A SUPPLEMENT

to

"A REPORT OF HURRICANES, AND CONDITIONS
INDICATING A HURRICANE, IN THE VICINITY
OF GALVESTON, TEXAS, FROM 1867 to 1916."
CARRYING THE RECORD BACK TO THE YEAR 1818.

to

MR.DAVID DALY

MANAGER

GALVESTON-HOUSTON ELECTRIC RAILWAY COMPANY

MARCH 21, 1916.

BY REX DUNBAR FRAZIER

Supplementing the report of March 7, 1916, "A Report of Hurricanes, and Conditions Indicating a Hurricane, in the Vicinity of Galveston, from 1867 to 1916," there is given herewith additional information and data carrying the record back to 1818.

This has been gathered from a manuscript prepared by Clarence Ousley immediately following the hurricane of September 1-10, 1900; inbound letter No. 621.6 from Ben C. Stuart, Beaumont, Texas, in the files of the Houston office of the United States Weather Bureau; Bancroft's history; works of Francis Parkman and issues of newspapers, as mentioned, on file in the Rosenberg Library, Galveston.

Tradition tells of great gales that have swept the Texas coast, inundating it to a great extent and uprooting trees, casting ships far inland and changing the coast line. Historical reference is made to gales that wrecked the ships of the early explorers. Probably the first is in the narrative of Alver Nunez, a Spanish explorer, who, with forty-eight companions, the survivors of a party of two hundred and forty, was cast ashore during a gale in November, 1527. They landed on an island called Malhado, which, according to historians, was in all probability Galveston Island. LaSalle, in his wanderings along the Texas coast searching for the mouth of the Mississippi river, encountered severe gales.

According to the Spanish chroniclers a severe gale on September 4, 1766, destroyed a mission on the shore of Galveston bay and caused a high tide which inundated the land.

Several years ago the writer was told that the bleaching hulk of a wrecked vessel stood forty miles inland on the prairie between Matagorda and Copano bays. This vessel had been there within the memory of the earliest settlers. About eight or nine years ago the rotting hulk of an old vessel was uncovered at a point about twenty-five miles west of Houston. This find was at least forty miles from the nearest salt water, but as it was only four miles from the channel of the Brazos river very likely it had been carried overland and buried during one of the periodical floods of that stream. The oldest resident in that vicinity did not know when the vessel had been wrecked, so it evidently occurred in the early part of the past century, or possibly earlier.

From the best authorities it is learned that up to the year 1816 Galveston was uninhabited, and it is probable that the only human beings regularly visiting Galveston island were the Carankawa, also spelled Carancahaus, indians. This was a tribe of stalwart savages, having the reputation of being cannibals, who hunted along the Texas coast and crossed to Galveston island by a series of shoals about fifteen miles west of the city. This string of shoals or reefs still bears their name.

In the narrative of Col. Warren D. C. Hall, printed in 1859, Galveston island in 1816 is mentioned as Snake Island, or Isle de Calebras as it was called by the Mexicans and Indians, and was not generally known, if at all, as Galveston. However, all the islands along the Texas coast were called Isles de

Calebras in consequence of the number of rattlesnakes to be found in the driftwood and sand hills common to all of the islands next to the Gulf shore. According to Col. Hall, the island in 1816 was composed mainly of marsh, with an occasional ridge or elevation of two or three feet, and the whole surface, with the exception of the bays and bayous, was covered with a luxuriant growth of grass.

The main island was separated from a smaller one to the eastward by a pass from the Gulf five or six feet deep, and the eastern island was known as Little Campeachy. Col. Hall fails to mention that Galveston island was called Campeachy, which is mentioned by different historians. According to an issue of the Galveston News under date of Tuesday, June 4, 1889, Don Luis Aury visited Galveston island on May 10, 1817, and found the pirate Lafitte, driven from Barataria, in full possession of the island. Aury mentions that the island was called Campeachy.

