BSCES: History & Heritage

Few professional societies in this nation have had a continued and rich history as the Boston Society of Civil Engineers. Nor have many societies had so many members whose contributions to our nation's growth have been so far-reaching.

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THE LATE EIGHTEENTH century saw the great growth and spread of the industrial revolution in England. Giant strides in industrial activity necessitated the development of additional roads, canals and railways, as well as the improvement of rivers and harbors. It was during this period of initial industrial expansion that the profession of civil engineering was firmly established to meet these needs. Many men, most of them self-educated and self-made craftsmen and mechanics with exceptional talents, endeavored to realize these improvements. From among them two British engineers, John Smeaton (1724-1792) and Thomas Telford (1757-1834), made invaluable technical and social contributions toward the profession of civil engineering.

Initially a maker of scientific instruments, Smeaton was possibly the first to call himself a civil engineer. His talent and ability drew him into new fields and he was selected to work on the construction of the Eddystone Lighthouse. Subsequently, he worked, or consulted, on a wide range of road, bridge and canal construction projects. In 1771, those men in the new field of civil engineering created an informal organization to share common interests. Over the next 21 years, some 65 persons — engineers, scientists, craftsmen and mechanics — met to discuss their activities. By 1792 conflicts arose that put a halt to these meetings. However, there was sufficient momentum to renew the "society," but Smeaton died before meetings recommenced. In the following year a new organization of similar composition was formed and named the Smeatonian Society of Civil Engineers.

In 1817, a group of young engineers laid the foundation for starting a new organization that would meet more specific needs in the furthering of professional engineering knowledge. At a meeting on January 2, 1818, the group adopted rules that eventually became, with minor changes, the basis of the Institution of Civil Engineers. This new society met for two years without any substantial growth in membership. In an effort to spur member-

ship, the group altered its rules to include the election of a president "whose extensive practice as a civil engineer has gained him first-rate celebrity; and that a respectful communication be made to Thomas Telford, esquire, civil engineer, to patronize the Institution by taking upon himself the office of President."

Of humble origins, Telford was at first apprenticed to a stone mason. He mastered that craft and soon became involved in building projects, becoming county surveyor of Salop. Both in England and abroad, he became involved in bridge, canal, road and harbor construction. Telford was a member of the earlier Smeatonian Society, but had not been associated with the new society until being invited to serve as its president. Under his direction the new society grew rapidly and was incorporated on June 3, 1828. Several years later, Telford focused his attention more on the Institution of Civil Engineers and endowed it with a large bequest. His attentions assured this new society of its stature and longevity.

New engineering developments were also taking place in the United States. Two engineers in New England, Loammi Baldwin (1740-1807) and his son Loammi (1780-1838), made invaluable contributions to the profession and our nation's industrial growth. The elder Baldwin was the engineer for the Middlesex Canal between Boston and Lowell, Massachusetts. This pioneer project ushered in the canal era of American transportation. Utilizing locks and reservoirs, and with stream crossings and varied conditions to deal with, Baldwin established engineering practices that formed the standard for subsequent canal construction. The younger Baldwin was engineer of Dry Dock No. 1 at the Boston Naval Yard in Charlestown, Massachusetts. Finished in 1834, this dry dock served as the model for this type of construction. Both of these projects are National Historic Civil Engineering Landmarks. Other projects completed in the first half of the nineteenth century in New England that have been recognized as National Historic Civil Engineering Landmarks for their importance are:

Sewall's Bridge. Built in 1761 by Major Samuel Sewall, this bridge crosses the York River in York, Maine. It was this country's first pile trestle structure designed for general highway traffic. It was rebuilt on the original design in 1932.

Allendale Mills. Located on the Woonasquatucket River in North Providence, Rhode Island, the original mill building was a four-story stone rubble structure built in 1822 by Zachariah Allen. The building is one of the first applications of heavy timber set in mortar to increase fire resistance. The use of power looms for manufacturing broadcloth was pioneered here as well as the use of a rolling process to produce a gloss finish.

Granite Railway. The country's first incorporated railway that was operated as a transportation business. Built in 1826, this railway was used to move granite in Quincy, Massachusetts, from quarry to waterfront. Gridley Bryant was the engineer. The operating flexibility required for a common carrier resulted in innovations that are still used in railroad practice.

Cumberland & Oxford Canal. This canal from Portland to Sebago Lake in Maine was about 20 miles long. It had a rise of 265 ft., 27 locks and a small stream crossing on a 100-ft. wooden aqueduct. Designed by Holmes Hutchinson, engineer for the Erie Canal, it operated from 1830 to 1870.

Penobscot Boom. For about 100 years this complex of booms and crib-work piers along the Penobscot River in Maine played an important role in the area's prosperous lumbering industry. In 1835, the boom received and rafted over 82 million board feet of river-floated logs.

Canton Railroad Viaduct. Completed in 1834, this viaduct in Canton, Massachusetts, is still in use. One of the earliest surviving multi-arch stone railroad bridges in the country, it is 615 ft. in length. Engineers were G.W. Whistler and W.G. McNeill.

