

REPORT OF COMMISSIONERS

OF

PROVINCETOWN DIKE.

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Commonwealth of Massachusetts.

REPORT OF THE COMMISSIONERS.

To His Excellency the Governor of the Commonwealth of Massachusetts.

The Commissioners appointed under a Resolve approved June 10, 1867, and charged thereby with the duty of constructing a dike for the protection of Cape Cod Harbor, now make their report.

The amount appropriated by the Resolve of 1867 having been found to be insufficient for the purpose to which it was applicable, a further sum of \$50,000 was appropriated by a Resolve approved May 19, 1868. On that day, the plan for the construction of the dike across East Harbor Channel, which had been previously submitted to the governor and council, and carefully considered, was further examined and approved by them.

The Commissioners, appreciating the urgent necessity for immediate action, in order to secure the advantage of the mild season of the year, then already well advanced, made arrangements on the same day for testing the effect of driving and the requisite strength of sheet and round piles, on the site which had been selected for the dike, preliminary to making contracts for the timber to be used in construction.

Without a day's delay, advertisements for proposals were made, and contracts were soon entered into for timber, lumber, engines, scows and other appliances. On the 26th day of June, 1868, one month and seven days after the final Resolve and the plan had been approved, the requisite machinery and material for commencing operations had been collected at the mouth of

East Harbor Channel, and the first round pile was driven for the foundation of the dike.

The season proved singularly favorable, and the work from this time progressed rapidly and without interruption, in accordance with the plan adopted at the outset; and on the 4th day of November, 1868, the embankments on the south (or Beach Point) side, and on the north (or Provincetown) side, having been successfully, though not without difficulty, constructed, the channel into East Harbor was completely and finally closed. Filling with sand over the whole timber-work immediately followed, and was continued through the winter and spring, and until June, 1869, when the dike had been raised to a height of six feet above the line of high water; being then 1,400 feet in length, 250 feet wide at the base, and 75 feet wide on the surface. Of this width, twenty feet on the western or outer side were designed as an allowance for washing away by the action of the sea during settling, and in the natural formation of the slope of the structure, and the curves of the shore. Excepting this margin of twenty feet, the entire surface of the dike was planted with beach grass, to prevent the blowing of the sand, and to compact and strengthen the structure.

Operations were then suspended, and the Commissioners awaited and watched with interest the action of the sea upon the work through a series of storms, and extreme tides, and changes and fluctuations of currents, in order to test the strength of the dike and to inquire if any additional defences would be required. The violent gales of September and October, 1869, abraded the bank on the outer side in several places, and to such an extent as made it imperative that some work should be done to repair the breaches and arrest further action in the same direction. After an interview with Brev. Maj. Gen. J. G. Foster, of the U. S. Engineer Corps, and an inspection of the dike, with him, the Commissioners concurred in his views, and determined to extend a bulkhead and jettées of brush and piling along the western side of the dike, parallel to and just below the line of high water, and to fill the intermediate space with sand, the whole being ballasted and secured with stone. A similar work, for a like purpose, had already been tested by Gen. Foster on Beach Point, in immediate proximity to the dike, with the most satisfactory results. And we here

take pleasure in saying that the practical knowledge and ability of Gen. Foster in the construction of works in the vicinity, under the authority of the general government, had attracted the attention of the Commissioners, and had led them, as early as November 10, 1868, to avail themselves of his valuable assistance by appointing him their consulting engineer. His cordial coöperation, his advice and suggestions, the result of acknowledged skill and experience, have, in the opinion of the Commissioners, been of great value to the Commonwealth.

In pursuance of the purpose above indicated, contracts were made for materials, and active operations were resumed November 10, 1869, and have since been consummated in accordance with the plans of Gen. Foster; and since that time, some small expenditures have been made, from time to time, to repair the action of the sea on the harbor side.