At that time Pelican island was merely a narrow piece of marsh on which it was impossible to walk dry-footed, except upon a small spot about one-hundred feet in length. The marsh--covered with sea grass growing in the mud--was covered with water at high tides and not visible at any distance. Col. Hall mentions that by 1820 the island had increased to a kind of shell bank, the east side of which had a few small bushes growing upon it. As this was after the hurricane of 1818, it is evident that this storm or some previous hurricane changed the contour and topography of the island. The writer has examined old charts of

portions of the Texas coast he is familiar with. All were much different than at present. Islands and channels have appeared or disappeared during the past century; bays have changed their depths and the general shape of the shore has greatly changed. Without a doubt hurricanes have been the cause. In the previous report mention is made of the loss of several blocks of land off the east end of the city of Galveston during a hurricane. In the 1900 hurricane Galveston lost from one-half to two blocks of land fronting the entire Gulf shore. In the August, 1915, hurricane the beach outside of the sea wall disappeared and on Bolivar peninsula the waters of the Gulf encroached to such an extent that the Gulf and Interstate Railway Company was compelled to secure twenty miles of new right-of-way. The waters of the Gulf now cover the site where their tracks were located immediately before the hurricane.

Col. Hall also saw in 1820 what are now known as Deer Islands, west of the location of the Causeway. Now they are of fair size, but he described them as not having an acre of dry land on the largest and further mentioned that they were entirely covered with water during high tides. They were then known as Egg Islands, and there was not a bush of shrub on them.

Crossing Galveston island to the sand hills in the western portion of the present city limits there was an almost continuous marsh, a large portion of which was subject to overflow at periods of high tide.

The first great gale that visited Galveston, of which there is any authentic record, was in 1818, when four of Lafitte's vessels were sunk or driven ashore. Without doubt this was a hurricane whose center passed over or near the island. In the following year Col. Hall mentions that he saw the wrecks of these vessels. One was lying near L'Allemande's fort, the highest point of the island, and another was ashore at Virginia Point, the apex of the adjacent mainland to the north.

Owing to the fact that there was no settlement on Galveston island, and only at intervals was it visited by hunting and camping parties, the next mention of a hurricane is in the year 1837. On October 6 several buildings in the course of construction were blown down, and a number of vessels sunk or driven ashore, among them being the man-of-war Brutus and the privateer schooner Tom Toby.

The following account of this hurricane is from the Telegraph and Texas Register, (the first paper printed in Houston), of October 11, 1837:

"The late accounts from the seaboard are of the most distressing character. A tremendous gale appears to have swept the whole line of the coast and destroyed an immense amount of property. It commenced on the first and increased in violence until the sixth. At Velasco four houses were blown down; the whole country for miles around inundated and all of the vessels in the harbor, consisting of the brig Sam Houston, and the schooners DeKalb, Fannin, Texas and Caldwell were driven ashore. The last named has since been got off and cleared on Sunday last

for New Orleans. At Galveston the waters were driven in with such violence that they rose six or seven feet higher than the ordinary spring tide. They inundated a large portion of the east end of the island and compelled the soldiers of the garrison to desert their barracks and seek shelter on the elevated ground near the intended site of Galveston City.

"The large new warehouse of Mr. McKinney and the new custom house were completely destroyed and the goods scattered over the island. The brigs Perseverance, Jane and Elbe (the latter a German vessel), were driven ashore, and are complete wrecks; the Phoenix is also ashore, but slightly injured, and may be easily set afloat again. The schooners Select, Henry, Star, Lady of the Lake, and the prize schooner Correo, are ashore, some of them high and dry. The Tom Toby, (privateer), is a wreck, and the Brutus, (Texan Naval schooner), is considerably damaged. The schooner Helen is the only vessel which has received no damage. So far as we have been able to learn only two individuals have perished. The history of this country contains no record of any hurricane that has equalled this, either in the violence of the storm or the extent of the destruction. There is a reason to believe that the destructive influence of this gale has extended gradually over the surface of the Gulf; we therefore apprehend that the next intelligence from the United States and from Mexico will be rife with accounts of disastrous shipwrecks. We sincerely trust that neither the calamities of enemy or friend will equal our own."

The Galveston News under date of June 4, 1839, states that the newly completed Tremont hotel, built on the site of the present building and completed early in 1837, was blown down in the October hurricane of that year (1837)x. It was reconstructed and opened April 22, 1839.

As a matter of historical interest only, the brig Elbe, referred to above, was never repaired and hauled into water, but for many years served as Galveston's jail.

In October, 1842, Galveston was visited by a severe gale, the low lands being overflowed and considerable damage done to buildings and shipping.

The great September hurricane of 1854 did little damage to Galveston. The water came up on the floors of some of the stores on the Strand, and the little steamer Nick Hill was wrecked.

Mr. Charles Trube, who has resided in Galveston for the past sixty-six years, told the writer several days ago that he distinctly remembers the hurricane of 1854. Confirming statements of early writers he stated that one peculiar feature of the gale has been overlooked. Previous to the advent of the hurricane Galveston was in the throes of a severe Yellow fever epidemic. When the hurricane blew out the Yellow fever went with it, those being ill recovered from the scourge and no new cases were reported.

