



The advancement of the science of engineering and the interest of the profession : the Montana Society of Civil Engineers 1887-1899
by Kathleen Lucille Hendricks

A thesis submitted in partial fulfillment of the requirements for the degree of MASTER OF ARTS in History
Montana State University
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Abstract:

On July 5, 1887 a group of mining, mechanical, and civil engineers, architects, and surveyors met in Helena, Montana Territory to form the Montana Society of Civil Engineers. Their purpose was the "advancement of the science of engineering and the interest of the profession." The engineers organized in response to the unique physical and technical problems presented by a new environment, problems which required the sharing of information and experience. They organized to defend their reputations against unqualified and unscrupulous men who claimed to be engineers. They advertised the presence of qualified engineers within the Territory and discouraged the importation of engineers from eastern cities. They exercised a political influence on legislation dealing with matters of engineering and technology.

The paramount goals of the Montana Society of Civil Engineers between 1887 and 1899 were reputation and compensation. The association wished to appear as an advisory body above selfish interests and petty politics. The engineers complained that in spite of exacting standards of education and experience their occupation was ignored, distrusted, and underpaid. They coveted the status attained by the legal and medical professions, which they felt would ensure respect, employment, and financial security.

The early Society was essentially a Helena organization, composed of railway engineers, public land surveyors, gold and silver mining experts, and a few irrigation specialists. By the mid-nineties railroad construction was declining, and many of the Society's charter members left the state. Public land surveys decreased, and surveyors sought employment with cities and counties. Others turned to the construction of hydroelectric plants, or irrigation canals and reservoirs. The decline of silver and expansion of the copper industry drew mining and metallurgical engineers, geologists, and chemists to Butte.

In 1897 the Society acknowledged changes within the profession by amending its name to the Montana Society of Engineers. Civil engineers no longer controlled the organization; increasing specialization and the growth of the mineral industry invalidated the original title. By 1899 the focus of the profession had shifted to Butte's mineral industry. The Society again adjusted, moving the headquarters to Butte. By 1901 increasing technological sophistication encouraged stricter requirements for active membership, but industrialization led to relaxed standards for associate members.

In its first twelve years the Montana Society of Civil Engineers set a precedent of active involvement in the state, in technical development, in legislative action, and in professional standards. But by the end of the century the era of the civil engineers had ended.

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OF CIVIL ENGINEERS 1887 - 1899

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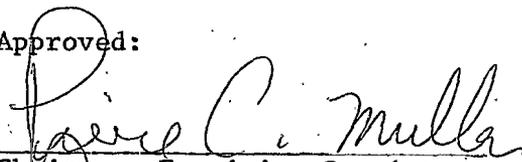
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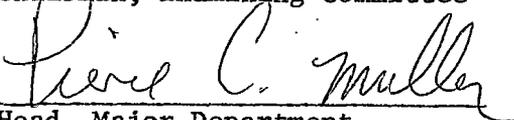
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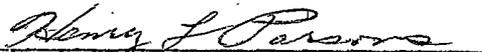
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ABSTRACT

On July 5, 1887 a group of mining, mechanical, and civil engineers, architects, and surveyors met in Helena, Montana Territory to form the Montana Society of Civil Engineers. Their purpose was the "advancement of the science of engineering and the interest of the profession." The engineers organized in response to the unique physical and technical problems presented by a new environment, problems which required the sharing of information and experience. They organized to defend their reputations against unqualified and unscrupulous men who claimed to be engineers. They advertised the presence of qualified engineers within the Territory and discouraged the importation of engineers from eastern cities. They exercised a political influence on legislation dealing with matters of engineering and technology.

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CHAPTER 1

AN ASSESSMENT OF SOURCES

In July 1887 a group of men, composed of civil engineers, mining engineers, and surveyors, met to form the Montana Society of Civil Engineers. This organization, later renamed the Montana Society of Engineers, is still actively involved in engineering in Montana. In 1973 the Society designated Montana State University as its official archives and transferred all records over two years old to that depository.

The story of the records of the Montana Society is not an unusual one, but it has a happier ending than that of most institutional documents of this nature. The Society did not have a clubhouse, so its archives were shifted from place to place and finally disappeared. Occasional attempts were made to trace the papers, but were finally given up in the belief that they had been lost or destroyed.

Then in about 1970, Davidson Piper of the Anaconda Company, a member of the Society, found a box of old papers in a storage room of the Hennessy Building in Butte. (The upper floors of the building house the Anaconda Company offices.) The collection, which included ledgers, correspondence, publications, applications, and minutes of meetings, was turned over to Dix Shevalier of Helena. Mr. Shevalier, a past president of the Society and a member of its Archives Committee, spent many hours cleaning and sorting the papers. In 1973 Mr. Shevalier delivered the collection to Dr. Glenn Martin, Head of the Department of

of Civil Engineering at Montana State University, who had been instrumental in arranging their transfer. Dr. Martin moved the records to the Montana State University Archives, where Ms. Minnie Paugh of Special Collections performed a preliminary inventory.

On receipt of the Society archives, Ms. Paugh inventoried the collection. She arranged the materials chronologically, as far as possible, since it had obviously been so drastically rearranged as to destroy the original order. When an item was undated she left it in the original position with respect to other documents.

The School of Engineering also contributed financially to the historical record of the Montana Society of Engineers, by arranging a research assistantship for a graduate student in history to study the organization and its impact on the development of Montana. I was fortunate enough to be that student, and in August of 1973 began to work with the documents.

The collection has been roughly divided into correspondence, membership lists, membership applications, minutes of meetings, and papers of publications. The correspondence can be classified as letters, financial transactions, proposals for action by the Society and reports of meetings or committees. I see no reason to doubt their authenticity as original records of the organization.

Information for the years from 1887 to 1900 is obviously incomplete. Some correspondence files consist only of transactions;

two receipts comprise the file for 1893. Others include vaguely-worded replies to missing letters. I have been able to add some items to the collection, but much of the information has been gathered from newspapers, particularly the Helena Independent. The Society headquartered in Helena, and often submitted abstracts of meetings to the local papers. Special speakers occasionally attracted news coverage.

Engineering journals, such as Engineering News and the Engineering and Mining Journal yield additional information on professional developments in Montana. The Transactions and Proceedings of the national engineering societies contain some information. From 1888 to 1915 the Montana Society of Civil Engineers was a member of the Association of Engineering Societies, a nationwide group of city and state engineering organizations. The Association published a monthly Journal which carried abstracts of the Society's meetings. The Journal also printed selected papers which had been read before the Montana Society. Copies of parts of the Journal relating to the Society have been added to the collection.

Other sources include contemporary correspondence of some of the members. The F. L. Sizer collection and the Walter W. deLacy collection at the Montana Historical Society were particularly helpful. Secondary sources include histories of Montana and histories of the engineering profession.

