Engineering in the Fringe Areas of Cities

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It is a real pleasure to be here, to renew old acquaintances, and to get up to date on what has happened in our home cities in the past few months. The subject assigned to me, "Engineering in the Fringe Areas", looked very interesting and I approached the preparation of a talk on the subject with no particular apprehension, but as a friend of mine said, when told he was eating horse meat, it still tasted pretty good, but the more I chewed it, the bigger it seemed to get. Even an attempt to define some of the terms so as to narrow the discussion, only led into wider and wider possible subjects to discuss.

Before considering some of the specific problems involved, we might define "fringe areas." This phrase has had a recent popular vogue in planning and technical publications and has become something of a catch phrase for the laymen. Actually it is the area in which the expansion and development of a growing and changing city is taking place. From the standpoint of the city engineer, this fringe area in addition to producing the normal problems of utility design is complicated by the fact that the legal corporation line of his city probably runs through it, with part of the fringe area inside and part outside. Thus his proposed solutions to the various technical problems involved are complicated almost beyond clearing up by the more or less artificial legal and red tape barriers involved in operating in two legally separated administrative areas. Of course the problems vary from city to city depending on size and certain other factors.

In even the smallest of growing cities certain particular problems always occur. Usually these involve sub-division layout, and the proper layout of thoroughfares so as to connect the new areas to the existing traffic flow pattern of the older city. The problems increase in type and complexity as the city increases in size, so that second class cities almost invariably have problems of sewage collection and disposal. In our only first class city, Indianapolis, this problem alone is a tremendous one, handled by a separate administra-
tive organization. If the city owns some or most of the public utilities in the community, many further engineering problems are involved.

Specifically, I believe that the city engineer in any Indiana town, large or small, is looked upon as the best available source of technical information concerning most of the physical problems of his community, and properly so. His training, background and interests equip him for problem solving and give him the ability to dissect and analyze a mass of facts, information, opinions and emotional attitudes so as to arrive at the basic problem and some proposed solution. The problem of street alignment, street width and type is probably the first to occur in the developing fringe area. The subdivider wishes to take advantage, as a rule, of favorably located areas with the idea of developing them for residential purposes and making a profit. Quite often he wishes to get his investment and profit back very quickly, and is hopeful that the investment required will be comparatively small. The engineer should (and as an agent of the Board of Works definitely has power to) require at least that the proposed street layout conform with the probable development of traffic access arteries in the existing city. A statute passed in the early 1900's gives the Board of Works authority over the alignment of thoroughfares in an area within four miles of the city corporation limits and as far as I have been able to determine, this statute was not invalidated or superseded by the 1947 planning act. This statute may be found by looking up the powers of the Board of Works as outlined in the section of Burns Statutes on municipal corporations.

To give sensible advice, the engineer must familiarize himself to a considerable degree with the traffic flow of his community and its relation with inter-city highways in his area.

Specific items that could be recommended in sub-division layout are these: First, recommend to your council and to the county commissioners that ordinances be passed or amendments be made to existing ones, requiring that good-sized permanent-type markers be set at the corners of all sub-divisions and that inspection of these must be made by the city engineer before the plat is accepted for record. It is preferable that all lot corners be staked with iron pins or pipes and that permanent-type monuments be set at each street corner, but if this ideal situation can not be achieved, it is really essential that permanent or extremely long-lasting markers be set at each corner of the boundaries of new sub-divisions. In addition, a policy for the development of the thoroughfares and utilities in sub-divisions should be worked out and enforced by ordinance.
far these requirements should go depends entirely upon the policy of the local community and may vary all the way from a minimum pavement to the complete furnishing of sewer, water, sidewalk, curb and gutter and concrete street. Several cities in the middle west require all these things to be done by the developer before plats are recorded and before any city services are granted to the new subdivision.

