Appendix F

Low Battery Seawall
Archive Drawings and Excerpts from the City of Charleston Year Books
This drawing was obtained from the City of Charleston Archives. The drawing shows the cross-section design through the Low Battery and is dated 1935, nearly 16 years after the completion of “The Boulevard Extension”. This cross-section design graphically correlates with great precision the dimensions and configurations as described in the City of Charleston Year Book 1911 and Year Book 1917.
This drawing was obtained from the City of Charleston Archives. This is an undated drawing believed to be a design detail for “The Boulevard” portion of the Low Battery Seawall. The design detail indicates the use of a series of brace piles consisting of pairs of vertical and batter piles connected to the concrete portion of the seawall with a 1-1/2inch diameter rod. Note: the City Engineer’s approval is indicated with the note… “Brace piles, 40 at each curve in the wall”.
This drawing was obtained from the City of Charleston Archives. The drawing is a survey dated 1911 of “The Boulevard” portion of the Low Battery Seawall and indicates the locations of failures in the newly constructed seawall. The most common failure was the outward (seaward) movement of the protective concrete veil. The survey also indicates that these failures were repaired in 1911. It appears that the repair technique consisted of driving additional vertical piles at the toe of the seawall and placing cobbles and riprap at the base of the seawall.
This drawing was obtained from the City Of Charleston Archives. This is an undated drawing believed to indicate the actual layout for “The Boulevard” portion of the Low Battery seawall. The water depths are shown and the soil boring data is indicated in three locations. The drawing also shows the design details of the timber barricades to be constructed at the ends of the seawall to retain the fill.
This drawing was obtained from the City of Charleston Archives. This is an undated drawing believed to be a design detail for the Low Battery seawall of two alternatives for the connection of the batter (sloped) pile to the adjacent vertical pile. The detail shows the cross-section of the timber platform that supports the main concrete structure of the seawall.
This drawing was obtained from the City of Charleston Archives. This drawing is a topographic survey dated 1909 showing the various elevations of the fill that had been placed landward of the seawall during construction of “The Boulevard”.
This drawing was obtained from the City of Charleston Archives. This drawing dated 1909 is a record of the test pile data used during the construction of “The Boulevard” portion of the Low Battery seawall. The data indicates the final depth of pile penetration, the “blow count” of the pile driver hammer, and the resultant increment of pile penetration into the ground, and the location of each test pile along the seawall by stations of 100-feet.
This drawing was obtained from the City of Charleston Archives. This drawing dated 1909 indicates the geometry for the layout of “The Boulevard” portion of the Low Battery seawall.
This drawing was obtained from the City of Charleston Archives. This is an undated drawing believed to be a survey of the horizontal position of “The Boulevard” portion of the Low Battery seawall. The “Line” of the seawall had been plotted on an exaggerated transverse scale in relation to the longitudinal scale. Surveys were taken on three separate occasions December 11, 1910, June 2, 1911, and June 12, 1911. Perhaps, the fill placed landward of the seawall had caused some portions of the seawall to move seaward.
This drawing was obtained from the City of Charleston Archives. This drawing dated 1910 is the design for the stairs along the seaward face of “The Boulevard” portion of the Low Battery seawall. It also shows the different levels for the timber platform supporting the main concrete structure of the seawall.
This drawing was obtained from the City of Charleston Archives. This drawing dated 1917 is the design for the protective concrete slabs that are located along the seaward face of the timber sheet piles.
This drawing was obtained from the City of Charleston Archives. This drawing dated 1918 is a design for the installation of the granite railing pedestals on the “Boulevard Extension” portion of the Low Battery seawall.
REPORT OF CITY ENGINEER.

Charleston, S. C., January 1, 1910.

To the Honorable the Mayor and City Council,
Charleston, S. C.

Gentlemen:

The following Annual Report of the City Engineer's Department for the year 1909, I have the honor to submit for your consideration, in accordance with Section 782, Revised Ordinances.

In connection with this report, your attention is directed to the reports on "Sewerage" and "Sewerage Extension" made to the Sewer Board, and on "Street Cleaning," "Scavenging" and "Highways" made to the Board of Public Works. These latter reports include a considerable portion of the work of the Engineer's Department, but it is not considered necessary to duplicate them here since they can be seen elsewhere.

