FIELD NOTES OF
FRANCIS MOHRHARDT
AS AN ARMY ENGINEER
IN THE TENNESSEE CAMPAIGN
DURING THE CIVIL WAR.

W. C. B.
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From Adairson to Lebanon 10 m. From Lebanon to Clarksville 20 m.
From Lebanon to Chattanooga 58 m. From Chattanooga to.
Bridge 18 m. From Bridge to Huntsville 58 m. 5
From Huntsville to Spanish Fort 180 m.

Huntsville Alabama in Jackson Co. County seat. Billfork 12 m.
From Huntsville to Huntsville 3 miles.
From Huntsville to Nashville 271 m. Bridge burnt at Delight.
and Great Chaff. From Bridge supposed to be burnt lately.
The front wall 42 1/2" x 16"
The west wall 32 1/2" x 16"
North wall 19 1/2" x 16"
West wall 26" x 16"
middle wall 32 1/2" x 16"
basket wall 32" x 16"

Dresser 32" x 16"

Door 3' x 8' 30" x 16"
4 w 3' 2" x 3' 16"
4 3' 1" x 1' 10" x 16"
2 D 2' 2" x 4' x 16"

New Masonry 142 1/2 bricks.
Reinerg old Rock 24 1/2" Perches.
Joff 4 Door stone 108 1/2 Perches.

x 2.1
x 5.8"
St. Louis Nov. 25, 1869.

Hon. Board of City Council of the City of St. Louis.

Gentlemen,

In compliance with a resolution passed by your Honorable Body on the 28th of October 1868, requesting the undersigned to furnish a report of such matters pertaining to the Engineer's Department, as he may deem of interest, I have the honor to submit to your consideration the following statement and suggestions as the result of my observations and experience in reference to street improvements, etc., made during my recent visit to eastern cities.

My uninterrupted connection with the Engineering Department for the last 26 years has rendered me familiar and conversant with the different modes of improving, repairing and reconstructing streets which have been adopted during this time, as well as with the results obtained there from and has prepared me to observe and appreciate the different methods employed in the cities.

Many of the present defects of our streets are due to canals which may be easily traced and may, by improved modes of construction be greatly deferred or entirely removed and it will be my endeavor to indicate some of the leading causes and to propose such remedies as are suggested by and based upon my own experience and my observations in my recent trip east.

Driveways. The principal requirements of a perfect road may or street, apart from its grade and location and economy of construction and maintenance and the mode of street improvements adopted in any case in reference to the stability thereof, should be selected with due reference to nature and amount of traffic, which will be concentrated upon the same. A pavement which would be found cheap and durable for a country road or a suburban street might quickly fail under the heavy traffic of the central portion of a city while a material adopted to the latter would be uneconomical expensive in the former locality.

Macadamized Driveways.

We all know and it has long been felt and acknowledged, that the
The general construction of the greater portion of our macadamized streets is far from being perfect, and in wet weather especially during winter and spring season our main thoroughfares are in an intolerable state and even some of them can hardly be kept in a passable condition. All of our macadamized streets are constructed of lime stone which material will remain for a long period to come, our chief dependence for the improvements of the greater part of new streets within the new limits. The material is easily accessible and abundant in the vicinity of the City and in consequence thereof cheaper than any other material. The lime stone in the shape of blocks and used for paving is far preferable to the lime stone broken small and used as macadamizing, in the latter state the softness of the material will cause the same rapidly to wear out and be crushed and ground into dust and easily converted into mud but still some remedy may be applied by which this evil may be some way diminished, and that will consist in the different and superior mode of construction. —

The usual custom of paving the broken work loosely upon the surface of the new made street and leaving the completion of the roadway to the travel which is compelled to pass over it, is wrong in principle and destructive in practice. The street left in this condition is unfinished and unfit for travel, it lacks smoothness and compactness, the principal requisites of a good road.

We can observe every day where such street are given to the public, that all the travel, instead of being induced to pass over said street, is driven away from it on account of the roughness and softness of the road — people will rather drive along the sidewalk, as long as the same is not paved yet, or else make a detour of several blocks, rather than risk the unsafe and inconvenient travel over the same — or if this is impossible, the one single track along the centre of the carriage way will be formed in which each successive team will carefully follow. In this manner the traffic which should be evenly distributed over the entire surface of the carriage way is concentrated entirely over a narrow strip of a few feet in the centre, while on both sides the loose stones remain untouched.
The arc street is this city which were improved four or five years ago, where one finds the central portion totally worn out and the sides seem never to have been used at all.

The expenses thus added to the repair accounts after exceed by many fold the additional funds of completing a street in a creditable manner. More over the open layer of broken stone affords no effective protection against water, which freely penetrates to the earth beneath, where its evaporation being prevented it must remain to seep through the road bed. This being thus softened, in some places sinks in others makes out and in others is forced up between the stone of the Macadam permanently preventing their mutual consolidation and producing a surface which however firm in dry weather is loosened by every rain and disturbed by every frost.