Such extensive requirements are unusual and are often bitterly opposed by developers and others. If the long view is taken, a forward view of 30 to 50 years, by no means a great period in the life of a city, these so-called maximum requirements are both economically and technically justified. Street widths, maximum and minimum grades, spacing between cross streets, the question of dead end streets in residential areas and so on, are matters on which considerable difference of opinion exists, but where streets may become major arteries, adequate widths, excellent base course and proper drainage should be required as an absolute minimum in the development of a sub-division.

Next, as a rule, is the desire for water from the city utility. This becomes a problem of the city engineer very frequently, if this city owns its water utility. If it does not, his responsibility may be slight unless he is asked to advise on the need for future fire protection. The problem of additional water supplies is a very present one in many Indiana cities today. Again the engineer is often the person in the community most conscious of the growing consumption of water, due to increased population and such new uses as air conditioning. The use of water in manufacturing is increasing very greatly, partly due to air conditioning of plants, but principally because of new processes. The type of industry involved naturally has a great deal to do with the amount of water required and each community’s problem is different and complicated by all these factors.

If the water utility is municipally owned, the engineer should urge the Board of Works and utility authorities to develop their system in a rational manner, so that minimum 6-inch mains are laid for future fire protection, as required by the fire insurance underwriters. This does not mean that smaller mains cannot be used in short runs provided that fire hydrants attached to 6-inch mains exist within a 300 foot radius, approximately, of all the houses or buildings involved. Maintenance of adequate pressure also involves the inclusion in all designs of adequate distribution mains and looping wherever possible. Probably no main to which a fire hydrant is
attached should be installed without provision for present or future looping. The engineer also must familiarize himself with the capacity of his plant, the extent of the present water resources and the probable sources of future water supplies.

The third fringe area problem which commonly arises is that of sewerage, and the city engineer familiar with the topography of his city and the surrounding area is best qualified to recommend sizes and courses of sewers and whether or not separate or combined systems should be used. Here again he most frequently finds the developer quite reluctant to spend the money which he, the engineer, knows is or will be necessary to produce an adequate system. As a matter of economics, the sewerage system will probably be a combined one in most areas although local situations may change that picture. However, the combined system is extremely common in Indiana. Here again, the engineer must look as far forward as possible when studying development of sub-divisions.

Sometimes, the sub-division may lie across the best location of later interceptor mains or may be in the lower part of a minor drainage area so that provision must be made for the drainage to come at some later date from outside the subdivision. Very often the developer of a smaller area feels it is not his place to pay for the additional cost of larger pipe for the main sewers in his section. This problem again is one for the local Boards of Works to solve, for they may feel justified in advancing the difference in cost to the developer or to the contractor, with the expectation that this charge will be placed against the subdivisions further up the drainage area when they are developed later.

Here the difficulties of engineering in the fringe area really begin to become serious since it is often most difficult to predict the probable need and course of development. It is my own opinion that in most of Indiana the most optimistic estimates of future growth are not improbable of realization. Our area is now (and has been since 1940) expanding in population at about the rate of two per cent per year compounded. Don’t study this figure too seriously; some of its implications are almost appalling. An adequate general knowledge of the surface drainage and geological characteristics of the surrounding area is almost essential for the city engineer. The State Geological Survey can be of great help in this field. Tentative drainage and sub-drainage districts should be pretty well worked out so that the engineer can describe them fairly simply to the developers of specific small plots of ground in these areas. Since much of this area lies outside existing corporation lines, it is theoretically illegal,
1 suppose, to spend city money on engineering surveys, so that much of the work must be strictly that of the city engineer as an individual, studying and making himself familiar with the area involved. Much information is available in many parts of Indiana from the topographic sheets of the U. S. Geological Survey and much more will be available soon.

The north half of the state has been flown within the past two years by aerial photographic mapping firms as a preliminary to contour mapping of the entire area for the strategic section of the armed services. This work has progressed very rapidly and most of you have probably received offers from the aerial photographic firms involved to furnish you with aerial surveys of your cities at a very reasonable price. We have ordered such a set for the city of Anderson to replace our present mosaic of the area, which is six years old and already badly out of date. The cost—70 cents per square mile—is nominal. The scale—1,000 feet to the inch, approximately—is adequate for many planning purposes.

