

Excerpts from a Report to the Citizens of West Lafayette

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The vast majority of the streets of West Lafayette are reaching a point where only major reconstruction can bring the streets up to a standard where an economical maintenance program can be initiated. The reasons for the present street situation are varied and complicated, and will be discussed in detail later when we get into the various sections of this report.

This report will consist of three sections; planning, engineering and construction, and finance. Since the various sections are so closely connected, there is bound to be overlapping.

PLANNING

Never has any program in West Lafayette, in which tax money was to be used, had more thought, time, and effort put into it by as many qualified and interested citizens. This is as it should be because never have the taxpayers been asked to underwrite such a large program through direct taxation for any civil city project. Never has a program received so much expert consideration from so many people qualified in the field for less money.

Mayor Fred L. Willis on March 25, 1957 invited a number of West Lafayette citizens to serve on the Citizen's Street Committee "to make a study and an inventory of our needs in order that might set up a priority schedule for repairing and improving our streets."

The task before the committee was to:

- (a) Make an inventory—type of surface, condition, width, lengths, character of curbs and gutters;
- (b) Make an appraisal of needs;
- (c) Suggest standards of reconstruction, new construction and maintenance;
- (d) Determine probable costs;
- (e) Suggest means of financing; and
- (f) Establish priorities.

Subsequent to taking the inventory, three sub-committees were organized: construction and maintenance, finance and priority.

In carrying out the first task of the committee to "Make an inventory type of surface, condition, width, lengths, and character of curbs and gutters" the streets of the city were divided into 11 approximately equal groups. In general, two members of the Street Committee were assigned to each group for the purpose of making a block to block visual inspection of the streets and some determination of their condition. The following data were collected for each part of each street: Name, location of section, width, type of curbs, types of surface and condition of surface.

- I. Types of curbs:
 1. Standard curb and gutter.
 2. Stone or concrete vertical.
 3. Cobblestone.
 4. None.
- II. Type of surface.
 - A. Concrete.
 - B. Bituminous.
 - C. None.
- III. Condition of surface.
 - E. Excellent.
 - G. Good.
 - F. Fair.
 - P. Poor.
- IV. Remarks.
- V. Inventory made by.

For the purpose of the inventory the condition terms were defined as:

“Excellent—A street that could not be improved from the standpoint of the surface and drainage.

Good—A street that appears to be in such condition that a little maintenance work now would save the city a large maintenance expense in two or three years.

Fair —A street that can have the holes patched and be resurfaced without a complete rebuilding job.

Poor —A street which is so bumpy and so full of holes that the only way it could become a satisfactory street is to have it torn up and rebuilt.

Note: No street can be considered a good street without curbs and gutters.”

The data were collected on a convenient form prepared by the city engineer.

The summary of the data collected in the inventory indicated that we had approximately:

- a. 100,000-110,000 sq. yd. of concrete pavements needing resurfacing.
- b. 160,000 sq. yd. of bituminous pavements which required various degrees of repairs from resurfacing to complete rebuilding.
- c. 60,000 sq. yd. of special cases not included above.

Further study of the available data by the city engineer, the chairman of the Construction and Maintenance Sub-committee and the chairman of the Street Committee indicated that some detail regarding the thickness of the bituminous pavements and quality of materials underlying them was needed. The characteristics and depth of the underlying material determines whether a suitable base may be established by compaction of the existing soil or whether some more expensive means of stabilization will be required. The only way to obtain the required information was to take samples of materials from the black top streets and determine the characteristics by appropriate tests.

These tests and the information gained will be discussed in more detail in the engineering and construction section of the report.

The next item to be discussed under planning is the establishing of priorities. It was important that the streets that needed attention first to be the first ones to receive attention without any possible claims of favoritism. The priority rating was the tool used to solve this problem. The priority rating is based on the following assumption: the street that should be improved first is the one that is used by the largest number of people and that is in the poorest condition.