The construction of the Sea Wall, from South Battery, at the foot of King Street, to Chisolm's Mill, at the west end of Tradd Street, has had our close attention, both in the preparation of plans and specifications and in the inspection of the work now in progress.

The street signs have been inspected from time to time and necessary repairs and renewals made. Acetylene gas generators, of which we have knowledge, have also been inspected as required by ordinance. The Union Station has been inspected at various times, as has also the Cooper River water front; reports on the latter having been made to the Dock Commission. Building plans and specifications have been examined, permits issued and construction inspected as required by the building code. Tests of paving, brick and cement, have been made for all public work.

The following tabulated statement shows the work done in preparation of data, profiles, estimates, etc., for curbs, sidewalks, roadways, drains, etc.:
Mayor Rhett's Annual Report

soon as its pit and pumps are installed and all will be in operation before the Summer is over.

Boulevard

This work is not yet complete. It is hardly probable it will be finished before May 1st. The saving to the City in the cost of engineering and inspection by the Engineer and his office has been over $25,000. Mr. Dingle has certainly earned his salary and the public owe him much more than they have any idea of.

Health

The reorganization of the Health Department in 1906 by the revision of all ordinances in existence in reference thereto; the addition of many safeguards and some means of enforcing them, and the persistent efforts of the Health Officer, Dr. J. M. Green, in bringing the public to a realization of the necessity of observing rules of sanitation, has brought about most admirable results. As soon as the sewerage system is in operation over the entire City, there will be no reason why our rate of mortality, both white and colored, should not compare favorably with the best urban rate in the Country.

Fire Department

This Department has put its new motor engine in use during the past year and has found it fully up to expectations. The City is spreading and the calls on the Department are growing greater and greater. The necessity for its being made a fully paid department has become apparent and a beginning has been made in that direction during the present year. In a short time "call-men" will be a thing of memory only.

Police Department

There has been a marked improvement in the police force of the City in the past few years. The physique of the men is better, their attendance is better and the esprit-de-corps is better, although there is still much to be desired in the latter.

Mayor Rhett's Annual Report

The growth of the City and its suburbs in the past three years has added considerably to the task of this department, and the public does not realize the strain it too often has to undergo with its limited numbers.

Salaries and Wages

Inasmuch as property has advanced about 50% in the past seven or eight years, and the true tax rate has been reduced lower than ever before, it is only proper that the salaries and pay of the men in the departments, whose cost of rent and living has of course increased, should be raised. Thus only can they share in this prosperity, which has come to the tax payer. From time to time, this has been done, and this administration can feel it has acted fairly by both the tax payer and the employee.

In no city in the World, can there be found a more careful, and economical expenditure of public money and a more scrupulous regard for the public interest by its officials and employees. In no place in the World will there be found such a sense of public duty actuating men of the highest ability and attainments to a service for the public which no money can buy and for no other consideration than a patriotic love of their city.

Respectfully submitted,

R. G. RHETT,
Mayor.
### City Engineer’s Report

#### Expenditures

<table>
<thead>
<tr>
<th>Item</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>City Engineer</td>
<td>$2,910.67</td>
</tr>
<tr>
<td>Two Asst. Engineers</td>
<td>2,050.00</td>
</tr>
<tr>
<td>Office Assistants</td>
<td>960.00</td>
</tr>
<tr>
<td>Drawing Instruments</td>
<td>$33.88</td>
</tr>
<tr>
<td>Engineering Instruments</td>
<td>105.17</td>
</tr>
<tr>
<td>Drawing Materials</td>
<td>33.96</td>
</tr>
<tr>
<td>Record Books, Printing, Stationery etc.</td>
<td>111.02 $</td>
</tr>
<tr>
<td>Miscellaneous:</td>
<td></td>
</tr>
<tr>
<td>Car tickets</td>
<td>$50.00</td>
</tr>
<tr>
<td>Stamps</td>
<td>25.00</td>
</tr>
<tr>
<td>Express and Drayage</td>
<td>13.75</td>
</tr>
<tr>
<td>Typewriter</td>
<td>40.00</td>
</tr>
<tr>
<td>Telephone</td>
<td>25.20</td>
</tr>
<tr>
<td>Filing cases</td>
<td>130.49</td>
</tr>
<tr>
<td>Map</td>
<td>75.00</td>
</tr>
<tr>
<td>Draughting</td>
<td>15.00</td>
</tr>
<tr>
<td>Incidents</td>
<td>2.50 $</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$376.94</strong></td>
</tr>
</tbody>
</table>

**TOTAL EXPENDITURES WEST END IMPROVEMENT.**

To January 1st, 1911.

