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HISTORIC AMERICAN ENGINEERING RECORD

ROUND LAKE AUDITORIUM, ORGAN

HAER No. NY-543-A

Location: 2 Wesley Avenue, Round Lake, Saratoga County, New York

The Round Lake Auditorium Organ is located at latitude 42.936683, longitude -73.794091. The coordinate's datum is North American Datum 1983. There is no restriction on the release of the organ's location to the public.

Present Owner: Village of Round Lake, New York

Present Use: Concert performance

Significance: The Round Lake Auditorium Organ is the largest and probably the oldest three-manual pipe organ by an American builder to survive substantially in its original form from before 1850, and it contains the earliest known surviving zinc pipes in an American organ. Because the instrument retains a high proportion of its original pipe work as well as its original playing mechanism, it allows modern audiences to experience the actual sounds that nineteenth-century audiences heard, and it allows organists to perform under the same mechanical conditions earlier performers experienced. The organ and the auditorium that houses it lie within the Round Lake Historic District, established in 1975.

Historian: Michael R. Harrison wrote the Historical Information section of the report, while J. Lawrence Lee, Ph.D., P.E., wrote the Structural/Design Information section.

Project Information: Recording of the Round Lake Auditorium Organ was completed during 2010–2011 by the Historic American Engineering Record (HAER) for the Village of Round Lake. It was conducted under the general direction of Richard O'Connor, Chief, Heritage Documentation Programs. Paul D. Dolinsky, Chief, Historic American Landscapes Survey, supervised the project. The recording team consisted of Michael R. Harrison, Historian, and J. Lawrence Lee, HAER Engineer-Historian. Renee Bieretz produced the large-format photographs.

The team wishes to acknowledge the generous assistance of Matthew Bellocchio, Andover Organ Company; Bill Ryan, Round Lake Village

Historian; Stephen L. Pinel, Organ Historian; and Bynum Petty, Archivist, the American Organ Archives of the Organ Historical Society. Special thanks go to Dixie Lee Sacks, Village Mayor, for her logistical support and gracious hospitality.

Related Documentation: Round Lake Auditorium, HAER No. NY-543

Part I. Historical Information

A. Physical History

1. Dates of construction: 1846–48

2. Builders: William Henry Davis and Richard M. Ferris

Richard M. Ferris (1818–58) learned organ building as an apprentice to Henry Erben, the leading organ builder in New York and one of the foremost in the United States during the second and third quarters of the nineteenth century. Ferris started with Erben in 1830, and much of his work over the next few years involved assisting with the assembling, finishing, and tuning of instruments that the firm sold to places in the South. He returned to New York in 1835, and stayed with the firm at least into 1838, when, after a dispute with Erben, he was able to terminate his apprenticeship about a year short of its term. He worked independently repairing and tuning organs in the South for a time before setting up his own organ works in New York in 1841. He located his firm first on Fulton Street near Nassau Street, but moved it to White Street in 1842 when he entered into a brief partnership with Henry Leaman. In 1843 or 1844, Ferris formed a new partnership with William H. Davis (1816–88). Little is known about Davis. He learned piano making in the shop of his father, Morgan Davis, and during his subsequent career he claimed to have begun making organs in 1840.[1]

Davis & Ferris advertised that "they are prepared to furnish Organs of any description on as liberal terms as any other establishment in this city, and pledge themselves that all organs entrusted to them shall give entire satisfaction."[2] The firm made organ pipes for other builders, but they also received a steady stream of commissions for complete instruments. The organ for Calvary Church, New York, was the largest instrument they built during their brief collaboration. The partnership ended in 1849 when Davis established an organ-building business of his own, which "built small instruments of good quality for rural churches at reasonable prices" that lasted until the death of Davis's son and successor in 1915.[3] Ferris continued without a partner until 1856, when he suffered a stroke. The next year, his half-brother Levi U. Stuart (1827–1904) became a partner, and the firm was briefly restyled Richard M. Ferris & Co. Stuart had learned organ building in Ferris's shop, as had his four

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[1] Biographical details about Ferris, Davis, and Stuart are drawn from Clare W. Beames, "Builders. Richard M. Ferris. L. U. Stuart. Their Organs," *New York Weekly Review* 21, no. 29 (July 16, 1870): 4–5; Orpha Ochse, *The History of the Organ in the United States* (Bloomington, Ind.: Indiana University Press, 1975), 164–66; Stephen L. Pinel, *Ferris & Stuart: Organbuilders in Nineteenth-Century New York*, unpublished manuscript, 1990, copy made available by the author; idem, "The Ferrises and the Stuarts: Instrument Makers in Nineteenth-century New York," *The Tracker* 30, no. 1 (1986): 15–35.

Beames gives 1837 as the date Ferris left Erben; in a later edition of the *New York Weekly Review* he revises this to 1835. But a notice reporting Ferris injured in a boating accident with coworkers on the Harlem River confirms him still in Erben's employ in 1838; see "Melancholy occurrence," *New York Commercial Advertiser*, Apr. 30, 1838, 2.

[2] "Organs," *The Churchman* 14, no. 29 (Sept. 21, 1844): 4, quoted in Pinel, *Ferris & Stuart*, 107.

[3] Pinel, *Ferris & Stuart*, 157.

brothers, and when Ferris died on December 6, 1858, at the age of 40, Stuart continued the business until 1876, although he dropped the Ferris name in 1860.

Ferris built about sixty organs during his lifetime. His work included two three-manual (i.e., three-keyboard) organs, the ones for Calvary Church (1847) and All Souls' Unitarian Church (1856), both in New York. He also rebuilt the 1839 two-manual Thomas Robjohn's organ at the South Dutch Reformed Church into a three-manual instrument in 1854. Two-manual organs made up about a third of his output, and the balance comprised smaller, one-manual instruments. He built organs predominantly for clients in New York and Brooklyn, but he also installed instruments in New Jersey, Pennsylvania, Virginia, Wisconsin, Connecticut, Michigan, Delaware, Texas, and Mississippi. In 1853, Edward Hodges, the organist at New York's Trinity Church, called him "about the best organ-pipe maker we have."[4] Clare W. Beames, a New York organist, music critic, and Ferris contemporary, described him as

> very nervous, precise and exceedingly irritable. If a piece of work did not exactly suit him, he would destroy it. . . . His ear was very acute, and in tuning an organ, he could scarcely satisfy himself. . . . In finishing the organ in All Souls' Church—which was one of his last efforts—he was so over-particular about the tuning, being several months about it, that it was thought he would never get through.[5]

3. Original Plans: The vestry of Calvary Church contracted with Davis & Ferris to build an organ with three manuals, pedal board, thirty-three speaking stops, and five couplers. Design changes agreed during construction resulted in a completed three-manual instrument with thirty-two speaking stops and six couplers. The organ was organized tonally into four divisions: the Great, the Choir, the Swell, and the Pedal. The Great division contained the fundamental voices of the instrument. The Choir contained additional fundamental sounds and accompanimental voices. The Swell supplied solo voices, and the two-ranks of pedal pipes provided the lowest notes in the instrument. The Swell division was enclosed in a box with moveable front shutters to allow dynamic control of the division; the performer controlled the expression shutters using a hitch-down pedal positioned adjacent to the pedal board. (See Appendix I for the proposed, contracted, as-built, and current stoplist for the organ.)

The organ's pipes were fabricated in pine, a tin/lead alloy, and zinc, the selection of material for individual pipes being dictated by tonal and strength considerations. At the time of construction, zinc was a new material for organ pipes, and the instrument now contains the earliest known zinc pipes in an American organ.[6]

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[4] Ochse, *History of the Organ*, 164; Edward Hodges to Trinity Chapel Building Committee, Feb. 11, 1853, quoted in John Ogasapian, "Organ Building in New York City, 1700 to 1900" (Ph.D. diss., Boston University, 1977), 163 (note 4).

[5] Beams, "Builders," 5.

[6] Jonathan Ambrosino, et al., eds., *An Organ Atlas of the Capital District Region of New York State* (Richmond, Va.: Organ Historical Society Press, 2006), 13.

Davis & Ferris erected the organ in the rear gallery of Calvary Church within a pine case supplied by the church and decorated with Gothic-revival details. They built the playing desk into a recess in the center front of the case, and arranged the draw knobs on panels to either side of the manuals. The novel arrangement of these knobs in the form of crosses is rumored to be "a conceit of the rector's."[7] As with all organs at the time, wind was supplied to the instrument using a hand-pumped bellows, and the builders provided a handle protruding from the right side of the case for the pumper to work.

The vestry resolved in February 1848 to gild or ornament the front pipes of the organ, "subject to the approbation of the Rector, & Messrs. Davis & Hoffman [vestrymen]"; it also authorized the expenditure of $75 to pay painter Benjamin Blonk to do the work. It is not known if gilding was carried out at this time, but the vestry paid Richard Ferris & Company $125 for organ gilding in the summer of 1859.[8]

4. Alterations and Additions: Payments recorded in the financial records of Calvary Church indicate the organ was regularly maintained and tuned each year it was there. It was initially maintained by Richard Ferris and then by his successor Levi U. Stuart. More significant repairs and modifications have been made to the organ at a number of times.

In February 1852, Mr. Smyth, a member of the Music Committee, "lament[ed] the condition of the organ," and in April the committee arranged with Ferris to make unspecified "repairs," for which he was paid between $400 and $500 over the course of the following year. The vestry spent an additional $375 in 1862 to have Levi Stuart clean the organ.[9]

The vestry approved major repairs to the organ in mid-1867 and used $1,000 of church funds and a matching $1,000 from outside subscriptions to hire Stuart to undertake the work, which he appears to have done during the winter of 1867–68.[10] Stuart's repairs significantly altered the organ by changing its compass from G to C. When new, the instrument's Great and Choir divisions contained fifty-nine-note ranks of pipes, spanning from GG (in the third octave below middle C [i.e., c^1]) to f^3 (in the second octave above middle C). To bring the organ into accord with the increasingly common standard of C as fundamental pitch, Stuart eliminated the lowest five pipes from all but two ranks in each of these divisions, giving

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[7] Charles A. Radzinsky, "Organ Building and Organ Builders of New York," in Frederick W. Thornsby, ed., *Dictionary of Organs and Organists* (Bournemouth: H. Logan & Co., 1912), 108.

[8] Stephen L. Pinel, notes from the Calvary Church vestry minutes, Feb. 1, 1848; idem, notes from the Calvary Church financial ledgers, Sept. 1, 1859. Staff at the Parish of Calvary–St. George's, New York, could not locate the nineteenth-century vestry minute books and financial ledgers of Calvary Church during the period of research for this report. Citations to Calvary Church records herein are therefore from notes and photocopies made ca. 1985 by archivist Stephen L. Pinel for the American Organ Archives of the Organ Historical Society and generously provided by Mr. Pinel to the author in September 2010.

[9] Quote from Samuel M. Shoemaker, *Calvary Church Yesterday and Today: A Centennial History* (New York: Fleming H. Revell Co., 1936), 97; Pinel, notes from Calvary Church vestry minutes, Apr. 9, 1852; idem, Calvary Church financial-ledger notes, Nov 27 and Dec. 16, 1852, Apr. 14 and May 14, 1853, and July 18, 1862.

[10] Pinel, notes from Calvary Church vestry minutes, June 27, 1867; idem, Calvary Church financial-ledger notes, Dec. 23, 1867, and Jan. 2, Jan. 20, and Mar. 3, 1868.

them a new compass of fifty-four notes, C to f^3. Stuart similarly altered the Pedal from an eighteen-note compass of GGG–C to a twenty-five-note compass of CC–c by cutting down the pipes of the Double Open Diapason, eliminating the lowest five notes of the Open Diapason, adding new treble pipes, and replacing the pedal board. The Swell division, originally built with a forty-two-note compass of c–f^3, was not altered. It is likely, but not documented, that new keyboards were fitted as part of the compass change.[11]

Alongside the compass change, Stuart replaced the 4' Second Principal in the Great division with a new 8' stop, described variously in contemporary sources as a Gamba or a Salicional.[12]

The vestry approved $1,000 in additional changes to the organ in October 1878, and these were also carried out by Levi Stuart. The work included:

- Cleaning, regulating, repairing, and tuning the pipes and the action;
- Repairing the keyboards;
- Installing a new blowing apparatus;
- Adding 16' Bourdon and 8' Violoncello stops by the Pedal;
- Adding new lower octave to 8' Cremona in the Choir.[13]

Calvary Church sold the Davis & Ferris organ in April 1888 to the Round Lake Association of Saratoga County, New York. Organ builder Giles Beach of Gloversville dismantled the organ and oversaw its reinstallation in Round Lake. A number of changes were made during this process.

- Beach increased the compass of the Great, Choir, and Swell divisions from fifty-four to fifty-eight notes through the addition of treble pipes f^3–a^3 to each rank. In most of the organ, these new pipes were simply placed into toeboard holes left empty by the compass change in 1868. In the Swell, however, this increase required the construction of a small extension box onto one side of the swell box to house the new pipes. It is not certain if Beach installed fifty-eight-note keyboards at this time or if such had been installed by Stuart in 1868.[14]

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[11] "Organ in Calvary Episcopal Church," *New York Weekly Review* 21, no. 38 (Sept. 17, 1870): 6; Ambrosino, *Organ Atlas of the Capital District Region of New York State*, 13–14. An additional stoplist reflecting the compass change appears in L. U. Stuart, *Church and Parlor Organs of Every Description on Hand and Made to Order* (New York: Francis & Loutrel, printers, n.d. [ca. 1872]), n.p. [10], copy in American Organ Archives of the Organ Historical Society, Talbott Library, Westminster Choir College, Rider University, Princeton, New Jersey.

[12] The stop is named "Salicional" in Stuart, *Church and Parlor Organs*, n.p. [10], and named "Gamba" in "Organ in Calvary Episcopal Church," *New York Weekly Review* 21, no. 38 (Sept. 17, 1870): 6.

[13] Pinel, notes from Calvary Church vestry minutes, Oct. 16, 1878. Although the vestry minutes specified a "new cremona stop," manufacturing differences evident among the pipes of the Cremona in the organ today imply that the original stop was not replaced but simply augmented with new bass pipes. The original Cremona installed by Davis & Ferris was a short-compass stop with forty-two pipes spanning c–f^3, and the lowest octave of pipes (notes C–B) now in place are apparently of later manufacture than the existing c–f^3.

[14] Ogasapian, "Organ Building in New York City," 174.

- Beach installed a water engine to pump the wind-supply bellows. The Round Lake Association purchased the engine from the Ross Valve Company of Troy in late June or early July 1888 for a cost $165. One press report described the machine as "a beautiful water motor, doing the blowing of four good, smart men."[15]
- Beach may have added an 8' Viol d'Amour stop to the Great division in place of the Gamba or Salicional that replaced the original 4' Second Principal in 1868.[16]
- Beach may also have added the Forte stop now present on the organ. The Forte engages the full Great division at once. It is operated by two draw knobs, one to engage and one to disengage.[17]

Although a Kinetic rotary blower powered by an electric induction motor was added to the instrument sometime in the 1920s or 1930s, most changes made to the organ after its installation in Round Lake have come since the mid-1970s, when the Andover Organ Company of Methuen, Massachusetts, began its long and ongoing association with the village. Andover's work, led for many years by Robert C. Newton and more recently by Matthew Bellocchio, has included:

- Installing in the Great division an 1858 Ferris & Stuart Second Principal stop in place of the non-original 8' Viol d'Amour (1976);
- Cleaning, repairing, and reinstalling the Trumpet and Clarion in the Great (1976);
- Reconditioning the wind regulators (1976) and restoring the wind system (2009–10);
- Installing an 1855 E. & G. G. Hook Trumpet to replace the missing Trumpet stop in the Swell (1977 or 1978);
- Replacing the 1868 pedal board with a nineteenth-century Hutchings 30-note pedal board (1979);
- Replacing various missing pipes;
- Restoring several front pipes that had collapsed at their mouths (date unknown);
- Restoring the Swell hitch-down pedal and reinstallation of the outer set of swell shades (1997);
- Restoring the manuals (2009–10).[18]

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[15] Quote from "Pebbles from Round Lake Shore," *Schenectady Daily Union*, July 16, 1888, 3. Executive Committee minutes, June 23, 1888, in Round Lake Camp Meeting Association Minute Book for meetings from Nov. 2, 1881, to Sept. 28, 1895, [hereafter cited as **RLCMA**], 183; Round Lake Camp Meeting Association cash book 1888–1894, entry for Oct. 19, 1888. Both books in the Round Lake Village Archives, Round Lake, New York.

[16] No record of the addition of this rank has been found, but it was in place when restoration work began on the organ in the 1950s. The most likely explanations are that Beach installed it in 1888 or that the Gamba / Salicional installed in 1868 was actually this Viol d'Amour.

[17] "Ferris' 1847 organ at Round Lake, New York will be featured in '67 convention," *The Tracker* 11, no. 2 (winter 1967): 2. It is also possible that the Forte stop was added before 1888.

B. Historical Context

The Davis & Ferris organ now in the auditorium at Round Lake, New York, was built for Calvary Church in Manhattan between 1846 and 1848. Calvary Church was founded in 1835 and incorporated in 1836 to establish an Episcopal parish in New York's still largely undeveloped and sparsely settled east side above 14th Street. The church corporation leased a lot on Fourth Avenue (now Park Avenue) just above the future line of 30th Street and raised a small frame church, which was consecrated on New Year's Day 1837. The congregation grew, but the city's northward expansion slowed, so when the vestrymen resolved to end their lease and purchase a church site in 1841, they decided on a property further south at the northeast corner of Fourth Avenue and 22nd Street. They moved the existing building to the new site, and later expanded it during the first half of 1842. The original church contained thirty-six pews; after expansion it held eighty-nine, and further rapid growth required the vestry to enlarge it twice soon thereafter. By 1845, the frame church held 155 pews but could not be expanded further, so the still-growing congregation decided to invest in a new masonry church building. When the ground conditions on Calvary's property were found to be incompatible with the anticipated weight of a new building, the vestry purchased six lots a block further south, on the northeast corner of Fourth Avenue and 21st Street, and invited architect James Renwick, Jr., to design the new church. The aesthetic success of Renwick's Gothic-revival-style Grace Church at Broadway and 10th Street, then nearing completion, prompted the vestry's invitation, and Renwick met his clients' expectations by proposing another Gothic design for Calvary, to be built, like Grace, in white marble. This material was subsequently changed to brownstone for reasons of economy, and the spires Renwick designed for the principle facade were executed in wood for the same reason. The cornerstone was laid in March 1846, and the building was consecrated June 4, 1847. "[I]ts erection has drawn off some of the fashion from Grace Church," the *New York Post* concluded a month later.[19]

New York and Boston were the leading centers of organ building in the United States at mid-century—although local builders thrived in many cities—and churches and private individuals could purchase instruments of any quality with ease in these metropolises. The first pipe organ owned by Calvary Parish was a small, four-stop instrument the vestry bought for $225 from builder Thomas Wagstaff in late 1836. This fee included tuning and maintenance for twelve months. In 1844, after the original frame church had been moved to its second site and expanded a number of times, the vestry hired Henry Erben to build a new, larger organ, which he did for $725, minus a credit of $200 for the old organ which he took in trade. About six months after installation, the vestry complained to Erben that the Trumpet stop in the new organ was "too weak for decent music" and arranged for him to

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[18] Pinel, *Ferris & Stuart*, 339–40; Matthew Bellocchio, Andover Organ Co., to Paul Dolinsky, June 29, 2010, letter filed in the field notes for this project.

[19] The history of Calvary Church is summarized from Shoemaker, *Calvary Church Yesterday and Today* and Charles H. Brent, *A Master Builder: Being the Life and Letters of Henry Yates Satterlee, First Bishop of Washington* (New York: Longmans, Green and Co., 1916), 74–76. The parish history found in Jonathan Greenleaf, *A History of the Churches of All Denominations in the City of New York from the First Settlement to the Year 1846* (New York: E. French, 1846), 101–102, although contemporary with the founding of the church, is unreliable in its details. Quote from Shoemaker, *Calvary Church*, 54, citing the *New York Post*, Aug. 6, 1847.

replace it. He installed an alternative reed stop, an Hautboy, in the Trumpet's place, and, much to the vestry's displeasure, charged the church $25 for the work.[20]

The exact details of the size and make-up of the Erben organ are not known, but it is clear the church leadership felt the instrument's sound would not fill Renwick's new sanctuary, and the music committee invited bids for a new organ in early 1846. Records of two of these bids survive, although it is likely more were received. The firm of Hall & Labagh submitted a specification in March for a three-manual instrument and followed up in May with an estimate of $3,250. The firm wrote that it would include the new organ's case, valued at $750, in exchange for the old organ.[21] Davis & Ferris submitted their proposal and estimate on April 11, offering to construct a three-manual instrument for $3,000, case not included, or $2,250 if the old organ were taken in trade. Alongside the customary assurances of quality—"The above organ will be made of the best seasoned materials, and the composition or mixture of the metals shall be rich"—the builders suggested the novel step of fashioning certain of the metal ranks in zinc, "as there has been an entire revolution in the use of metal within this past few years." They continued,

> The tone of Zinc is as pure as a bell and as durable as Iron, but we would expressly state that we would as leave make them of Metal as Zinc were it not that we have some pride in the construction of the Instrument and would prefer having it a Monument to our fame, rather to our disgrace as we are both practicals and seek for fame rather than emolument.[22]

These bids, although vastly more than Calvary Church had previously spent on an organ, were low for the size and quality of instrument the parish now wanted. The new organ for Trinity Church on Broadway at the foot of Wall Street, then under construction and virtually the same size as the instrument proposed for Calvary, had a contract price of $6,300; by the time it was completed in late 1846 it had cost the Trinity corporation, counting case and overruns, $10,500. Similarly, the bids for the just slightly larger instrument commissioned in 1851 for Trinity Chapel on east Twenty-fifth Street near Fifth Avenue ranged from $4,000 to $7,000, with Richard Ferris bidding $5,750.[23]

The vestry at Calvary took up consideration of the first bids it received on March 26, 1846, but did not empower the music committee to act until May, when the balance of the bids had been received. The music committee selected Davis & Ferris to build the organ, and the church corporation signed a contract with them on May 22. The church agreed to pay $3,000 and accept the $750 credit by trading in the Erben organ. The contract specified that the new instrument was to be ready for use by May 1, 1847, and that no payments would be made to

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[20] Shoemaker, *Calvary Church*, 12, 52–53.

[21] Hall & Labagh's proposed specification and transcriptions of related correspondence appear in Stephen L. Pinel, "A Documented History of the Round Lake Auditorium Organ," *The Tracker* 30, no. 1 (1986): 44–45.

[22] Davis & Ferris, Estimate for an organ for Calvary Church, Apr. 11, 1846, copy made from Calvary Church vestry records reproduced in Ambrosino, *Organ Atlas of the Capital District Region of New York State*, 16–18.

[23] Arthur H. Messiter, *A History of the Choir and Music of Trinity Church, New York* (New York: E. S. Gorham, 1906), 296, 303; Pinel, "Documented History," 46.

the builders until the organ was completed, installed, and accepted by the music committee. The committee or its agent could request alterations to the organ's design during construction if these did not involve additional expense to the builders. The builders were not responsible for the case. The question of zinc or metal pipes was left open, although zinc was eventually selected for the lowest pipes in eight of the organ's original ranks.[24]

The specification given in Davis & Ferris's contract differed in certain respects from the design in their original proposal; most notably, it contained four additional stops and a 25-note pedal board instead of an 18-note one. In June and August, Calvary's organist, Charles Judah, worked with Davis & Ferris to refine the specification further, eliminating a few stops, adding others, and modifying the design of the swell box, a change that required a $200 modification to the contract. The 18-note pedal board was also revived. (For full specification details see Appendix I.) The result was an organ very close in tonal design to the one Henry Erben was building for Trinity Church, a similarity that was likely intentional since Trinity was the oldest, largest, and wealthiest Episcopal parish in New York and thereby had an influential voice in matters of church practice and politics in the city.[25] Trinity Church's vestry had commissioned an organ from Henry Erben in 1844 for the parish's new Richard Upjohn–designed church. The instrument's tonal design was the work of Edward Hodges, Trinity's organist, an Englishman with a music doctorate from Cambridge who, unable to secure a cathedral position in England, immigrated to Toronto in 1838 and then New York in 1839, bringing with him contemporary English ideas about organ design as well as idiosyncratic notions from his own experience. The Trinity organ was to be the largest instrument in the city; it also formed a picturesque and noble addition to Upjohn's noteworthy interior. As such, it attracted a great deal of attention among players, builders, and the general public. Its specification was published as early as the fall of 1845 and was probably well known among the city's organ builders.[26]

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[24] The Great Second Open Diapason, First Principal, Second Principal, Trumpet, and Clarion; the Swell Clarion; and the Choir Dulciana and Cremona all contain zinc pipes. The Violoncello in the Pedal, added in 1878, is also zinc. Pinel, notes from Calvary Church vestry minutes, Mar. 26 and May 12, 1846; "Specification for organ to be built by Mess. Davis & Ferris for Calvary Church," May 21, 1846, and Agreement to build an organ between the Rector, Churchwardens, and Vestrymen of Calvary Church and William H. Davis and Richard M. Ferris, May 22, 1848, copy of original in Calvary Church vestry records provided to HAER by Stephen Pinel.