This practice is ruinous to any street and could be avoided by thoroughly consolidating the roadway by successive rolling before the same is opened for the public travel, so as to furnish an inducement for the use of the same, and set of parts only—such of the whole. In consequence of the travel being more evenly distributed, the roadway will wear more uniformly, but will not and can not be formed and its durability must be greatly advanced, to say nothing of the freedom of the comfort of all who use it and the reduction of wear and tear of teams and rolling stock.

In grading many of the new streets of the City heavy embankments are required in which case it is customary which this department to defer the complete improvement until the earthwork has had time to settle. Not infrequently, however, through and in consequence of the inconsiderate imprudence of property holders and other interested parties, this custom is suspended and the pavement added prematurely. The inevitable result is speedy sinking and margins from the failure of the road bed. In some instances an entire re-construction may be required. Within few months after the new street is thus completed, to avoid many such irregularities it would be advisable to let and enter into contract separately for the grading or filling of each street, where the filling exceeds 5 or 6 feet in height and to postpone the letting of the paving and other work of the same until the embankment are
thoroughly and evenly settled. By this mode of procedure not only a better result in the improvement of the respective roadway would be achieved, but also a considerable reduction of the prices for the work itself would be obtained in consequence of the increased competition of such contractors, who are prepared to do one portion of the improvement, but who are entirely unable to enter into contract for the whole work, and who are consequently compelled under the present system to sub-contract and to execute such work generally much below the contract price.

In this last report the City Engineer has REPORTED referred to the serious injury caused by the Careless and often unnecessary cutting, breaking up of new pavements for the laying of sewer, gas and water pipes. I deem it appropriate to quote his remarks upon this subject:

"A very considerable amount of the repairs of streets must be regarded as unnecessary, and due to the wasteful policy which allows corporations and private owners to break up the surface of the finished roadway for the laying of gas and water mains or..."
A bottom foundation for the broken rock to rest upon as introduced many years ago in England and other countries and since adopted by most successful road builders and which mode is also extensively employed in New York in the construction of Boulevards or public drives, as for instance in the continuance of Broadway, west of central park from 59 to 105 all of the avenues have a width of 150 feet and are laid off and divided into two separate carriage ways which a grass or gravel space in the middle similar to the plan adopted by your Hon. Body for our Grand Avenue.

The halford pavement is constructed as follows: After the rock bed is completed and properly shaped to the required curvature and well consolidated by ramming or rolling, a compact and firm pavement is carefully made of large wedge shaped stones 2 or 4 feet deep, laid with their sharp edges upward. The interstices in the upper surface are then filled with stone chips and a coat of broken slate the size of 3 1/2 inches diameter, added in two layers, the first four inches road mated for one way traffic.

The thick is the second three inches thick and each layer well rolled before the other is put on. The object of this bottoming or foundation is to distribute the pressure of passing loads over a greater surface and to prevent the soft clay from being forced upward through the broken stone as often happens in such weather to the certain destruction of the roadway.

The sketch below will represent a section of street as above described.

The additional material labor will increase the cost of the present mode of making the roadway from $4.50 per square yard to about $7.00 on in an entire block of 500 feet in length the extra cost would amount to about $250 or a little over 40 cents per front foot on each side of the street.

I am confident that such constructed roads will yield the much satisfactory result and will require not 1/4 of the repairs of our present streets.

The manner in which the above mentioned Public Drives & Boulevards in New York were formed as follows:
The bottom course consists of a 9 inch layer of gneiss, then 6 inches of sand and each layer 4 inches of trap rock broken to the size of 3/4 inch, the whole depth to be 21 inches, and each layer well watered & rolled before the other is put on. Often a top dressing of one or two inches of fine gravel or coarse sand is added to finish a smooth & even surface. The gutter & curb stones are secured by a foundation of rough ovoid 6 inches thick.

The immense amount of expenditure in the repair of our macadamized streets during former years, and especially that of the last fiscal year amounting to $81,986.52 for lime stone $105,831.21 for porphyry amounting in aggregate to $187,815.33 will demonstrate at once the necessity of a more careful, thorough and substantial construction of our streets.

In the same proportion as our city improvements will extend, the traffic on our streets will be increased and the repair of such streets, which at present are little used will in five or ten years hence become a source of a heavy expense, in consequence of the increased traffic and the

careless and inferior execution of the first construction of the same.

Porphyry

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The use of Porphyry for the repairs of our macadamized streets has proved a failure. The material is not adapted for this purpose and in respect of bonding qualities is even inferior to our lime stone.

The amount expended by the City for broken porphyry since its adoption 18 months ago is $175,000.00. This amount is large for an experimental material, which has never been tested and which now proves to be of so little value to our streets.

Said amount used only for temporary repairs of streets would have been sufficient to furnish an entire new street improvement free from any further expenditures for repairs for a term of 5-6 years of 8,750 square of lime stone block paving @ $20.00 per square or 75 blocks (each block to be 300 feet long with a carrying way of 40 feet in width) which is equal to the whole surface repaired with porphyry with tax the City.
5470 square feet of New York pavement at $32 per square foot of 46 blocks of the same size as above mentioned.