The part of Cape Cod to the west of High Head in Truro, which is about six and a half miles in length, with a width varying from a few hundred feet to a little more than three miles, is composed of coarse sand washed up by the waves and currents to the beaches, and blown from them by the wind into sand hills or dunes, some of which have attained an elevation of more than a hundred feet above mean high water. The sand is silicious, and so perfectly free from earthy matter that washing it does not discolor the water, and its sharpness and size of grain are such as to make it highly valued for mixing with lime and cement for building purposes, and it is often specified for that purpose for first-class works in the Atlantic cities and other places to which it can be conveyed without transshipment. The depth to which the sand extends has not been very definitely ascertained. Cape Cod Harbor, which is surrounded on three sides by this sand, washed and blown up as above, has a depth of 75 feet below mean low-water mark. In boring for water in Provincetown, sand, with occasional layers of shells, was found at a depth of 184 feet, beneath which was found a stratum of clay, which was penetrated to the depth of 16 feet. Similar clay, at about the same level, is found by sounding in Barnstable Bay, midway between Provincetown and Plymouth. From all that could be gathered, it has been inferred that, at the site of the dike, the depth of sand below the bottom of the channel is not less than a hundred

feet. As may reasonably be expected, this sand permits the passage of water through it very freely. The ponds, of which there are several on this part of the Cape, are of fresh water, except when the sea breaks into them. As soon, however, as the sea is excluded again by the closing of the breaches, which usually takes place naturally, the water begins to freshen, and after a time it becomes perfectly fresh. Fresh water can always be found by digging near the sea level, even very close to high-water mark. In some natural depressions, several hundred feet from the beach, fresh water, in considerable quantity, stands above the level of the sand at some part of every tide, and disappears at others,—the height at which fresh water stands evidently depending on the height of the tide, although the fresh water is not, necessarily, at its greatest height at high water. The sand being so completely free from all coherent matter, is easily moved by currents of water. According to different writers on hydraulics, sand is moved by a current with a velocity from 6 inches to 12 inches per second. According to observations made in 1867, before the dike was commenced, by A. Savary, civil engineer, under the direction of the Commissioners, the mean velocity of the current at the site of the dike, during some parts of every ordinary flood tide, was two and a half feet per second; and during parts of the ebb tide, three feet per second.

It was a matter of common observation that there was a considerable movement of sand in and out of East Harbor at every tide, and the observations of Mr. Savary show that the velocity of the current was fully adequate to produce this effect. They also show an adequate cause for the facts definitely ascertained by Mr. Henry L. Whiting, by his survey of Cape Cod Harbor in 1867, compared with that of Major J. D. Graham, completed in 1835, namely, that Cape Cod Harbor was being materially encroached on by an accumulation of sand opposite the mouth of East Harbor. Savary's observation that the velocity of the current from East Harbor into Cape Cod Harbor, during some part of each tide, was greater than that in the opposite direction, indicates a sufficient cause for a daily flow of sand from East Harbor into Cape Cod Harbor. It might appear that this must some time come to an end, from the exhaustion of the sand in East Harbor, but the supply was

unfortunately kept good by the wind blowing it into East Harbor from the beach on the outside of the Cape.

The only real ground for thinking that the encroachment on Cape Cod Harbor would some time come to an end from natural causes, was that the quantity of sand blown into East Harbor probably exceeded the quantity carried out of it by the tide into Cape Cod Harbor; the effect of which, if continued long enough, must have been to fill up East Harbor with sand, which would so reduce the flow of water through the channel, that the current would no longer have power enough to carry the sand into Cape Cod Harbor. But this would evidently have required a great length of time, probably centuries.

The location of the dike is represented in Plate I. Its site was selected with a view to its economical construction, and to avoid injury to the neighboring bridge. It was located on the Cape Cod Harbor side of the bridge in order to afford access to it with vessels; which would have been cut off by the bridge if the dike had been built on the East Harbor side, there being no draw in the bridge. It was placed as near the bridge as it was thought prudent, on account of the scour in the bottom which was expected to be produced by the building of the dike, and if too near the bridge, would have endangered its piers.

