SOME PROBLEMS OF THE CHARLES RIVER DAM[1,2]

By John R. Freeman

The proposition to dam the tidal estuary of the Charles lying between Boston and Cambridge has been before this community and a subject of legislative inquiry, at one time and another, for more than forty years. The suggestion came naturally from a desire to avoid the offensive appearance and odors from portions of the large areas of mud flats uncovered at low tide. The earliest suggestion was somewhat vague as to details but proposed the control of the water level. This obviously involved some kind of dam, and the agitation of 1869 which reached the state of legislative inquiry involved a dam of height sufficient to flood the flats.

Half tide dams and full dams, salt water basins and fresh water basins have been proposed, and the proposed location has ranged all the way from Craigie Bridge to a point three miles up the stream near the foot of the narrow river and the head of the broad basin. Eminent citizens famed for public spirit and breadth of view have favored it. Other eminent citizens doubting its feasibility from a sanitary standpoint have earnestly opposed it. Mayor Matthews[3] at his inaugural in 1891 recommended the project in earnest terms saying:

> [W]e have in this basin the opportunity for making the finest water park in any city in this country, an opportunity which should be grasped before it is too late. The eventual solution of this whole problem should, I think, be an imitation of the plan adopted by the City of Hamburg under similar circumstances. We should dam up the stream at the narrowest point between Charlestown and Boston and lay out a series of boulevards along the basin thus created.

The Massachusetts Legislature of 1893 by Chapter No. 475 enacted that the newly established board of the Metropolitan Park Commissioners and the State Board of Health sitting as a Joint Board should investigate the sanitary condition and prepare plans for the improvement of the beds, shores and waters of the Charles River between Charles River

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[1]From a draft manuscript found among Freeman's private papers in M.I.T. Archives. Prepared for publication by Deborah A. Cozort, Assistant Archivist.

[2]The Annual Report of the Board of Government of the Boston Society of Civil Engineers, for the year 1903-1904, p. 2, cites that at the June 24, 1903 meeting the following paper was read: "John R. Freeman, 'Problems connected with the proposed Charles River Dam.' (Illustrated)".

[3]Mayor Nathan Matthews of Boston represented the Petitioners in favor of the dam before the Committee on Charles River Dam in 1902.

Bridge and the Waltham Line.

The scientific investigation of the problems presented may fairly be said to have begun with the work of this Joint Board, notwithstanding their limited appropriation (their engineering expenses were only about $2,800.00). They outlined the main problems so completely that the more recent board has found reason to differ from them only in some of the details, such as means for removing the pollution from the basin and in proposing that the dam shall form part of a new Craigie Bridge instead of being located 600 feet up stream. [The] strong endorsement of the project given by these two boards . . . failed to [convince] all the honest doubters, and strong personal interests were aroused in opposition.[4]

It is considered by many that under the strong recommendation of the Joint Board of 1894 the Legislature would have authorized the work and the cities [would] have supported it, had not the project as then presented contained a proposal to fill a long strip of the tidal basin 300 feet wide in the shabby water-side of the Beacon Street houses. [The proposal would thereby have made] available a new tier of lots upon which residences might be built presenting a facade appropriate to a water park. [T] he sale of [these] lots would doubtless have paid the cost of the entire improvement, but the chief spokesman for the opponent[s], the eminent lawyer Mr. L. S. Dabney, a resident of the adjoining territory, says that [they] feared the unsanitary condition of a sewage pollut[ed] . . . . . fresh water lake, and would have opposed the project with equal vigor had the filling of this new tier of lots been abandoned.

A veritable howl of indignation arose from Beacon Street, and as the residents of that region are reputed to have money to burn, . . . intelligence, standing and great influence in the community, there were soon plenty of opposition and no lack of eminent counsel at work probing the scheme . . . and emphasizing the doubtful [pollution argument].

