

UTILITIES

WATER SUPPLY

During the first years of the college the only source of water was from natural springs. The First Annual Report, for the years 1858-59, mentions "the large spring" lying to the north-north east of the barn. That spring was about at what is today the intersection of Sixth Street and Wallace Road. It was originally thought that water from that spring could be "conveyed by means of an Hydraulic Ram to all these building sites." The sites referred to were those for the barns, the Farm House and the College (Main).

By 1865 the Minutes record that "Your committee have not been as successful as they would desire in conveying the water from the spring to the building." (Main) A pipe line of 1 1/2" drain tile laid in cement had been built "but the pipe leaked and is probably a failure. It is supposed that the tile is not laid well in the mortar....We would recommend the finishing of the water Ram for the benefit of the College, Farm House and Barn. It is much needed at the barn."(1)

A well was dug at the Farm House, 32 3/4 feet deep as reported in the Minutes of the January 14-16, 1867, meeting. This was said to provide "good water and plenty of it." For the College building a well was dug at the head of a spring "about three hundred yards west of the Building and by the use of a wind mill force the water to the upper story of the Building." That report expanded on the description:

The supply of water has been abundant and of good quality for drinking and cooking purposes. It is quite hard, however, and I recommend to your consideration the importance of building cisterns of large size for the supply of water in the Laundry.

In the summer season the water in the tanks cannot but be very warm and insipid. I respectfully recommend the construction of capacious ice houses.

I am happy to report that windmill and pump work successfully and that during the late cold weather there was no interruption in the supply of water.(2)

(1) Minutes, March 23-24, 1865

(2) Minutes, Jan. 11-13, 1869

That operation was short-lived as seen in the Biennial Report for 1871:

There can be no justifiable delay in providing for a permanent supply of good water for the buildings. So far our expedients for obtaining water have, on account of limited means, been quite inadequate. The well, seventy rods west, from which the water was pumped into the building by means of a windmill, has the last two years failed about midsummer, and compelled us to depend on water wagons for a precarious supply. This method of getting water is expensive, and intolerably vexatious, and calls for immediate remedy.

The solution adopted was to install a pump at the spring northeast of the barn and thence by new pipe to the buildings. The pump was operated by compressed air with an alternative use of steam. That system was completed by 1873. It was replaced in 1879 by a windmill, as reported in the Aurora for July of that year:

Prof. Thomson has in active operation a windmill of his own invention. It has a governor or self-regulator attachment that throws the vanes in or out of the wind according to its force, so that the mill approximates a regular or unchangeable speed. The proper steps are being taken to secure a patent. The mill built by the Professor last winter, for supplying the College with water, has proven entirely successful, and it is a great saving over the old way of pumping by steam.

1879 also saw the construction of an outdoor water storage tank behind Main "from which the kitchen, laundry, and everything in the basement of the building, are to be supplied with water."(1)

Both wells and cisterns were dug at the two professors' houses built in 1883 (Osborn Cottage and Sloss House). Earlier wells had been dug for President Welch's house (South Hall) and for the Boarding Cottages. Although no confirmation has been found, it is probable that the two earlier residences, Marston Cottage and Music Hall, had their own wells. A windmill and well were constructed for the Veterinary Hospital in 1885.

By 1890 the need for a more adequate system of water supply for the entire campus had become a necessity as recorded in the Biennial Report for 1890-91:

With the number of inhabitants that we now have upon the grounds and the important necessity for water in the buildings on the

(1) Aurora, June 1879

campus for the providing of the green and horticultural gardens with abundant water, we should have an economical and general water supply for the campus.

The developments and construction of a new water supply and distribution system for the campus are summarized in a report by Professor Anson Marston, included in the 1896-97 Biennial Report, from which the following excerpts have been taken:

In 1893 I was instructed by your honorable body to prepare plans for a college waterworks system....I prepared plans for the system substantially as now completed, and these were adopted by the board of trustees in 1893. Funds for construction were not available at that time, and it was not until 1896 that the necessary appropriation was secured from the legislature. In the meantime the necessity for the system had been demonstrated by the enforced closing of the college for two weeks in 1895 on account of lack of water, and by two or three fires, which had to be extinguished by the primitive method of carrying water in buckets.

The failure of the college spring in 1895 made it necessary to sink a deep well instead of developing the former supply as contemplated at first. In 1896 I made the modifications of the first plans rendered necessary by this fact and by the construction of Margaret Hall....

