization.

Your committee begs leave to report that while it is of the opinion that an amalgamation of the Louisiana Engineering Society with the American Association of Engineers is desirable, and recommends such action, at the same time it believes that the members of this Society are not generally well informed as to the objects and purposes of this national organization, and that before any definite action is taken by the membership on this proposed step, that there be published in our Journal the enclosed pamphlet, "The American Association of Engineers: What It Is—What It Does."

Very respectfully,

JOHN KLORER,
B. S. NELSON,
J. H. SEAMAN.

HISTORY

The American Association of Engineers was incorporated June 14, 1915 (but not for pecuniary profit), under the laws of the State of Illinois.

The national scope and type of organization could not possibly be named better than the American Association of Engineers. Almost from its inception the growth has been phenomenal, each year the membership doubling. By the end of 1919 there will be 10,000 members. We want this rate of growth to continue until A. A. E. shall have one hundred thousand or more

members. When that time comes the profession will have a national voice that will be heard.

The Association stands for idealism, yet for aggressive action. It desires that its aims and objects be presented to every engineer in the United States, to the end that all may join in helping to bring speedily a new era for engineers.

OBJECTS

The Constitution provides that:

"The objects of the Association shall be to raise the standards of ethics of the engineering profession and to promote the economic and social welfare of engineers, especially by:

"Affording means for the interchange of information beneficial to members of the engineering profession, maintaining a service clearing house for the benefit of members, influencing proposed legislation affecting the engineering profession, and taking action necessary or advisable to safeguard the profession's welfare, promulgating the Association's ideas through proper publicity, and fostering a brotherly spirit among engineers."

In order to carry out the above aims, definite activities have been undertaken.

COMPENSATION

For quite obvious reasons, the engineer and technician are receiving less wages than are being paid in other lines of endeavor. The American Association of Engineers has taken up the problem of securing adequate pay in a fearless and business-like way. The first branch to receive specific attention was the railroad engineer. At a national conference in Chicago, March 17, railroad engineers from all over the country came together and adopted a schedule of salaries which was presented to the Board of Wages and Working Conditions of the Railroad Administration in a hearing March 31 and April 1-2. A supplemental report, prepared in accordance with instructions of the Wage Board, consisting of a digest and summary of seventeen hundred questionnaires from engineer employees on ninety-one different railroads, was sent to the Wage Board on May 1. On June 2 the case was taken from the Wage Board and the Regional Directors were told by the Director of Operation that

they had authority to adjust engineers' salaries. The Northwestern Region was the first to put a new schedule into effect. The other Regions either have or are expected to fall into line. A railroad department has been organized in charge of an Assistant Secretary and staff. A competent committee of representative men from different parts of the country has been appointed to give direction to the railroad department and to make recommendations to the Executive Board in the formidable questions that will face his department.

If there were nothing else to justify the existence of A. A. E. than this successful effort, it would be sufficient to convince the thoughtful railroad engineer of the permanent value of A. A. E. membership.

A. A. E., through its Washington Secretary, obtained early in July the signature of the Assistant Secretary of the Navy, Franklin D. Roosevelt, authorizing new rates of pay for the technical force in the Navy. The Navy Technical Association had been endeavoring to bring this about for some time. If a business organization of engineers 6,000 strong can do this, what can an all-inclusive organization of 100,000 or more do? The obvious answer is for every engineer to join.

ENGINEERING FOR ENGINEERS

The salary problems of the other branches of the profession will be taken up in as rapid order as organization and thorough preparation make conditions favorable. The 1919 Annual Convention instructed the Executive Board to promote the non-technical interests of engineers in the employ of government, states, counties and municipalities. This work is now under way. A report making definite recommendations of pay for positions in several branches was presented to the 1919 Annual Convention by the Chicago Chapter Compensation Committee. The delegates instructed the Executive Board to extend the study to a national scope during the present year. The Executive Board has named an Organization Committee to plan ways and means to carry out these instructions. Like the railroad campaign, success will depend directly on the support given the Association by the public service and all other engineers joining, and thus giving to A. A. E. the strength that comes from numbers and adequate finances.

Several of the Chapters are now working on securing better pay for local engineers in public service in the employ of cities and states. National headquarters has acted as a clearing house in this work, and has backed up the local activities with definite recommendations.

EMPLOYMENT

The American Association of Engineers is proud of the assistance rendered its members through its Service Clearing House. This department is in charge of an Assistant Secretary and a suitable staff, and occupies rooms of its own at national headquarters. The Association, through its Employment Department, has filled several thousand positions with its members and has saved to them many thousand dollars which would have gone to commercial employment agencies. This amount is several times the annual dues of those who received employment service.

Plans are being carried out for increasing the scope and efficiency of the Service Clearing House until favorable contact shall be established with all the principal employers in the country. It is hoped that the capacity of this department can be increased until employers looking for five to ten thousand dollar men will come to A. A. E. for them, as they now do for men in lesser positions. It is also planned to develop a service patterned somewhat after the method of classification of personnel used in the army, whereby men were placed in the positions they were best qualified to fill. Such a rating should help members, particularly the young men, to direct their future. It should also be very useful to the Service Department in furnishing employers the best available men.

Every member is listed in the A. A. E. Directory in such a manner as to show plainly the work he is qualified to do. The Annual Directory will be a medium of increasing value to employer and to employee. The Association looks forward to the time when every reputable engineer in the United States will be listed in it—an all-inclusive classified list of American engineers. The motto of the Service Department is "No member out of employment."

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This block test, however, was not sufficient proof, and comparative flight tests on these same engines were made at one of the fields under the observation of army officials, the same engineers from the Lubrication Department and from the engine manufacturers. These flight tests were of thirty hours' duration and checked the results obtained on the block tests. The official conclusion, which was drawn up and signed by the three observers from the different departments, stated that both the mineral and Castor Oil gave entire satisfaction and there was little difference in the use of these oils from a lubricating standpoint, yet if they were classified according to performance, consumption and condition of these engines when taken down and general results, the classification would be the Liberty Aero Oil first and the Castor Oil last.

Even after this, the question would bob up constantly. It was a sort of 'fly in the ointment,' and it seemed to stay in the ointment regardless of the efforts made to pluck it out, though in one of the fields the conversion to mineral oil was so complete that when an attempt was made to get some used Castor Oil to see if it could be reclaimed, the Lubrication Engineer advised he had great difficulty in getting a pilot who would use the Castor Oil, which shows how the pendulum swings.

This same field also reported that in a French motor which they had received, which had been using Castor Oil, they found the pistons gummed tight, the Castor Oil having oxidized leaving a shellac-like surface; the motor had to be taken down and this varnish-like surface dissolved with alcohol, which probably would have been the condition of the engines arriving at the fields had the engine manufacturers been allowed to use Castor Oil in production and acceptance tests.

The necessity for using the same mineral oil on these engines from the production of engines and all parts, to the operation of the completed plane in the fields, is easily shown in the following illustration:

Contracts were let for pumps for the Liberty Engines, which pumps were to show a certain pressure at fixed speed. The pump manufacturers used a very heavy oil and paid no attention to temperatures. When the pumps were sent to the engine builders,

who were using an entirely different oil, the pumps were changed so as to get the desired pressure; when the engines were sent to the plane makers, they were tested with a different oil, which would not show the desired pressure, and the pumps again changed, and then when they arrived at the field for operation, there was still a different oil to contend with and another change necessary. These changes all resulted in delay and expense, which were remedied by the establishment of specification oil throughout the entire program.

Engineers from the Lubrication Department, at the request of the engine manufacturers, were finally sent to all the factories for the purpose of standardizing engines and parts as to lubrication; this work was handled in a most satisfactory manner, and the manufacturers were put on a standard basis of testing out and working in their motors with specification 3501 oil, the same as used at the flying fields.

The program of lubricating the rotary engines with Castor Oil was never seriously disturbed. There was so much to be done with lubrication of the stationary engine program that the oil men rather compromised with the situation by insisting that the stationary engines could be lubricated with mineral oil, and conceding that the Castor Oil, which was to be produced in such large quantities, could take care of the rotary engines.

However, those oil men were not satisfied that mineral oil could not be used on the rotary engines with an equal degree of success; neither were they satisfied that the Castor Oil program was going to be the great success the country and farmers had been led to believe. And so in a quiet way they set about the testing of rotary engines with mineral oil and mixtures of Castor and mineral.

The first tests were run on a Gnome Monosoupape Engine at the Washington Navy Yard, and were made with straight Castor Oil and then with mixtures of Castor and mineral oil, decreasing the castor mixture until the proportion was 90 per cent mineral oil and 10 per cent Castor. It was determined from these tests that the smaller the percentage of Castor Oil, the less gummy and adhesive was the carbon deposit, in fact, with the 10 per cent Castor mixture the carbon deposit was sooty and flaky

and very easily removed, in comparison with the very adhesive carbon deposited when straight Castor or the high percentage of Castor were used.

At this time a run was also made with straight mineral oil, but mechanical trouble had developed with the engine, and as there were more important matters pending in connection with the fixed cylinder engines, the lubricant for which had not been provided, no further tests were made on this engine at that time.

Later tests were made at the Le Rhone engine plant, another rotary engine of different type, of mineral oil, with very satisfactory results, and flight tests were also made at several of the fields with Le Rhone engines using Liberty Aero Oil, and reported upon satisfactorily. Finally, in order to have official confirming data regarding the lubrication of this rotary engine with mineral oil, it being the only rotary engine that entered into the 1919 program to any large extent, a rather elaborate program was laid out for flight tests, and an engineer from the Oil and Lubricating Branch detailed to handle the tests.

This program was just getting under way when the armistice was signed and the entire Oil and Lubrication Branch practically disbanded, the oil men returning to the industry before completion of the tests. However, the rumor has filtered through that these tests with the regular Liberty Aero Oil were a great success, that the mineral oil gave even better satisfaction than the Castor Oil, as when the rotary idles the plugs foul when using Castor, but not with the mineral oil, and that the pilots were very enthusiastic over the mineral oil, and the fields were asking permission to use the Liberty Aero Oil in place of the Castor.

If this rumor is really authentic, and it came pretty straight, then Mr. Parish's original belief and theory that the big Castor Oil Program was unnecessary is practically confirmed, and it was time, energy and money practically thrown away.

In view of these developments and the enormous amounts of money spent on the Castor Oil fallacy, it is little wonder that no one claims the credit or discredit for the inception of the idea. But it is a comfort to those who had the lubrication program in charge to know that had the war continued, even with

the flat failure of the Castor Oil program (and it was evidently a flat failure, as the anticipated production of 25 bushels of Castor beans per acre turned out an actual production of less than 5 bushels to the acre, according to our latest reports) the emergency was prepared for and the lubrication of the rotary engines would have been taken over by the lubrication engineers in the fields and by the petroleum industry without the slightest ripple in their operations.

MINUTES OF MEETINGS AND BUSINESS OF THE SOCIETY.

Special Meeting of the Society, June 23, 1919.

The meeting was called to order with President Olsen in the chair and 18 members and guests present. The meeting was called for the purpose of considering for the second time the following resolution offered by Mr. W. T. Hogg:—

“WHEREAS, the steady development of our port, and our manufacturing and commercial establishments is creating more and more congestion in the movement of vehicles over the streets of the crowded commercial districts; and

WHEREAS, the thoughtless development of our present street railway lines has left not a single street free for vehicular traffic to move in and out of the commercial sections above Canal Street.

BE IT RESOLVED, That the Louisiana Engineering Society deems it imperative to the future growth of our city that at least two streets leading up or west from Canal Street be freed from street railway tracks, and be reconstructed, one for the concentration of light, pleasure vehicular traffic, and the other for heavy commercial truckage.

BE IT FURTHER RESOLVED, That St. Charles Street, the logical connecting link between the St. Charles Avenue and Canal Street Boulevards, be devoted to pleasure vehicular traffic and Magazine or Tchoupitoulas Street, to heavy commercial truckage.”

Mr. Hughes, representing Mr. Ben Beekman, was granted the floor, and spoke against the resolution.

The resolution was then put to a vote and carried unanimously.

There being no further business to come before the meeting, the same was adjourned.

JAMES M. ROBERT,
Secretary.

Regular Meeting of the Board of Direction, September 8, 1919.

The meeting was called to order with Messrs. Olsen, Lawes, Riess, Klöner and Robert present. The following applications were approved and ordered through the ballot:—

RESIDENT MEMBERS—W. H. Davidson, Elliott J. Dent, Charles A. Favrot, Andrew Wm. Jackman, James Richardson Lowe, Irving H. Morse.

TRANSFER FROM JUNIOR TO RESIDENT—Ralph Earl.

NON-RESIDENT—John Lovejoy Henning.

ASSOCIATE—Edmund Jefferson Glenny.

JUNIOR MEMBER—Emile Charroppine Freeland.

TRANSFER FROM STUDENT TO JUNIOR—Henry Hester Bate, Joseph W. Joachim.

The application of Mr. J. R. Adams for re-instatement was acted upon favorably and accordingly Mr. Adams was re-instated to take effect from July 1, 1919.