On the night of October 2nd and 3rd, 1867, Galveston was visited by a severe hurricane, which did much damage to the city and shipping. Quite a number of vessels were wrecked and

the Galveston, Houston and Henderson Railway bridge across Galveston bay was destroyed. A number of lives were lost and the damage was estimated at a million dollars. The cemetery was inundated to such an extent that there could be no interments for thirty hours. This is the first mention of any of the bridges across Galveston bay being destroyed.

Mr. Ousley states that on the 9th of June, 1871, Galveston was visited by an easterly gale which reached its height at midnight, breaking the following morning. Considerable damage was sustained in the city and among the shipping, but no loss of life was reported.

Referring to pages 10 and 11 of the previous report, under dates of June 8 to 10, 1871, the presumption that the weather records on those dates indicated the proximity of a hurricane is verified.

On the 2nd and 3rd of October, 1871, Galveston was visited by a severe easterly blow, and the water flooded almost the entire city. The steamer C. R. Hall foundered in the upper bay and all hands were lost, with the exception of one man. Several other vessels were wrecked.

Evidently the Galveston weather office overlooked this blow as no mention was made of it in the early records.

Mr. Ousley has additional information regarding the hurricane of September 14-17, 1875, pages 11 and 12 in the previous report. He states that many houses in the city were wrecked and shipping in port was greatly damaged. "There were a number of men at Fort Point in government employ," he

states, "and their quarters were washed away and thirteen of them drowned. Dr. Geo. W. Peete, quarantine officer at the Point, and his nephew were swept away and lost, and several persons in the city were killed. Along the upper bay there were a number of lives lost. Up to this date this had been the most destructive storm in the history of the Texas coast."

From this date to the present year the previous report contains all available data.

You will note big gaps in this record during the earlier part of the last century. While the island was occupied as early as 1817 it was abandoned in 1822, and only hunting and fishing and treasure seeking parties visited the island for a number of years. As the entire Texas coast region was a wilderness it can hardly be expected that hurricanes or storms should be chronicled during this period. Hurricanes may have occurred, and the island and adjacent mainland may have been tide swept many times during that period without the phenomena being noticed, or at least being recorded.

Following the storm of August 15-17, 1915, Mr. Ben G. Stuart of Beaumont, Texas, wrote a letter to Dr. B. Bunnemeyer, Section Director of the United States Weather Bureau, Houston, containing a list of hurricanes that have visited the Texas coast from the dawn of history to 1867. As this letter is very interesting it is given in full herewith:

"While severe storms have swept the coast of Texas long before the dawn of history, the first authentic record we have dates from September 4th, 1766, when, according to the Spanish

Chroniclers, a severe gale visited Galveston bay. An Indian Mission and Presidio called San Augustus de Ahumado had been located in what is now Chambers county, and, by investigation, thought to have been situated on or near Lake Charlotte, which connects with the Trinity river just north of the present settlement of Wallisville. The wind greatly damaged the Mission buildings, and the water from the bay and river submerged the land, which was only a few feet-(probably 6 or 8)-above ordinary tide. The disaster resulted in the abandonment of the Mission. Lake Charlotte is six miles from the mouth of the Trinity river, and more than fifty miles from the Gulf of Mexico. The same spot was submerged during the hurricane of August 15-17, 1915.

"As the coast of Texas was unhabited for many years, save by roving bands of savages-the Opelousas near Sabine Lake and along Bolivar peninsula, and the Carancahuas and Cokes from Galveston island as far west as Aransas and possibly to the vicinity of the Rio Grande--there is no record of hurricanes until the occupation of the island by Lafitte in 1817, and our information regarding it comes from statements made by James Campbell, who was in the service of Lafitte, and Col. Warren D. C. Hall, an officer under General James Long, who was operating against the Spainards and who visited Galveston island to attempt to enlist Lafitte in the enterprise, but without success. According to them the island was visited by a severe hurricane, the wind being from the east and north-east, and veering to the northwest. The exact date of the storm has not been preserved, but it was in September or October, 1818. The entire island

was submerged, with the exception of a small spot on the east end, near the present site of the State Medical college. Lafitte's huts on shore were badly damaged, and several of the vessels cast ashore or sunk. There is no record of the number of lives lost, if any.