One of the problems in working with the collection is that it is an institutional record. The amount and type of material preserved fluctuated with changes in officers. In periods when the Society had no permanent rooms the records were moved about with the officers, and material no doubt was lost. After seventy-five years only fragments of the original documents remain.

The primary value of the correspondence lies in its originality. The letters were written in response to issues and events vital to the Society during the last decade of the nineteenth century. They reveal that the Montana Society of Engineers was recognized by its fellow institutions, to the extent that they requested representation in planning for the Columbia Exposition. This was an era of technical organizations and of professional pride and participation.

A secretary's habit of noting on the back of a letter what action had been taken, e.g. "Read at meeting of Nov 15/90 Ans'd Nov. 22/90 reporting action of MSCE" guides one to the minutes of that particular meeting for a record of the discussion. Letterheads yield addresses and employment records, titles and positions. The style of penmanship and phraseology help one to "get into" the period, and aid in deciphering unclear handwriting.

The letters were written by the central figures of the Society, but not necessarily by central figures in Montana engineering. Often

the men who built the bridges, platted the veins, and surveyed the rail lines were too busy and too mobile to assume the responsibilities of organizational leadership. Also, business letters do not reflect conceptions of oneself and one's role in society as personal letters do.

Some letters reveal more personality: Mr. William A. Haven commented that "If airships were in common use, as an able ex-president of the Am Soc C E hopes soon to be the case, I would gladly take passage & attend your meeting. . . ." Mr. Haven went on to reminisce about the roots of the Society, beginning with Colonel Dodge. He spoke of its use of publicity in matters of public works to uphold engineering standards in the State, and to advertise the existence of expert engineers within Montana. He thanked the members for his election as an Honorary Member, and added that he was now president of the Engineers' Society of Western New York at Buffalo. Mr. Haven, in his nearly illegible writing, left the historian a wealth of information. One is taken back to a time in which air travel was still science fiction to the average citizen. Two of the organizing members of the Society, Mr. Haven and Col. Dodge, are mentioned by name, and policies of the early society are outlined briefly.

Letters are not always so informative. Many referred vaguely to "the matter to which you refer in your favor of the 19th" and one is totally lost as to the subject of the exchange. Elliott Wilson, in a

letter to the Society's Secretary, endorsed the appointment of an alternate delegate to the Committee on the Columbia Exposition, but neglected to give the name of the new delegate. The information is not irretrievable, but a search of engineering journals and newspapers for the Committee proceedings is time consuming.

Financial transactions for the collection are generally fragmentary, but the record for 1899 appears to be quite complete, and yields valuable information on the income and expenses of the Society. On January 20, F. W. Blackford was reimbursed for the expense of type-writing drafts of a proposed bill for State Engineer, indicating an active interest by the Society in legislation concerning their profession. A similar reference to House Bills No. 28 and 29 and to reimbursement of members traveling to Helena to address the legislature confirms this impression. One can go to the Legislative record for further information.

Bills for newspaper offices, such as that of January 21, 1897 for fifteen copies of the Anaconda Standard, send one to the newspaper files in search of a pertinent article. Assessments by the Association of Engineering Societies lead the historian to the Journal of the Association.

The correspondence also included reports of committees, such as the proposed amendments to the Road Law and County Surveyor Law.

A comparison of the proposals with the final legislation provides a hint as to the influence of the Society on the Montana Legislature.

Another category of the correspondence, that of published reports like the Proceedings of the General Committee on the International Engineering Congress. . . helps to establish the position of the Society within the engineering profession, and gives additional insight into the status of engineers in society. In a speech to the Committee, C. C. Bonney, President of the World's Congress Auxiliary Exposition, emphasized his vision of a world-wide cooperation to benefit mankind, and engineers as the architects of the physical structure.

In summary, the Montana Society of Engineers, collection from 1890-1900, is only a vague and truncated reflection of the concerns and activities of the men who composed the Society. The fragmentary nature of the collection, the vagueness of letters and bills, the age of the papers, the blurring of ink, the groupings with no record of who stapled the papers or made the marginal notes, all present problems for the historical researcher. On the other hand, these are original records of the Society, written in response to current events. To my knowledge, they present the only existing internal records of the affairs of the group. No histories have been written on engineering in Montana, so the only other records available are in the technical and engineering journals, local newspapers, biographies and

autobiographies, contemporary histories, or secondary sources. A careful study of the correspondence can provide a guide through these sources, and eventually yield the outline of a picture of the Montana Society of Engineers.

The Montana Society of Engineers was unique among engineering associations, since the organization was formed in 1887, two years before Montana gained statehood. A challenging physical environment yielded opportunity for technological developments. The newness and isolation of the region and the engineering profession's prominence in its development gave the Society an opportunity to shape legislation. Competition from unqualified and unscrupulous men calling themselves "engineer" required establishment of standards of professionalism. The goals throughout the early years, in addition to the development of new technical products and processes, were compensation and reputation.

CHAPTER 2

"CO-OPERATION AND ASSOCIATION:" THE NEED FOR A PROFESSIONAL SOCIETY 1867-1887

From Helena, Montana Territory, November 14, 1877, Walter W.

deLacy wrote to his cousin Fannie,

Our new Surveyor General is a very particular man, and examines all papers himself, something that no other before him ever did. He is not a surveyor, but has asked me to teach him the business, so that he can understand it at least theoretically. He is someone, I believe, a very honest and conscientious man, who intends to try & live on his salary and not rob his Deputies. He is not popular here, because he is honest and don't drink whiskey, and comes from Deer Lodge, but he will be a good one for us I think, and I am heartily glad to see an honest administration once more.¹

DeLacy's surprise at the honesty of the new Surveyor General, Roswell H. Mason, stemmed from a decade's observation of that office. DeLacy had come to Montana in 1859 with Lt. John Mullan, who was building a wagon road from Ft. Benton to the Dalles. In 1861 he returned to the Montana gold fields and spent several years prospecting around Bannack, Virginia City, and as far south as Jackson Hole, Wyoming. In 1864-65 he laid out town sites for Ft. Benton, Deer Lodge, and Argenta, and made the first map of the newly-created Montana Territory. He was appointed Colonel of Engineers by Acting Governor Thomas Meagher, and took charge of a supply train to Ft. C. F. Smith during the "Indian War" of 1867.

DeLacy was by this time a recognized authority on the geography of Montana Territory, and when Solomon Meredith was appointed first Surveyor General of Montana in 1867, he made deLacy his official map-maker. For three years deLacy held the position; he and Benjamin F. Marsh, the field assistant, located the initial point and ran the base line for Montana surveys. In 1871 he left the Helena office for private practice, made surveys for the Union Pacific Railroad, and spent two years as Helena city engineer. Like many engineers and surveyors, he contracted with the surveyor general's office for public land surveys.²

State and Territorial surveyors general were presidential appointees, and the spoils system was the order of the day. Each administration replaced current officeholders with personal friends and party-faithfuls. In some cases, the appointees were good, qualified men. Often, however, they took advantage of their limited tenure for personal gain, awarding contracts to friends and extracting bribes from the deputy surveyors.