There being no further business the meeting was adjourned.

JAMES M. ROBERT,
Secretary.

Regular Meeting of the Society, September 8, 1919.

The meeting was called to order with President Olsen in the chair and 38 members and guests present. The reading of the minutes of the previous meeting was dispensed with. A letter from the Order of Ancient and Modern America was read offering the accommodations of its Council Chamber for the use of the Engineering Society and was received with thanks.

Professor W. B. Gregory made a short talk on the proposed Department of Public Works and offered the following resolution to be passed by the Society:—

“RESOLVED, That the Louisiana Engineering Society endorses Senate Bill 2223 to create a Department of Public Works, and that this endorsement be forwarded to the two Louisiana Senators and our Representatives in Congress.”

Upon receipt, this resolution was passed and in accordance with the rules of the Society must be passed at two consecutive meetings.

The technical exercises of the evening were then proceeded with and Mr. W. M. Davis, Chief Engineer of the Lubricating Branch of the Texas Oil Company, read a most interesting paper on the “Organization of the Oil and Lubricating Branch of the Air Service.” After considerable discussion which was enjoyed by all, Mr. Davis was accorded a vote of thanks.

There being no further business the meeting was adjourned with the usual collation.

JAMES M. ROBERT,
Secretary.

RECENT ADDITIONS TO THE LIBRARY.

Petroleum Refining—Campbell.

Reconstruction—Friedman.

Scrap Metals—Vickers.

Aviation—Lage.

Aerobatics—Barber.

Aviation—Hayward.

Aviation—White.

Iron and Steel—Spring.

Fighting the Boche Underground—Trounce.

Industry and Humanity—King.

The Instructor—Allen.
Instincts in Industry—Trad.
Powdered Coal—Herington.
Piping—Svenson.
Purchasing—Rindfoos.
Marine Insurance—Winter.
Factory Management—6 Vols.
Machine Shop Library—9 Vols.
Engineering and Architectural Jurisprudence—Wait.
Shore Erosion and Protection—Johnson.
Our Natural Forests—Duouai.

keeping are engineering. A like comparison might be made with state and national activities. "Engineers for engineering" is one of our slogans. We expect by publicity to make it as impossible to appoint a lawyer as Director of Public Works as it would be to appoint a doctor as Attorney General. The Association will direct its efforts in due season to having the Secretary of Interior in the President's cabinet an engineer, and in seeing that one or more engineers are on the Interstate Commerce Commission.

One of the objects of the Association is to supervise legislation affecting engineers and to take necessary steps to safeguard their welfare. In this class falls licensing or statutory regulation in the practice of engineering. The principle on which licensing can be justified is to raise standards of practice in order that better service may be rendered the public. Last spring, when licensing was active in many states and laws were passed in several, A. A. E. was the chief functioning reservoir of information. While the Association has favored licensing for a long time, the policy followed is to help engineers of a state put the best possible law on the statute book, once they have decided to have a license law.

UNIONISM

The American Association of Engineers is a union of the same type as the United States Chamber of Commerce, of which it is a member, or as the American Medical Society, American Institute of Architects, Bar, or any other professional organization. A. A. E. has been characterized as the Engineers' Chamber of Commerce. A union after the order of a labor union it is not. It expects to attain its economic ends by the application of intelligence, by a united front and publicity. To accomplish these things a 100% organization is needed; 100% in efficiency and 100% inclusive of all professional engineers in the United States.

A. A. E. believes in application of intelligence, in co-operation and in loyalty to the employer.

Labor and capital must work hand in hand and must not fight. The engineer belongs to neither, but must be loyal to both and assist in bringing about co-operation.

Engineers favor increased production, lowering of unit costs and higher efficiency. They favor stimulating individual initiative so that the best that is in a man may be brought out.

To bring the wages of the engineer to a proper level is but one of the things A. A. E. is undertaking successfully, while in these times, securing adequate pay is the most important of our activities, yet there are many others, all non-technical in character and pertaining to the business side of life.

In determining a schedule of salaries, the American Association of Engineers does not believe in a standard wage down to which those of superior attainments are leveled, but a minimum for each position. The range above the minimum is determined solely by the ability of the individual to demonstrate his worth by salesmanship and work.

DEMOCRACY

A. A. E. is an American organization and is democratic to the core. Officers are nominated by petitions and selections have always been on the basis of past and hence expected service to the profession rather than as a reward for past technical achievements.

Recently a referendum ballot on ten activities of the Association was ordered by the Board of Directors in order that their relative importance in the minds of the members might be learned. A liberal response, both in number of ballots cast and in the constructive suggestions they contained, justified the procedure. The Association aims to help the individual member to develop increased usefulness and to develop for him larger opportunities.

MEMBERSHIP

Who Is Eligible.

Any engineer of good character who has had one or more years of experience, or one or more years' education at a recognized technical school as a minimum requirement, and who is willing to work to help the Association accomplish its aims. In numbers is strength, and by strength will we accomplish our objects. A. A. E. desires quality, but also quantity of members.

GRADES OF MEMBERSHIP

1. A Certified member shall be a graduate of any recognized technical engineering college or school who shall have had not less than two years of practical engineering experience, or any person who has had seven years of practical engineering work, three years of which shall have been in responsible charge of engineering work.

2. A Junior member shall be any person who is a graduate of any recognized technical engineering college or school, or who has had five years' practical engineering experience. A Junior member shall be dropped from membership after ten years unless he shall have previously passed to a higher grade.

3. A Candidate Junior member shall be any person who shall have had at least one year's practical engineering experience or one or more years' technical training in a recognized technical engineering college or school. A Candidate Junior member shall be dropped from membership after five years unless he shall have previously passed to a higher grade.

4. A Student member shall be a student at any recognized technical engineering college or school at the time of this application for membership. A student member shall be dropped from membership after six years unless he shall have previously passed to a higher grade.

5. An Associate member shall be a person at least 30 years of age, who is connected with or interested in engineering affairs. He shall present a written application stating his connection with and interest in the engineering profession, which application shall be signed by at least two certified members in good standing. The Qualifications Committee, if in its opinion said applicant has a high standing in his business or profession, shall recommend to the Board of Directors his application as an Associate member. There shall be no Associate member admitted into the Association over and above ten per cent of the number of Certified members.

DUES

Certified, Junior, Candidate Junior and Associate members pay \$10.00 per year dues and an entrance fee of \$6.00.

Student members pay \$3.00 per year, and are exempt from entrance or transfer fees at all times.

Entrance fees must accompany all applications.

Engineers while in the military service of the United States are not required to pay any dues or entrance fees until six months after declaration of peace, provided they are qualified for certified membership.

Engineers honorably discharged from military service, if accepted for membership, are granted free entrance fee if application is made within six months after discharge. First year's dues are payable upon notice of election to membership.

Entrance fee will be six dollars during the year of 1919. On January 1, 1920, it will be increased.

Every engineer who wants to see done what the Association has set out to do should, therefore, send in his application at once.

CLUBS, CHAPTERS AND SECTIONS.

Wherever twenty or more members can get together in any community they are urged to form a local, autonomous division of the national Association, called a chapter. A definite amount of the funds of the Association is returned for the chapter's use.

The purpose of the chapter is to subdivide and localize the activities of the Association. Each chapter has its own set of officers, which have full jurisdiction over the territory assigned to them. Business offices will be opened in connection with chapters in all cities, where the size warrants it, principally to handle local work.

Chapters are not only privileged, but urged, to take up all activities conducive to their development.

President Finley said: "We want the chapters to work out their own destiny, do their own work, take up the matters at hand in the community in which they live and are organized, with the fullest freedom. I consider the National Association of the A. A. E. as a sort of watch tower to register the work of the different chapters."

Where three or more, but less than twenty, can be brought together, American Association of Engineers' clubs are formed. There are now over thirty chapters and about the same number of clubs scattered all over the country.

A railroad section of A. A. E. can be formed on any railroad where there are ten or more members or prospective members of A. A. E. The railroad sections are completely harmonized with local chapters and subordinate to them, yet are given certain independence and power. The railroad section idea was conceived in connection with the March 17 Conference, and has been a means of benefit in bringing to a successful stage the railroad wage case.

BOOK REVIEWS

Shore Processes and Shore Line Development. By DOUGLAS WILSON JOHNSON, Professor of Physiography, Columbia University.

In all engineering works having any relations with sea-coast phenomena (either past or current), a knowledge of the processes by which the land and shore lines have been, or may be, modified, is desirable, and it frequently happens that, without such knowledge, the designing engineer fails to give to his employer or client the services to which he is entitled. The library of the Louisiana Engineering Society is supplied with rather an exceptional fund of literature on river regulation and related matters, but for an association of engineers, many of whose work is more or less intimately connected with sea-coast problems, our library is not well equipped with works bearing on such problems. The book which has just been published by Professor Johnson will prove to be a valuable addition to the library, and might be considered as the nucleus for additional volumes on kindred subjects. It is not, strictly speaking, an engineering book, but it will serve as an excellent groundwork for an engineering study of lands which have been formed or modified by sea agencies, problems of sea-coast protection, etc.

The average engineer will find that a casual examination of a considerable proportion of the book will suffice, as much space is taken up in a theoretical discussion of wave forms and dimensions, their origin, etc., and in terminology. A most copious reference to authorities follows each chapter, in fact, these references impress the ordinary reader as forming a complete bibliography of the subject. The general arrangement and "make-up" of the book are excellent tho the author apologizes in his preface for hasty termination of his work, which prevented "that careful attention to details which every work of this kind should receive." The hasty termination referred to was caused by the author's acceptance of a commission to assist in our recent efforts to clean house in Europe.

Of greatest interest to local engineers are the chapters describing shore currents, their effect on drift and shore lines, wave

action on gentle slopes and the results of sea currents when combined with the discharge of currents of silt-bearing streams.

The table of contents is sufficiently detailed to enable the student to select the matter which will serve his immediate purpose, and to avoid wasting time on details in which he may not be interested.

While the author does not present any startlingly new theories, his general method of treatment of the various subjects is well illustrated in the resume of one line of argument, in which he states that past general acceptance of a theory is not sufficient justification for future unquestioning acceptance.

So far as has been noted, the book does not contain the solution of any definite engineering problem, but it does make available for the use of engineers fundamental data, the intelligent use of which should assist in avoiding errors and in designing successful and economical structures.

ARTHUR M. SHAW.

PAPERS AND DISCUSSIONS

STORAGE AND DISTRIBUTION OF OIL AND GASOLINE AND THE RECLAMATION OF USED LUBRICATING OIL AT AVIATION FIELDS.

By W. M. DAVIS.

Read Before the Society, September 8, 1919.

As is well known, one of the prime essentials in the operation of airships is a supply of suitable gasoline and lubricating oil. On starting the various flying fields, it was soon found that there was a great diversity of opinion as to what oils should be used, also as to storage, handling and distribution. Each engineer officer, officer in charge of shops and hangars and also the representatives of the various aero engine companies, of whom there are usually one or more at each field, had his own particular ideas in regard to oils that should be used. Some claimed that castor oil was the only lubricant that would successfully lubricate aero engines. Some were in favor of petroleum oils, but wanted some particular brand, claiming that nothing else would answer; others wanted some other brand of oil. Still others were trying mixtures of petroleum and castor, and so it went until there was great confusion and annoyance, and the results were very unsatisfactory. Then some one connected with the air service had a happy thought and proposed that a department should be organized with the view to bring about a uniformity of practice in the use of oil and gasoline. Mr. W. F. Parish, who was at the head of the Technical Department of the Texas Company at New York City, was called to Washington and asked to take charge of the work. He at once proceeded to organize a staff of experienced lubricating engineers and oil inspectors, selected from the various oil companies. He first started a series of tests at the Bureau of Standards, and also at the Navy Yard Shops on the various makes of aero engines using various kinds and brands of oil and gasoline. He also organized a test laboratory and conducted a series of laboratory tests on all these oils, careful record being kept of the data, and this was tabulated. Then specifications were prepared for lubricating oil to be known

as Liberty Aero Oil, and for gasoline to be known as Aviation Gasoline, and all oil and gas to be bought must conform to these specifications. As the facilities for storage, handling and distribution of oils and gasoline in the various fields were very crude and wasteful, Mr. Parish called in the best talent he could procure and had designs prepared for a suitable oil storage house and laboratory with testing laboratory attached. About twelve different plans were submitted. From these, one that seemed to best meet the requirements was chosen, and an oil house was built at each field.

He then assembled a staff of lubricating engineers and oil inspectors, selecting them from the various oil companies, and, after a course of instruction, these men were sent to the various fields, a lubricating engineer and an oil inspector to each field. The oil houses were provided with storage tanks for new oil, one 5,000-gallon tank at each single unit field, two 5,000-gallon tanks at each double unit field; also reclaimers for treating the used oil, and tanks for storing the reclaimed oil. Outside of the oil house, at some convenient place near the railroad siding, were placed from two to four 10,000-gallon tanks underground for storing Aviation Gasoline, also storage capacity in the garages for motor gasoline. A system of reports was prepared, so that we had a complete check on the amount of oil used and in storage. Our daily report showed the balance from the day before, amounts for each week on lubricating oils received, amounts issued, and amounts on hand at the end of the day.