This comparison will suffice to show what improvement might have been made with such a large amount of expenditure and in what proportion the expense of repairs could have been correspondingly reduced in the following 5 or 6 years.

Repairs. The repairs to our streets would be more effectual and less expensive if conducted in a more prompt and systematic manner, than at present.

Were our streets constantly kept in good condition, the cost of their maintenance would be comparatively light, but there are so many demands upon the city treasury that repairs are generally deferred until they become absolutely necessary, when they are executed at perhaps double the cost which would have been required at first. The principle of economical street repairs is never to allow it to become seriously out of repair, a depression once formed can be filled immediately at a very trifling expense.

But if neglected it rapidly deepens, widens, and Paved Streets.

Before the introduction of wood pavements in 1863 most of the streets in the central business portion of our city were paved with stone on edge. This mode of improvements has been almost entirely suspended, superseded by the Nicolsons Pavement. The principal objection to bare stone paving is its limited durability, the noise occasioned by heavy travel, the resistance which is uneven surface opposes to travel and its insecurity for teams. Notwithstanding this defect it is feasible that satisfactory result might be obtained with this material by a proper and thorough mode of construction.

The vicinity of this city affords a very hard, sound, and durable line stone, which carefully and regularly dressed to a proper and uniform depth and shape and set upon a good foundation of from 6 to 8 inches of coarse sand, would, without doubt, furnish a good and durable pavement. The stone blocks should be all of uniform depth, say 9 or 10 inches not more than from 4 to 6 inches...
wide and from 8 – 12 inches deep, set in regular straight courses at right angles with the curb. Such a pavement would be constructed for about $18 - 22 per square, or at least $10 - 12 less than wooden pavement and its durability would certainly equal that of brick. This kind of pavement would be well adapted for our leading thoroughfares, such as Broadway & Corinhalts St and others, which are subjected to a very heavy & continual traffic.

The saving of the present heavy annual expense for repairs would soon repay the increased original cost of such pavements, to say nothing of the great improvement in the streets themselves & the facility with which they could be kept clean, an achievement now almost impossible. I have examined the stone pavements in New York and the so-called Cobblestone pavement laid on Broadway is perhaps the worst perfection of its kind in this country. It consist of granite blocks all evenly shaped with straight joints and square bottom and uniform 9 inches thick, 3 thick and 12 inches long. The Blocks are set in 3 inches of sand upon a foundation of 6 inches of concrete.

I noticed in particular that the slightest indentations in the pavement were promptly repaired, and in order not to interfere with the traffic on the street during the week, such repairs were made even on the Sabbath.

Such a pavement is of necessity expensive. It costs from $80 - 90 per square and can only be afforded in such thoroughfares as Broadway. On other streets in New York the Belgian Pavement is used. This consists of Blocks of Trap Rock 4 - 8 inches long, of uniform shape and square bottom, set upon a bed of 6 inches of sand and well rammed. The price of such work is from $40 - $45 per square. In examining the Contracts & Specifications for the Belgian Pavement, I found a provision that all the materials necessary for the Blocks must be hauled upon the street, that they will be carefully inspected by a competent person and all Blocks which, in quality and dimension or in any way in other respects fail to conform strictly to the specifications.
Wooden Pavement

The wooden pavement has been introduced within the last few years in most of our large cities and this year has been very popular. I have carefully examined the different modes of constructing wooden pavements employed in the City of New York & Chicago. Thus far Pavements laid in New York appear in respect to material and workmanship superior of any other and far surpass those of St. Louis. It may therefore be expected that their pavement will be much more durable than those laid down in this City.

The wonderfull success which has attended the Nicolau pavement has called for a large number of nominally improved methods, but which are in a large degree only unimportant modifications, whose superiority is more easily asserted than established.

The following variations of wooden pavement are being laid in New York under the
Directions of the Croton Aqueduct Department, and the results which they will obtain by their extensive experiments, in that respect may well be considered decision in the selection and in the final adoption of the most suitable and durable mode of street pavement, Nicolson Pavement. This pavement is the same as used in our City. During my presence in New York it was being laid on 33rd Street, 5th Ave, Madison 7th, and on Cortlandt St., both Broadway and Greenwich St. The material was white pine (not burnished) and was of excellent quality, being entirely free from all knots, splits, cracks and other defects. The bottom boards are thoroughly tarred on both sides with hot coal tar, brought to a proper consistency with pitch so as to be tough, resilient and not brittle when cool. The Blocks are carefully selected and assorted and set so that those in each parallel course are exactly of the same thickness or width. Thus, are from Cond.

between the strips is secured. Each 20 Block before it is set is dipped to half its height in hot coal tar prepared as above described. The balance of the work is done as usually, the spaces between the blocks being well filled with gravel and thoroughly penetrated with hot coal tar. The foundation wall well prepared and well rolled with iron rollers and the whole work was done in the most careful and substantial manner. The work is done with regard to the future as well as to the present, and the consequence is a degree of perfection in the work which will be seldom be obtained under the system of awarding work only to the lowest bidder irrespective of the competency of the party bidding or his interest in the final result or success of the work to be performed.
De Golger pavement

This kind of pavement is extensively laid in Chicago. It differs from the Nicholson pavement only in having no strips between the blocks, the whole space being filled up with gravel and tar. This modification was devised to meet a difficulty said to have been experienced with the strips in the Nicholson pavement, which for some cause becomes dislocated and working upward, loosens the gravel between the blocks and consequently the blocks themselves. Mr. Gogoloff Patents known as the Improved pavement.