"From 1820 to 1836 there was no settlement on Galveston island, although the Mexicans had built a small frame structure there in 1831 for a custom house, but it does not appear to have been used for any length of time. In 1821 settlers began to arrive, passing up the Bay, and located in the succeeding years at Harrisburg, Anahuac and other points, but in none of the records of the period between 1821 to 1836 is there mention of any destructive hurricane on the Texas coast. This does not signify that there ~~were~~ was none, but as all of the settlements, with very few exceptions, were inland they would not have felt its effect to the same extent as the island.

"The year 1837 witnessed the beginning of Galveston, and by October, several buildings were under construction. Immigrants were coming in, and there were twenty vessels in the harbor. There were no wharves, and the Mexican custom house was the only building on the island, the population being sheltered in tents and sod huts. On the first of October an easterly gale began blowing and continued with more or less intensity until the sixth, causing a very high tide and submerging most of the island. The wind then suddenly veered to the northwest and swept the waters of the Bay down upon and

across the island." At this point Mr. Stuart has inserted the extract from the Telegraph and Texas Register of October 11th, that year, giving an account of the hurricane. This is given in the forepart of this report.

Continuing, Mr. Stuart says: "Col. Amasa Turner, who was present, wrote as follows: 'There were about thirty vessels in Galveston harbor when the great storm commenced on October 1st, 1837. It began with a wind from the southeast and held to that quarter for three days; then it veered a little to the east and so continued until the sixth day, filling the Bay very full and making a four foot rise at Houston. On the evening of the sixth the wind veered to the northeast and blew very strong. The schooner, Tom Toby, a privateer, parted her cable and went ashore at Virginia Point. About sunset, the wind, veering all the time to the north, and, if possible, increasing, brought the large volume of water from the Bay onto the island with such force and violence as to sweep everything in its course. On land every house, camp, sod house and inhabitated structure was swept away, except the old Mexican custom house. Only one of the vessels held its moorings.'

"On the fifth of October, 1842, another hurricane visited Galveston, but the wind was not so high as in 1837, nor the tide; although much of the town (then lower than at present) was flooded, and considerable damage to goods was sustained. The wooden Episcopal Church, on the southeast corner of Tremont and Winnie streets was blown from its blocks and badly wrecked. A number of other buildings were damaged and several

small structures were demolished. No loss of life in the town was reported.

"The great gale of September 16-19, 1854, which swept the Texas coast, did not inflict much damage at Galveston, its greatest force being felt to the westward. Of its effect at Galveston the "Civilian and Gazette," of September 19, said:

"'An easterly gale began to blow last Saturday and has continued almost without interruption to the present time. The wind has not been severe, but being from the quarter which always produces the highest tides, the waters of the Gulf and Bay have been higher than we recollect since 1842. The floors of a number of stores on the Strand were overflowed during Sunday night, and considerable damage was done to such articles as were deposited on the floor. The little steamer Nick Hill was lost off Dollar Point.'

"The greatest force of this hurricane was felt at the town of Matagorda, to the westward of Galveston, Col. R. D. Parks, then residing there, but afterward at Temple, said: 'It left a trail of disaster to be recorded in history. Hardly a house was left standing in the townsite or vicinity.' Another eye witness says: 'The storm at Matagorda was September 18th, 1854. The water from the Bay did not come over the town. Two people were killed. The steamer Kate Ward and crew were lost in Matagorda Bay--from report it was said at Dog island.'"

It is the writer's opinion that this was the hurricane that destroyed the settlement at Saluria, which was situated

either on Bayucos island, lying between Espiritu Santo bay and Matagorda bay, or on an island that has merged with Matagorda island and before its merger was known as Saluria island. During the nine months the writer spent in that vicinity Bayucos island was also called Saluria island by many. Others, some of them old residents in that section, stated that after the hurricane the channel separating Saluria and Matagorda islands disappeared. As various years were given in which the "big" hurricane occurred it is very likely that that section was affected by several of the storms that have been recorded on the Texas coast.

Continuing Mr. Stuart says: "The great hurricane of August 10th, 1856 was felt but little at Galveston, but L'Ile Dernier, or Last Island, a summer resort on the Louisiana coast, was engulfed, with the loss of many lives. The steamer Nautilus from Galveston for New Orleans with thirty passengers, however, ran into the gale and foundered, all hands being lost except a negro man who clung to a bale of cotton and was cast ashore on the Louisiana coast.

"In the latter part of September, 1865, a hurricane struck the town of Calcasieu on the west Louisiana coast. The place was inundated and some eight or ten persons perished. As there was neither telegraph nor rail communication to that place, the report was brought to Galveston by the master of a lumber schooner.