Lisbon Tunnel. Built in 1835-1837 by James Laurie as Chief Engineer of the Norwich and Worcester Railroad, it was the country's first true railroad tunnel. Located in Lisbon, Connecticut, it carried the railroad line through a hill of solid rock.

Babb's Bridge. Built in 1840 for $318, this bridge between Gorham and Windham, Maine, is the oldest covered bridge in Maine. A queenpost truss structure, it is still in operation.

Massachusetts Base Line. Authorized in 1830 and completed in 1841, this geodetic survey of Massachusetts from Hatfield to South Deerfield was the first such survey in any state. Simeon Borden performed the base line measurement with surveying equipment of his own invention.

Lowell Waterpower System. Due to the work of James B. Francis with waterflows, the canal system at Lowell, Massachusetts, was improved to provide efficient water-power regulation. Francis, and U.A. Boyden before him, made design improvements to water turbines that resulted in higher power ratings. (See pages 141-144 for an article on this landmark.)

The Year 1848

Europe and North America prospered in the early nineteenth century under the impetus of the industrial revolution. In France, a group of engineers had finally succeeded in forming an organization to unite members of the civil engineering profession and to provide a forum for technical discussion. After many years of disagreement, primarily between government and private engineers, the Société des Ingénieurs Civils de France was formed on March 4, 1848.

In the United States, the nineteenth century saw great developments in highway, canal, tunnel and railway construction as well as water and sewer improvements based on the rediscovery of Roman techniques of bridge and aqueduct construction. Vast projects were conceived and carried out to tap the resources of this new land. Of the many distinguished events, developments and projects that occurred in the early nineteenth century, the year 1848 is notable for:

- The end of the Mexican War on February 2 that extended US territories from the Atlantic to Pacific Oceans, thus creating the need for a transcontinental railway.
- The discovery of gold on January 28 in California at Sutter's Mill, giving even more impetus for a transcontinental railway.
- The completion of the 1,200-ft., seventeen-arch Starrucca Viaduct in northeast Pennsylvania under the Scottish engineer James Kirkwood.
- Construction was begun on the first railroad across the Alps that would connect Vienna and Trieste.
- Thomas Telford completed his first tubular bridge (forerunner of the Britannia Bridge) 400 ft. across the Conway River.

Nearer to Boston, other events took place:

- Just eight years after opening, the Western Railroad of Massachusetts began double-tracking its line through the Berkshires.
- The Troy & Greenfield rail-line was in the process of organization, and was seeking to tunnel through Hoosac Mountain which it could not then undertake due to financing.
- Initial proposals for the destruction by surface blasting of the rock barriers at Hell's Gate, East River, New York, were made.
- The finishing of laying 51 miles of 5′ 6″ track from Portland, Maine, to Montreal.
- The New York & New Haven Railroad secured track rights into Manhattan, opening an all-rail route between Boston and New York.
- A new railroad was opened between Boston and Dedham, Massachusetts
- Fresh water was piped into Boston from Cochituate Pond about 20 miles away.

It was in this climate of expansion and innovation that the Boston Society of Civil Engineers — the first organization for the advancement of the civil engineering profession in the New World — was founded.

The Founding of the Society

The desire for civil engineers to unite for the advancement of the profession and for the improvement of its members was not confined to Europe. By 1848 the growth in the amount, and scope, of projects requiring civil engineers in the United States, and in Eastern Massachu-

setts in particular, had escalated. It seemed obvious to engineers in this area that they should form an organization that would further the practice of their profession. One of those engineers, Henry S. McKean, who attended the first meeting of what would become the Boston Society of Civil Engineers (BSCE), recounted the following about that meeting:

> "An informal meeting of gentlemen engaged principally in Civil Engineering, having been called by private notification, was held at the United States Hotel in Boston, on Wednesday evening, April 26, 1848, to consider the expediency of taking measures to form a Society, for social intercourse and professional improvement, to be composed of civil engineers and of gentlemen engaged in pursuits kindred to civil engineering. Of about twelve persons invited, there were present only Messrs. J.H. Blake, G.M. Dexter, E.S. Chesbrough, H.S. McKean and W.S. Whitwell.
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> "The meeting was not formally organized. A general conversation took place on the subject of the proposed Society. A conviction that it was desirable to form one, and a willingness to cooperate for that object, was expressed by all present. The determination of the precise means to be used was deferred to a subsequent meeting which it was supposed would be more fully attended.
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> "After a light supper the meeting adjourned to meet at the same place on Monday evening, May 8th."

Additional persons attended subsequent meetings at which the constitution and by-laws were adopted. The first regular meeting was held on July 3, 1848, when the Society elected the following officers: James F. Baldwin, President; George M. Dexter, Vice-President; John H. Blake, Secretary; William P. Parrott, Treasurer; and Joseph Bennett, Ellis S. Chesbrough, James Laurie, Samuel Nott and William S. Whitwell, Directors.