Meanwhile, the Park Commission and the State Board of Health said but little. They had investigated so far as a limited appropriation would permit. [They] had presented a carefully considered report and upon it they rested. The chief claims in opposition were first that the health of

[4]Freeman's manuscript characterized the boards as having ". . . added to the fame of Massachusetts throughout the length and breadth of this continent, one by the thoroughness and skill of its investigation, the other by breadth of conception and beautiful execution of its work." — ed.

[the] community would be endangered by the sewage polluted basin; second that malaria would be invited by increased dampness of the soil due to the elevation of the ground water; [third] that the cooling influence of the influx of [a] large body of salt ocean water twice a day would be lost; fourth that the navigation interests around the basin would suffer; fifth, that the commercial interests of Boston would be threatened and the shoaling of the main channels of its harbor [would be] invited by cutting off the scouring action of [the] tidal prism.

The Park Commission had already shown the desirability of the project, the State Board of Health had rendered its opinion on the sanitary questions involved, and so the Legislature naturally passed the harbor problem along to the State Board of Harbor and Land Commissioners, directing them by Chapter 85 of the Resolves of 1894:

> To inquire into the construction of a dam and lock in the tidal basin of Charles River, with special reference to interference with the tide water and its special effect upon the harbor of Boston — and a sum not exceeding $1,500.00 is allowed for the necessary expenses of such inquiry and hearing.

Naturally, with so limited an appropriation, the Harbor Commission did nothing in the way of scientific or practical inquiry through its own engineer but simply gave an opportunity for all persons desiring to be heard to present their views. Seventeen hearings were given and a thousand pages of printed testimony and argument recorded, but a small part of which was devoted to Harbor questions. The bulk of the testimony related to problems within the special province of the Board of Health and that of the Park Commissioners.

Expert testimony in opposition [to a dam, with respect to the sanitary issue] was presented by Professor [Dwight] Porter, George E. Waring, Jr. and Dr. Henry J. Barnes, and in favor . . . by F. P. Stearns, Albert F. Noyes and Prof. Sedgewick.[5] Marinden and Whiting of the Coast Survey [testified] on the harbor question. The burden of the defense rested on a few statements by Mr. Stearns. Eminent citizens appeared on both sides. President [Charles W.] Eliot [of Harvard], Henry D. Yerxa, E. D. Leavitt and Asa M. Tice were heard in favor [of the dam] while L. G. Burnham, President of the Associated Board of Trade, William H. Lincoln, [and] Captain Humphrey, Treasurer of the Boston Tow Boat Company, spoke earnestly of the impending danger to Boston Harbor. Eminent counsel, among them two ex-governors of Massachusetts,

[5]This is probably William Thompson Sedgwick, M.I.T. Professor of Biology.

appeared for the opponents while the city solicitors of Watertown, Cambridge and Newton argued in support of the proposition.

The State Board of Health and the Metropolitan Park Commission, as befitted their dignity, did not appear before the collateral branch of the Board of Harbor Commissioners to urge this project. Although Mr. Stearns, the chief engineer of the Joint Board, appeared by request, [he did not take] the time to prepare any special report, for those were the days when he was working to the limit of endurance on his report for the Metropolitan Water Supply. The fight was plainly in the hands of the opposition.

As already stated, the Harbor Commissioners had an appropriation of only $1,500.00, barely sufficient to pay the stenographer and the expenses of the hearing. They apparently did not feel called upon to make any investigation on their own account.

Their verdict was that a full and exhaustive investigation would have to be made before anyone could foretell with reasonable certainty what the effect of a [Charles River] dam would be. [They] concluded their report with the words:

> . . . in view of the incalculable injury which might ensue from [impairing] the usefulness of the harbor, we are unable to report in favor of the recommendations contained in the report of the Joint Board.

On the sanitary questions, the [Commissioners] stated that, in view of this conclusion, it was thought to be unprofitable to indulge in any discussion of the testimony. [They] ventured the statement that in view of the irreconcilable [testimony] of the experts, [the Commissioners were] unable to say that the conclusion of the Joint Board might not justify the experiment so far as sanitary objections were concerned.