A method of establishing a priority rating to sections of streets by assigning point values to the several elements which make up the characteristics of a street was developed. This scheme of rating was patterned somewhat after rating plans used by highway departments. The essential elements of the priority rating scheme are outlined below:

A. Importance Rating (Maximum value 100 points)

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|--------------------|----------------|
| 1. Traffic volume | 0 to 60 points |
| 2. Route service | 0 to 20 points |
| 3. Connecting link | 0 to 20 points |

- B. Condition Rating (Maximum value 100 points)
1. Width (arterial, local) 0 to 20 points
 2. Surface condition 0 to 20 points
 3. Curbs and gutters 0 to 20 points
 4. Structural adequacy 0 to 40 points

After each factor in the Importance Rating and the Condition Rating was evaluated, the points for the Importance Rating and the Condition Rating were totaled separately as indicated. To get the Priority Rating, the Condition Rating was subtracted from the Importance Rating and the answer with its sign (+ or —) was entered. The higher the arithmetic value of the Priority Rating, the higher the priority of improvement suggested by this sufficiency rating tool.

All streets in the city were then listed in order of their Priority Rating except that streets which had never been improved by the property owners were not included.

The priority rating suggested by the listing will be used as a basic guide but not to provide a program which would cause a contractor to do a considerable amount of "hopping around." In other words, if adjacent blocks of a given street have different priority rating it may well be to the city's advantage to rehabilitate them at the same time.

It might be well to explain, in this section of the report, a few basic concepts to which the mayor and council are dedicated in this program. First, the fact must be accepted that good streets do not come cheap, but good streets are the most economical in the long run. Therefore, they will not compromise the standards that have been set in order to make a showing, or to permit a group to get an improved street that will, in a year or two, be a liability on the city. Second, the street in front of each property must have been improved originally by someone other than the city. After the original improvement, it then becomes the responsibility of the city to maintain the street in the best possible condition. This means that streets which have not been improved will not be included in the Street Improvement Program.

ENGINEERING AND CONSTRUCTION

It was stated earlier in this report that the first task was to "make an inventory." The members of the Citizens Street Committee were able to obtain all of this information except that portion dealing with the base and sub-base materials and conditions sometimes called structural adequacy. Since it was felt that the base is the most important factor in any street, an expert was engaged to evaluate the streets from the standpoint of structural adequacy.

Through the office of the city engineer and with the cooperation of the street department, 32 test holes were dug at selected locations and the surface condition of the streets was observed. Samples of the base and sub-base material from the various locations were analyzed and a recommended maintenance procedure prepared.

The consultant evaluated the test samples and prepared a report. Its main topics are:

1. Street condition classification giving (a) street name with portion, (b) condition, (c) recommended maintenance, (d) adequacy classification;
2. Recommended maintenance—five types varying from no work to complete rebuilding;
3. Inspection data—description of streets and portions of streets having some grade of bituminous surface;
4. Log of test holes; and
5. Grain size analysis.

In light of the information obtained by the consultant, estimates of quantities and costs were revised according to the following classifications:

- Type A. Scarify and compact, apply 200 lb. per sq. yd. hot-mix binder, 80 lb. per sq. yd. hot-mix surface and repair curbs and manholes.
 - Type B. Scarify, add 6-in. No. 63 gravel, compact, place 280 lb. per sq. yd. hot-mix (2 courses), repair curbs and manholes.
 - Type C. Some base patching, add 280 lb. per sq. yd. hot-mix.
 - Type D. Streets are in good condition now but are showing signs that they may deteriorate in the future so Type A maintenance would be required. Apply seal coat soon.
 - Type E. Good to excellent and show no signs of serious deterioration. Future seal coat.
- Concrete pavements—resurface with $1\frac{1}{2}$ in. of hot-mix, repair curbs and manholes.

It has been recognized that in any undertaking of the size contemplated design standards and control of quality of work must be set up and maintained. The following was prepared by the Citizens Street Committee as policies to be followed:

Design Standards and Control of Quality of Work

A. Design Standards.

The City of West Lafayette is situated on three basic soils. These include (1) river bottoms, (2) gravel terraces, and (3) glacial up-

lands. The type, depth and quality of adequate pavements depends in part upon the type of subgrade. Hence, design standards which reflect the requirements of each soil type should be adopted. Sub-drainage design should also be provided when needed. These design standards can also reflect the type of street, i.e., major arterial, secondary arterial or local.

As a part of the pavement design standard moisture-density requirement should be specified for the subgrade and base course. Many failures of West Lafayette streets are a direct result of improper moisture content at time of compaction as well as inadequate compaction. These items must be checked periodically by experienced personnel during construction. Needless to say, the engineer should be given the authority to accept or reject the work on the basis of these control tests.