Thus, the nation's oldest continuing engineering society was established. In the 1830s there had been unsuccessful efforts to form an engineering society. In 1836, engineers associated with the Cincinnati & Charleston Railroad sought to establish the National Society of Civil Engineers. Three years later in Baltimore, forty engineers from eleven states proposed to form an American Society of Civil Engineers after a call from a meeting of engineers in Atlanta. Benjamin Latrobe, a railroad engineer, was elected president and a committee was formed to draw up a constitution. At a subsequent, poorly attended meeting in Philadelphia the constitution failed to receive approval and efforts to form this society ceased. Four years after the founding of the BSCE in 1848, the American Society of Civil Engineers and Architects was formed in New York. In 1869, the Civil Engineers Club of the Northwest (Western Society of Engineers) was established in Chicago.

Early Activities

The Boston Society of Civil Engineers secured a room for meetings in Joy's Building on Washington Street in Boston where one of the founding members of the society, Uriah A. Boyden, maintained an office. The society created a library committee to acquire technical and scientific books and periodicals for member use at Joy's Building.

A draft of the original by-laws stated that "every member be *required* to present a paper, or make a gift of a scientific book, map, plan or model each year." This by-law was subsequently amended to read that such activity would be "desirable means of promoting the objects of the Society." James Laurie presented the first paper to the Society on "Coal and Iron Trade of Great Britain and United States." Published in the *Mining Journal & American Railroad Gazette,* the editors commented that "judging from the paper of Mr. Laurie, we may look for valuable contributions from this Boston Society to the cause of science and general knowledge, and we rejoice in its existence among us."

A great majority of the papers presented to the Society in its first years of existence were on railroads and hydraulics since most members were engaged primarily in these fields. Such railroad-related papers included: "A Railroad to the Pacific," by P.P.F. Degrand,

Highlights of Founding Members' Careers

Samuel Ashburner (1816-1891) He spent most of his life in Boston, consulting in the railroad field. He had been division engineer on the construction of the Eastern Railroad, and chief engineer of the Hartford, Providence & Fishkill Railroad.

James F. Baldwin (1782-1862) Builder of the Boston & Lowell Railroad, he served as a commissioner for the construction of the Cochituate water supply. After its completion, his interests were mainly in connection with mills and industrial properties. He also served as a state senator.

Joseph Bennett (1814-1875) He worked first on railroads. He then worked on the Brooklyn Water Works and on surveys for increased power on the Merrimack River. He translated several technical books, was the Society's librarian and contributed articles to various publications.

John H. Blake (1808-1899) At first he had been in chemical practice. He was a partner with Darracott in building gas plants throughout New England. Later, he was active in street railway development and served as president of the Middlesex & Metropolitan Cos.

Simeon Borden (1798-1856) He was best known for his Trigonometrical Survey of Massachusetts. His services were widely sought as an expert witness on mechanical inventions.

Uriah A. Boyden (1804-1879) Inventor of the hook gauge and diffuser, he improved the Fourneyron turbine. He became financially independent through his inventions and devoted much of his life to scientific research.

Ellis S. Chesbrough (1813-1886) After 18 years in railroad work, he became chief engineer of the western end of the Cochituate water supply project, and later served as water commissioner and as Boston's first city engineer. In 1855, he went to Chicago, where for over 20 years he was in charge of sewerage, water supply and other public works.

John Childe (1802-1858) A graduate of West Point, he built much of the Western (B & A), Troy & Albany, Ohio Central and Mobile & Ohio railroads.

Marshall Conant (1801-1873) Editor of numerous publications on astronomy, he was a surveyor on the Boston water supply and later became principal of the Bridgewater Normal School.

Franklin Darracott (1820-1895) He was a partner with Blake in building gas plants throughout New England. He later went to New York City where he was vice president of the Nason Manufacturing Co., a firm dealing in valves, steam heating fittings and sanitary supplies.

William L. Dearborn (1812-1875) After locating and building railroads in various parts of New England, he became chief engineer of the Grand Junction Railroad. Later, he went to New York and was in charge of a number of important projects for the city's water supply.

George M. Dexter (1802-1872) He served as agent of the Boston & Lowell

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a Boston railroad broker; reports of railroad surveys; "Useful Formulae Adapted to Locating and Constructing Railroads," by Simeon Borden (later published in book form); and, reports on locomotive explosions. Other papers included: "Construction of Beacon Hill Reservoir" and "Mode Adopted for Carrying Water to South Boston," by W.S. Whitwell; "Contracts," by E.S. Chesbrough; and "Use of Lead for Service Pipes," by J.H. Blake. Simeon Borden exhibited his self-designed base-line measuring apparatus that was used for the

Railroad. He was interested in architecture and had much to do with development of buildings in Boston's old Scollay Square. Later, he was treasurer and then president of the Vermont Central Railroad.