The construction of this pavement I examined on 14th Street, New York.

It consists of blocks laid solidly and closely together with out any gravel between them. Each block, as those next to the curb has circular holes bored vertically from the top, about 3 inches deep and from % to % inches in diameter and about 3-4 inches apart, beside a triangular groove on each side extending through the block.

The side of the groove is 3/16 inches and the angle a right angle so that when two blocks are placed together, there is a opening formed 3/16 inches square, which receives a wooden dowel or key of the same length as the groove. The blocks and dowels are well tinned and placed upon a similar foundation with the Nicholson pavement. The holes in the surface of the pavement are well filled with fine gravel and the whole is thoroughly tinned and a coat of fine gravel spread over the whole. The vertical holes are intended to furnish footholds for animals.

The accompanying sketch will more fully explain the description of this pavement.
It is claimed that this invention by linking the block together and furnishing a compact surface, excludes water from between them and that this dowels preserve the bond of the materials and also prevent unequal settling.

Brooke's Tank & Trainers Pavement

This is a recent invention patented in January 1869. It had not yet been laid in New York, but it was informed by Mr. Trainer, that he was about to enter into contract for the construction of a paving of his pavement in that city. It is similar to the Nicolos with a single difference, that it provided a compound flooring, consisting of longitudinal and transverse planking, solidly fastened together and to the blocks. The transverse pieces are nailed to the floor and accurately filled into dovetail rebates in the linear ends of the blocks. This pavement seems to possess some features calculated to give greater strength and durability than the common Nicolos pavement, but evidently at some increased cost of first cost. The annexed sketch represents a section of this form of pavement.

Besides those already mentioned experiments have been made in New York with the Stafford Pavement of which one block has been laid on Wall Street bet. William and Hanover St. consists of cubical blocks of wood put together in sections 3 feet long & 2 1/2 feet broad.

This pavement appears to lack compactness and firmness. Some of the single sections had already become loose and partly displaced, leaving openings through which water penetrates to the sub foundation.
The Brown & Miller Pavement

Consists of hewn Blocks cut on one end square and on the other at an angle of 45 degrees and resting against parimatic sills, so laid as to divide the strain and support the pressure equally etc.

The forms of wooden pavements have been proposed and are advocated, but in their leading features they have generally been found very similar to each other or to Nicholson pavement from which they differ in unimportant details. It has already been remarked that it is doubtful if any of these improvements are superior to the original invention of Samuel Nicholson in St. Louis only one kind of wooden pavement has thus far been tested, the Nicholson. The first Block was laid on Walnut St. near Main & Second in Sept. 1860. It consisted of oak Blocks with pine flooring and strips. The cost of this Block was $120.00 per square.

This pavement last 7 years until September 1867, when it required reconstruction. No further use of this pavement was made until fall 1863 when a contract was entered into for its construction for a number of Blocks.

The pavement with burned-tipped cotton wood has only been introduced within the two years, therefore it is not yet possible to state how far this modification is to be considered an improvement and whether the advantage secured will compensate for the additional cost of about $8.00 per square.

 Nicholson paving appears not to exceed 6-7

feet
Concrete Pavement

Different kinds of concrete or asphalt pavement have been lately introduced and especially on a large scale in New York. A portion of 57th Ave has been recently covered with the so-called Pitsch Concrete pavement and also several public drives in Central Park which I noticed with others a sample of the pavement known as Undamped bitumen laid by Mr. James O. Tish.

6. Trial.—The result of all these trials is a beautiful smooth and comfortable roadway, easily kept clean, safe for travel and also cheap in its construction, but whether this pavement is sufficiently durable and substantial on the street subject to a heavy traffic, like our centrally located narrow streets, is a question, which have not been satisfactorily answered.

The traffic of 57th Avenue is comparatively light, the street is wide and the travel there for distributed over a large surface. Here in our city it is quite different. In the principal business portion of our city the carrying away of the street cars are only from 90 to 25 feet wide and both sides of the street in front of store and ware houses being obstructed and occupied during the day for the loading and unloading of the wagons and drays there remains only a very narrow strip through the center of the street, over which the heavy traffic is compelled to pass. This narrow portion of the street must therefore bear the pressure and wear of nearly all the travel passing through it. For such fragmented thoroughfares only the most substantial mode of pavement is wanted and therefore it is more advisable to await the result of the experiments already made with that material in other cities and profit by their experience than to incur heavy expenditures for the purpose of testing anew pavement on our own responsibility.
General Remarks.