In 1871 Henry D. Washburn, Montana's second surveyor general, died from exposure suffered in an exploration of the Yellowstone Park area. President Grant appointed John E. Blaine to replace him. Blaine charged deLacy and the other deputy surveyors 20 percent of each contract he let. In 1873 Blaine was tried for extortion and forced to resign, and Grant appointed Andrew J. Smith of New York.³

A new appointment presented an additional threat, since Smith might bring assistants with him from the East. The deputy surveyor's position was extremely insecure, based as it was on the whims of Congressional appropriations, political patronage, and the graft of greedy surveyors general. "Federal Officers, who have the giving of Contracts, can practice any amount of extortion," complained deLacy,

1st because they can always find men to take Contracts, who need them, and next because it is useless to complain to higher authorities as every obstacle is thrown in the way of getting a conviction, or having them removed, and 3rd if they are removed the probabilities are that their successors may be worse. Such is the civil service of the U. S. This Surveyor General promises me a good Contract this year if he gets sufficient appropriations, and as nearly all the profitable work will be done then, I shall take no more Contracts, but endeavor to get into some other way of life, where there will be less risk, and perhaps as much profit, and where I will not be under the mortification of having to give up a portion of my earnings to a set of scoundrels. I would not mind it so much if the men sent out here, were not [sic] of ordinary respectability and good habits, but they are not. Our former Surveyor Genl. Blaine, was an awful drunkard, came near being convicted of extortion, and had to resign, and in the course of a few months, was appointed Paymaster in the Army, with the rank of Major. Our present Surveyor General is also a drunkard, and an utterly idle man--has no profession, and after being two years in his office don't know anything about his office except to sign the papers that are presented to him. . . .⁴

In 1877 President Hayes suspended Smith, and appointed Roswell H. Mason, whom deLacy characterized as "the first honest Surveyor General that we have ever had." Mason was sensitive to the problems of the deputy surveyors and to the defects in the system of public land surveys which contributed to corrupt practices. While many of the

charges of greed were undoubtedly justified, part of the problem arose from legislation unfit to the rough, inhospitable land being surveyed.⁵

Montana presents a striking contrast to the broad river valleys of the East, or the gently rolling hills of the Great Plains. The western river valleys are often narrow and winding, framed on either side by steep, heavily-forested mountains. To the east, the Missouri and Yellowstone Rivers and their tributaries boast rich agricultural lands, but the valleys are still narrow by eastern standards, and flanked by 300' embankments. The plains above the rivers are broken by rough canyons a hundred feet deep. The winters are bitter, with occasional -40 degree temperatures, heavy snowfall, and piercing winds; spring comes late and wet, turning streams to torrents and low lands to bogs.⁶

Rough terrain and short, unpredictable seasons hindered the surveyors. The party of Rollin I. Reeves, surveying the boundary between Wyoming and Montana, quit work in the fall of 1879 near Cooke City, Montana Territory. Reeves wrote,

On the morning of October 6th a light snow was falling. . . . On the morning of the 9th while it was still snowing, a part of our number went out on line and brought in the instruments and tools that had been left on line the evening of the 5th. Although this point was not two miles from camp, it was the hardest day's work experienced by several members of the party during the survey. The surface is covered with fallen timber, dense undergrowth, and vast quantities of boulders and broken stones.

The snow was wet and heavy. As it fell from the trees it drenched the men through and through. It required nearly all

day to bring in the instruments. Accordingly the camp was disbanded, some going to Yellowstone Park, some to Bozeman, some to Crow Agency, and others to Fort Washakie. . . .

In the spring the survey continued, and Reeves records the loss of a man who "must have fallen down one of the numerous horrible canyons which are notorious in that region. His horse and coat were found but not himself though vigorous search was made for him along the streams and along the lower levels."⁷

Physical conditions were further complicated by the survey system's administration. Each session of Congress appropriated a lump sum for the survey of each state or territory, and specified the rates to be paid for work done. The surveyor general then let contracts to bonded deputies who carried out the work. On completion of the survey, the deputy made up his notes, which were examined by the surveyor general's staff. If approved, maps and notes were sent to the General Land Office in Washington, D. C., and an examiner checked the work in the field. If the survey was approved, the plats were sent to the land offices, the settlers could enter their claims, and the surveyor was paid.

Meanwhile, the deputy was forced to borrow money to cover his operating expenses. He had to provide all equipment, horses, and board for his men, in addition to salaries. He competed for labor with the farmer and miner, and was forced to pay \$2 per day, including idle days. The season generally began late, due to delays in Congressional

approval of appropriations and ended in October or November with the first heavy snows. During the winter the deputy surveyor spent his time in making up his notes and maps, so was unable to work at other jobs, except perhaps on occasional mineral survey. He also had to pay board for ten or fifteen horses, at \$2 per head per month. Final approval of the survey might take as long as three years, during which the surveyor was charged twelve percent interest on his loan.⁸

Regulations governing the surveys augmented the problem. The appropriation bill specified the classes of land which could be surveyed; deputies surveying other lands would not be paid. Only non-mineral timber lands could be surveyed, and no pastoral lands. The system put the burden on the surveyor, who must decide how the land should be classified. As deLacy pointed out, in a letter to Surveyor General Mason, men unaccustomed to the arid sagebrush flats of the West were often unable to judge the land's fertility.

In 1863, I was one of the first to enter the Stinking Water Valley, on my way to the far famed Alder Gulch. I thought then that I had never seen a more desolate or worthless looking valley. It was covered with sage brush. Within two years this sagebrush land proved to be excellent farming land, and to-day the valley contains many thriving farms, well cultivated, has at least two towns and a large number of herds of cattle, horses, and sheep, besides mines on every side of it.

I have seen the same thing in other places in this Territory, in California, in Idaho, and in Washington Territory. My experience has been a very varied one, yet withal I might survey land and declare that it was agricultural; it might be inspected by some one who had no experience in this country and rejected as such, and I might lose my time, my money, and my employment.⁹

Mason used deLacy's argument to plead for a change in the system. He pointed out that settlers often misrepresented land in requesting a survey, because they were unaware of the classifications and also because they were not sure where the township lines ran. A surveyor might take a contract for a given township, buy provisions, hire a surveying crew, and travel to the site, only to find that it was not agricultural land and thus not surveyable. In this case he was supposed to survey those portions legally acceptable and then find other townships to substitute. "The temptation is great," Mason acknowledged,

to proceed with the subdivision of townships included in his contract, irrespective of the character of the land, especially when, as had been the case for the last two years, the appropriation for surveys is made so late that the deputy cannot get into the field until long after the fiscal year commences; has to work in the late fall and winter, until the snow drives him in, and go out again to finish the work in the spring, when the weather is, if possible, worse.¹⁰

Mason recommended that the entire territory instead be surveyed into townships, with comprehensive descriptions of topography. More complete surveys could be made as the country was settled.