AERO ENGINES.

The engines used for training flyers, bombers, and gunners at the aviation fields were of the fixed cylinder type, this name being used to distinguish them from rotary cylinder types, such as the Gnome and the Le Rhône, but of these latter two makes but very few were used. Of the fixed cylinder engines, the ones in more general use were the Curtiss OX-5-type engine of about 90 H. P., the Hispano-Suiza engine of about 140 H. P., and the Liberty 12-cylinder engine of about 400 H. P. Most of the training at the primary fields, that is, where student aviators take their first instruction in flying, was done with the Curtiss OX-5 engine of 90 H. P. This was a very satisfactory engine;

in fact, one of the most satisfactory, as regards cost of maintenance and operation, of any, but was not powerful enough for use in advanced training, bombing, and gunnery work. For this the Hispano-Suiza and Liberty engines were used. The system of lubrication in all the fixed cylinder engines is practically the same, varying some in the details. The oil is forced by means of a pump through a hole in the shaft to the bearings and crank pins and up through the connecting rods to the wrist pin, the oil then falling into the sump, being pumped over again, a gauge being used to show the oil pressure. The Curtiss OX engine is what is known as a dry sump engine; by that is meant that there is a diaphragm plate in the crank case beneath the shaft and bearings with openings in it through which the oil drains into the lower part of the crank case, known as the sump. From there it is pumped back into the engine again. The object of the diaphragm plate is to prevent the oil, when stunting the ship, that is looping and making steep banks, etc., from dropping back into the cylinders and becoming burnt and dissipated. This also prevents to a great degree fouling of the spark plugs and piston rings. This type of engine is very economical on lubricating oil. The Hispano engine is more powerful than the Curtiss, averaging about 140 H. P., and while a very fine piece of workmanship, is more delicate in its parts and requires more careful handling and is more costly in upkeep and consumption of oil and gasoline. The reason why oil consumption is greater than in the Curtiss engine in proportion to power developed is due to the fact that it is a wet sump type, that is, there is no diaphragm plate or any other means of preventing the oil from flowing back into the cylinders when the ship is stunting. The Liberty engine is a force-feed type, the same as the two mentioned above, but has an auxiliary tank into which the oil drains and flows back to the engine again. I spoke about the two types of rotary cylinder engines, the Gnome and the La Rohne. When the Air Service was first organized, these engines were being used in France to quite an extent. It was deemed advisable to start the manufacture of them on this side, but as the stationary type of engine, such as the Curtiss, Hispano, and Liberty, were found to be so much more economical on gasoline and oil, very few of them were used, and I doubt if

there are today any of them in use. These engines are known as rotary engines, for the reason that the cylinders, of which there are several, revolved in a circle around the shaft, the gasoline being taken in through the crank case and without the use of a carburetor. It was therefore necessary to use a very rich mixture, and the reason why castor oil was necessary was due to the fact that the castor oil coming into intimate contact with the gasoline would retain its body and act as a lubricant better than petroleum oil. Petroleum oil being soluble in gasoline, soon became so thin as to be of no value. This is particularly true of the Gnome engine.

While I have been at all the aviation fields in the Southern States, yet as I am more familiar with the conditions at Ellington Field, I will describe the methods of distributing and handling oils and gasoline there.

The aviation gasoline was received in tank cars and run by gravity into the storage tanks. For distributing the gasoline on the fields we had 11 tank trucks, some of them Fords, and some Federals, from 150 to 350 gallons capacity each. The gasoline was pumped by means of a motor-driven rotary pump from the 10,000-gallon storage tanks into the tank trucks. There was also on each truck a small tank of about 10 or 15 gallons capacity for lubricating oil, and another tank for water for the radiators. These trucks were driven about the various flying fields, and when a ship landed and the pilot would call or signal for gas, a truck would drive up in front of the ship, the gas man would hand up the end of the hose to the pilot, who would stick the nozzle into the opening of the tank and the gasoline would be pumped into the tank. If he needed oil or water, that was put in also. Each truck was provided with a clip board and pad of report blanks. The driver would enter the number of the ship, the number of gallons of gasoline, and the number of quarts of oil. There was also a tank truck that made the rounds of the hangars at night, or early in the morning, so that when the ships went out to the field they had a full supply of oil and gasoline to start with. These reports were turned in daily and a summary made, showing the exact amount distributed during the day. A report was also kept by the Crew Chiefs or Hangar Chiefs, usually a Corporal or Sergeant, of the performance of

each ship, the number of the ship, number of engine, number of flying-hours, number of minutes idling time, number of gallons of gasoline received and quarts of oil. This data enabled us to figure up at the end of the week the amount of gasoline and oil used, total flying time, and idling time, which, added together, made the engine running time and the amount of gasoline and oil used per engine running hour. As we found that the temperature had something to do with the rate of oil consumption, we also kept a record of the average temperature and found by plotting the data on a chart in the form of a curve that if the weather got warmer, the consumption of oil per hour was increased. The consumption of oil also varied somewhat with the kind of flying that was done. For instance, as the weather got cooler this fall, we were expecting to see a decrease in the consumption per hour, but, to my surprise, it held up, and in some cases got higher. At first we were at a loss to know what caused this, as we knew conditions in the hangars were practically the same, and our records were being kept correctly. Some one then suggested that ships on the bombing field seemed to be using more oil than they were on straight flying, so then it occurred to us to ascertain just how much was used on each stage of flying, so we had our clerks take all the daily reports of the crews for one week, about two or three hundred of them, and divide them into the various stages; that is, separate the crew reports of those on cross-country flying and formation from those on gunnery work and bombing field, etc., and work out the consumption per hour for each stage. This showed that ships doing straight flying, such as cross-country flights and formation, would use less oil per hour than the ships on the gunnery stage, the bombing stage, and those on acrobatic work. This was due to the fact that on these last named stages the pilots did a great deal of steep climbing and banking, causing the oil to flow up into the cylinders and become thereby lost.

I suppose one of the most interesting features of our organization was the reclamation and cleansing of used aero engine oil, and putting it back into use again. When our department was first organized, some of the fields, especially those in the North, had been in operation several months. It was necessary to draw the oil out of the crank cases after every eight or ten hours fly-

ing. This oil was either being thrown away or else used for fuel. When our department was organized one of the first things that was done was to arrange to have all used oil put into barrels and drums and saved. The dirty oil on being brought from the hangars is emptied into storage tanks and we pump about 100 gallons into each reclaimer. This oil usually contains a small amount of gasoline, enough usually to bring the flash test way down. The first thing to do is drive off the gasoline. This was done by using live steam at about 30 pounds pressure. We take samples from time to time and make flash tests, and when we find it is back to its original test of 350° Fahrenheit or more, we then treat the oil with an alkali, which acts as a sort of coagulant, and causes the carbon matter to separate from the oil after standing several hours. We then examine the oil and when clean and free from carbon, we turn water into the bottom of the reclaimer and raise the whole mass up so as to allow the clean oil to flow off through an opening in the tank. We then take a sample of the oil and make a viscosity test; if too low, we add enough new heavy oil to bring it up to the required viscosity; if too heavy we add enough light oil to bring down to the required viscosity. The oil is then emptied into storage tanks in the basement, and is ready to issue out for use again.

In regard to the reclaimed oil, I will say that it has been entirely satisfactory in every respect. In fact, some of the officers in charge of flying seemed to think it was better than the new oil. One officer in particular, who had charge of testing out a number of ships with Liberty engines in them, liked it so well that he insisted he should have a barrel of it at the hangar so as to be sure of always having it to use. Another officer on starting off on a long flight filled up with reclaimed oil, and on his return said he had no spark plug trouble going out, but on his return trip, he had to use some other oil and then had spark plug trouble. We might say that a sample of gasoline was taken from each tank car before it was emptied into the storage tank and a distillation test was made.

In regard to the castor oil growing propaganda, which was given so much publicity in the press during the early part of 1918, I can say that as far as I knew personally, there was no castor oil used. The oils used at the fields where the writer was

stationed were exclusively petroleum oils, conforming strictly to the United States Army Specification No. 3501. As the best explanation of the use, or rather lack of use, of castor oil in the Air Service, I will read from an article that appeared in the "National Petroleum News" of July 16, entitled "The Castor Oil Bubble and How It Was Bursted." This, I understand, was written by a person who was intimately connected with the lubrication branch of the Air Service from its organization until the end of the War, so it can be considered authoritative.

"It is doubted if Sherlock Holmes, with all his ability to penetrate the mysteries of the unknown, could go to Washington and uncover the discoverer of the Castor Oil Bug! It is the child of nobody's brain! The great minds which conceived the idea of 'Reviving a Lost American Industry,' as some of the papers put it, must have perished at Chateau-Thierry or Belleau Woods, for they are not to be found in Washington, and no one seems to know just whose brain gave birth to this wonderful thought.

The men who handled it last will probably inform you that it was 'passed on' to them by someone else, and no one accepts the responsibility for being the real father of the thought. It may be an illegitimate product, or it may be the accumulated result of the workings of many brains. At any rate, in the summer and fall of 1917 the idea became prevalent that the only thing that would save the nation from the invasion of the Hun and give American aircraft a place in the sun was the concentrated essence of this famous bean.

As the great Napoleon once said, 'A country can be prepared against the invasion of an army, but it stands helpless against the invasion of an idea,' and so it was with the Castor Oil mania. It was almost impossible to pick up a paper, from our best known five-cent weekly to the 'Four Corners Gazette,' without seeing at least a paragraph regarding the absolute necessity for Castor Oil to lubricate the Liberty Engines. Headlines flared with it, the farmers were circularized with it, and thousands upon thousands of dollars were spent in its attempted production.

There is a peculiar, rather unexplainable psychology back of the belief that Castor Oil is a superior lubricant to mineral oil. Before the days of aviation engines it was often used by racers

as an extra margin of safety, as they considered it would stand up longer under more severe conditions than mineral oil. It then became the general lubricant for all rotary engines, and at the beginning of the war, when the supplies of this product in Europe were inadequate, it was also used either straight or mixed with mineral oil in the stationary cylinder engines, especially when mechanical trouble developed.

One mixer of mineral and castor oil in London secured the exclusive recommendation for his mixture from the manufacturers of one of the best known aviation engines, gave this mixture a trade name, and sold it at a very high price. This condition was probably brought about for the reason that with aviation engines the risk was considered too great to justify experimenting, and as Castor Oil was generally looked upon as the lubricant for severe emergency conditions, it was accepted for aviation work, apparently without any technical data to warrant same.

When Mr. W. F. Parish first started his oil work in Washington on the basis of petroleum products, he was received with doubt and cynicism by most of the aviation engine designers and manufacturers. They seemed positive that Castor Oil was necessary to lubricate their engines. Our internal combustion engine builders were accustomed to small engines, and when they tackled the Liberty they were working on something far beyond their general practice, and were rather afraid of the proposition. When the first engines were designed, there was some difficulty with lubrication and Castor Oil was decided upon as the solution; this, however, did not remedy the mechanical difficulty and re-design was necessary; and when the engine was finally so designed that it would operate properly with Castor Oil, it would operate just as satisfactorily with mineral oil, providing that it was a mechanical difficulty that could not be attributed to the lubricant used.

However, had a sufficient supply of Castor Oil been available, even at an exorbitant price, it is believed that the manufacturers of the aviation engines would have insisted upon its use; and would never have allowed the petroleum men to enter the situation; but fortunately for the purse of the government, the Castor

Oil supply was too uncertain and experiments had to be made and a supply discovered of a more accessible product.

From data obtainable in regard to oil used by the Germans, they had never used Castor Oil, and no substantial basis could be found for the use of this oil and its mixtures by the French and English in their fixed cylinder engines.

The situation in Washington had advanced too far, however, to materially change the Castor Oil program; appropriations had already been arranged for and an organization started for the planting and crushing of the beans; the money could not be saved, and it was decided by Mr. Parish that it was good information to 'deceive the enemy.' Therefore, even after the specification for Liberty Aero Oil was arrived at and this oil was in use in the fields, no special attempt was made by the Lubrication Department to stop the Castor Oil propaganda.

Mr. Parish was for quite a few years prior to 1910, Chief of the Technical Force of the Vacuum Oil Company in Germany, with many lubrication engineers on his staff, and early in 1915 he learned that one of the engineers whom he had trained was an officer in the German army, in charge of all lubrication.

He knew this man so well that he could figure about the conclusions that would be drawn if this engineer heard the United States had to plant a vast acreage of Castor beans to obtain oil to lubricate their aviation engines. Mr. Parish figured the reasoning of the man, who was an expert engineer, would be about as follows:

'The U. S. must have Castor Oil; they have an improperly designed engine which is giving trouble, else they would not consider this necessary; with an improperly designed engine they cannot compete with Germany; depending on a newly organized industry and uncertain weather for their supplies of beans will cut down their operation and naturally their production.'

Thus it was reasoned that this very propaganda, which was too far along to stop, might prove helpful in misleading the enemy, and a benefit to us as long as we did not allow the forecast to come true.