"On Wednesday, October 2nd, 1867, a strong easterly gale commenced blowing at Galveston, which shifted to the north-east during the night and on the morning of the 3rd, had attained

a velocity estimated between 60 and 70 miles an hour. There was no weather bureau, and, of course, the figures were only guess work. During the morning of the 3rd the waters of the Gulf and Bay rose rapidly until much of the city was flooded. The water from the north side came nearly up to Church Street at its highest elevation, while from the Gulf side it reached nearly to Broadway. The cemeteries at 40th street and Broadway were inundated, and all the lowland down the island was covered with water. Much damage was done to buildings in the city and more than thirty were destroyed. The lower floors of the stores on the Strand and Mechanic street were flooded and their contents badly damaged. The brig, Ocean Wave, from Philadelphia, was cast ashore on the beach near the present site of Fort Crockett, and her captain drowned. The bark, Palace, and the brig, Egarita, in the harbor were driven ashore, as were a number of small craft, and the steamboats, Alice M and Sunflower, were wrecked. The trestle of the Galveston, Houston and Henderson Railroad between Eagle Grove and Virginia Point was completely wrecked, and communication was kept up by means of a ferry boat until after it was rebuilt, which was not done for several months. There were three lives lost and the property damage was estimated at $1,000,000.00, including that to vessels. As previously stated, the gale began from the eastward on October 2nd, the wind veering to the northeast during the night, and continuing from that quarter until about 2:30 on the afternoon of the 3rd, when it lulled temporarily, to veer from the northwest from which point

it blew strongly for a short time, the waters receding rapidly, and by 5 o'clock the sky was clear and the wind of only moderate velocity. This hurricane cut a channel five feet deep through the low sand flat east of Sixth street, from the Bay to the Gulf, which remained open for only a few months. It also did much damage at the mouth of the Rio Grande, and at Brownsville."

With reference to this last, it is the writer's recollection that it was this hurricane that destroyed the towns of Bagdad and Clarkesville, situated opposite each other at the mouth of the Rio Grande.

Some years ago, when in that section, the stories woven about their destruction were often told the writer. During the War between the States these towns sprung into prominence because of the cotton running that was being done through them. One being situated on Texas soil and the other on Mexican soil made it comparatively easy for the State to get its cotton to foreign ports. Both towns were swept away shortly after the war and it must have been during the hurricane of 1867.

As so much has been written about the 1900 storm a detailed description of it was omitted from the former report. However, the writer recently found a copy of the personal narrative of I.M. Cline, local forecast official and section director, United States Weather Bureau, in Galveston at the time of the hurricane, which is of peculiar interest. This narrative was conveyed to the chief of the bureau in the form of an official report.

"The hurricane which visited Galveston island on Saturday, September 8, 1900, was no doubt one of the most important meterological events in the world's history. The ruin which it wrought beggars description, and conservative estimates place the loss of life at the appalling figure of six thousand.

"A brief description of Galveston island will not be out of place as introductory to the details of this disaster. It is a sand island about thirty miles in length and one and one-half to three miles in width. The course of the island is southwest and northeast, parallel with the southeast coast of the State. The city of Galveston is located on the east end of the island. To the northeast of Galveston is Bolivar Peninsula, a sand spit about twenty miles in length and varying in width from one fourth of a mile to about three miles. Inside of Galveston Island and Bolivar Peninsula is Galveston Bay, a shallow body of water with an area of nearly five hundred square miles. The length of the bay along the shore is about fifty miles and its greatest distance from the Gulf coast is about twenty-five miles. The greater portion of the bay lies due north of Galveston. That portion of the bay which separates the island west of Galveston from the mainland is very narrow, being only about two miles in width in places, and discharges into the Gulf of Mexico through San Luis Pass. The main bay discharges into the Gulf between the jetties; the south one being built out from the northeast end of Galveston island and the north one from the most southerly point of Bolivar Peninsula. The channel between the jetties is twenty-seven to thirty feet in depth at different stages of the tide.

There are channels in the harbor with a depth of thirty to thirty-five feet, and there is an area of nearly two thousand acres with an anchorage depth of eighteen feet or more. The mainland for several miles back from the bay is very low, in fact much of it is lower than Galveston Island, and it is so frequently overflowed by high tide that large areas present a marshy appearance. These are in brief the physical conditions of the territory devastated by the hurricane.