The Surveyor General also emphasized the importance of examinations in the field. All work was to be inspected by an official who would repeat a portion of the survey, checking for accuracy, construction of corners, and description of topography. Except for examination of the form of the notes, this was the only check on surveyors. Unfortunately, inadequate appropriations limited the surveyor general's staff and

delayed copying of notes and maps and examination of surveys in the field. Many surveys were never examined, either because the surveyor general lacked the time, skill, and funds, or because he considered the position as a sinecure. When fraud was discovered, neither surveyor nor bondsman was prosecuted.

Often the surveys were poorly done, for many of the surveyors were unskilled. Some were railroad engineers who had no experience in land surveys, were unfamiliar with the territory, and did not know how to write up the field notes. Others had no knowledge of surveying at all, or lacked even "the slightest knowledge of mathematics."¹¹

The men's morale was undermined by decreases in rates. In the early 1870's rates were \$15. per linear mile on standard lines, \$12. for township, and \$10. for section lines. In 1876 the rates dropped drastically, to \$10. for standard lines, \$7. for township, and \$6. for section lines. Augmented rates were allowed for "heavily timbered land," but the maximum was \$13. per mile, less than the previous standard rate. In 1877 regular rates were the same, but augmented rates rose to \$16. for standard lines, \$14. for township, and \$10. for section lines in "heavily timbered and mountainous" regions. In 1878 Mason compared the 2.8¢ per acre paid Montana surveyors with the 7¢ paid by the Province of Ontario, and requested an increase in rates. Rates were increased in 1880 to \$12., \$10., and \$8., but Mason's report effected no significant changes in the system of public land surveys.¹²

Mason remained in office throughout the Hayes administration, but in 1881 President Chester Arthur appointed Henry M. Teller as Secretary of Interior. John S. Harris, former Louisiana Senator and director of the Texas & Pacific Railroad, became Surveyor General of Montana Territory. The following year Congress again decreased survey rates, allowing \$9. for standard lines, \$7. for township, and \$5. for section lines. Augmented rates were \$13., \$11., and \$7. In less than a decade rates had dropped to sixty percent of the original level, but the least accessible land remained to be surveyed. In 1883 Walter W. deLacy wrote to Congressman Martin Maginnis, warning that at the decreased rates many surveyors had lost money the previous year. Unless rates were revised, none would be willing to take contracts for the next season.¹³

There were, however, other ways to make money in the rapidly-growing western territories. As settlement extended westward homesteaders demanded surveys describing the land so they could file claims. An act of 1862 established the special deposit system, by which settlers demanding a survey deposited its cost in a government depository. After 1871 the settlers were issued certificates of deposit which could be used to pay for homestead or preemption lands in the township being surveyed. In 1879 another act allowed the certificates, or "scrip," to be applied to lands anywhere in the United States. This created a market.

for the certificates, bought by speculators at 93 and 94¢ on the dollar. With time, the schemes became even more elaborate.¹⁴

In 1882 Frank L. Sizer, Chief Clerk in the Montana Surveyor General's office, wrote to R. W. Burns of Yankton, Dakota Territory,

I wish to tell you confidentially that I know that a large amount of scrip will be issued in this Territory this season, and if you desire I can put you in communication with the parties to whom it will be issued directly--This will be first hands you see and you ought to be able to make a very good bargain with them, but please remember that I must make something out of it--and govern yourself accordingly.

Sizer estimated that a man with \$10,000. cash to invest could realize a twenty-five percent profit within a year.¹⁵

In addition, Sizer attempted to guarantee the presence of scrip by encouraging settlers to apply for special deposit surveys. He wrote to a friend, E. J. Hall of Denver, that he needed "a sharp business man who can talk well and explain away the doubts of the honest ranchman in regard to signing the Application and the assignment of the scrip."

The business was evidently profitable, for he was willing to pay a starting salary of \$150. per month--equivalent to his own--plus expenses.¹⁶

Sizer's correspondence indicates that Surveyor General Harris was aware of the scrip schemes, if not actively promoting them. When E. E. Cunningham, ex-Surveyor General of Nebraska, wrote to Harris attempting to get a share in the schemes, he was turned down, but Harris had given Sizer "full swing in the office."¹⁷

By 1885, when Grover Cleveland was inaugurated President, corruption in the special deposit system was widespread. The new Commissioner of the General Land Office, William A. J. Sparks, reported to Interior Secretary L. C. Q. Lamar that "condonement of irregularities had come to be regarded as a part of the official duty of the supervising and accounting officers of the Government.

I found that augmented rates for surveys were allowed upon no other evidence than the character of the survey warranted such rates that the interest statement of the contractor; that it was common to allow townships to be surveyed other than those originally embraced in the contracts upon which the liabilities were estimated; that it was a frequent practice of deputies to return a survey for part of a township under a deposit for the whole, and omit the remainder as unsurveyable, when upon a new deposit being made another contract would be procured and the land returned as surveyed, or, upon receiving a contract for the survey of a township, the deputy would execute the easier portion and leave the more difficult to remain unsurveyed and to become subject to an extra charge to the government hereafter, and that it has not been uncommon for deputies to be paid twice for doing the same work, once for the original survey and again for 're-tracing' it under another contract.¹⁸

While these conditions did not exist to the same degree in all the western states and territories, reform obviously was needed in the public land surveys. When Harris left office in 1885, deLacy's friends recommended his appointment as Surveyor General, but Interior Secretary Lamar appointed an old school friend, Benjamin H. Greene. Greene's appointment, based on his acquaintance with Lamar, was not unusual. His uniqueness derived from that fact that he was a practicing engineer, with a substantial reputation.

