SUBURBIA: SATELLITE OR SPRAWL

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A safe and adequate water supply is the first requirement of suburban development. Such a supply is usually obtained by extension of existing public mains, development of a new common supply or the installation of individual local wells. Developers prefer to utilize existing supplies wherever possible. Consideration must be given to the adequacy of the source to meet the increasing demands of the present population and the expected population of the proposed development. Of nearly equal importance is the capacity of the distribution system. New developments are generally outside of the area presently served. Approaching the ends of distributing lines the ability to maintain adequate pressures is frequently difficult and thus the added load may require strengthening of the entire system. There are few more exasperating events than to find no water on the second floor as company comes to warm the new house. Many developers are willing to extend existing mains but are not in a position to go back into the distribution system to increase pipe sizes or provide interconnections which may be necessary.

The development of a new supply in this State offers many problems, both technical and administrative. There are relatively few remaining sources of surface water of satisfactory quality available in Massachusetts without providing considerable treatment as most of our surface water resources have been appropriated already for water supply or other uses. In instances where a source of surface water supply is available in the vicinity of a suburban development it is quite probable that treatment in excess of plain chlorination would be required because of direct pollution or development on the watershed. Many of the ground waters of Massachusetts are not satisfactory for direct sources of water supply due to a high content of iron and/or manganese. Thus even if a ground water source of adequate quantity were available there is considerable probability that treatment would be required. Frequently a developer would find it un-

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reasonable to set aside a sufficient area around a well for proper development and sanitary protection. In instances where treatment would be required, either a surface supply or a ground water supply, the State Department of Public Health would feel that the operation of such facilities should be in the hands of a responsible public agency, such as a municipality, a water supply district or a water company operating under the jurisdiction of the Department of Public Utilities. Water districts may be formed only with the approval of the Legislature and the residents of the area. When thus established authority is granted to issue bonds for construction and to raise funds by taxation and other means available to municipalities. Thus the continued maintenance and operation of the facilities are guaranteed and the Department of Public Health maintains its normal jurisdiction over the quality of the water and the sources of supply.

The possibility of providing a water supply from individual wells with sewage disposal on the same lot is restricted to areas where the lot size will physically permit a considerable distance between such facilities. Under favorable conditions it has been felt generally in Massachusetts that such a minimum distance should be 50 feet. With the advent of synthetic detergents it is felt that this minimum may not be adequate and it may be necessary to increase minimum recommendations to 100 or more feet. It should be emphasized that such requirements are minimum, not optimum or adequate in many instances.

Disposal of sewage most frequently offers problems to suburban development. Where possible to do so, sewage should be disposed of by means of the municipal sewerage system. Consideration should be given to the adequacy of the sewerage system and the sewage treatment facilities. Federal grants-in-aid are available to municipalities for the construction or extension of sewage treatment facilities, but no such funds are available for common sewers. Federal aid is forthcoming for the construction of interceptors and pumping stations in certain instances. A survey of the practices of municipalities indicates that the developer is usually required to bear the entire cost of sewer extensions to serve the newly developed area. The operation of the system thereafter may be placed on the general tax levy or a sewer usage charge directly against the resident.

Where it is not possible to connect each individual home directly to the municipal sewerage system, consideration should be given to

providing a common sewerage system and either pumping the sewage from a central point to an existing sewerage system or providing treatment facilities at a central location. In either instance the Department of Public Health requires adequate assurance of the proper maintenance and operation of facilities. Where only pumping facilities are required the municipality will frequently assume the title and thereafter operate and maintain the works if the system meets local engineering requirements. In other instances proper operation may be by means of formation of a sewerage district similar to a water district or by means of trust deeds where a responsible agency, such as a large banking institution, guarantees proper maintenance and operation of works. The General Laws of the Commonwealth do not provide for the operation of sewerage or sewage treatment facilities as public utilities.

The use of individual sewage disposal facilities on each lot is dependent very considerably on the size of the lot, character of the soil, the elevation of ground water, and the proximity of sources of water supply, buildings and property lines. Such works generally consist of septic tanks and subsurface leaching works, although the use of cesspools is approved in certain favorable instances within the Commonwealth. Of great importance are the character of the soil and the elevation of ground water. Developers find it necessary to utilize more and more marginal land and thus provide housing in clayey soils and swampy areas which heretofore have been considered unsatisfactory for building purposes.