Sereno B. Eaton (1823-1899) After working on the Old Colony Railroad, he moved to Ohio where he was engineer of the Keokuk, Fort des Moines & Minnesota Railroad and Hannibal & Naples Railroad; and other lines of the CB & Q system. During his later years, he was a contractor for heavy shovel work on railroad construction.

Robert H. Eddy (1812-1887) He first worked as engineer for the East Boston Land Co., developing much of that property. Later he became a patent solicitor, probably the first to establish that profession in this country.

Samuel M. Felton (1809-1889) He was chief engineer and superintendent of the Fitchburg Railroad, and president of the Philadelphia, Wilmington & Baltimore Railroad during the Civil War. He arranged for Abraham Lincoln's trip through Baltimore to take office as president. After the war, he became president of the Pennsylvania Steel Co.

James B. Francis (1815-1892) He became engineer of the Locks and Canals at Lowell at the age of 22, serving that company as engineer, agent and consulting engineer for over 50 years. He was responsible for turbine improvements, and for developing the waterpower system at Lowell. The published accounts of his water flows experiments, *Lowell Hydraulic Experiments,* in 1855 remains an engineering classic.

Charles H. Haswell (1809-1907) An eminent civil and marine engineer in New York City, he was the author of the *Engineers and Mechanics Handbook.*

Waldo Higginson (1814-1894) He served as agent of the Boston & Lowell Railroad. In his later years, he was founder and president of the Arkwright Mutual Fire Insurance Co.

Isaac Hinckley (1815-1888) He was superintendent of the Providence & Worcester Railroad, agent of the Merrimack Manufacturing Co., and on Felton's retirement became president of the Philadelphia, Wilmington & Baltimore Railroad.

Eben N. Horsford (1818-1893) He was a professor and founder of the Lawrence Scientific School at Harvard. He later founded the Rumford Chemical Works.

Josiah Hunt (1818-1874) He worked on Massachusetts railroads, becoming a superintendent in 1850. He moved west and became chief engineer of the Great Western (Illinois) Railroad, land agent of the Hannibal & St. Joseph Railroad, and director of many other lines. He was president of a bank and four-time mayor of Hannibal, MO.

Martin B. Inches (1820-1893) He was nephew of Boston mayor Martin Brimmer. He took part in railroad surveys and reported on water supplies in his early years.

Samuel F. Johnson (1821-1883) He was division engineer on the Fitchburg Railroad, engineer and superintendent of the Vermont & Massachusetts Railroad, chief engineer of the Chicago, St. Paul & Fond du Lac Railroad, and chief engineer of railroads in Texas. Returning to New England, he built parts of the Old Colony

trigonometrical survey of Massachusetts. Marshall Conant presented his "solar attachment" for a compass. With the new society well under way, it was incorporated on April 24, 1851, by George M. Dexter, Simeon Borden and William P. Parrott.

Early Civil Engineering Education & Career Opportunities

In the early nineteenth century very few civil engineers received formal training in their profession. Of all the early members of BSCE,

and the Portsmouth & Dover railroads.

James Laurie (1811-1875) He served on the construction of the Norwich & Worcester Railroad and on many railroad lines between New York and Boston. An expert on bridge construction, he built the bridge across the Connecticut River at Warehouse Point. He served as the first president of ASCE, and delivered the first papers before BSCE and ASCE.

Henry S. McKean (1810-1857) A teacher and librarian at one time, he then became resident engineer on the Boston water supply and assistant city engineer.

Samuel Nott (1815-1899) He worked on the Boston & Worcester Railroad. He was division engineer on the Eastern Railroad and later located and built many other railroads in New England. In 1855, he became superintendent of the Hartford, Providence & Fishkill Railroad.

George A. Parker (1822-1887) He was engineer on the Concord Railroad, chief engineer of the Sullivan Railroad, and superintendent and acting president of the Philadelphia, Wilmington & Baltimore Railroad. He built a $2 million bridge across the Susquehanna. Returning to New England, he built the Lancaster Railroad and served in the Massachusetts Legislature.

William P. Parrott (1810-1868) After engaging in the shipping industry, he worked as a partner with Nott on railroad surveys. He was later president of the Vermont & Canada Railroad and active in the development of Boston's waterfront, Back Bay and East Boston.

Thomas W. Pratt (1812-1875) He was involved in the construction of the Norwich & Worcester Railroad and other lines between New York and Boston. He developed the truss that bears his name and was inventor of various railroad mechanical improvements.

Theophilus E. Sickels (1822-1885) He served on the Croton Aqueduct and resident engineer under Chesbrough on the Cochituate Aqueduct. He then became chief engineer of the West Chester & Philadelphia and the Philadelphia & Baltimore Central railroads. Later he was chief engineer of the Hannibal & St. Joseph Railroad, chief engineer and general superintendent of the Union Pacific Railroad, and built the first bridge across the Missouri River at Omaha.