"The usual signs which herald the approach of hurricanes were not present in this case. The brick-dust sky was not in evidence in the smallest degree. This feature, which has been distinctly observed in other storms that have occurred in this section, was carefully watched for, both on the evening of the 7th and the morning of the 8th. There were cirrus clouds moving from the southeast during the (fore)afternoon of the 7th, but by noon only alto-stratus from the northeast were observed. About the middle of the afternoon the clouds were divided between cirrus, alto-stratus, and cumulus, moving from the northeast. During the remainder of the 7th, strato-cumulus clouds prevailed, with a steady movement from the northeast. A heavy swell from the southeast made its appearance in the Gulf of Mexico during the afternoon of the 7th. The swell continued during the night without diminishing, and the tide rose to an unusual height when it is considered that the wind was from the north and northwest. About 5 a.m. of the 8th Mr. J. L. Cline, observer, called me and stated that the tide was well up in the low parts of the city,

and that we might be able to telegraph important information to Washington."

Writer wishes to state that the J. L. Cline mentioned in the above is a brother of I. M. Cline, and during the writer's stay in Corpus Christi, about ten years ago, he was closely acquainted with him. The facts as contained in Dr. Cline's narrative were often told the writer. J. L. Cline at that time was observer at Corpus Christi.

Continuing, Dr. Cline said: "He having been on duty until nearly midnight, was told to retire and I would look into conditions. I drove to the gulf, where I timed the swells, and then proceeded to the office and found that the barometer was only one-tenth of an inch lower than it was at the 8 p.m. observation of the 7th. I then returned to the gulf, made more detailed observations of the tide and swells, and filed the following telegram addressed to the Central Office at Washington:

"'Unusually heavy swells from the southeast, intervals one to five minutes, overflowing low places south portion of city three to four blocks from the beach. Such high water with opposing winds never observed previously.'

"Broken stratus and strato-cumulus clouds predominated during the early forenoon of the 8th, with the blue sky visible here and there. Showery weather commenced at 8:45 a.m., but dense clouds and heavy rain were not in evidence until about noon, after which dense clouds with rain prevailed.

"The wind during the forenoon of the 8th was generally

north, but oscillated, at intervals of from five to ten minutes, between northwest and northeast, and continued so until 1 p.m. After 1 p.m., the wind was mostly northeast, although as late as 6:30 p.m., it would occasionally back to the northwest for one or two minutes at a time. The prevailing wind was from the northeast until 8:30 p.m., when it shifted to the east, continuing from this direction until about 10 p.m. After 10 p.m., the wind was from the southeast, and after 11 p.m., the prevailing direction was from the south or southwest. The directions after 11 p.m., were from personal observations. A storm velocity was not attained until after 1 p.m., after which the wind increased steadily and reached a hurricane velocity at about 5 p.m. The greatest velocity for five minutes was eighty-four miles per hour at 6:15 p.m., with two minutes at the rate of 100 miles per hour. The anemometer blew away at this time, and it is estimated that prior to 8 p.m., the wind attained a velocity of at least one hundred and twenty miles per hour. For a short time, about 8 p.m., just before the wind shifted to the east, there was a distinct lull, but when it came out of the east and southeast it appeared to come with greater fury than before. After shifting to the south at about 11 p.m., the wind steadily diminished in velocity, and at 8 A.M., on the morning of the 9th was blowing at the rate of twenty-six miles per hour from the south.

"The barometer commenced falling during the afternoon of the 6th and continued falling steadily but slowly up to noon of the 8th, when it read 29.42 inches. The barometer fell rapidly

from noon until 8:30 p.m., of the 8th, when it registered 28.48 inches, a fall of pressure of about one inch in eight and a half hours. About 8:30 p.m., the barometer rose at the same rapid rate that had characterized the fall. The barograph trace sheet during the storm, from noon September 6, to noon September 10, is enclosed as figure 1. On account of the rapid fall in pressure, Mr. John D. Blagden, observer took readings of the mercurial barometer as a check on the barograph, and his readings are as follows:

(Omitted)

"These readings confirm the low pressure shown by the barograph and indicate the great intensity of the hurricane.

"Mr. Blagden looked after the instruments during the hurricane in a heroic and commendable manner. He kept the wires of the self-registering apparatus intact as long as it was possible for him to reach the roof. The rain guage blew away about 6 p.m., and the thermometer shelter soon followed. All the instruments in the thermometer shelter were broken, except the thermograph which was found damaged, but has been put in working order.