Consulting Engineer: $1,100.00

Preliminary Investigations:
- Surveys: $1,749.31
  - Test piles: 65.50
- Instruments: 427.56
- Drawing Material: 32.12
- **Total Instruments**: 1,814.81

Office Supplies, etc.:
- Printing: $42.75
- Stationery: 6.80
- Advertising: 47.22
- Stamps: 10.00
- Telegrams: .50
- **Total Office Supplies**: $107.27

Office Maintenance:
- Rent: $87.50
- Stove: 6.15
- Fire Wood: 1.35
- **Total Office Maintenance**: $95.00

Excerpt from the City of Charleston Year Book, 1910
Relating to the Engineering History of the Low Battery Seawall
Mayor Rhett's Annual Review

Deposited with U. S. Government ................................................... $ 1,000.00
Options ......................................................... $1,500.00
Quit Claims .................................................. 2,475.00
Legal Services ................................................. 100.00
Recording Deeds ............................................... 87.00

Inspection .................................................. $ 4,168.05
Launch for Inspectors ............................................. 4,255.20
Launch, repairs and supplies ................................... 433.70

Barricade—Tradd St ................................................. 32,074.93
   " King St ...................................................... 794.56
   " Rutledge Ave .............................................. 3,469.51
   " Limehouse St ............................................. 9,136.59
   " King St ...................................................... 652.04

Main Wall ........................................................ 15,131.85
Transportation of shells ....................................... 210,633.50
Transportation of cobbles ....................................... 619.23
Transportation of cobbles from City Streets to wharf 112.75

Shell, Young's Island ........................................... 2,046.51
Shell, Charleston Canning Co ................................... 922.06

Granite rip-rap material and transportation .................. 107.36
Drain casings ................................................ 1,046.02
Labor on drains cutting for connections ..................... 417.29
Constructing Transit Stations in river ........................ 12.00

Filling ....................................................... 35,572.50
Improving approaches, B. P. W .................................. 1,162.10

Total .................................................. $190,331.15
McLean Co., Less portion of above paid 1911 ................. $1,490.60
Inspection ................................................ 20.00
Office Rent .................................................. 10.00

Respectfully submitted,

J. H. Dingle,
City Engineer.

The following is given as information:

<table>
<thead>
<tr>
<th>Description</th>
<th>Sq. miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area of high land</td>
<td>.376</td>
</tr>
<tr>
<td>Area of marsh and flats</td>
<td>1.36</td>
</tr>
<tr>
<td>Total area of City</td>
<td>5.12</td>
</tr>
</tbody>
</table>

Excerpt from the City of Charleston Year Book 1910
Relating to the Engineering History of the Low Battery Seawall
WEST END IMPROVEMENT.

This work accomplished the reclamation of forty-seven acres of river front in the Southwestern portion of the City along Ashley River. The area reclaimed varied in elevation from about 6 feet below mean low water to about 6 feet above the same datum, and was filled to elevation not less than 8.5 feet above mean low water, with material dredged from the river, requiring 667,000 cubic yards of material, exclusive of shrinkage and settlement. To retain this filling, a concrete wall 3,885 feet long, on pile foundation was constructed, having been so designed as to admit of future extension. With this in view, a temporary timber barricade was constructed at each end of the wall with a total length of 262 feet extending from wall to high land to retain the filling, instead of the more expensive permanent concrete work, which would be valueless should the wall be extended. The toe of the wall was protected with oyster shells, cobble stones, and granite rip-rap. Across the fill three main drains were extended each on pile foundations, with a total length of 939.1 feet 30-inch terra cotta pipe, and 921.5 feet, 4 feet by 4 feet reinforced concrete drain with a total of nine manholes. The wall exclusive of rail and reinforced concrete sheet piles, consists of about 39 cubic feet concrete per lineal foot, the coping being reinforced with 4 longitudinal rods 5-8-inch diameter. The rail which surmounts the wall rises 2 feet 6 inches above coping and consists of reinforced concrete pillars 12 inches by 12 inches, set 10 feet apart, center to center, and connected by reinforced concrete arches with spring lines 12 inches above coping and rise of 6 inches, the rail being 12 inches deep at center, 6 inches thick and reinforced with 4 longitudinal 5-8-inch rods and vertical rods of same diameter, spaced about 8 inches center to center.