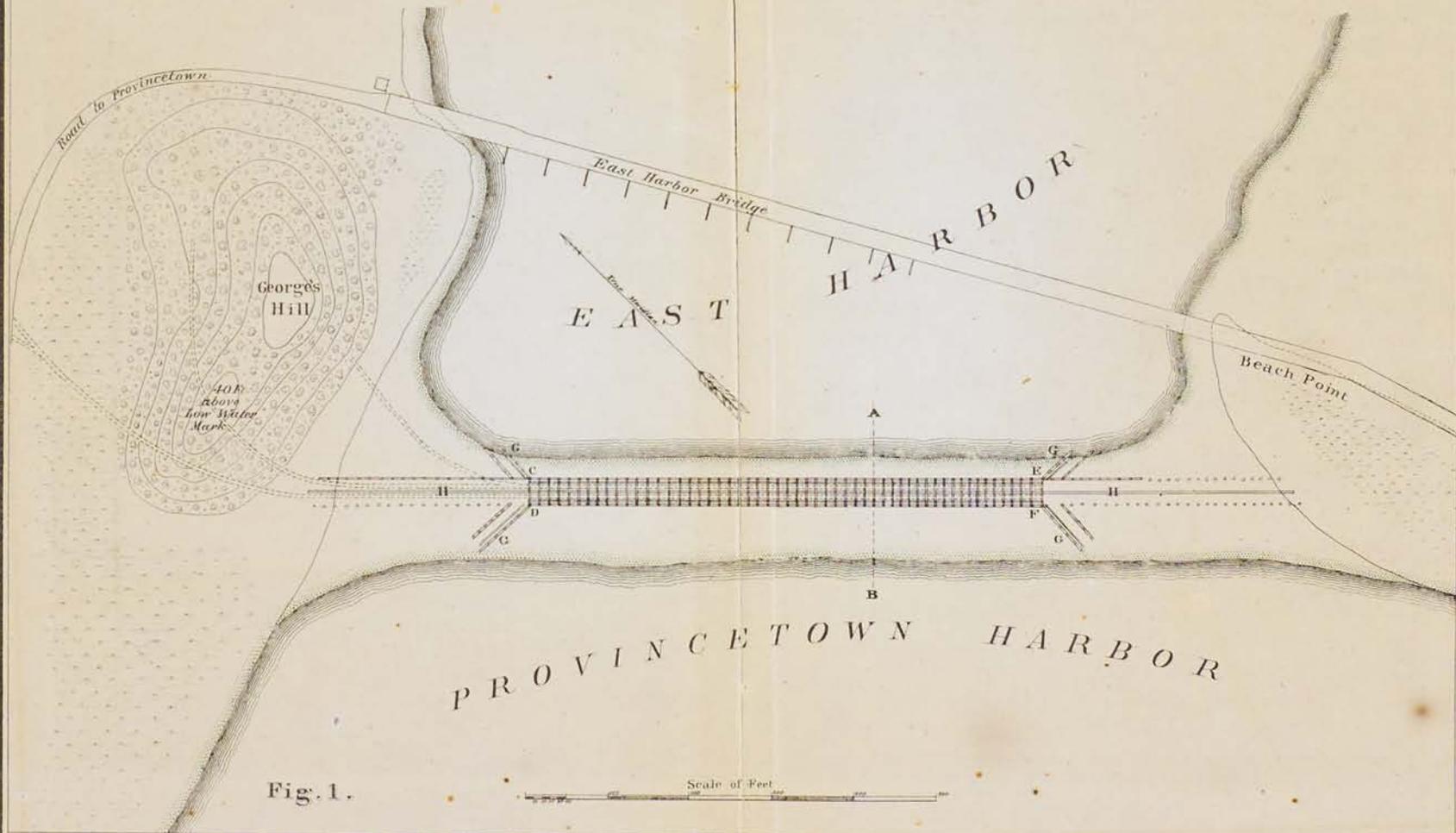
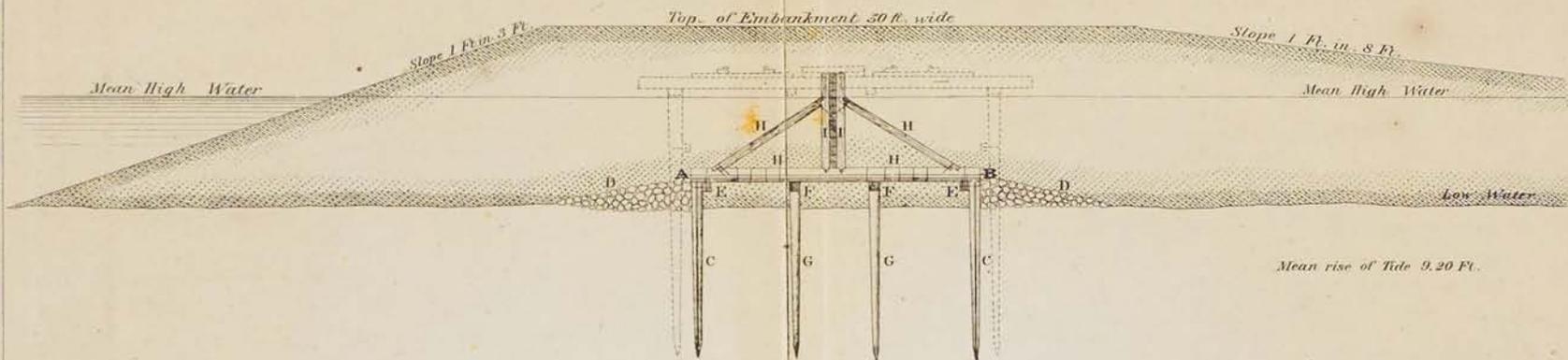
The only material available in the vicinity for the construction of the dike, was the sand in the neighboring sand hills. Of this there was an ample supply; but if it had been attempted to make an embankment of this material, in the ordinary way, by filling out from one or both ends, expecting gradually to narrow up and finally close the channel, it must have been a failure; for after narrowing up the channel to a certain extent, every tide would have carried away as much sand as had been filled in since the previous tide, either by washing away the heads of the embankments or by scouring out the bottom, or probably both. That this must be the effect was so obvious that the attempt was not made. According to Mr. Henry L. Whiting's chart, when the salt marshes are covered, East Harbor covers an area of about nine hundred acres. During a high course of tides before the dike was built, this large body of water flowed in and out through the channel, every tide, or in a little less than twelve hours. In ordinary tides about two-thirds of this area were covered, but provision had to be made