"Storm warnings were timely and received a wide distribution, not only in Galveston, but throughout the coast region. Warning messages were received from the Central Office at Washington on September 4th, 5th, 6th, 7th, and 8th. The high tide on the morning of the 8th, with storm warnings flying, made it necessary to keep one man constantly at the telephone giving

out information. Hundreds of people who could not reach us by telephone came to the Weather Bureau office seeking advice. I went down on Strand street and advised some wholesale commission merchants who had perishable goods on their floors to place them three feet above the floor. One gentleman has informed me that he carried out my instructions, but the wind blew his goods down. The public was warned, over telephone and verbally, that the wind would go by the east to the south and that the worst was yet to come. People were advised to seek secure places for the night. As a result thousands of people who lived near the beach or in small houses moved their families into the center of the city and were thus saved. Those who lived in large strong buildings, a few blocks from the beach, one of whom was the writer of this report," (meaning Dr. I. M. Cline), "thought that they could weather the wind and tide. Soon after 3 p.m., of the 8th conditions became so threatening that it was deemed essential that a special report be sent at once to Washington. Mr. J. L. Cline, observer, took the instrumental readings while I drove first to the bay and then to the gulf, and finding that half of the streets of the city were under water added the following to the special observation at 3:30 p.m: 'Gulf rising, water covers streets of about half city.' Having been on duty since about 5 a.m., after giving this message to the observer I went home to lunch. Mr. J. L. Cline went to the telegraph offices through water from two to four feet deep, and found that the telegraph wires had all gone down; he then returned to the office, and by inquiry learned that the long distance telephone had one wire still working to Houston,

over which he gave the message to the Western Union Telegraph office at Houston to be forwarded to the Central Office at Washington.

"I reached home and found the water around my residence waist deep. I at once went to work assisting people, who were not securely located, into my residence, until forty or fifty were housed therein. About 6:30 p.m., Mr. J. L. Cline, who had left Mr. Blagden at the office to look after the instruments, reached my residence, where he found the water neck deep. He informed me that the barometer had fallen below 29.00 inches; that no further messages could be gotten off on account of all wires being down, and that he had advised everyone he could see to go to the center of the city; also, that he thought we had better make an attempt in that direction. At this time, however, the roofs of houses and timbers were flying through the streets as though they were paper, and it appeared suicidal to attempt a journey through the flying timbers. Many people were killed by flying timbers about this time while endeavoring to escape from the town.

"The water rose at a steady rate from 3 p.m., until about 7:30 p.m., when there was a sudden rise of about four feet in as many seconds. I was standing at my front door, which was partly open, watching the water, which was flowing with great rapidity from east to west. The water at this time was about 8 inches deep in my residence, and the sudden rise of four feet brought it above my waist before I could change my position. The water had now reached a stage ten feet above the ground at Rosenberg Avenue, (Twenty-fifth street), and Q street, where my residence stood. The ground was 5.2 feet

elevation, which made the tide 15.2 feet. The tide rose the next hour between 7:30 p.m., nearly five feet additional, making a total tide in that locality of about 20 feet. These observations were carefully taken and represent to within a few tenths of a foot the true conditions. Other personal observations in my vicinity confirm these estimates. The tide, however, on the bay or north side of the city did not attain a height of more than 15 feet. It is possible that there was five feet of back water on the gulf side as the result of debris accumulating four to six blocks inland. The debris is piled eight to fifteen feet in height. By 8 p.m., a number of houses had drifted up and lodged to the east and southeast of my residence, and these with the force of the waves acted as a battering ram against which it was impossible for any building to stand any length of time, and at 8:30 p.m., my residence went down with about fifty persons who had sought it for safety, and all but eighteen were hurled into eternity. Among the lost was my wife, who never rose above the water after the wreck of the building. I was nearly drowned and became unconscious, but recovered, though being crushed by timbers and found myself clinging to my youngest child, who had gone down with myself and wife. Mr. J. L. Cline joined me five minutes later with my other two children, and with them and a woman and child we picked up from the raging waters, we drifted for three hours, landing 300 yards from where we started. There were two hours that we did not see a house or any person, and from the swells we inferred that we were drifting to sea, which in view

of the northeast wind then blowing, was more than probable. During the last hour that we were drifting, which was with southeast and south winds, the wreckage on which we were floating knocked several residences to pieces. When we landed about 11:30 p.m., by climbing over floating debris to a residence on Twenty-eighth street and Avenue P, the water had fallen four feet. It continued falling, and on the following morning the gulf was nearly normal. While we were drifting we had to protect ourselves from the flying timbers by holding planks between us and the wind, and with this protection we were frequently knocked great distances. Many persons were killed on top of the drifting debris by flying timbers after they had escaped from their wrecked homes. In order to keep on the top of the floating masses of wrecked buildings one had to be constantly on the lookout and continually climbing from drift to drift. Hundreds of people had similar experiences.