When Greene arrived in Helena, he and deLacy discovered that they had worked together as engineers on the New Orleans and Jackson Railroad in 1852. The two men had much in common; both were born in the South though deLacy, born in 1819, was ten years older than Greene. Both men were college graduates, and deLacy had been tutored at West Point (though never admitted) and taught at Army and Navy schools. Both began their engineering careers in railroad construction, both were involved in surveys for road and canal schemes in the southern states and in Central America. Greene served in the Confederate Army, deLacy volunteered for the Mexican War and the Yakima Indian War of 1855. Both had endured physical hardships--Greene on Confederate battlefields and Mississippi levee reconstruction, deLacy on Southwestern deserts and in building roads to Canadian gold fields--and were victims of the cyclic financial crises and the political maneuvering of nineteenth-century America.¹⁹

DeLacy readily accepted Greene's offer of a position as Chief Mineral Clerk, confiding to Fannie that

It suits me very well, what with my knees, and my being so heavy, it is difficult for me to get along over the mountains, and I shall be glad to have a rest. There are so many surveyors in town, and everywhere, that it is difficult to make more than a living--and there will be plenty more to come with these railroads.²⁰

Railroad location and construction brought many surveyors and civil engineers to the West. In 1886 the Great Northern Railway was approaching Great Falls, and its subsidiary, the Montana Central, was

building lines linking communities along the Continental Divide. The Northern Pacific, unable to build branch lines until the road was completed to Tacoma, organized the Northern Pacific & Montana Railway Company to begin adjunct work in Montana. Competition was keen, J. J. Donovan of the Northern Pacific recalled, "crossing in the field, fighting in the courts, yet with no bad blood between the two corps of engineers." And when the Montana Central reached Helena, rival engineers welcomed it with a sign, "'N. P. Pay your money. Take your choice. M. C.'" Location was not always so peaceable; E. H. McHenry recalled an armed confrontation when the Northern Pacific "jumped" part of the Union Pacific's abandoned line between Dillon and Helena.²¹

Generally, though, the engineers were more concerned with problems of climate and terrain. John Stevens, writing in 1926, recalled his discovery of the Marias Pass in 1889. E. H. Beckler, Chief Engineer of the Puget Sound extension of the Great Northern, hired Stevens to search for the legendary pass through the northern Rockies. Stevens left Ft. Assiniboine, near Havre, in late November, with some inaccurate reconnaissance sketches, team and driver, a saddle horse, and an assistant from St. Paul "whose friendship for John Barleycorn made him worse than useless to me." The party traveled through blizzards all the way to the Blackfoot Agency, where the white man balked. The Blackfoot Indians, fearing the evil spirit at the river's head, refused to accompany Stevens. A Flathead murderer seeking

refuge with the Blackfoot finally agreed to go, for the price of some woolen underwear, a red blanket, and the promise of a jug of whiskey when they returned. The Indian "played out" near the false summit, so Stevens built him a fire and continued west. He found the pass and satisfied himself that he had found the Pacific watershed, but it was too near dark to return.

It was practically impossible to build and keep a fire going, so I tramped a track about a hundred yards in length and walked it back and forth until enough daylight broke to make it safe to travel. . . .When I reached the Agency, I found that the mercury had been at 36 deg. below at the Agency the night I spent on the summit, some 1500 feet higher and what it was there, the good Lord only knows but the mosquitos didn't bother me.

Location of the Great Northern Railway through Marias Pass shortened the line a hundred miles and saved in curvature and grade line, making the Hill road the most efficient and economical of the transcontinental lines.²²

The problems of curvature and grade plagued mountain railway location. W. A. Haven, Northern Pacific & Montana Railway engineer, came to Montana from the Erie Railway where maximum grade was five-tenths percent and curvature four degrees. On the line from Helena to Butte his superior set the limits of a four percent grade and a twenty degree curve. "I might say," Haven added, "that we did not exceed these limits excepting on the railroad from Boulder to Elkhorn, where we made a four percent grade and a twenty-two degree curve." He had trouble, however, finding a locating engineer who could survey to a

grade line until his leveler, E. H. McHenry, said he could do the work. "All right, go ahead; if you can do it your pay will be \$100 per month as a starter, instead of \$40 as leveler." So this was the beginning of the upward growth of McHenry."²³

In 1889 McHenry, searching for an economical route for the Northern Pacific line east from Butte, reconnoitered Pipestone Pass and discovered the pass he named the "Homestake."

On the western side of the [Homestake] pass, the slopes were very precipitous, dropping 800 feet in three-quarters of a mile to the upper "bench" of the Black Tail Valley; there was, however, ample distance in which to make the descent before the crossing of Silver Bow Creek was reached and accordingly there were no location problems to be solved on this side of the mountain, apart from the difficulties introduced by the excessive roughness of the slopes which is a characteristic feature of the granite formation of this general region. This condition was very marked in the Homestake Canyon on the eastern slope of the mountain which later taxed both the physical and trigonometrical powers of the engineers to their utmost in fixing and marking the line of definite location, thru the wild and tangled mass of huge boulders, timber and brush as then encountered.

Incidentally, these conditions afforded good shelter for both bears and mountain lions which were frequently and in some cases, most humorously encountered by the engineers, until they were finally driven out by the heavy blasting, when the construction of the roadbed was begun.²⁴

Bears and mountain lions, inclement weather, rugged mountains and swift snow-fed streams all presented physical and technical problems for engineers trained on eastern railroads. The civil engineers recognized the advantages of sharing new and innovative skills.

Montana's mineral wealth presented another challenge, as the mining engineers developed elaborate mechanical and chemical processes

to deal with the stubborn ores. By 1886 placer mining had given way to quartz and silver operations, and investors recognized Butte's copper potential. In 1885 Montana produced \$21,954,150. worth of gold, silver, copper, and lead, an increase of fifty percent over the previous year. Of that total, silver contributed \$11.5 million, copper \$6.78 million, and gold 3.4 million. By 1887 the respective values were \$17.8 million, \$8.85 million, and \$6 million, for a total over \$33 million. Mines, smelters and mills required knowledgeable management, attracting engineers from the Comstock Lode, from eastern states, and from other engineering pursuits.²⁵

Montana's engineers were gaining recognition for their expertise, serving on special committees advising cities and counties on engineering development. In June of 1886 Benjamin Greene, Walter W. deLacy, and Col. J. T. Dodge, Chief Engineer of the Montana Central Railroad, were appointed to a commission on a sewer system for the city of Helena. The commission was apparently an advisory body to City Engineer George K. Reeder, who had presented a detailed report to the city council. The Independent commended the report, but added,

It shows consideration beyond his years, but we must differ with Alderman Duff's assertion, that he is competent, in conjunction with the sewerage committee, to devise a system satisfactory to the city. It is entirely too large a question to be handled by any but experienced sanitary engineers and the amount involved is too great. . . .²⁶

The Helena paper's demand for an "experienced sanitary engineer" illustrated the local engineers' lack of status. Thirty years later

W. A. Haven recalled his humiliation when Helena "sent to St. Paul to get an Engineer to tell her how a city on a steep hillside could be drained."²⁷

Montana's engineers were becoming aware of themselves as a profession, in the sense of a group of men whose occupations required specialized skill acquired through education and experience. Greene's arrival in late 1885 coincided with Montana's development into a state; with the movement for reform in public land surveys; with rapid expansion of railways, mines, and smelters; and with a national trend toward organization of scientific and technical professions. Contact among deputy surveyors operating out of Greene's office and the railroad and mining engineers headquartered in Helena contributed to a sense of unity. Territorial demands for statehood added a note of permanency, and engineers began to think of themselves as citizens of Montana, with professional reputations to protect.²⁸

An immediate concern was to exclude incompetents, such as inexperienced surveyors and speculators, from practice of engineering. Protection was needed, too, against attempts to reform the public land surveys. Cleveland, Lamar, and Sparks threatened both the surveyors' reputations and their economic interests. Letters by individuals such as deLacy and Mason had been relatively ineffective in raising rates, setting standards for deputy surveyors, or amending the survey system, but an organized group could exert more influence.