[25] Two letters between Charles Judah and Davis & Ferris detailing design changes are transcribed in Pinel, "Documented History," 48.

Stephen Pinel sums up the parallels between the Trinity and Calvary organs: "The Greats are exactly alike except for compass; the Swells are identical except for a divided Mixture, and the Choirs differ solely in that Davis & Ferris supplied two additional stops. There are also mechanical similarities: the inter-manual octave couplers, [the] swell boxes with triple-thick walls and multiple sets of shades, and [the sharp] pedal keys covered with brass." Pinel, *Ferris & Stuart*, 138.

[26] Pinel, "Documented History," 46. Details of the gestation of Erben's Trinity Church organ can be found in chapter 13 of John Ogasapian, *English Cathedral Music in New York: Edward Hodges of Trinity Church* (Richmond, Va.: Organ Historical Society, 1994). For a discussion of Hodges's influence in organ reform in Bristol before his emigration to the U.S., see Nicholas Thistlethwaite, *The Making of the Victorian Organ* (Cambridge: Cambridge University Press, 1990), 153 *et seq*.

The Calvary organ was installed in the rear gallery of the church, where its 24' x 16' footprint occupied about one-fifth of the available space. Six rows of pews filled the space between the organ and the gallery rail, with a small space left open behind the organ bench in which the choir stood. The vestry contracted all the woodwork in the church (as well as the two wood spires) to carpenter John Sniffen, and it is likely he and his men built the organ case.[27] Whether James Renwick designed the case is unknown. The form of the case superficially echoes the tripartite composition of Renwick's west and south exterior elevations for the church itself, but most of the case's Gothic details, drawn from a different vocabulary than the one employed for the building, find no precedent on the church's exterior.

Few details of the progress of construction and installation survive. In late May 1847, a newspaper reported that the organ was nearly complete after a year's work, but that "a portion of it only, will be in readiness to use at the consecration of the Church." The article continued,

> It is the opinion of some of our most competent judges, that this Organ will be equal if not superior to anything of the kind in this country. Its power is intended to be about one third greater than the Organ at Trinity Church. For the ordinary purposes of Church worship, the Choir Organ, containing eight stops . . . will be voiced in a soft and agreeable manner. . . . The Pedal Organ (of two stops) will be very heavy; the large double Open Diapason being in scale, larger than any known of here.[28]

The organ did feature in the church's consecration service on June 4, 1847.[29] How much work remained to be completed at that point is unknown, but financial problems at the church appear to have led the builders to delay the finishing touches until they felt more secure that their compensation would be forthcoming. The purchase of the new site and the construction of the new church plunged the Calvary corporation into deep financial difficulties. Funds ran short during construction, and the church fell behind on its debts. From 1847 through the fall of 1850, the vestry tried numerous strategies to raise capital. Only a few—such as convincing Trinity Church to assume the mortgage on Calvary's real estate—were more than marginally successful. Like many contemporary parishes, Calvary looked to its pews as a revenue generator. It auctioned off the choicest ones to wealthy parishioners, sold the rest to those who would occupy them, and charged everyone an annual rent. The first pew auction at Calvary took place in the spring of 1847, but it garnered a smaller return than hoped and established disadvantageously low rents. As the church's obligations mounted, the vestry, in desperation, offered pews to its creditors in lieu of payment. A few accepted, allowing the church to secure its new carpets and furniture for five pews and compensate its architect for three. In early 1848, the vestry turned its unfinished rectory over to the builder to be finished and then leased back to the church, and, in June, it auctioned off the old frame church.[30]

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[27] Shoemaker, *Calvary Church*, 54.
[28] "Calvary Church organ," *Morning Courier and New-York Enquirer*, May 26, 1847, 2.
[29] "City items," *New York Daily Tribune*, June 2, 1847, 1.
[30] Extended discussion of the church's financial problems appears in Shoemaker, *Calvary Church*, 63–67, 86–88.

Although the vestry made an initial payment to Davis & Ferris of $518.22 in January 1847 and tried to secure a mortgage to finance the organ the following September, it could not settle the debt with the builders in a timely fashion. Instead, in May 1848, it negotiated a two-year lease of the organ. The vestrymen agreed to pay Davis & Ferris $175 in rent for the first year and $87.50 for the second, with the payments to be made at the end of each year. They also agreed to retain the builders for all maintenance during the lease term at the rate of $50 per year. The church could buy the organ during the lease for $2,500, payable in two annual installments, for which the builders allowed a six-month grace after each year-end for the payments to be made with interest. If the church opted not to purchase the organ, it was to be returned "in good order and condition reasonable wear and tear only excepted." For their part, the builders agreed to complete and finish the organ "in the manner and style heretofore agreed upon . . . within forty days" from the date of the agreement so that the church could "have free and uninterrupted use and enjoyment of the said organ" during the lease period.[31]

Just as the lease went into effect, the church found itself able to make a few installment payments on the original purchase contract. It paid $550 by the end of 1848, but was not able to pay any more during 1849. By late 1849, it had also fallen behind on paying the rent. In arrears on many debts, a group of creditors appears to have sued the church corporation because a variety of church property was sold at public auction in late August 1849 to settle some of the debts. Among the property sold was the church's "right, title and interest" in the organ. Fortunately, it was purchased (for just $10) by vestryman Louis S. Comstock. Because the church's interest in the organ was encumbered by the conditions of the lease agreement, and because various vestry members had by this point advanced money to the church to pay the organ rent, Comstock assigned his purchase in trust to Philip R. Kearney, Calvary's treasurer, where it remained as security until the church repaid the money advanced by the vestrymen.[32]

A smattering of partial rent payments came to Ferris during 1850, in addition to the whole amounts due for organ maintenance. (Davis had left the partnership by this point.) In September, Ferris wrote the vestry,

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[31] Pinel, Calvary Church financial-ledger notes, Jan. 15, 1847; idem, notes from Calvary Church vestry minutes, Sept. 28, 1847; Agreement to rent the organ between William H. Davis and Richard M. Ferris and the Rector, Churchwardens, and Vestrymen of Calvary Church, May 1, 1848, transcribed in Pinel, notes from Calvary Church vestry minutes, May 22, 1848.

[32] Pinel, Calvary Church financial-ledger notes, May 1, May 16, May 31, and Oct. 30, 1848; Agreement to place the organ in trust between Lucius S. Comstock; the Rector, Churchwardens, and Vestrymen of Calvary Church; and Philip R. Kearney, Nov. 14, 1849, and Memorandum of Sale, Nov. [ ], 1850, both transcribed in Pinel, *Ferris & Stuart*, 533–39. The church's interest in the organ was sold on Aug. 30, 1849. The next day, the church's furniture was sold at auction, netting about $300 for the creditors on an estimated value of $8,000; "City items," *New York Daily Tribune*, Aug. 31, 1849, 1, quoted in Pinel, *Ferris & Stuart*, 150 (note 22).

The vestry minutes for Oct. 27, 1849 note, "On motion of Mr. Kearney [the treasurer], it was resolved that the clerk be authorized to assign the contract [for the organ lease]. . .to any person or persons who will pay the installment and rent due thereon the 1st November provided such person or persons execute an instrumental agreeing to transfer said contract to the church on repayment to him or them of the sum advanced with interest." The transfer of Comstock's interest in the organ to trust followed soon thereafter. Minutes quoted in Pinel, "Documented History," 48.

> It has become my duty of a necessity to inform you that there is still some Twenty One Hundred dollars with interest due on your Church Organ, the first payment due May 1849, has not been paid, the second due May 1850, has not been paid, and the reservation of six months grace expires on the 1st of November.
>
> I now appeal to your honor as gentlemen and your charity as Christians that you will on the first day of November next, rather keep the organ by paying the above mentioned sum, or else put me in the quiet possession thereof without any additional trouble on my part.[33]

By this date, however, the vestry membership had turned over and a new rector was in the process of being called. These developments opened a solution to the church's financial quagmire. As a condition of accepting the rectorship, the Rev. Francis Lister Hawks—a highly respected preacher whose arrival promised to forestall damage to the church's reputation—required the vestry to re-auction all the pews, thereby raising needed funds immediately and resetting the annual pew rents to rates consistent with the church's long-term needs. To make the new sale work, every pew had to be auctioned. Existing pew holders were required to surrender their deeds, but they received credit for what they had paid before when repurchasing their pews. The sale took place October 31, 1850, and it raised enough money to settle the church's immediate obligations. Within days, the vestry began making installment payments to Ferris: $300 on November 6 and $200 on November 20. It repaid the vestrymen who had advanced money for the organ rent, and the church's right and interest in the organ was released from trust that same month. Regular payments to Ferris continued through 1851 until the organ was paid "IN FULL" on November 17, 1851. The church bought back its rectory in 1854, and the construction debt was finally extinguished in 1859.[34]

Music at Calvary Church

Calvary Church purchased a high-quality instrument from a careful and talented builder that was intended to be the equal of the best organs in the city. With such an instrument in hand, the music committee and the vestry began to cultivate a quality music program. Over the next three decades, the church hired a succession of prominent leaders in the lively New York musical scene to fill the role of organist and choir director, resulting in the development of a strong reputation for good music at Calvary.

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[33] Richard M. Ferris to Vestry and Wardens of Calvary Church, Sept. 11, 1850, copy made from Calvary Church vestry records reproduced in Ambrosino, *Organ Atlas of the Capital District Region of New York State*, 19.

[34] Brent, *Master Builder*, 77; Shoemaker, *Calvary Church*, 86–88, 94–95; James Grant Wilson, ed., *The Centennial History of the Protestant Episcopal Church in the Diocese of New York, 1785–1885* (New York: D. Appleton and Co., 1886), 277; Pinel, Calvary Church financial-ledger notes, Nov. 6 and Nov. 20, 1850, Jan. 6, Feb. 2, Apr. 7, May 8, June 10, July 22, Aug. 19, and Nov. 17, 1851; Memorandum of Sale, Nov. [ ], 1850.

Throughout the period that Calvary Church owned the organ, the accompanied quartet choir was the predominant form of Sunday music making in New York's mainstream churches. A quartet choir comprised four solo singers: a soprano and an alto (both women) and a tenor and a bass (both men), and the accompaniment was almost always provided by an organ. Both the organ and the singers were usually positioned in a gallery at the rear of the church where they formed an aural but not visual part of the service. In wealthy churches these performers were paid professionals whose talents could also be appreciated in the city's concert halls and music rooms. Quartets were most common in Episcopal and Catholic churches, but in New York their popularity extended into many Baptist, Presbyterian, Methodist, Reformed Dutch, Unitarian, and Congregational churches as well. Even Congregation Emanuel, a Jewish Reform synagogue, had a quartet choir at mid-century. There were about fifty Episcopal churches in New York in 1860, of which thirty-two have entries in Thomas Hutchinson's 1861 *American Musical Directory*. Almost three quarters of these churches (twenty-three) had either quartet choirs or double quartet choirs. The remaining nine churches featured either congregational singing, mixed choirs of men and women, or, in the case of three churches, choirs of men and boys after the English cathedral tradition.[35]

The quartet repertoire was rich and varied, but it relied heavily on "arrangements for four voices of popular opera airs and ballads"; that is, on psalm, hymn, and other religious texts set to familiar tunes drawn from the theater and concert stage. This style, although increasingly questioned by some critics as "sentimental and secular," was very popular, and, in the wealthiest churches, was performed with great artistry and accomplishment.[36]

Charles D. Judah became organist at Calvary in the spring of 1846 while the congregation was still worshiping in its frame church, and he continued for two years after the consecration of the new church. The music committee's selection of Judah, an attorney and counselor-at-law, may reflect the original church's small physical size, modest organ, and as-yet simple musical needs. In November 1847, after the new building was opened, the vestry appropriated a total of $900 to pay Judah and "a full and efficient choir" to perform at services, a first indication of efforts to raise the quality of the music. Judah departed in 1849, and was replaced briefly by 23-year-old George F. Bristow (1825–98) before the vestry hired composer, teacher, and organist George Henry Curtis (1821–95) to organize the music for the 1849–50 year.[37]

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[35] *The American Musical Directory* (New York: Thomas Hutchinson, 1861), 220–24. Forty-nine Protestant Episcopal churches, chapels, and missions are listed in H. Wilson, *The New York City Register* (New York: H. Wilson, 1859), 15–16.

[36] H. E. Krehbiel, "Surpliced Choirs in New York," *Harper's New Monthly Magazine* 77, no. 457 (June 1888): 68.

[37] Shoemaker, *Calvary Church*, 58, 304–05; Pinel, notes from Calvary Church vestry minutes, Nov. 16, 1847. Evidence for a church-choir year comes from a newspaper report published in the 1890s: "Since time immemorial New York churches have cherished this, the first Sunday in May, as the day to put away the old and inaugurate the new in all matters pertaining to choir lofts. The old year ended last Sunday—the new year begins to-day. All contracts for paid choristers begin to run and all changes in the plan and scope of the choir date from this date." "Chat in the choir loft," *New York Herald*, May 3, 1891, 10.

Other Episcopal parishes, such as Trinity and Grace, had had success improving the quality of their Sunday music by engaging organists trained abroad. Possibly seeking to follow their example, the music committee hired Henry Wellington Greatorex (ca. 1813–1858) in 1850 at the annual salary of $300. About 37 years old at the time, the English-born Greatorex was a respected music teacher, vocal performer, organist, and composer. Trained by his father, Thomas Greatorex, the organist of Westminster Abbey from 1819 to 1831, Henry served for a time as organist at St. Marylebone Church in London before emigrating to the U.S. in 1838 or 1839 to take up a position at Center Church in Hartford, Connecticut. He left after two years, but subsequently worked at St. John's Church in Hartford for several years. By 1846, he was in New York and situated as organist at St. Paul's Chapel, part of Trinity Parish. A year after starting at Calvary, Greatorex published a collection of church music containing many of his own compositions, which achieved wide circulation and popularity.[38]

Under Greatorex's leadership, Calvary gained a reputation for high-quality music. As a writer for the *Journal of Fine Arts* described it,

> Within a few blocks of Union Park rise the stone [*sic*] spires of a magnificent church. Its solemn aisles are weekly crowded with worshippers. Its huge organ responds to the fingers of a Greatorex; its caged choir displays the skilful warblings of Madame Wallace Bouchelle, with other paid and select vocalists. Its walls resound with the eloquence of one of the most eminent of American divines [Rev. Francis Lister Hawks]. . . .[39]

The article explained that E. Wallace Bouchelle was "the sister of the great composer and performer William V. Wallace" and that she sang alongside tenor Marcus Colburn, contralto Mrs. Clark, and a bass whose name the writer did not know. As for the organ,

> In quality of tone and general mixture it compares favorably with a majority of our instruments. It has a prompt and noble pedal-bass, and some of its individual stops possess peculiar beauty. A judicious voicing of the whole diapason of this instrument would, undoubtedly, supply that evenness and brilliancy of tone which the ear so ardently longs for, during its performance.[40]

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[38] Shoemaker, *Calvary Church*, 96; H. W. Greatorex, *A Collection of Psalm and Hymn Tunes, Chants, Anthems, and Sentences, Original and Selected, From the Best Standard Composers* (Boston: Oliver Ditson and Company, 1851). Biographical details for Greatorex found in James Grant Wilson and John Fiske, *Appletons' Cyclopaedia of American Biography* (New York: D. Appleton and Company, 1887), 2:733; N. H. Allen, "Old Time Music and Musicians," *Connecticut Quarterly* 2, no. 2 (Apr., May, June 1896): 153, 156; Philo Adams Otis, *The First Presbyterian Church 1833–1913: A History of the Oldest Organization in Chicago*, 2nd ed. (Chicago: Fleming H. Revell Co., 1913), 212–14; Frank J. Metcalf, *American Writers and Compilers of Sacred Music* (New York: Abingdon Press, 1925), 256–62; Gordon Mork, ed., *The Homes of Oberammergau by Eliza Greatorex* (West Lafayette, Ind.: Purdue University Press, 2000), 1–2.

Greatorex's second wife, Eliza Pratt Greatorex, was the first woman elected as an associate of the National Academy.

[39] "Occasional Sketches. Calvary Church, New York," *Journal of Fine Arts* 3, no. 9 (Jan 1, 1851): 148.

[40] "Occasional Sketches. Calvary Church, New York," 148.

It was common practice at this time for organ builders to work with their clients to sponsor initial public recitals, usually called "exhibitions," to show off recently completed organs. Henry Erben, for example, organized a two-day exhibition of the recently completed Trinity Church organ in October 1846 that featured twenty-one organists, attracted thousands of listeners, and gained wide coverage in the press.[41] Richard Ferris arranged a more modest public exhibition of the Calvary organ on Friday, July 23, 1852, fully five years after the church was dedicated. The delay was probably occasioned by the protracted period taken to pay for the organ. The greater part of the program comprised performances by Greatorex and the organist William Berge, whose improvisation the reviewer for the *Musical World* praised for its "very novel effects." Madame Bouchelle sang "With verdure clad" from Joseph Haydn's oratorio *The Creation*. "Messrs. Melvill and Wells also performed," but it is unclear if these men were organists or vocal performers. The reporter for the *Musical World* concluded,

> The Organ is a first class one . . . . The organ is the best we have heard for some time. The diapasons are remarkably full, and are not overpowered by Sesquialtra [*sic*], Mixture and Fifteenth, as is the case in many Organs in this city. The Solo stops are all carefully voiced; the Hautboy is very even and clear. The touch is also well-regulated and easy; and, we think the Instrument, altogether, very creditable, both to the taste of the church and to the Organ builder.[42]

Henry Greatorex left Calvary Church in 1853.[43] His immediate replacement is not known, but by mid-1854, J. G. Maeder had charge of the music program. This man was in all likelihood James Gaspard Maeder (1809–1876), an Irish-born composer, conductor, teacher, and stage producer most frequently remembered as the husband of actress Clara Fisher.[44] He had a strong reputation as a vocal instructor, and versions of the following advertisement appeared occasionally in the *New York Herald*:

> MUSICAL INSTRUCTION—SINGING AND PIANO forte—Mr. Maeder, organist of Calvary church, has resumed business. Italian and English singing for the stage, concert room, or private life. Great care paid to the accompaniment of songs, so very essential even to the finest singer, No. 476 Broome street.[45]

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[41] Ochse, *History of the Organ in the United States*, 151–52.

[42] "A new organ," *Musical World and the New York Musical Times* 3, no. 23 (Aug 1, 1852): 393; Ferris's advertisement for the performance appeared under "Amusements" in the *New York Herald*, July 22, 1852, 7.

[43] Greatorex left New York for Charleston, South Carolina, where he took up duties (possibly not all at once) at St. Philip's Church, Kahal Kadosh Beth Elohim Synagogue, and the Catholic Cathedral of St. John & St. Finbar. He died of yellow fever in September 1858.

[44] The earliest reference found to Maeder being Calvary's organist is an encomium by "J. G. Maeder, Organist Calvary Church," dated July 7, 1854, that appears in an advertisement for Nutting's Aeolicons in *New-York Musical Review and Gazette* 6, no. 23 (Nov. 3, 1855): 372; Frederic Boase, *Modern English Biography* (Truro: Netherton and Worth, 1897), 2:687; Clara Fisher Maeder, *Autobiography of Clara Fisher Maeder* (New York: Dunlap Society, 1897), xiv *et seq*.

[45] "Musical instruction—singing and pianoforte" [advertisement], *New York Herald*, Oct. 5, 1856, 6. See also a similar ad in the same newspaper, Sept. 19, 1857, 7.

Maeder departed in 1857 or 1858 and was replaced by the respected performer and arranger William A. King (d. 1867), an Englishman. He had most recently been organist and choir master at Grace Church, where in 1852 he published the popular *Grace Church Collection of Sacred Music*, a compilation of four-part psalm and hymn settings "arranged from the classical and sacred works of the great composers."[46]

Maeder and King had the experience and connections necessary to maintain the quality of quartet-choir performance established by Greatorex. For the August 1859 funeral of congregant Col. Herman Thorn, for example, King selected a number of chants and anthems that were performed "with fine effect" by the quartet of Charles Guilmette, Ernest Perring, and sisters Madeline and Mary Gellie, all well-known solo singers who frequently appeared in concert elsewhere in the city with King and other lights of the city's classical music world. "It was remarked subsequently by several persons," a *Herald* reporter wrote after the funeral, "that the singing was the best they had ever heard on a similar occasion."[47]

King resigned from Calvary in 1860, and the vestry hired Joseph Mosenthal (1834–96) to replace him.[48] Mosenthal was prominent in the city's music scene during the second half of the nineteenth century as a violinist, organist, conductor, composer, and arranger. Born in Cassel (now Kassel) in the principality of Hesse (now part of Germany), he trained under his father and grand-ducal organist Schuppert. He also studied violin under the great violinist and composer Louis Spohr before immigrating to the United States in 1853. He soon became a violinist with the Philharmonic Society and from 1855 to 1868 was a member of the Mason-Thomas Quartette, whose concerts helped establish a taste for classical chamber music in the United States. In 1858, he became organist at Trinity Parish's St. John's Chapel. Two years later, he was hired by Calvary Church, and he remained organist and choir master there for twenty-seven years. Besides his church duties, Mosenthal became director of the recently established Mendelssohn Glee Club in 1867 and over the next three decades shaped the group into an exclusive ensemble of the highest caliber whose concerts became society events and inspired the founding of men's choruses across the country. Mosenthal composed numerous original works, mostly for men's chorus or mixed quartet, and his compositions and arrangements featured regularly in church services throughout the city. He published two collections of anthems and hymns for use in Episcopal services during the 1870s. He died in 1896 during a rehearsal in the Mendelssohn Glee Club's rooms, lying under his own painted portrait.[49]

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[46] William A. King, *New York Grace Church Collection of Sacred Music* ([New York]: 78 Bleeker St., 1852).

[47] "The funeral of Col. Herman Thorn," *New York Herald*, Aug. 3, 1859, 5. For one of many concert appearances that featured the Gellies, King, and Guilmette, see Vera Brodsky Lawrence, *Strong on Music: The New York Music Scene in the Days of George Templeton Strong*, vol. 3, *Repercussions, 1857–1862* (Chicago: University of Chicago Press, 1999), 75.

[48] The reason for King's resignation is not clear, but evidence suggests a falling out. In a newspaper advertisement he wrote, "Mr. William A. King begs to announce that his engagement as organist of Calvary church expires on the 1st of May next, having resigned, he is therefore open to an engagement as organist and musical director of any church wishing he services." "Organist," *New York Herald*, Feb. 3, 1860, 7.

[49] Joseph Mosenthal, *Anthems for the Morning and Evening Service of the Episcopal Church, Composed and Arranged for Quartette Choirs* (New York: William A. Pond and Co., 1870); idem, *Hymn Tunes in Various*

By all reports, Mosenthal kept the music at Calvary at a high standard. He was praised for his ability to attract "the services of some of the best known church singers of their day," including tenors William Henry Cooke, William Castle, Frank Potter, and Carl Alves; basses Philip Mayer and Charles B. Hawley; and the previously mentioned Madeline and Mary Gellie.[50] A correspondent for *Dwight's Journal of Music* wrote in 1861 that

> The music is rendered with as much taste and genuine artistic thoroughness of execution here, as at any other church in the city. The repertoire is extensive and varied, comprising adaptations from the masses, selections from the collections of Greatorex, King, etc., with original compositions of the organist. The choir is a quartette; the soprano and alto parts are sustained by the two sisters, Misses Madeline and Mary Gellie, and the tenor and bass by Messrs. Cooke and Philip Mayer.[51]

"The organ is a very good one," the *Dwight's* reviewer concluded, and seventeen years later another critic noted that "those who are familiar with it through the playing of Mr. Joseph Mosenthal, must concede it to rank among the best organs in America."[52]

By the early 1880s, the professional quartet was assisted on Sundays by an amateur chorus of about twenty mixed voices, while a week-day choir of women (led by the rector) and a parish choir of women, children, and retired men (led by George W. Lay) provided music at the church's smaller services.[53] In January 1887, however, the vestry at Calvary decided to replace the Sunday quartet and four-voice chorus with a vested boy choir that would perform in front of the congregation near the alter instead of in the gallery behind. Mosenthal objected to this change and resigned. In his place, the music committee hired 38-year-old Arthur Edmonds Crook, a Cambridge University–trained native of Bristol, England, who had served for five years as organist and choirmaster of St. Paul's Church, Baltimore, a prominent parish that had employed a vested boys choir since 1872.[54]

Metres for Quartette Choirs (New York: William A. Pond and Co., 1877); "Chat in the choir loft," *New York Herald*, May 3, 1891, 10; "Mosenthal died suddenly," *New York Herald*, Jan. 7, 1896, 17; "Obituary. Joseph Mosenthal," *New-York Tribune*, Jan. 8, 1896, 5; "Flickers," *American Art Journal* 66, no. 14 (Jan. 11, 1896): 214; George P. Upton, ed., *Theodore Thomas: A Musical Autobiography,* vol. 2, *Concert Programmes* (Chicago: A. C. McClurg & Co., 1905), 37 *et seq*.; "Guide to the Mendelssohn Glee Club Papers, 1856–1970," JPB 06-5, New York Public Library for the Performing Arts, Music Division, http://www.nypl.org/archives/2631.

