ZONING BUFFERS: SOLUTION OR PANACEA?

Just by using the word "buffer," we assume that two or more things are antagonistic. And indeed, the idea that the activities taking place on one piece of land may be harmful to those on a neighboring parcel is almost as old as zoning itself.

The zoning buffer is an attempt to solve this ever-present problem of incompatible land uses. There are two chief types. One--the "use buffer"--is an offshoot from the main branch of the zoning ordinance in its conventional historic form. The other--the "landscaped buffer"--is a fairly recent development. Both will be taken up in turn, but because certain dangers lurk in the concept of the "use buffer," we shall trace its connections with the structure of the zoning ordinance.

In trying to prevent a conflict between land uses, the first step was to classify and segregate the different types of uses. The next step was to arrange them in a hierarchical order, from high to low. Most zoning ordinances today reflect this hierarchy, and some actually specify it in so many words: "The order of classification of uses from highest to lowest for the purposes of this ordinance shall be as follows. . . ."

An essential part of the basis of high-low use classification is the "zoning pyramid." Just where this term first arose is not clear, but it has become an often-used device to explain the structure of the typical zoning ordinance.

As the accompanying diagram shows, all those uses in the "highest" or residential class are permitted throughout the pyramid. Starting with the second level, the next lower or business uses are permitted in addition. And at the lowest level, industry is permitted in addition to residence and business uses. Thus, uses accumulate from the top to the bottom of the pyramid. Or, putting it another way, "higher" uses are always permitted in the next "lower" class.

Prepared by Mary McLean

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This diagram oversimplifies the situation, and nearly every modern zoning ordinance contains exceptions to the rule, the most notable one being the prohibition of residences in industrial districts.

In recent years, the assumption that pyramidal zoning is a wholly satisfactory way of making land uses compatible has been challenged. The biggest impetus has come from the movement to guarantee good land for industry—land that is well placed and arranged in parcels large enough to accommodate one-story plants with large parking lots, characteristic of modern industrial establishments. This movement has in turn been reflected in the trend toward exclusive industrial zoning, already mentioned.

Pyramidal zoning has been challenged also because over the years the idea of "good" and "bad" has been injected into the scheme of things and substituted for "high" and "low"—words that in themselves do not necessarily possess moral value. Instead, the view that all classes of use have a place in the community is gaining wide favor. Thus the problem is not so much one of protecting residences from all other uses as in seeing that the zoning ordinance, to the extent possible under the law, encourages the proper functioning of each class of land use.

This is not to say that residential properties need not be protected. In fact, the threats to peaceful urban neighborhoods increase as time goes on and as technology advances. The new viewpoint is more a matter of emphasis than a change of position.

An ordinance that is not cumulative, but which still divides principal uses into classes according to function, can be represented by a cube. In this schematic diagram, nothing but business and associated uses are permitted in the business zone, and nothing but industry in the industrial zone. Actually, this picture is not as far-fetched as it might seem to be. There are, for instance, a number of zoning ordinances that prohibit residences in business as well as industrial zones—though still permitting business in industrial. Others restrict the business uses in an industrial zone to those that are accessory to industry. The trend toward planned shopping center zones and planned industrial districts is also a manifestation of the "exclusive" zoning principle.

It is also becoming fairly common for ordinances that are predominantly pyramidal in fact to be organized as if they were cuboid. To take an example: the C-1 zone in a pyramidal ordinance permits all R-4 uses, and by virtue of the cumulative effect, all preceding residence uses. These residential uses are not individually enumerated in the C-1 district provisions, however. In contrast, many contemporary ordinances specifically list in each zone the uses permitted, even though this listing may duplicate previous lists. This practice produces a lengthier, bulkier document, but it also makes the ordinance easier to use. In the long run, it should discourage the automatic progression of previous uses that the present cumulative zoning makes so easy.
A secondary effect of the pyramidal organization of zoning ordinances—and one that bears on buffer strips—is the assumption that higher uses need to be protected from those lower down the scale or pyramid. What we are questioning here is not the fact that this may well be the case in most circumstances, but rather the assumption that (1) all adjoining use classes have "zone border compatibility" per se, and that (2) the intervention of a use immediately lower on the scale serves to protect a higher use from one still lower down.

Compatibility. To see if this assumption is accurate, we first must say what we mean by compatibility. This concept is very important in zoning, and is one of the basic reasons for dividing uses into classes. In determining compatibility, we evaluate such factors as property values, traffic conflict, mixture of pedestrian and vehicular traffic, phenomena that affect the senses (noise, light, glare), aesthetic considerations, psychological factors, and building height and bulk. (Also, see Norton, 1955, for a discussion of what constitutes compatibility.)

For many years compatibility was considered mainly in relation to residential uses, but recently it has been extended to business and industrial uses as well. Richard L. Nelson, author of The Selection of Retail Locations (1958), devotes a chapter to "The Principle of Compatibility." Briefly, businesses are compatible if they help each other: "A high degree of compatibility exists between two businesses which, because of their adjacency, do more volume together than they would if separated... The measure of compatibility is the degree to which the two businesses interchange customers."

In addition, compatibility can be measured, according to Mr. Nelson, by a negative factor—interruption of pedestrian traffic. He sets up detailed compatibility tables on the basis of extent of customer interchange and shopper traffic interruption. The relationships between businesses are graded according to whether they are highly compatible, moderately compatible, slightly compatible, incompatible, or deleterious.

Industrial management, too, is becoming increasingly concerned with compatibility. One of the big attractions of a planned industrial district is that industries within the district are chosen on the basis of their mutual compatibility. (See Planned Industrial District Zoning, Planning Advisory Service Information Report No. 120, 1959.)

It is interesting to note that a new element is introduced into the idea of compatibility as it applies to business and industrial uses. Whereas protection is uppermost in considering whether or not another use is compatible with a residence, enhancement carries equal weight where business and industrial compatibility are under consideration. This emphasis is in line with the movement away from "negative" zoning (that is, the ordinance that prohibits) and toward "positive" or "permissive" zoning (that is, the ordi-

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1For complete information on the references given in the text, see the list at the end of this report.
nance that uses the affirmative approach and is also designed to carry out a land-use plan.)