PROCEEDINGS OF THE LOUISIANA ENGINEERING SOCIETY

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EDITORIAL NOTES AND COMMENT

Wood Preservation. The technical exercises of the November meeting of the Society were devoted to the reading of a paper and the discussion of the same entitled "Relation of Wood Preservation to Engineering," by Mr. Henry M. Rollins. It was a source of sincere regret that Mr. Rollins was ill and was not able to be with us to read and discuss the paper himself. We were fortunate, however, in having with us, a number of gentlemen actively engaged in the creosoting industry, some of whom were guests and others members of the Society, and they gave us the benefit of their expert knowledge and experience in the discussion of the paper.

One of the points which gave rise to considerable discussion was the statement on the part of several of the creosote

men as to the widely divergent and often impossible specifications for wood preservation sent in by engineers of this community as well as of other parts of the country. So strongly was this point emphasized that a resolution was passed authorizing the president to appoint a special committee to take up this question and make an attempt to secure standard sets of specifications, which would avoid the inconsistencies and errors of many of the specifications now in use.

In this connection there is published herewith as a part of the discussion the specifications of the American Wood Preservers' Association for creosoting timber, this being furnished through the courtesy of Mr. F. P. Hamilton of the Creosoted Materials Company. Professor Gregory called attention to some tests he had made upon certain timbers taken from the trestle of the Northeastern Railroad across Lake Pontchartrain. These were creosoted timbers and at the time they were removed from the trestle for the purpose of testing them, they had been in use about twenty-six years. The tests were made in the early part of the year 1909, and Professor Gregory has furnished a copy of the specifications under which the timbers were treated with creosote. As about thirty-six years have now elapsed since these specifications were prepared, it will be of interest to those engaged in the creosoting industries as well as to many engineers to compare these specifications with those of the present day as set forth in the proceedings of the American Wood Preservers Association.

Colonel Dent called attention to an experience of his with creosoted piles in San Juan, Porto Rico, in which it appeared that the life of a treated pile, on account of the attacks of the teredo, was only about five years. As this appears to be somewhat at variance with results obtained in other portions of the Caribbean and tropical waters, it might be of importance to the wood preservers to have some investigations made as to special or peculiar conditions which may have produced these results.

Another important question is the fire hazard of treated as compared with untreated timber. Concerning this point

several interesting instances were described in the discussion which would seem to indicate that the fire hazard from treated timber was very slight after the timbers had been exposed to the weather for some time. There was no statement, however, as to the danger of fire before the excess oil disappeared from the surface of the timbers.

It is hoped that the publication of the paper and discussion will bring forth additional facts, which we shall be glad to publish in subsequent issues of the Proceedings.

Cairo and Memphis Datum Planes. We are publishing in this issue a paper entitled "Memorandum on Mean Gulf Level of the Mississippi River Commission and on the Cairo and Memphis Datum Planes," prepared by U. S. Assistant Engineer, Kivas Tully, under the direction of Lieut. Col. Chas. L. Potter, Corps of Engineers, U. S. Army.

This is published at the suggestion of Professor Donald Derickson, head of the School of Civil Engineering, Tulane University. In a letter to the Editor, Professor Derickson states that during the summer of 1918 he was engaged as Special Assistant to the Board of Advisory Engineers, which was appointed to prepare a report upon the physical and financial feasibility of a Mississippi River railway crossing at or in the vicinity of New Orleans. This advisory Board was to report to the Public Belt Railroad Commission of the City of New Orleans.

He met with considerable difficulty at first in securing any definite and consistent information as to the exact meaning of Cairo and Memphis Datum planes, and consequently wrote to the Secretary of the Mississippi River Commission, stating the difficulties encountered. In reply he was furnished with a copy of Mr. Tully's report.

Believing that this report would furnish data of interest and of value to many members of this society, and to engineers from other parts of the country who may in their work for the first time be coming in contact with the term "Cairo Datum" and "Memphis Datum," Professor Derickson has made the very wise and timely suggestion that the report be

published in the Proceedings.' Through the courtesy of the Mississippi River Commission we have been supplied with a copy of the report for publication in this issue."

Paving Bids. In the latter part of October President Olsen of this Society was requested by Mr. Prevost Breckenridge, Chairman of the Paving Committee of the Association of Commerce, to appoint a committee of engineers for the purpose of examining into the fairness of the bids for paving, recently received by the city. The request for the appointment of this committee was concurred in by Mayor Behrman, Commissioner of Public Works, Stone, and the City Engineer.

President Olsen accordingly appointed a committee consisting of Mr. Marcel Garsaud, Chairman, Mr. Chas. E. Kerr and Mr. John Riess.

The conditions which brought about the necessity for such an investigation may be stated as follows:—

A short time ago the city received bids on pavements of various kinds for certain streets in the commercial district, and a certain number of the streets under consideration were included due to the efforts of the committee on street paving appointed by the Association of Commerce.

The property owners on these particular streets petitioned the Commission Council to have their streets paved at cost figures based on certain estimates made by the City Engineer's Department. Upon compiling the bids, however, it was found that these were far beyond the estimates originally made.

As the city does not feel justified in forcing the property owners to pave the streets under the above conditions, the Louisiana Engineering Society has been called upon as the best qualified body to make an impartial investigation and report upon the fairness of these bids, considering present cost of materials and labor conditions. The report of the committee is submitted herewith:—

New Orleans, October 30, 1919.

Mr. Ole K. Olsen, President,
Louisiana Engineering Society,
822 Perdido Street, City.

Dear Sir:—

The Committee appointed by you upon the request from the New Orleans Association of Commerce to examine into and report on the fairness of the bids recently received by the City, submits the following:

A conference was held with the City Engineer and we secured from him the detail estimates prepared by his department, together with the tabulation of all bids received by the City on Sub-surface Drainage Work and on Paving, all as proposed for the year 1920.

Invitations were extended to material furnishers and to the contractors who were apparently the low bidders on this work to meet and confer with the committee.

The material men gave all quotations made by them. The Contractors, in turn, gave the committee copies of their detailed estimates, or verbally furnished to the committee such information as was requested.

After careful study, a detailed estimate was made of the cost of the large items entering into the proposed construction. This estimate may be called the 'Committee's Bid,' was made independently, and is based on our knowledge of present day labor costs and on material quotations furnished to the contractors and to us. As an Exhibit, we submit a copy of our estimate. The prices named include an average gross profit of from 15 per cent to 20 per cent.

The estimates made by the City Engineer's Department are, in our opinion, too low, due principally to failure to take fully into consideration the present high cost of labor and its low efficiency, together with the expected raise in freight rates.

We considered it out of our province to examine into the material prices as quoted, except to note that they are no higher than the prevailing prices in all other lines of construction.

We are of the opinion that the low bids as submitted by the contractors for the various streets are fair and reasonable and carry only a legitimate margin of profit. With our knowledge of construction activities both here and in other parts of the country, we deem it highly improbable that any bids received within a year would be as favorable.

Our thanks are expressed for the courteous co-operation extended by the City Engineering Department, the Material Men, and the Contractors.

Respectfully submitted,

MARCEL GARSAUD, Chairman.

CHAS. M. KERR,

JOHN RIESS.

Estimates by Committee—Sub-Surface Drainage Work.

(1)

Excavation	\$ 1.78 Per Cu. Yd.
Clay Pipe 6"	.38 Per Lin. Ft.
Clay Pipe 10"	.72 Per Lin. Ft.
Clay Pipe 12"	.91 Per Lin. Ft.
Clay Pipe 15"	1.28 Per Lin. Ft.
Clay Pipe 18"	1.70 Per Lin. Ft.
Clay Pipe 21"	2.50 Per Lin. Ft.
Catch Basin No. 1	93.00 Each
Man Hole No. 1	26.70 Each
Handholes	23.00 Each
Cleanouts	11.00 Each
Old Stone Curb, reset	.38 Per Lin. Ft.
New Stone Curb	1.52 Per Lin. Ft.
Circular Curb	3.35 Per Lin. Ft.
Letters	.40 Each
Art. Stone Ft. Walks	2.20 Per Sq. Yd.
Brick Sidewalks	2.00 Per Sq. Yd.
Brick Re-laid	1.00 Per Sq. Yd.

Vit. Brick Ft. Walks	5.15 Per Sq. Yd.
Flag Re-laid	1.25 Per Sq. Yd.

(2)

Paving.

New Headers	\$ 1.32 Per Lin. Ft.
Old Headers	.80 Per Lin. Ft.
Concrete	17.00 Per. Cu. Yd.
Wood Block	4.46 Per Sq. Yd.
Binder	.73 Per Sq. Yd.
Asphalt	1.35 Per Sq. Yd.
Bitulithic	2.05 Per Sq. Yd.
Sm. Gran. Blk. New	5.56 Per Sq. Yd.

The American Association of Engineers. We published in the October issue of the Proceedings the report of the committee appointed to consider the advisability of the Louisiana Engineering Society affiliating with the above association. There was also published a complete statement of the aims and purposes of the American Association. The report of the committee was favorable to our affiliation with the larger association, and the matter is still to be acted upon by the Society. The Editor has recently received from Mr. L. C. Datz a communication in which Mr. Datz takes a very strong stand against having our society affiliate with the American Association. He believes that we should maintain a close relation with the National Engineering Societies, particularly in view of the fact that these societies are preparing to form some co-operative organization with very much the same aims as those of the American Association.

It is to be noted that this A. A. E. proposes to deal with a side of the engineering profession to which very little if any attention has been given by the great national engineering organizations, and this is the ethical and economical side as distinguished from the strictly professional or technical side. This aspect of the question is constantly assuming greater importance in the minds of engineers, particularly as they are awakening to a keener realization of their place in the progress of civilization and to a stronger sense of their responsibility as citizens. It is rather natural, therefore that the American

Association of Engineers should appeal rather definitely and strongly to engineers who are keeping in touch with current ideas.

If the organization of the American Association has served to arouse the older and more strictly technical societies to a sense of neglected opportunities, and has made them realize the necessity of branching out along these new paths, good has been done. Before we come to any definite decision with reference to our affiliation with any of these new organizations, it would seem to be the wiser course to wait until we hear something of the plans of the national societies in this new field.

Engineering Council Bulletin. A recent bulletin from the Engineering Council calls attention to the following items, some or all of which may prove of interest to our members:

The efforts of Engineering Council to secure the appointment of an engineer on the new industrial commission, recently designated by the President to consider and report on the labor situation, have been rewarded by the appointment of Mr. Herbert C. Hoover, who, as most engineers know is also the prospective President of the American Institute of Mining and Metallurgical Engineers.

The "Jones Reavis Bill" to create a National Department of Public Works was, in response to the request of the Engineers, Architects' and Contractors' Conference on Public Works, allowed to remain in committee of Congress without action, pending the prosecution of the campaign. A move to give it active legislative status will be made shortly after the opening of the fall term of Congress.

Senator Thomas of Colorado, at the closing hours of the recent session of Congress, introduced a bill for the establishment of a trained body of 200,000 railroad workers to constitute a railroad army reserve force subject to call by Secretary of War in the event of nation-wide railroads strikes.

According to a report of Brig. Gen. C. B. Drake, Chief of Motor Transport Corps, 216 types of passen-

ger automobiles and trucks were represented in the 150,000 machines purchased by War Department during recent war.

Bureau of Public Roads states that while expenditures during 1919 for hard-surface highways will set new records, with total of \$138,000,000, this figure is small in comparison with computed available total for 1920, of \$633,000,000, the spending of which promises to be dependent chiefly on quantity of materials present limited railway facilities can transport.

Office of Adjutant General announces that present policy governing selection and appointment of members of Officers' Reserve Commissioned Personnel, individual members of which will be qualified to perform fully duties of their respective grades when ordered into service in case of emergency. Officers commissioned in Officers' Reserve Corps to Oct. 31st, 1919, numbered 52,839.

Among the limiting factors in the progress of highway construction, according to Thos. H. MacDonald, Chief of Bureau of Public Roads, are: (a) inability to interest the more efficient contractors in road work; (b) lack of trained highway engineers. Concerning the latter, he states that while civil engineers have the fundamental knowledge to carry on road work, they must have additional and specialized experience before undertaking road building.

Contracts for electrical machinery for the propulsion of three new battleships have been awarded by the Navy Department,—price for three sets \$5,000,000. According to Navy officials electrically driven battleship, has given entire satisfaction and the Tennessee, the second to be thus equipped, will shortly be put in commission.

High cost of labor in the mining and treatment of pyrites promises according to the Bureau of Mines, a substitution of brimstone for much of the sulphur which has heretofore been derived from iron pyrites.

PAPERS AND DISCUSSIONS

RELATION OF WOOD PRESERVATION TO ENGINEERING

By HENRY M. ROLLINS.

Read before the Society, November 10, 1919.

The knowledge essential to the successful career of the engineer of to-day is far wider in its scope and variety than that of the engineer of the previous generation, so must the field of knowledge of the engineer of the next generation be greater than that of the present, for the engineer, though a specialist, is gaining recognition as a leader of progress, a builder, a business man, a director in the affairs of business, municipalities, and state craft.