The foundation consists of vertical piles 6 feet, center to center, both ways braced by one row of batter piles along the front, 3 feet center to center. Outside of the batter piles, parallel with and supported by same, a line of 5-inch grooved and spliced sheet piles 30 feet long was driven and on this was set the reinforced concrete deck consisting of tongued and grooved slabs 3 feet wide and 6 inches thick, cast on shore and set in place after having thoroughly set. The slabs were reinforced with 5-8-inch rods, about 8 inches center to center, wired together and the length of slabs varied with depth of water in which they were placed.

The finished elevation of the coping is 10.5 feet above mean low water.

Bids for the above work were invited March 24, 1909, to be opened May 3, 1909.

The contract was awarded to McLean Contracting Company of Baltimore, Md., and was signed June 21, 1909, with date of completion January 21, 1911.

Owing to delays of various kinds, some unavoidable, the work was not accepted until June 3, 1911, and even then the acceptance was conditioned upon the performance of certain work, deemed necessary within the 60 days which under the contract intervened between acceptance and final payment.

Upon the date of final payment, viz: August 5, 1911, the portion of the area last filled, which being at the spillway and therefore containing the lightest material, had settled and $500.00 was withheld until this was raised again to the contract elevation, which was accomplished December 8, 1911, when final payment was made. Under the agreement made by the City with the lot owners whose interests were affected by this improvement, the plans were to be examined and reported upon by a consulting engineer, and for this work, the City was fortunate in securing the services of Mr. F. R. Harris, C. E., U. S. N., who had the esteem and confidence of all connected with the work and whose services were much appreciated.
The expenditures for the entire work were as follows:

TOTAL EXPENDITURES, WORK AND IMPROVEMENT.

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consulting Engineer</td>
<td>$1,516.00</td>
</tr>
<tr>
<td>Preliminary investigation</td>
<td>1,516.00</td>
</tr>
<tr>
<td>Equipment, instruments, etc.</td>
<td>536.36</td>
</tr>
<tr>
<td>Office expenses (printing, stationery, advertising, paper, etc.)</td>
<td>104.60</td>
</tr>
<tr>
<td>Office maintenance (heat, stove, firewood, etc.)</td>
<td>158.50</td>
</tr>
<tr>
<td>Cushions, gold plates, etc.</td>
<td>50.30</td>
</tr>
<tr>
<td>Inspection</td>
<td>6,614.68</td>
</tr>
<tr>
<td>Additional work (paving, stationery, and repairs to work)</td>
<td>446.18</td>
</tr>
<tr>
<td>Improving approaches</td>
<td>5,146.37</td>
</tr>
</tbody>
</table>

Contract:
- Sea wall: $39,973.64
- Tower Street barricade: 3,130.00
- King Street barricade: 3,130.00
- Rutledge Avenue drain and appurtenances: 6,000.00
- Limehouse Street drain and appurtenances: 6,000.00
- King Street drain and appurtenances: 750.18
- Shell deposited: 1,250.08
- Cables deposited: 265.00

Total: $181,362.46

Low drainage: $281,279.40

Shade work on fence: $1,575.00

Riprap (waterfall—shell, mobile, and rock): 3,500.00

Concrete work, King Street extended: 6,700.00

Phosphatic rock: 3,700.00

Lumber, pipe, tools, etc.: 71.50

Riprap: 10,500.00

Steel for roadway (McCabe): $692.37

Steel for roadway (Gibbs Paving Co.): 5,842.12

Total: $281,279.40

From the above it will be noted that the engineering and inspection (including consulting engineer, preliminary investigations, instruments, printing, stationery, advertising, office rent and maintenance, labor, and operation of same and salaries) amounted to 5.02 per cent of total cost of work to January 1, 1912. The salaries and labor expense amounted to 3.28 per cent of cost of work, excluding preliminary engineering work and engineering equipment.