Lucian Tilton (1811-1877) He worked on Massachusetts railroads, becoming a superintendent in 1850. He was chief engineer and superintendent of the Toledo, Wabash & Western Railroad; president of the Great Western (Illinois) Railroad; director of the Illinois Central Railroad; and vice president of the North Chicago Railroad.

William S. Whitwell (1809-1899) He was chief engineer of the Boston distribution system of the Cochituate water supply and was for some years a partner with J.B. Henck. Later, he was treasurer and president of the Boston Water Power Co. and managing treasurer of the Boston & Roxbury Mill Dam Corp.

Thomas S. Williams (1812-1874) He was resident engineer on the Cochituate Aqueduct, superintendent of the Boston & Maine Railroad, and later a partner in Williams & Page, dealers in railroad supplies.

only Eben N. Horsford, an honorary member, had received a degree in civil engineering (from Rensselaer in 1838). Others received formal educations in related fields. William P. Parrott studied mathematics and natural science at Norwich University (1825); and Thomas W. Pratt attended Rensselaer. Many engineers were graduates of West Point where Sylvanus Thayer had pioneered technological education in this country. Among them were founding member John Childe, as well as G.W. Whistler, W.G. McNeill and W.H. Swift.

A number of engineers received their training by working in the offices of noted practicing engineers. The younger Loammi Baldwin was one such engineer who took on students. He had originally planned to become a lawyer, but his interest in natural science led him to engineering. He went to Europe to study public works and opened an office in Charlestown, Massachusetts, on his return. As Baldwin's reputation grew, young men came to him for training in physics, mathematics and surveying, and later served as his assistants. A number of BSCE founding members — Uriah Boyden, George Dexter, Robert Eddy, Samuel Felton, Waldo Higginson, Samuel Johnson, Henry McKean and George Parker — were trained in Baldwin's office. After his death, Samuel Felton took over the office and training activities.

Other founding members had only the equivalent of a high school education. These men learned their profession through practice and self-initiated study. James B. Francis and Ellis Chesbrough were two such men who went on to excel in their fields.

Opportunities abounded for these early engineers. From 1835-1855 railroad mileage increased in Massachusetts from 50 to 1,200 miles, and in New England from 50 to 3,500 miles. This explosion in railroad construction offered many opportunities and at least 28 of the 31 regular members had worked on railroads at some point. Other members worked on the water supply system for the growing city of Boston. Several engineers, James B. Francis and Uriah A. Boyden among them, were employed in the development of water power required by textile mills, especially along the Merrimack River north of Boston. Other engineers were involved in land and waterfront development, and road, bridge and gas works construction.

The growing need for engineers brought about a marked rise in educational institutions offering engineering courses and degrees. In 1847, the Lawrence Scientific School was established at Harvard, and the Sheffield Scientific School at Yale. Union College at Schenectady, New York, began offering engineering courses in 1845, as did Brown University at Providence, Rhode Island, in 1849. The Massachusetts Institute of Technology (MIT) was established in 1861 with BSCE members James Francis, William Parrott and Eben Horsford among the incorporators.

The Junior BSCE

The Boston water supply system was completed by 1850 and over the next few years the amount of railroad construction in New England diminished. However, the midwest was undergoing a period of rapid development, creating a demand for civil engineers. During the 1850s many Boston area engineers travelled west to take advantage of these new opportunities. Founding members John Childe, Sereno Eaton, Samuel Felton, Josiah Hunt, Samuel Johnson, John Laurie, George Parker, Theophilus Sickels and Lucian Tilton had become employed in railroad work outside of New England. Samuel Nott and Thomas Pratt were in Connecticut; and Joseph Bennett was in New York. Ellis Chesbrough left to oversee the Chicago sewer system. The Society continued to meet, but attendance was gradually dwindling. Since BSCE membership mainly consisted of engineers who had reached positions of responsibility within the profession, there was little encouragement given to younger men just entering the profession to become heavily involved in the Society's proceedings. The Society finally decided it was best to suspend activities temporarily. Samuel Ashburner and Waldo Higginson were given charge over the Society's property, and the Society's records and library were deposited with the Boston Athenaeum in 1861.

However, young engineers brought renewed life to the Society. During the 1860s a new generation of civil engineers arose in Boston. MIT had been founded in 1861 and classes started in 1865, with 1868 as the year of the first graduating class. One MIT graduate, Ernest W. Bowditch (1869), wrote to forty young engineers in the Boston area on May 24, 1873, about forming "a junior Engineers' Association to meet at certain times and places for the purpose of consulting and discussing whatever topics of interest may be suggested, connected with engineering."

Twenty-six persons met at MIT on May 30, 1873, in response to Bowditch's call. They

agreed to form a society with the suggested name of "Boston Engineers' Club." A draft of a constitution and by-laws were discussed at a second meeting. This initial constitution proposed the name "Boston Society of Engineers" for the group. The name provoked considerable discussion and Desmond FitzGerald finally proposed the name "Boston Society of Civil Engineers" which was accepted. Additional articles of the constitution were discussed, and just a week after the first meeting, the new society was formed with the following officers: Desmond FitzGerald, President; Henry Manley and Ernest Bowditch, Vice-Presidents; George Rice, Secretary; and, Robert Richards, Treasurer. Of the 62 signers of the constitution, at least 20 were recent graduates of MIT, and some signers were apparently enrolled as students there.