"Zone Border Compatibility." Let us briefly examine the assumptions mentioned earlier, that all adjoining use classes have zone border compatibility per se, and that the intervention of a use immediately lower on the scale serves to protect a higher use from one still lower down.

Inherent in the idea of a high-low scale is the concept of degree of restrictiveness. Thus R-1 zones are usually the most restrictive of all: fewer types of uses, lower density, large lot area, and wider yards. In the commercial group, C-1 zones are most restrictive, for the same kinds of reasons; and a similar logic holds in the industry groups.

Consequently, since dissimilar zones are going to have to be adjacent to each other, the greatest zone compatibility comes when a zone only slightly less restrictive adjoins one that is more restrictive. Any damaging effect of the lower on the higher use zone will therefore be slight, according to the theory.

These effects can be further reduced by transition zoning—a subject, as it applies to residence zones, that has been fully treated by Arthur C. Comey in his book Transition Zoning (1933). Transition zoning consists in applying more restrictive controls over the uses next to the zone boundary that separates a higher and a lower zone. (Or, it may work the other way, and controls may be relaxed in the transition area—a practice that employs a somewhat different principle.) Controls may apply to use, but more often they apply to height, area, and yards. Transition zoning of use has now evolved into a type of "buffer zoning," as we shall see later.

This general argument seems satisfactory as long as we are dealing with
several different low-density residence zones. But what of the effect created by proximity of a high-rise apartment zone to a three-story apartment zone? From the standpoints of building bulk and traffic generation, for instance, is a high-rise apartment a more desirable neighbor than a one-story neighborhood store? Or, to take another example, is a strip commercial zone more compatible with a residence zone than a light industrial zone? What, in the second example, are the relative effects on property values and the relative degrees of disturbance due to traffic, noise, and lights?

The answer to these questions is, of course, that it depends a great deal on the extent to which the zoning ordinance regulates the effects that might be harmful to nearby neighborhoods. In other words, compatibility or incompatibility, in these examples, depends on the characteristics and activities of the various uses and the conditions under which they operate. Rank position per se has nothing to do with compatibility.

The assumption of universal "zone border compatibility" is fallacious from another viewpoint, also. Most readers are probably familiar with the argument that it is all right to permit hospitals, nursing homes, nursery schools, and other humanitarian institutions in R-3 and R-4 zones but not in R-1 and R-2 zones. The argument holds that the high-density zones can put up with these uses because they are high-density zones: since the people already live closer together, they can endure these institutions better than can people who live farther apart.

Although Edward M. Bassett has long since blasted this line of reasoning (Bassett, 1940), ordinances throughout the country continue to reflect it. Furthermore, it carries over into the thinking about zone boundaries. If a shopping center is to be built in the heart of a suburban R-1 district, why not put an R-4 zone in between, so that the apartment houses can protect the single-family homes from the lower use?

Too literal reliance on the zoning pyramid leads to still another fallacy. As we have seen, the text of a zoning ordinance is organized along the lines of a gradual change, through zone steps, from one extreme to the other. The zoning map, on the other hand, and the land-use arrangement it depicts, seldom carry out that arrangement. The result is that most zoning maps show a hodgepodge of disparate zones. The effect of this assortment is not necessarily bad, but neither does it reflect the safe and ordered arrangement of the zoning pyramid. To some extent, then, the protection offered by a conventionally graded ordinance is misleading because the arrangement on paper does not work out realistically on land.

The "buffer" concept in zoning has taken two different forms, which seem to be unrelated to each other. One, which for convenience we shall call the "use buffer," grows out of the traditional framework of zoning described above. The "landscape buffer," on the other hand, is essentially a design device. Both, however, are attempts to defend the most fragile and vulnerable part of a zoning plan—the zone borders. Both have also been seized upon to make rezoning more palatable.
A Realistic Approach

Buried in Volume XIII of the Harvard City and Regional Planning Papers is Alfred Bettman's article, "The Fact Bases of Zoning," written in 1925. In this paper, Mr. Bettman points out that the relationship between the zoning ordinance and public health, safety, welfare, and other police power goals is one that should be demonstrable in fact.

Whether, for instance, the segregation of business from residential districts tends to promote the public health, is obviously not a question of law but a question falling within the domain of the science and art of public hygiene. . . . Similarly, the relationship of the various district regulations of a zoning ordinance to public safety involves questions of fact and of cause and effect which do not fall within the realm of law, but within the realm of the arts and sciences that deal with security of life and limb under urban conditions; and similarly throughout the other subdivisions of the police power.

Bettman was also interested in clarifying the idea that zoning has a factual basis: "Instead of surmising or reasoning a priori, we should actually trace the way in which the engineering plans and public improvements of a particular city have, in detail and in particulars, been adjusted to the zone plan, and the economies and efficiencies resulting therefrom."

In the years since 1925, developments show that Bettman's plea for a scientific approach to zoning has to some extent been heeded. The most notable example is, of course, industrial performance standards, which require that certain effects be measured (with instruments, if possible, and by observation if not). It is probably not possible in all phases of zoning to be as precise. But even if scientific precision is lacking, it should still be possible to demonstrate a causal relation between a zoning requirement and what it is supposed to achieve. For example, if side yard requirements are intended to permit access to light and air by neighboring buildings, then the yard requirements should in fact do so. And this causal effect should be capable of demonstration.2

This does not necessarily mean that every zoning provision must first be tested, or that elaborate proof must be drawn up to show the efficacy of every zoning plan. But if the ordinance is brought to court, theoretically, at least, the connection between the provision being questioned and the particular ends it is designed to achieve should be demonstrable by reference to objective standards of one kind or another.