for the highest tides. The only practicable mode of meeting the peculiar difficulties of the case appeared to be to provide a channel through which the tide could ebb and flow without scouring up to the time of the final closing. The method adopted for closing the channel is represented in the accompanying plates, in which C. D. E. F., Plate I., and A. B., Plate II., are a plan and vertical section of a timber apron, six hundred feet long and twenty-five feet wide, on which the dam for closing the channel was erected. The water was prevented from passing under the apron by sheet pilings, C. C., Plate II., and round the end by the timber abutments, G. G., Plate I., which were connected with the shores by sheet pilings, H. H. and embankments of sand. The flow of the tide in and out of East Harbor was thus confined to the space between the abutments and above the apron, the section of the channel at this point being reduced to about one-half of its original area, and the velocity of the current being, of course, increased in the same rate. To prevent the scouring out of the sand on each side of the apron, by the rapid current produced by this contraction of the channel, the bottom was rubbled or rip-rapped for a distance of about twelve feet on each side of the apron, as represented at D. D., Plate II. Preliminary to driving the sheet pilings, the piles for the staging, represented by the dotted lines in Plate II., were driven from scows. This was a rather difficult operation on account of the sea; which although usually slight, interfered very much with the operation. After the staging was erected there was seldom any trouble from this cause, the driving being all done from the staging. The sheet piling was driven to a depth of about twelve feet in the sand, and cut off at about two feet above the average level of the bottom of the channel. The piles were driven at all times of tide, but were cut off at low water only. The sheet piles were of spruce, seven inches thick, grooved and tongued, and to facilitate the driving were shod with iron. Four sets of pile-drivers were used, each consisting of a gin, with hammer weighing from 1,600 to 1,800 pounds, a portable steam-engine rated at five to seven horsepower, and managed by eight men, each gang driving about fourteen piles per day of ten hours.

The apron was made of five-inch spruce plank, grooved and tongued, and was held in place by being spiked to the waling

Fig. 2.