Respectfully submitted,

J. H. DINGLE, City Engineer.
Excerpt from the City of Charleston Year Book 1911

Relating to the Engineering History of the Low Battery Seawall

Waring until the 12th of January, 1913, and until their successors are elected and qualified. That the successors of the said H. W. H. Buck and Julian H. Jahn shall be elected by the City Council of Charleston some time within thirty (30) days prior to the expiration of their terms of office, and shall hold office for a period of four years, and in the event of the death, resignation or removal from office of either of the said H. W. H. Buck or Julian H. Jahn, or their successors, the vacancy shall be filled by the City Council of Charleston. That the successors of the said P. H. Godden and T. R. Waring shall be elected by the Chamber of Commerce of the city of Charleston some time within thirty (30) days prior to the expiration of their terms of office, and shall hold office for a period of four years, and in the event of the death, resignation or removal from office of either of the said P. H. Godden and T. R. Waring, or their successors, the vacancy shall be filled by the said chamber of commerce.

Section 4.—That the said "Ashley River Water Front Corporation," hereby incorporated, may have and use a common seal, may sue and be sued, contract, and be contracted with, and may adopt such rules and by-laws determining the number and nature of the officers of the said corporation and the mode and manner of its operation as may be agreed to by a majority of the members of the corporation; said corporation shall have and may exercise the following powers, "et al.: It may acquire land within the limits of the city of Charleston, by purchase, gift, donation, or otherwise, and hold the same upon such terms, trusts, or conditions, not inconsistent with the provisions of this Act or the laws of the State, as shall be expressed in the deeds or grants conveying said land, and it may develop or improve any land so acquired in accordance with plans and regulations which shall first be approved by the City Council of Charleston. It may, with the consent and approval of the City Council of Charleston, dedicate, appropriate and lay out any part or parts of said land as streets, highways, public parks, or for other public purposes; and it may sell or dispose of any part or parts of said land not appropriated to any public use; and for the purpose of acquiring land for reclamation, improving or developing lands held by said corporation, it may contract debts, and in evidence thereof give its notes, deeds, or other obligations, and secure the same by mortgage or deed of trust of any of its lands not appropriated to a public purpose, or by pledge of its securities; and such debts shall be the debts of the said corporation only, and in no case whatsoever shall they be held or taken to be the debts of the City Council of Charleston or the State of South Carolina. No moneys received by the said corporation from any source shall be applied to any purpose other than the expenses of maintaining the said corporation, the payment of its debts, the acquisition of land and the development and improvement of the same.

Section 4.—Such corporation shall have the right and power to convey any and all lands, property, water, riparian, or other rights or easements, or any interest therein necessary for the extension, improvement or protection of any property devoted to a public use, upon the same terms and conditions as hereinbefore expressed.
conditions and in the same manner as now provided by law for the con
demnations by railwavs, canal and turnpike companies. Provided, That
just compensation shall first be paid for any property owned by individuals
or corporations before the same are taken by said corporation in the con-
struction of said wall and filling up said area, and just compensation
shall also be first paid individuals or corporations owning lands bounding
or bounding on any navigable streams within or running through said area
before the same are inundated, stopped or their use interfered with, all of
which compensation shall include not only the value of the property taken,
but also the damages inflicted upon such business as may be conducted on
said property or said lands bounding or bounding on said navigable streams,
by either the taking of the property or the impeding or stoppage of such
stream or interference with the use thereof.