The expenditure for the repairs of our streets, especially the macadamized ones during the latter years, have been enormous, so that it is the highest time for us to study and contemplate, in which manner we can obviate this and how we can reduce them and secure more economy in the future.

The first step to be taken, should be in securing a better and more complete construction of our public street work and that can only be reached by a more ample supervision during the construction of the same. This matter is so important and of such vital interest to every citizen and taxpayer of this community, that no more time should be wasted in inaugurating a new system.

The cost of the work done during the last fiscal year for instance only in the improving the new street within this City amount to $ 381,201.96 of which the City paid $ 144,091.55 out of the City Treasury and $ 232,110.35 were paid by the respective property owners as special tax. It is apparent that in order to enforce a proper execution of such a large amount of work, scattered over a vast territory of many miles throughout the New Districts of our City, it necessitates a thorough system of control and superintendence. This is utterly impossible with the present insufficient force of superinten
dence and under the inadequate organization of the Engineer department.

There should be placed under the direction of the City Engineer at least one general Superintendent of all Street work a man of energy, experience and competency and vested with such powers and authority, as to enable him to exercise a full control and supervision over all public Street work, all matters appertaining to constructing recons- structing and repairing of streets.
should be thoroughly examined by him and he should give such orders and instructions to the Street Commissioners and special overseers as will be necessary to insure a prompt execution of the different works. He should be also be empowered to discharge from the work any laborer or mechanic, who shall be incompetent or dissolute client, or who shall place any defective materials in the work, etc. and such discharge should be a bar against his being employed again on any street work hereafter, unless the City Engineer should revoke said discharge. In awarding contracts for street work preference should always be given to that bidder, who has proved him to be responsible, competent and willing to carry out the work promptly, and in the accordance with the intention of the contract and all bids made by incompetent men, and such bids which may be much below the estimated cost of any work should not be considered at all and in all cases, where sufficient prove or evidence can be established that any one Contractor has intentionally furnished inferior work or in any way neglected or slighted the work, then such Contractor should be prohibited or debarred from further bidding for any similar work.

As this exists under the present system of awarding the work only to the lowest bidder, irrespective of his competency and capacity, no inducement for any Contractor to exert himself to execute his work properly or in a superior style the adoption of the above suggested method of awarding work would be the only means, by which a charge
could be effected and better work be attained.

I have endeavored to obtain some information in reference to public parks and for that purpose have visited all Parks in New York, Brooklyn, Boston, Philadelphia and Chicago, and have carefully examined into the modes, systems and operations in the improvement and regulating of the same. But as this report has acquired more length, than I first intended, I prefer to obtain from any further perusal of this matter and hope that at some future time you may allow one to submit some suggestions to your Honorable Body in relation to inaugurating a new and different system in that respect. Hoping that some of my suggestions may meet your approval.

I remain very respectfully,

[Remainder of the page is filled with handwritten notes and calculations.]

107 feet large size lead pipe 70 cts. $7.45
173 small... 50 cts. $8.65
2. Inch lead traps $1.15
2. Leads $1.00

1. 3 inch. drg. & water cock $5.75
1. day's time P & P setting traps 77 $7.50
1. valve & Hydrant $12.00
2. 3/4 inch & water cock $4.50
2. Pan Water closets $36.00
2. French closet basins $9.00
2. 3 compression cock
1. iron sink 36 x 18 inch $5.50
30 x 15 $4.50
18 1/2 sheet lead for closet
1 day's time. Drumber & helpers for setting up. Closet & sinks $7.50
6 1/2 lead for joints in soil pipe $4.88
Memorandum on the Public Improvement of the City of St. Louis by D. Christian Rank Civil & Mining Eng.

I

Historical Reflections.

The logic of comparative History has long since established the incontestable truth that the Character, extent in the condition of Public works and improvements owned by a Community, state or Nation, present not only the most reliable evidence of their relative degree of civilization, but the most precise scale of the enterprising spirit and industrious capability of their Citizens.

The mutual relations existing between the cause and the effect of a national Policy having references to the establishment of a timely system of public works, improvements cannot possibly be illustrated more strikingly than the comparative reference to the destination of this ancient and modern cities, states and nations, which History records as the ruling powers and cultivators of their times.

If commerce a trader and enterprise, then to the acknowledged fundamental elements of industrialism and enterprize, it must also be admitted that the national consequences are wealth, Power, social and political aspiration.

The successful operations of the individual merchants, in order to enlarge speculation, association, personal local competition, which again foster jealousy, avariciousness, antipathies, fratricide, exclusive exclusions, spurious factional intrigues, ruling Power ever consternation and ruin.
This is short is the organic cause of
the rise and fall of the ancient
monarchical
cities. from Carthage, Corinth and all
other emporiums of commerce and trade
on the Contus Econuics to the Hane,
Gino and Venecie, simple because they
failed to appreciate the vital
importance of a timely introduction
development and maintenance of a
rational system of Public Compre-
ments as a essential requisite on this
Power which to a great extent depends
by a well organized connection with its
external industrious tributaries.