The real obligation to base zoning provisions on fact comes when a new zon-

2A more scientific approach to achieving access to light and air is the daylight indicator and sunlight indicator method developed by the Ministry of Housing and Local Government. See The Density of Residential Areas (1952), and Flats and Houses 1958 (1958), London: Her Majesty's Stationery Office. Available from British Information Service, 45 Rockefeller Plaza, New York 20, N. Y. Similar devices have been used in the zoning ordinances of a few American cities.
ing technique is introduced. And unless a factual demonstration is made at this time, the drafters of the ordinance may unintentionally deceive the public--unless the claims happen by chance to coincide with the facts.

It is also at this stage that the authors of a zoning ordinance should be wary of a semantic trap. The snare is set up in this way: First a concept is developed involving a statement of the problem, and a way it can be solved (for example, a means of reducing the harmful effects of one use on another). Next, an attractive name is given to it (buffer strip). Then the name is applied to an object that superficially resembles the suggested solution but that does not possess the characteristics necessary to the solution (a "buffer strip" too narrow to produce the desired effects). The result of this process is that the attributes of the name are relied on whether or not the object in fact does what the concept implies.

It is against a background of fact, therefore, that buffer strip devices should be examined: What is a buffer expected to achieve? What are the conditions of its achievement? Do the particular zoning provisions fulfill these conditions?

**Use Buffers**

As we have seen, the "use buffer" idea is employed mainly by taking ordinary zoning districts and mapping them in such a way that a "buffer" district is interposed between one zone another. What happens when this idea is carried to its logical conclusion is shown on the accompanying map extract. Instead of the zoning ordinance being an instrument to carry out a land-use plan of the community, it reflects a land-use arrangement based on the idea--if not the fact--of protection. (In this particular example, interestingly enough, very little land in the C-2 zone has in fact been put to business use. Most of it is devoted to residences as an outcome of the cumulative principle of the zoning pyramid, and because there is little incentive for business investment.)

Lest the wrong impression be received from this discussion of the fallacies of the "use buffer," we hasten to say that we do not mean to attack the idea of use segregation nor the attempt to improve "border relations." If anything, the need to determine what constitutes compatibility, to set up scientific standards where possible, and to isolate the factors of land-use relationships that make for a good urban environment is greater now than ever before.

A diminishing supply of urban land, the increase in apartment house con-
struction, and the growth in large-scale projects of all kinds--residential, commercial, and industrial--are but a few of the factors that complicate the problem. These developments and others put pressures on local officials to find an answer that satisfies both sides.

The grading of zoning districts according to compatibility has proved to be a sound zoning principle, offering protection where it is needed most. And various refinements developed over the years have, in Comey's words, helped to mitigate "the detrimental effect to property on the edge of one zoning district resulting from the actual or prospective development of adjacent property in a less restricted district." (Comey, 1933)

But it is quite another thing to turn doctrine into dogma, and to make a rigid logical system out of what was intended to be a set of guiding principles. A priori reasoning applied to a practical situation runs counter to the prevalent trend in zoning.

**Landscaped Buffers**

Although the purpose of a landscaped buffer is the same as that of a use buffer--namely, to ameliorate or even prevent the damaging effects of one kind of land use on another--it operates on quite a different principle. Under the concept of a landscaped buffer, a wholly desirable, noncontroversial use of land is placed between the two conflicting types of districts. The effect of a landscaped buffer is mainly physical: it provides space, obstructs undesirable views, and in other ways reduces the impact of one thing upon another.

Landscaped Buffer as an Acoustic Screen. One of the claims often made for a landscaped buffer strip is that it acts as an acoustic screen, reducing the noise emanating from a source to a level where it will not be offensive to people living nearby. So far, tests of the amount of noise reduction gained by buffer plantings are inconclusive, and a case for their effectiveness has not been established.

\[
\begin{align*}
\text{Relation between sound level and distance from a noise source.}
\end{align*}
\]

Mention should be made of the inverse-square law, which states that the intensity of noise diminishes approximately as the square of the distance from the noise source. Because of this phenomenon, distance itself is something of a buffer, though how effective it is in any practical situation depends on several variables.

Among the factors affecting the propagation of noise are wind profile (whose shape depends on the roughness of the ground); wind fluctuations (velocity and frequency); and temperature (the velocity of sound increases with temperature). The pattern of sound distribution is largely determined by these
three factors. Their effects can be represented in a three-dimensional model:

A. Three-dimensional representation of the intensity distribution around a sound source in the presence of a temperature and wind gradient. The sound source and the receiver are located 10 feet above ground. The height of the surface about the ground level represents the sound pressure level in db, and the distance from the source is on a logarithmic scale.

B. Intensity distribution around a source in the presence of a wind stronger than that corresponding to A.

Source: The Physics of Outdoor Sound (Ingard, 1953)

If the noise is slight, reduction due to distance might be enough to make a difference. But if the noise is very loud, a considerably greater distance is needed to secure noticeable reduction. Therefore, the width of a buffer strip should bear some relation to the loudness of the noise generated at the source.

A reduction in noise level gained by a buffer-type planting strip, to be worthwhile, must be added to that normally resulting from the spreading of sound waves over distance alone. In any given situation, therefore, two factors should be taken into account: attenuation due to distance and other variables; and additional attenuation—if any—due to the planting.

In recent years, much interest has been shown in the effects of landscaping on noise reduction. It was hoped at one time that trees might be used to reduce noise from jet airports, but tests conducted in England demonstrated that the reduction achieved in noise of this magnitude was meaningless. (See Impact of Turbine-Powered Aircraft Upon Land Near Airports: Part II, Planning Advisory Service Information Report No. 64.)

Another situation where plantings have been recommended as an acoustic buffer is along high-speed expressways. Unfortunately, scientific tests of their actual value apparently have not been made. A paper on "Abatement of Highway Noise with Special Reference to Roadside Design" (Highway Research Board, 1955) reported two isolated cases where state highway engineers had observed a satisfactory reduction in noise due to planting. Apparently no actual measurements were made, and the observations were subjective.
This paper goes on to point out that to be effective, buffer plantings should be provided for at the time of right-of-way purchase, and that the vegetation should be planted as close as practicable to the traveled way.\(^3\) It concludes with the observation that field tests are needed to obtain data for general uniformity and agreement on: (1) methods of measurement of highway noise from the standpoint of annoyance to roadside dwellers; (2) noise levels acceptable for different land-use areas in which highways may be located; and (3) most effective and economical methods for abating (reducing) highway noise to abutters.