At the next two meetings, the constitution and by-laws were formalized, an agreement made with the Boston Public Library for the use of engineering books by society members, and arrangements made with MIT for the use of a room for meetings. Subsequent meetings were held regularly and papers were presented. The new society charged an executive committee on June 27, 1873, to explore actions necessary "to render the society legally capable of holding property and of having exclusive right to its name." This committee soon learned that another society incorporated in 1851 bore the same name. Thereupon, the society decided to look into a "union of the societies and possession of literary property of the corporated society."

Bowditch contacted about ten members of the older society who were still living around Boston. A warrant issued by George Morrill, Justice of the Peace, authorized members of the older society Thomas Pratt, Waldo Higginson and Franklin Darracott to call a legal meeting of the corporation. On April 27, 1874, original founding members James B. Francis, Waldo Higginson, Franklin Darracott, Thomas Pratt and Samuel Nott met and elected Francis to the office of president and Nott to clerk and secretary. The names of members of what was then called the Junior Society (BSCE of 1873) were proposed for membership in the older society, and Higginson and Pratt were instructed to reclaim property deposited with the Boston Athenaeum in 1851.

A meeting on June 8, 1874, saw the members of the Junior Society elected to membership in the older society, thus providing the BSCE with its current continuous link to the older society formed in 1848. Once the union had been accomplished, the older members retired from office and Thomas Doane was elected President, with Desmond FitzGerald, Vice-President; George Rice, Secretary; and Clemens Herschel, Treasurer.

Links With Other Societies

Just three weeks before the initial meeting of those interested in forming a civil engineering society, on April 5, 1848, a group of railroad superintendents met to form the New England Association of Railroad Superintendents. Original BSCE founding members Samuel Felton, Waldo Higginson, Josiah Hunt and Lucian Tilton attended. Other BSCE members to eventually join were William Parrott, Isaac Hinckley, Thomas Pratt, Samuel Johnson, Thomas Williams, George Dexter and Samuel Ashburner. Parrott was Secretary, Tilton served at one time as President, and Williams as Vice-President. The Association published a railway gazette that often included BSCE papers. The activities of the Society and the Association were closely related; later on the two organizations occupied adjacent rooms, sharing a library. With the development of the midwest and the slowdown in New England, rail construction members left the area, and the Association dissolved on October 1, 1857.

The American Society of Civil Engineers and Architects was formed on November 5, 1852, in the office of Alfred W. Craven, chief engineer of the New York City Croton Aqueduct. Twelve men were present, including James Laurie, a founding member of the original BSCE. He brought with him a constitution based on BSCE's and was elected President of that society, an office he held for 15 years. The American Society held regular meetings until March 2, 1855, when the society suspended activities. Again, like BSCE, engi-

neers were moving steadily west, creating an apparent void at home.

In 1867, due to Laurie's efforts, the American Society was revived. Its name was changed to the American Society of Civil Engineers (ASCE) the following year, and it has continued to flourish and advance the civil engineering profession ever since. Other original BSCE founding members who were members of ASCE at one time or another were Ellis Chesbrough, William Dearborn, George Dexter, Samuel Felton, James B. Francis, Charles Haswell, Waldo Higginson, Josiah Hunt, Martin Inches, George Parker, William Parrott, Thomas Pratt and Theophilus Sickels. In addition to Laurie, Chesbrough and Francis served as ASCE presidents during their careers.

The Northeastern Section of ASCE was formed in 1921, later becoming the Massachusetts Section. At that time, ASCE and BSCE formed a joint committee to explore forming an affiliation. This committee recommended affiliation and both societies approved this recommendation. However, the Affiliated Technical Societies of New England, later named Engineering Societies of New England (ESNE), was created in 1922. Sharing headquarters with ESNE at 715 Tremont Temple, BSCE found the affiliation with ASCE to be apparently unnecessary and it was mutually dissolved. The ESNE Journal publishes announcements of affiliated society meetings and matters of general interest to engineering societies in New England.

The Association of Engineering Societies was created in 1881 by BSCE, the Engineers' Club of St. Louis, Civil Engineers' Club of Cleveland and the Western Society of Engineers. The purpose of this Association was to jointly publish papers and proceedings of its participating societies. By 1900, the Association had eleven member societies, and in 1913 BSCE withdrew from the Association in order to publish its papers and proceedings independently.