Our ancient led conquest and ruled
for 10 centuries the destiny of Europe,
Asia, and Africa if her government had
committed the same neglect to dispense
with the grand System of public
improvements which still the day
witnesses not only her political
tale of civil and criminal codes its economical
institutions and principles of Administra-
tions remain for ever illustrious Compli-
ments of her civil ability and political
supremacy.
And that in the History of our own century and the records of every day prove that modern Society has been to some extent the result of an attempt made by the art and science of Engineering to solve problems of practical engineering and to secure the possibility of improving the condition of mankind through the application of the sciences of civil engineering and mechanical engineering, which would have been known in the middle ages of craftsmanship as the works of the craftsman and the guilds of the city, and which would have been expressed in the form of a code of laws, a code of manners, and a code of morals. For a single decade the works of civil engineering and mechanical engineering and what would have been the millions of workman of the rank and file finding the work of the Princes of commerce and trade of liberty and humanity in mankind would have been deprived of its civil character and of fabric of modern Society fall into desolation and perish and disappear.

II

St. Louis and its destiny.
The philosophers who express the opinion that Society would rather be pleased by blindness in its fancies than by critical justification of its virtues, have certainly no animosity of the modern dogma of predestination. Cities which our nervous generation seems to cultivate with more licentious imaginations than its abstract realities though as long as the destiny of localities will remain to the subject to the same rule of dependency than the destiny of men, the circumstances surrounding the same—there will be no danger that the majestic halls of the mast will rise to the standard of glory by the fulcrums of a providential partnership there is no danger that its natural interdependence to the customary error of the People to mistake the rules of private economy for the leading principles of political economy, and this debate in the penny-saving of the Public Administration while it escapes their attention unavoidable results is a relation damage to the public interest.
Admitted that the destiny of the City of St. Louis is but a question of time it must be still
born in mind that because its reality is based on the condition of a timely systematical
utilisation of the economical resources so tributary to its geographical situation, it is not sufficient to improve the local
interest immediately connected therewith alone, but we must also cultivate the social
as political relations existing between our local position to the national objectives,
interest our national advantages and central
locations within the empire of the Mississippi
Valley.

Grant in the noblest sense of the word as
the perspective future of the City of St. Louis
passes the spectrum of hope and reason
the critical eye of the Historian still
hesitates to accept it as a fact accordingly
until we shall be convinced of the fact
that its administration will be conducted
on the rational principles of political
strategy instead of an historically
proven narrow minded merchant policy
and is there any cause to anticipate a
recurrence of the failure of the ancient
merchant administrations in our
modern times, or has the puffed history
of the City of St. Louis proved to be a
reptile of its trifling with the much
more economical entrance of our days.

With regarders to state, that until 1850
for a period of 55 years, the administrator
of our commercial affairs excelled more
by its automatic strength than by
life existing of the modern exhibitions
development of national laws.
The introduction of the steam power in
1828 had long changed the value of space
and time — Railroads and its principal
and internal improvements had raised
the economic life than 25 years from the
condition of a lowest point in the open
prairie to a two self full competition
with the great mercantile city of the Mississippi. The several which played between the gulf of Mexico to the sources of the Missouri and Mississippi — Nature had provided the channel of the father of streams to pass on the limits of St. Louis and their grandeur its commercial supremacy over the produce and exchangers of some of the most extensive and fertile agricultural empires. comes to hire.

What wonder when the merchant associations of these days and those which were continuous, Habers without showing objection to any public improvements, tending to improve the navigation of the Mississippi or to aid and support any diligent enterprise to obtain an enormous navigation, with the controlling power. But fate has its own ways to teach mankind its lessons on the logic of national laws. The repeated high waters from 1844 to 1849, overflowing the city limits in various parts almost to the level of

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Co. a mental act, examined from unmeetness. Ponds, sloughs, and ravines, thus moralous deposits resulting in the furious raging of cholera in 1849, affecting not only the commerce and trade by an almost entire stoppage, but reducing the Population of the city to a few-half figure. The calamity caused by the introduction of a proper system of drainage of these Ponds, Sloughs, and Ravines, opened at last the eyes of the People who, stoned, determined to dispose the merchant faculty of their administration and elected 1850. Hon. Luther M. Kemmet, the first Mayor possessed of enlarged views on the importance of a rational system of public improvements and, who, had the nerve to use the credit of the City of the immediate establishment of the present system of streets and streets.