A meritorious case failed from lack of investigation and presentation complete enough to satisfy the conservatives and the honest doubters. Victory rested with the opponents and almost nothing more was heard in public of the scheme for the next six or seven years. I have heard some of the foremost advocates of the project say within the past year that they were now not sorry for the defeat, that there had been developments in these eight years which favored changes in the original plans and now the time was ripe for doing a more perfect and beautiful work.

About two years ago the project was revived under the lead of Henry L. Higginson, philantropist and financier, foremost in many good

works for the public good. [Higginson was aided by] Augustus Hemenway, likewise a lover of his kind, whose interest in wholesome recreation is shown by the name borne by the gymnasium of Harvard University. James J. Storrow, son of one of our foremost lawyers, himself a rising lawyer and financier, a lover of wholesome recreation who had pulled the stroke oar and been a coach of Harvard crew, and other public spirited citizens earnest in the belief that this great improvement should not wait longer, started upon a campaign of education and prevailed upon the Legislature of 1901 to appoint a Committee for a thorough investigation of all these questions.

The Governor and Council gave evidence of careful attention to the Harbor problem in the makeup of this Committee. [The Chairman was] Dr. [Henry Smith] Pritchett, President of [M.I.T.][6] . . . and recent[ly] superintendent of the U.S. Coast Survey. Colonel Samuel M. Mansfield [was] an officer of high rank in the U.S. Corps of Engineers [who had formerly been] in charge of the improvements in the channels of Boston Harbor [and the planning of] the new Broadsound Channel. In Richard H. Dana [they] found a man of the highest standing in the community who had already given largely of his time *pro bono publico* and in whom the citizens of both Boston and Cambridge would have great confidence.

The Committee [on the Charles River Dam] was directed in specific terms to investigate the desirability and feasibility [of the project.] An exceptionally wise feature of the [enabling] statute . . . authorized the expenditure of such funds [for] investigations as the Governor and Council might determine. The [Committee] began the investigation with a series of public hearings. [They] first asked the various municipal boards and commissioners of public improvements whether a dam would interfere with present or prospective public works, . . . thus wisely opening the question in its broadest terms.

The Street Commissioner of Boston presented maps showing the relation of the drainage and the sewerage system to the water level and the flow of the Charles. The Chief Engineer [of the] Metropolitan Sewage Board described the relation of these sewers to the Charles and the necessity of their overflow into the basin in time of storm. [He also] gave estimates showing the small extra cost of sewage pumping that would be caused by raising the overflow level. The City Engineers of Boston, Cambridge and Newton and the Town Engineers of Brookline

[6]Freeman referred to M.I.T. in his manuscript as ". . . what we believe to be the foremost scientific school of the country . . ." Freeman graduated from the Institute in 1876 and served as a member of its Corporation. -ed.

and Watertown described the relation of their sewers to the river. Some of these city officials admitted that a good deal of sewage now got mingled with the natural flow of Stony Brook and thus entered the Fens and the Charles. The City Engineer of Cambridge presented statements indicating that seven percent of all the sewage of Cambridge now found its way into the Charles. The faculty of Tufts College Medical School located near the Fens called attention to the discharge of large quantities of sewage into the Fens Basin. The Harbor Commissioners sent their engineer, but he confined his testimony to a statement of the construction work in progress and declined to enter into the premeditation of opinions on the Harbor question. The Commandant of the Watertown Arsenal, the Chairman of the Boston Park Commission and the Chairman of the Cambridge Park Commission each appeared and stated the relation of works under his charge to the proposed improvement.

Perhaps the most interesting statements were those from the State Board of Health and the Metropolitan Park Commission. The Chief Engineer of the State Board of Health presented a very full statement containing many statistics and computations and claimed that the upland Charles below the head of the proposed basin was more free from direct sewage pollution than any river of equal size in eastern Massachusetts. [He further claimed] that the sewage entering the basin of the Charles after the new high level sewer was completed would be utterly insignificant in proportion to the flow of the river and "could not be regarded as a menace to the health of those boating on the basin or living upon its boarders."