Merger With ASCE

The Society has always had close ties with ASCE from the involvement of James Laurie in ASCE's founding to the 1921-1922 affiliation to joint meetings with the Massachusetts Section of ASCE in the 1960s. Having two prominent professional societies in one area could, and did, lead to scheduling conflicts and redundancy. Membership in both organizations was common. In 1957, a joint meeting of the ASCE Section and BSCE was held on the topic, "Why Two Civil Engineering Societies for Boston?" A committee report to BSCE in 1961 requested careful study of consolidation. Conflicts in meeting schedules between the two societies prompted the formation of more joint committees, and separate committees within each society, on relations with the other organization during the late 1960s. These interorganizational committees issued joint reports in 1970 and 1971 detailing recommendations for the consolidation of the two societies.

Merger with the Massachusetts Section of ASCE was viewed as a way to reduce the aura of friendly competition that had grown over the years, and to emphasize the aspects of cooperation. Such benefits of merger were:

- An increase in membership, reduced operating costs and increased meeting attendance.
- A lessening of the burden on persons holding key positions in both organizations, permitting them to fulfill their duties with less duplication of effort.
- Aiding the engineer in involvement in community, civic and political arenas through a single unified front.
- Attracting more young engineers who might not join BSCE because their residence in Boston might be temporary.
- Offering members the technical and professional strengths of both societies.

Upon a vote of the membership, BSCE agreed to absorb the Massachusetts Section of ASCE and to affiliate with ASCE. The Massachusetts corporate status and vested funds of the Society were retained, and under the affiliation the following changes were made:

- The Society changed its name to the Boston Society of Civil Engineers Section of the American Society of Civil Engineers

(BSCES), with its constitution and by-laws modified accordingly.

- BSCE members became members of the affiliated society without having to become members of the National ASCE.
- New, non-ASCE members would be designated junior affiliates without voting and office-holding privileges.

In April 1974, Thomas K. Liu became the first president of the Boston Society of Civil Engineers Section/ASCE. The following year the constitution and by-laws of BSCES were adopted.

Membership & Growth

The 1848 and 1875 constitution and by-laws provided for the grades of Member, Corresponding Member and Honorary Member. By 1890 the grade of Corresponding Member had been dropped and the grade of Associate added to provide for "persons interested in the objects of the Society and desirous of being connected with it." Joseph R. Worcester, in his 1909 presidential address, put great emphasis on making the Society more interesting to young engineers. Based on committee recommendation, the Society added the grade of Junior in 1910, and Student in 1932.

Society membership was 723 in 1910, and grew to 1,000 in 1928. It dropped to approximately 800 in 1948. Before association with ASCE in 1973, membership was at 1928 levels. Consolidation did indeed increase membership and in 1979 it was 2,000. Membership now is about 2,800.

Publications

Papers presented to the Society were bound and made available to the membership in the Society's library. One of the first BSCE publications was *Report of Proceedings — September, 1879 to June, 1881.*

The major reason for entering the Association of Engineering Societies in 1881 was to provide a means for jointly publishing papers and proceedings of the participating societies. From 1900 to 1906 the Association published a monthly publication that included meeting notices, and a special section entitled, "Bulletin of New Engineering Work." This bulletin gave way to an expanded monthly bulletin in 1906 that included all member society proceedings, with the exception of papers presented, and an advertising section.

In 1913, BSCE withdrew from the Association and established its own journal. Since the Society had been supplying nearly one-half of the Association's Journal, the Society felt that having its own journal would outweigh the loss of other society papers and the cost would be less by eliminating its share in the Monthly Bulletin. The first issue of the *BSCE Journal* appeared in January 1914. It contained papers presented before the Society, reports of professional committees, items of general interest and Society proceedings. The *BSCE Journal* was published ten times a year until 1934; quarterly from 1934 to 1981; and thereafter twice a year.

In 1983 the Society decided to make some changes in the focus and content of its Journal. The Society's Board of Government appointed a Journal Review Committee "to make a comprehensive evaluation of the Journal, taking into account all pertinent factors — financial, editorial, advertising, readership and production." As a result of that committee's recommendations, the following year the Board of Government endorsed "a major restructuring of the entire Journal effort...to obtain its permanent improvement." An enlarged and active Editorial Board was charged with undertaking intensive solicitation and review of papers as well as the revision and reorganization of the Journal's appearance, production, advertising and circulation. The first issue of *Civil Engineering Practice: Journal of BSCES,* which appeared earlier this year, represents the outcome of the evaluation begun in 1983.

Library

In 1848, a library committee was formed to acquire technical and scientific books and periodicals. Joseph Bennett took special interest in the library and was made official librarian in 1851. The library contained, in addition to books and periodicals, papers presented to the Society as well as plans, models and items of interest to members. In January 1853, the library and Society offices

were moved from Joy's Building to Tremont Row where the library was shared with the New England Association of Railroad Superintendents.

Upon deactivization of the original Society in 1861, the library was deposited with the Boston Athenaeum. When the Junior Society was inducted into the older society in 1874, there was some difficulty in reestablishing the library since some books had been catalogued and placed on the Boston Athenaeum Library shelves. Books that had not been incorporated into the Athenaeum Library were transferred back to the Society, and the Society was reimbursed for those that had been incorporated.