It has been a source of satisfaction to me that the plans, both for the general system and for the tower and its details, which were originated and fully worked out by me, have been completely approved by the competent consulting engineers to whom they were submitted....

In July, 1896, the contracts for the distribution system and the foundations of the water tower were awarded to Crellen & Lovell of Des Moines, who finished their work in November, 1896. At the same time the contract for the super-structure of the water tower was awarded to the King Bridge company of Cleveland, Ohio, who completed erection in August, 1897.

The contracts for the pumping station were let in May, 1897. Jackson & Moss of Des Moines, constructed the station, installed the pump, and laid the pipe line connecting with the distribution system. Their contract has just been completed....

The college [water] tank is of steel, 24 feet in diameter by 40 feet high, besides the hemispherical bottom. Its capacity is 162,000 gallons, or 5,200 barrels. The balcony floor is 110 feet above the capstones, and the total height of the structure is 168 feet....

The [pumping station] building communicates directly with the boiler room of the college power and lighting station, the boilers of which are utilized to supply steam for pumping. The building is located directly over the artesian well, 2,215 feet deep, from which the college water supply is taken....

The report then showed a total cost of \$34,000 plus \$2,000 for a temporary water supply while the deep well was being drilled.

Over the next few years the distribution system was extended to additional buildings and to new fire hydrants. Repairs were needed on the pump and in 1907 a new well was drilled east of the spring to provide needed additional water.

The water filtration plant was erected in 1915-16 from plans prepared by Professor M.I. Evinger of the Sanitary Engineering department. This eliminated the iron sediment in the water which had been making it "as brown as coffee when drawn from spigots in the buildings."(1)

Another well, #3 was drilled 1919 to supplement the diminishing yield from the older wells. In 1922 one more well was drilled. In that same year meters were installed to measure water usage in each building.

Wells #5 through #10 have subsequently been added to ensure an adequate supply of water for the campus. Some of the earlier wells have been plugged because they no longer furnish enough water to justify pumping.

(1) Biennial Report, 1912-14

SEWERS and DRAINAGE

During the earliest years on the college farm a main problem was disposal of surface waters -- by what today we refer to as storm sewers. In 1868 the Farm Superintendent reported to the Board:

I had a ditch wide and deep enough to carry all the water ordinarily flowing in the slough that skirts along and near the south side of the farm, directly east from where the slough debauches from the bluffs to Squaw Creek, length a little over 100 rods. This improvement conveys the water in a straight due east line into the creek instead of letting it flow over some forty acres of bottom pasture.

That channel still carries College Creek water in a straight line across the intramural fields to Squaw Creek.

In the Minutes for January 1869 it is recorded that

About 130 feet of two inch tile was used to drain the cellar of 2 of the Prof. Houses and properly half that number will yet be used in the cellar of the 3d house. The Drain already cut is doing valuable service.

Those first two houses are those now known as South Hall and Music Hall, while the third one was Marston Cottage.

A year later the Minutes include the first mention of a sewer to serve the College building:

The sewer....consists of a hallow cylinder of Brick made for the purpose laid in mortar. It is over 80 rods long and its interior diameter is 26 inches. It lies every where below frost & in many places runs 8 or 10 feet below the surface. It has sufficient decent and its capacity is such that it will serve for the drainage of all the buildings hereafter erected on the College grounds....

Provision should also be made to run some drains through the land set apart for a garden for the College as portions of it are entirely too wet for garden purposes.

That sewer line from Main was by no means as successful as the 1870 account would indicate. By 1877 it was determined that the sewer was "defective in very many respects and altogether unsuited for the purpose for which it was originally designed." Its condition and a proposed replacement system are well defined and described in the "Report of the Committee on College Sewerage" included in the Minutes of November-December 1877. The old sewer had created conditions which led to an undue amount of sickness among the students as well as obnoxious odors both in and outside of the building.

The first sewer had discharged into the slough south of Main (about at a point where Union Drive nears the northernmost part of Lake LaVerne today). A new sewer was installed in late 1877 and extended east to empty at a location near where Knoll Road crosses the creek. The improvement was noted in the Aurora for March 1878:

The college sewer which formerly emptied into the small creek just south of the building, has been changed so that it now runs east and empties in further down. This change has long been needed, as the odor, which every south wind wafted to the building, was very disagreeable.