Similar standards should be developed for all types of construction.

B. Work Done by Contract.

There is no substitute for quality and it may be obtained by the use of good materials properly placed. Adequate inspection by experienced personnel is a necessity. Some of the items are control of water in concrete mixes, proper tamping of backfill in trenches, moisture control and proper compaction of subgrade and base materials, hot mixes of adequate proportions placed at proper temperature and properly compacted, prevention of freezing of newly placed concrete, etc.

C. Work Done by City Forces.

No less rigid requirements should be applied to work done by city forces. It appears that the city and state-wide method of patching bituminous pavements can only result in failures. The present method may have been imposed by lack of funds, lack of personnel or by tradition.

D. Work Done by Utilities and By or For Property Owners.

A vigorous inspection program should be applied to all work done in the street right-of-way by the utilities and by contractors for the property owners. This applies particularly to the openings in streets and their proper closing. Again adequate compaction of backfill, proper quality of concrete, and prevention of freezing of concrete are examples.

Suitable specifications should be available covering the openings in streets and their closing and no less important is the availability of competent inspectors to check the work.

Restriction of Cutting into Streets

If any or all of the proposed rehabilitation program is adopted provision should be made to prevent the cutting into the new surfaces

for a period of from three to five years. Emergency entrances by utilities would of necessity be excepted. All citizens should be appraised of the proposed program and given an opportunity to bring sewer, gas and water services to the property lines. There is no need to spend the money for replacements as proposed and have the work disturbed within the near future. Such a requirement is not new to cities.

Every effort will be made during the reconstruction of the streets to carry out the above recommendations.

After the council received and approved the report of the citizens, it was agreed that the engineering necessary for this project could and should be done by the engineering department of the City rather than contract with a consulting firm to do this work. This would not be true in most cities, but, since there is a wealth of technical help available, we should avail ourselves of it.

It might be well to explain in more detail the type work mentioned above in Type A, B, C and etc.

Maintenance Type A

Streets in this category are in poor condition but have an adequate thickness of good quality base course. The existing road surface should be removed and the base scarified, leveled, and compacted. A good quality cold type paving mixture should then be applied. A hot-mix bituminous concrete surface would be better but more expensive.

If it is found that the base course in question has a binder content as low as 5 to 7% (considered too low in this case because of the probable low plasticity of the material passing the #200 sieve), some additional binder should be added when the base course is scarified. This is very important in order to obtain proper compaction. The maximum limit of binder material should be no higher than 15%.

Maintenance Type B

Streets in this category are in poor condition and do not have an adequate base course, or do not have a base course. The existing road surface and 6 to 8 inches of the existing base course (or subgrade if there is no base course) should be removed. The subgrade should then be compacted and 6 to 8 inches of granular base course material containing approximately 10% binder placed and compacted. The same surface as for Maintenance Type A should be applied.

Maintenance Type C

Streets in this category are considered structurally adequate but require a new surface. After thorough patching of all holes in the

pavement, the type surface called for in Maintenance Type A should be applied.

Maintenance Type D

Streets in this category are in good condition now but are showing signs that they may deteriorate so that in the future they will require Maintenance Type A.

Maintenance Type E

Streets in this category are in good or excellent condition and show no signs of serious deterioration.

The deterioration of streets in Maintenance A and D categories is due primarily to a poorly compacted base course and/or a poor pavement surface. In general, those in category A have both poor compaction and poor pavement surface, and those of D have a good surface on a poorly compacted base course.

The method of reconstruction of the streets was explained and it was felt that it would probably be better to have the work contracted for than to attempt to have it done by city forces. There are several sound reasons for this conclusion. First, the city would have to buy several pieces of large road building equipment. It would be necessary to have a grader, a roller, a vibrating compactor and several other items of lesser size which we would not normally need in the regular street department operation. This equipment could not be used to their maximum efficiency from the standpoint of time. They would sit idle several months of the year. It would also be difficult to obtain qualified personnel to run such equipment on a part time basis, and the city could not afford to hire these people full time if they were needed only about seven months each year. It is necessary to have qualified people who have had considerable experience in this type of work for many of the jobs other than those which involve running equipment. Such personnel are not available.