Mr. Las Casas, Chairman of the Metropolitan Park Commission showed how the [Charles River] estuary had been encroached upon from time to time until more than half its area had been filled. [He] also give a history of the park improvement along its shores and showed that nine-tenths of the toal shore line of seventeen miles around the proposed basin had now passed into public ownership. [He stated] that the Metropolitan Park Commission had not acquired its holdings in a haphazard manner for the mere purpose of making parks here and there but that each was part of a comprehensive plan and that, "the Charles River is the central feature of the Metropolitan Park System both as a waterway and as a parkway." [Mr. Las Casas] eloquently urged that the transform[ation of] this basin into a water park was a logical consequence of natural location and of the work already done and that any shortsightedness today would call for a heavy penalty in increased expenditure hereafter. This first stage of the hearings clarified the relation of all public works around the basin to the project in question.

The Massachusetts Civic League presented petitions in favor [of the dam] signed by five hundred residents of the crowded North End. President Eliot of Harvard made a strong plea stating that the project was in the interest of the people by the hundred thousands, that the dam was essential to . . . beauty and the sanitation of the valley with its extended low lands and marshes. The Roman Catholic Vicar General of the Archdiocese [and] the Episcopal Bishop of Eastern Massachusetts urged this park improvement on broad humanitarian grounds . . . Congressman Fitzgerald urged it as a representative of the crowded North End and John Shepard urged it as a resident of the Back Bay. Mr. Gamaliel Bradford and others living near the Charles opposed the project with equal earnestness and claimed that the whole scheme was merely an effort to provide the boating men of Harvard College with a better waterway for their races. There was plenty of other testimony both general and expert. Mr. Percy Blake presented a very full study of the problem on behalf of [project advocates], bringing out many facts to show that it was entirely safe from every standpoint. Mr. J. Herbert Shedd presented facts and figures showing that nothing unsanitary was to be feared and that the harbor surely would not suffer.

Professor Porter, on behalf of the opponents, presented a report in which he found against the dam on every point. [He] found that the Alster Basin of Hamburg was not a safe guide on sanitary questions because [it is] located 700 miles nearer the North Pole and in a cooler climate. [He said] that the foul Fens Basin was but a prototype of the proposed basin, that the remaining undredged mud flats are not large or particularly offensive, and that the shores not yet improved could be sloped and made attractive for a small sum. . . . [Professor Porter reported] that it was doubtful that the proposed basin would ever be largely used for pleasure boating and that skiffing upon it would be unsafe. [He advised] that the bathing at Captain's Island would no longer be sanitary or agreeable. [He noted] that the building of the dam would not prevent possible flooding of the marshes in extreme freshets and high tides, and that the constant level of the dam because of ice would injure the navigation. . . . [Professor Porter estimated] that the temperature of the basin water would be raised 8 or 10 degrees and the temperature of the breezes blowing over the basin would be materially warmer than now and less wholesome.

Mr. Rudolph Hering was strong in the belief that unless [special] arrangements were added . . . the basin as proposed would unquestionally have disappointing results [and] would probably be injurious to health and certainly to comfort. [He] insisted that the sewage now entering the basin must be excluded. He said, "most of the solid sewage

will remain suspended or deposited nearer the shores and create conditions unworthy of a park."

In the twelve days of hearings the Committee [on Charles River Dam] accumulated a large and varied assortment of maps, statistical tables, blueprints, inferences and opinions - a mass of testimony that filled between three hundred and four hundred closely printed pages.[7] [The testimony would] doubtless have exceeded [the] thousand pages of testimony [accumulated by] the Harbor Commissioners had not the Chairman called a halt. On oral testimony in the form of question and answer which alone appears to have standing in courts of law, he stated with a positiveness that was refreshing that this slow and disjointed method was a waste of time. [He] urged that the expert testimony be presented in the form of written reports. Notwithstanding the violent protest of counsel, this course prevailed.