It should be emphasized that although this article was optimistic about the possibilities of landscape buffers as effective noise reducers, it did not report that proof had been established.

On the other hand, measurements have been taken of the effectiveness of solid walls as noise buffers or deflectors. Calculations were made to find out if traffic noise heard on adjoining properties is reduced when freeways are depressed below grade. The solutions indicated that, using uniform dimensions of distance, height of wall, and height of observer, the same amount of reduction was secured from a depressed highway as from a wall. (This does not include sound level reduction due to distance.) (Rettinger, 1959) Earlier tests have shown that a wall reduced traffic noise level by about 10 to 15 decibels. (Rettinger, 1957)

It is a mistake, though, to assume that a hedge can be substituted for a wall. The author of these articles states that measurements showed that a 6-foot privet hedge resulted in a reduction of only 3 decibels.

Finally, the observations made in the Handbook of Noise Control (Harris, 1957) should be noted.

For bushes and trees to be effective in containing noise in an open work area or reducing noise in residential areas, the density of growth must be very high and the depth of treatment great. If trees are used the leaf level should extend almost to ground level. Systematic studies of the attenuation provided by bushes and trees have not been made. However, measured transmission losses through various types of jungle . . . are useful as a guide. These data indicate that bushes and trees provide only slight attenuation. Therefore, as a practical matter, the use of plants as a sound barrier can be justified only when the effects desired are marginal, or when other avenues of approach are either unprofitable or exhausted.\(^4\)

From information available to date, we can only conclude that planting strips are not effective acoustic buffers. When combined with space or distance, they may produce a very slight sound reduction, but the amount

\(^3\)But not so close as to prevent dissipation of exhaust fumes. (See Highway Research Board, 1955, p. 45.)

is so small as to be negligible. Until more knowledge is available, it is far safer to rely on the attenuating effects of distance than to count on plantings of any kind.

**Landscaped Buffer as a Visual Screen.** A second claim made for buffer-strip plantings is that they shut off the view between one use and another, reducing or canceling out whatever disadvantages might come from seeing that use. This claim is, of course, easily substantiated and constitutes perhaps the biggest argument in favor of buffer strips in various kinds of situations.

It is easy, however, to fall into the trap of requiring a buffer strip in a zoning ordinance, for instance, and then assuming that the requirement will achieve the results desired. Depending on what effect is desired, the type of plantings, their height, thickness, and maintenance should be specified. Otherwise, the buffer strip requirement will be nothing more than lip-service to an idea.

Designing a buffer strip whose purpose is to cut off virtually all view of an industrial plant, for example, is clearly a job for a landscape architect familiar with the flora of the locality. Again, there are no objective standards to go by. But if sight distances in a tropical jungle are any indication, a complete screen would need to be at least 20 feet wide and planted with an unusually dense growth.

The following description of foliage characteristics is taken from the *Handbook of Noise Control*; it describes the different types of jungle growth in which the sound measurements mentioned above were taken:

<table>
<thead>
<tr>
<th>Zone</th>
<th>Leafiness</th>
<th>Sight distance</th>
<th>Penetration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>very leafy</td>
<td>20 feet</td>
<td>by cutting</td>
</tr>
<tr>
<td>2</td>
<td>very leafy</td>
<td>50 feet</td>
<td>with difficulty,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>but without cutting</td>
</tr>
<tr>
<td>3</td>
<td>leafy</td>
<td>100 feet</td>
<td>free walking if care is taken</td>
</tr>
<tr>
<td>4</td>
<td>leafy</td>
<td>200 feet</td>
<td>rather easy</td>
</tr>
<tr>
<td>5</td>
<td>very leafy under-</td>
<td>300 feet</td>
<td>easy</td>
</tr>
<tr>
<td></td>
<td>growth; large</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>bracketed trunks</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In a practical situation, the need or intent to completely block off the sight of a building or other use seldom arises. More often, the purpose of a so-called buffer strip is to break up the massive appearance of a solid building wall, for instance; to obscure or camouflage, rather than conceal. This effect, unfortunately, is difficult to measure in quantitative terms, and its success is in the realms of psychology and aesthetics rather than optics.

One approach is to examine again the meaning of the word "buffer." According to Webster's New World Dictionary of the American Language, a buffer is "a device using padding, springs, hydraulic pressure, etc. to lessen or absorb the shock of collision or impact." Therefore, in the second meaning given, it is "any person or thing that serves to lessen shock."
The question then becomes this: what are the characteristics of a planting strip that succeed in reducing the effects of seeing a factory, a parking lot, an office building, or some other nonresidential use? Should there be a predetermined ratio between spacing of trees and front footage, for instance? Or between tree spacing and length of building wall? Should the strip be wide enough to exploit the principles of perspective? What percentage of the total view should be shut off by foliage when plants have reached maturity? Should vertical as well as horizontal sight lines be considered?

These are some of the questions that should be given thought if a buffer device is used for the purpose of obscuring view. Although there may not be any cut-and-dried answers, merely to pose them will increase the probability of arriving at a realistic solution.

As is true with a number of other zoning refinements, factual information is badly needed on the visual value of buffer strips. Few studies of their influence on land value or their success in ameliorating what would otherwise be an incompatible juxtaposition of land uses have been made. No one can quarrel with the idea that landscaping improves appearance. The real question is whether in a given situation it can solve a basic incompatibility, or whether its effects are only marginal.