Wood preservation in America owes its successful establishment, its record of usefulness, and its present position among American industries, to the intelligent effort of the leading engineers of the country, but more particularly to those of the period between 1875 and 1900, foremost among whom was that "Grand Old Man," Octave Chanute.

The report of the committee on the "Preservation of Timber" made to the annual convention of the A. S. C. E., in June, 1885, is the real beginning of organized effort to place wood preservation on an engineering basis, and to make the industry a national asset.

The attention given to wood preservation by our engineers from this date has been constant, and the progress made since that time in the science of wood preservation is due wholly to the perseverance of the engineers of the country.

Wood preservation is, no doubt, a legitimate child of the engineering profession, and is entitled to the assistance due to a child from its parent.

It is not necessary to state that all the cross ties, poles, piling and structural timbers of every description used in this country are used under the specification and supervision of the engineer.

When you look at the statistics showing timbers used, treated and untreated, you cannot but believe that the child is being neglected.

During 1918 the steam and electric railways of the country used 136,200,000 cross ties of which 30,000,000, or approximately 22 per cent were treated, 78 per cent untreated, and possibly the same percentage will hold when applied to other structural timbers.

You engineers who advocate preservation of timber and conservation of timber, must know what such practices are doing to our meager forest reserve. You can without much investigation almost name the day when structural timber will be a thing of the past.

Our forest area of today is approximately 25 per cent of the original acreage, and we are reducing our available supply, after allowing for annual growth, by approximately 65 billion feet annually. We are already experiencing the effect of this reduction in supply by a reduction in the annual cut, and abnormal prices for timber of all classes.

The engineer should feel the effect of this condition more quickly than any other class because it affects his plans and cost estimates very materially, and often causes changes in specifications, eliminating the timber, and using instead makeshifts.

The engineer can be of great service to the present generation, and of greater service to future generations, if he will assist, as he can, in the conservation of the timber of this country, by specifying where practicable, the use of treated timber instead of untreated timber, and by following up to the extent of seeing that treated timber is used when specified.

Such expressions coming from a wood preserver may seem selfish to some of you, but when you look at this proposition from all angles, you cannot fail to appreciate the fact that you, each of you, wish your structures to be as permanent as conditions will permit you to make them, which means conservation of materials and money, and put another way, means, where wood is used, treated timbers.

Now, as to the practical in timber treatment, engineers have a general knowledge of wood preservation, but this knowledge is not uniform in character and detail. This is evidenced by the great variety of specifications which originate with the engineers of the country.

Wood preservation in some things has passed the experimental stage. There are today innumerable records of treated material, which have given sufficient length of service to establish the industry as a necessity. In the earlier days of timber treatment in this country some of the operators tried to clothe their processes in mystery, and would have you believe that they alone knew the secrets of how to accomplish the magic results. Such conditions could not long maintain in this country of investigating minds, and today all that is known about timber treatment is available to those who wish to know.

This information has been gotten by careful investigation being carried on, and probably will be as long as we have timber to treat.

As an industrial people we are gradually adopting standard methods for the performance of certain specific things, and there exist no reasons why the specifications covering treatment of timber should not to some extent be standardized. That you may more clearly get my meaning I will name a few things which come to us from time to time.

In the steaming of timber to artificially season it, if the temperatures are excessive, or the steaming periods too long, it has the effect of reducing the strength of the timber. The percentage of loss in strength due to excessive steaming varies with the species of wood, and percentage of sap wood to heart wood. Yet, engineers in making specifications vary over large ranges in both temperatures and periods of time for steaming, these variations for the same class of timber ranging in temperature from 240° F. to 300° F., and in time from 2 hours to 16 hours.

The steaming period which has stored heat and possibly moisture in the wood, is followed by a period of vacuum, which exhausts the vapors from the treating cylinder, lowers the pressure and boiling point of the interior of the cylinder, thus facilitating the evaporation of the moisture in the wood by the heat stored up in it during the steaming period. It is reasonable to suppose that the length of vacuum period should be governed by the cylinder temperature. Inasmuch as very little evaporation will take place in the cylinder after the temperature

drops below the boiling point corresponding to the vacuums, very little good will be accomplished by continuing this part of the process beyond this point. Yet specifications vary on the length of this part of the process from 45 minutes to eight hours.

Some engineers attempt to supply additional heat during the vacuum period by the use of the closed heating coils in the treating cylinder, and write into their specifications: "The cylinder temperature during vacuum period must at all times be kept above the boiling point corresponding to the vacuum by means of closed heating coils in bottom of treating cylinder."

I do not believe that any engineer ever figured just how much heating surface you would need in the bottom of the cylinder to produce this result. Yet because it would be the ideal cylinder condition they continue to write it into their specifications.

Those of you who figure on this proposition bear in mind that most treating cylinders in the South are not covered with non-conductors, but rather that their surfaces are ideal for radiation, also that you have a rather doubtful medium for the transmission of the heat from the coils to the other parts of the interior of cylinder when you have reduced the interior pressure to a 24" vacuum. A pressure slightly lower than this, when used in connection with a "Thermos" bottle, practically prevents the transmission of heat.

Some specifications call for a certain amount of creosote oil to be injected per cubic foot, and also specify minimum penetration, which will be accepted; with no apparent regard to percent of sap-wood or heart wood in the timber under consideration. No engineer should expect to buy timber under such a specification at as low a figure as he could if only the amount of oil per cubic foot were specified. Some specifications demand that timber after treatment is finished shall be left in the cylinder for a period to prevent drip of oil from timber, others that it shall be immediately removed to prevent the same thing.

A perusal of a number of specifications will show you many points of difference, and lack of uniformity, where there should be none.

The creosote oil specification has been largely standardized, yet there are still extant oil specifications which have been obsolete for twenty years, and while it is now impossible to get oil complying with them, when the oil situation again approaches normal they will again make their appearance.

One other specification which I wish to mention is that covering piling. Some people who write specifications covering piling have not observed the general characteristics and shapes of tree trunks as they have walked through our forests, and occasionally we get a schedule wherein the prospective customer desires that all his piling of various lengths shall have the same butt measurement, and also that the tips shall all be of one size. This character of schedule is difficult to handle.

Has it ever occurred to you how many different sizes of piling are used for apparently the same class of loading? Some of our largest railway systems vary much in the size of piling, one having a standard of 14" butt, another 14" six feet from the butt, and still another diameter of 12" one quarter distance from butt.

My reason for enumerating the above is to show that, while each engineer has good and sufficient reasons for specifying what he does, there is a difference, and the instinct of the engineer to err on the side of safety, has probably established the habit of specifying larger piling than is absolutely necessary. I would also mention, that during the present period of high prices of timber and creosote oil, prices are more closely based on cubical contents of timber than at any time in the past, and your cost might be lowered by the use of small piling where your loading will permit, or possibly by the use of more small piling than would be required of the larger size, i. e., where you have been carrying certain loading on a four pile bent, put in five smaller ones.

There is still another factor in wood preservation which I have not mentioned, which is of mutual interest to the wood preserver and the engineer—that is inspection at treating plant. Any business man likes to come in personal touch with his customer, and the wood preserver likes to feel that the inspector on the job represents his customer, and he wants to feel that

if he satisfies the inspector he has satisfied his customer, and we all appreciate satisfied customers.

Sometimes, however, the wood preserver finds it very difficult to satisfy the inspector. This is sometimes brought about by the inexperience of the inspector, sometimes by misinterpretation of specifications by the wood preserver, or the inspector, and sometimes by the fact that the inspector's instructions do not permit him to exercise his mental faculties in the matter. I believe that all wood preservers will join me in saying that we are always delighted to get an inspector who knows what he wants, and knows when he gets it.

The failure to clothe inspectors with authority to pass on all questions arising in connection with work at treating plant often causes expensive delays, both to treating plant and customer, and of necessity increases cost of inspection.

The practical and the technical probably find more intrenchments about a treating plant for the carrying on of their contests than usually appear about other industries. The reason for this, of course, is that timber, ties and piling, and all other forms of wood are products of nature's laboratory, and are not produced to fit man made specifications, and therefore it is difficult to furnish material from this source of production which will grade 100 per cent on any specification.

Creosote oil is largely a by-product, and is not made according to any fixed formula, but of necessity must vary in percentage of its component parts, as the tars from which it is made vary, and as the requirements for other products from the tar still vary. There should be a certain tolerance permissible on all creosote oil specifications, and in view of our knowledge of the toxic values of creosote oil, I believe that this tolerance should be a liberal one.

The opportunity for discussion of the above topics before you gentlemen is one which I appreciate very much.

DISCUSSION

THE PRESIDENT: Gentlemen you have heard Mr. Rollins' very interesting paper on "Creosoting." We have with us this evening a number of distinguished gentlemen who are interested

in the creosoting industry, and we would be glad to hear from all of them. Mr. Lagrone, of the Louisiana Creosoting Company, of Winnfield, Louisiana, is here, I believe.

MR. LAGRONE: I don't know that I could add anything of interest to what is stated in the paper. I heartily endorse the things that have been stated, and feel like the writer has hit the nail on the head, all the way down.

MR. DUNSTON: With reference to that clause about specifications calling for a certain amount of creosote oil per cubic foot of timber, and requiring a certain amount of penetration, these are two things which work together; it takes so much oil to penetrate so much timber; and if you specify a smaller amount of oil, you will not get that penetration. Some customers, on round timber, specify a 12-pound treatment of oil with a minimum of an inch and a half penetration. According to forest service tests, it takes about $34\frac{1}{2}$ pounds of creosote oil to thoroughly penetrate the timber through and through, and 12 pounds of oil will penetrate about one-third of the volume of timber. That is, in round timber averaging 9 inches, an inch and a half penetration will leave over 50 per cent of the timber to be treated. Many points come up in the specifications which inspectors insist upon, and they cannot be met; it is a physical impossibility. The points brought out in the paper deserve your special consideration, and engineers should not simply follow the plan of copying the specifications of another man.

MR. LOCKET: Where do engineers get these specifications?

A MEMBER: One copies it from another, and another copies it from somebody else.

MAJOR DENT: I would like to ask whether the depth of penetration should be stated, or whether the pounds per cubic foot should be specified?

MR. DUNSTON: If you desire a certain penetration, you specify the penetration and then pay for the oil to make that penetration.

MAJOR DENT: Why should you specify straight penetration, and let the cubic feet go

MR. LAGRONE: If you paid for all the oil that the wood absorbed, that would be all right.

MAJOR DENT: You mean we don't get the penetration that we call for?

MR. LAGRONE: No, I mean if you specify a 2-inch penetration, the plant will have to treat the timber until they equal that penetration, and charge you for the oil it takes to make it. If you ask for the minimum penetration,—the character of the timber has a great deal to do with that; you will get more in one piece than in another.

MAJOR DENT: I remember, in San Juan, Porto Rico, I ran into a person who said he didn't know creosote from Worcester-shire Sauce. We put piling down there, and the untreated pile would be riddled by the teredo in six months, or may be less, and in the creosoted pile it ate through the creosote in about five years. The only protection to the piling that I found down there that really stood up was in some of the Navy Department work, where they copperplated that section between extreme low water and that portion wet by the wave wash. This applies to every creosoted pile I saw in that harbor.

PROF. DERICKSON: I think the important question, in this connection, is how long will it last? That has been the question in my mind. I was very much interested, the other day, where at St. Charles Avenue, opposite Tulane University, there were some ties exposed to view which had been in the ground about 22 years, creosoted with a 12-pound treatment. I got a piece of one of the ties, and, while it may have come to the knowledge of some of you that creosoted wood will last much longer, I was very much gratified to find that those piles were apparently in as good condition as when they were put down, with the exception that the center, near the spike, was what is termed "burned." I found the ties had been supplied by the creosote plant, I think, at Southport. Mr. Powell told me he had been instrumental in selling the ties. I understood the foreman said he had put them down more than 22 years ago. I think that was one of the best advertisements for creosoted wood with which I had ever come into contact. If any wood is subject to extraordinary conditions, it is a tie in the ground, part of the time wet, and part of the time dry. Those ties, I believe, had a 12-pound treatment. Possibly Mr. Braselman could give more information regarding them.

MR. BRASELMAN: Those ties were not treated in our plant here. They were treated by our plant in Beaumont, with 12 pounds of oil per cubic foot. Recently we got one of those ties from the company, and had it two or three months, and we hammered that tie and cut it to pieces, and didn't find a piece of rot in it.

The Southern Pacific built a freight shed, I think in 1897, in Lower California, in a section which was infested with the teredo. Just recently the lease on this special piece of property expired, and the railroad wanted to remove the pier, and it became easy to see the effect of the creosote on the preservation question. They made a close examination of those piles, and I think they found 60 or 70 per cent in good shape, which were used again, re-driven. I think that is one of the best examples of preservation by creosote.