Section 5.—That whenever such culverts, improvements or protection
shall make necessary the filling up of low lands, owned by private parties,
to a level established by the said City Council of Charleston, and such filling
up is proposed to be accomplished by excavations from the bed of the Ash-
ley River, bordering the water front to be extended, improved or pro-
tected, under a general plan established by said City Council of Charleston,
said low lands may be filled up by the said corporation at the expense of
the said private owners, and the cost thereof shall be all in upon the land
so filled up; said cost to be paid by each parcel owner shall be determined by the
proportion which the cubic contents of the filling in each lot or parcel of
land, separately owned, shall be to the cubic contents of the whole area
filled; Provided, however, That if the corporation and the owner cannot
agree as to the cost of filling, aboreaid to be borne by such private owner
then the same shall be determined by a proceeding in the nature of an ac-
tion against such party, to be instituted by the corporation, in the Court
of Common Pleas, to recover the amount claimed to be due, and the rea-
sonable cost to be paid by such lot owner shall be determined by the jury,
as in the case of similar actions. The corporation shall first notify each
private owner interested in the plan proposed, and of the level up to which
said lots are to be filled, and each private owner may, if they see fit, ar-
range to fill up their lands at their own expense, such filling up to be done
either prior to or contemporaneously with the filling done by the corpora-
tion, such filling to be in accord with the general plan adopted. In the
event that any lot owner objects to the cost of filling of his lot or lots, then,
in that event, each owner may require the corporation to purchase said lot
at a price agreed upon between the said corporation and the owner; and
in case of failure to agree upon the price, then, and in that event, the said
corporation is hereby authorized to condemn the said lot or lots, and upon
paying to the owner or owners the price that may be fixed therefor, as
hereinbefore provided, the title thereof shall vest in said corporation, who
shall proceed to fill said lot or lots, and may sell the same to reimburse itself
for all expenses and charges. That for the purpose of such condemnation
the said corporation shall file, in the Court of Common Pleas, a petition
Report on West End Improvement

Charleston, S. C., March 26, 1918.

To the Mayor and Aldermen,
the City Council of Charleston.

I beg to submit herewith the Annual Report of the City Engineer on West End Improvements, Boulevard Lots and Sea Wall.

LAWRENCE M. PINCKNEY,
Chairman Committee on Ways and Means.

REPORT OF CITY ENGINEER, WEST END IMPROVEMENT—BOULEVARD LOTS.

Charleston, S. C., January 2, 1918.

Alderman L. M. Pinckney,
Chairman Committee Ways and Means,
Charleston, S. C.

Dear Sir:

I beg to report as follows concerning the construction of Drains, Sidewalks (including curb) and Roadways, in the Boulevard Area, West of Council Street and South of Tradd Street:

After due advertisement, bids for drain construction were opened in November 1916, and award made to Simons-Mayrant Company Charleston, S. C., the contract being signed in January, 1917.

As this area had been filled five or six years previously, with material dredged from the
river. It was necessary to provide pile foundations for the drains and appurtenances.

Where sewers were constructed contemporaneously with the drains, each two-pile bent supported both drain and sewer, the pipes being laid five feet apart.

The piles varied in length from twenty feet to thirty feet below cut-off, very few being less than thirty feet long.

In the double pipe trench, round piles were driven and capped with six inch by twelve inch caps, the bents being eight feet center to center, and the piles in each bent five feet, center to center. In single pipe trench, both round and square piles, six inches by six inches were used, the bents being five feet, center to center, and the piles in each bent two feet, center to center. The caps support longitudinal plank four inches by eight inches, doubled, for the large pipe and four inches by twelve inches for the smaller pipe.

Main drains were laid in the following streets:

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>TERRA COTTA PIPE</th>
<th>Man-Hrs</th>
<th>Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ashley Ave from Trade St to Boulevard</td>
<td>136.8</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Reorganized from Convention St to Trade Street</td>
<td>136.8</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Copper St from Gibbes St to Boulevard</td>
<td>42.5</td>
<td>556</td>
<td>2</td>
</tr>
<tr>
<td>Gibbes Street from Convention St to Radcliffe Avenue</td>
<td>416.7</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>South End from Convention Street to Radcliffe Avenue</td>
<td>367.2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>South End from Ashley Ave to Coleman Street</td>
<td>212</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Telfair Street, from Chalmers Street to West End</td>
<td>207.9</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1.334.5</td>
<td>1440</td>
<td>213.8</td>
</tr>
</tbody>
</table>

Although the drains are in use, the work has not been completed, there being several items to be corrected before acceptance.

Upon completion and acceptance, there will be due the contractor, $1,738.96.

**Curb.**

Granite curbing was purchased under the Street Department contract and a considerable portion of the contemplated curbing has been laid by Mr. James Begley, the Street Department Contractor for Curb-Setting. For Curb, Labor and Material, there is due the Street Department $4,225.04.

**Sidewalks.**

Filling for sidewalks is being purchased from Mr. W. A. Hutchinson, who, after the advertisement, was awarded the contract at eighty cents per cubic yard, f. o. b. cars Charleston Terminal Company. For hauling the filling from Charleston Terminal Company to the Boulevard, Mr. H. W. Bischoff, was awarded the contract at 58 cents per cubic yard.