"Sunday, September 9, 1900, revealed one of the most horrible sights that ever a civilized people looked upon. About three thousand homes, nearly half the residence portion of Galveston, had been completely swept out of existence, and probably more than six thousand persons had passed from life to death during that dreadful night. The correct number of those that perished will probably never be known, for many entire families are missing. Where twenty thousand people lived on the 8th not a house remained on the 9th, and who occupied the houses may in many instances never be known. On account of the pleasant gulf

breezes many strangers were residing temporarily near the beach, and the number of these that were lost cannot yet be estimated. I enclose a chart, figure 2, which shows, by shading, the area of total destruction. Two charts of this area have been drawn independently; one by Mr. A. G. Youens, inspector for the local board of underwriters, and the other by myself and Mr. J. L. Cline. The two charts agree in nearly all particulars, and it is believed that the chart enclosed represents the true conditions as nearly as it is possible to show them. That portion of the city west of Forty-fifth street was sparsely settled, but there were several splendid residences in the southern part of it. Many truck farmers and dairymem resided on the west end of the island, and it is estimated that half of these were lost, as but very few residences remained standing down the island. For two blocks inside the shaded area the damage amounts to at least fifty per cent of the property. There is not a house in Galveston that escaped injury, and there are houses totally wrecked in all parts of the city. All goods and supplies not over eight feet above the floor were badly injured, and much was totally lost. The damage to buildings, personal, and other property in Galveston County is estimated at about thirty million dollars. The insurance inspector of Galveston states that there were 2,636 residences located prior to the hurricane in the area of total destruction, and he estimates one thousand houses were totally destroyed in other portions of the city, making a total of 3,636 houses totally destroyed. The value of these buildings alone is estimated at five million five hundred thousand.

"The grain elevators which were full of grain suffered the smallest damage. Ships have resumed loading and work is being rushed day and night. The railroad bridges across the bay were washed away, but one of these has been repaired and direct rail communication was established with the outside world within eleven days after the disaster. Repairs and extensions of wharves are now being pushed forward with great rapidity. Notwithstanding the fact that the streets are not yet clean and dead bodies are being discovered daily among the drifted debris, the people appear to have confidence in the place, and are determined to rebuild and re-establish themselves here. Galveston being one of the richest cities of its size in the United States, there is no question but that business will soon regain its normal condition and the city will grow and prosper as she did before the disaster. Cotton is now coming in by rail from different parts of the State and by barge from Houston. The wheels of commerce are already moving in a manner which gives assurance for the future. Improvements will be made stronger and more judiciously; for the past twenty-five years they have been made with the hurricane of 1875 in mind, but no one ever dreamed that the water would reach the height observed in the present case. The railroad bridges are to be built ten feet higher than they were before. The engineer of the Southern Pacific Company has informed me that they will construct their wharves so that they will withstand even such a hurricane as the one we have just experienced.

"I believe that a seawall, which would have broken the swells, would have saved much loss of both life and property. I base this view upon observations I have made in the extreme northeastern portion of the city, which is practically protected by the south jetty; this part of the city did not suffer more than half the damage that other similarly located districts without protection sustained.

"From the officers of the United States Engineering tug Anna, I learn that the wind at the mouth of the Brazos river went from north to southwest by the way of west. This shows that the center of the hurricane was near Galveston, probably not more than thirty miles to the westward. The following towns have suffered great damage, both in the loss of life and property: Texas City, Dickinson, La Marque, Hitchcock, Arcadia, Alvin, Manvel, Brazoria, Columbia and Wharton. Other towns farther inland have suffered, but not so seriously. The exact damage at these places cannot be ascertained."

Appended hereto is a map of Galveston as it appears today with shaded portion showing area of total destruction during the 1900 and 1915 hurricanes. The map indicates the beach at a point ranging from one half to two blocks or more farther inland along the entire gulf front than prior to September 8th, 1900. Also there is indicated on the map the elevation of the different blocks above sea level in 1900. From Avenue J, or Broadway, to the gulf a gradual fill extends to the top of the seawall, which is seventeen feet above mean tide.