Distinguished counsel on both sides summed the various points, and on almost every important point the experts called by the proponents were diametrically opposed by the experts called by the opponents.

I was asked to review the testimony and get it into parallels and to aid the Committee in its construction. Then came my days of sorrow. To untangle this conglomeration of facts and opinions, to get opposing statements in parallel, to trace back the data on which they rested, to arrange all this in [a] form convenient for members of the Committee to weigh, and incidently to present some opinions of my own was no easy task particularly as it was desired that I also review the evidence of 1894. Reconciling the views of my friend Porter with those of my friend Blake or those of my friend Goodnough with the diametrically opposite opinions of my friend Hering was impossible. After tracing back their data, I shunned the responsibility of declaring which was making the shrewdest guess from the insufficient data.

For a time I almost began to envy those experts of the court room whose lawyer friends tell them what they are expected to prove. I began to sympathize with the Harbor Commissioners and wish that I might dodge a decision on the sanitary question and imply that Harbor shoaling was one of those things that no fellow could [predict].

It became more and more clear that insufficent exact reliable data

[7]***Evidence and Arguments before Committee on the Charles River Dam, Appointed under Resolves of 1901, Chapter 105. December 16, 1901 through January, 1903.*** Boston: Printed for the State by Wright and Potter, 1903. Actually, the volume is 553 pages with maps and illustrations. —ed.

was at the bottom of all of the difficulties. Many of the differences of opinion brought out both in the hearing of 1894 and of 1902 came from men of different points of view working from insufficient data. Many of the points in controversy, although now matters of opinion, could be made matters of fact by field work and measurements, by observation and experiment. I reported to the Committee [on the Charles River Dam] that I must put engineering parties into the field before presenting a report which would justify conviction.

The Committee responded nobly. Several engineering parties were put into the field. Some of the most eminent specialists that could be found were called in to assist us by further observation and experiment on some of the most puzzling questions. I never would have dared to undertake this work in addition to previous engagements had I realized what it would come to. Days of sixteen hours were the frequent rule and a man never had more loyal or willing helpers. Spear, Carter, Armstrong, Pierce, Ireson and others worked far into the night week after week without complaint, each earnest to help in getting our data into the best possible shape before the time appointed for a report. If there are engineers who see signs of imcompleteness in some matters as, for example, boring and ground water determination, or lack of scientific polish or elaboration in some of the special studies, we must ask to bear gently with us for the date for the report was fixed by law.

As in many another problem, the way cleared up as we advanced. It all looks clear and easy now, but I will confess that there were [difficult] weeks while I was studying the pollution and finding more and more from day to day and [I was] particularly [discouraged] after talking with some of my friends of the city engineering department whose ten or twenty years of acquaintence with the sewer system had made them fearful of anything more than a half tide dam. I was myself in doubt about the sweetness of a stagnant lake receiving occasional overflows of sewage.

We quickly used up our first appropriation. Dr. Pritchett [the Committee Chairman] went to the Governor and Council and told them where we were and what we were up against. If we stopped with the initial appropriation, the answer to the problems would be imcomplete. Additional funds were twice granted [and our work] continued. . . . In all of this engineering work we expended a little less then $30,000.00 leaving a little more than $20,000.00 for rent, lithography, printing and the expenses of the Committee and the secretary.

I believed at the time and still believe that this money was wisely

spent. It appeared to me that a great case was on trial before the public and that the completeness of evidence, thoroughness of data, and quality of expert advice should [meet the standards of] eminent counsel in an important case. Judged by these standards our expenditures were moderate. The simpler problems of the Whitehall Pond case cost each of the contestants about $35,000.00, and I have repeatedly seen water diversion cases and the valuation of water works cost much larger sums.

Having in a long introduction thus told the story of the case, we will now discuss the investigation of some of its special problems.