In places along the sidewalks which are to be improved, the lots are much lower than the walls, necessitating the construction of curbing on the property line to retain the sidewalk fill. It is intended to use two inch plank for this purpose in the expectation that the lots, at least along the street lines, will be filled before the plank decays.

The inner curb will cost about seventeen cents per linear foot, which would be unnecessary if the lots were filled for a width of two or three feet from the street line, in advance of sidewalk construction.
Roadways.

Oyster shell for surfacing the roads is being delivered at the Boulevard, by Mr. J. A. F. Meyer, who was awarded the contract at $1.00 per cubic yard f. o. b. lighter.

The expenditures to December 31, 1917, are as follows:

<table>
<thead>
<tr>
<th>Item</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advertisements</td>
<td>$ 1.69</td>
</tr>
<tr>
<td>Contract-Dumps, Boulevard</td>
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<td>Oyster Shells</td>
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<td>Filling</td>
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<td>Hauling Filling</td>
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<td>Lumber</td>
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<tr>
<td>Labor Spreading Filling</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>$9,181.60</strong></td>
</tr>
</tbody>
</table>

Respectfully submitted,

J. H. Dingle
City Engineer.

Report on West End Improvement

REPORT OF CITY ENGINEER, WEST END IMPROVEMENT—SEA WALL.

Charleston, S. C., January 2, 1918.

Alderman L. M. Pinckney,
Charleston, S. C.

Dear Sir:

I have the honor to report as follows, concerning the construction of the sea wall, South of and parallel with the present South Battery wall.

The “Boulevard” wall extending from the West end of Tradd Street to the South end of King Street, was completed in 1911. The wall now under construction will extend this wall Eastward to connect with an extension of the East Battery wall. The design of the extension is the same as that of the “Boulevard” wall except at the East end where the wall is raised several feet to meet the elevated promenade of East Battery.

The wall is supported by pile bents carrying a flooring of two inch and four inch plank, the difference in thickness of the plank forming a shoulder to resist, in a measure, any transverse movement of wall over platform. The pile bents six feet, center to center, consist each of two vertical piles, six feet, center to center, and one batter pile on the water side. These three piles are held together by two five inch by twelve inch clamps, eight feet long, bolted to each pile. In addition, the batter piles are bolted to the outer vertical piles. Intermediate batter piles are located between bents, so that batter piles are three feet, center to center. A waling strip six inches by twelve inches, is placed at about platform level and securely bolted to all batter piles. Outside of this wailing strip are driven, at an angle of thirty
degrees with the vertical, grooved and spliced sheath piles, five inches thick and thirty feet long, bolted and spiked to the walling strip. Reinforced concrete grooved and tongued slabs, 1-2-4 proportions, cast on shore, are driven on the outer face of the wood sheath piles to three feet below mud line, forming a concrete veil for the protection of the wood against marine borers.

The steel reinforcement of the concrete slabs projects several feet above the upper end of the slabs and is later bent over and incorporated in the concrete of the wall proper. The outer face of the wall proper, has a batter of one in ten, from the coping to mean high water, below which a circular arc, seven feet six inches radius, extends to the concrete slabs.

The thickness of concrete at platform level is six feet six inches from outer slope to inner face; the platform extends two feet six inches beyond the inner face of the concrete. The rear face of the wall at platform level is five feet six inches back of the front face of the coping, which latter is one foot six inches thick. The wall is stepped off at rear from platform to coping, the height of coping above platform being eight feet. The level of platform is two feet six inches above mean low water, the top of coping being ten feet six inches above same datum.

The coping is of reinforced concrete 1-2-4 mixture, the rest of the wall is of plain concrete 1-2-4-5. An expansion joint in the wall is provided every ninety-six feet. The piles driven to date are sixty feet and seventy feet long, about ninety per cent being of the latter length. The total length of wall will be about 950 feet.

After due advertisement, the contract for construction of wall, for filling in back of same and for extension of existing drains through the wall by reinforced concrete additions to same, supported on pile foundations, was awarded to Bryan & Co., of Jacksonville, Fla., who signed contract on Thursday, March 29, 1917, with a time limit of 200 working days, for completion.