PROF. GREGORY: Another example of the length of life of preserved wood is to be found in the bridge of the Northeastern Railroad. I don't know the exact date it was built, but it must have been about 35 years ago. When that structure was 27 years old, Mr. James Haugh, a past president of this society, sent ten samples to Tulane University of stringers that were 6 inches by 16, in cross section, and 30 feet long. These stringers had been preserved after all holes were bored and all framing completed, and the tests on those stringers compared favorably with new timber and with newly treated timber. Two years later, when the structure was 29 years old, seven more of the same specimens were sent to Tulane, and they showed practically the same result. That has been some years ago; I think the structure must now be thirty-five years old, at least.

THE PRESIDENT: Mr. Stream, have you anything to say about your wharf building down at Ceiba, Spanish Honduras?

MR. STREAM: We have a wharf in the Caribbean Sea, which is now sixteen years old, and it is just as good to-day as it was when it was put down, I think. It stands a heavy sea, and we have no trouble with it. Our ties are all creosoted. In fact, we creosote timbers for dwellings down there. We have been doing this for six or seven years now. It is so valuable to us that we wouldn't do without it. We shove in all the creosote

we can. We are rather extravagant with the creosote; we think it is profitable. I do not recall the exact amount of oil we use, but I think it is something around 12 pounds. That was the quantity we thought was the proper thing, at the time the wharf was built.

MR. HAMILTON: We always recommend more, in the tropics, around the Cuban waters. Not less than 20 pounds.

MR. STREAM: I don't think we have anything more than 12 pounds; not much more. I was looking at the piling several months ago, and it is in almost perfect shape.

MR. HAMILTON: I believe that for any work on land, or bridge timbers and things of that kind, a 12-pound treatment should last at least 30 years. I do not think that is an exaggerated statement. The specifications put out by the Wood Preservers' Association, I think, are the best that can be secured.

MR. LOCKETT: Any engineer can get copies of that, I suppose, by communicating with the association.

MR. HAMILTON: Yes. Copies are in this library, and in most every other library in the country. We get specifications every now and then calling for Forest Service, Grade A oil—something of that kind—and we have looked everywhere in the world for the specification, and we have gone to government officials and asked them where to get it; they didn't know. I took it upon myself to find the specification; I didn't know what it was, and the people who specified it couldn't tell what it was. We took it up with the Forest Products Laboratory, at Madison Wisconsin, and they said it had gone out of existence ten or twelve years ago, and they had no record of it. Another illustration of the kind of specifications that come to us is one for piling, 40 to 60 feet long, 12-inch tips and 14-inch butts. Now 12-inch tip and 40 feet long, would give you about a 16-inch butt. They wanted 40 to 60 feet long, 12-in tips and 14-inch butts. Such piling cannot be had.

MR. KLOSER: I think this is as opportune a time as I shall have to ask Mr. Hamilton whether he gets any of those ridiculous specifications from our office. When I first had occasion to write out specifications for creosoted timber, I did what all of us do—we look up all previous specifications, but there was

such a rigmarole of stuff in there that I did not understand, that I confessed my ignorance and went to one of the engineers connected with the creosoting works at Southport—none of whom are here tonight—and explained that what we wanted was a real good honest job of creosoting, and wanted him to write out specifications to get the proper results. What he gave us is what we put in the specifications on which we ask for bids, and I think, from the experience we have had, we get a fairly good result. I don't know how long ago that was, but it must have been about ten or twelve years. And since some mention has been made of specifications for that kind of work becoming obsolete in ten or twelve years. I think it is pertinent to study up the matter anew. I think they knew the business well, ten or twelve years ago, but it seems that specifications, in that length of time, become out of date, just as do specifications for grading lumber.

There happened to be two remarks made tonight which set me to thinking about something. One member said, with reference to creosoted ties taken out of St. Charles Avenue the other day, that the tie was in very good condition, except for some slight decay where the spike had been driven in. Professor Gregory, mentioning the structure over the Northeastern bridge, said all the holes for the fastenings were bored before the creosoting was done. I think we might learn something from those statements. It is very important, if it is possible to do so, that all the boring, all the fitting, and all the cutting of the timber should be done before creosoting, rather than afterwards. That was brought very forcibly to my notice last week in this way: We had occasion to load a machine, one of these levee machines, on a creosoted barge owned by the government, which apparently was in good condition. The machine skidded, however, going down on the barge along the track and struck the bumper blocks, which were fastened into the creosote with drift-bolts, and I noticed where the drift-bolts had been withdrawn by the force of this collision, that there seemed to be evidence of decay. So that it resolves itself into this: That what is put on a structure is not limited to the life of the timber only, but also to the fastenings.

We also notice, in some particular kinds of structure, that creosoting is not everything that we desire. One of the Levee Boards placed a contract a few months ago for a barge, similar to the one I referred to a moment ago, and we were particularly anxious that it should not be built of creosoted timber, for the reason that what we were after was a barge strong enough to stand up under severe duty, rather than a barge with an indefinite life. In that particular case, we had to specify lumber of very high grade, 85 per cent hard pine surface measure, and I think we have a better barge than the creosoted barge, on account of the fastenings being stronger. Also another feature that I think was in favor of the untreated timber for the barge was the fact that the oakum seems to deteriorate very rapidly in the creosoted barge. Those are little points occurring to me which might be of interest to some of the other members who have such problems to contend with.

MR. RIESS: Speaking from the contractor's point of view, we are finding it increasingly hard to get labor to handle creosoted lumber. I was recently engaged in the construction of a wharf in which the character of the creosote work was mean and ugly; the oil seemed to be very heavy, about the consistency of molasses, and we couldn't get the men to handle this lumber. Certain lumber coming under the same contract would be of a dry variety, and the men offered no objection, but whenever the supersaturated stuff with the heavy oil came along our crews would diminish right off. I think some effort should be made to get rid of the surface oil, so that the men could handle the material. The situation is becoming more and more difficult, and I think something ought to be done about it. The material should be given an after-treatment to rid it of the surplus oil appearing on the surface, or the character of the oil should be studied more carefully, so as not to have so much variation, and so as to make working conditions more agreeable. I would like to hear from the creosoting experts as to what could be done to remedy this condition.

MR. HAMILTON: The point is well taken that timbers ought to be framed in every case before treatment, and it can be done with little trouble; it can be done at a small cost, and should

be done. We do it all the time; we recommend that the framing be done at our plants, especially for bridge timbers. It means a little extra cost, but the plants are all in a position to do it, and there is no breaking of the creosote surface after it is treated. In the case of telephone poles this is the regular practice, poles being bored and gains cut before the poles are treated.

For the condition referred to by Mr. Riess, the empty cell treatment is probably as good as any. In that treatment you put in 10 or 15 or 16 pounds of oil and draw it out, leaving about 6. The oil is probably forced deeper into the fibers of the wood by this process than by the other 12-pound system. Then you don't get the oozing or bleeding, as the oil is drawn out. It is preferable to have the timber well seasoned in advance, if possible. You get a cleaner pole. The linemen didn't like to climb them, but they are getting over that, now. Hundreds and thousands of creosoted poles are being used. The Western Union and other telegraph and telephone companies are using creosoted poles almost altogether.

PROF. DERICKSON: We have listened to a valuable paper and interesting discussion, participated in by men who have special knowledge of the subject. The issue of the Proceedings in which this paper is to be published could be made a very valuable book of reference if the editor could be furnished with a standard set of specifications for wood preservation as approved by these experts.

MR. HAMILTON: We can furnish the specifications of the American Wood Preservers' Association, as published in the proceedings of the A. W. P. A. As a rule, they specify English oil, of which we have had very little in three or four years, practically none in this country.

THE PRESIDENT: I shall be glad to take up the question of the appointment of a special committee of contractors, architects and creosoting men to consider the matter of standard specifications for timber treatment, if there appears to be a sentiment in favor of same.

MR. KELLEHER: I would like to say, in this connection, that we have recently had correspondence upon the matter, and I suppose other creosoters have had, too, from the American Rail-

way Engineers' Society. I understand they have a committee which has made exhaustive investigations all over the country, and they recently had a committee down here which investigated the Lake Pontchartrain trestle and other work on these same lines, with a view of recommending standard specifications both for treatment and for oil for different kinds of work. If the matter was taken up in co-operation with them, it might avoid duplication of the work. In the meantime it might be very desirable to have a standard set of specifications for oil and treatment, because sometimes we get specifications which have apparently been put together from various sources, with such resulting inconsistencies as to make them very difficult to work out.

THE PRESIDENT: We should like to hear from Mr. Goldstein. I think he is the only representative of the architects present.

MR. GOLDSTEIN: I was thinking of asking a couple of questions, myself. We are in the habit of specifying a certain wood for sills, when we have wood construction, and where we have heart timber I don't know whether we get the penetration from the creosote. Would we be better off by specifying a lower grade timber for sills for that character of work? Would there be longer life in the wood, and a saving of money for the client? And with reference to the pilings on the city docks, could you treat the ends of the piles, without treating the whole pile?

MR. VANDERVEER: That has been tried, by leaving on a pile the inner skin for that portion which you don't care to have treated. How successful that has been, I couldn't say.

MR. ROACH: With reference to peculiar specifications, I recall in 1897, when I was with the L. & N. Railroad, somebody sent in a set of specifications, and we sent them to the Chief Engineer in Louisville and called his attention to what the specifications were and to the fact that no plant could tell us if there was any oil like it made. We then forgot the matter. A short while ago somebody on the Atlantic coast sent those identical specifications back. I had not seen them for nineteen years, but I remembered them because they were so remarkable when they were first sent in. So that same specification for oil and treatment, which we had thrown away and refused to fill nineteen years before, came back to us.

MR. KLOSER: The question of partially treated timber, which is desirable in some cases, and which also spells a great economy on some construction work, is very applicable to the construction of bulkhead work. I have had occasion to prepare specifications for bulkhead work, in which probably two-thirds of the sheet piling would be imbedded in the soil and the remaining portion subject to decay by reason of water, air, etc. It is perfectly feasible to build that unit of sheet piling, which ordinarily consists of three pieces of creosoted lumber, of five pieces, with one central creosoted piece, and the two sides built of four pieces with the top ends creosoted but not the lower ends. When creosoting costs something like \$18.00 to \$25.00 a thousand, and the work is extensive in character, there is quite an economy effected by resorting to this scheme. It is a very simple thing, and why it does not occur to us all, I cannot say.

I should like some information from Mr. Hamilton on another question. We completed a creosoted bulkhead at Gretna, and we recognize the fact that as soon as those oils are in the timber there is more or less fire hazard by carrying insurance, but after a certain period elapses I understand this risk or fire hazard is not so great. Is there any reliable information on that question which would assist one in determining when to discontinue the insurance on any particular piece of work?

MR. HAMILTON: I have no available information on that.

MR. ROBERT: Let me give just a little personal experience about the fire risk in connection with creosoted timbers. Those old timbers, referred to by Professor Gregory, which were taken out of the Northeastern bridge, appeared to us, after the completion of the tests, to be good stuff for a little extra firewood. So we cut them up and took them home, only to find out by sad experience that they simply would not burn at all.

MR. CARR: With reference to this point, about three months ago I had occasion to inspect a wharf at Tampico, which had been partly destroyed by fire two years before. This was a creosoted wharf, and although the thing had been pretty well rebuilt, the effects of the fire, and just how far it went, were very apparent. The damage to this wharf,—although there were three barges of sulphur alongside,—was more from breakage and

falling of heavy pipes than from the actual burning up of the old timbers. A lot of the old timbers and about 85 per cent of the piles stayed right there. It was thoroughly creosoted material, and I should say, from the fire hazard standpoint, that wharf at the time of the fire was a much better risk than untreated timber. The wharf was about five years old at the time of the fire. There was another structure near by, also exposed to the intense heat, which never caught fire. This, too, was of creosoted material.

MR. HAMILTON: I think I have said enough already, but I will state another instance. The Philadelphia and Reading R. R. had a pier at Philadelphia, constructed in much the same way as the one just referred to, and with creosoted flooring. This pier was filled with paper, some cotton and other inflammable stuff. It burned, and the steel structure twisted up like so many snakes, but the wood block floor was left in and a new steel structure was built over it. The blocks were burned or scorched on top, but they were left in. That was wood block flooring, however, and not piling.

MR. VANDERVEER: As to the matter of wood, we never advocate the treatment of heart pine timber; we think the treatment of the sap wood sufficient.

A MEMBER: You don't get 100% heart, do you? There is some sap in all, and the sap will rot in a few years, or eventually, and the heart part probably will not rot.

Is it not a fact that heart has a better tensile strength than sap? Is it not better to treat heart than sap, where tensile strength is a consideration?

MR. BRASELMAN: It has been found that heart timber is stronger, but the difference is very slight. If you specify square edge and sound long leaf, and get it treated, you get a character of timber that will withstand decay better than 85% or 90% heart untreated, or even treated, because the penetration is very slight. In the present lumber market, and there is no telling what the price will be, it is from \$12.00 to \$15.00 more in price than square edge and sound. There is quite a saving in that. In young virgin timber, however, it is quite a different proposition.

MR. HOGG: In speaking about the Northeastern bridge timber, Professor Gregory did not bring out the kind of treatment that was used there. I don't think it is the same treatment which is in use today.