SECTION AT A-B. Scale $\frac{1}{16}$ = 1 foot



pieces, E. E., Plate II., and to the timbers, F. F., on the tops of the round piles, G. G., two rows of which were driven about five feet apart in the row, for the purpose of holding these timbers. The rubble stone could not be put in to protect the bottom from scouring until after the sheet-piles in its vicinity were driven. It was necessary, however, to protect the bottom in the neighborhood of the piles as they were being driven; and sand-bags were used for this purpose, as they did not interfere with the driving of the piles; each bag weighed from seventy-five to one hundred pounds and about 13,000 were used; and they proved to be economical and effective.

After the apron abutments, wing-pilings, and embankments were completed, and the bottom on each side of the apron protected from scour by the rubble stone, arrangements were made for shutting out the tide. For this purpose the frames, H. H., Plate II., were erected on the apron at intervals of ten feet, the sills being securely fastened to the apron by long spikes; spaces were left between the upright posts, I. I., to receive five-inch plank, grooved and tongued, with which the channel was finally closed. Nothing occurred to prevent the carrying out of this plan, and it was completely successful.

Subsequently, the embankment constituting the dike was formed, with sand from the neighboring sand hills, one of which (called George's Hill) is represented in Plate I. About 150,000 cubic yards of sand were moved an average distance of 1,200 feet, for this purpose, by means of a series of railway tracks, some of which are represented on the plate. Nearly the whole of the timber in the apron, pilings, stagings, &c., was necessarily buried in the embankment.

When the tide was first shut out of East Harbor, the height of the surface of the water shut in happened to be between one and two feet above the mean level of the sea. It did not remain at this height, however, but gradually fell to near the mean level, partly from leakage through the dam, but mainly, it was thought, by percolation. Beach Point, which connects with the south-easterly end of the dike, is a ridge of sand, about two miles and a quarter in length, separating East Harbor from Cape Cod Harbor. Its height nowhere exceeds ten feet above high water, and its width between the high-water marks on each side varies from about twenty to about two hundred feet.

The beach on the Cape Cod Harbor side has a slope varying from about one foot in seven to about one foot in twenty; on the East Harbor side the slope is very much less rapid, and large flats, covered from one to three feet deep at high water, extend for a considerable distance from high-water mark. Soon after the channel was closed the surface of the water in East Harbor stood at near the level of half tide; at high water the level on the Cape Cod Harbor side of Beach Point was about four feet higher. The effect was that for a time, in the neighborhood of high water, the water percolated through the porous sand and appeared in innumerable little streams on the East Harbor side, running down the slight slope of the flats. The percolation undoubtedly took place to some extent over a large area under water, where it could not be observed. At low water there must have been a percolation to an equal extent in the opposite direction, although not so apparent. The effect must have been to produce a slight fluctuation with every tide in the height of the surface of the water shut in. The area of water surface was, however, too large, and the disturbing effects of rains, evaporation and wind, too great, to make it apparent, except by a series of nice observations, which were not undertaken.

In the construction of the dike, there were used about 1,000,000 feet of lumber, upwards of thirty-one tons of iron, about 6,000 tons of stone, and 13,000 sand-bags; and, during the most active operations, there were one hundred and one men and eighteen horses employed. The average force was seventy-one men and fifteen horses. Arrangements were made for boarding the men and subsisting the horses within a few rods of the work, so that there was no waste of time or strength.

Gen. Richard A. Pierce, who was one of the Commissioners originally appointed under the Resolve of 1867, continued to hold the place until the time of his death, which occurred August 3, 1869, although he had not been able to perform any service for several months previous to his decease. While his health and strength permitted him to participate in the work assigned to the Commission, he exhibited the same zeal, energy and ability which characterized him in the various public trusts to which he had been called. The vacancy was filled by the appointment of Mr. Marston, October 28, 1869.

There was appropriated in 1867-68, for the construction of the dike, and for expenditures incidental thereto, \$150,000. Of this sum, there was expended for these purposes, \$137,666.65, less by credit from sale of material and machinery, \$5,562.24; making the net cost to the Commonwealth of the structure at the mouth of East Harbor \$132,104.41, and thus leaving a balance of \$17,895.59 of the appropriations unexpended.