On March 22, 1887 a group of Montana engineers and surveyors met to take "the preliminary steps toward the organization of a Territorial Society of Civil Engrs. and Surveyors. . . ." which would be known as the Montana Society of Civil Engineers. Sixteen men are listed in the Society's records as Organizing Members: Benjamin H. Greene, Montana Surveyor General; Eldridge Beckler, Chief Engineer of the Montana Central Railway; Joseph Harper, Butte City Engineer; Henry B. Davis, Deputy Mineral Surveyor; James Keerl, Chief Clerk, Surveyor General's office; John Wade, Deputy Mineral Surveyor; Joseph T. Dodge, Chief Engineer in the construction of the Mullan Tunnel; Elliott H. Wilson, Deputy Mineral Surveyor; Adelbert E. Cumming, Deputy Surveyor; Robert J. Walker, Deputy Surveyor; L. R. Lothrop, Division Engineer, NP & Montana Railroad; Walter W. deLacy, Chief Draftsman, Surveyor General's office; George Reeder, Helena City Engineer; Sigmund Deutsch, Deputy Surveyor; George O. Foss, Assistant Engineer, NP & Montana Railroad; and George Swallow, Montana Inspector of Mines. These occupations were by no means exclusive. Some men gained experience with the railroads, went on to survey public lands or mining claims, then bought an interest in a promising mine, or built and operated a smelter. In the nineteenth century "civil engineer" usually meant "civilian engineer," as distinguished from military engineers. As the engineering profession expanded, requiring unique skills acquired through specialized education or practice, mining, metallurgical,

mechanical, and electrical engineers demanded the distinction of precise titles. "Civil" was confined to construction, transportation, irrigation and city and county engineering. Biographical information on the men is incomplete, but of the sixteen, at least eight were college graduates and six of those had studied civil engineering. At least fourteen had worked as railroad engineers, four on irrigation or flood control, twelve were surveyors, six owned or managed mining properties, three had taught, and five were city engineers.²⁹

In May Reeder, Wade, and Keerl issued a circular inviting the Territory's engineers to a meeting in July. The invitation reviewed the March meeting, explaining that "It was the sense of the meeting that if other professions were benefitted by cooperation and association, that similar advantages will accrue to our prospective society."³⁰

The desire for association was based on a realistic assessment of the profession's status in Montana. Fraud and incompetence in public land surveys threatened its reputation; city and county governments refused to recognize local engineers' skill and responsibility; railroads and mines required new techniques adapted to the physical environment. In addition, the region's rapid growth attracted engineers from the East, where professional associations were well-established. In Montana they found unique opportunities to influence legislation, to direct development, and to set precedents for professional standards.

Organization of a professional society marked a change in attitude of Montana engineers. They no longer regarded the Territory as a temporary location to be exploited for quick profits. Instead she presented vast opportunities for development, and the engineering profession would lead in that development. "Montana," boasted E. H. Wilson at the Society's first annual meeting, "affords the best of fields for the exercise of professional skill.

Her granite barriers separate four valleys which demand union. Her hills abound in metallic wealth and the experiences there with our brothers, the mining engineers, have placed them in the vanguard of progress. Munificent nature assures us that in these valleys and on the flanks of these mountains a populous empire will be supported--demanding the best efforts of the mechanical, mining and civil engineer. In the lustre which the next decade will shed on Montana's developments, let the past and present be fulfilled, and let us all, fellow members, endeavor to make the name of Civil Engineers' Society of Montana shine bright.³¹

CHAPTER 3

"THE MAIDEN EFFORT;" LEGISLATION AND INFORMATION 1887-1889

By 1887, Montana was no longer a wilderness. The frontier was gone, Indians were relegated to reservations, placer mining had given way to a sophisticated mineral industry, and agriculture was spreading throughout the fertile valleys. Twenty years of development had revealed the wealth of the Territory's resources; she anticipated her status as the "Treasure State," and clamored for entrance into the federal union. Butte's copper mines rapidly expanded, smelters were built, and high-grade matte was shipped east for refining. In 1887 Marcus Daly's Lower Works Smelter processed 3000 tons of copper ore per day. That year Montana produced \$5,978,536. worth of gold, \$17,817,548. worth of silver, and 78,700,000 pounds of copper.³²

While the primary source of Montana's wealth was mineral, territorial entrepreneurs recognized the potential of her forests and rich agricultural lands. The Territory boasted nearly half a million head of cattle, valued at \$9.5 million, and a million head of sheep worth over \$2 million. Nor was the region uncivilized. Montana's two hundred school districts enrolled 12,000 pupils. Already half a dozen towns claimed over 1000 inhabitants, and agricultural communities planned flour mills and breweries. The Utah & Northern Railroad from Ogden to Silver Bow had been completed in 1881, and the Northern Pacific

connected Helena with the East in 1883. The St. Paul, Minneapolis and Manitoba, renamed the Great Northern, reached Great Falls in 1887. The mood of the Territory was one of optimism, promotion, and expansion. Engineers obviously would play a major part in Montana's growth.³³

To assure and direct their role, a group of engineers met on March 22, 1887, and appointed a committee "to draft a Memorial to the Engrs. and Svrs. of the Territory asking their cöoperation in the organization of a Territorial Society of Civil Engrs. and Surveyors." The idea of a professional organization met with approval, and July 5, 1887 forty-six men gathered in Helena, in the office of Surveyor General Greene, to organize the Montana Society of Civil Engineers.³⁴

Colonel J. T. Dodge was elected president. He had been Chief Engineer for the Northern Pacific's Mullan tunnel, and built the Helena & Jefferson Railroad from Helena to Wickes. First Vice President was Elliott H. Wilson, who had come to Montana in 1871 to survey the Northern Pacific route. In 1884, following construction work on the Union Pacific, he settled in Butte as a U. S. Deputy Mineral Surveyor. George K. Reeder, Helena City Engineer was elected Second Vice President.

Secretary and Librarian James K. Keerl had worked on the Louisiana Division of the Texas & Pacific Railroad under Benjamin Greene. When Greene was appointed Surveyor General of Montana Territory, Keerl accompanied him as Chief Clerk. John W. Wade, Treasurer, came to Montana in 1880 to work on the Helena & Northern Pacific Railway, later

was elected Lewis and Clarke County Surveyor, then Helena City Engineer.