Map of the Basin

As a starting point for several investigations we made surveys for a new map showing the depth of water in all parts of the basin from Craigie Bridge to the dam at Watertown, with contours of depth drawn at one foot intervals. The surveys of the lower half were in the charge of Instructor [George L.] Hosmer of the Institute of Technology during his summer vacation. The Metropolitan Park Commission helped us out in the survey of the upper half. This map gave us accurate data for the areas of flats uncovered at low tide, for computing the cost of dredging these flats. [The data] were also of use in our sanitary and biological studies, for [as a result of] dredging for the Cambridge embankments, filling portions of the Boston shore, and improving the margins further upstream, the bed of the river had undergone great changes since the previous survey. There was nothing connected with this survey which was in any way out of the ordinary and nothing about which I need take your time.

Remedies for Pollution

The problem of the pollution [of the Charles Basin was central to] the main question of whether or not a dam and basin were feasible and advisable. [Reports written by experts measuring the pollution were appended to the final report of the Committee on Charles River Dam.] The five appendixes containing these reports in condensed form covered more than 200 pages. [E]ach one of these appendixes might easily cover a paper occupying an entire session of this Society. To touch upon them in the time at my disposal, I must further consolidate the reports . . . and can therefore not go into details.

The two main questions about pollution are first, whether the amount was sufficient to produce offensive conditions, and second, how to dispose of it. We had lots of testimony on this subject and it was made

up of opinions rather than fact of observation. The experts estimated the proportion of the sewage [which escaped into the Charles River] from one percent to seven percent of the entire amount from the adjoining thickly settled territory. It was stated by experts of high standing that the amount of the sewage to enter the basin could certainly be taken care of . . . by natural forces. [Other] experts of high standing strongly maintained that these overflows of sewage would shortly make the basin very abusive to sight, smell and health.

Professor [Dwight] Porter concluded that the condition of the proposed basin would shortly become very abusive and referred to the present condition of the basin in the Back Bay Fens as an illustration. Mr. Percy M. Blake reviewed sewer gauge records of Cambridge and other cities and records of rainfall. [He] found that the river flow was more than ample to dilute [the sewage] beyond notice and concluded that the present sewage overflow into the Charles could be cared for by the existing natural forces without any special salt water sluice and special marginal conduits. Mr. Goodnough presented a very complete study based on a theoretical discussion of the sizes of the sewers, the rainfall records and the pollution from each. [He] concluded that there was no danger of the basin becoming abusive.

Mr. Rudolph Hering stated

> . . . . . a theoretical computation of the amount of filth escaping from the overflows may be far from giving the true results regarding the expected quality of the water, for they deal with averages. I cannot agree to such a method of computation in this case.[8]

[He] concluded that the proposed basin would surely be abusive unless all overflow of sewage was prevented from entering it. The late Mr. George E. Waring in 1894 had reached opposite conclusions.

Mr. Stearns, you will remember, was exceptionally familiar with the Boston Main Drainage System having had an important share in its direction and subsequently been charged with its management for two years. [He] concluded in 1894 that no danger whatever was to be apprehended on sanitary grounds. [He noted] that, should objectionable waste by any chance appear, the basin could be temporarily flushed out with harbor water. [I]t must be borne in mind [however] that Mr. Stearns had reached this conclusion eight years ago, before Stony