Although a couple of sources report that Mosenthal left St. John's Chapel "when the craze for surpliced choirs broke up his quartet," St. John's still had a solo quartet choir in 1861. "Chat in the choir loft," *New York Herald*, May 3, 1891, 10; Thomas Morgan Prentice, "Boy Choirs in America," *Munsey's Magazine* 9, no. 1 (Apr. 1893), 82; "Church Music in New York," *Dwight's Journal of Music* 18, no. 21 (Feb. 23, 1861): 380.

[50] Quote from "Chat in the choir loft," *New York Herald*, May 3, 1891, 10.

[51] "Church Music in New York," *Dwight's Journal of Music* 18, no. 23 (Mar. 9, 1861): 396.

[52] "An Important Invention for Organs," *American Art Journal* 29, nos. 14–15 (Aug. 10, 1878): 184.

[53] The members of the various Calvary Church choirs in the 1880s are listed in the various editions of the *Year Book of Calvary Church, New York City* (New York: Bedell & Brother, 1881–86, 1888).

[54] "Musical and dramatic notes," *New-York Tribune*, May 3, 1887, 4; Shoemaker, *Calvary Church*, 157; "Boy Choirs in America," *Munsey's Magazine* 9, no. 1 (Apr. 1893): 84.

The decision to move the choir to the chancel required an organ in the chancel, too, and provided a justification for replacing the 40-year-old Davis & Ferris organ with a more modern instrument, as it was impossible for an organist facing away from the alter in the rear gallery to direct a choir at the other end of the building. Within weeks of Mosenthal's resignation, the music committee asked for a specification and quote from Frank Roosevelt, successor to Hilbourne L. Roosevelt, then the city's most prominent organ builder. The firm's proposal was accepted March 31, 1887, and a contract quickly signed for $10,500.[55]

Changes in organ technology allowed the Roosevelt organ to be split between new galleries inserted into the extreme northeastern and southeastern bays of the church's aisles and the west gallery. The chancel organ was dedicated in April 1888; the new west gallery organ, for processional and concert use, was completed later. An electro-pneumatic action, instead of the direct mechanical action used in the Davis & Ferris organ, allowed all parts of the instrument to be controlled from a single console placed among the chancel choir stalls. "The division of the instrument in the two ends of the church," one reviewer noted, "makes possible crescendos and diminuendos and antiphonal effects of startling intensity."[56]

Calvary Church sold the Davis & Ferris organ for $1,500 in April 1888 to the Round Lake Association of Saratoga County, New York, which was looking for an instrument to install in the auditorium at its camp-meeting grounds. Organ builder Giles Beach of Gloversville dismantled the organ and oversaw its shipment by rail up the Hudson River valley from Manhattan, its components "completely filling four freight cars."[57]

Episcopal Church Music Reform

Calvary Church's decision to change the style of music in its services resulted from a long-developing shift in thinking within the Episcopal Church about liturgical forms and customs. From its founding in 1789, the Protestant Episcopal Church in the United States counted within its membership individuals holding a wide variety of beliefs about ritual and doctrine. Throughout the nineteenth century, an increasingly vocal and influential group argued for reclaiming the catholic heritage of Episcopal worship and sought to reform many church practices along conservative and archaic lines. The high-church movement in America was strengthened by the intellectual rigor and passion of the Oxford or Tractarian movement, a parallel effort started in the 1830s to reform worship practice in the Church of England, the body the Episcopal Church descended from, and over the course of many decades high-

[55] Pinel, notes from Calvary Church vestry minutes, Mar. 31, 1887; Shoemaker, *Calvary Church*, 157.

[56] Quote from "Literature, Art and Music," *Frank Leslie's Sunday Magazine* 23, no. 6 (June 1888): 471. Details of the Roosevelt organ appear in "Organ News," *Musical Opinion & Music Trade Review* 11, no. 129 (June 1, 1888): 407, and "The Organ in Calvary Church, New York," *Musical Opinion & Music Trade Review* 11, no. 131 (Aug. 1, 1888): 509–10. The organ was rebuilt by E. M. Skinner in 1907 and G. Donald Harrison in 1936. The organ at Calvary today reflects additional modifications made between 1963 and 1983.

[57] Pinel, "Documented History," 51; Executive Committee minutes, Apr. 7, 1888, in RLCMA, 169; Executive Committee minutes, May 19, 1888, in RLCMA, 176; "Pebbles from Round Lake Shore," *Schenectady Daily Union*, July 16, 1888, 3.

church ideas brought about profound changes in religious doctrine, ritual, architecture, and music on both sides of the Atlantic.[58]

High-church proponents sought in part to strengthen ritualism in worship services. They argued that liturgy and ceremony had grown too plain and should be returned to their elaborate medieval forms. This argument naturally extended to music, a central component of medieval Christian liturgical practice, and reformers sought to revive plain chant and bring the sung service of the English cathedrals to parish churches. They argued that boys should sing the high voice parts instead of women and that choirs should dress in vestments and stand at the front of the church where their presence alongside the clergy would form an essential visual and aural element of the service.

The vested choir of men and boys singing anthems and Tudor polyphony was a considerable departure from prevailing musical practice in American churches, and its introduction, slow and incremental, played out over many years. The first boy choirs began to appear in Episcopal churches in the mid-1840s. In New York, two important early sparks for change were the hiring of Edward Hodges by Trinity Church in 1839 and William Augustus Muhlenberg's establishment of a boy choir at the Church of the Holy Communion in 1846. Hodges raised the standard of performance at Trinity and its chapels and introduced music from the English cathedral choral tradition in which he had trained. He established a boys choir, but kept it in the rear gallery and retained his female singers for solo work. His taste ran toward "pure, simple, devout and grand" music, in contrast to the music of parishes such as Grace and Calvary, which he disparaged as partaking of "the Oratorial and serious Opera cast." He retired in 1858 after a series of strokes, and Trinity replaced him, at first *ad interim* and later permanently, with Henry Stephen Cutler, recruited from Church of the Advent in Boston, a high-church parish that had a vested choir. Cutler pushed Hodges's reforms further: he identified boys capable of singing the solo work and dismissed the female singers. He split the choir into *Decani* and *Cantoris* parts in order to achieve antiphonal effects as was done in English cathedrals. His split choir started in the gallery next to the organ, but soon moved to the front seats of the sanctuary and then into the chancel, where a small chancel organ had to be purchased to accompany them. Cutler's efforts to vest the choir were strongly opposed at first, as many felt such costume was too close to Roman Catholic practice, but the change was achieved when the choir had to perform before the visiting Prince of Wales in October 1860.[59]

In an 1861 description of Trinity's music program, Cutler defensively positioned the parish's conservative reforms as "a move in the right direction" and claimed that his new choir was

[58] Arguments for a return to a supposedly purer and more authentic form of worship appealed to many people in the socially and politically turbulent wake of the Industrial Revolution; as Nicholas Temperley has argued, "the Tractarian ideal of worship, like much else of the Romantic movement, was at bottom an attempt to repudiate the increasing pressures of urban materialism." Nicholas Temperley, "The Anglican Choral Revival," *Musical Times* 112, no. 1535 (Jan. 1971): 75. See also Edwin Ryan, "The Oxford Movement in the United States," *Catholic Historical Review* 19, no. 1 (Apr. 1933): 33.

[59] Leonard Ellinwood, *The History of American Church Music* (New York: Morehouse-Gorham Co., 1953), 77; "Boy Choirs in America," 81; Krehbiel, "Surpliced Choirs," 66–67. Hodges quoted in Ogasapian, *English Cathedral Music in New York*, 165.

"no innovation but strictly in accordance with ancient usage." He justified the exclusion of women from church performance on the precedent that female singers "are never heard in the English cathedrals" and noted that his "boys are most carefully selected, with reference to musical aptitude and refinement of character, and belong to the higher walks of life. . . . Daily they are practiced . . . in the classical works of Handel and the cathedral composers; any thing, however, which resembles in style the modern Italian is carefully avoided."[60]

Trinity's prominent position and its successful implementation of musical and liturgical changes helped make such reforms a legitimate option for other churches to consider, although few followed suit right away. In fact, many Episcopal organists rejected Cutler's archaic innovations. The New York musical scene in the second and third quarters of the nineteenth century was dominated by German-born and -trained musicians and their students, supplemented by a high number of classically trained French and Italian singers and their students. Their performance quality was excellent, their repertoire largely modern and continental, and their rehearsal time for each Sunday reputedly brief and efficient. Organists with no background in English Cathedral practice nor training in the cultivation of boys' voices hesitated to upset their finely tuned musical establishments by substituting boys for women. They likely also felt little affinity for the antiquated repertoire espoused by the reformers.[61] "I have heard boy choirs here and in England," Joseph Mosenthal told an interviewer in 1891, "and the best ones, too, in both countries, and I am not willing yet to subscribe for them—no, not even after hearing St. Paul's, in London."

> Here, [Mosenthal continued,] where our churches are smaller and our pastor and choir are both well known by the worshippers, the strictly ecclesiastic form of music necessary in the cathedral service should, I think, give way to a more poetic form of music—one that will express the more intimate relations between the clergy and people.[62]

Reformers replied that solo-quartet performances, however high quality, were little more "than a kind of divertissement thrown in for some relief to the religious proceedings. . . . [W]ho could look on the well-dressed congregation—with ladies resplendent in diamonds—as they sat listening to the picked singers in their pay, and associate them with an act of worship?"[63]

"For a quarter of a century Mr. Mosenthal's popularity was a powerful check on the surplice movement," critic Henry E. Krehbiel wrote in 1888, when one-third of New York's Episcopal vestries had replaced soloists and mixed choirs with choirs of men and boys, "but it continued to wax steadily, if slowly, and only a few months ago it carried him out of Calvary Church, after twenty-eight years of eminent service . . . ." In 1882, the high-church-

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[60] *American Musical Directory*, 247–48.

[61] G. Edward Stubbs, "Why We Have Male Choirs in Churches," *Musical Quarterly* 3, no. 3 (July 1917): 423–24; Joseph Bennett, "Observations on Music in America. II. Church Music," *Musical Times and Singing Class Circular* 26, no. 506 (Apr. 1, 1885): 195.

[62] "Chat in the choir loft," *New York Herald*, May 3, 1891, 10.

[63] Bennett, "Observations on Music in America. II. Church Music," 195.

leaning Rev. Henry Yates Satterlee became rector at Calvary; four years later, he used the parish's fiftieth anniversary to call for, among other things, a restructured sanctuary and a new organ. In January 1887, the vestry polled the parish about the possibility of instituting a vested chancel choir and found the congregation in favor. Mosenthal resigned that very month on artistic grounds and "because he was unwilling to undertake to give music with a surpliced choir in the absence of an adequate system for the musical education of boys."[64]

The Round Lake Camp-Meeting Association

In 1867, Joseph Hillman, a life insurance agent from Troy, New York, and leading light within the Troy Conference of the Methodist Episcopal Church, led a group of laymen in search of a permanent home for the conference's summer camp meetings. Methodist camp meetings, organized in many places throughout the U.S. during the nineteenth century, were sponsored by the more evangelical elements of the church to bring together ministers and worshipers in the outdoors for a week or more of preaching, prayer, testimony, and spiritual renewal. Inspired by the sylvan, water-side setting of the Wesley Grove camp-meeting ground on Martha's Vineyard, Hillman and his associates sought a picturesque place with recreational potential near a railroad, settling on a wooded site between the placid Round Lake and the line of the Rensselaer and Saratoga Railroad, about 10 miles south of Saratoga Springs. They incorporated the Round Lake Camp-Meeting Association in May 1868 and set in motion efforts that summer to prepare the land for camp use. The first Troy Conference Camp Meeting was held at Round Lake in September, with between 2,000 and 3,000 people in attendance.[65]

That first year, a simple covered preaching stand was built in the woods between the railroad and the lake, with rows of rustic benches facing it, and underbrush and boulders were cleared away to provide tenting grounds. The next year, civil engineer H. Drube surveyed the property, and the association laid out streets in a radiating plan centered on the speakers' stand. The association made lots available for rental or purchase, and a number of wealthy families, the vanguard being shareholders of the association, built the first private wood cottages on the grounds at this time. The association purchased small tents to shelter prayer meetings and a large tent, christened the Tabernacle, to shelter gatherings of up to 2,000.

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[64] H. E. Krehbiel, "Surpliced Choirs in New York," *Harper's New Monthly Magazine* 77, no. 457 (June 1888): 68; Brent, *Master Builder*, 102; "Musical and dramatic notes," *New-York Tribune*, May 3, 1887, 4; Pinel, "Documented History," 51.

Mosenthal headed to Europe for an extended tour after his resignation, but returned to the city in 1891 to take up music direction at All Souls' Unitarian Church, which made use of a solo quartet. The *New York Herald* chose his return as the moment to praise Mosenthal as a "life long exponent of much that [is] best in modern church music to-day"; "Chat in the choir loft," *New York Herald*, May 3, 1891, 10.

[65] Biographical details for Joseph Hillman appear in Matthew Simpson, *Cyclopaedia of Methodism* (Philadelphia: Louis H. Everts, 1881), 444–45, 732. The history of Round Lake is summarized from Arthur James Weise, *History of Round Lake, Saratoga County, N.Y.* (New York: Press of Douglas Taylor, 1887); Mary Hesson, et al., *Round Lake: Little Village in the Grove* (Round Lake, N.Y.: Round Lake Publications, 1998); "The Methodist National Camp-meeting," *New-York Tribune*, July 9, 1869, 5; "Pebbles from Round Lake Shore," *Schenectady Daily Union*, July 16, 1888, 3; "The Round Lake Assembly," *The Sun*, Aug. 2, 1891, clipping in Round Lake Village Archives, folder "RLA 1891."

The association initially acquired 40 acres of land, but augmented the property through the purchase of 80 additional acres in 1873 and a final 80 in 1875.

These preparations attracted the National Camp Meeting of the Methodist Episcopal Church, which met on the grounds in July 1869 and drew an estimated 15,000 to 20,000 attendees on certain days. Other groups looked to use the well-prepared and bucolic site in addition to the repeated camp meetings of the Troy Conference, and Round Lake hosted the first New York State Camp Meeting and the first Fraternal Camp Meeting during the early 1870s, as well as recurring visits from the Union Evangelistic Camp Meeting, the Sunday-School Assembly, and the Gospel Temperance Meeting.

These Methodist gatherings attracted participants from a wide range of income levels, but those who camped on the grounds tended to be moderately to highly well-to-do because of the expense. One reporter calculated in 1869 that, even though tent rentals ranged from $3 to $30, fitting out a tent comfortably with rented furniture and gear would cost at least $20 for a ten-day camp meeting, and food and other incidental expenses would add even more.[66] Not surprisingly, many thousands of attendees participated only for the day, making trips by railroad, coach, or cart from Saratoga, Troy, and other nearby communities. Most who made a holiday of the experience during Round Lake's early years stayed in tents, but increasing numbers built cottages to stay in or rent out, and hotels and boarding houses appeared as well. Predominantly ministers, educators, merchants, and businessmen owned the cottages. As one promoter claimed, "At Round Lake there are no imperative dictations of fashion. A woman's plain toilet does not subject her to disagreeable criticism, and children may enjoy the freedom of the healthful retreat in simple, home-worn clothing. The infrequency of horses and vehicles, and the absence of cats and dogs on the grounds, greatly lessen the watchful care of small children at play out-doors."[67]

In 1872, as the camp's popularity as a healthy and respectable place to holiday grew, the association allowed cottages to be occupied as summer homes outside of camp-meeting dates. The number of cottages increased, and tents became rare. After the successful resolution of a financial crisis in 1883, the association worked to expand Round Lake's cultural and educational facilities, and in rapid succession the grounds acquired Alumni Hall (1884) to house the Summer School Assembly, an auditorium (1885), the Griffin Institute (1886–87), and the George West Museum of Art and Archaeology (1887). A water works and sewer system were also built in 1887, the same year a hose company was founded and the Arcade (a suite of shops) was built. By the late 1880s, a regular community had developed, and the burgeoning year-round population was numerous enough to support the construction of a permanent Episcopal church in 1892 and a Methodist Episcopal church in 1893–95.[68]

The association dropped the words "camp-meeting" from its name in 1887 in an acknowledgement of Round Lake's transformation from a purely Methodist retreat into a Chautauqua. "We shorten our name because we have broadened our work," president William Griffin declared. "Henceforth this place will be known, not as a 'Methodist Camp Ground,' but a 'Christian Summer Home,' . . . where the brotherhood of Christ shall dwell

[66] "The National Camp Meeting," *New-York Tribune*, July 10, 1869, 9.
[67] Weise, *History of Round Lake*, 72.
[68] Hesson, *Round Lake*, 55–56.

together in unity, provoking one another only by 'love and good works.'"[69] As one newspaper writer described the camp's maturation,

> The association, with [its] liberal extension on theological and educational lines, is also providing for an extension of the privileges of Round Lake as purely a Summer resort for pleasure, health, and recreation. Fishing in the best bass waters in the State, boating, tennis, croquet, picnics, evening entertainments, with magic, stereopticon views, recitations, &c., and, above all, the great annual musical assembly, which has now become almost a national affair, are all encouraged in the widest way, and those wise fathers of the association cherish the idea of making Round Lake a truly fashionable and lively Summer resort, freed by religious and educational influences from the rough and tough elements that pervade some resorts.[70]

Round Lake Auditorium

The auditorium was the largest of the improvements built at Round Lake during the 1880s. When the camp was founded, a wood platform with a roof served as the speakers' stand, and simple plank seats provided audience seating. Occasionally a canvas cover was put up to shelter some of the seats. In 1873, the association installed backed benches, and, in 1876, it raised a permanent canvas canopy over the seats and installed a 600-pound bell on the roof of the speakers' stand. By 1884, "the canvas covering, by long use and decay, could no longer furnish the needed shelter," and trustee James Lamb, a textile-mill owner from nearby Cohoes, led efforts to secure plans and funding to build an auditorium. The plans were ready by November, but sufficient funding was not in hand. In early 1885, one of the trustees proposed erecting the building without a finished floor or side walls, and the association approved this frame-and-roof-only approach in March 1885.[71]

The 140' x 85', 2,000-seat auditorium was designed as a large gable-ended basilical shed. Constructed of wood with a timber-and-iron-rod truss roof, it abutted the speakers' stand, which was left in place and became the auditorium's stage. The architect provided clerestory windows along the sides for light and ventilation, and these were significantly augmented by the light and breeze admitted through the building's open sides at ground level. The association fitted canvas screens so the sides could be covered when needed.

Marcus Fayette Cummings, an architect from Troy, probably designed the auditorium. Although no documentation links him conclusively to the building, he designed numerous buildings on the grounds, including at least two cottages from the 1870s, benefactor and sometime trustee William Griffin's house, the George West Museum, the Griffin Institute, the Woodlawn Hotel (1887), and two summer-school dormitories (Garnsey and Kennedy

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[69] Weise, *History of Round Lake*, 69–70.

[70] "The Ministers' Institute," *New York Times*, June 13, 1892, 3.

[71] Quote from "President Robinson's Annual Report," clipping from unknown newspaper in RLCMA, 48; Weise, *History of Round Lake*, 24, 32; minutes of trustees' semi-annual meeting, Nov. 2, 1884, RLCMA, 43; Executive Committee minutes, Jan. 10, 1885, in RLCMA, 47; Executive Committee minutes, Mar. 7, 1885, in RLCMA, 53.

halls, 1887). His advertisement in Arthur Weise's 1887 book *History of Round Lake* claims credit for unspecified "other buildings at Round Lake," and the decorative and structural similarities between his known buildings and the auditorium argue in favor of the latter being his work. Contractor W. H. Rose of Ballston Spa built many of Cummings's buildings at Round Lake, making him the leading candidate for the auditorium's contractor.[72]

The association dedicated the auditorium on Sunday afternoon, July 19, 1885, with a sermon by the Rev. John P. Newman of New York and a concert of vocal and instrumental music conducted by J. E. Van Olinda. Before the sermon, camp superintendent John D. Rogers "read an itemized account of the expenses incurred in building the auditorium," the *Troy Times* reported. "The cost has been very moderate," the paper continued, "much of the material used having been furnished to the association at half the usual prices. The superintendent stated the total cost to be $3,152.18, $3,000 of which remained to be provided for." William Griffin, at that time an association trustee, took the stage and announced that the association hoped to raise the required funds before dedicating the building. On the spot he proposed dividing the debt into $5 shares to be purchased by the audience. "The audience was in excellent humor," the *Troy Times* concluded, "and subscribed promptly and liberally, and in about an hour the necessary amount had been secured."[73]

Although association president Rodman H. Robinson described the auditorium publicly as "beautiful and commodious" and claimed that "public sentiment is so replete with commendation, that there has been rarely a criticism," privately the trustees found the acoustics wanting, and a special committee, led by Joseph Hillman, was appointed in November 1885 to look into solutions. The results of their work are not known, but it is possible their suggestions informed the extension of the building undertaken three years later.[74]

Round Lake Music Festival

Congregational singing was a key Methodist camp-meeting activity, and vocal groups and instrumental ensembles contributed regularly at Round Lake from its earliest years. By the 1880s, more ambitious performances were occasionally staged, such as the presentation of the oratorio *Joseph* by a choir of sixty singers under the direction of C. G. Norris of Troy that was held in the summer of 1882. The construction of the auditorium encouraged more expansive thinking about musical programming, and this in turn created an incentive to improve the auditorium. Who first proposed the idea of organizing a Round Lake Music Festival for the summer of 1888 is not known, but the association trustees enlisted conductor

[72] Weise, *History of Round Lake*, 100; Mary B. Hesson, "The Round Lake Auditorium" [typescript], 10–11, Round Lake Village Archives, folder "Auditorium."

[73] "$3,000 in an hour," *Troy Times*, July 20, 1885, transcription in Round Lake Village Archives, folder "RLA 1891; Weise, *History of Round Lake*, 54.

[74] Quote from "President Robinson's Annual Report," May 5, 1886, in RLCMA, 73; Minutes of trustees' meeting, Aug. 12, 1885 and Nov. 3, 1885, in RLMCA, 63 and 58.

and composer George A. Mietzke, the German-born choral-festival and music-education champion from Rutland, Vermont, to formulate a plan.[75]

Mietzke presented his ideas in January 1888 and the trustees moved ahead swiftly to implement them, first by arranging for the creation of a Round Lake Musical Association to organize the performances and then by procuring designs to build an addition onto the auditorium in place of the old speakers' stand. Drawings for an apsidal annex containing a proper enclosed stage with risers were in hand by the end of February, and the trustees took the cautious step of showing them to Carl Zerrahn, one of the nation's leading choral conductors, for his opinion before proceeding with construction. In March, association president William Griffin and trustee H. C. Farrar went in search of a pipe organ for the new annex, contacting piano and organ dealer George G. Saxe "and others." It is not known exactly how Griffin and Farrar learned about the Davis & Ferris organ from Calvary, but they negotiated its purchase in April and procured the services of Giles Beach to bring it from Manhattan at the same time.[76]

Giles Beach (1826–1906) was an organ builder from Gloversville, New York, about 40 miles east of Round Lake. Born to a farming family, he learned organ building and repair in the shop of Troy builder Augustus Backus. Beach started his own organ business in about 1850, and restarted it in 1856 after a brief stint working in Westfield, Massachusetts, possibly in the employ of organ builder William A. Johnson. Beach's business grew through the next decade, supplying organs mostly to congregations within a 60-mile radius of his works. In 1870, he and partner Stephen Moore opened an expanded factory and retail operation which they styled the American Church Organ Works. A healthy run of commissions followed, but a fire in 1876 destroyed the factory and with it Beach's ambitions as a maker of original instruments. Thereafter, his career focused entirely on repairing, rebuilding, and reinstalling existing instruments, work exemplified by his removal of the Calvary Church organ to Round Lake.[77]

Between May and mid-July, the contractors Converse and Clark demolished the old speakers' stand and built the $3,000 auditorium annex. They also built a wood-frame tower alongside to support the speakers' stand bell. Beach and his men probably began the organ installation in June. Beach is believed to have cut down the largest pipes in the Pedal Open Diapason to make them easier to ship and install, and he installed a water motor in place of

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[75] Weise, *History of Round Lake*, 48. For a brief biographical sketch of Mietzke, see T. D. Seymour Bassett, "Minstrels, Musicians, and Melodeons: A Study in the Social History of Music in Vermont, 1848–1872," *New England Quarterly* 19, no. 1 (Mar. 1946): 37–40.

[76] Executive Committee minutes, Jan. 21, 1888, in RLCMA, 155; Executive Committee minutes, Feb. 18, 1888, in RLCMA, 161; Executive Committee minutes, Apr. 7, 1888, in RLCMA, 169; Executive Committee minutes, May 19, 1888, in RLCMA, 176; "President Griffin's Report," May 9, 1888, clipping from the *Round Lake Journal*, in RLCMA, 173. Zerrahn, long-time director of Boston's Handel and Haydn Society, regularly conducted festival choirs throughout the northeast; "Carl Zerrahn dead," *Boston Globe*, Dec. 30, 1909, 8.