Greenbelt between industrial and residential property. Strip is 80 feet wide; plantings are about five years old. Oak Park, Michigan

5One study, not yet completed, is being made by Oak Park, Michigan. In 1952, Oak Park adopted a master plan that provided for buffer areas, or greenbelts, to isolate industrial areas, commercial areas, and major highways from adjacent residential properties. Since 1952, the city has acquired through dedication and acquisition some 3.3 miles of greenbelts, varying in width from 20 feet to 110 feet, depending on the type of area to be isolated. For the most part, developers have dedicated the land and paid for the initial development material costs, with the city providing the labor. Experience shows that the plant material screening does not become effective until five or six years after planting. On the other hand, maintenance costs decline as the plantings mature. Tentative findings indicate that the adjoining residents for the most part are favorable to the greenbelt idea and believe that greenbelts are desirable to live next to. The effect on land value is not determined yet, but preliminary investigations indicate that properties next to greenbelts have not decreased in value as a result of being located near a factory or road. Experience so far shows that maintenance is the big factor, and a city official advises that a program of this type should not be attempted without it.
Zoning Provisions

The appendix consists of buffer provisions extracted from a number of zoning ordinances. The "use buffer," as described earlier, is not among them because it comes into being by means of the zoning map rather than through specialized provisions. The examples, therefore, deal almost entirely with landscaped buffers. There are a few, however, that permit certain other uses of the buffer area in addition to landscaping, and several others that are special-purpose buffer zones.

It may be unfair to compare these various provisions point by point. For one thing, they are not necessarily designed to accomplish the same thing. For another, they are extracted and isolated from the ordinance as a whole, and other provisions, not shown, may influence the total effect of an industrial zone, for instance, on a nearby residential neighborhood. No comparisons are made on the types of uses permitted in the "buffered district," although ordinances that also contain performance standards are so indicated.

There are certain points, however, that a planning commission considering buffer strips should look for when reviewing these provisions. They should be examined critically to see whether or not they would in fact achieve the objectives hoped for by employing a buffer strip device in any given community.

1. Lateral width of buffer area. Width ranges from 8 feet to 150 feet; is not specified in some cases.

2. Types of uses permitted. Some provisions require landscaping only and prohibit all other uses. Some permit parking and certain buildings and other structures; others prohibit parking.

3. Standards. Except for specifying width, few provisions attempt to set up standards that define a "buffer effect." Sarasota, an exception, specifies a degree of opacity, and in common with several others, indicates height and maintenance of planting.

4. Function. In most cases, buffers are used to separate industrial zones from residential areas. Some, however, apply to commercial zones and specialized types of land use such as trailer parks and freeways.

5. Yard pattern. In some cases, the distance of the "buffered" use from the "protected" use follows the traditional yard pattern. That is, a required buffer strip located along a side yard abutting a residential lot may be narrower than that located along a rear yard. In other cases, the distance is uniform and is related to type of use, irrespective of yard pattern.

6. Intervening streets. In some examples an intervening street or alley may substitute for a buffer area. In others, the street makes no difference in the requirements.

7. Label. Some areas are called "buffers," and some with similar provisions are not. The term "buffer" appears to bear little relation to the width of the strip.
8. **Intent statements.** A few of the examples are prefaced with a statement on the intent or purpose of the buffer strip or zone. In other cases, the reasoning is clear, though implied. Some simply specify a buffer or planting strip, but do not make quite clear what it is intended to accomplish.

**Court Cases**

Buffer strips of different types have been involved in several recent zoning cases. The citations are as follows:

Kozesnik et al. v. Township of Montgomery et al.; Slover et al. v. Township of Montgomery et al.; Depew et al. v. Township of Hillsborough et al. (three cases); Supreme Court of New Jersey, April 8, 1957, 131 A. 2d 1, 9 Zoning Digest 146. (The court held that the quarry operator should provide the necessary buffer and not cast the burden on the neighboring owner.)

Penny v. City of Durham, Supreme Court of North Carolina, Feb. 25, 1959, 107 S.E.2d 72, 11 ZD 161. (An intervening 150-foot buffer strip was involved in interpretation of "directly opposite")

Ridgeway Co. v. Board of Adjustment of Florham Park, Superior Court of New Jersey [trial court], July 30, 1959, 154 A.2d 23, 12 ZD 81. (Case involved shopping center area requirements. The only question on which plaintiffs failed to make the required showing that the ordinance was unreasonable was the 50-foot buffer strip.)

Miner v. City of Yonkers, Supreme Court (N.Y.), Westchester County [trial court], June 12, 1959, 189 N.Y. S.2d 762, 12 ZD 90. (Buffer strip provided by business developer was not required by ordinance, and hence did not make the rezoning conditional.)

McClain v. City of Hazel Park, Supreme Court of Michigan [highest court], Oct. 13, 1959, 98 N.W. 2d 560, 12 ZD 130. (Rezoning conditioned on reservation and landscaping of 30-foot strip upheld; effect was merely to require a building setback.)

**Summary and Conclusions**

The buffer concept has arisen because some land uses are incompatible when located in adjoining districts. The buffer device is an attempt to lessen incompatibility, or to cancel out effects that would occur if a buffer were not there.

Two main types of buffer devices have been developed: the *use buffer*, which is a logical, but not necessarily realistic, outgrowth of the conventional pyramidal zoning ordinance; and the *landscaped buffer*, which is a design device and relies mainly on physical and visual features for its effect.

The *use buffer*, applied uncritically, seems to be of dubious value. If rank
position on a "restrictiveness" scale is relied on to protect "higher" uses, the results may be disappointing. The "buffer" zone may fail to give the protection desired. Or undesirable conditions may be imposed on uses within the "buffer" zone itself.

On the other hand, the landscaped buffer shows considerable promise. While wishful thinking may have gone into some zoning provisions, others show that an attempt has been made to approach the problem scientifically. More factual information is needed, however, to determine what can be achieved by strips of different widths and with various types of landscaping, and what their limitations are.

It is hard to avoid the conclusion that buffer strips have been used on occasion to soften up the opposition--namely, the residential property owners who oppose new industry, a freeway, or a new shopping center. The ethical problem here is one that each planning commission has to solve for itself. But if it is to carry out its function with honor, a planning staff does have the responsibility of presenting the facts and not relying on a pretty label. A buffer strip should be what its name implies and it should achieve what is claimed for it.