Over the next few years changes and extensions were made to the system and by November 1892 the IAC Student reported:

When the work is completed this fall over 6000 feet of sewer line will have been added to that already laid, a line now running from every important building on the grounds.

Filter beds, as a more sanitary disposal system, were installed in 1898 at a location on the north side of College Creek just west of what is today Wallace Road. The system had been designed by Professor Anson Marston, and construction was under contract with J.L. Black of Boone. It proved to be a very successful method of operation.

Much subsurface drain tile had been installed at several areas of the campus to improve soil conditions for plantings as well as to minimize puddles and pools of accumulated surface water.

In 1906 an agreement was reached with the City of Ames granting the city the right to connect a Fourth Ward sewer system into the college disposal plant. The city would be obligated to pay part of the cost of expanding the filterbed area and an annual maintenance and operating fee. It was 1908 before the sewer system for the Fourth Ward was under construction.

By 1916 the load on the disposal plant had become excessive and the following year a new plant was built north of the railroad and just east of the underpass on Haber Road. Construction of that plant included the Imhoff tank and Dosing Chamber, both added in 1920.

The filter beds of the old disposal plants were removed in 1922, and the area was then developed for tennis courts.

In 1925 the responsibility for the operation of the sewer system was transferred from the Engineering departments to the Department of Buildings and Grounds.

The Biennial Report for 1929-30 called attention to the need for expansion of the disposal system:

The college sewage from nine dormitories and all other college buildings passes through a septic tank and filter on the college grounds and thence to a small stream. The filter beds are not only wholly inadequate in size, but are entirely out of repair and all the college sewage is now running into the stream with very slight purification.

Ten years later the Biennial Report (1938-40) shows no improvement in conditions:

During the past year a great number of complaints have been received from residents of the City of Ames living near Squaw Creek below the outlet from the College Sewage Disposal Plant. On account of the overloaded conditions in the plant the treatment of sewage is not complete and it is discharged into the creek at certain times in a condition approaching untreated sewage. In checking the design of the present plant, it is apparent that it was designed for approximately 200,000 gallons per day. Weir readings taken on our main outlet sewer last year indicate that the present flow of sewage ranged from 400,000 to 500,000 gallons per day. In other words, the plant is attempting to treat about twice the flow for which it was designed.

The following year (1941) a joint college-city project was initiated to study and recommend solutions to the problems of sewage disposal for both the college and the city. In 1943 a temporary by-pass sewer was installed to transfer part of the college load to the city system, thus relieving the load on the college plant. An agreement with the city for construction of a new disposal plant was entered into in 1947. Construction contracts were awarded in 1949 and the plant was placed in operation in January 1951.(1)

The college disposal system was then abandoned and the area of the filter beds cleaned out and converted to open field space.

During the fifties there was extensive development of the storm sewer system on the campus to minimize the volume of water into the sanitary system.

By 1979 plans were underway to relocate the city disposal plant farther south on the Skunk River and to increase its capacity to handle the heavier loads of the city and the university.

(1) Minutes, April 10-11, 1952

ELECTRIC POWER and LIGHT

The first electric lights on the campus were installed in old Main and the Office Building in the fall of 1884 under a contract with Western Edison Light Company. The agreement called for the company to furnish a dynamo to be operated by "Suitable belting and counter shafting" to the college steam plant, to provide "250 ten candle Edison Incandescent lamps placed on suitable fixtures or attachemnts" and connected with "a two hundred ten candle light Edison dynamo." The lamps had a guaranteed life of six hundred hours "when burned at normal candle power."(1)

Two years later the number of lamps installed had been almost doubled with a new dynamo added.

In 1892 the supervision of the electrical system was transferred from the office of the Steward to that of the Professor of Electrical Engineering. The July 29, 1893, issue of the IAC Student records:

During the summer vacation several of the electrical engineering students were engaged in putting the Edison three wire lighting system in the college buildings. This gives much better satisfaction than the old and now all rooms are abundantly supplied with light.

The Biennial Report for 1894-95 records that "Our electric light plant has been thoroughly overhauled and its efficiency eminently improved, greatly promoting the welfare of the students.

Lighting of the campus grounds was first discussed by the Board in 1896, but it was at least two years later before any light was placed outside of buildings, when the Board referred to the building committee, with power to act, "the matter of putting in new electric light poles."(2) On October 15, 1900, the ISC Student noted that "An incandescent light has been placed at the foot of the hill by Music Hall." The building named is what was later known as South Hall, originally built as the residence for President Welch in 1809.