[77] The best reconstruction of Beach's life appears in Stephen L. Pinel, "Giles Beach and the American Church Organ Works," in *Litterae Organi: Essays in Honor of Barbara Owen* (Richmond, Va.: Organ Historical Society Press, 2005).

the original hand-pump for the wind supply. He did the final voicing of the instrument for its new home.[78]

The first Round Lake Music Festival ran for seven days in July 1888. Carl Zerrahn and George Mietzke shared the directing responsibilities, covering four days of rehearsals and three evening performances. The first evening featured the cantata *Hear My Prayer* by Felix Mendelssohn-Bartholdy and *Sanctus* by Charles Gounod. The second presented Thomas Anderton's cantata *Wreck of the Hesperus*, and the final evening had Mietzke's *Festival Motet* and Gounod's *The Redemption*. "Season tickets admitting to all rehearsals and concerts will be sold for $1.50," one newspaper reported. "Single concert tickets 50 and 35 cents." The name of the organist for these performances is not known.[79]

The festival was repeated in 1889 under the direction of Carl Zerrahn and Charles A. White of Albany. Christian A. Stein of Troy played the organ. The four evening programs (transcribed in Appendix III) presented an assortment of cantatas, songs, arias, and organ solos by German, Italian, American, French, and English composers, some performed by accompanied soloists, others by the full festival chorus. Tellingly, the choice of selections closely echoes the "Oratorial and serious Opera cast" of the music played on the organ throughout its forty years at Calvary Church, in part a reflection of the taste-making influence of the German musicians leading the performances.[80]

The music festival continued annually until at least until 1898. The Germania Orchestra of Boston made its first appearance in 1891 and continued to appear annually thereafter. Zerrahn appeared through 1893; the next year Emil Mollenhauer, leader of the Germania, took up the baton. The programs continued to showcase vocal soloists and feature popular cantatas and oratorio excerpts, and, as far as can be determined, the organ was used consistently as a solo instrument each year.[81]

Little is known about the use of the organ for recitals and worship in the first decades it was at Round Lake, although it seems probable that it was played frequently. The few recital notices that survive imply the organ's prominent position in the auditorium kept it in regular use amid each summer's plethora of classes, lectures, meetings, and devotional programs.[82]

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[78] "Our Organ," *Round Lake Journal*, July 1888, 3.

[79] "A festival of music," *Schenectady Daily Union*, July 2, 1888, 3. This newspaper report misspells Carl Zerrahn's name as "Ferrohn" and renders Gounod as "Sonnod." Mendelssohn's "Hear My Prayer" has been assumed from the paper's report of "Mendelssohn's 'Hearing Prayer.'"

[80] Executive Committee minutes, Apr. 13, 1889, in RLCMA, 233; Concert programs, July 24, 25, 26, 27, 1889, Round Lake Village Archives, folder "RLA 1891."

[81] Programs survive for selected performances from the 1889, 1891, 1895, and 1897 festivals in the Round Lake Village Archives, folder "Music." The 1891 season was called the "fifth" although it was actually the third; similarly, the 1895 festival was advertised as the "ninth" when it was the seventh. No references to the festival have been found after 1898.

[82] Three sample notices of organ recitals scheduled in the midst of busy daily schedules at Round Lake are "Round Lake Assembly. Close of the Musical Festival," *New-York Tribune*, July 28, 1890, 4; "The Round Lake Assembly," *The Sun*, Aug. 2, 1891, clipping in Round Lake Village Archives, folder "RLA 1891; "Preachers at Round Lake," *Troy Semi-Weekly Times*, July 18, 1902, 2. No recital programs survive dating before the late 1940s.

Educational and camp-meeting activities at Round Lake declined through the 1920s and 1930s, and the place ceased to be a religious center and summer resort by the end of World War II. Its transition to a hamlet with a modest year-round population is reflected in the demise of the institutions of its heyday. The George West Museum closed in 1919; it was reused as a school before being demolished in 1965. The Griffin Institute was demolished in 1946; its supporting dormitories, Garnsey Hall and Kennedy Hall, came down in 1956 and 1962, respectively. The railroad station was taken down in 1958. Finally, the Round Lake Association was dissolved in 1968, and residents voted to incorporate as a village in 1969.[83]

The auditorium survived, however, and continued to be used for performances and movie screenings throughout the decades of Round Lake's decline and transformation. The building received a concrete floor and fixed theater-style seating in 1914. The open side walls were glazed and the rear wall enclosed between 1911 and 1919.[84] Although organ maintenance waned and the instrument fell into disrepair, it remained partly playable. A Sunday service sheet from 1944 shows the organ in use for the standard prelude, hymn accompaniment, and postlude, and a concert in the late 1940s featured the organ prominently, with organist Robert W. Boenig playing, among other works, a transcription of *Finlandia* by Jean Sibelius for piano and organ duet. His wife Ella, mezzo-soprano on the program, played the piano in the duet.[85]

Enter Helen T. Hirahara (1896–1988), a trustee of the Round Lake Association and an organist, who had played the organ in the 1920s. In 1954, after moving back to Round Lake in her retirement, she took an interest in the building and the instrument and instigated efforts to repair them to allow more regular use. Hirahara and her son, John F. Lewis, not only undertook fundraising and publicity but also attempted to make repairs and replace worn or missing parts in the organ themselves with the aid of Paul Fischer, organist of St. Paul's Lutheran Church in Saratoga Springs.[86]

By summer, two manuals could be used, and Fischer organized a benefit concert to aid the local Episcopal church. The program, held August 26, 1954, mixed organ solos, violin and piano works, and songs with piano accompaniment. Stanley Saxton, a professor at Skidmore College, played the organ with Fischer acting as stop-puller, and Saxton interspersed

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[83] Hesson, "The Round Lake Auditorium," 6; Hesson, *Round Lake*, 24, 47, 100–101.

[84] The canvas shades are mentioned in the trustee minutes for the last time in 1911, and a 1919 plan shows the new walls in place. The auditorium roof was refurbished in 1980, and the structure and foundations stabilized between 1997 and about 2000. Hesson, "The Round Lake Auditorium," 14; Jodi Ackerman, "Auditorium repair job a top priority," *Gazette*, May 23, 1999, clipping in Round Lake Village Archives, folder "Auditorium Organ (2 of 2)."

[85] Marion Williams, "Famous old church organ discovered in Round Lake," June 4, 1959, clipping from unknown newspaper, in Round Lake Village Archives, folder "Auditorium Organ (2 of 2)"; "Round Lake Auditorium Order of Service," July 23, 1944; Typewritten concert program, n.d. [annotated "Auditorium / 1947 or 1948?"], both in Round Lake Village Archives, folder "Auditorium: Concerts."

[86] Williams, "Famous old church organ discovered in Round Lake."

"remarks about the organ" throughout the performance. Classically trained musicians drawn from surrounding communities filled out the non-organ parts of the program.[87]

Restoration efforts continued in 1955, although the scope of work done at this time is unknown. Hirahara, described by one reporter as "a tiny, energetic lady with an infectious enthusiasm," brought the organ to the attention of the recently established Organ Historical Society (OHS), whose founding members were interested in identifying extant, functional mechanical-action organs in the United States. Members such as F. R. Webber who had begun looking into the New York organ builders of the nineteenth century knew that Davis & Ferris had built an organ for Calvary Church, but they did not know who had purchased it in 1888. They were delighted to learn in 1959 that the instrument survived in Round Lake, and they realized that it was one of the oldest surviving three-manual instruments by an American builder.[88] The organization's journal quoted organist Robert James's assessment of the organ in 1967.

> I have seen this organ many times . . . The tone is in general quite mild by anybody's standards and not entirely successful in the large hall. However, this is probably typical of the New York builders in that time, and, in addition, it should be kept in mind that Calvary Church, the organ's original home, is considerably smaller. The visual effect of the organ is fantastic. It sits on a high platform at the front of the hall several steps above a lower platform evidently intended for clergy, choir and possibly an orchestra.[89]

The OHS put Hirahara in touch with E. Power Biggs, one of the most popular organ performers at the time, for his support and assessment. Although he visited Round Lake in 1957 while researching instruments for his recording "The Organ in America," the Davis & Ferris organ was not in a condition to be recorded.[90]

Edna Van Duzee, a Round Lake resident since 1947 whom one reporter described as "Round Lake's 'unofficial historian,'" joined Hirahara in preservation efforts in the late 1960s. The leading role she soon took in fundraising and programming lasted for the next three decades. "Ultimately," organist Stephen Pinel wrote in 1990, "posterity must credit the preservation of

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[87] Adele M. Woodworth, "Concert in Round Lake Auditorium revives former cultural interest," clipping from unknown newspaper, Aug. 26, 1954, Round Lake Village Archives, folder "Auditorium: Concerts"; "Round Lake church group schedules recital on century old organ," clipping from unknown newspaper, Aug. 18, 1954, Round Lake Village Archives, folder "Auditorium Organ (1 of 2)."

[88] Hirahara quote from Jo Ann Patenaude, "At 120, it still swells with sound," *The Saratogian*, June 21, 1967, 9; Williams, "Famous old church organ discovered in Round Lake."

[89] "Ferris' 1847 organ at Round Lake, New York will be featured in '67 convention," *The Tracker* 11, no. 2 (winter 1967): 2. The Organ Historical Society subsequently scheduled performances on the organ as part of its national conventions in 1967 and 2006.

[90] Betty Stott, "Round Lake's famous organ is 'discovered,'" *Schenectady Union-Star*, June 5, 1959; Barbara Owen, *E. Power Biggs, Concert Organist* (Bloomington, Ind.: Indiana University Press, 1987), 138.

this landmark instrument to her resolute efforts."[91] Van Duzee appeared frequently as the restoration effort's public face. Nancy Curren wrote in the *Schenectady Gazette*,

> The coordinator of the organ recitals, Mrs. Edna Van Duzee, took me and Gazette photographer Ed Schultz on a guided tour of the inner sanctum of the organ. It was an adventurous ascent among the vast chimneys of the deep-throated pedal pipes, to tiptoe along the catwalk to the tracker mechanism and the myriad pipes. . . .
>
> Vandals both human and animal have joined the incursions of weather in an unheated building to corrupt the former glories of the organ . . . . The maze of metal, leather and exotic wood parts has uncountable possibilities for breakdown, wear and disorder.
>
> Playing the musical giant is a challenge for the most expert organist. A climb to the catwalk reveals the plight of the inner parts. Bundles of pipes lie in odd corners, waiting to be identified and put in place. Toot! "Oh, it speaks," [some]one says, and puts it back. Someone must know why it's there.[92]

Two village 15-year-olds were arrested in May 1966 for causing $750 worth of damage to the pedal board and some of the pipework.[93] Their mischief was soon repaired, and in 1967 a modest schedule of summer recitals was scheduled, starting with a June performance for the assembled membership of the Organ Historical Society's annual convention. Under Van Duzee's guidance, more programs were planned in subsequent years, and a handful of summer organ concerts have taken place in the auditorium each year ever since.[94]

A 1968 recital program lauded the Hirahara and Lewis's "considerable . . . unselfish effort" to keep the organ playable, but acknowledged that a "thorough restoration" was still necessary. Although vitally aided by the members of the Women's Round Lake Improvement Association and other volunteers, Hirahara and Van Duzee used performances to raise funds to enlist professional assistance as often as possible. Visiting recitalists offered their help and advice, and Paul Carey of Troy, "a specialist in organ building and repair," guided the cleaning of the organ and its pipework and the making of minor repairs to the swell box and wind chests in 1972. Sidney Chase of Worcester, New York, and Michael Anthony Loris of Barre, Vermont, performed additional maintenance in 1972 and 1973, respectively. In the middle of the decade, however, Round Lake began an association with the Andover Organ Company of Methuen, Massachusetts, a firm focused on creating,

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[91] "Round Lake . . . home of the tracker organ," *Commercial News* (Saratoga County, N.Y.), Aug. 7, 1974, 18; Pinel, *Ferris & Stuart*, 338.

[92] Nancy Curran, "This organ can lift you, lull you or open your eyes—hear it Sundays," *Schenectady Gazette*, undated clipping [July 2_, 1974], Round Lake Village Archives, folder "Auditorium Organ (1 of 2)."

[93] "Two held for damage to organ," *Schenectady Gazette*, May 18, 1966, 17; Bill Blando, "Mother-son team revive historic organ," clipping from unknown newspaper, Aug. 18, 1967, RLVA, folder "Auditorium Organ (1of 2)."

[94] Pinel, *Ferris & Stuart*, 540–45.

rebuilding, and restoring mechanical-action organs. In 1976, Andover's Robert Newton rebuilt the organ's wind reservoirs, cleaned and revoiced the Great reeds, and restored the 4' Second Principal in the Great by removing the 8' Viol d'Amour and installing a Second Principal stop salvaged from an 1858 Ferris organ in St. Mary's Roman Catholic Church, Newark, New Jersey. The firm has continued to maintain the instrument in the years since, undertaking major work as funds have become available.[95]

Part II. Structural / Design Information

Introduction[96]

The magnificent and varied panoply of sound produced by a classic pipe organ like Round Lake Auditorium Organ, i.e., one that uses moving air rather than electronic synthesis to generate sound, is the product of a machine that is at once both simple and complex. It is simple in that each individual sound is generated by blowing air through a single pipe, and the air is routed to that pipe through only two control elements. Its complexity results from assembling a large quantity of these pipes, each having a unique sound, and arranging their controls in an ergonometric and interacting manner that allows a talented performer to combine the individual sounds in an almost unlimited range of combinations.

At the time this organ was built for Calvary Church, all pipe organs used mechanical systems to direct their air, or *wind*, to their pipes, though by the time it was sold to the Round Lake Camp-Meeting Association, pneumatic and electro-pneumatic systems were coming into use. Thus, the Round Lake Organ, like all so-called "tracker" organs, has an entirely mechanical assemblage of bars, rollers, levers, and wires (collectively known as its *action*) that operates its control valves.[97] Tracker organs need only five basic systems to function. These are the *wind system* that generates and distributes the wind throughout the instrument; more than 2,000 *pipes*, collectively called *pipework*, that produce the different sounds; the system of *stops* that routes the wind to individual groups of similar-sounding pipes called *ranks*; the system of *keys* arranged on several keyboards, known as *manuals* or *claviers* (including one for the feet called the *pedal board*), that causes specific frequencies of sound, or *pitches*, to *speak*; and the system of *couplers* that allows an organist to interconnect the keys on different manuals, enabling a greater combination of sounds to be played than might otherwise be possible using only ten fingers and two feet. Four of these five systems come

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[95] Program for recital given by G. Daniel Marshall, July 31, 1968, and Program for recital given by John Scott Whiteley, June 11, 1985, both in RLVA, folder "Auditorium Organ (1 of 2)"; "Famed organ used for recitals," *Commercial News* (Saratoga County, N.Y.), Aug. 23, 1972, 2; Fred LeBrun, "Pipe dream," *Sunday Times-Union*, Aug. 15, 1976, F1; "Need $7000 for organ fund," *Malta Messenger*, Aug. 19, 1996, clipping in RLVA, folder "Auditorium Organ (1 of 2)"; Pinel, *Ferris & Stuart*, 339; Ambrosino, *Organ Atlas of the Capital District Region of New York State*, 13.

[96] Except as noted, this description of the Round Lake Organ is based on inspections of the instrument by the HAER team.

[97] In the strictest sense, a "tracker" is one type of component employed in all-mechanical-action organs, and several hundred are used in a large instrument such as this one. Being such a common component, the term came to be used in place of "mechanical" or "mechanical action," though it is uncertain when this usage became common.

together and interact in the organ's *wind chests*, multi-compartment boxes that receive the wind, support the pipes, and contain the stop and key control valves that route wind to each pipe as desired. Only the coupler system does not have components that are an integral part of, or connected directly to, the wind chests.

Each system is relatively straightforward, even though all but the wind system consists of dozens of similar parts with many components grouped together in rather small spaces. This makes the overall machine appear very complex, which is accentuated by the requirement that all of the controls for the organ (manuals, stops, and couplers) must be arranged in an ergonomically practical manner in a console called the *playing desk*. Thus, every successful organ design results from the compilation of hundreds of individual design choices, most of which involve multiple parameters.

Every large organ is a unique creation, and an organ designer-builder must combine an innate sense of the overall sound he or she wishes to achieve in a given space—often in conjunction with the organist purchasing the instrument—with excellent technical abilities in two distinct areas. First is the ability to visualize the complete instrument in its ultimate location—how all of the required components can fit in the available space(s), and how they can be connected and inter-connected to the wind system and playing desk. The second involves a thorough knowledge of every technical detail and technique needed to accomplish the first. A successful organ is arguably the ultimate human combination of art, science, technology, and craftsmanship.

This section will focus on the science and technology William Davis and Richard Ferris employed to design and build the instrument. While these technical aspects are more objective in nature than any assessment of the instrument's artistic qualities, it must be remembered that each technical feature—each design decision—exists not simply to perform a specific, objective function, but to interact with the others synergistically and enable performers to achieve subjective, artistic ends. This is what distinguishes organs from most other machines, and the specific combination of details selected is what distinguishes the Round Lake instrument from other organs.

General Arrangement

The organ is currently located in the southern addition to the auditorium, which was specifically built in 1888 to house the instrument.[98] From the auditorium, the Gothic-revival organ case dominates the upper stage area. Measuring 24' wide x 16' deep x 34' high, the case has three sides—the south wall of the auditorium forms its fourth wall—that enclose the complete instrument, except for the blower, which is housed on the floor beneath.[99] The upper portion of case's front façade, which terminates in three peaks, features five Gothic

[98] The Round Lake Auditorium actually has its longest dimension in the northeast-southwest direction, but for simplicity, its southwest end, where the organ is located, will be identified as the southern end, and the other directions will be similarly shifted in this section of the report.

[99] These dimensions are from Pinel, "A Documented History of the Round Lake Auditorium Organ," 53. Other dimensions in this report are approximate, as this recording project did not include *in situ* measurements of the organ.

openings—three large and two small—that surround groups of gilded organ pipes. A carved, horizontal band below the openings tops the lower portion of the case and serves as a lintel for the playing desk's niche, which is symmetrically flanked by six inset Gothic panels. The case was fabricated from a soft wood, likely pine, and finished in faux walnut. It was part of the organ's original installation in Calvary Church, and it generally reflected the exterior design of that building, but available records there do not specify its designer or builder.

This architectural style differs from that of the Round Lake Auditorium, but it presents an impressive visage nonetheless. While the case provides an aesthetic façade, it has functional purposes as well. It provides some security for the organ's pipes and mechanical components by limiting personnel access, and it helps direct the sound into the auditorium by focusing it up to the angled ceiling, forward through the five gothic openings that frame the visible pipes, and out through louvers on each side, where angled walls redirect it toward the auditorium. It is not, however, the primary structural support for the instrument. Only the largest metal pipes, which can be seen in the outer arches of each side, and the non-speaking, decorative metal pipes directly above the playing desk depend on the case for support. The sides of the case have access doors that are now secured with modern hasps and padlocks, and the west-side door has been replaced in part with a piece of unfinished plywood. The reasons for and dates of these modifications are not known for certain, but the effects of age are likely, with padlocks providing the easiest, least expensive means of security in recent years.

The playing desk is built into a niche in the center of the front façade and attached to it, but the floor structure bears its weight. When the organ is not in use, two case-mounted doors slide from the sides of the niche and meet in the center to fully enclose the entire playing desk except the pedal board. A hasp and modern padlock are now used to secure the doors in their closed position. The original in-door lock remains in place, but wear and loss of its key have rendered it unusable. Two electric lamps, one on each side of the niche and mounted on pantographs, were installed at some point to illuminate the playing desk. Both show extensive use and wear. Other non-original fittings include a control crank for a no-longer-extant water motor and a rocker switch that now starts and stops the electrically-driven blower. In 1979, Andover installed an in-kind replacement pedal board to correct excessive wear. The three keyboards were rebuilt and recapped in 2009–10. The previous (1868) pedal board was retained and is stored inside the case, as are several sets of pipes removed over the years and the original lever used when the organ was hand pumped.[100]

In recent years, the 1888 addition housing the organ has experienced subsidence. While some stabilization has been done, an inspection in 2010 revealed that a portion of the building's structure had settled enough to cause a roof truss to begin bearing on the top corners of the case. Not having been designed to carry such loads, the front of the case, including the visible pipes, has bulged outward. The Village of Round Lake, which now owns the organ, sought an engineering evaluation that resulted in the installation of a temporary support column that bears on the foundation on each side of the case. The

[100] Matthew Bellochio, conversations with authors on multiple occasions.

columns were sized to relieve the roof loading from the case but not to change in the extent of its deformation.[101]

Inside the case, the organ's components are supported on three levels, as can be seen in Appendix IV, Figure 3. The larger wind chests, pipes, and both reservoirs rest on the floor, but the remaining wind chests and pipes are supported by a free-standing frame constructed primarily of dimensional lumber. This frame has two primary levels at approximately 8' and 16' above the floor, plus intermediate levels for certain pipes. The middle and upper levels are accessed via wooden rungs on the south side of the frame. The frame may date from the 1888 installation of the organ in the auditorium, although portions of it could be from the organ's original construction in 1846–48. Over the years, technicians have made several repairs to the frame using newer materials and installed plywood walker boards to ease maintenance access. The frame not only supports the various components, but it also maintains their alignment with the playing desk, a crucial requirement in a tracker organ. The areas above and beside the reservoirs provide space for much of the key- and stop-action components. Key-action members run primarily through the central space above the reservoirs, while the heavier stop-action members and wind trunks occupy spaces on each side.

The pipes in the instrument are arranged in four *divisions*—Great, Choir, Swell, and Pedal—each of which is directly controlled by one of the manuals. Each smaller group of similar-sounding pipes, i.e., each rank, rests on top of a wind chest that supports those pipes and routes air to them as the organist desires. All pipes are vertically oriented, and their feet are held in the wind chests by gravity alone. No fasteners or elastic seals are used at the feet, but many of the longer pipes are loosely secured to the frame with string, which does not dampen the pipes' vibrations but prevents them from falling over.

With a few exceptions, the wind chests and pipes are organized on three levels within the case. The lowest level is just above the floor and consists of a pair of large chests that support the largest pipes of the Pedal division. These chests sit approximately 2' inside the louvered east and west sides of the case. The Pedal pipes on these chests increase in length (decrease in pitch) from the front of the case to the back (north to south), with the longest pipes standing approximately 16' tall.

The middle level, approximately 8' above the floor, contains the chests and pipes of the Great and Choir divisions. The Great division is directly behind the center of the case façade, and its chest is split front to back with a walker board between the two halves. Considered as a whole, these pipes increase in length (height) toward each side with the shortest pipes in the center, an arrangement known as an **M** layout for its overall appearance. The visible speaking pipes in the case are the largest ones of the Great division. The split chest for them

[101] The problem was observed by the HAER team in June 2010, who advised the owner and suggested the temporary remedy pending an as-yet-undetermined permanent solution. The owner's consulting engineer subsequently designed and installed the columns.

is mounted between the main great chest and the case.[102] Directly behind (south of) the Great pipes is a transverse walker board and a vertical frame known as a *roller board* for the swell division that allows vertical parts of the key action to be translated from the center of the instrument to both the east and west sides. (Roller boards are discussed in the key action section below.) Two additional roller boards for the Great and Choir divisions are located below the middle-lever walker boards. The organ's Choir division chest and pipes are mounted behind (south of) this roller board. This chest is in one piece. The Choir pipes have an **N** layout, which is similar to an **M** layout, except that the shortest pipes are located decidedly toward the west side, giving them an asymmetrical appearance. The largest Choir division pipes are mounted on a separate *toe board* behind the main choir chest, about 4' above the floor. Wind is supplied to the pipes sitting on this toe board through individual ducts known as *conductors* that run from the back of the choir chest down to the pipes. The height of these pipes, which extend up to about 12' above the floor, required this separate toe board arrangement.

The upper level of the frame, approximately 16' above the floor, supports the Swell division directly above the Choir division. Unlike the other divisions, the Swell division chest and pipes are fully contained within a three-ply, wooden Swell enclosure that has movable shutters called *shades* on its north side. These shades, which are hollow and rotate on horizontal axes, are opened, partially closed, or fully closed by the organist using a pedal on the right (west) side of the pedal board, giving him/her some dynamic control over the Swell pipes. The Swell enclosure originally held a second set of shades, but it was removed at some point and these shades are now stored in the blower room. Both sets of shades were once infinitely adjustable using a balanced pedal, but the current arrangement with one set of shades and a pedal having notches for the three positions was installed by the Andover Organ Company in 1997. Tightly fitting doors on the south and east sides of the Swell enclosure provide maintenance access. Within the enclosure, the Swell pipes have an **A** layout with the longest pipes in the center. The organ's 1867-68 conversion from G compass to C compass required the installation of four additional notes to the high-pitched end of most ranks, including all ranks of the Swell division, a change that necessitated the addition of an extension to the west side of the Swell enclosure. Since these added pipes are among the instrument's shortest, the addition extends only part way up the enclosure's side, and its top panel is hinged to provide access. Adhesive residue on the inside walls is evidence that the Swell enclosure had once been lined with fabric, a once common technique for acoustical insulation, but none is currently present.

Two more ranks of pipes are mounted at approximately this level, but these are Pedal-division pipes, and they are mounted in an **A** layout on a split chest located directly behind the upper portion of the case façade. The northern portion of a walker board along three sides of the Swell enclosure furnishes access to these pipes as well as the swell pipes.