For about 25 years after 1874, older materials — particularly bound periodicals and departmental reports — had to be discarded to make room for new material due to the library's small quarters. By 1889 there were 600 bound volumes and 900 unbound volumes and pamphlets.

The library received a number of books of historical value in 1901 from the estate of Charles H. Swan. In 1906, Clemens Herschel, a past president, presented 70 books that were to form a nucleus of a special library. He continued to donate books throughout his life, and bequeathed some from his estate. Howard K. Parker in 1909 donated 300 volumes that showed civil engineering developments in the early nineteenth century. In 1916, the library received 1,100 books from the estate of Edmund K. Turner. In addition, many other members donated books over the years.

Securing the latest technical literature had always been a priority of the library. In 1922, books in electrical and mechanical fields were added and the list of periodicals broadened. By 1925 there were 10,500 bound volumes and 3,800 pamphlets.

During the 1960s and 1970s, restrictions on affordable space regrettably forced the gradual abandonment of the library, with the exception of copies of the Society's Journal and certain publications such as contributions to soil mechanics and lecture series notes. The library collection was distributed among local universities, and in May 1972 the bulk of the library collection was turned over to Northeastern University, with the condition that all Society members be granted Northeastern University Library privileges.

Technical Activities

In order to pay special attention to developments within specific disciplines within civil engineering, Albert F. Noyes, in his 1896 presidential address suggested the formation of groups within the Society for discussion of topics of particular interest in the various fields. This appeal was echoed in 1903 by President George A. Kimball. Later that year, 14 members petitioned for the establishment of "a section for consideration of the special subjects relating to sanitary engineering." Over the years additional sections were formed, or sections renamed, to reflect current technical emphasis (after affiliation with ASCE the designation "Section" was changed to "Group"):

Designers. Formed in 1920 and renamed *Structural* in 1947. As new sections were formed, its focus was increasingly devoted to structural engineering.

Northeastern University. Formed in 1922 to include students, graduates and faculty of Northeastern University. Disbanded in 1953.

Highway. First formed in 1924, renamed *Transportation* in 1946, with scope of activities broadened to include railways and airports.

Hydraulics. Formed in 1940.

Surveying & Mapping. Formed in 1940 and disbanded in 1964.

Construction. Formed in 1957.

Computer. Formed in 1969.

Geotechnical. Formed in 1969.

Environmental. Initially, this was the Sanitary section. It was renamed to Environmental in 1973.

Waterways, Port, Coastal & Ocean. Formed in 1983.

Engineering Management. Formed in 1984.

These technical groups hold from three to five technical meetings throughout the year. In addition, there are also from five to fifteen special meetings that include lecture series.

Awards, Prizes & Funds

In order to more fully recognize the contributions of its members to the profession, community and the Society, as well as to foster the development of students in civil engineering, the Society has administered various funded awards and prizes:

Desmond FitzGerald Award for promising students.

Howe-Walker Award to members of student chapters.

William P. Morse Award for students.

Lester Gaynor Award to an individual whose service as a part-time elected or appointed city official has been outstanding.

Clemens Herschel Award for a paper presented to the Society that has been useful and commendable.

Ralph W. Horne Award to a BSCE member whose unpaid service in municipal, state or federal elective or appointive post has been outstanding, or for philanthropic activity in the public interest.

Technical Group Awards for papers of excellence presented before technical group meetings.

President's Awards for members' contributions to, and efforts for, the Society.

Endowments to the Society also make possible:

Thomas R. Camp Lecture Series on outstanding recent developments or proposed or completed research in the sanitary engineering field.

Arthur Casagrande Lecture Series given by an eminent engineer with longstanding achievements in practice, teaching and/or research in geotechnical engineering.

John R. Freeman Fund particularly devoted to the encouragement of young engineers in various ways.

Joseph C. Lawler Lecture Series on the management of complex engineering projects.

Other Activities

Over the years, the Society has engaged in many other activities:

Code of Ethics. The Society developed and adopted, on December 18, 1912, one of the first engineering codes of ethics in the United States.

Employment & Welfare. In 1889 the Society directed the Secretary to maintain a list of members seeking employment, and established an employment bureau in 1910. This bureau was incorporated into the Affiliated Technical Societies of Boston in 1922 (now ESNE). In 1932, during the depression, the ESNE and Boston Society of Architects organized the Emergency Planning and Research Bureau, Inc., to render employment services. A Welfare Committee was also active during the depression and was concerned with matters of compensation and member welfare.

Boston Subsoils. In 1921 a Committee on Boston Subsoils was created and from 1923-1931 collected about 3,900 boring records. These records were published in the September 1931 *BSCE Journal.* Borings have been made periodically over the years, with results published in the Journal. The last such report was in 1985.

The Society has also had committees on rainfall and runoff, and floods in New England. In addition, the Society has drafted or revised building codes for state and municipal authorities.

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