Proceeding from some of these specific problems to a somewhat more general view, it becomes increasingly obvious that great foresight, on an organized basis, is essential if our cities are to be comfortable, efficient and pleasant places in which to live. The phrase, city planning, or comprehensive planning, is perhaps too broad and has some connotation of the dreamer type planning common some 30 years ago, but it certainly is true that we must make plans, use common sense, and develop foresight, and that the engineer is probably the most logical person to head up the technical phases of this work. My own opinion is that only the engineers have the background which makes it possible for them to approach the study of future planning with anything like good judgment. My own experience in recent years has put me in contact with a great many of the planners in the eastern United States. I find most of them to be entirely earnest, often widely informed, but rarely with the practical engineering background necessary to translate their ideas into really workable city plans.

The engineer, of course, is an ex-officio member of the City Plan Commission and very often finds himself secretary, since his office furnishes secretarial and filing services to the Commission. It usually is the spot which furnishes petitions for rezoning. He perforce becomes familiar with many of the ordinances of his city pertaining to planning and if the city has a master plan, he usually is familiar with its various aspects. A thorough knowledge of the purposes of the plan, the methods by which the various ordinances—
zoning, building code, traffic thoroughfare, sub-division control, and others—act as tools by which the city may be shaped from its present unwieldy form to a somewhat more ideal form is essential to him. In fact, as I see this changing scene it seems to me that in Indiana, with our present laws and statutes, and the present impossibility of using the city manager form of government or anything very closely resembling it, the city engineer and his office must gradually change function so that he becomes more the administrator and coordinator of these various engineering problems in the growing section of his city, the so-called fringe area. He must be the person whose responsibility it is to explain, time after time, to group after group, to person after person, how these matters work, why it is necessary for controls of this sort to be exercised throughout a city and what the result will be.

This is in essence, a change from the old concept of the city engineer as a combination lot surveyor, supervisor of maintenance for sewers and streets, and designer of the minor projects of the city. These things will remain a part of his duties, but as various departments or sections under his general supervision, so that he becomes a director of public works, responsible to and acting under the orders of the Board of Public Works and available day in and day out to provide the coordination and make the decisions between previously separated departments and to explain to the many citizens groups, not technically informed, how and why the city works as it does and how it can be improved.

It is also in my opinion essential that a gradual shift in viewpoint be carried out by most of our planning commissions in Indiana. Too often they attempt to safeguard the interest of one private individual or one private group. Such as residential property holders, as against some other individual or some other group or corporation, such as a business or industry which attempts to rezone property. Actually, the function of the Plan Commission is to safeguard at all points the public interests, such as the schools, thoroughfares, sewers, water mains and other utilities and involves looking at what the later result of the proposed action will be on these items. If it is attempted to protect the interest of one private citizen as against another, only a year or two later the very man who you were attempting to protect comes in and wishes to make changes similar to those made by his neighbor against whom he may have protested violently not too long before.

Courts exist specifically for the protection of the rights of one private individual as against another and these matters can safely be
left to the courts. However, the protection of investments in school properties, streets, and in other public utilities is the proper and definite responsibility of the planning commission. This viewpoint, while often neglected, is essentially sound, will be upheld by the courts and is almost always understood by the citizens of the community once it is explained to them. In conclusion, I would say: you can see that my concept of the city engineer is a broad one and it is my belief that his functions and responsibilities are changing with the years. Very often the temptation is great to retire into the shell of technical problems only and refuse to accept responsibility for the broader implications of policy making involved in these ideas of the Engineer's duties. I hope to live to see the day when the chief engineer of any city will be looked upon as the responsible administrator and coordinator of the physical activities of the city, both in the fringe and in the central areas. Only then will he be fulfilling the responsibilities and duties of a professional man and only by so doing can he and our profession receive the respect and income we feel that we deserve.