So far as can be known, the dike has served one of the purposes of its construction,—the prevention of the shoaling and narrowing of Cape Cod Harbor by the sand which was carried out by the ebb tides from East Harbor and deposited in Cape Cod Harbor. Already, the currents along shore appear to be bearing the sand which they transport up against the dike and along Beach Point, in a natural process of repair. That the dike will serve another important purpose of its construction, if occasion should arise, in arresting the severance of Provincetown from Truro, and the destruction of Cape Cod Harbor thereby, whenever the abrasion of the sea on the outside shall have wasted away the narrow and narrowing strip of beach, is confidently believed. While we are unable to state with accuracy the extent of the continuous waste on the outside of the outer beach, it is clear that it is steadily going on. It is only a question of time when the sea will have gnawed its way through this barrier, and shall pour its forces into the basin of what was East Harbor. The same unceasing and untiring process which has completely destroyed and obliterated the islands which formerly lay southward, off Chatham, and which is encroaching on the highlands of Truro to such an extent that within a period of sixty-seven years about sixty feet of the bluff, one hundred and fifty feet high, and of a compact clay formation, have been carried away, always wasting and never restoring, will not be arrested until it has broken through the beach at the head of the meadow above East Harbor, and then this dike must be relied on either to resist the action of the sea, as it now stands, or, more probably, to serve as the nucleus of a new formation, which shall be of sufficient strength to be safe and permanent.

The dike has recently been examined by Gen. Foster, and by Brev. Brig. Gen. George Thorn, of the U. S. Engineer Corps;

and Gen. Thorn, who succeeds Gen. Foster in charge of the interests of the general government in relation to the harbors in this vicinity, has undertaken to receive the work under his care, and attend to its security and protection. This is in accord with the view which has all along been held,—that the whole subject of the protection of Cape Cod Harbor should be at the cost of the general government, and the Commissioners hope that the sum which has been expended by the Commonwealth for this purpose will eventually be reimbursed by the United States. And in this connection, we call attention to certain letters of Gen. Foster's, which are appended to this Report.

PAUL HILL,
JAMES GIFFORD,
GEO. MARSTON,

Commissioners.

PROVINCETOWN, May 23, 1871.

CAPE COD HARBOR IMPROVEMENT.

COMMISSIONERS.

Paul Hill, expenses and compensation,	\$5,575 43
James Gifford, expenses and compensation,	5,502 37
R. A. Pierce, expenses and compensation,	2,257 60
James B. Francis, expenses and compensation,	1,627 31
Geo. Marston, expenses and compensation,	186 50
Joint expenses of Commissioners,	57 65

ENGINEERS.

H. L. Whiting, expenses and compensation,	1,487 38
H. F. Mills, expenses and compensation,	402 71
Maj. Gen. J. G. Foster, consulting engineer,	750 00

SURVEYORS.

Gershaw Bradford, expenses and compensation,	354 47
A. Savary, expenses and compensation,	169 30

CONTINGENT EXPENSES.

Labor,	42,584 44
Lumber,	25,072 54
Stone,	17,180 84
Iron, spikes, tools, pipe, oil, etc.,	4,623 20
Steam-engines,	3,250 28
Scows,	1,412 68
Blacksmithing,	1,249 32
Sand cars, trucking, carting, etc.,	2,376 81
Piles,	2,428 20
Freight,	3,965 82
Bags, blocks and boxes,	1,446 96
Use of horses,	1,754 75
Use of scow, engine, and pile-driver,	545 10
Tubular, wells, barrels, etc.,	492 84
Coal, hardware, etc.,	776 48
Stationery, printing and advertising,	361 55
Boats, anchors, etc.,	168 93
Rent and clerk hire,	136 44
Beach and grass sods,	435 50
Material for dike,	200 00
Photographs,	170 00
Miscellaneous expenses,	1,267 92
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	\$130,271 32
	1,499 82
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	\$131,770 14

STATE OF NEW YORK

IN SENATE

REPORT OF THE

COMMISSIONERS OF THE LAND OFFICE

FOR THE YEAR 1884

ALBANY: PUBLISHED BY THE STATE PRINTING OFFICE, 1885.