At this date, the following work has been done:

- Plumb Piles driven 284, equivalent to 850 lin. ft. of Wall.
- Batter Piles driven 64, equivalent to 100 lin. ft. of Wall.
- Wood Sheath Piles driven 115, equivalent to 145 lin. ft. of Wall.
- Bents on 32, equivalent to 190 lin. ft. of Wall.
- Decking laid 6,000 ft. B. M., equivalent to 150 lin. ft. of Wall.
- Concrete slabs placed 3, equivalent to 19 lin. ft. of Wall.
- Piles driven and cut off for drain, 35.
- Drain completed, 85 final feet.

The following material is estimated on hand:

- Concrete slabs
- Decking
- Wood Sheath piles
- Foundation piles
- Cement
- Broken stone
- Sand
- Bolts and reinforcement

The following are the expenditures from date of contract to December 31, 1917:

- Type writing specifications
- Blue printing plans
- Advertising proposals
- Miscellaneous:
  - Telegrams
  - Counter
  - On account contract
  - Inspection

Total

Very respectfully submitted,

J. H. DINGLE
City Engineer.
Report on West End Improvement

West End Improvement—Sea Wall

Alister C. Sinkler, Chairman,
Committee Ways and Means,
Charleston, S. C.

Dear Sir:

The work of constructing a sea wall and filling in behind same at South Battery was completed December 1, 1919.

The work included the construction of approximately 1,000 feet of sea wall, including removal of old rail from existing wall to new wall, the extension of the Meeting Street and the Church Street drains, the extension of the High Battery walk and filling in the reclaimed area behind the new wall.

The contract with Bryan & Co., of Jacksonville, Fla., was dated March 29, 1917, and provided the following prices:

- High section of wall, per linear foot: $50.00
- Low section of wall (with reinforced concrete rail), per linear foot: $35.00
- Low section of wall (with granite posts and galvanized rail, provided by City), per linear foot: $35.00
- Reinforced concrete drain on pile foundation, per linear foot: $15.00
- Rip-rap, if ordered, per ton (2,000 lbs.): $2.00
- Filling, per cubic yard: $0.14
- Lump sum bid for entire work exclusive of rip-rap, using reinforced concrete railing: $41,849.00
- Lump sum bid for entire work, exclusive of rip-rap, using existing granite posts and pipe railing: $41,585.00

The work was done under the list mentioned item, viz.: $41,585.00 for entire work exclusive of rip-rap.

As the City was accumulating a considerable amount of old cobble stones from repaving operations, arrangements
were made to use this stone for rip-rap and bids were asked for moving and placing this material resulting as follows:

Moving and placing cobble stones which had been dumped on shell walk along line of old wall approximately 80 feet from line of new wall, per ton.................. $0.75
Moving and placing cobble stones which had been dumped on City lot at foot of King Street approximately 30 feet from the center of the work, per ton.................. 1.00

Upon removal of the granite posts which had been imbedded in the old shell-concrete wall, the bases were found to be unusually massive and it was considered desirable to trim these bases before setting the posts in the new wall. A call for bids brought in offer to trim 88 posts, more or less, for $370.00. This offer was accepted.

The expenditures for the year were as follows:

Contract, sea wall and filling................................. $16,435.50
Contract, rip-rap............................................... 1,487.00
Adjusting old wall southeast corner of Battery................. 38.85
Contract, cutting granite post.............................. 370.00
Inspection.................................................... 775.00
Advertising.................................................. 80

Total...................................................... $19,118.29

The contract provides that ten per centum of the contract for sea wall and filling shall be withheld by the City until 60 days after completion and acceptance and then paid to the contractor, provided that no defects shall have become evident during the aforesaid sixty days. In accordance with this provision, should no defects develop in the work, the contractor will be due, or February 1st, his final payment, viz.: $4,158.50.

The total expenditures for this work from commencement to December 31, 1919, were as follows:

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<th>Description</th>
<th>1917</th>
<th>1918</th>
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<td>Advertising proposals</td>
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<td>Contract, sea wall and filling</td>
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<td>Contract, cutting granite post</td>
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<td>$19,118.29</td>
<td>$47,269.39</td>
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Respectfully submitted,

J. H. DINGLE,
City Engineer.