The Society elected three trustees: Eldridge H. Beckler had been Engineer-in-Charge of the Bozeman Tunnel on the Northern Pacific, and in 1887 replaced Dodge as Chief Engineer of the Montana Central Railway. Joseph Harper came to Montana from the Union Pacific, built the Glendale smelter for the Hecla Consolidated Mining Company, and in 1884 was elected Silver Bow County Surveyor. The third trustee was Walter W. deLacy, Montana's "Pioneer Engineer."

At its first meeting the Society adopted a constitution and by-laws. While the name specified "civil engineers," mining and mechanical engineers and architects were also admitted. The stated goal of the organization was the "advancement of the science of engineering and the interests of the profession." The Montana Society of Civil Engineers would accomplish this goal by providing social interaction and intellectual stimulation, by exchanging knowledge of processes and products, by publicizing accomplishments of the profession, and by unifying the Montana engineers into a group capable of exerting political force in Territorial affairs.³⁵

The first monthly meeting of the Montana Society of Civil Engineers was held August 20, 1887, when some of the members met in Dodge's rooms to discuss engineering subjects. "These meetings," commented the Helena Independent,

promise to be very interesting and profitable to the members of the profession and in the mountain country where difficult engineering problems are constantly arising, the discussion in the society may prove highly valuable.³⁶

A week later the Society held a special meeting to issue a memorial on the death of Colonel J. B. Clough, Engineer-in-Charge of Northern Pacific work in Montana. Clough was not a member of the Society; the resolutions praising his engineering ability indicated a desire to call the Territory's attention to the accomplishments of the profession as a whole.³⁷

Throughout the fall of 1887 the Society was rather inactive, probably because the engineers were racing to finish their surveys and construction projects before winter. In October President Dodge retired and returned to the East. Apparently no one replaced him in office until the annual meeting, in January 1888, when George Reeder was elected President, and E. H. Beckler became Second Vice President.³⁸

The first annual meeting was a gala affair; the business meeting was followed by a three-hour banquet featuring

Blue Point Oysters with Celery.
 Consomme Imperial.
 Brook Trout with Parisienne Potatoes,
 Sauce Maitre d'Hotel.
 Sweet Breads with French Peas,
 Lardia Filia of Beef with Champignons,
 Mashed Potatoes and Asparagus.
 Chicken Salad with Mayonaise Dressing.
 Peach Ice Cream,
 Fruit Cake, Lady Fingers, Macaroons.
 Meringue Kisses, Confectionary.
 Oranges.
 Roquefort Cheese, Stilton Cheese,
 Water Crackers.
 French Coffee and Cognac.³⁹

Laudatory toasts followed the dinner. "Let us congratulate ourselves," began E. H. Wilson, "on membership in a profession which builds monuments for the comfort and happiness of humanity.

.....
 We are asked what practical good is offered with membership in our society? I would answer that as engineers it will credit us with laudable ambition at least among our professional brothers. It will invite a healthy emulation among ourselves. It will publish in our own communities the fact that Montana has experts amply equipped to conduct the system of improvements that her development demands.

The opinion of our society should form an oracle whose adverse criticism will be a bar to slovenly, venal or unprofessional practice on the part of outsiders as well as members. It may, by the insurance of good work on the part of its members, secure to us suitable reward for our exertions.

These are the promised benefits to secure which we should remember that upon each one of us individually, in whatever capacity employed, devolves the duty of protecting the good name of the society and the profession. . . .⁴⁰

The Montana Society immediately began the program outlined by Wilson--developing its reputation within the state and among national engineering societies; upgrading professional practice, thereby insuring employment and financial rewards; and protecting the name of the Society and of the profession. One way of gaining publicity on a national scale was by affiliation with the Association of Engineering Societies. The Association was a union of state and local societies, extending from Boston to Kansas City, from Wisconsin to St. Louis. The monthly Journal provided reasonably inexpensive publication of papers and proceedings, acquainted Montana engineers with new technical processes, and provided a forum for discussing common concerns. The most crucial

argument for joining the Association of Engineering Societies was the need for unity within the profession.⁴¹

The civil engineers' alliance was directed against the domination of army engineers in national public works. The chief complaint was that army engineers were put in charge of public works, relegating civilian engineers to subordinate rank and lower pay. Competent civil engineers refused to work under such conditions, and national public improvements suffered as a result. West Point graduates acquired abstruse theory, but lacked the pragmatism needed for successful engineering. While recognizing military engineers' proficiency in their field, the civil engineers resented "the establishment of a sort of titled nobility in the profession," and insisted that civil works were the specialty of civilian engineers.⁴²

The Council of Engineering Societies on National Public Works, formed in 1886, had introduced the Cullom-Breckenridge bill to create a bureau of harbors and waterways and a corps of civilian engineers to plan and construct all public works. The Montana Society of Civil Engineers joined the movement. In April 1888, it drafted a memorial to Congress, supporting the Council's activities and recommending the proposed bill as a solution to the wasteful, underpaid, and poorly-executed system then in existence.⁴³

Engineering societies tried to gain status as experts not only in construction, but also in regulation. In July 1888 the

Montana Society received a letter from the Western Society of Civil Engineers at Chicago, concerning state appointment of engineers to inspect highway bridges. The members responded favorably to the idea of a state engineer, and agreed to cooperate with the Western Society in setting a scale of minimum rates "for preparing working plans and specifications for bridges." Ex-President Dodge wrote that "there is no place where the public is more exposed to danger than in crossing a bridge; there is no work where expert knowledge is more requisite. . . ." Yet in many cases highway bridges were constructed by unskilled laborers, with no expert supervision.⁴⁴

The Society did not agree, however, that a state engineer should extend his inspection to railroad bridges. First of all, the State might then be held responsible in case of failure, and secondly, a responsible company would employ an engineer equally, if not more competent. The state engineer "would, to a large extent, be remunerated by the honor of the position, and the intense satisfaction afforded through the opportunity presented of serving the public," Montana engineers apparently doubted that an engineer's sense of public responsibility would overcome the financial advantage offered by corporate employment.⁴⁵

The reluctance to regulate railroad bridges reflected, at least partially, the dominance of railroad men in the Society. In 1887 and 1888 the officers were all organizing members of the Society, and all

civil engineers who had worked in railroad location and construction or as deputy surveyors. Technical discussion emphasized such topics as "Railway Location," "Tracklaying of the Montana Central Railway," or "whether a locomotive engine was capable of producing as much effective power while backing as when pulling. . . ."46

In 1889 the Society, though still concerned with railroads, became involved in a variety of subjects. That January Benjamin H. Greene, Montana Surveyor General, was elected President of the Society, Elbridge Beckler became First Vice President, and Henry B. Davis Second Vice President. Davis had worked on the Northern Pacific, surveyed public lands, and in 1885 was elected Deer Lodge County Surveyor. Treasurer Charles W. Helmick was the partner of George Reeder, and Thomas T. Baker, who replaced Harper as Trustee, had been the first Silver Bow County Surveyor. Baker was also a competent mining engineer, the first to hold office in the Society.