1884	1883	1882	1881	1880	1879	1878	1877	1876	1875	1874	1873	1872	1871	1870	1869	1868	1867	1866	1865	1864	1863	1862	1861	1860	1859	1858	1857	1856	1855	1854	1853	1852	1851	1850	1849	1848	1847	1846	1845	1844	1843	1842	1841	1840	1839	1838	1837	1836	1835	1834	1833	1832	1831	1830	1829	1828	1827	1826	1825	1824	1823	1822	1821	1820	1819	1818	1817	1816	1815	1814	1813	1812	1811	1810	1809	1808	1807	1806	1805	1804	1803	1802	1801	1800	1799	1798	1797	1796	1795	1794	1793	1792	1791	1790	1789	1788	1787	1786	1785	1784	1783	1782	1781	1780	1779	1778	1777	1776	1775	1774	1773	1772	1771	1770	1769	1768	1767	1766	1765	1764	1763	1762	1761	1760	1759	1758	1757	1756	1755	1754	1753	1752	1751	1750	1749	1748	1747	1746	1745	1744	1743	1742	1741	1740	1739	1738	1737	1736	1735	1734	1733	1732	1731	1730	1729	1728	1727	1726	1725	1724	1723	1722	1721	1720	1719	1718	1717	1716	1715	1714	1713	1712	1711	1710	1709	1708	1707	1706	1705	1704	1703	1702	1701	1700	1699	1698	1697	1696	1695	1694	1693	1692	1691	1690	1689	1688	1687	1686	1685	1684	1683	1682	1681	1680	1679	1678	1677	1676	1675	1674	1673	1672	1671	1670	1669	1668	1667	1666	1665	1664	1663	1662	1661	1660	1659	1658	1657	1656	1655	1654	1653	1652	1651	1650	1649	1648	1647	1646	1645	1644	1643	1642	1641	1640	1639	1638	1637	1636	1635	1634	1633	1632	1631	1630	1629	1628	1627	1626	1625	1624	1623	1622	1621	1620	1619	1618	1617	1616	1615	1614	1613	1612	1611	1610	1609	1608	1607	1606	1605	1604	1603	1602	1601	1600	1599	1598	1597	1596	1595	1594	1593	1592	1591	1590	1589	1588	1587	1586	1585	1584	1583	1582	1581	1580	1579	1578	1577	1576	1575	1574	1573	1572	1571	1570	1569	1568	1567	1566	1565	1564	1563	1562	1561	1560	1559	1558	1557	1556	1555	1554	1553	1552	1551	1550	1549	1548	1547	1546	1545	1544	1543	1542	1541	1540	1539	1538	1537	1536	1535	1534	1533	1532	1531	1530	1529	1528	1527	1526	1525	1524	1523	1522	1521	1520	1519	1518	1517	1516	1515	1514	1513	1512	1511	1510	1509	1508	1507	1506	1505	1504	1503	1502	1501	1500	1499	1498	1497	1496	1495	1494	1493	1492	1491	1490	1489	1488	1487	1486	1485	1484	1483	1482	1481	1480	1479	1478	1477	1476	1475	1474	1473	1472	1471	1470	1469	1468	1467	1466	1465	1464	1463	1462	1461	1460	1459	1458	1457	1456	1455	1454	1453	1452	1451	1450	1449	1448	1447	1446	1445	1444	1443	1442	1441	1440	1439	1438	1437	1436	1435	1434	1433	1432	1431	1430	1429	1428	1427	1426	1425	1424	1423	1422	1421	1420	1419	1418	1417	1416	1415	1414	1413	1412	1411	1410	1409	1408	1407	1406	1405	1404	1403	1402	1401	1400	1399	1398	1397	1396	1395	1394	1393	1392	1391	1390	1389	1388	1387	1386	1385	1384	1383	1382	1381	1380	1379	1378	1377	1376	1375	1374	1373	1372	1371	1370	1369	1368	1367	1366	1365	1364	1363	1362	1361	1360	1359	1358	1357	1356	1355	1354	1353	1352	1351	1350	1349	1348	1347	1346	1345	1344	1343	1342	1341	1340	1339	1338	1337	1336	1335	1334	1333	1332	1331	1330	1329	1328	1327	1326	1325	1324	1323	1322	1321	1320	1319	1318	1317	1316	1315	1314	1313	1312	1311	1310	1309	1308	1307	1306	1305	1304	1303	1302	1301	1300	1299	1298	1297	1296	1295	1294	1293	1292	1291	