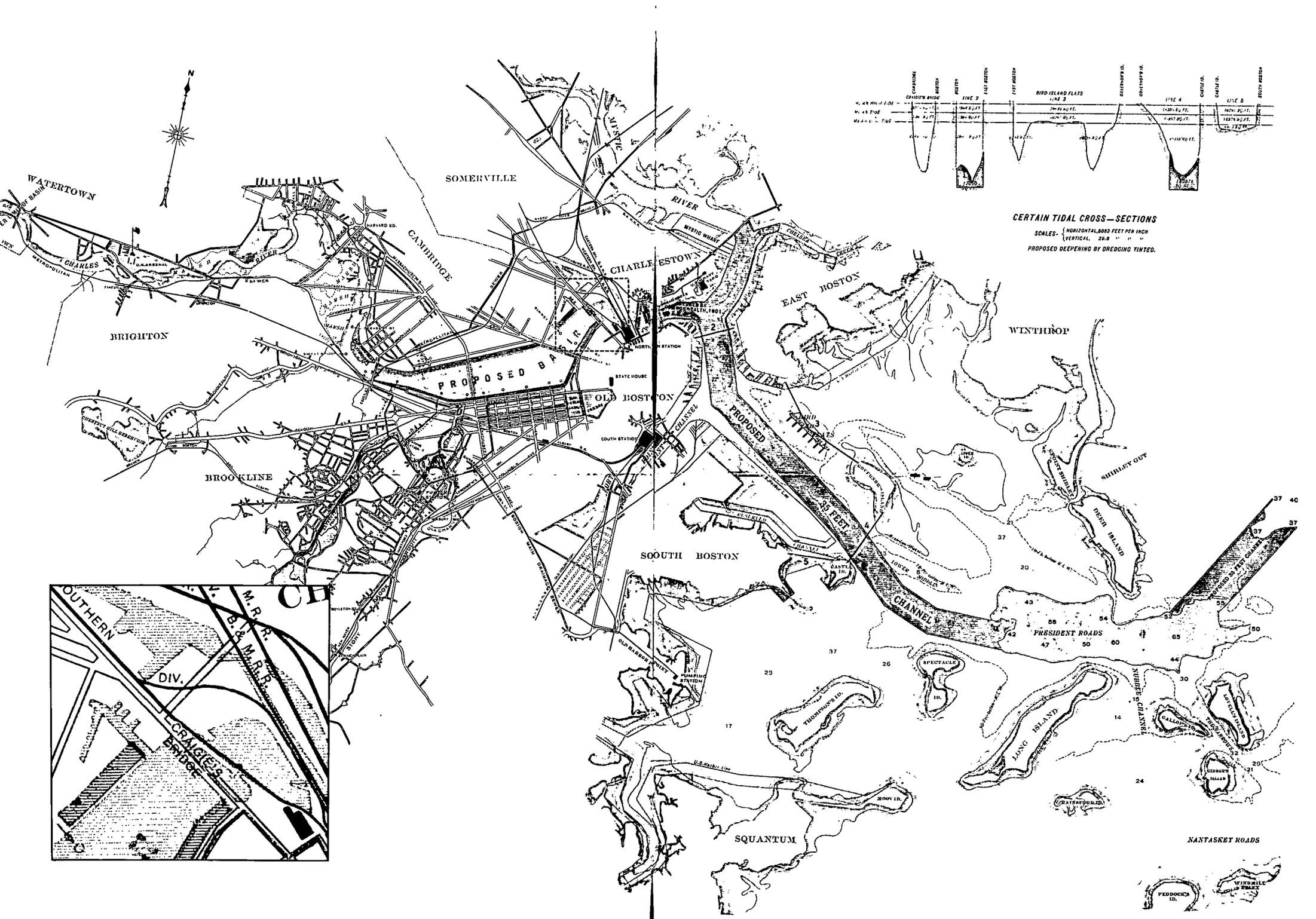
[8]Commonwealth of Massachusetts, *Report of the Committee on Charles River Dam Appointed under Resolves of 1901, Chapter 105, to Consider the Advisability and Feasibility of Building a Dam Across the Charles River at or Near Craigie Bridge.* Boston: Wright & Potter, 1903, p. 134.

Brook had reached its present condition of pollution.

Mr. Noyes in the hearing of 1894 had expressed entire confidence that the sanitary conditions would not be bad. Mr. J. Herbert Shedd, designer of the Providence sewers, was fully familiar with the conditions at the Providence Cove and in the Providence River and equally familiar with the conditions in the regions around the Charles River. From his previous engineering experience in Boston, [he] was confident in the belief that no abusive condition need be feared.