Whatever the merits of a buffer strip, it is not a substitute for land-use planning, nor is it a substitute for performance standards or other industrial zoning controls. But even with adequate land-use planning and adequate industrial zoning, situations may arise where proximity of incompatible uses cannot be avoided. Or two objectives may conflict--for instance, the goal of a short journey-to-work, and the goal of a safe, pleasant residential environment. In these kinds of situations, buffer strips apparently can save the day--provided they are properly designed and their value can be demonstrated factually.
APPENDIX

Readers be warned! The following ordinance extracts are not offered as models. This representative collection contains both good and bad examples of buffer provisions. Some are good in some ways, and ineffectual or incomplete in others. In other cases, the substantive provisions seem more satisfactory than the administrative.

These extracts could have been arranged according to the types of districts being "buffered." But if this had been done, the provisions that make up a system (e.g., Cumru Township) would have been separated, and the technique of relating requirements to type of district would have been concealed.

The buffer strip or zone should be approached warily and critically. These examples illustrate the development of the idea and show different techniques. Before any of them are adapted to another ordinance, they should be examined for their bad points as well as their good, for mistakes to avoid as well as for achievements to emulate.

Buffer Yards Between Residence and Nonresidence Zones

In C - Retail Commercial Districts: Side Yards. None required for a building used exclusively for commercial or other non-residence purposes, except that where a lot abuts a street on the side lot line or a Residence, or Rural Residence district in the Township, or a similar district in an adjoining municipality, a side yard shall be provided which shall be not less than twenty-five (25) feet in width.

In HC - Highway Commercial Districts: Special Buffer Requirement Adjacent to Residence District. The front, rear, or side yard of any lot used for commercial or other non-residence purposes which abuts a Residence or Rural Residence District in the Township, or a similar district in an adjoining municipality, shall be not less than fifty (50) feet in width or depth measured from the boundary line. Where a street constitutes the district boundary line, the yard shall be measured from the street line. Along each side or rear property line, the twenty (20) feet of such yard space nearest the boundary line shall be used only as a planting strip on which trees or suitable shrubbery shall be placed, and along each street line, the twenty (20) feet of the required front yard adjacent to the street shall be suitably landscaped, except for necessary sidewalks and accessways, subject to the provisions of Section 1007 relating to vision, obstruction. The remaining thirty (30) feet of required yard may be used, however, for off-street parking or for any other purpose other than a building or permanent structure, or any commercial, manufacturing, or processing activity.

In LM - Light Manufacturing Districts: Yard Adjacent to Residence District or Township Boundary Line. Along any boundary line of a Rural-Residence or
Residence District or any similar District in an adjoining municipality, a buffer yard shall be provided which shall be not less than one hundred and fifty (150) feet in width, measured from such boundary line. Where a street constitutes the boundary line, the yard shall be measured from the street line. The fifty (50) feet of such yard space nearest the district boundary line shall be used only as a planting strip on which trees or suitable shrubbery shall be placed. The remaining one hundred (100) feet of space may be used for off-street parking or for any purpose other than a building or permanent structure, or any manufacturing, commercial, or processing activity.

In M - General Manufacturing Districts: Yard Adjacent to Residence District or Township Boundary Line. Along any boundary line of a Rural-Residence or Residence District or any similar District in an adjoining municipality, a buffer yard shall be provided which shall be not less than two hundred (200) feet in width, measured from such boundary line. Where a street constitutes the boundary line, the yard shall be measured from the street line. The fifty (50) feet of such yard space nearest the district boundary line shall be used only as a planting strip on which trees or suitable shrubbery shall be placed. The remaining one hundred and fifty (150) feet of space may be used for off-street parking or for any purpose other than a building or permanent structure, or any manufacturing, commercial, or processing activity.

(Note: Ordinance prohibits offensive emissions, glare, etc.)

Cumru Township, Berks County, Pennsylvania, 1958

Screen Planting in M-1 Light Industrial District

Along any side or rear lot line adjoining an "R" District, there shall be provided a screen planting of trees.

(Note: Ordinance has only one industrial zone.)

Falls Church, Virginia, 1959

Planting Screen in Industrial Zone

Greenbelts - M-1: Industrial establishments in the M-1 Zone adjoining, facing or abutting a more restrictive District shall establish and maintain a greenbelt not less than ten (10) feet wide containing a compact screen of evergreen shrubbery not less than six (6) feet in height.

(Note: Ordinance has one industrial zone only. Also contains performance standards regulating noise, smoke, odor, gases.)

Palm Springs, California, 1958
Buffer Areas Between Residence and Nonresidence Districts

Buffer Area. Where a C-2 Commercial District abuts a Residential District there shall be a buffer area along the district boundary line within the C-2 Commercial District, the depth of which shall be at least 20 feet measured from the district boundary line; where such line is along a street the depth of the buffer area shall be at least 10 feet from the side line of the street. The buffer area may be included in any front, rear or side yard area required under the provisions of this Section. The buffer area shall be used for no purpose other than planting and screening, and there shall be not more than one entrance and one exit from each lot to any street except that additional entrances and exits from a buffer zone—in locations approved by the Police and Highway Departments—may be permitted when authorized as a special exception by the Board of Adjustment.

Buffer Area. Where an L I District abuts a Residential District there shall be a buffer area along the district boundary line within the L I Limited Industrial District, the depth of which shall be at least sixty (60) feet measured from the district boundary line. The buffer area shall be used for no other purpose other than planting and screening, and there shall be not more than one entrance and one exit from each lot to any street except that additional entrances and exits from a buffer zone—in locations approved by the Police and Highway Departments—may be permitted when authorized as a special exception by the Board of Adjustment.

Buffer Area. Where "N S C" Neighborhood Shopping Center District abuts a Residence District, there shall be a buffer area along the district boundary line within the "N S C" Neighborhood Shopping Center District, the depth of which shall be at least 100 feet measured from the district boundary line; where such a line is along a street the depth of the buffer area shall be at least 50 feet from the side line of the street. The buffer area may be included in any required front, rear, or side yard area. The buffer area shall be used for no purpose other than planting or screening.