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[102] Except for the visible pipe chests whose locations dictate a split chest, it is not clear why the great wind chest was split. While splitting the chest provided excellent access to all of these pipes, it does not appear to be necessary when compared to the maintenance access, or lack of it, furnished for the choir and swell pipes, and no tonal advantage has been identified. Unfortunately, no records exist that identify the basis for Ferris' choice.

Division of the Instrument

The physical arrangement of the Round Lake Organ described above was largely determined by the musical organization of the instrument. An organ employs many different styles of pipes to produce its varied sounds, and the designer, Richard Ferris, with the assistance of his partner, William Davis, selected pipe styles for the ranks largely according to the English school of organ building. Like many organ builders, Ferris and Davis sought to achieve an identifiable sound by selecting a unique mix of pipe styles that, when played together, produced a pleasant, yet distinctive timbre.[103] No single rank covers the entire pitch range of the organ, and some ranks speak at different dynamic levels (volumes) than other ranks with similar timbres. All of these qualities have to be organized in a convenient and useful manner that allows an organist to combine them in a myriad of ways.[104]

An organ's various ranks are grouped into divisions, each of which is played using an individual manual. The four divisions of the Round Lake Organ each play a certain selection of ranks, and each includes only a portion of the instrument's total pitch range. Except for a few ranks that are designed to sound harmonically, a specific key, say middle C, on any manual will sound only that note or an octave of it, in every selected rank, so the pitch will be uniform, though the combination of timbres can vary widely.[105] There are, however, devices called couplers that allow the keys of one manual to simultaneously actuate the equivalent keys of another division, giving the organist additional sound possibilities, and often simplifying how complex musical passages can be played.[106]

In general, and with no couplers engaged, the organ's lowest notes, i.e., those with the lowest frequency, or pitch, are in the Pedal division. The Great division, the organ's core division, has ranks with a higher range of pitches, while the Choir division consists of ranks with roughly the same pitches but different dynamics or timbres. The Swell division is generally pitched higher; however, all of these divisions overlap to a considerable extent, allowing an organist to play the same musical passage using different manuals to obtain different timbres

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[103] During later modifications, Levi Stuart, Giles Beech, Robert Newton, and Matthew Bellochio all altered this original timbre somewhat to suit their own tastes by removing certain ranks of pipes and replacing those ranks with different styles of pipes that spoke the range of pitches desired, but with different timbres. This is not unusual, but rather it was a common practice as tastes change over time

[104] Organ design and building is a highly specialized endeavor that is generally learned by an apprentice to an accomplished organ builder, and it takes many years of experience on a variety of instruments to master. Each custom-built organ, including this one, is a unique creation resulting from both objective and subjective choices by its designer. In spite of these individualities, a useful understanding of organ design can be gleaned from George Ashdown Audsley, *The Art of Organ-Building*, 2 vols. (Mineola, N.Y.: Dover Publications, 1965 reprint of 1905 first edition); Hans Klotz, *The Organ Handbook* (St. Louis, MO: Concordia Publishing House, 1969): and William Leslie Sumner, *The Organ: Its Evolution, Principles of Construction and Use*, 4th ed. (London: Macdonald & Co., Ltd., 1973).

[105] The Round Lake Organ has two stops named Twelfth and Fifteenth in the Great division that intentionally add specific harmonic voices instead of an octave when selected. Five stops known as *mixtures* engage multiple pipes or ranks that speak in a chord whose fundamental pitch is the note being played.

[106] "Equivalent keys" may, or may not, mean the exact same notes. For example, with the Choir manual coupled to the Great manual, middle C played on the Great may sound middle C in the Choir as well, but when the Great is coupled to the Pedal board, middle C and the C an octave lower may speak. Other combinations are possible, depending on the couplers and stops selected.

or dynamic levels. Organists often use the Swell division as a solo voice in contrast to the richer ensemble sound of several ranks from the other divisions speaking together—sometimes through the use of couplers to enable one hand to play the Great and Choir manuals simultaneously while the other hand plays only the Swell manual. This organization of ranks and divisions gives the organist a very wide variety of possible sound combinations to choose from at any time. The Round Lake Organ is somewhat unusual in that each division except the pedal includes ranks with enough variety of timbres that each can essentially be played as an independent instrument able to produce reasonably full, well-colored sounds. In most organs, this is true only for the great division. The other divisions usually furnish timbres and dynamics that augment the great division, but cannot replace it to furnish the musical core.

An organist selects the ranks needed to produce a particular timbre and volume, collectively called a *registration*, by pulling out draw knobs known as stops—so named because each one stops the wind flow to a particular rank when pushed in—to route wind to the desired ranks. (Ranks are commonly called stops as well, even though the term is only partially accurate because some stops control more than one rank.) The logic of this terminology may seem backwards—pull a *stop* to *start* a flow—but it is nevertheless almost universally used. The organist can change registration as desired at any place in the music while he/she continues to play. The great variety of sounds an organ can produce is due to this feature, and no other non-electronic instrument can provide comparable variety.

The Round Lake Organ currently features approximately 2,120 pipes arranged in forty-two ranks that are actuated as thirty-four stops. (The pipe total can vary slightly when pipes must be removed for maintenance, and the difference in rank and stop totals is due to five stops being mixtures that utilize two or three ranks each.) Its current arrangement of stops in each division, known as its *stoplist*, is shown in Appendix I. Some of the stop names will bring a certain kind of sound to mind, but others will be unfamiliar, and some of them definitely do not mimic the sound of the modern instruments that share the names. Because of organ building's long history and the influence of design concepts from many eras and locales, there are few, if any, truly universal names for stops and divisions. The names initially used with the Round Lake Organ reflect its period and the ideas of Ferris, which were strongly, but not completely, influenced by the English school of organ building. The names of some of the ranks that were added later reflect different schools. In addition to stop changes over the years, the Round Lake Organ's *compass*, or overall range, was changed once as well in the late 1860s.

Wind System

While out of sight and, hopefully, not heard, the wind system is the heart of the instrument. Without a blower of some type, there is no energy to produce sound. From the blower, a system of reservoirs and wind trunks channels the wind to all of the organ's wind chests. Other components installed in the wind system control the volume, pressure, and stability of the wind flow to compensate for the varying requirements selected by the organist. For example, large pipes need more wind to speak than small pipes. Loud passages of music require more wind than soft passages. The greater the number of stops selected, the greater

the volume of wind required. This system must also be quiet in operation, so as not to interfere with the music being played. The Round Lake Organ's current wind system, the third generation for this instrument, automatically compensates as needed to satisfy all of these requirements.

The Round Lake Organ currently employs an electrically-driven centrifugal blower to generate its wind, but this was not always the case. Manual effort originally furnished the wind when the organ was located at Calvary Church in New York. An assistant called a *pumper* moved a long lever up and down to work a bellows equipped with two leather flap valves, one of which admitted atmospheric air as the bellows expanded and a second that routed the air out to a reservoir on each downstroke. The original wooden handle for this instrument survives, though not connected to the organ, as does a slot for it in the west side of the organ case, but the bellows are no longer extant. The slot's location and the organ's location in Calvary Church suggest that the original bellows was probably located inside the case, adjacent to the reservoirs, which was a common arrangement at the time.

The pumper's job was a more sophisticated task than might be expected. The volume of wind had to vary with the needs of the instrument and music, increasing for loud passages and decreasing for soft ones, and this required the pumper to vary the frequency of his strokes. Since he could not see the organist or receive advice from him or her, the pumper had to know the music being played and its wind requirements. Any failure of the pumper to anticipate the need for significantly more or less wind could have detrimental effects on the performance.

When Giles Beach installed the organ in the Round Lake Auditorium, he replaced the manual pumping handle for the bellows with a water engine furnished by the Ross Valve Company of Troy, New York. Powered by gravity-induced flow from the camp's water tower, this water engine was a vertical, dual-acting, reciprocating device with a valve that automatically directed the water flow through the alternate ends of a single cylinder to move a piston. A vertical iron bar extended from the piston rod at the top of the engine up to a beam that moved one side of the bellows. A throttle valve in the water inlet pipe allowed the organist to control the speed of the engine and, thus, the volume of wind produced. This throttle valve was held closed by a weighted lever, and a rope attached to the end of this lever was routed to a manual control handle mounted in the playing desk above the left-side stop knobs. By rotating the handle, the organist turned a cast worm behind the panel, which caused a follower to move fore or aft longitudinally along the worm's groove, depending on the direction the organist turned the handle. This motion either pulled on the rope to open the throttle valve or allowed the weight to close it to the degree desired. Neither the water engine nor the bellows survived when they were replaced by the electric motor and blower now in service, but the control handle still exists, as do several metal fixtures still in place near the blower room under the upper stage floor. The location of these fixtures suggests that Beach mounted the bellows underneath the upper stage floor and installed a duct from it to the primary reservoir. A typical Ross Water Engine installation is shown in Appendix IV, Figure 4.

After electric service arrived at Round Lake, probably during the late 1920s, a motor-driven Kinetic Organ Blower replaced the bellows and water engine. This blower, manufactured by the Kinetic Engineering Company of Philadelphia, Pennsylvania, is the company's style 2HYM.[107] Rotating at 1,150 RPM, it delivers up to approximately 500 cubic feet per minute (cfm) of air at a maximum pressure of 4" W.G. The Kinetic 2HYM Organ Blower consists of a horizontal shaft, upon which two backward-inclined-blade fans are mounted, and a rectangular body with internal baffles to separate the rotor wheels. The fans work in series, and the baffled walls of the case serve as the blower's scroll sheets. Appendix IV, Figure 5 shows the interior of a similar Kinetic Blower. The output from the second fan flows up through internal openings into a distribution chamber on top of the body, from which a 12"-diameter vertical duct fitted with a flexible joint extends through the ceiling and into the rear of the organ case above. Below the flexible joint, the duct is a thin-wall steel pipe, but conventional sheet-metal duct material extends from there to the main reservoir. A 1-horsepower Western Electric model 187085 induction motor powers the blower. Its badge plate shows a patent date of May 12, 1925, clearly indicating 1925 as the earliest possible year for its installation. The motor-to-blower shaft connection is a pair of specialized flanges that are connected by four strips of leather. The leather provides the necessary flexibility while isolating the blower from most motor vibrations. The blower case and coupling are painted Kinetic's standard green color, but the motor appears to be dark gray (under a thick coat of dust). The motor and blower remain in service and operate smoothly. Their bearings show evidence of regular lubrication, and the coupling's leather strips appear to have been replaced within the last few years.

The primary wind duct from the blower enters the back (south) side of the organ vertically for approximately 3' before it turns horizontal to reach the *main reservoir*. Two additional 90-degree elbows change its elevation and direction to reach the main reservoir's inlet connection port near the floor. The horizontal run shows deformations likely resulting from someone walking on it but is otherwise in good condition.

The main reservoir is a square, vertically-operating bellows with two intermediate frames between its top panel and bottom box. The panels and frames are made of wood, with dovetail joinery that has been sealed and painted to minimize leakage. Each of the three flexible sections is a single-fold leather bellows that extends around the perimeter of the reservoir. The bellows expand and contract as needed to accommodate short-term changes in wind usage, thus maintaining a uniform wind pressure to the pipes it serves. Pantographs at each corner ensure that the bellows expand and contract uniformly. Several blocks of stone that rest on the top panel maintain the reservoir's pressure. As the bellows expand or contract, these motions move a butterfly damper in the supply duct from the blower. A

[107] The no-longer-extant Kinetic Engineering Company was a well-known supplier of blowers for organs during the first half of the twentieth century. Its distinctive design, first patented in England by Louis B. Cousans in 1887, was one of the earliest mechanical blowers for organs that could automatically deliver a stable flow of wind at a relatively constant pressure over the wide range of volume required by an organ and do so quietly. While the cubical body restricted efficiency, the additional volume it provided helped keep the fans well within their range of stable operation during changes in wind volume and back pressure.

lightweight chain attached to the damper's control arm on one end and the top of the main reservoir on the other actuates the damper. As the top rises, indicating more wind supply than needed, it slackens the chain, allowing a counterweight on the control arm to close the damper and reduce the supply flow, and vice versa. The chain's route is simple, requiring just two small sheaves for 90-degree turns. Wind trunks from this reservoir supply wind to the large pipes of the pedal division and to the secondary reservoir.

The organ's *secondary reservoir* sits immediately north of the main reservoir, and its construction is virtually identical to it. Two short ducts convey wind from the main to the secondary, and each has a gate damper to control the flow. Except for reciprocating instead of rotary damper motion, these regulators operate like the main reservoir regulator. The secondary reservoir supplies wind to the Great, Choir, and Swell division pipes. Since these pipes use wind at a lower pressure than the Pedal pipes, the secondary reservoir has lighter stones resting on it than does the main reservoir.

Rectangular wooden wind trunks convey the wind from the reservoirs to the various chests. The two ducts that supply the great chests are each fitted with a *percussion bellows*. This is a door that is hinged at the bottom with a leather bellows on the other three sides and a spring that tends to close it. A percussion bellows is actually an accumulator whose purpose is to minimize shocks in the wind when the organist suddenly changes the registration. Since sudden, large changes in wind demand can happen faster than the reservoir regulators can respond, the percussion bellows expand or collapse to briefly contain or supply the "extra" wind involved. The Choir, Swell, and Pedal divisions of the Round Lake Organ do not have percussion bellows. The wind ducts branch as needed and terminate at the various *wind chests* throughout the instrument.

Pipes

Pipes, collectively referred to as *pipework*, are the devices that produce the characteristic sounds of the instrument. Each of the more than 2,100 pipes speaks with a single sound. Each has a specific fundamental frequency, or *pitch*, producing certain audible harmonic frequencies—always higher than the fundamental frequency—that define its *timbre*, and a specific amplitude, or volume, known as a *musical dynamic level*, or simply *dynamic*. While every element of a pipe affects its sound, pitch is predominantly a function of the pipe's length, with longer pipes producing sounds perceived as "lower" and shorter ones generating sounds perceived as "higher." High-pitched sounds have a higher frequency (cycles per second, or *Hertz*) than low-pitched sounds.[108]

[108] While physicists, engineers, and organ builders often need to describe the mechanics of wave motion and vibrations in objective, measurable terms and mathematical functions, human perception of those vibrations (actually cyclical oscillations in air pressure) known as sound has a strong subjective component. Most humans "hear" the superposition of several simultaneous frequencies more as a single entity than as a collection of individual sounds. Thus, subjective terms like "bright" and "dark" convey more about the nature of sound, known as *timbre* that one hears than would an objective listing of the different harmonic frequencies. Similarly, "soft" and "loud" effectively indicate relative differences in volume (the amount of air pressure change per cycle, known as *amplitude*) better than specific terms like decibel, which would vary depending on one's location in the auditorium. Such terms will be used herein when needed to describe the audible perception of sound rather than the physical qualities and quantities of wave motion.

These pitches, also known as *tones*, are not random. Over centuries, musicians developed standard sets of pitches that allowed music to be written down and musical instruments to be designed and built to produce those particular pitches. The standard generally used in the so-called Western world identifies each pitch, or *note*, with a letter (A through G for *natural* notes) that may be modified with a *sharp* or *flat* (often called a *half-tone* or a *semi-tone*) that respectively raises or lowers the pitch of certain natural notes. Eight consecutive notes, such as C-D-E-F-G-A-B-C, comprise an *octave*. Adding the allowable sharp (or flat) notes gives each octave twelve specific pitches.[109] As its baseline pitch, the Round Lake Organ uses one A note with a frequency of 435 Hz., and all other notes are pitched in relation to it. Although many twentieth-century instruments use a slightly higher frequency (A = 440 Hz.) as their baseline pitch, virtually all Western musical instruments are designed and built to generate these particular notes.

All of the Round Lake Organ's pipes share some commonalities, including a lower portion with a hole through which wind enters the pipe, a device to induce steady vibrations into the wind, and an upper portion that determines the pitch and timbre of the sound. While there are numerous variations in the size, shape, proportion, and material of organ pipes, their sounds, i.e., vibrating air columns, originate in one of two ways, and pipes are referred to as *flue* or *reed* pipes to distinguish the technique employed.

This difference in how the sounds originate give the two types of pipes distinctly different timbres at a very basic level. The reed momentarily stops the airflow through the pipe once each cycle, and this produces sound with a decided "buzz" that is somewhat similar to that heard from a trumpet or tuba. In a flue pipe, the airflow oscillates across the upper lip, but it never actually stops moving. This gives the sound a "smoother" character more like that of a flute or recorder.

In a flue, or *labial*, pipe, wind entering the lower portion, or *foot*, encounters the *lingual*, a plate (metal) or block (wood) that obstructs the pipe except for a narrow gap called the *windway* along one side. (Cylindrical metal pipes have an indented, flattened area that allows for a straight outside edge of the windway.) Just above the windway is the *mouth*, an opening in the pipe with upper and lower edges called *lips*. The pipe's *body* extends above that. Many flue pipes are *open* at their top ends, but some are closed, or *stopped*. Others have *visors* that partially close the top opening to improve intonation or timbre. Flue pipes often feature projections on the sides and/or lower lip of their mouths called *ears* and *beards* that help steady the wind flow and sound quality, particularly as the sound first forms at the start of a note.

[109] The term "octave" can be misleading to non-musicians since the eighth pitch is actually the start of the *next* octave, rather than the end of the current one. The usage no doubt stems from the fact that two notes an octave (or eight pitches) apart blend together well, while two notes seven pitches apart sound harsh, or *dissonant*, when sounded together. Ironically, when the five allowable half-tones are included, the same octave is usually considered to have only twelve tones, not thirteen as one might expect.

When a particular pipe is selected to sound, or *speak*, a thin sheet of wind flows up through the windway and out of the mouth at a near-vertical angle, where it passes just outside the sharp-edged upper lip. As per Bernoulli's principle, this flow produces a local region of low pressure adjacent to the mouth that induces some air to flow out from the lower portion of the body, thereby producing a region of lower pressure just above the languid.[110] The lower pressure causes air in the body to begin flowing downward, and simultaneously draws the sheet of wind inside the upper lip. Both actions raise the internal air pressure, which allows the sheet of wind to again flow through the mouth to the outside, and the cycle repeats continuously, until the wind flow stops.

Within the body, this repeating cycle causes a pulse of low-pressure air to begin moving up and down its length, reflecting back at each end (actually slightly outside an open end), with the frequency of these cycles determined by the pipe's length. The longer the body, the longer it takes the pressure pulse to move through the pipe; hence a lower frequency, or pitch. Wavelengths that exactly correspond to the pipe's length superpose and naturally amplify, while those that do not are rapidly attenuated and die out. The predominant wavelength that superposes, the strongest *resonant frequency*, is the pipe's *fundamental pitch*, and certain multiples of the fundamental pitch that also superpose are known as *harmonics*. These harmonics, which can only occur at multiples of 2, 3, 4, etc. of the fundamental pitch, give the pipe its timbre, and pipes are given a variety of body shapes and proportions that enhance or minimize different harmonics to create the various timbres. For example, a "thin" pipe will generate more harmonics and produce a "brighter" sound than a "fat" one of like type, and a longer pipe will generate more audible harmonics than a shorter one, but it will tend to sound "darker."

In an open flue pipe, the fundamental wavelength must be quadruple the length of the pipe's body, while it can be only twice the length of a stopped pipe. Thus, for otherwise similar pipes, stopped ones will have pitches one octave higher than open ones, but tend to be quieter. The Round Lake Organ has examples of both types. The physics that define this are well-known and described in numerous physics and acoustics treatises, so they will not be repeated here.[111]

While the underlying physics of a reed pipe are the same as for a flue pipe, a reed pipe generates sound in a fundamentally different way. Where a flue pipe uses pressure differentials across the mouth to make the air induce vibration in itself, a reed pipe, as the name implies, uses a vibrating reed to put a column of air into oscillation. In place of a mouth, a reed pipe has a tube with an opening on one side called a *shallot* and a thin piece of

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[110] Daniel Bernoulli (1700-1782) established the basic relationships between the pressure, velocity, and density of a fluid, which he published in *Hydrodynamica* in 1738. What has become known as Bernoulli's principle states that the pressure in a fluid must decrease as its velocity increases, and *vice versa*. For additional information, see "Hydrodynamica," *Encyclopædia Britannica.Online*, Encyclopædia Britannica, 2011, http://www.britannica.com/ EBchecked/ topic/658890/Hydrodynamica.

[111] Readers interested in the physics of pipe organs can see Klotz, *The Organ Handbook*, 41-54, and Sumner, *The Organ*, 267-275, among other sources.

metal (usually brass) called a *reed* held against the opening. The reed is curved slightly to form a narrow gap between it and the shallot's opening. Unlike a flue pipe's external mouth, the reed-and-shallot assembly is fully enclosed within a *boot*, which is analogous to a flue pipe's foot. When wind is admitted to the boot, it flows up through the gap and into the shallot, which opens into the *resonator*, as the upper portion of a reed pipe is called. The wind flowing through the gap generates a low-pressure region inside the shallot, which causes the reed to flex and close the gap, stopping the flow. This results in the shallot's internal pressure returning to normal, thus releasing the reed to flex back to its original position with the gap open to allow wind flow. Again, this cycle repeats until the wind flow ceases.

The low-pressure pulse flows up and down in the resonator just as it does in an open flue pipe to set the fundamental pitch of the air column. To better suit the reed type of sound, resonators have a variety of shapes that differ from the bodies of flue pipes. While the basic physics of how they achieve a given pitch and generate harmonics are the same, the different shapes strongly affect the harmonics that are enhanced and diminished. Since a reed pipe has no mouth opening to the outside, all wind flowing through it must exit via the resonator, so all reed pipes are open.[112]

Pipes are made of either wood or metal. Most of the smaller pipes in the Round Lake Organ are metal while the larger ones are primarily wood. All of the reed pipes are metal. The wooden pipes have a square cross section with straight bodies, and their feet form truncated, inverted pyramids. The pieces are usually glued together but in larger pipes screws are also used. While wood can deteriorate from losing moisture during significant changes in humidity over time, it is generally stronger and more dimensionally stable than the soft metal alloys used for pipes. Consequently, Davis and Ferris elected to make most of the Round Lake Organ's larger pipes, as well as some of the smaller pipes, out of wood. These wooden pipes are fabricated from softwood, probably a variety of fir or pine, and the builders took care to use only planks having the grain running almost perpendicular through the plank's thickness to minimize the likelihood of it warping over time.

Most of the organ's metal pipes are made from an alloy of tin and lead—sometimes called simply *tin*—that is blended in a molten state and cast into thin sheets.[113] Some pipes are made of other metals to obtain different timbres. All pipes comprising the Second Open Diapason rank of this organ's Great division were fabricated from zinc, as were the lowest notes in nine of the instrument's original ranks, which was a relatively new technique at the

[112] There is a second style of reed-shallot arrangement known as a *free reed* where the reed vibrates inside the shallot opening without completely stopping the air at any time, but the Round Lake Organ does not have any free-reed pipes, so they will not be discussed here.

[113] Sheet casting is done by moving a headbox filled with the molten alloy smoothly along a long, flat table. The molten metal flows out through a slot in the bottom of the headbox as two people move it along the table. The slot opening and movement speed determine the sheet's thickness. Done properly, the alloy flows out and solidifies into a uniform sheet that can be cut into the required shapes, then formed and soldered into pipes. Though most manufacturers had, or have, their own preferred recipe for tin, the alloy is typically between 50 and 66 percent tin by weight. More lead than that will be too soft and malleable for the pipe to hold its shape, and it will have a duller sound.

time as has been noted earlier in this report. Whether tin or zinc, the pieces for each pipe are cut from the cast-metal sheets, shaped by hand around various forms, and soldered together into a complete pipe.[114] A metal pipe weighs less than the same size wood pipe, but it is more fragile. The relatively soft, malleable alloy can be easily deformed to adjust its sound, but over time, large metal pipes, even those with a high percentage of tin, tend to collapse from their own weight, and it takes very little distortion to change a pipe's intonation or timbre.

This organ's larger pipes, both metal and wood, have projections known as *ears* on the sides of their mouths. These ears prevent wind from spreading out as it exits a large mouth, particularly when the pipe is just starting to speak, making the attack of the note crisp and clear. Ears on metal pipes can also be bent in or out a little during voicing and tuning, but this is not always done. If done repeatedly, fatigue can cause the ear to break off, which has occurred in this organ. Fortunately, they can be soldered back in place.

All pipes need to be both *voiced* and *tuned* after the instrument has been erected, and tuning will consist of periodic checks and adjustments. A pipe's voice is generally established during the organ's installation using a variety of tools to slightly alter those portions of the pipe that affect its timbre and how it starts to speak. Changes may include altering the upper lip, changing the angles of the ears, flaring the top of the pipe, installing a visor, and even cutting holes into a pipe's upper portion. Voicing is a complex process that affects not only how each pipe sounds, but also how different pipe timbres blend when played together. Though it may take considerable experimentation to achieve the desired voicing—a subjective sound quality that varies between organists, organ builders, and organ tuners—short of a major alteration or rebuilding of the instrument, voicing is rarely changed once established. The Round Lake Organ was undoubtedly revoiced when it was installed in its current location, as well as when its compass was changed.