PROF. GREGORY: The specifications under which the timber was treated form a part of the paper in which I reported those tests in the Transactions of the American Society of Civil Engineers. I shall look them up and submit them as a part of the discussion.

PROF. GREGORY: (Communicated): The specifications under which the timber was treated were as follows:

TIMBER.

The timber for creosoting shall be long-leaved or Southern pine. Sap surfaces on two or more sides are preferred.

PILES:—The piles shall be of long-leaved or Southern pine, not less than 14 in. at the butt. They shall be free from defects impairing their strength, and shall be reasonably straight.

The piles shall be clearly peeled, no inner skin being left on them. The oil used shall be so called creosote oil, from London, England, and shall be of a heavy quality.

The treatment shall vary according to the dimensions of the timbers and length of time they have been cut. Timbers of large and small dimensions shall not be treated in the same charge, neither shall timbers of differing stages of air seasoning, or the close-grained, be treated in the same charge with coarse or open-grained timbers.

The timbers shall be subjected first to live steam superheated to from 250° to 275° Fahr., and under a 30 to 40 lb. pressure. The live steam shall be admitted into the cylinders through perforated steam pipes, and the temperature shall be obtained by using superheated steam in closed pipes in the cylinders.

The length of time this steaming shall last will depend on the size of the timbers and the length of time they have been cut. In piles and large timbers freshly cut, as long a time as twelve hours may be required. After the steaming is accomplished, the live steam shall be shut off and the superheated steam shall be maintained at a temperature of 160° or more and a vacuum

of from 20 to 25 in. shall be held for four hours or longer, if the discharge from the pumps indicates the necessity.

OIL TREATMENT.—The temperature being maintained at 160° Fahr., the cylinders shall be promptly filled with creosote oil at a temperature as high as practicable (about 100° Fahr.). The oil shall be maintained at a pressure ranging from 100 to 120 lb., as experience and measurements must determine the length of time the oil treatment shall continue, so that the required amount of oil may be injected.

After the required amount of oil is injected, the superheated steam shall be shut off, the oil let out, the cylinders promptly opened at each end, and the timber immediately removed from the cylinder.

In the erection of timbers the sap side must be turned up, and framing or cutting of timbers shall not be permitted, if avoidable. All cut surfaces of timbers shall be saturated with hot asphaltum, thinned with creosote oil. The heads of the piles when cut shall be promptly coated with hot asphaltum and oil, even though the cut-off be temporary.

PROF. ANDERSON: Speaking as the editor of the Proceedings, I wish to second the suggestion of Professor Derickson to the effect that the representatives of the creosoting industry furnish a set of standard specifications for oil and treatment to be published in our journal. This would help to obviate some of the very difficulties of which they complain with regard to impossible specifications, and would be of great assistance to the engineering profession in this city and community. They might also give us some data on fire hazards and other questions which have been raised here this evening.

We would welcome the opportunity to publish any such data and information in the pages of our Proceedings.

MR. SCHMIDT: I have done a little work upon the problem of radiation from the surface of the creosoting cylinder.

If I remember correctly, there was considerably more heat radiated from the cylinder than was given to them by the coils. You can see from this that heating coils would not do much good. If the treating plants would lag their cylinders, possibly they would get better results. There is a plant at Atlanta in that

form, I think. I don't know whether the Slidell or other plants lag their cylinders.

MR. BRASELMAN: I think Professor Anderson is right about getting this data in concrete form, and I believe I represent the sentiment of the creosoters when I say that I would like to have the president appoint a committee to that end.

I would like to move that the president appoint a committee to look into this matter of gathering this data together.

(The motion was duly seconded and passed.)

THE PRESIDENT: I shall be very glad to appoint a committee after I have advised with certain persons in order to secure the best available men for the same.

MR. LOCKETT: I have given some attention to the question of lagging of cylinders, but I very much doubt whether the result would pay. It would mean quite an investment to cover one of those cylinders, when you realize they are several feet in diameter and 150 feet long. The covering would have to be very thick, and I doubt if the results would justify such a large expenditure.

MR. HAMILTON: (Communicated): With reference to the paper and discussion on creosoting at the last meeting of the Society, I am giving herewith two specifications which have been adopted by the American Wood Preservers' Association.

Some engineers specify a pure distillate of coal tar, such as is covered by Specification No. 1, but since the European War there has been practically no such oil as this imported, and none made in this country, and the available supply is so small as to preclude this specification from general use.

Specification No. 2, covers oil manufactured in this country, and which is not a pure distillate, but has an admixture of refined coal tar. This second specification has been almost universally used for the past three or four years on work of all classes, both for Government and private use, and is such as can be furnished by any of the creosoting plants.

SPECIFICATION NO. 1: The oil used shall be the best obtainable grade of coal-tar creosote; that is, it shall be a pure product obtained from coal-gas tar or coke-oven tar, and shall be free from any tar, including coal-gas tar and coke-oven tar, oil or residue

obtained from petroleum or any other source; it shall be completely liquid at 38 deg. C., and shall be free from suspended matter; the specific gravity of the oil at 38 deg. C., shall be at least 1.03. When distilled by the common method; that is, using an 8-oz. retort, asbestos covered, with standard thermometer, bulb $\frac{1}{2}$ inch above the surface of the oil—the creosote, calculated on the basis of dry oil, shall give no distillate below 200 deg. C., not more than 5 per cent below 210 deg. C., not more than 25 per cent below 235 deg. C., and the residue above 355 deg. C., if it exceeds 5 per cent in quantity, shall be soft. The oil shall not contain more than 3 per cent water.

SPECIFICATION NO. 2: The oil shall be a pure coal-tar product, consisting only of coal-tar distillates and oils obtained by the filtration of coal-tar. It shall contain no admixture of crude tar.

Water shall not exceed 2 per cent.

The specific gravity at 38 deg. C., shall not be less than 1.03 nor more than 1.12.

Matter insoluble by hot extraction with benzol shall not exceed 2 per cent.

The specific viscosity (Engler) at 82.3 deg. C., shall not be more than 1.170 for 200 cubic centimeters.

No variation above this standard shall be allowed. The term "Specific Viscosity" in this case, shall mean the number of seconds for water at 20 deg. C., given in the official certificate for the viscosimeter used, divided into the number of seconds for the creosote-tar solution at 82.3 deg. C.

On distillation by the standard method of the A. R. E. A. it shall yield the following fractions based on dry oil:

Not more than 1 per cent at 170 deg. C.

Not more than 5 per cent at 210 deg. C.

Not more than 30 per cent at 235 deg. C.

The residue at 355 deg. C. shall not exceed 26 per cent.

This second specification is what the representatives of the creosoting companies had in mind in their discussion of the Rollins' paper.

With further reference to the treatment with this oil, the following specifications are recommended and used by the U. S. Railroad Administration for air-seasoned timber:

"After the material is placed in the cylinder a vacuum of at least 22 inches shall be maintained until the wood is as dry and as free of air as practicable. The creosote oil shall then be introduced, without breaking the vacuum, until the cylinder is filled. The pressure shall be gradually raised and maintained at a minimum of 125 pounds per square inch until the required quantity of preservative is injected into the material, or until the Railroad's representative is satisfied that the largest volumetric injection, that is practicable, has been obtained. The temperature of the preservative during the pressure period shall be not less than 170 degrees Fahrenheit, nor more than 200 degrees Fahrenheit, and shall average at least 180 degrees Fahrenheit. After pressure is completed and the cylinder emptied of preservative, a vacuum shall be maintained until the material can be removed from the cylinder free from dripping preservative.

The treating plant shall be equipped with the thermometers and gauges necessary to indicate and record accurately the conditions at all stages during the treatment, and all equipment shall be maintained in condition satisfactory to the Railroad. The owner of the treating plant shall also provide and keep in condition for use at all times the apparatus and chemicals necessary for making the analyses and tests required in these specifications.

When permission is given to prepare the material for treatment by steaming instead of seasoning by air, it shall not be subjected to pressures or temperatures for periods sufficient to injure the wood."

When the timber to be treated is green, as is nearly always the case, it is necessary that artificial seasoning

with steam be resorted to, and the following is the common method used under such conditions.

The timbers to be treated are run into the cylinders and doors closed. Live steam is admitted at such a rate as to secure a pressure of 20 to 30 pounds within 30 to 60 minutes. This steam pressure is maintained for a period varying from 2 to 12 hours, depending upon the character of the timber and its condition, and upon the judgment of the plant engineer, care being taken not to over-heat the timbers.

A vacuum is then applied and maintained for at least one-half hour or longer if necessary, to draw the vapors and sap from the cylinder. At the expiration of this vacuum, the preservative oil is admitted to the cylinder without breaking the vacuum, until the cylinder is entirely filled with the preservative oil, which has been heated to a temperature of 170 to 190 degrees Fahrenheit before admission into the cylinder. Pressure is then applied and maintained until the timbers have absorbed the required amount of preservative. The pressure is then released and the surplus oil drained from the cylinder.

I believe that the above covers the most approved and universally used method of treatment.

The plant engineer, of course, should be allowed to use a reasonable amount of judgment in connection with the purchaser's inspector.

MEMORANDUM ON MEAN GULF LEVEL OF THE MISSISSIPPI RIVER COMMISSION AND ON THE CAIRO AND MEMPHIS DATUM PLANES.

Prepared under the direction of Lieutenant Colonel Chas. L. Potter,
Corps of Engineers, U. S. Army, Secretary, by
Kivas Tully, Assistant Engineer.

February 23, 1912.

Three datum plans have been used by the Mississippi River Commission, namely:

1. Cairo datum.
2. Memphis datum.
3. Mean Gulf level.
 - (a) Preliminary value.
 - (b) Adopted value.

Before giving the final relation of these different planes to each other as determined by rerunning the precise levels between Biloxi, Miss., and Cairo, Ill., the following explanation of how these different datum planes came into use is offered:

In 1876, before the creation of the Mississippi River Commission, the survey of the Mississippi River was begun under the direction of Maj. C. B. Comstock, Corps of Engineers, U. S. Army, in the vicinity of Cairo, Ill. No sea level connection was available at that time at Cairo, and it became necessary to adopt a datum to which levels of the survey could be referred temporarily. This datum was taken at 300 feet below a plane then known as the Cairo City datum, which read 9.16 feet on the U. S. Engineer gage at Cairo, Ill. This Cairo City datum was also known as "mean low water" at Cairo, and the zero of the local gage in use prior to 1871 was at this elevation. This plane, 300 feet below the city datum, has since been known as the "Cairo datum."

When the same survey, under Major Comstock, was taken up in the vicinity of Memphis, in 1877, there was still no sea level connection nor was there any precise level connection with Cairo, so it became necessary to adopt another local datum temporarily. This datum was taken at 225 feet below the high water of June 23, 1858, which read 34.16 feet on the U. S. Engineer gage at Memphis, Tenn., 230 miles below Cairo. This place has since been known as the "Memphis datum."

These surveys under Major Comstock in the vicinity of Cairo and in vicinity of Memphis, were not connected by precise levels until 1880, after the work was taken up by the Mississippi River Commission, but as charts of these Comstock surveys were published in 1878 and 1879, the elevations on each set were necessarily referred to their respective local datum planes.

The first connection by precise levels between Cairo and Memphis was completed in 1880. The precise levels were run under Major Comstock from Cairo to Columbus (21) and under the Mississippi River Commission from Columbus to Memphis (230). By these levels the Cairo datum was 13.13 feet below the Memphis datum.

In this way did these two fictitious datum planes originate, and it is obvious that they were intentionally placed so low that when the survey reached the Gulf all corrections, to refer to Gulf level, would have the same sign.

The published elevations of all precise level benchmarks of the Mississippi River Commission prior to the adoption of mean Gulf level in 1899, were referred to the Cairo datum pursuant to a resolution of the Commission of January 6, 1881, from which the following is an extract: "The probable errors of the heights assigned to the different permanent benchmarks, with reference to the Gulf of Mexico, will ultimately be stated. For the present all our precise levels to be referred to the benchmarks at Cairo." (See Vol. 1 of Proceedings, 34th meeting.)

From the wording of this resolution the intention is evident to eventually refer all elevations to mean Gulf level when it should become known.

In order to determine the elevation of mean tide in the Gulf of Mexico, a tide-gage was established at Biloxi, Miss., by Commission in 1881, and read for several years. As a preliminary value, the mean of readings on the staff gage at this station from May 28 to October 13, 1882 (equal to 6.401 feet on the present gage) was used temporarily, but was not regarded at any time as more than an approximate value. This tide gage was connected by precise levels in 1882 with the line of precise levels along the Mississippi River from Cairo to New Orleans,

and the mean tide reading, described above, was found to be 21.26 feet above the Cairo datum. This was called preliminary value and was in use until the final value was adopted in 1899. In like manner the Memphis datum was found to be 8.13 feet below this preliminary value of Gulf level.

Subsequently lines of levels of the U. S. Coast Survey east of the Mississippi connecting with benchmarks of the Commission along the Mississippi River revealed considerable discrepancies between the two lines. About this time it was decided, but not for this reason, to level from Baton Rouge, La., to the Gulf, and this was done in 1898. The line from Biloxi, Miss., to New Orleans, La., was rerun early in 1900.