No method of local sewage disposal has been developed to date that may be considered suitable for an unlimited period of time. Our present local disposal facilities are generally designed to operate for a period of some 20 or so years. It is anticipated that they must be replaced, at least in part, at some future date and thus ample room for at least duplicating the original facilities should be provided.

Of utmost importance is the maintenance of the facilities, particularly the septic tank, which must be cleaned from time to time. The State Department of Public Health does not look with favor upon the installation of sand filters for individual households but does consider the installation of such for schools and other public buildings. In such an event the effluent must be discharged to a suitable body of receiving water.

It is well understood that our surface waters cannot be maintained

in their pristine glory. There are no longer sufficient areas to permit disposal of liquid wastes to the ground in our urban areas; thus the ultimate disposal must be to a stream or the ocean. The people generally demand that our surface waters be free of obnoxious substances and pleasing to the senses. This State believes that maximum use should be made of its water resources, taking advantage of the ability of the streams to purify themselves through time, reoxygenation and other natural processes. Since waters of various degrees of purity are required for various purposes the State, through the New England Interstate Water Pollution Control Commission, classifies its waters in accordance with their proposed highest use. Domestic water supply requires water of highest purity and thus is designated Class A. Such waters are suitable for domestic purposes with no treatment other than chlorination. Class B waters are generally suitable for bathing, game fishing and other similar uses. Class C waters, the largest group of our waters, are suitable for recreational fishing and other uses. Such waters may receive effluents of sewage and industrial waste treatment plants but must always be maintained aesthetically acceptable. Class D waters are suitable for power development, shipping, etc. but must be kept out of a nuisance condition. Streams in which nuisance conditions prevail continuously or from time to time are presently in Class E but every effort is being directed to eliminating sources of pollution or providing sufficient treatment to raise water quality to an acceptable level. Thus it may be seen that discharge of treated effluents to a stream, and the degree of treatment required is dependent on the natural ability of the receiving water to assimilate the waste within its assigned classification based on the proposed highest use.

The suburban developer should understand the powers, duties and responsibilities of various public agencies. From the public health angle the most important of such agencies are the board of health and the State Department of Public Health. When a developer proposes to subdivide land he must submit plans to the local planning board, which in turn refers matters of water supply, sewage disposal and drainage to the local board of health. No subdivision plan may be approved if the board of health disapproves any of the facilities for these purposes. The size of lot is not the direct responsibility of the local board of health except that such a board may establish a minimum size of lot consistent with the needs in regard to water supply and sewage disposal. The board of health may, after a suitable

investigation, decide upon a minimum area for sewage disposal for an average size house. This area requirement would vary very considerably with the character of the soil. Generally speaking the board has a right to establish a minimum lot size which would provide for location of a private well, where necessary, at a safe distance from any sewage disposal facilities which might be needed now or in the anticipated future. In one instance a Massachusetts Superior Court rules that a board of health might reasonably assume a minimum area to be devoted for sewage disposal facilities, add 50 per cent for expansion of the family and double this resulting area to provide for duplication of all of the facilities if and when required. A minimum lot was thus established, knowing the legal requirement for setbacks from the sidewalk, average size of house, an average size sewage disposal system, providing for a local water supply at a minimum of some 50 feet from the disposal facilities and then adding enough area to provide for the rebuilding of the sewage disposal facilities. A board of health may only establish a minimum size of lot to maintain proper facilities for health and sanitation. It may adopt rules and regulations relative to the construction and location of wells and the construction, size and location of sewage disposal facilities. It may also adopt housing standards. In the absence of such standards the board of health may exercise authority in the field of housing only so far as it pertains to the general cleanliness of the premises, the conditions of floor, ceilings and such, freedom of the cellar, basement and walls from dampness, the operation of water closets and heat generating equipment.

The board of health has jurisdiction over all sources of nuisance and causes of sickness. Under this general authority it may adopt rules and regulations and cause compliance. Inadequate sewage disposal facilities are considered nuisances and thus within the jurisdiction of the board. It is of interest to note that an order of the board must be complied with before there may be review by the courts.