Tuning, on the other hand, is typically done on a regular schedule. Several environmental parameters, including temperature and humidity, affect any instrument's *intonation*, the term for how accurately the various pipes sound unison or chordal notes together without small frequency errors that are heard as (usually) undesirable "beats" in the sound. Flue pipes can be tuned in several ways, including adjustments to ears and changes to flare or de-flare the pipe tops, as well as the adjustment of a sliding collar at the top of a pipe. These changes slightly change the pitch of the pipe up or down as needed. Though the first two methods may seem permanent, they are usually reversible, at least until fatigue causes a fracture or the tool impacts cause another part of the pipe, particularly the foot, to deform or fracture. The Round Lake Organ exhibits examples of all these methods having been used at some point in its history. Reed pipes are tuned using a small wire held in place by a block between the

[114] Solder is a lead-tin alloy with a relatively low melting point. A hot tool, the soldering iron, heats the sheet metal joint to melt a strand of solder so that it flows into the small gaps at the joint, bonds to both sides, and quickly cools to harden into a solid joint. The proportions of lead and tin in the solder are different than in the metal alloy such that the solder has the lower melting temperature. This yields a solid joint without damaging the sheet metal. Soldering zinc requires careful surface preparation, preheating, and a solder with zinc added to the tin and lead.

shallot and resonator that has a handle formed at its top end and a bend at the bottom to form a bar that rests against the reed perpendicular to it. Moving this *tuning wire* vertically alters the natural frequency of the reed slightly, thus changing the pitch of the pipe. The tops of reed-pipe resonators can be altered as well, if necessary, and the Round Lake Organ has evidence of this technique.

Wind Chests

Wind chests contain the organ's control valves that route wind to the particular pipes the performer has selected using the stops' draw knobs and the manuals' keys. A stop and a key valve must be opened for a pipe to speak. Closing either or both of these valves silences that pipe. Except for positioning the Swell division shades, every action an organist takes with this instrument actuates some of these valves in the wind chests.

Organ builders have developed a wide variety of wind chest designs over the years to achieve accurate, reliable performance within an even wider variety of installation constraints. Like many mechanical-action instruments, the Round Lake Organ primarily employs what are known as *slider-pallet chests,* wherein strips of wood called *sliders* move back and forth horizontally to serve as the stop valves, and hinged doors called *pallets* open and close in response to key movements, causing specific pitches (notes) to sound.[115] They act in series, with the wind flowing first through pallets that route the wind to sound specific notes, and subsequently through holes in sliders that route that note's wind to the appropriate pipe in each selected rank. (A portion of the Pedal division utilizes a different type of wind chest, known as a *ventil chest*, which is described at the end of this section.)

As shown in Appendix IV, Figure 6, this routing of the wind is somewhat analogous to an $x - y$ grid, with a "pipe" at every intersection of x and y (integers only). Any "pallet" (x) would then activate every y value for that value of x, and each "slider" (y) would activate every possible value of x for that value of y. Out of perhaps hundreds of possible $x - y$ intersections, only the pipe where this x value and this y value intersect would speak, since only it would have both x and y activated. If multiple values of x were activated simultaneously, every intersection of these x values with the given value of y would speak. The same would be true for multiple values of y, as well as for multiple values of both x and y.

To physically accomplish these logical operations, each slider-pallet chest is essentially a stack of air-tight chambers with valved openings. Appendix IV, Figure 7 shows how these chambers and valves are constructed and function. They are among the most precise assemblies in the instrument. Constructed of wood and assembled with screws and glue, the chests are fitted with internal panels that form the various chambers. The chest components must be precisely cut and planed to minimize leakage, while the moving parts—the sliders and pallets—must fit snugly enough to prevent leakage yet move with minimal resistance.

[115] "Hinged" as used here must be considered in its broadest context, since these hinges are actually pins that pass perpendicularly through holes at one pallet edge. The holes are countersunk to provide the necessary freedom of motion, and springs maintain engagement. This design is simple, and it introduces very little friction.

This is particularly true for the sliders, which slide in tracks covered in thin leather. This leather provides a little flexibility to serve as an adaptive seal, but the primary means of leakage control is a close tolerance between the sliders and the fixed pieces of the chest. Since this often results in a less-than-perfect seal, small V-grooves milled diagonally between the holes drilled for the pipes in the underside of the chest's top board route any slider leakage to the atmosphere so that it will not flow into an unintended pipe and create an undesired sound, known as a *cipher*. The door-like motion of each pallet allows it to be fitted with a piece of leather that functions effectively as a gasket when it is closed and a spring to ensure its closure.

Each division has its own chest that services all of its ranks. The Pedal and Great chests of the Round Lake Organ are each physically split into two chests, but each function together as a single unit. These two divisions also have auxiliary chests located some distance from their main chests, all for reasons having to do with space allocation.

The bottom level of a slider-pallet chest is a single chamber that functions as a plenum. The pallet receives wind from a wind trunk and provides a volume that slows and stabilizes the wind. Its ceiling also forms the floor of the middle-level chambers—one chamber per pitch, separated by vertical baffles. Rectangular openings through the ceiling/floor board allow wind to flow into the middle-level chambers, and each opening is fitted with a hinged (pinned) pallet that is normally held closed by a spring. A *pull wire* attached to each pallet extends through a small hole in the floor of the plenum, where it connects to the key action. Pressing a key on that division's manual causes one of these pallets to open downward against the spring, allowing wind to flow from the plenum to the chamber above. When the key is released, both the spring and air pressure act to close the pallet.

Each middle-level chamber supplies wind to the pipes of a specific pitch in all of the ranks mounted on that chest. For example, the Great division of this organ has 17 ranks. When the organist presses middle C, that pallet opens to furnish wind to the middle-C chamber that supplies wind to the middle-C pipes in all 17 ranks. The ceiling of this middle-C chamber has a hole drilled in it for each of these 17 pipes. Every other note has an identical arrangement, with these middle-level chambers separated by vertical baffles. The Great division chest has a 58-note range, thus 58 of these chambers.

The top-level chamber contains the division's sliders and their tracks, with a slider for each rank that simultaneously opens or stops every pipe in that rank. Fixed pieces of wood called *bearers* separate the sliders and help bear the weight of the overhead top board and pipes. The holes for the pipe feet in the top board are slightly countersunk to ensure a snug fit and minimal leakage, since the pipes are held in place by gravity and the joints have no elastomeric seals.

Unlike the other wind chests, those comprising the floor-level Open Diapason and Double Open Diapason ranks do not have sliders. These chests are larger than the others in volume, and they are split with their halves located at the far sides of the instrument. Sliders for these chests would be large, need to move a considerable distance, and require a substantial

activation force, so Ferris used sliderless wind chests known as *ventil chests* for them. Four gate valves located in the relatively short trunks from the primary reservoir to their respective chests stop the wind to these chests. A pallet is located below each pipe inside the single-chamber chest.

Playing Desk

As noted earlier, the Round Lake Organ's playing desk is located in a niche at the center of the case's front façade. While this location has been referred to by one critic as a "hole-in-the-wall position" and the "most objectionable" location for a playing desk, because of how it limits the sound an organist can hear, it was commonly employed for installations that had little room available in front of the case.[116] This location was, moreover, mechanically advantageous, as it allowed a shorter, simpler action than is needed in tracker organs with playing desks outside the case or those having pipes located in multiple cases.

This organ's three manuals for the hands are identical. Each has 58 keys—34 white keys for natural notes and 24 shorter, black keys for sharp (or flat) notes—for a range of 4.83 octaves. All of them are wooden, but the natural keys have ivory panels called *plating* covering their tops and visible ends. The sharp, or *comb*, keys are finished with a black wood, probably ebony, with no covering. The natural keys of the great manual are yellowing and a few are missing pieces of plating, which is evidence of having been played more than those of the other two manuals. The three manuals are arranged in a terrace, with the Choir manual at the lowest level. The Great manual is approximately 2" above the Choir manual and set behind it with about 1" of overlap. The Swell manual is similarly situated above the Great manual. All three manuals are level and straight, and the equivalent keys of each are directly above or below one another.

The pedal board consists of 30 pedals—18 natural and 12 comb—that are mounted in a rectangular frame that partially extends beyond the front of the case. The organ bench, though not attached, straddles the pedal board over its outside (north) end. While most modern organs have pedal boards that are curved both vertically and horizontally to form a concave arc that matches the natural motion of a performer's legs, all organs built in the United States before 1903, including this one, feature straight pedal boards, with all of the pedals level and parallel.[117] While a curved pedal board is ergonomically superior, the design and construction advantages of a straight pedal board are readily apparent, as it requires only two pedal designs, one for natural and one for comb, and all pedals of each type are the same length with similar, parallel connections to the subsequent action. The frame of a straight pedal board is also simpler to build than a curved one.

The stop and coupler *draw knobs* are located in vertical panels on both sides of the keyboards known as *jambs*. Uniquely at Round Lake, so far as known, these knobs are mounted in cruciform arrangements with decorative outline mouldings. Stops for the Swell and Pedal divisions, along with the coupler knobs, occupy the left (east) jamb, while the right (west)

[116] Audsley, *The Art of Organ Building*, 68-69.
[117] Audsley, *The Art of Organ Building*, 128.

jamb contains the Great and Swell stops, plus two knobs that engage and disengage all ranks simultaneously. The original labeling was engraved into an ivory inlay on the face of each knob. Most of these are in a Roman font, but eight feature an elegant script. Nine of the 42 knobs now exhibit name changes that were done in a free-hand manner at various times when pipes were changed from one style to another.

The non-functional water-engine control handle is above the draw knobs on the left jamb, and an electrical switch for the blower is mounted on a small shelf, also on the left side. The pedal that actuates the Swell shades is just above the right side of the pedal board. A wooden rack to hold the performer's music and a rectangular, sterling silver badge plate reading "RICHARD M. FERRIS, BUILDER, New York" are mounted on the vertical panel behind the three manuals. Interestingly, the badge plate does not display an opus number (serial number). The badge plate is often obscured by a removable, wood-framed mirror hanging in front of it that allows the organist to see an instrumental and/or choral ensemble conductor who would necessarily be behind his back. The mirror on the Round Lake Organ, clearly not original, is non-symmetrical as hung, with one end that appears to originally have been intended to be its top, curved.

Stop Action

As noted above, stops allow the performer to select the ranks that speak in any given registration. On the Round Lake Organ, a rank is selected by pulling a draw knob, often called a *stop knob*, horizontally out from the jamb approximately an inch. Pushing it back silences that rank.

Each stop knob is at the end of a long, wooden rod, known as a *trace*, or *tracer*, that extends through the jamb panel and southward horizontally for a distance that varies depending on where the remainder of the stop action is located. Guides called *registers* keep them aligned as necessary, and they have square cross sections sized to accommodate both tension (pulling) and compression (pushing) forces. Each trace has a small block attached to one side behind the console face that limits the distance each knob can be pulled out. The Round Lake Organ's traces appear to be English walnut, a hardwood with good strength and dimensional stability. Many of these traces have splices made by gluing one or two additional pieces of wood across butt joints in the traces. A few tongue-and-groove joints also exist. Some of these joints may be repairs—evidenced by the use of a different wood—but most appear to have been done as adjustments during the organ's installation in New York or Round Lake.

The south end of each Great, Choir, and Swell trace is pinned to a horizontal, wrought-iron square. Each has a slotted end to accommodate one end of the square. A pin—typically a wire with a right-angle bend that serves as its head—passes through vertical holes to form a rotary joint with little lost motion. It is easily removed when needed for maintenance. The square's corner is pinned to a frame piece using a shouldered screw. Its other end is pinned to a second trace with another wire pin.

The second trace extends to a third square that changes the motion to vertical, or to the lower end of a *rocking lever*, a first-class lever that rotates about a horizontal axis. The Great, Choir, and auxiliary Pedal (behind the front of the case) chests require their stop actions to be in a horizontal, east-west direction, so the set of second traces on the organ's east side transfer the motion eastward to locate the vertical traces on the east sides of their respective chests. Another set of traces, squares, and levers near the end of each chest transfer the vertical traces' motion to the ends of the sliders that penetrate the wind chests. One lever in each of these actions is fitted with a counter weight that balances the weight of the vertical components.

The stop actions for the Swell and Pedal (floor-level chests) divisions work essentially the same way, but certain details are different. The vertical portion of the Swell action uses long levers called *rocking levers* that are pinned to the frame near their mid points. They are located on the organ's west side, thus avoiding interference with the Great and Choir actions on the east side. Each of these rocking levers has its lower end pinned to one of the second traces, and its upper end engages a Swell rank slider. The lengths of these rocking levers had to be accurately computed, but the resulting action is smooth and durable. Ferris easily could have used an arrangement like that he employed for the Great and Choir divisions here, but the additional vertical length needed would have required more force to lift them or substantial counterbalancing weights or springs. Using rocking levers here avoided both problems, since the weight of each lever is born by its fulcrum pin.

The ventil chests comprising the floor-level Open Diapason and Open Double Diapason ranks do not have sliders. Four gate valves—two for each rank—stop the wind to these chests, and they are located in the relatively short trunks from the primary reservoir to their respective chests. The south ends of the Open Diapason and Open Double Diapason traces are connected to arms that extend about 3" from vertical roller bars called *trunions*, and each one rotates approximately 60 degrees when its stop knob is pulled out or pushed in. The arm of each trunion supports the end of the stop rod and the end of a short articulation rod using a common pin through the three pieces. The other end of the articulation rod is pinned to a third rod that extends in an east-west direction to squares near the gate valves for each side of the rank. In the stopped position, the articulation rod rests at an angle to the stop rod. When the stop is pulled to its open position, the motion causes the articulation rod to move to a position almost in line with the stop rod, which, in turn, moves the third rod to operate the wrought-iron squares at both ends. Each of these squares is connected to one of the vertically acting gate valves with a string, such that pulling it upward opens the rank. Coil springs balance the weight of the wooden gates to reduce the force needed to open these stops. Springs are also used where necessary at other locations throughout the stop action to ensure that the draw-knob force needed to activate all stops is approximately the same, regardless of its routing or construction, but most do not need them, an indication of the careful selection of machine elements and routing for each division by Ferris to obtain a consistent "feel' for all of the instrument's stop knobs.

The distance that any stop knob needs to move is not especially critical, but consistency is an asset for the performer. This organ's stop knobs move approximately 1", and they are always

pulled or pushed their full distance, since the stops have only "on" and "off" settings. Because of friction resulting from their snug fit, certain sliders can benefit from some mechanical advantage in the action that yields greater force at the slider than the organist imparts to the stop knob.[118] In other cases, particularly the Pedal division gate valves, each gate must travel farther than its stop knob, so the action's components are sized to increase distance between the knob and valve. The reduced force is acceptable due to the relatively low friction in these valves, as well as springs that compensate for much of the gate's weight.[119]

The right-side draw-knob panel has two additional knobs, one of which is marked "Forte" while the other is unmarked. These knobs respectively engage and disengage what is generally called *full organ* by simultaneously opening or closing all of the stops. Full organ produces the maximum dynamic level, though it is quite literally a "power play" that exchanges finesse and sonic texture for volume. Accordingly, it is sparingly employed, but the ability to open and close all stops simultaneously makes it practical to do so. Handling all of the stops individually would take too much time if necessary in the middle of a performance. (While playing, an organist rarely changes more than two or three stops at a time, though he/she may well change more than that while not playing between pieces or movements.)

The full-organ action looks much like the stop action and uses similar components, but the motion of the single draw knob must be split into several traces that take different paths in order to reach a connection with each rank's stop action, and the full-organ engagement knob is only pulled. A separate disengagement knob is used to avoid compression forces on the long, complex engagement action that could cause a failure should any part bind. The disengagement knob is likewise pulled to cancel the full-organ registration. It actuates a separate set of linkages and a rotating paddle that acts on several stop squares simultaneously to disengage the action and retract the engagement knob. This disengagement knob can easily be pushed back in after use since it does not experience compressive forces.

This action must of necessity have some lost motion to avoid any interference with the stop action when it is disengaged, and its multiple links acting together result in more frictional resistance to movement. Consequently, the engage and disengage knobs must be pulled out approximately 6", and the force required is noticeably greater than needed for any single stop.

Key Action

The action between the manuals' keys and their respective pallets in the various wind chests is substantially different in both design and execution than that employed in the stop action.

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[118] As with any mechanism, an increase in force at its output is achieved by reducing the travel of the output component (slider) or increasing the travel of the input one (knob). Similarly, an increase in output travel is accompanied by a reduction in output force.

[119] The on-site inspection of the Round Lake Organ revealed several locations where mechanical advantage may have been designed into the action, but no measurements were taken to confirm the presence or absence of mechanical advantage in the organ's stop action.

This was necessary because the manner in which an organist uses keys is very different from the way he/she uses stops, and pallets function differently than sliders. During a performance, a stop is pulled out or pushed in only a few times to change registration, but any given key, along with its action, may experience hundreds of cycles, since it must function every time its specific note is played, regardless of the rank, or ranks, selected to speak. Additionally, the key action must respond very rapidly to open and close the pallets and require relatively little force to actuate. (One needs only to hear a rapid run up a scale or a trill, i.e., a rapid cycling between two notes for some period of time, to appreciate how responsive the key action must be.) This means that the action must have low inertia, and inertia is directly proportional to mass. Thus, the key action needs to be as lightweight as practical. A second requirement, reliability, favors heavier members to ensure that they can endure the cyclical stresses placed on them for a long time without failing. The key action that Ferris used had evolved over more than three centuries into an elegant system that was not only lightweight and durable, but adaptable to a wide variety of organ sizes and physical arrangements as well. The description that follows applies to the Great, Choir, and Swell divisions, even though there are differences in the lengths of certain members and the location of specific components for the three divisions. The Pedal-division action functions in a similar manner, but its differences will be discussed in subsequent paragraphs.

Key action functions in a straightforward manner. In the Round Lake Auditorium Organ, each manual key is a first-order lever, thus depressing the front of any key causes its back end, or *tail*, to rise. These keys are pinned so that their fulcrums are at their centers, and their vertical movement is restrained to approximately $^{3}/_{8}$" at each end. Ferris designed the remainder of the action to produce this same $^{3}/_{8}$" movement at the pallet pull-down wires, so the various action components impart no mechanical advantage to the action, but only the direction changes required by the organ's physical layout.

The tail of each key pushes a short vertical member up, which causes the rotation of a wooden square. This square, which pivots about a transverse, horizontal axis, pulls on a long, horizontal strip of wood that terminates at a second transverse-axis square several feet south of the playing desk. (This distance is different for each division.) Key-action members that are pushed are called *stickers*, while those that are pulled are known as *trackers*—the term that gives mechanical-action organs their popular name. Since stickers must resist buckling, they have a larger cross section than trackers, and they are used only when necessary for short runs. Trackers, on the other hand, are not pushed and, therefore, have no tendency to buckle, so they can be quite long and thin, with many over 10' long, but rarely exceeding $^{1}/_{16}$" thick x 1" wide. They are made from softwood to minimize their weight and inertia, and while they may appear to be excessively flexible and flimsy, they are actually quite stable and introduce very little lost motion. The alignments of longer trackers are maintained with guides known as *registers* where necessary, but their use is minimized to avoid unnecessary friction.

Both stickers and trackers have one end fitted with an adjustable connection to the adjacent part of the action, while the other end has a non-adjustable connection. Each adjustable connection consists of a threaded bronze wire that is secured to the tracker's end with

whipping and shellac and a fitting that screws onto it while engaging the adjacent part. They must introduce a minimum of lost motion, but have enough flexibility to accommodate the relative motion between the parts without binding. The non-adjustable connections vary in design to suit their locations and connecting parts, but they also must function reliably without lost motion or binding. Many trackers have holes that align with holes in an adjacent part to form a tang-and-clevis joint when a pin is inserted. Others employ a hook formed from bronze wire. Trackers that connect directly to pallet pull-down wires have small metal eyelets on their fixed ends. These eyelets, formed from wire, are also secured to the tracker with whipping and shellac. The bottom ends of the key stickers in this instrument fit into slots cut into the tails of the keys, while their top ends have threaded rods that fit through holes in the squares and accommodate an adjustment fitting.

The adjustment fittings are crucial to obtaining the desired amount of motion throughout the action while keeping lost motion to an absolute minimum. Lost motion, i.e., uncontrolled slack in the action, has two detrimental effects: poorer response to the performer's key strokes and noise resulting from parts impacting one another. The adjustment fittings address both problems by allowing the instrument's maintainer to keep all of the action's connections just snug enough to keep the action responsive and quiet, but just loose enough that the pallets fully close to seal their holes, and the manual's keys rest at a uniform level. When built, and throughout most of its life, the Round Lake Organ used a centuries-old method where the adjustment nuts, sometimes referred to as *buttons*, were cut from leather thick enough that a hole through one would engage the threads on the bronze wires. A washer was often added between the button and the adjacent part to reduce wear. In recent years, the Andover Organ Company, who maintains this instrument, has replaced the original leather buttons with modern, metal-and-plastic fittings that are easier to adjust, maintain their adjustment better, and distort less over time than leather. However, no portions of the trackers, stickers, or rollers were altered, making this a fully reversible modification. This modern detail has significantly enhanced the reliability of the organ and reduced maintenance costs. Since this organ is owned by a small village, these economies are crucial to it remaining in service, and the fittings are visible only when one is inside the case.

The previously noted second square changes the horizontal motion to vertical, and a second tracker extends up from the square. To this point in the action, the stickers, trackers and squares are all parallel and in east-west alignment with their respective keys, which also means that they are transversely arranged in note order. The diameter of most pipes, plus the space needed between them, makes each wind chest considerably wider than the manuals, so the action must have a precision means of spreading the trackers in an east-west direction to line up with the pallet pull-down wires. Additionally, many ranks in this organ have the pipes for their natural notes on one side of the chests and those for the sharp notes on the other to balance the weight of pipes bearing on the chests. Splaying the trackers like a fan would give each one a different length, and the unavoidable sideways force resulting from the angle would be different for each one. Both conditions are undesirable. Avoiding it requires the trackers to remain parallel, only farther apart than in the preceding portions of the action.

This is achieved with components called *rollers*. A roller is a horizontal, transverse, wooden rod having an oblate cross section supported on each end by wire pins that serve as journals in wooden bearing blocks and allow the roller to rotate freely about its long axis. (The oblate cross section reduces weight, thus, each roller's moment of inertia, and one pin is removable to allow the roller to be removed from its bearings if necessary.) Each tracker rising from the second square connects to a short arm mounted near one end of a roller and directly above that square. A similar arm on the other end is located directly below the pallet pull-down wire. Thus, the input vertical motion is transmitted transversely by the roller's rotation and converted back to an equivalent output vertical motion at the other end. The rollers for each division are mounted parallel and horizontal on a vertically-oriented *roller board*. The three roller boards, constructed with dimensional lumber, were designed to fit the various roller lengths and locate a solidly mounted wooden bearing block at each end of each roller. Since many rollers can be located end to end, particularly when natural and sharp pipes are mounted on opposite sides of the organ as was commonly done in this instrument, an intermediate diagonal frame member was installed to support the intermediate bearings. Thus, the three roller boards have an irregular shape, but they are basically trapezoidal with only their top and bottom members parallel. Since each roller board supports up to 58 rollers that must hold their radial and axial positions to ensure a minimum of lost motion, the roller boards are solidly built and securely affixed to the instrument's frame. They are located at places in the instrument that provide the simplest, most-direct route between the manuals and wind chests, so each is physically unique even though they function alike. Particularly visible on the Swell roller board, but also present on the Great and Choir roller boards, is the addition of four rollers featuring different details from the others at the lower west corner of the roller board. These, along with the other associated action components, serve the pipes mounted in the Swell enclosure annex, and they likely were added when the instrument's compass was changed. While their fabrication details are different, these rollers function exactly the same way as the original ones.

The final link to the wind chest is a third tracker that rises vertically from a roller to connect to a pallet pull-down wire. The pull-down wire passes up through a small hole in the bottom board of the wind chest and connects to the free end of the pallet, pulling it open to admit wind to all pipes of the desired pitch in that division that have been opened via the stop action. Since air pressure and the pallet spring both act to close the pallet when the key is released, the pull-down wires and trackers remain under tension as the action returns to its closed state.

The Pedal division action uses similar components that individually function in the same manner, but the number, sequence, and physical layout of the pedal action is different to accommodate the location and movement of the pedals and the design and layout of the wind chests, which are mounted in three locations around the instrument. Since all components of this division are larger and require more wind than those in the other divisions, the action must have correspondingly greater travel. With larger, heavier pallets to move and the greater force applied by the organist's feet, the pedal action's components are correspondingly heavier than those in the other divisions as well.

Each pedal is a third-class lever, meaning that its fulcrum is located at its northern end, below the performer's bench, while its output is at its south end and its input (foot pressure) is in between. When the organist's foot depresses a pedal at approximately its mid-point, the pedal's tail moves down as well, but it moves a greater distance, thus providing the greater travel needed throughout the action. Third-order levers are not always found in organs, but Ferris used them effectively in this instrument, partly to increase the action's travel and partly to enable efficient couplers to the manuals. (Couplers are discussed below.)

A sticker below each pedal's tail presses down on one end of a wooden square that rotates about a north-south axis. The other end of the square is connected to a tracker that extends to the east or west side of the instrument. Like the other divisions, the pedal division chests are arranged with the natural notes on the east side and the sharp notes on the west. The 16' Open Diapason and Double Open Diapason ranks are located at the extreme east and west sides of the organ. Though the other Pedal-division ranks mounted behind the front of the case use non-split chests, their natural and sharp pipes are similarly arranged. Thus the direction of the transverse trackers from these squares, which are located in line with the pedals and in note order, alternates between those routed east and those routed west.