Until the day the than timely system of public improvements has since undergone
Hardly any additional extensions neither in principal nor constructions tangible and adequate to the rapid progress and development of our indications as well as to the demand of a vastly increase of Population and its relations to our home and foreign commerce and trade. May be said that the cause of Slavery (compasst the introduction of free institutions) those that fact infer that Slavery is a national imperinance to the development of economical masses or was slave labor not rather and inducements to such as practice. But Slavery was favored. The road had opened new channels of commerce and trade to the city on account of the efficient system of transportation and its Population has swelled in less than ten years but still the military Engineer found the City the land of the

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simpler means of transportation of the common facilities of Harbor improvements and a relative supply of water of a tangible connection between the river and the Rail ways of docks for ships building & repairs in short of any thing which surpassed the limits of the most ordinary marine exchanges. Then the City a County of St. Louis in Company with the State of Missouri had spent $27,000000 in the construction of 270 miles of R.R. The City has since invested millions in so called River and Harbor Improvements, in Establishment construction of Repairs of Streets and Alleys, Sewers & Water works - but does the mere fact of an expenditure of millions of Dollars indistinguish the expending administration with the ennui of our modern statement ship if they were squandered in three
In deduction opening:

<table>
<thead>
<tr>
<th>Description</th>
<th>Feet</th>
<th>Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>67 x 6.5 x 1.50</td>
<td>435.5</td>
<td>0</td>
</tr>
<tr>
<td>12 x 5 x 1.50</td>
<td>60</td>
<td>0</td>
</tr>
<tr>
<td>54 x 2 x 1.50</td>
<td>168</td>
<td>0</td>
</tr>
<tr>
<td>36 x 1 x 2</td>
<td>72</td>
<td>0</td>
</tr>
<tr>
<td>58 x 1 x 0.50</td>
<td>29</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1006.0</strong></td>
<td><strong>0</strong></td>
</tr>
</tbody>
</table>

5 Houses on 1/2 x Olive:

- Front:
  - 5 doors each: 7.6 x 5 x 1.6
  - 5 windows each: 3.6 x 3.2 x 1.6
  - 5 coalsheds: 3.5 x 6.5 x 1.6
  - 2 windows: 3.6 x 2.5 x 1.6

- Rear:
  - 4 window doors each: 7.6 x 3.9 x 1.6
  - 4 windows each: 11.9 x 3.6 x 1.6

Local enclosure walls:

- Front:
  - 1 door: 7.6 x 5 x 1.6
  - 1 window: 3.5 x 3.6 x 1.6

- Rear:
  - 1 window: 12.6 x 6 x 1.6
  - 1 door: 7.6 x 6 x 1.6

Capt's Door:

- Front
  - 1 door: 7.6 x 5 x 1.6
  - 1 window: 3.5 x 3.6 x 1.6

- Rear
  - 1 door: 7.6 x 5 x 1.6
  - 1 window: 12.6 x 4 x 1.6

Backbuilding:

- 3 windows: 3 x 12 x 3.7 x 1.6
- 1 door: 7.6 x 5.6 x 1.6
- Coal storage: 6.6 x 6.6 x 1.6
\[
\begin{align*}
4.3 \times 4.026 \times 1.30 &= 29.66 \\
4.3 \times 6.25 \times 1.50 &= 43 \\
32.16 \times 5.80 \times 1.50 &= 28.6 \\
32.16 \times 6.50 \times 1.50 &= 28.6 \\
24.16 \times 6.66 \times 1.50 &= 28.6 \\
28 \times 6.50 \times 1.50 &= 28 \\
28 \times 6.33 \times 1.50 &= 28 \\
28 \times 6.25 \times 1.50 &= 28 \\
32 \times 6.50 \times 1.50 &= 28 \\
29.66 \times 1 \times 2 &= 59.33 \\
2 \times 16.50 \times 5.25 \times 1.25 &= 216.5 \\
9 \times 1.50 \times 1.50 \times 1.50 &= 2945.23 \\
5 \times 1.50 \times 3 &= 2945.23 \\
\end{align*}
\]
Lynches Rock