FINANCE

The financing of a project of this type requires considerable study and research. The finance committee was able to compile the following information concerning the present street monies:

A. Funds coming to the civil city are placed in the general fund and distributed to the several departments according to the published budget. Some of the revenue sources are motor vehicle fund, property tax, grant from Purdue University, parking meters, payment for services and permits.

The Street Department budgets for selected years and the corresponding motor vehicle fund allocations are indicated below:

<i>Year</i>	<i>Budget</i>	<i>Motor Vehicle Fund</i>	<i>M. V. F. percent of Total</i>
1957	\$ 93,968.00	\$62,136.00	62
1958	101,260.00	83,788.00	83
1959	114,736.00	85,000.00 (est.)	74

Certain funds are available in the city engineer's budget for street intersection work.

B. Present use of funds includes ice and snow removal, sanding, tree and debris removal, and many other activities not directly related to street maintenance. The result is that only modest repairs are possible under present conditions.

C. The present street department is not equipped, nor is it properly staffed, to carry out a comprehensive street improvement program.

After obtaining the street data and unit costs of the various types of improvements the probable costs were broken down as follows:

<i>Bituminous Surface Type of Maintenance</i>	<i>Estimated Quantity Sq. Yd.</i>	<i>Unit Cost</i>	<i>Probable Cost</i>
A	42,245	\$2.00	\$ 84,490
B	8,958	2.50	22,395
C	36,784	1.90	69,890
D	47,991	0.30	14,397
E	55,855	0.30	16,757
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Total Bituminous	191,833 Sq. Yd.		\$207,929
Concrete Pavements to be resurfaced	85,463 Sq. Yd.	\$1.10	\$ 94,009
Total Repair	277,296 Sq. Yd.		\$301,938

To the above construction costs must be added an amount, over and above that provided under any city budget, to provide funds for adequate engineering services in design and construction and legal and financing expenses. These items may cost \$20,000 to \$25,000. In order to keep a bond issue within legal limits and to provide for these expenses, it appears necessary to omit items D and E (future seal coating) from this immediate program and do that work in the near future as part of the yearly maintenance. Type D work cannot be long delayed or a complete rebuilding program will be needed for these specific sections of streets. Type E may be a little farther away.

The proposed reconstruction program then appears as:

SUMMARY OF REHABILITATION

Bituminous, Type A	42,245 sq. yd.	@	\$2.00	\$ 84,490
Bituminous, Type B	8,958 sq. yd.	@	2.50	22,395
Bituminous, Type C	36,784 sq. yd.	@	1.90	69,890
Concrete Resurfacing	85,463 sq. yd.	@	1.10	94,009
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				\$270,784
Engineering, legal and financing expenses				25,000
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Probable total cost				\$295,784

After obtaining the costs above, the committee made the following recommendations:

- A. \$300,000 or as much as is needed to execute the program here contemplated should be raised on a general obligation bond issue under as favorable fiscal conditions as possible.
- B. The funds for construction obtained from the bond issue should be expended under contracts let by competitive bidding to qualified contractors. The aim here being the renovation of West Lafayette streets in the most economical and efficient manner.

The recommendations of the finance committee were received and approved by the city council and the necessary proceedings for selling the bonds were begun. At the March meeting, the city council passed Ordinance No. 9-59 which is "An Ordinance of the City of West Lafayette authorizing the issuance and sale of bonds of said City for the purpose of providing funds to be applied on the cost of construction, reconstruction, widening, resurfacing and otherwise improving streets in the City."

In concluding this report it might be well to explain the principle behind the city executing the street improvements as set out in this program. It has been stated that the street improvement is the individual property owners responsibility because his property benefits from the improvement. This may be true, but it must be remembered that only those streets which were once improved by some one other than the general public will be included in the program. Secondly, all streets which have been improved are to be included in the rehabilitation program so everyone will be treated equally. Thirdly, it would be impossible to get the job done in twenty years if it were done by getting petitions signed for each block of each street. And

finally, it would be unfair to require people who live on major arterial or secondary arterials to have to pay more than the people living on residential streets because their streets must carry more and heavier traffic and must therefore be wider and of a stronger design. Yet the people living on these streets receive no more benefits from the street than anyone else in town.

West Lafayette is developing into a city and we must be willing to grow in our thinking and accept the responsibilities of such a community. The street improvement program is one of the responsibilities of a growing city.