Tredyffrin Township, Pennsylvania  
(amended to 1959)

Landscaped Buffer Around Trailer Parks

Trailer parks shall be surrounded by a landscaped buffer area to the width of 50 feet along arterial highways and 25 feet in width along arterial highways [pic] and 25 feet in width along all other highways and property lines. All landscaping is to be shown on a plan approved by the Zoning Department for the trailer park design.

Dade County, Florida, 1957
Planting Strip in Industrial Zones

Greenbelt. A greenbelt shall be a planting strip composed of deciduous or evergreen trees or a mixture of each, spaced not more than forty (40) feet apart and not less than one (1) row of shrubs, spaced not more than five (5) feet apart and which grow at least five (5) feet wide and five (5) feet or more in height after one (1) full growing season, which shall be planted and maintained in a healthy growing condition by the property owner.

Greenbelt. Where an industrial district is located adjacent to a residential district, a public park or playground and not separated therefrom by a street or alley, a greenbelt buffer strip of trees and shrubs shall be provided and maintained, of not less than eight (8) feet in width, along the property lines. The Board of Appeals may vary these requirements where conditions are such that a greenbelt buffer strip will not serve a useful purpose.

(Note: This ordinance also has performance standards for noise, glare, fire, and safety hazards.)

Northville Township, Michigan, 1955

Landscaped Buffer Strip

Greenbelt. Where a non-residential use is located adjacent to a residential district, a greenbelt buffer strip of trees and shrubs shall be provided and maintained of not less than twenty (20) feet in width along a rear property line, and not less than eight (8) feet in width along a side property line. The Planning Commission may vary these requirements where conditions may cause a hardship to the affected property, or where conditions are such that a greenbelt buffer strip will not serve a useful purpose.

(Note: Applies to both manufacturing zones, M-1 and M-2. Ordinance also has performance standards for noise, glare and heat, and fire and safety.)

Plymouth, Michigan, 1955

Landscaped Buffers Between Nonresidence and Residence Zones

In S-C Shopping Center Districts: Along each side or rear property line which adjoins an R-1, R-2 or R-3 Residence District, a buffer planting strip shall be provided on which shall be placed shrubbery, trees, or other suitable plantings sufficient to constitute an effective screen. Along each street line bounding the district, a twenty (20) foot buffer area shall be provided, suitably landscaped except for necessary sidewalks and accessways.
Nothing herein provided shall prohibit the erection of a suitable fence or wall on the required buffer area.

The character of buffer areas and screening devices to be maintained including the dimensions and arrangement of all areas devoted to plantings, lawns, trees, or similar purposes [are to be shown on development plans.]

Yard in Manufacturing District Adjacent to Residence District Boundary Line.
In Manufacturing Districts along any Residence District boundary line the following regulations shall apply:

a. A buffer yard of not less than fifty feet in width shall be provided which shall be used only as a planting strip on which hedge, evergreens, shrubbery, or other suitable planting shall be provided and maintained.

b. No building in which manufacturing or processing operations take place shall be located closer than one hundred and fifty (150) feet from a residence district boundary line. This requirement shall not apply to office or administrative buildings, parking facilities, storage buildings, tanks and appurtenances, or other buildings which do not include manufacturing or processing operations.

Where a street constitutes the boundary line, the yard shall be measured from the street line. Where land in an adjoining residence district is held in common ownership with contiguous land in a manufacturing district, one hundred feet of such land in a residence district may be used in meeting the above requirements, but such land used to meet yard requirements may not thereafter be sold separately, if such sale would reduce the yard space below minimum requirements.

West Deptford Township, Gloucester County, New Jersey (amended to 1959)

Buffer Strip in Business and Industrial Zones

Greenbelt. A strip of land variable in width, but not less than eight (8) feet wide for the growing and maintaining of a screen planting of healthy trees and shrubs, which shall not be less than five (5) feet in height.

Local and General Business Districts: Greenbelt. All non-residential uses, when adjacent to an existing residence or a residential district, shall provide and maintain, in a healthy growing condition, a greenbelt buffer strip of trees and shrubs not less than eight (8) feet in width.
Wholesale districts: Greenbelt. All non-residential uses, when located adjacent to an existing residence or a residential district, shall provide and maintain in a healthy growing condition, a greenbelt buffer strip of trees and shrubs not less than twenty (20) feet in width.

Industrial districts:

<table>
<thead>
<tr>
<th></th>
<th>M-1</th>
<th>M-2</th>
<th>M-3</th>
<th>M-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front yards</td>
<td>8'</td>
<td>50'</td>
<td>150'</td>
<td>200'</td>
</tr>
</tbody>
</table>

All building lines and front yards shall be established no closer to the street than the future street line as established by the Master Thorofare Plan of the Township of Warren.

Side yards and rear yards

<table>
<thead>
<tr>
<th></th>
<th>None</th>
<th>20' each</th>
<th>60' each</th>
<th>100' each</th>
</tr>
</thead>
</table>

Greenbelt

None, except when a side yard abuts a zoning district other than industrial, then 8' wide

Along all zoning district boundary lines which border on a more restrictive zoning district. Along all street property lines but may be omitted along the front yard when the front yard is landscaped.

8' wide 20' wide 20' wide

(Note: This ordinance also contains detailed performance standards.)

Warren Charter Township, Michigan, 1952

Yards in Industrial Zones

Yard (setback) side

(A) Each lot shall have two (2) side yards, each at least twenty (20) feet in width. On corner lots, the side building line shall be the same as the front building lines of the majority of lots fronting on the same street or a minimum of twenty-five (25) feet except that in areas where no Master Plan of Highways has been adopted, the side building line shall be not less than seventy (70) feet from the center line of any abutting street or highway. If the lot adjoins a lot in a Residential Zone along its side lot line, there shall be a side yard equal to the height of the tallest industrial building located on the lot which is proximate to the side yard, but not less than thirty (30) feet. The side yard may be used for off-street parking or loading; however, a planting strip at least ten (10) feet wide shall be provided, planted with suitable trees, shrubs, etc. as determined by the City Manager.