These were all men of standing, whose statements of fact and observations would be accepted implicitly by every man in this room and . . . would probably also have been accepted by the men on the other side. Obviously, we [had] to get down to the bed rock facts and get more facts. While there was much evidence presented, the main pieces of positive evidence were the statements of Mr. Hastings that the Cambridge clock gauges showed that seven percent of the entire sewage of Cambridge escaped into the river during storms. Dr. Henry J. Barnes recounted seeing with his own eyes large quantities of floating excrement at the outlet at the sewer overflow near Hereford and Beacon Streets after a sudden rain.

We set forth to become more familiar with the sewer overflow. [M]y assistant climbed down into each one of the seventy-five manholes, inspected its operative condition and obtained measurements from its float and swinging gate. [To] the extent that its opening could be observed and arranged for, we organized a sort of minuteman brigade. [We] divided the overflows up into districts so that whenever a heavy shower occurred these could be visited and measured and the quantity of water flowing through it approximately determined. This was not a very sweet or attractive job, but we got a good deal of valuable information. [We] found every one of these pieces of apparatus in good working order every time that we inspected them. [O]ur evidence that this apparatus did not fail to do the work that was expected greatly increased. We found, however, one of these in operation more elusive than "the Irishman's flea," and never until undertaking this investigation had I appreciated how quickly the rain gets into the sewers and how quickly the peak of the flood wave has passed. I soon found out that the only way to obtain positive information was by setting clock gauges maintained by Mr. Hastings in Cambridge which have been so much in evidence throughout this case, but here again we had difficulty for the clock and the record chart that will work beautifully in the office or in the open air rebels when put into the foul atmosphere in the sewer manhole. I came near having suspicions about the walking dele-



Portion of map from 1903 Report at reduced scale of about 1" = 5920'. Inset, lower left, shows area centered on Craigie's Bridge where dam was constructed. Inset scale, about 1" = 1500'.

Editor's Note

The Editorial Board decided it would be unnecessary and, in fact, unwise, for reasons of convenience and economy, to reproduce the 20 technical appendices, comprising 454 pages of text, included with the original Report. These appendices, each of genuine historic value, are listed, with subheadings, in the Table of Contents of the following reprint. The interested reader who would like to see any of them, but does not have access to the original Report, can obtain a copy, at the cost of reproduction and handling, from the BSCE Section office, 80 Boylston Street, Boston, MA 02116.

gate who looked after these clocks. Things conspired against us, for instead of having weather like we have had during the past two weeks, we had the most remarkable absence of rain storms during the time that I was most anxious to get observations of the overflow. But we kept at it, persistently hastening to the River every time it had begun to rain. In our gasolene dory I navigated rapidly to every overflow outlet and in some of these found an abundance of material going out which would not look well in the water park.

I soon reached the conclusion that the reason why Mr. Goodnough and others of our sturdy oarsmen who have been long familiar with the Charles River had not seen more of this kind of pollution, came from the fact that people seldom go a boating during a heavy rain. From conversation with the draw tender and others as well as my own inspection, I soon became convinced that a condition at times prevailed that [defied description] by any system of statistics. . . .

A Harvard professor described a mass of [sewage which he observed] floating by the outgoing tide, thickly covering the surface for thirty or forty feet in width and for a mile or more in length. [He] was confirmed in this statement by the assistant keeper. I myself once saw the Binney Street overflow discharge such a mass of this filthy material and saw such long streaks of it coming for half an hour at a time . . . that I concluded that the floating gate sometimes acts as a sort of skimmer to hold back and concentrate the floating pieces for a long time during the progress of a storm while the bulk of the sewage [runs] out into the Metropolitan sewer. [F]inally the pitch of water [runs] to the gate to such an extent as to belch a large mass of this material forth. Obviously, material of this kind seen floating about by a family boating party on the future parkway would destroy the relish of a trip even though a chemist might issue his certificate that the quality on the basin as a whole was too minute a percentage to trouble oneself about.

Although the manuscript for Freeman's speech ends here, his notes indicate that the speech as delivered included additional sections describing the Report of the Chemist, Harry Clark, and Freeman's study of Boston Harbor currents and temperatures. — ed.