The action from the pedal trackers to the split wind chests for the 16' Violincello and Bourdon ranks behind the case façade is essentially the same as described above, but with a different physical layout. A second set of squares located just above the floor connects to vertical trackers, and a third set of squares connects them to horizontal, transverse trackers that terminate at squares directly below the pallet pull-down wires. The connection details are similar to those described above. Because of their transverse routing just south of the case's front, the transverse trackers terminate under the pallets, and rollers are not required.

The Open Diapason and Double Open Diapason trackers extend farther east or west to reach their respective chests. As noted above, these four chests are quite large, and they extend almost the entire north-south dimension of the case. Each of these chests also has a four note addition that likely dates from the organ's compass change. Those for the Double Open Diapason extend horizontally and almost perpendicularly from the north end of the two chests. The Open Diapason additions consist of small, separate chests mounted above the floor parallel to the two main chests that are supplied with wind from the main chests through short metal trunks. As with the additions to the manual actions' roller boards, the action to these pallets have minor detail variations from the original action, but are otherwise similar. The trackers for the Open Diapason additions terminate at squares below the auxiliary chests. Short wire trackers rise vertically from the squares to horizontal rollers under these chests that spread the action. Vertical wire trackers extend from the rollers to connect with pallet pull-down wires. The action to the additional Double Open Diapason pipes is virtually identical to the action that operates the pallets in the main Open Diapason and Double Open Diapason chests.

The trackers from the pedals to the four main Open Diapason and Double Open Diapason chests pass through openings in the chest support boards and connect to squares that change the motion to vertical. The fulcrums of these squares are mounted to the support boards of

their respective chests. Most of these squares connect to a vertical wire tracker that rises to connect to the arm at one end of a roller. These rollers, which are mounted directly to the chest support boards, extend horizontally under the chests in a north-south direction, and their output ends are directly below their respective pallet pull-down wires. These rollers have a greater cross-section and longer arms than those described earlier, but their shape, construction, and operation is otherwise identical. Vertical wires extend up to the pallet pull-down wires. Space constraints meant that a few of these rollers had to be located below the squares. These are similar to the other rollers, except that they have wooden stickers to press down on their roller arms.

Because of the great length of the trackers between the pedal squares and the squares under the chests, plus the greater travel of the action—approximately 1"—the pedal action exhibits more tracker flexibility, lost motion, and connection noise than the manual actions. These are more pronounced in the lower two-thirds of the pitch range because those notes are played more often than the higher third of the pedal range, resulting in more wear. While this may be noticed by the performer, it is undetectable to the audience seated in the auditorium.

Couplers

The Round Lake Organ features six mechanisms called *couplers* that allow the performer to make the manual or pedal board for one division simultaneously actuate the manual of one or more other divisions. Pulling a coupler draw knob connects all equivalent keys of both manuals by simultaneously moving a link at every key. With a coupler engaged (knob pulled out), the entire action of the coupled division, including its keys, will move in unison with the action of the division actually being played. Like other aspects of this organ, its couplers can be engaged or disengaged at any time during a performance. The couplers do not engage stops, so the performer sets each division's registration independently just as when no couplers are engaged.

This organ uses three types of coupler mechanisms, *drumstick*, *sidecar block*, and *backfall and idler*. All three accomplish the same thing, but Ferris selected the type to use for each coupler based on the division couplings he wanted and the physical relationships of these divisions' actions. For example, coupling two adjacent manuals, such as Swell to Great, requires a different mechanism than coupling widely separated manuals like Great to Pedal.[120] As with the instrument's other systems, ease of operation and reliability are essential to facilitate playing and maintenance. The action that engages the couplers is generally similar to the stop action, though there are differences in routing and connections to the control elements.

The simplest of these couplers is the drumstick coupler, also known as the sliding-kidney coupler. Both names reflect the shape of a piece that fits between the tails of two adjacent keyboards. The drumstick coupler's sole application is for making the lower of two adjacent

[120] The name of each coupler, such as "Swell to Great" and "Great to Pedal," indicates that the first division listed will also speak when the second division's keys are depressed. In this organ, the couplers *do not* function in the reverse manner.

manuals actuate the upper one. It consists of a drumstick for each key, all of which are pinned to a horizontal *stock* that fits transversely between the two manuals such that the drumsticks are aligned between their respective keys. The tail of each lower-manual key has a ramp on its top side near its end. When the coupler is not engaged, the stock is positioned to hold the drumsticks away from the ramp so that movements of neither the upper nor lower keys transmit motion to the other. When the draw knob is pulled to engage the coupler, the action slides the stock horizontally to push the round part of each drumstick in between the lower key's ramp and the bottom of the upper key. Depressing a lower-manual key raises its tail, which pushes both the drumstick and upper-manual key's tail upward. Since depressing an upper-manual key moves its tail away from the drumstick, it has no effect on the lower-manual's key. On the Round Lake Organ, the drumstick coupler is used only to couple the Swell manual to the Great manual. Key motion on the Great manual is repeated on the Swell manual, but, key motion on the Swell manual is *not* repeated on the Great manual.[121]

Manuals with other physical orientations are coupled using sidecar-block couplers, sometimes referred to as double-square-sliding couplers. Ferris used them in this instrument to couple the Choir manual to the Great manual, and the Swell manual to the Choir manual. These couplers are not located between key tails, but rather where the second squares change the action's movement from horizontal to vertical. Each coupler consists of an additional square with one slotted arm that straddles the horizontal tracker of the driving key, and its other arm connected to the output (vertical-motion) arm of the second square of the key to be driven. A small wooden block, the *sidecar block*, affixed to the horizontal tracker engages the coupler square when desired to transfer the tracker's motion to the coupler square and on to the second square of the driven action. There is, of course, a coupler square for each key.

The fulcrums of these coupler squares are mounted on a transverse stock that is positioned by a draw knob to engage or release the couplers simultaneously. With the knob pushed in, the stock is pulled away from the sidecar block on the tracker so that they cannot contact the coupler squares and thus not transfer motion from the driver manual to the driven manual. When the coupler is engaged by pulling the knob out, the stock slides horizontally into a position that allows the sidecar blocks to rotate the coupler squares and transmit motion from the driver to the driven manual. As with a drumstick coupler, a sidecar-block coupler operates in only one direction. For example, on the Round Lake Organ, the Choir to Great coupler, when engaged, causes the Great manual to drive the Choir manual, but the Choir manual can be played independently without actuating the Great manual. The same is true for the Swell to Choir coupler.

Coupling the three manuals to the pedal board introduces additional challenges caused by the pedal board's distance from the manuals, its greater length of travel, and its different proportions, particularly the greater width of each key. Additionally, since the Pedal division has only thirty keys, only a portion of each fifty-eight-key manual division can be coupled to it. Ferris addressed all of these challenges with the backfall-and-idler coupler, a design commonly used in this application. The tail of each manual key is notched on the bottom

[121] For a detailed discussion, see Audsley, *The Art of Organ-Building*, 102-106.

such that the upper end of a vertical sticker can be moved in and out of the notch. When aligned with a notch, a sticker does not engage a key. Below each manual is a horizontal *stock* with mortises for the upper ends of that coupler's stickers. Pulling a draw knob for one of these couplers causes its stock to move the heads of all thirty of its stickers out of the notches to engage the key tails. Since the three manuals' keys are in line, the stickers for the Great and Swell manuals pass through mortises in the tails of the lower manuals' keys that are large enough to prevent interference.

For each note, the lower ends of these three stickers are pinned to one end of a horizontal arm whose other end is pinned to the frame. This arm, the *idler*, serves two purposes. First, it provides a stable foundation for the lower end of these three stickers. Second, it transfers the motion of any pedal key to all three stickers simultaneously. In addition to moving its own action, pressing a pedal key pulls down on a vertical tracker that extends up to one end of a first-class lever called a *backfall.* The opposite end of the backfall pushes up on a vertical sticker that pushes up on the idler and, thus, the three stickers. The backfalls are mounted in a horizontal fan arrangement that compensates for the different spacing of the pedal and manual keys. As with the couplers between manuals, these couplers function in only one direction, so that the manuals can be played independently while any of them are coupled to the pedal board. It is possible to engage manual-to-manual and manual-to-pedal board couplers simultaneously in any configuration desired, though accomplished organists tend to use couplers sparingly.

Part III. Sources of Information

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Appendix I: Organ Specifications (in chronological order)

Henry Erben, Organ for Trinity Church, New York, 1846

Great Organ (compass CC–f^3, 66 notes)
8' Open Diapason, larger
8' Open Diapason, smaller
8' Stopped Diapason
4' Principal, larger
4' Principal, smaller
4' Large Open Flute
2⅔' Twelfth
2' Fifteenth
Sesquialtera, 3 ranks
Furniture, 3 ranks
8' Trumpet
4' Clarion

Swell Organ (C-f^3, 54 notes)
16' Double Stopped Diapason
8' Open Diapason
8' Stopped Diapason
8' Dulciana
4' Principal
Cornet, 5 ranks
8' Hautboy
8' Trumpet
4' Clarion

Swell Bass (CC–c, 25 notes)
16' Dulciana
16' Serpent

Choir Organ (CC–f^3, 66 keys, 54 notes)
8' Dulciana
8' Stopt Diapason
4' Principal
4' Flute
2' Fifteenth
8' Clarionet, treble
8' Bassoon, bass

Pedal Organ (CCC–C, 25 notes)
32' Double Open Diapason (37 pipes, playable at 32' and 16')

Couplers and Mechanicals
Swell to Great
Swell to Great at octaves
Swell to Choir
Swell to Choir at octaves
Choir to Great
Great to Pedal at suboctaves
Great to Pedal
Choir to Pedal
Swell Bass to Pedal
Pedal Pipes, 32' pitch
Pedal Pipes, 16' pitch

From "Trinity Church Organ, at New York," *Musical Gazette* 1, no. 26 (Jan. 18, 1847): 205–206; Joseph Warren, *Hamilton's Catechism of the Organ*, 4th ed. (London: Robert Cocks and Co., 1865), 228; John Ogasapian, *English Cathedral Music in New York: Edward Hodges of Trinity Church* (Richmond, Va.: Organ Historical Society, 1994), 159.

Davis & Ferris, Proposed organ for Calvary Church, New York, April 11, 1846
29 speaking stops, 35 ranks, 1,634 pipes

Great Organ (compass GG–f^3, 59 notes)
8' First Open Diapason
8' Second Open Diapason
8' Stop Diapason
4' Principal
4' Night Horn, 42 pipes
2⅔' Twelfth
2' Fifteenth
Sesquialtera, 3 ranks
Cornetto, 5 ranks, 150 pipes
8' Trumpet
4' Clarion

Swell Organ (c–f^3, 42 notes)
16' Double Stop Diapason
8' Open Diapason
8' Stop Diapason
8' Dulciano
8' Clarabella
4' Principal
2⅔' Twelfth
2' Fifteenth
8' Hautboy
8' Trumpet

Choir Organ (GG–f^3, 59 notes)
8' Dulciano
8' Stop Diapason
4' Principal
4' Flute
2' Picolo
8' Cremona, 42 pipes

Pedal Organ (GG–C, 18 notes)
24' Large Double Diapason
12' Open Diapason

Couplers and Mechanicals
Great and Swell
Great and Swell at octaves
Great and Choir
Choir and Swell
Pedal and Great
Bellows signal

"The whole Organ to be metal except the Pedals and Stop Diapasons to middle C."

From Davis & Ferris, Estimate for an organ for Calvary Church, Apr. 11, 1846, Calvary Church vestry records, reproduced in Jonathan Ambrosino, et al., eds., *An Organ Atlas of the Capital District Region of New York State* (Richmond, Va.: Organ Historical Society Press, 2006), 16–18.

Davis & Ferris, Contract design for the Calvary Church organ, New York, May 21, 1846
33 speaking stops, 41 ranks, 2,062 pipes

Great Organ (compass GG–f^3, 59 notes)
8' Open Diapason, large scale, metal
8' Open Diapason, small scale
8' Stop Diapason, metal to F with chimneys
4' Night Horn, metal; to 4' c, 42 pipes
4' Principal, [large scale], metal
4' Principal, [small scale], metal
2⅔' Twelfth, metal
2' Fifteenth, metal
Sesquialtera, 3 ranks
Mixture, 3 ranks
8' Trumpet
4' Clarion

Swell Organ (c–f^3, 42 notes)
16' Double Stop Diapason, wood
8' Open Diapason, large scale, metal
8' Stop Diapason, metal with chimneys
8' Dulciano
8' Clarabella
4' Flute
4' Principal
2⅔' Twelfth
2' Fifteenth
Grand Cornet, 4 ranks
8' Trumpet
8' Hautboy

Choir Organ (GG–f^3, 59 notes)
8' Dulciano or Small Open Diapason
8' Stop Diapason, metal to F with chimneys
4' Principal, metal
4' Flute
2' Picolo
Furniture, 2 ranks
8' Cremona, 42 pipes

Pedal Organ (GGG–G, 25 notes)
24' Double Open Diapason, large scale
12' Dulciano

Couplers and Mechanicals
Great and Choir
Great and Swell
Great and Swell at octaves
Choir and Swell
Pedals and Great
Bellows alarm

From "Specification for organ to be built by Mess. Davis & Ferris for Calvary Church," May 21, 1846, Calvary Church vestry records, copy provided by Stephen L. Pinel.

Davis & Ferris, Calvary Church organ as completed, 1848
32 speaking stops, 40 ranks, 2,023 pipes

Great Organ [compass GG–f^3, 59 notes]
8' First Open Diapason
8' Second Open Diapason
8' Stopped Diapason
4' First Principal
4' Second Principal*
4' Night Horn [42 pipes]
2⅔'Twelfth
2' Fifteenth
Sesquialtera, 3 ranks
Mixture, 3 ranks
8' Trumpet
4' Clarion

Swell Organ [c–f^3, 42 notes]
16' Bourdon
8' Open Diapason
8' Stopped Diapason
8' Dulciana
4' Principal
Sesquialtera [3 ranks]
Cornet [2 ranks]
8' Trumpet
8' Hautboy
4' Clarion

Choir Organ [GG–f^3, 59 notes]
8' Open Diapason
8' Stopped Diapason
8' Dulciana
4' Principal
4' Flute
2' Picolo
Furniture [2 ranks]
8' Cremona [42 pipes]**

Pedal Organ [GG–C, 18 notes]
24' [Double Open Diapason]
12' [Open Diapason]

Couplers and Mechanicals
Great and Swell
Great and Swell at octaves†
Great and Choir
Choir and Swell
Pedal and Great
Pedal and Choir
Bellows alarm
Pedal Lock

* Stop replaced by an 8' Salicional or 8' Gamba in 1868. Subsequently replaced again by 8' Viol d'Amour (1888?).
** Stop extended by one octave in the bass in 1878.
† Coupler replaced by Swell to Pedal coupler at unknown date.

From "A new organ," *Musical World and the New York Musical Times* 3, no. 23 (Aug. 1, 1852): 393. See "Alterations and Additions," above, for discussion of changes to the organ. Information in square brackets extrapolated from later stoplists.

Round Lake Auditorium Organ
Built by Davis & Ferris (1846–48) with modifications by Levi U. Stuart (1868), Giles Beach (1888), and Andover Organ Company (various dates, 1976–2010)

34 speaking stops, 42 ranks, about 2,120 pipes
Three 58-note manuals; 30-note pedal board
Pitch A435, pressure 70 mm

Great Organ [compass C–a^3, 58 notes]

8'	First Open Diapason	metal
8'	Second Open Diapason	zinc
8'	Stopped Diapason	wood
4'	First Principal	metal, CC–CC zinc
4'	Second Principal*	metal, CC–EE zinc
4'	Night Horn	metal; from c, 46 pipes
2⅔'	Twelfth	metal
2'	Fifteenth	metal
	Sesquialtera, 3 ranks	metal
	Mixture, 3 ranks	metal
8'	Trumpet	zinc, f^3–a^3 metal
4'	Clarion	zinc, g^2–a^3 metal

Swell Organ [c–a^3, 46 notes]

16'	Double Stopped Diapason	wood
8'	Open Diapason	metal
8'	Stopped Diapason	metal, c–b wood
8'	Dulciana	metal
4'	Principal	metal
	Sesquialtera, 3 ranks	metal
	Cornet, 2 ranks	metal
8'	Trumpet**	metal
8'	Hautboy	metal
4'	Clarion	zinc resonators, d^2–a^3 metal

Choir Organ [C–a^3, 58 notes]

8'	Open Diapason	metal; from GG, 59 pipes
8'	Stopped Diapason	wood, c^1–f^3 metal
8'	Dulciana	metal, CC–DD zinc
4'	Principal	metal
4'	Flute	wood, e–a^3 metal
2'	Picolo	metal; from c, 46 pipes
	Furniture, 2 ranks	metal; fr. GG, 118 pipes
8'	Cremona	zinc and metal

Pedal Organ [CC–c, 25 notes]

16'	Double Open Diapason	wood, 18 pipes
16'	Open Diapason	metal, CC–FF wood
16'	Bourdon†	wood
8'	Violoncello†	zinc

Couplers and Mechanicals

Great to Pedal
Choir to Pedal
Swell to Pedal
Choir to Great
Swell to Great
Swell to Choir
Forte engage
Forte disengage

Swell pedal

* Replacement stop from 1858 Ferris organ at St. Mary's R.C. Church, Newark, New Jersey, installed 1976.
** Replacement stop from an 1855 E. & G.G. Hook organ, installed 1977 or 1978.
† Stop added by Levi Stuart in 1878.

From Jonathan Ambrosino, et al., eds., *An Organ Atlas of the Capital District Region of New York State* (Richmond, Va.: Organ Historical Society Press, 2006), 12–14, with corrections provided to the HAER field team by Matthew Bellocchio, Andover Organ Company.

Appendix II: Calvary Church Organists

At least eight organists served at Calvary Church during the forty-one years the organ was installed there. They were:

Charles D. Judah	1846–1849
George F. Bristow	1849
George Henry Curtis	1849–1850
Henry Wellington Greatorex	1850–1853
J. G. Maeder	ca. 1855–ca. 1857
William A. King	ca. 1858–1860
Joseph Mosenthal	1860–1887
Arthur E. Crook	1887–1890[122]

[122] Shoemaker, *Calvary Church*, 304–05. Shoemaker's list omits Maeder and King and gives incorrect dates for Greatorex's tenure.

Appendix III: Programs from the Second Season of the Round Lake Music Festival, July 22–27, 1889[123]

Conductors:

Carl Zerrahn, ...Boston, Mass.
Charles A. White, ...Albany, N. Y.

Christian A. Stein, Organist, Troy, N. Y. Miss Clara Stearns, Pianist, Troy, N. Y.

Wednesday Evening, July 24th.

Part First.

1. Solo—For the organ, ...Selected
   Mr. C. A. Stein.
2. Chorus—"Festival hymn,".....Buck
3. Song—"The Protestant,".....Hatton
   Mr. G. S. Lamson.
4. Song—"Lovely Spring,"..... Coenen
   Miss Hattie McLain.
5. "But the Lord is mindful of His own," ..... Mendelssohn
   Chorus.
6. Song—"Before the Dawn," ..... Chadwick
   Mr. J. H. Ricketson.

Part Second.

7. Cabatina—From "The Queen of Sheba," .....Gounod
   Mrs. Le Jeune.
8. "Fairewell," a German Volkslied,
   Chorus.
9. Song—"The Man o' War's Man,"..... Marchant
   Mr. Lamson.
10. Song—"Who is Sylvia?" ..... Schubert
    Mrs. Le Jeune.
11. a. "Ah! 'tis a Dream," ..... Lassen
    b. Serenade to Mignon, ... Massenet
    Mr. Ricketson.
12. Song—"Answers,".....Blumenthal
    Miss McLain.
13. "The Carnival,".....Rossini
    Chorus.

[123] Transcribed from originals in the Round Lake Village Archives, folder "RLA 1891."

Thursday Evening, July 25th.
Part First.

1. Organ Solo ..... Selected
Mr. C. A. Stein.
2. Anthem—"Thsi is the Day," ..... Cooke
Chorus.
3. Aria—"O! Sleep," ..... Handel
Mr. J. H. Ricketson.
4. Aria—"Ocean, thou mighty monster," from "Oberon," ..... Weber
Mrs. Le Jeune.
5. "The Carnival," (by request), ... Rossini
Chorus.
6. Rec[etative] and Aria—from "Tannhauser," ..... Wagner
Mr. Lamson.

Part Second.

7. Song—"On the Sound of a Voice," ..... Watson
Miss McLain.
8. Triumphal March—from "Naaman," ..... Costa
Chorus.
9. Organ Solo, ... Selected
Mr. Stein.
10. Duet—"The Fisherman," ..... Gabussi
Mr. Ricketson and Mr. Lamson
11. Chorus—"Sleep, Darling, Sleep," ..... Martin
12. Duet—"Cheerfulness," ..... Gumbert
Mrs. Le Jeune and Miss McLain.
13. Bridal Chorus—from "The Rose Maiden," ..... Cowen

Friday Evening, July 26th.
Part First.

"The Erlking's Daughter,"—A Cantata, ... Gade
For Soloists, Chorus, Piano and Organ.

Characters Represented

The Erlking's Daughter, ... Mrs. Le Jeune
The Mother, ... Miss McLain
Sir Oluf, ... Mr. Lamson

Part Second.

1. Organ Solo, ... Selected
Mr. C. A. Stein.
2. a. Horch wie still, ... Franz
b. Thou Art Near me, Margarita, ... Meyer Helmund

Mr. J. H. Ricketson.

3. The Vesper Hymn, ... Beethoven
Mrs. Le Jeune, Miss McLain, Mr. Ricketson, Mr. Lamson, and Chorus of Distant Voices.

4. Song—"Winds in the Trees," .....Thomas
Mrs. Le Jeune.

5. "Yoemen's Wedding Song,".....Poniatowski
Mr. Lamson.

6. Song—"The Song and the Rose,"..... Cowen
Miss McLain

7. "My Pretty Jane," (by request),..... Bishop
Mr. J. H. Ricketson.

8. Chorus of the Sons of Japhet, From the Oratorio "The Tower of Babel," .....
Rubenstein

Saturday Evening, July 27th.

Part First.

The Oratorio of "The Creation," (first part),.....Haydn
For Soloists, Chorus, Piano and Organ.

Characters Represented.

Gabriel,.....Mrs. Le Jeune.
Uriel, ...Mr. Ricketson.
Raphael, ...Mr. Lamson.

Part Second.

1. Organ Solo, ...Selected
Mr. C. A. Stein.

2. Aria—"Nobil Signor," from "The Huguenots," ..... Meyerbeer
Miss McLain.

3. Aria—"Una furtiva lagrina," .....Donizetti
Mr. J. H. Ricketson.

4. Organ Solo, ...Selected
Mr. Stein.

5. Song—"Thine Eyes, so Blue and Tender," ..... Lassen
Mrs. Le Jeune.

6. Quartet—from "Rigoletto," ..... Verdi
Mrs. Le Jeune, Miss McLain, Mr. Ricketson, Mr. Lamson.

7. "Bedouin Love Song," ..... Pinsuti
Mr. Lamson.

8. Song—"The Better Land,"..... Cowen
Miss McLain.

9. Festival Hymn, ... Buck
Chorus.

Appendix IV: Figures

Figure 1. D. H. Arnot, delineator. Lithograph of Calvary Church, New York, published in 1847 by G. and W. Endicott, lithographers. From the Library of Congress, Prints and Photographs Division.