footing: 33.40 x 0.83 x 3

wall: 26.40 x 7 x 1.75

footing: 31.50 x 0.83 x 3

wall: 21.40 x 7.80 x 1.75

 parte avw wall: 88.40 x 7.83 x 1.75

footing: 90.40 x 0.83 x 3

part footing: 46.25 x 0.83 x 3

wall: 46.75 x 6.75 x 1.75

f. and w. found. together: 93.50 x 1.6 x 1.50

front avw footing: 50 x 0.83 x 3

wall: 50 x 6.75 x 1.75

footing under base of the building: 13 x 0.83 x 1.50

The footing of the rock building together: 113.50 x 0.83 x 2

wall: 103.85 x 8.65 x 1.50

Chimney breast: 8.83 x 8.65 x 0.66

in closure walls of cellar: 12.60 x 2.60 x 1.6

one ditto: 6.50 x 6.50 x 1.50

one ditto: 6.50 x 6.50 x 1.50

one ditto: 7.50 x 5.50 x 1.50

one ditto: 6.75 x 11 x 1.50

1/2 window: 24 x 2.60 x 1.50

1/2 ditto: 12.50 x 4 x 1.50

1/2 closure: 12.75 x 7.50 x 1.50

1/2 closure of a door: 4.25 x 7 x 1.10

1/2 enclosure of a door: 4.25 x 5.75 x 1.10

1 window: 16.25 x 3.25 x 1.50

doors: 3.25 x 3.25 x 1.10

windows: 11.40 x 3.10 x 1.10

doors: 7.25 x 5.75 x 1.50

doors: 5.50 x 4.25 x 1.50

doors: 5.50 x 3.50 x 1.10

V 4 pieces: 3 x 6 x 3

1 window: 11.20 x 4 x 1.10

1 door: 7.85 x 5.75 x 1

2.25 x 5.75 x 1

519 feet
South wall on Olive St. 35'x 7' x 1.75
the footing 56.25 x 0.83 x 3'
footing under brick partition 50.25 x 0.83 x 2'
footing of the west wall 19.1
26.60 x 0.83 x 2'
wall 25.60 x 0.8 x 2.45
1st partition footing 53.85 x 1 x 2'
wall 53.85 x 2 x 1.50
4th partition footing 42.50 x 1 x 2'
rock part. 0.82 x 1 = footing 42.50 x 1.8 x 2'
wall 42.50 x 1.8 x 1.75

1st floor wall footing 92 x 0.83 x 2'
wall 92 x 8 x 1.75

2nd floor wall footing 114 x 0.83 x 2'
wall 114 x 8 x 1.75

3rd partition walls, facing each 42.50 x 0.83 x 2'
walls total 134.75 x 8 x 1.50

4th floor each
(3' x 3' x 3') 2 Remarks

1st partition footing 46 x 7 x 1.75

Coal for third each 6 x 2.75 x 1.50
coal 3 x 6.75 x 2.75

4 cellars doors each 7.50 x 5 x 1.50
6 x 4.50 x 1.50

4 window doors each 11.80 x 3.50 x 1.50
9 x 3.50 x 1.50

2 nut doors each 11.80 x 2.83 x 1.50
7 x 2.83 x 1.50

in rear doors & cellar windows

4 cellar doors each 5.25 x 8 x 1.50
5.25 x 8 x 1.50

4 cellar doors each 11.80 x 3.50 x 1.75
9 x 3.50 x 1.75

2 Cellar doors 3.30 x 6.75 x 2.8
2 Coal 2.30 x 6.75 x 2.8

Total 3.20 x 3.5 x 2.1

In deduction the openings for A. Callahan

2 rain doors 3.20 x 3.4 x 1.75
2 storm doors 3.20 x 3.4 x 1.75

Signed

2 rain doors.
2 Storm doors.
1 Over door 3.20 x 3.5 x 2.1
1 Over door 3.20 x 3.5 x 2.1
1 Over door 3.20 x 3.5 x 2.1
1 Over door 3.20 x 3.5 x 2.1
East Table: 30.90 x 27.30 = 843.57
North Table: 27.30 x 17 = 464.20
South Table: 27.30 x 17 = 464.20
West front: 28.20 x 23 = 650.9

12 square yards = 2.64

Fredrick [illegible]

Middle SE corner of 3rd Ave and 3rd Ave

In deduction the openings:
4 windows: 7.90 x 3.65 = 112
5 x 7.20 x 3.65 = 131.4
2 x 2.70 x 0.90 = 4
2 x 6.58 x 3.65 = 48
4 x 7.9 x 3.65 = 112
5 x 7.2 x 3.65 = 131.4
2 x 2.70 x 0.90 = 4
2 x 6.58 x 3.65 = 48

2 & door: 9.10 x 3.50 =
1 door: 7.80 x 3.75 =
2 window: 6.58 x 3.65 =

2 French doors: 7.20 x 12.00

76.95

9.8 x 3.75 = 36.95

26.4
parcels of R. R. which neither
distinguished for its particular gauge
than for its due relations asateris
to the heard of the City or is its dis-
connection and occasional removal of
the Policy objecting to its harmonious
communiciion of that it rather
prove a kind of retaliation on behalf
of the River monopolies against the
innovations of R. R. Road competition.
Or can be called a policy of raising
economy to improve the channel of
the River by the construction of
a dam of contradictory stone
dams palisative of which are
as manifest as it is evident that
a rational system of R. R. improve-
ments will have to provide for the
removal of its bulk of rock and the
basin eminently three from
Or have the demands of the people
and the public interest been met
unceasing experiments with cement gravel macadam Nichols & Grand's pavement aiming at a permanent system of streets & roads — or is the voice of Washington point for the establishment of a Waterworks for the city of Tennessee, increase of population and prospective citizens like St. Louis: extraordinary testimony of the economical intelligence, political foresight and administrative superiority of merchant governments.

My the pernicious superintendence of political speculators and the endowments of the mass of the People "sold" in the impositions practiced by modern industrialism, corrupt Ring Leaders and the families of manufactured public opinion, the irrevocable logic of time and natural law will pass a different judgement on these fabrics as the impending age of the III. New Era —
Field 26

Field 25

Field 24

Field 23

Field 22

Field 21

Field 20

Winchester, Spring 21/2 m. 7v

Mia Duncan 4 m. 6 to Winchester