By November 1902 the paper could say "Each night shows more lights distributed over the campus, their friendly rays lending light to the wandering pedestrian."

(1) Minutes, Aug. 21-22, 1884

(2) Minutes, July 13-15, 1898

An Agreement was made with the Ames Electric Power Company to extend their service to the college to provide a supplementary power source to the campus in the event of failure of the college plant. In 1909 an agreement with the city provided for the college to furnish power to the Fourth Ward. In 1931 the interconnecting lines were changed from overhead to underground.

During the 1940's extensive revisions were made in the power distribution systems and expansion of plant generating capacity. The load created by the Pammel Court units was carried almost entirely by power from the Ames plant until a new turbo-generator was installed at the campus Power Plant in 1950 after which Ames power was no longer needed. At that time the campus distribution was changed from three-wire to four-wire with an increase in capacity and efficiency of the system. The new cable was installed in buried conduit, replacing the use of electric lines in the tunnels. The change was accomplished over a period of several years.

Installation of new street lighting and additional lights for campus walks and parking lots were major developments in the 1960's.

Improvement, extension and replacement of electrical equipment, generating capacity and lighting is an on-going operation. New substations have been built for greater efficiency in power distribution.

Agreements with the Ames municipal plant have been continued and updated to maintain interconnecting lines for either plant to supplement the other in the event of accidental power outages.

GAS SUPPLY and DISTRIBUTION

In order to provide light in the College Building a gas generator was installed in 1869. The apparatus was furnished and installed by a Mr. Stryker of Chicago, operating under a Rand patent. This equipment was mounted outside at the rear of the building. A gas fitter from Des Moines, John M. Pearce, was employed to install the gas lines and fixtures inside the building.

This equipment worked satisfactorily except in cold weather. It was decided the following year to construct a brick gasometer house around the apparatus, at a cost of \$500.

In 1877 it was determined that a different gas generating system would be less expensive to operate. The new equipment was installed in 1878 and resulted in a saving of \$61.00 per month.

Twice the gasometer caught fire, but each time the flames were extinguished before serious damage had resulted.

By 1883 the potential danger of the gas house location close to Old Main was fully recognized and a new gas house was built farther to the west, just north of the workshops. The new equipment was larger and also furnished gas for the Chemical department.

Electricity replaced gas for lighting in the College Building in 1884. In 1886 a new engine and dynamo for the electric plant were installed in the gas house, at which time a new floor and ceiling were put in and the walls were whitewashed. The original gasometer structure was razed in 1887.

Independent gas generation was provided for North Hall in 1891 and it "will be a great advantage to the Botanical Department."(1)

In 1898 "A new gas plant is being put in west of Morrill Hall for the use of the geological and zoological departments."(2)

Other gas generating equipment was installed until by 1910 there were eight separate plants on the campus. None operated satisfactorily and all required frequent repairs. It was therefore determined that a better solution would be to install gas mains throughout the campus and to purchase gas from the Ames Gas Company. A contract with that company was executed in December 1910.(3) That contract expired at the

(1) Aurora, August 1891

(2) ISC Student, Sept. 20, 1898

(3) Minutes, November and December 1910

end of 1913 and a new agreement was made then with Iowa Public Service Co. to furnish gas to the college.

On January 26, 1933, the Iowa State Student reported a new tentative agreement and proposed contract with the Iowa Electric Light and Power Company to provide gas for the entire college at a wholesale rate. It can be assumed that the contract was subsequently executed.

Old age was catching up with the distribution system. The Biennial Report for 1938-40 records that the "pipe was installed in 1913 and is beginning to rust out in many locations. Innumerable repairs on the gas mains have been made in the last year and it will be necessary to replace all of this piping in the very near future." An appropriation of \$30,000 was requested for that purpose. But it was 1959 before an appropriation of \$25,000 was made. Much of the system was replaced and some new extensions were then made.

Normal maintenance and extensions to new buildings have been made as needs have arisen since that time.

STEAM DISTRIBUTION, TUNNELS and
CHILLED WATER

A contract to build a tunnel from the old Power Station to the new Engineering Hall (Marston Hall), to carry a steam line for heating, was awarded in October 1901.(1)

This was the beginning of the extensive tunnel system for heating pipes currently existing on the campus.