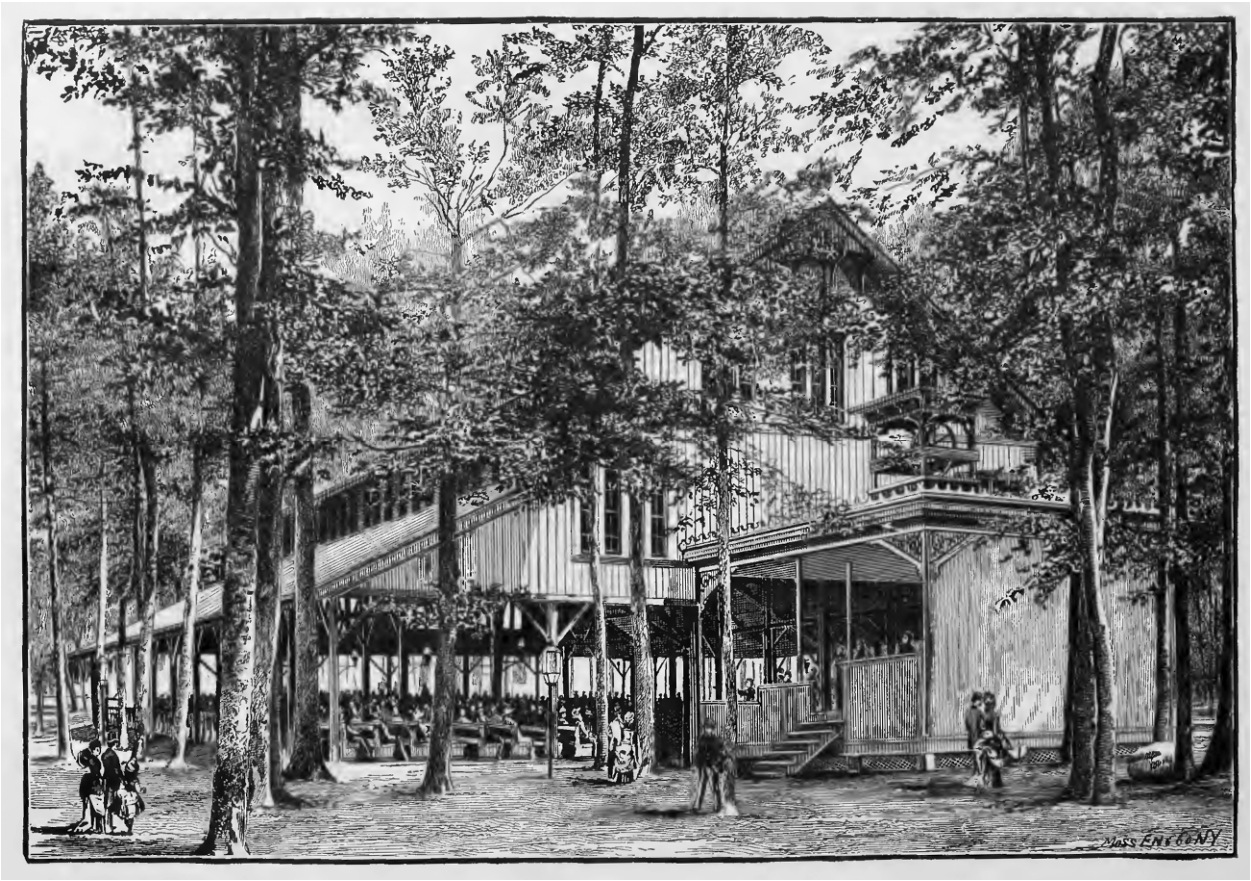

Figure 2. The Round Lake Camp-meeting Auditorium as it originally appeared. The original speakers' stand is incorporated as the stage in the foreground. Engraving by the Moss Engraving Co., New York, published in Arthur James Weise's *History of Round Lake* (1887).

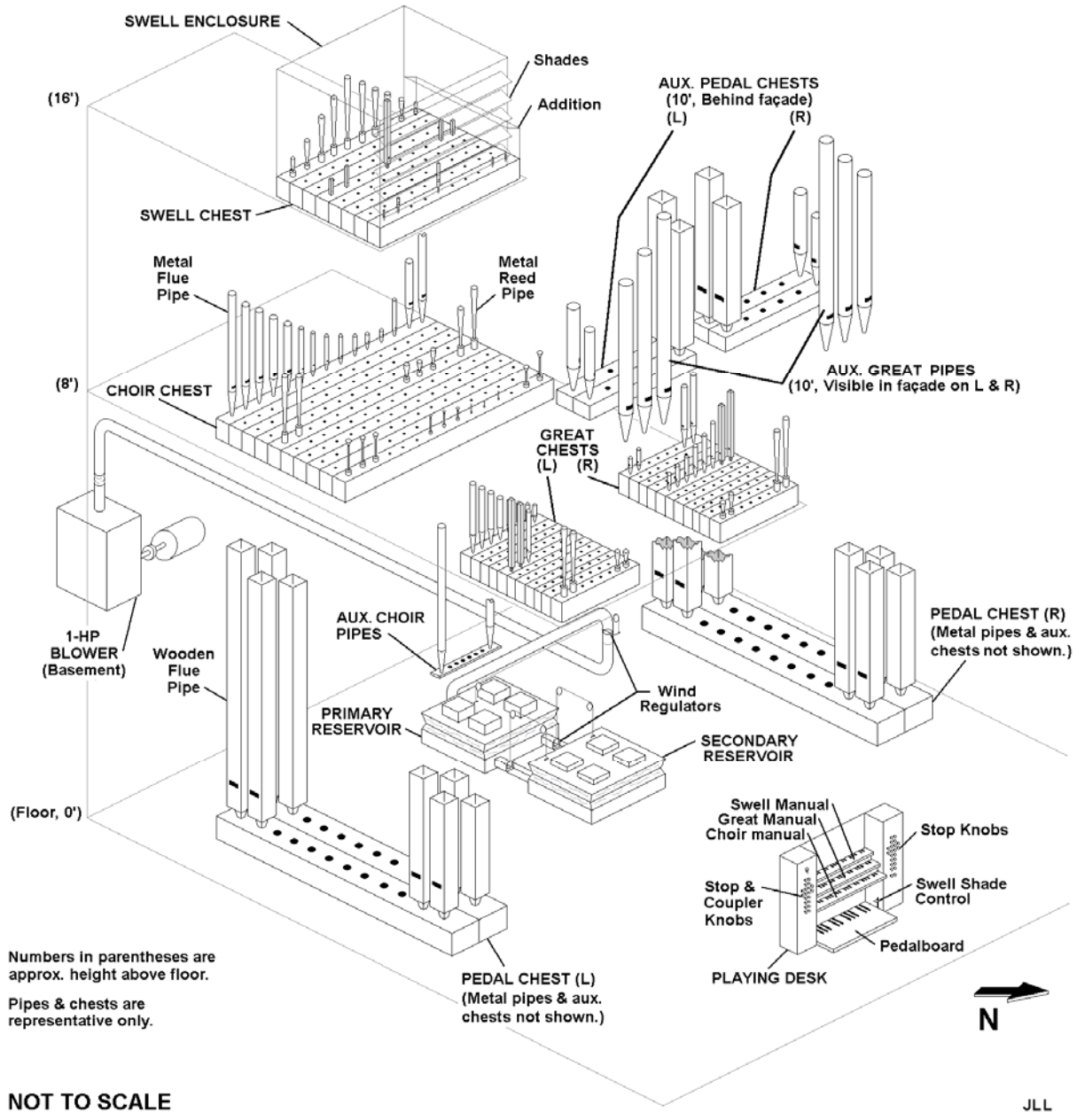

Figure 3. This exploded drawing shows the general arrangement of the Round Lake Organ and the approximate spatial relationship of its many components. Note that, for clarity, not all pipes are shown, and that these components are not intended to depict the organ's actual components in detail.

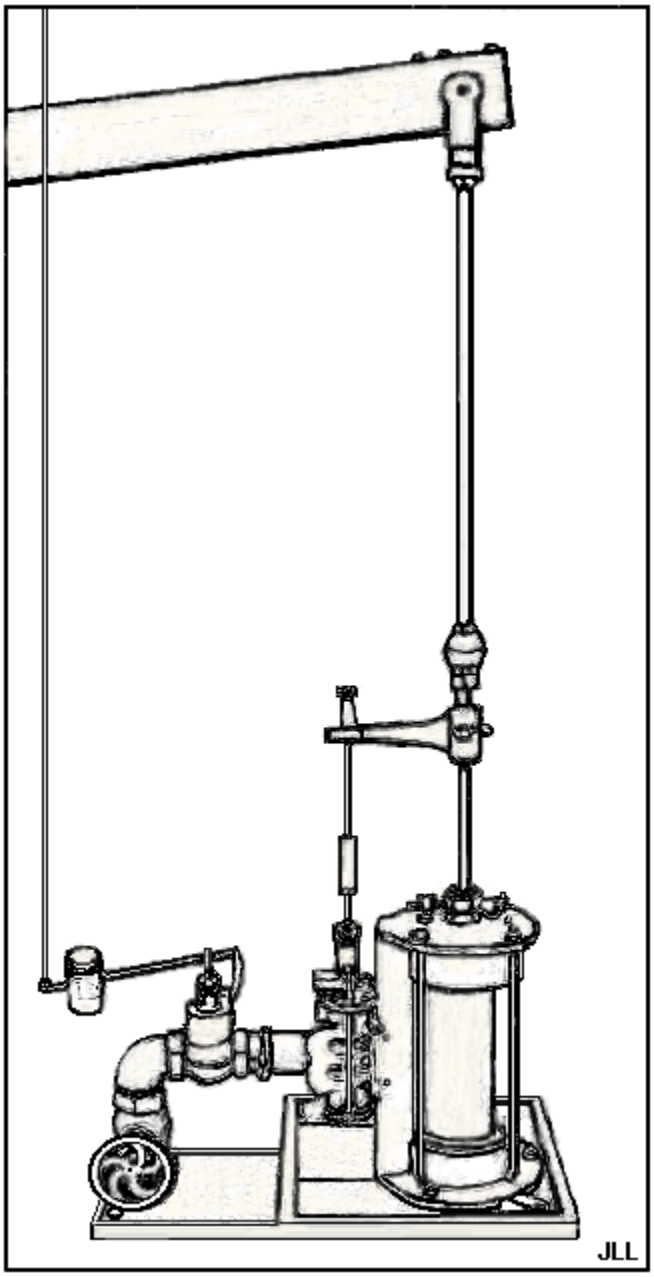

Figure 4. When installing the organ at Round Lake, Giles Beach added a Ross Water Engine that eliminated the need for a human pumper to work the bellows. This drawing, based on a photo of a surviving installation, shows how the double-acting, reciprocating water engine actuated a vertical rod and lever to work the bellows. This entire apparatus stands about 8' high. At Round Lake, the rope attached to the weighted lever of a throttling valve on the left side of the engine was connected to a manual control on the playing desk that the organist used to adjust the wind supply as the organ's demand changed. Pulling up on the rope opened the valve to increase the engine's speed and, thus, the volume of wind produced.

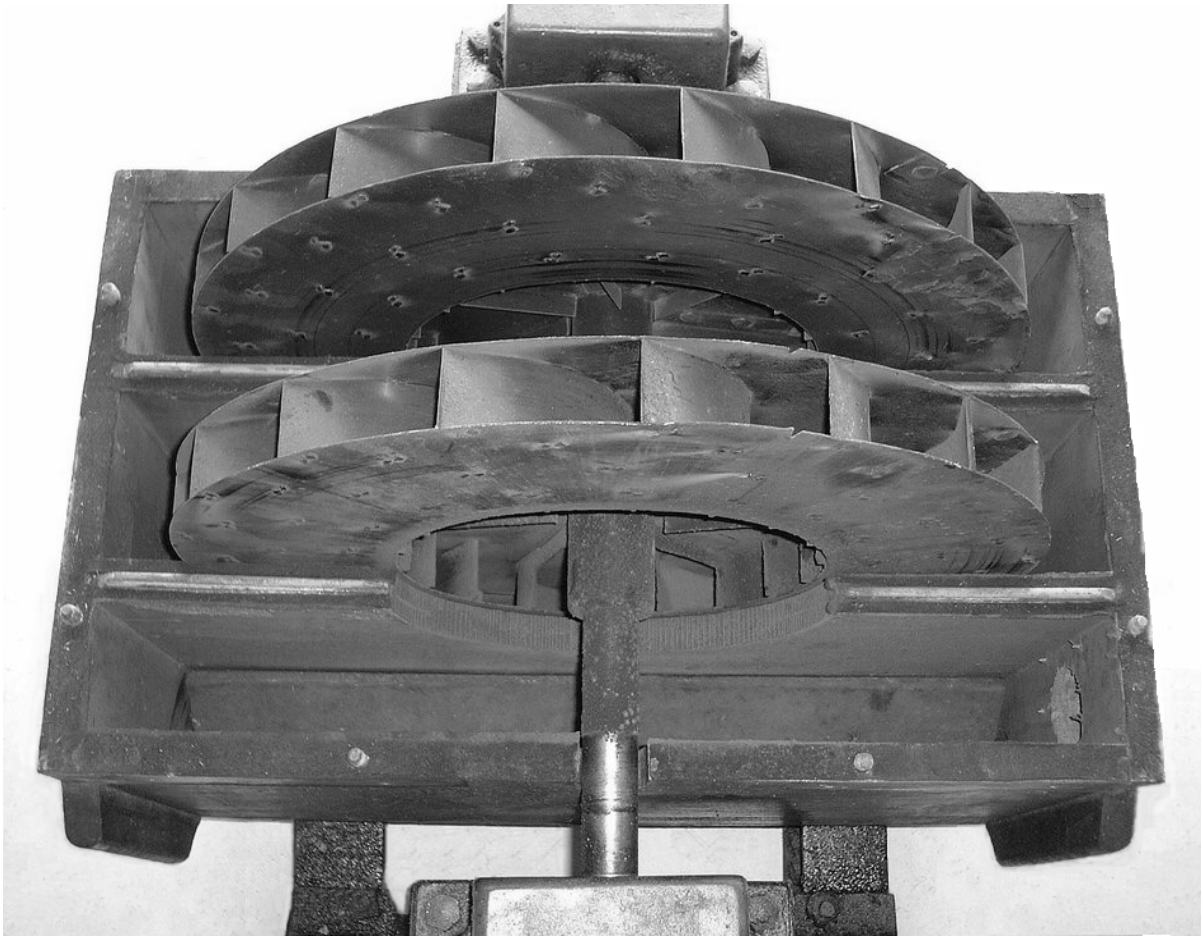

Figure 5. The Kinetic Engineering Company produced electrically-powered blowers that were specially designed for organs, and the Round Lake Organ received a two-stage one sometime after 1925. As seen here in a similar blower with its case opened, it contains two backward-inclined-blade fans that act in series. This arrangement, along with fixed baffles (not visible) and the cubical case design allow the Kinetic Organ Blower to accommodate the organ's continuously varying wind requirements smoothly and quietly without changes in its rotational speed or adjustments by the organist.

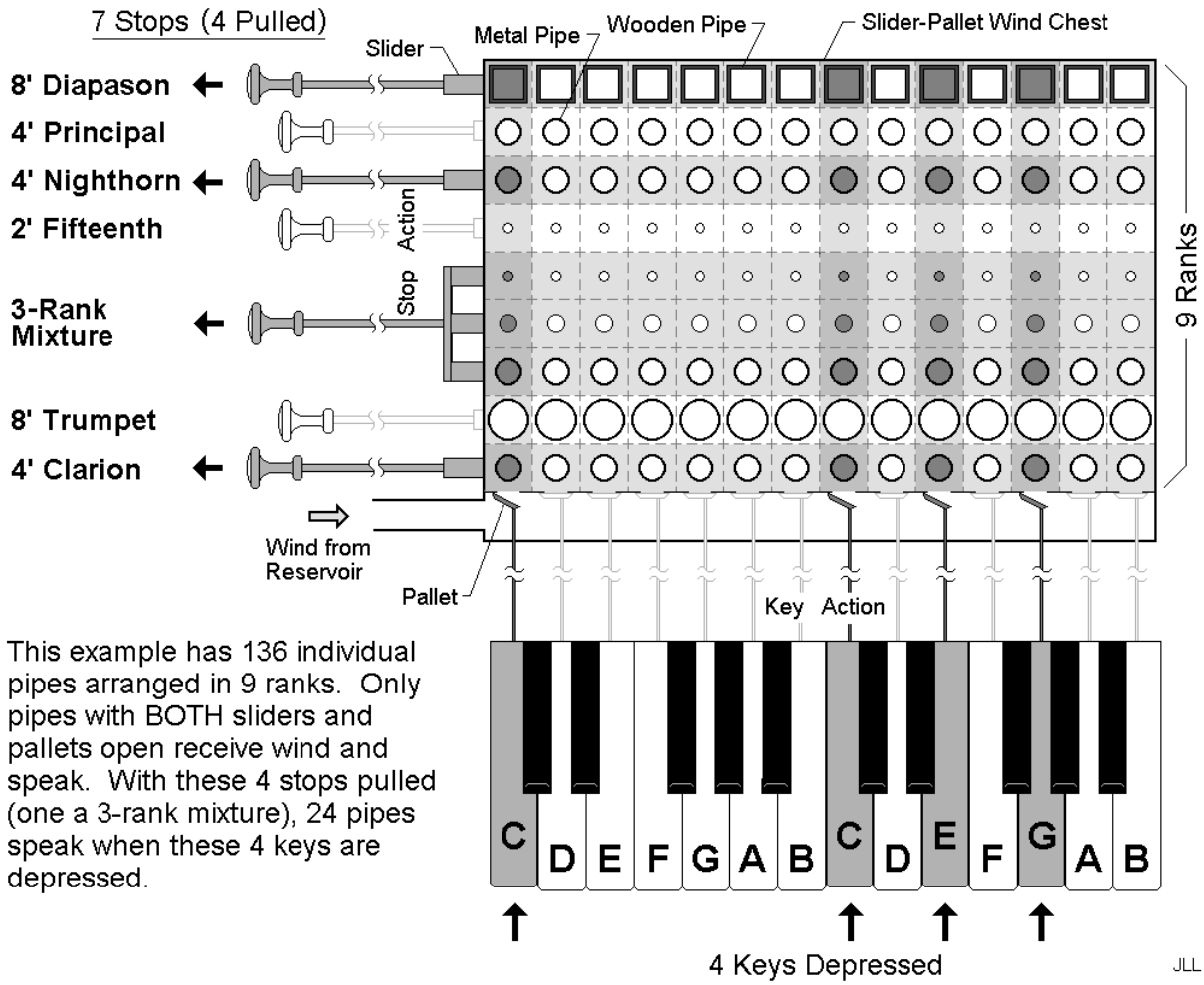

Figure 6. The Round Lake Organ uses primarily slider-pallet wind chests, with sliders that actuate its ranks and pallets that respond to the keys. Both sliders and pallets are contained in these wind chests, and together they correspond to a matrix, where any individual pipe can speak only when both the slider and pallet controlling it are open. A Mixture stop actuates more than one rank of pipes simultaneously. In this example, the 24 shaded pipes speak.

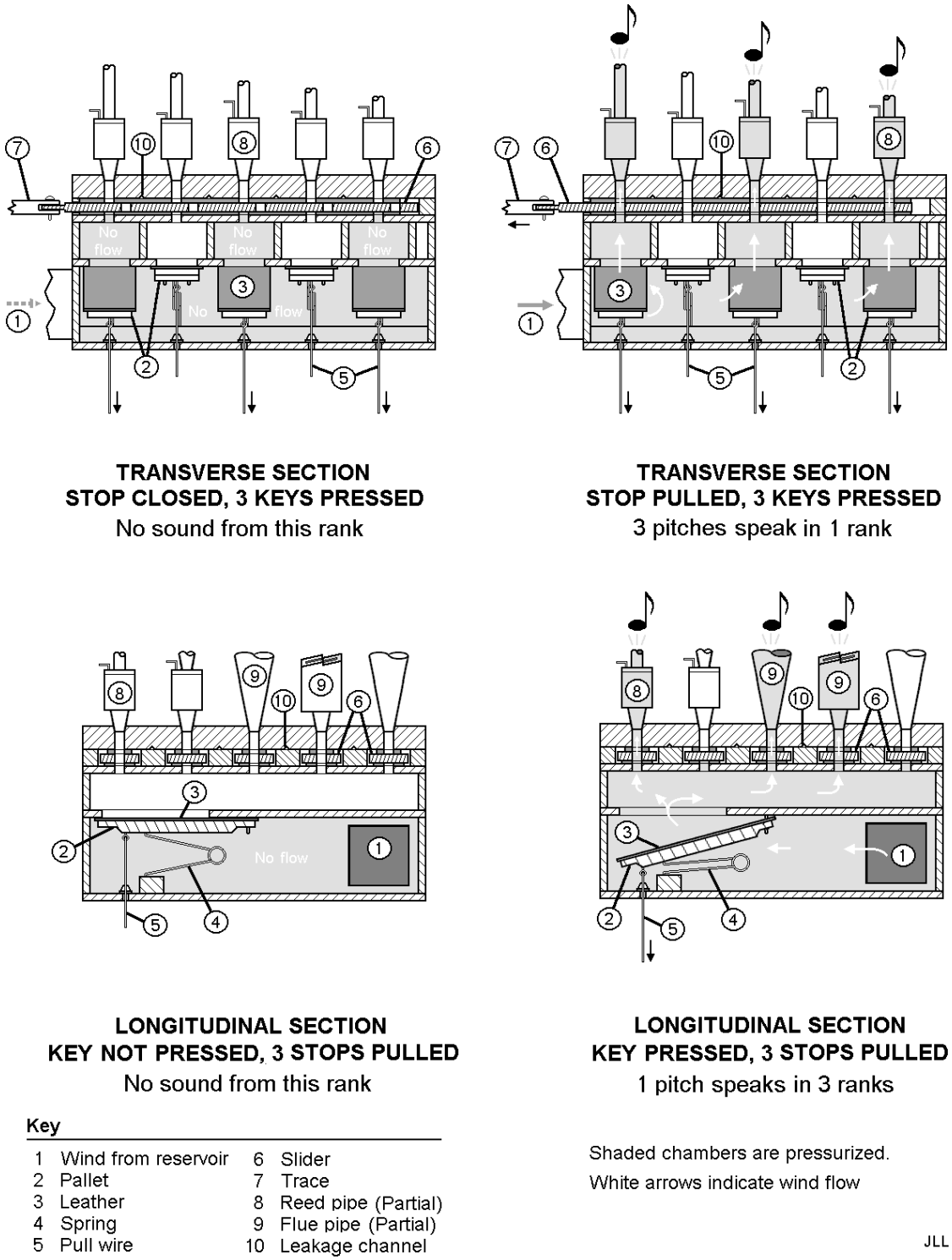

Figure 7. These simplified section drawings illustrate the construction and operation of a slider-pallet wind chest like those used in the Round Lake Organ. The transverse sections show one rank and five keys, while the longitudinal sections have five ranks and one key.

ADDENDUM TO:
ROUND LAKE AUDITORIUM, ORGAN
2 Wesley Avenue
Round Lake
Saratoga County
New York

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
U.S. Department of the Interior
1849 C Street NW
Washington, DC 20240-0001

ADDENDUM TO
HISTORIC AMERICAN ENGINEERING RECORD

ROUND LAKE AUDITORIUM, ORGAN

HAER No. NY-543-A

The following pages are an addendum to the 77-page historical report previously transmitted to the Library of Congress in 2012. During the editing process, the sharp marks (♯) were inadvertently removed from the original document. Therefore, the following corrections to the original report are noted.

On page 6, the first sentence of the final paragraph should read,

Beach increased the compass of the Great, Choir, and Swell divisions from fifty-four to fifty-eight notes through the addition of treble pipes $f^{\sharp 3}$–a^3 to each rank.

Appendix I: Organ Specifications (page 66) should read as the following:
Round Lake Auditorium Organ
Built by Davis & Ferris (1846–48) with modifications by Levi U. Stuart (1868), Giles Beach (1888), and Andover Organ Company (various dates, 1976–2010)

34 speaking stops, 42 ranks, about 2,120 pipes
Three 58-note manuals; 30-note pedal board
Pitch A435, pressure 70 mm

Great Organ [compass C–a^3, 58 notes]

8'	First Open Diapason	metal
8'	Second Open Diapason	zinc
8'	Stopped Diapason	wood
4'	First Principal	metal, CC–$CC^{\sharp}$ zinc
4'	Second Principal*	metal, CC–EE zinc
4'	Night Horn	metal; from c, 46 pipes
2⅔'	Twelfth	metal
2'	Fifteenth	metal
	Sesquialtera, 3 ranks	metal
	Mixture, 3 ranks	metal
8'	Trumpet	zinc, $f^{\sharp 3}$–a^3 metal
4'	Clarion	zinc, g^2–a^3 metal

Swell Organ [c–a^3, 46 notes]

16'	Double Stopped Diapason	wood
8'	Open Diapason	metal
8'	Stopped Diapason	metal, c–b wood
8'	Dulciana	metal
4'	Principal	metal
	Sesquialtera, 3 ranks	metal
	Cornet, 2 ranks	metal
8'	Trumpet**	metal
8'	Hautboy	metal
4'	Clarion	zinc resonators, d^2–a^3 metal

Choir Organ [C–a^3, 58 notes]

8'	Open Diapason	metal; from GG, 59 pipes
8'	Stopped Diapason	wood, c^1–f^3 metal
8'	Dulciana	metal, CC–$DD^{\sharp}$ zinc
4'	Principal	metal
4'	Flute	wood, e–a^3 metal
2'	Picolo	metal; from c, 46 pipes
	Furniture, 2 ranks	metal; fr. GG, 118 pipes
8'	Cremona	zinc and metal

Pedal Organ [CC–c, 25 notes]

16'	Double Open Diapason	wood, 18 pipes
16'	Open Diapason	metal, CC–$FF^{\sharp}$ wood
16'	Bourdon†	wood
8'	Violoncello†	zinc

Couplers and Mechanicals
Great to Pedal
Choir to Pedal
Swell to Pedal
Choir to Great
Swell to Great
Swell to Choir
Forte engage
Forte disengage

Swell pedal

* Replacement stop from 1858 Ferris organ at St. Mary's R.C. Church, Newark, New Jersey, installed 1976.
** Replacement stop from an 1855 E. & G.G. Hook organ, installed 1977 or 1978.
† Stop added by Levi Stuart in 1878.

From Jonathan Ambrosino, et al., eds., *An Organ Atlas of the Capital District Region of New York State* (Richmond, Va.: Organ Historical Society Press, 2006), 12–14, with corrections provided to the HAER field team by Matthew Bellocchio, Andover Organ Company.