1290	1289	1288	1287	1286	1285	1284	1283	1282	1281	1280	1279	1278	1277	1276	1275	1274	1273	1272	1271	1270	1269	1268	1267	1266	1265	1264	1263	1262	1261	1260	1259	1258	1257	1256	1255	1254	1253	1252	1251	1250	1249	1248	1247	1246	1245	1244	1243	1242	1241	1240	1239	1238	1237	1236	1235	1234	1233	1232	1231	1230	1229	1228	1227	1226	1225	1224	1223	1222	1221	1220	1219	1218	1217	1216	1215	1214	1213	1212	1211	1210	1209	1208	1207	1206	1205	1204	1203	1202	1201	1200	1199	1198	1197	1196	1195	1194	1193	1192	1191	1190	1189	1188	1187	1186	1185	1184	1183	1182	1181	1180	1179	1178	1177	1176	1175	1174	1173	1172	1171	1170	1169	1168	1167	1166	1165	1164	1163	1162	1161	1160	1159	1158	1157	1156	1155	1154	1153	1152	1151	1150	1149	1148	1147	1146	1145	1144	1143	1142	1141	1140	1139	1138	1137	1136	1135	1134	1133	1132	1131	1130	1129	1128	1127	1126	1125	1124	1123	1122	1121	1120	1119	1118	1117	1116	1115	1114	1113	1112	1111	1110	1109	1108	1107	1106	1105	1104	1103	1102	1101	1100	1099	1098	1097	1096	1095	1094	1093	1092	1091	1090	1089	1088	1087	1086	1085	1084	1083	1082	1081	1080	1079	1078	1077	1076	1075	1074	1073	1072	1071	1070	1069	1068	1067	1066	1065	1064	1063	1062	1061	1060	1059	1058	1057	1056	1055	1054	1053	1052	1051	1050	1049	1048	1047	1046	1045	1044	1043	1042	1041	1040	1039	1038	1037	1036	1035	1034	1033	1032	1031	1030	1029	1028	1027	1026	1025	1024	1023	1022	1021	1020	1019	1018	1017	1016	1015	1014	1013	1012	1011	1010	1009	1008	1007	1006	1005	1004	1003	1002	1001	1000	999	998	997	996	995	994	993	992	991	990	989	988	987	986	985	984	983	982	981	980	979	978	977	976	975	974	973	972	971	970	969	968	967	966	965	964	963	962	961	960	959	958	957	956	955	954	953	952	951	950	949	948	947	946	945	944	943	942	941	940	939	938	937	936	935	934	933	932	931	930	929	928	927	926	925	924	923	922	921	920	919	918	917	916	915	914	913	912	911	910	909	908	907	906	905	904	903	902	901	900	899	898	897	896	895	894	893	892	891	890	889	888	887	886	885	884	883	882	881	880	879	878	877	876	875	874	873	872	871	870	869	868	867	866	865	864	863	862	861	860	859	858	857	856	855	854	853	852	851	850	849	848	847	846	845	844	843	842	841	840	839	838	837	836	835	834	833	832	831	830	829	828	827	826	825	824	823	822	821	820	819	818	817	816	815	814	813	812	811	810	809	808	807	806	805	804	803	802	801	800	799	798	797	796	795	794	793	792	791	790	789	788	787	786	785	784	783	782	781	780	779	778	777	776	775	774	773	772	771	770	769	768	767	766	765	764	763	762	761	760	759	758	757	756	755	754	753	752	751	750	749	748	747	746	745	744	743	742	741	740	739	738	737	736	735	734	733	732	731	730	729	728	727	726	725	724	723	722	721	720	719	718	717	716	715	714	713	712	711	710	709	708	707	706	705	704	703	702	701	700	699	698	697	696	695	694	693	692	691	690	689	688	687	686	685	684	683	682	681	680	679	678	677	676	675	674	673	672	671	670	669	668	667	666	665	664	663	662	661	660	659	658	657	656	655	654	653	652	651	650	649	648	647	646	645	644	643	642	641	640	639	638	637	636	635
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