Before the then new Power and Heating Plant was started a contract had been entered into for constructing new tunnels, as recorded in the Biennial Report for 1903-05:

The Board has authorized the construction of tunnels, reaching from the present heating plant, adjacent to Engineering Hall, to connect with the new main building, Morrill Hall and East and West Cottages. These tunnels can be used later to convey heat from the central plant wherever it may be established.

In 1907 the tunnel from the site of the proposed new plant to connect with the existing system was contracted for with Bartlett & Kling at a cost of \$4.45 per lineal foot. The extent of that tunnel was described in the Biennial Report for 1906-08:

The main tunnel is constructed of cement reaching from the plant to a point north and west of Central Building, from which a tunnel branches to the southward, entering Central building, and to the westward connecting with another tunnel that leads to the shops and Engineering Hall. On this tunnel already completed we now carry the director's house, the New Hall of Agriculture, Central building, Morrill Hall, in which the Library is placed, Engineering Hall, the Engineering Shops, Chemistry building and Alumni Hall.

The following buildings remain to be connected and the necessary tunnels must be built for this purpose: Margaret Hall, Horticulture building, the Dairy building, Experiment Station barn and Stock pavilion..

Since that time the system has been extensively expanded as more buildings have been erected on the campus. A major undertaking was the steam line to serve the Veterinary Medicine Facilities where that service is installed in insulated pipe rather than in a tunnel. In 1978 a connecting extension was added to form a loop system for the campus,

(1) ISC Student, Oct. 26, 1901

adding to the reliability of the entire operation.

The central chilled water system was first planned in 1966 when Brown Engineering Company was directed to prepare plans for that installation. Construction began in 1968 and was in operation by 1970.

Expansions and additions, as well as modifications, continue on both systems as the needs arise.

TELEPHONES

Before the advent of the telephone the telegraph was the best system of long distance communication. In June 1874 The Aurora reported:

The Board of Trustees contemplate introducing telegraphy as one of the branches of study....Besides serving as a branch of study for those desiring it, it will be of great practical value to the institution, as a wire will be run from the College building to the telegraph office at Ames. The necessary apparatus will probably be provided by the opening of the fall term in July.

By August the same paper could record that "A wire extending from the farm house to the College is now in successful operation, and the ra-atat-tat of your operators is music in the ears of Miss Bowen."

The first telephone installation was noted in The Aurora in April 1878:

In a few days the President's office will be connected, by telephone, with Prof. Macomber's room in the laboratory. The instruments have arrived in good shape and Prof. Macomber is energetically at work arranging them.

In 1881 a report to the Board of Trustees relating to connecting the college with Ames by telephone was made at the May meeting of the Board. The estimated costs are of some interest:

For installation of poles and lines	\$ 84.00
Cost with one instrument	98.00
Cost with two instruments	112.00
For each additional instrument	14.00

Action was postponed at that meeting, but at the Nov.-Dec. meeting the Board approved payment of \$63.40 to the Ames and Nevada Telephone Co. for putting up telephone lines on the college grounds.

In 1892 IAC Student on May 14 reported that "The telephone line has been extended from the President's office to the Exp. station."

A complete system of telephones, with 20 instruments was installed between buildings in August-September 1898. The ISC Student noted the event on September 6:

Of the many new improvements upon our campus and in the various departments none will be more useful and none is more needed than the [new telephone] system. This new system which is now being put in, will connect all the offices and buildings on the campus, the motor depot included. It means much to the pro-

fessor in the engineering room wishing to talk to a person in agricultural hall or the green house; it means the saving of many steps and much time to all members of the various departments.

A new system was installed in January 1903 by the Boone County Telephone Co. providing each phone with a direct connection to the exchange in Ames. Over the next ten years various agreements were entered into with telephone companies. By 1908 underground lines were called for to eliminate poles on the campus.

In 1930 the first PBX system was installed in Beardshear Hall and later that year a similar switchboard was put in Welch Hall.

Dial phones came to the campus system in 1937. A new switchboard was put in at the same time. It carried 300 extensions and 23 trunk lines.

Pammel Court received its first individual phones to units in 1953. Before that only pay phone booths had been available.

An expanded system was installed in 1957 with a change from three digit to four digit numbers and a capacity of 700 total numbers.

1961 saw the first installation of telephones in residence hall rooms and at the same time the introduction of direct dialing without going through an operator. The system was also expanded to provide for 2700 phones.

The most recent change in systems came in 1965 when all university phones were placed in a new Centrex system and all carried the 294 prefix. At the same time the capacity was increased to provide for 4000 lines.