The second annual meeting included an excursion to Butte and Anaconda. The Society held its business meeting on January 19, 1889 in Helena, then on the twenty-first took the Montana Central Railway to Butte, observing details of construction on the way. After lunch the group boarded the Montana Union train for Anaconda, where they were met by Marcus Daly and conducted through the "Swansea of the West." Returning to Butte, they met for the annual reports of the Secretary and Treasurer and an address by retiring President Reeder on "The

Panama Canal." The banquet, with the usual toasts and speeches, lasted from 10 p.m. to 3 a.m., but the men were up the next morning for a tour of the Butte mines and smelters.⁴⁷

At the afternoon business meeting A. B. Knight, a Butte mining engineer, proposed that the name of the Society be amended to "The Montana Society of Engineers." He explained that the change would be more consistent with the qualification for membership, and "that the objects of the Society would probably be promoted by the change indicated." Civil engineers held the balance of power, however, for the amendment failed by a vote of fifteen affirmative to sixteen negative.⁴⁸

At the same meeting, George Foss presented a paper discussing problems of defining mineral locations from county records. The paper, along with a letter from George H. Robinson on mineral location, led to two bills which were presented to the Legislature in February 1889.⁴⁹

On February 12, 1889 the Montana Society called a special meeting to discuss a bill on the location and recording of mining claims. After considerable debate and several amendments, James Keerl suggested that the bill be examined by an attorney, to assure consistency with federal laws. Those in favor argued that

the bill affected materially the mining interests of the territory and would doubtless receive severe criticism from those affected; that this being the first appearance of the Society before the Legislature it was very important that the legality of the provisions of the bill should be inquired into in advance by those most competent to judge.

Others argued that legal advice was an unnecessary expense, since several members of the committee which drafted the bill were U. S. deputy mineral surveyors, and familiar with federal statutes.⁵⁰

The second argument won, and the bill was presented on February 14 by W. H. Roberts of Butte. House Bill 34 was entitled "an act to amend sections 1477, 1478, 1479, 1483, 1485 and 1486 of the fifth division, compiled statutes of Montana, relating to the location and recording of mineral claims." It provided for prompt, precise recording of mineral claims and for immediate location work to establish ownership. The act specified the details of boundary markers, and provided for survey by a deputy mineral surveyor. Ensuing debate centered around the requirement that the locator must sink a ten foot discovery shaft, or an adit or tunnel ten feet long, within sixty days of posting notice on the claim.⁵¹

On March 6, before the committee of the whole, Swiggert of Jefferson County moved that the section on location be omitted, since it was already covered by federal laws and the Territory could not "add anything to the United States laws." Haskell assured him that the proposal did not conflict with federal law, and Roberts added that the bill was patterned after Colorado law, which had experienced no problems. Speaker Lee Mantle of Butte urged retention of the section, as a deterrent to speculation. Swiggert withdrew his motion and the law, amended

to extend the proof-of-labor clause to placer claims, passed the House by a vote of twenty-one to one.⁵²

In the Council, the committee on mines and minerals reported the bill without recommendation, but the committee of the whole, on motion of Huffman of Custer County, recommended that it not pass. House bill 34 lost by a tie vote, five to five, with two members absent. Bickford of Missoula announced that he would move to reconsider the vote, but no action was taken before the Legislature adjourned the following day.⁵³

The Helena Independent deplored the Council's failure to reform abuses in mineral entries. The paper had supported the bill, arguing that

It is well known that hundreds of mining locations in this territory are irregularly made and have no actual value; that no work is done upon them during the time allowed for the first year's representation work, and that at the expiration of that time the claims are relocated under other names in the interest of the original locators, without any real development work being done upon them. The result has been that the practical development of mineral claims has been retarded for speculative purposes to the injury of bona fide miners and the territory at large. . . .⁵⁴

The Society's other bill, which called for an accurate survey of all town and village sites and additions, and provided for filing and copying plats, fared better. On February 14 William Thompson of Deer Lodge introduced Council Bill 36, "a bill for an act to amend sections 2031, 2032, 2033, 2034, 2037 and 2038, of the fifth division of the compiled statutes of Montana, relating to town and village sites and plats." Council Bill 36 was reported out of committee on March 7, with

amendments enlarging the monuments marking the intersection of streets. On the 12th the bill passed as amended, by a vote of nine to two, one member absent.⁵⁵

The House committee on towns, counties and highways reported the bill without recommendation and on March 14, on recommendation of the committee of the whole, the bill passed seventeen to five. The Council concurred in the House amendment, and Governor P. H. Leslie signed the bill on the fourteenth.⁵⁶

While Council Bill 36 was celebrated as "the Society's maiden effort toward framing legislation," the results were not entirely satisfactory. At the May 1889 meeting James Keerl commented that the amendment requiring approval by county commissioners before plats could be filed delayed sale of the property. The Montana Society of Civil Engineers was being blamed "for introducing so unreasonable a provision in the bill," while the fault actually lay with the Legislature. The Society also criticized legislative action on boiler inspection, noting that the method required by the new law was not only obsolete, but was liable to damage the boiler. They also objected to the horse-power qualification regulating licensing of engine operators, which bore little relationship to the responsibility of the position.⁵⁷

The Society's activism attracted the attention of Montana's Congressional delegate T. H. Carter. In June of 1889 he met with the Society, informed them that the Senate Committee on Irrigation would

visit Montana in August, and asked the engineers to collect data on the potential of irrigation in the Territory. Carter was already convinced, for he assured the Society that

the lands of Montana [were] one-fifth good agricultural, three-fifths grazing land and one-fifth mountainous, and that by judicious husbanding of waters the three-fifths grazing land could be made good agricultural land, and that a part of the one-fifth mountainous could be raised to a high state of cultivation.

These predictions were exceptionally optimistic, but the subject of irrigation was becoming critical. In the dry summer of 1889 armed men were guarding their ditches and crops were drying up; engineering technology promised to alleviate the problem.

The Montana Society appointed a committee which sent a questionnaire throughout the Territory. It requested information on existing canals and ditches, potential sites for reservoirs, average annual snowfall, soil type, production with and without irrigation, and a variety of other details. Chairman Walter W. deLacy, complaining that "the others were not going to do anything," wrote the report with the help of Secretary George Foss. It consisted of a county-by-county breakdown, totals for the Territory, and an elaborate map. The report estimated that with irrigation 20,000,000 acres of arid land could be reclaimed, an area twenty times the acreage then under cultivation and twenty-one and four-tenths percent of Montana's total area. Land value would increase from \$1. to \$10. per acre, livestock and personal property would jump \$100,000,000., and the population would grow to 1,500,000.