The State Department of Public Health in Massachusetts advises local boards of health upon request in matters of water supply, sewage disposal and drainage. The Department has authority of approval of sources and methods of treatment of public and semi-public water supplies and advises the Department of Public Utilities in such matters where the system is a public utility. The Department is required to advise cities, towns and industries relative to methods of sewerage and sewage treatment and approval of the Department is required

before the establishment of such facilities. The Department is the water pollution control agency of the Commonwealth and has authority to require the abatement of sources of pollution of all streams, lakes, ponds, and other waterways.

The Department is now authorized to establish a sanitary code, the enforcement of which will be the duty and responsibility of the local board of health but appeals from actions of the board or failure of the board to act may be referred to the Department of Public Health for decision prior to court action.

Public sewerage systems may be constructed under authority granted in the General Laws but more often are constructed under authorization of special acts of the legislature. Such acts establish the maximum borrowing capacity of the municipality or responsible agency for construction purposes. Such acts also provide for considerable latitude in the establishment of fees and methods of collection.

Under Massachusetts law all municipal bonds are of the general obligation type, thus pledging the full responsibility of the municipality. Revenue bonding is not generally authorized for municipal use in this state.

There are no federal or state funds available for construction of water supply facilities but Federal aid is available as an interest-free loan to municipalities for advanced planning for public works. Such funds must be repaid to the federal government upon the start of construction. Under Public Law 660 the water pollution control act, federal aid to the extent of 30 per cent or $250,000, whichever is the lesser, is available for construction of sewage treatment facilities. Such funds are only available when the sewage or other liquid wastes receive treatment which will result in the substantial removal of the settleable solids. Such funds are available for new construction of treatment works, treatment plant, outfalls, interceptors and pumping stations but are not available for construction of common sewers or outfalls in instances where treatment is not provided.

The sanitary engineer is currently called upon to provide improved methods of sewage disposal for individual lots. Septic tanks generally result in the reduction of suspended solids but a very considerable amount of organic solids are carried into the leaching field, resulting in the clogging of the soil. Such clogging usually occurs at the interfaces between the disposal facilities and the surrounding soil. Much work is needed to develop replaceable interfaces or other devices which would greatly increase the usable life of

disposal facilities. It is possible that recirculating systems may be developed so as to permit purification of the sewage and waste water and their reuse, thus providing a nearly self contained system. To date such systems have resulted in the production of large quantities of ammonia and their use has been retarded because of the lack of esthetic appeal. Prefabricated sewage treatment plants are now on the market. The standards of design and the results of the operation of such facilities are not adequately known so that many responsible agencies refuse to approve installations within their jurisdiction. Improved methods of removal of suspended solids and B.O.D. are needed.

One of the major problems that must be solved if sewage is to be disposed of by treatment plants discharging effluents to local streams is the removal and reduction of phosphates. This essential element is present in the effluents of sewage treatment plants and its presence in receiving waters generally results in the growth of algae, aquatic weeds, and in some instances obnoxious fungi and bacterial growths. Sewage and waste waters have always contained traces of phosphorous but the use of synthetic detergents has resulted in much higher concentrations than previously anticipated. It is not anticipated that use of such materials will lessen but that their use will expand both for home and industrial use. A suitable method of reduction in phosphorous in the effluents of sewage treatment plants has not been developed at the present time. Much time and study are currently being spent in a search for a suitable means of chemical control of the algae and weeds which naturally result from the presence of added phosphates. It is probable that the real answer lies in removal of the cause rather than subsequent control.

In summary, if suburban development is to provide a healthful outlet for our expanding population, ways and means of providing responsible agencies for the maintenance and operation of both water supply and sewage disposal facilities are necessary. A very searching inquiry is needed in the field of State and Federal aid for the construction of such facilities.

The sanitary engineer with the help of the laboratory can cope with the technical problems of water supply, sewage treatment and disposal, but added emphasis must be placed in fields of technical research and the administrative procedures of financing, maintenance and operation must be reviewed if suburban development is to proceed in the best interests of the general public.