A final value for mean Gulf level was formally adopted by the Mississippi River Commission on June 21, 1899. (See Proceedings, M. R. C., Vol. 4, page 582, and Report of the Chief of Engineers, 1899, pages 3296 and 3476.) The resolution referred to above reads in part as follows:

"The elevation above the adopted mean Gulf level of all benchmarks and other permanent points, established by the general survey of the river, shall be compiled and printed in the revised and new editions of tabulations of elevations and descriptions of permanent points.

That, as far as practicable, all permanent benchmarks, whose elevations are known, shall be marked with number and elevation above the adopted mean Gulf level, these marks to be similar to those used during the season of 1898 on the survey north of St. Paul, Minn.

That the Secretary of the Commission be directed to carry out the requirements of these resolutions."

The mean Gulf level thus adopted reads 6.083 feet on the staff at Biloxi, Miss., and is derived from 5 years tidal records at that station.

Beginning with the annual report of 1900, and in accordance with the foregoing resolutions, this office has published the elevations of all precise benchmarks with reference to mean Gulf levels where connection by releveling is available.

In 1900 the line from Fort Adams, Miss. (755) to Baton Rouge, La. (833) was relevelled, and subsequently the releveling was carried northward from Fort Adams, until finally in

1910, the line from Cairo, Ill., to Memphis, Tenn. (230), was rerun, thus completing the releveling from Cairo, Ill., to the Gulf of Mexico.

The results of the releveling makes the Cairo datum 20.434 feet below the adopted mean Gulf level at Biloxi, Miss., and makes the Memphis datum 6.630 feet below the same mean Gulf level. This shows a discrepancy between the earlier and later lines of precise levels of 0.508 foot at Cairo, and 1.182 feet at Memphis. The discrepancies seem to increase irregularly until Greenville is reached, and then decrease irregularly. The discrepancy from Memphis to Cairo is 0.674 foot, or slightly greater than the total discrepancy between the terminal points, Biloxi and Cairo as shown above.

The discrepancies along the line of levels are very irregular, as indicated in the table given below, but as it is proposed to submit a separate memorandum on the discrepancies between the earlier and later leveling the subject will be only briefly referred to here.

The earlier levels were run in part by the Comstock survey, in part by the U. S. Coast and Goedetic Survey and in part by the Mississippi River Commission.

The leveling, however, was all done by the Mississippi River Commission, and as the methods have been much improved since the earlier leveling was done, it has been tentatively decided to accept the releveling as correct.

The following are discrepancies between the two lines of levels at some of the principal points along the Mississippi River on the line from Biloxi to Cairo:

Location of Benchmark—	Precise Benchmark	Miles below Cairo	Discrep- ancy in precise level lines Feet.	Discrep- ancies referred to Memphis Feet.
New Orleans, La. (Carrollton).....	P. B. M. City Stone..... "XXMB June, 1874"	957	+0.080	—1.102
Collego Point, La.....	P. B. M. XII.....	904	+0.109	—1.073
Baton Rouge, La.....	P. B. M. XXXI.....	833	+0.461	—0.721
Opposite Bayou Sara, La.....	P. B. M. XXXIX..... N. W. Base	800	+1.003	—0.179
Two miles below Red River Landing, La.....	P. B. M. XLV.....	767	+0.729	—0.453
Vidalia, opposite Natchez, Miss.....	P. B. M. LXII.....	700	+1.098	—0.084
St. Joseph, La.....	P. B. M. 29.....	647	+1.355	+0.173
Two Miles above Delta, La.....	P. B. M. 211.....	596	+1.219	+0.037
Opposite Lake Providence, La.....	P. B. M. 112.....	542	+1.297	+0.115
Greenville, Miss.	B. M. 1 (C. & G. S.).....	478	+1.475	+0.293
Twenty-two miles above Arkansas City, Ark.....	P. B. M. 77.....	417	+1.441	+0.259
Opposite Mouth of White River, Ark.....	P. B. M. 67.....	393	+1.377	+0.195
Friars Point, Miss.....	P. B. M. Friars Point II.....	319	+0.892	—0.290
Helena, Ark.	P. B. M. Helena II.....	306	+0.776	—0.405
Austin, Miss.	P. B. M. Austin I.....	289	+1.012	—0.170
Memphis, Tenn.	P. B. M. Memphis '03.....	230	+1.160	—0.022
Memphis, Tenn.	P. B. M. 3 (Nicol 1876).....	230	+1.191*	+0.009
Memphis, Tenn.	P. B. M. 4 (Nicol 1876).....	230	+1.196	+0.014
Fulton, Tenn.	P. B. M. 43.....	175	+0.937	—0.245
Eight Miles below Cottonwood Point, Mo.....	P. B. M. 31.....	130	+0.829	—0.353
Hickman, Ky.	P. B. M. 14.....	36	+0.783	—0.399
Three Miles below Columbus, Ky.....	P. B. M. 10.....	24	+0.616	—0.566
Cairo, Ill. (M. R. C. Value).....	P. B. M. 2.....	0	+0.524	—0.658
Cairo, Ill. (Lake Sur. Value).....	P. B. M. 2.....	0	+0.545	—0.637
Cairo, Ill. (M. R. C. & Sur. Value).....	P. B. M. 1.....	0	+0.481	—0.701

Note—The plus sign indicates that the benchmark is higher by the later line of levels.

*Mean—1.182.

The above table indicates that if the later line of levels is accepted as correct, the elevation on the published detail charts of the Mississippi River Commission south of Cairo are in error by quantities varying from 0.0 to 1.1 feet, depending on the locality.

It is assumed for the present that the leveling northward of Cairo is correct. The error in elevations on the published charts of the Commission north of Cairo, Ill., is therefore 0.674 foot. That is, to reduce elevations published on detail charts of the Commission north of Cairo to latest value of Memphis datum, subtract 0.674 foot.

To reduce elevations of published detail charts of the Commission north of Cairo to finally adopted mean Gulf level, subtract 7.304 feet.

To reduce elevations on published charts of the Commission south of Cairo to Memphis datum, no constant correction can be given for reasons before stated.

On November 15, 1911, the Commission decided to refer elevations of surveys to the Memphis datum, and directed that provision be made for "putting, at each permanent benchmark on the map, both its elevation above Memphis datum and above mean Gulf level."

From what has been said before, however, it is evident that the Memphis datum elevations on the new maps will not agree with Memphis datum elevations on the old maps, and will not be directly comparable with them, until the old maps are corrected.

As an argument in favor of using only the mean Gulf level, it might be stated that the U. S. Coast and Geodetic Survey, after full investigation of the tidal records of the Commission, concluded to adopt the Commission value of mean Gulf level and has used it since, and in the general adjustment of the great continental level net published by Coast Survey in 1903 and 1907, elevations are all referred to mean sea level, which is assumed to be the same in the Atlantic and the Gulf of Mexico. The U. S. Geological Survey accepts this Coast Survey adjustment and publish elevations referred to Sea level, as does the U. S. Lake Survey, so that at the present time the most ex-

tensive surveys of the country are using a common datum, that is mean Sea level. The U. S. Weather Bureau also refers elevations to Sea level.

The former published values for Cairo and Memphis below preliminary value of mean Gulf level were:

Cairo datum	21.26 feet
Memphis datum	8.13 feet

Cairo datum below Memphis datum13.13 feet

The final values are as follows:

Datum planes referred to finally adopted mean Gulf levels.

Values final.

Cairo datum	-20.434 feet
Memphis datum	-6.630 feet
Mean Gulf level	

(a) Preliminary value +0.318

(b) Finally adopted value 0.000

CONCLUSION: The elevations of all precise level benchmarks of the Commission are now to be referred to the adopted mean Gulf level by resolution of the Commission.

The elevations of all gage zeros are now published by this office referred to adopted mean Gulf level.

The U. S. Coast and Geodetic Survey and other extensive U. S. surveys refer all elevations to this sea level datum, which will undoubtedly be the future reference plane of all general surveys of the United States and of all the great railroads.

By resolution of the Commission of November 15, 1911,

* * * "The surveys will be referred to the Memphis datum"

* * * (This especially refers to the resurvey below Cairo.)

The published charts of the Mississippi River Commission refer elevations to Memphis datum, using of course, the earlier levels, but the writer does not know of any resolution of the Commission prior to that of 1911, just quoted, directing the use of the Memphis datum.

MINUTES OF MEETINGS AND BUSINESS OF THE SOCIETY.

Regular Meeting of the Board of Direction, October 13, 1919.

The meeting was called to order with President Olsen in the chair and the following members present: Messrs. Lawes, Klorer, Burwell, Moses, Robert. Messrs. Riess and Williamson came in later. The minutes of the previous meeting were read and approved. The ballots for new members were then opened, there being 67 ballots. As a result the following members were elected to the respective grades of membership:

Resident Members.—W. H. Davidson, Elliott J. Dent, Charles A. Favrot, Andrew Wm. Jackman, James R. Lowe, Irving H. Morse.

Non-Resident Member.—John L. Henning.

Transfer from Junior to Resident Member.—Ralph Earl.

Associate Member.—Edmund J. Glenny.

Junior Member.—Emile C. Freeland.

Transfer from Student to Junior.—Henry Hester Bate, Joseph W. Joachim.

Upon application of Mr. Frank Reynolds, his status was changed from Resident to Non-Resident, and the status of Mr. E. H. Coleman was changed from Non-Resident to Resident, both as of October 1st, 1919.

A letter from Professor Anderson, the Editor of the Proceedings, requesting an appropriation of \$15.00 per month for office assistance in preparing the Proceedings. His request was granted.

The financial report of the Secretary was read and received and bills ordered paid.

Upon motion, the matter pertaining to the American Society of Engineers was ordered printed in the Journal so that the membership might get acquainted with the proposition before deciding on the affiliation with the same.

There being no further business, the meeting adjourned.

J. M. ROBERT, Secretary.

Regular Meeting of the Society, October 13, 1919.

The meeting was called to order with President Olsen in the chair and 72 members and guests present. The minutes of the previous meeting were read and approved. Mr. Klorer made a brief statement concerning our affiliation with the American Association of Engineers.

The resolution of Major W. B. Gregory was passed to the second reading. The resolution was read as follows:

“Resolved, That the Louisiana Engineering Society endorses Senate Bill 2232 to create a Department of Public Works, and that this endorsement be forwarded to the two Louisiana Senators and our Representatives in Congress.”

Upon motion duly seconded, this resolution was carried for the second time.

The technical exercises of the evening were then proceeded with and Mr. W. J. White, Engineer of the Dock Board, read a most interesting illustrated paper entitled, "Dredging Inner Harbor Navigation Canal for the Port of New Orleans." There was a great deal of interesting discussion which was enjoyed by all present.

After the discussion, Dr. H. H. Howe, Vice-President of the National Research Council, made a very interesting statement of the work of the Council during the war and its aims for peace.

There being no further business, the meeting adjourned to the usual collation.

J. M. ROBERT, Secretary.

Regular Meeting of the Board of Direction, November 10, 1919.

The meeting was called to order with Mr. Olsen in the chair and the following members present: Messrs. Riess, Burwell, Moses and Robert.

Upon motion duly seconded, the names of _____ and _____ were removed from the roll for non-payment of dues.

A communication from the Red Cross was received and filed. The financial report was read and approved and bills ordered paid.

There being no further business, the meeting adjourned.

J. M. ROBERT, Secretary.

Regular Meeting of the Society, November 10, 1919.

Meeting was called to order with President Olsen in the chair and 30 members and guests present. Minutes of the previous meeting were read and approved. Mr. John Riess made a short statement of the work of his committee on the paving work going on in New Orleans.

An invitation from the American Society of Municipal Improvements was read inviting the members of this Society to attend all sessions of the Convention in this City.

The technical paper for the evening was then proceeded with and a very interesting paper by Mr. Henry M. Rollins was read entitled, "The Relation of Wood Preservation to Engineering." This paper created a great deal of interesting discussion and upon motion by Mr. Braselman, it was decided to appoint a committee to compile in a way the information brought out in the discussion in order that it may be published in the Proceedings.

There being no further business, the meeting adjourned to the usual collation.

J. M. ROBERT, Secretary.

Recent Additions to the Library.

(December 5, 1919.)

- Waterworks Handbook.—Flinn, Weston and Bogert.
Use of Water in Irrigation.—Fortier.
Concrete Construction for Rural Communities.—Seaton.
Technical Gas and Fuel Analysis.—White.
Engine Room Chemistry.—Gill.
Cement and Concrete.—Sabin.
Power Plant Testing.—Moyer.
Gas Engine Ignition.—Norris, Winning and Weaver.
Textbook of the Materials of Engineering.—Moore.
Manufacturing Costs and Accounts.—Church.
Works Management.—Ennis.
Technology and Industrial Efficiency.
Irrigation Practice and Engineering.—Etcheverry (3 vols.)
Operation and Maintenance of Irrigation Systems.—Harding.