April 1960
(B) If a lot contains less than the required frontage, the side yard requirement on one side may be eliminated completely upon the approval of the Commission. Where such reduction is provided, party-wall construction shall be required.

Yard (setback) rear

(A) Each lot shall have a rear yard at least twenty (20) feet in width, when the lot adjoins a lot in a Residential Zone along its rear lot line, there shall be a rear yard equal to the height of the tallest industrial building, located on the lot which is proximate to the rear yard of the lot on which the industrial building is located, but not less than thirty (30) feet.

(B) A building not over fifteen (15) feet in height may encroach on the rear yard in this Zone providing that:

   (a) The rear yard planting strip shall be at least ten (10) feet in depth.

   (b) There shall be no access to a residential street or lot across the rear yard.

   (c) The wall bordering on the rear yard shall be unbroken by windows, doors, exhaust outlet and other openings.

   (d) No use is permitted within the rear yard, other than the required planting.

(C) When an industrial lot rears on a residential street, it shall have a rear yard planting strip at least twenty-five (25) feet in depth. No access to the residential street shall be permitted from the industrial lot.

(D) No rear yard shall be required when the lot abuts a railroad right-of-way.

(Note: The zone description contains this statement: "The regulations of this Zone are intended to provide standards of intensity of use and standards of external effects or amenities compatible with the surrounding or abutting residential districts."

The same provisions quoted above apply also to the I-2 Light Industrial Zone, whose zone description says: "This Zone is composed of certain lands so situated as to be suitable for light industrial development, but where the modes of operations of the industrial development will directly affect nearby residential and commercial uses. The purpose of this Zone is to permit the normal operations of almost all light industries, within an industrial neighborhood without the encroachment of residential and commercial uses. The regulations are necessary to control traffic congestion, fire and safety hazards and to protect the neighboring residential and commercial districts."

Rockville, Maryland, 1957
Limitations on Permitted Uses in Yard Area Where Industry Abuts Residential

Where an industrial area or property zoned for M-1 uses, fronts or sides upon a street, the opposite side of which is zoned for R-1, R-2, R-3, R-4 or C-1 uses, the uses in the M-1 District shall be subject to the following conditions and limitations:

(1) Setback Area. There shall be maintained a building setback area subject to the exceptions hereinafter set forth, of one hundred feet (100') measured from the right-of-way line, in which the following uses will be required, allowed, or prohibited as specified:

(a) Administrative buildings, not exceeding fifty feet (50') in height may be located therein provided such buildings are set back not less than fifty feet (50') from the street right-of-way line.

(b) Other buildings, not exceeding fifty feet (50') in height, may be located therein, provided such buildings are set back not less than fifty feet (50') from the street right-of-way line, subject to such limitations and conditions as the Board of Zoning Adjustment may deem necessary for the protection of neighboring residential uses.

(c) Landscaping.

(d) Employees recreational facilities without structures.

(e) Parking.

(f) Fences and walls not located within ten feet (10') from the street right-of-way line.

(g) Outdoor storage of material and equipment shall not be permitted in this area.

(h) Railroad facilities shall not be permitted in this area.

Where property which is zoned for M-1 purposes abuts and is contiguous to property zoned for R-1, R-2, R-3, R-4, or C-1 purposes; the uses in the property zoned for M-1 uses shall be subject to the following conditions and limitations.

(1) Setback Area: There shall be maintained a building setback area subject to exceptions hereinafter set forth, on one hundred feet (100') measured from the property line in which area the following uses will be required, allowed, or prohibited as specified:
(a) Administrative buildings, not exceeding the height limitations provided for in the adjoining residential or commercial district, may be located therein provided such buildings are set back not less than fifty feet (50') from the property line contiguous to both the industrially and residentially zoned territory.

(b) Other buildings, not exceeding the height limitation provided for in the adjoining residential or commercial district, may be located therein, provided such buildings are set back not less than fifty feet (50') from the property line which is contiguous to both the industrially and residentially or commercial zoned territory, subject to such limitations and conditions as the Board of Zoning Adjustment may deem necessary for the protection of neighboring residential uses.

(c) Landscaping.

(d) Employee recreational facilities without structures.

(e) Parking.

(f) A uniformly painted solid board fence or masonry wall six feet (6') in height shall be maintained along the property line.

(g) Outdoor storage of materials and equipment shall not be permitted in this area.

(h) Railroad facilities shall not be permitted in this area.

(i) No sign larger than fifty (50) sq. ft. shall face the residential area. Signs shall not be illuminated or animated.

(Note: These conditions apply also to M-2 Zone. Ordinance contains performance standards as well.)

Sunnyvale, California, 1951 (amended to 1959)

Planting Strip in M Industrial Zone

A planting strip at least ten feet (10') wide shall be provided along each abutting street, public space, or property in any residential zone, except for necessary ways of ingress and egress. The planting strip may be de-
ducted from the area reserved for off-street parking and off-street loading.

San Diego County, California, 1954

Buffer Zone

ZONE B-1. REGULATIONS (BUFFER STRIP). A person shall not use any premises in Zone B-1 for any purpose other than the following:

(a) Uses permitted within a setback line of Article 1 of Chapter 4.

(b) Landscaping.

(c) Motor vehicle parking.

(d) Employees' recreational area without structures.

(e) Access to any property between which and a highway the area in Zone B-1 is located.

(f) Railroad spur tracks. This subsection does not permit the storage of railroad motive power equipment or rolling stock in Zone B-1.

(g) An ornamental type fence not over eight feet in height, such as woven wire, welded wire, chain link, or wrought iron.

(h) Single or double faced signs identifying the persons occupying the adjoining premises, or the business conducted on the adjoining premises, not to exceed two signs per parcel of land and each sign having an area per face not exceeding eighty four square feet.

(Note: Applies to land adjacent to M zones and whenever indicated on the map. Article 1, Section 4, deals with front and side yard setbacks, and is designed to insure adequate open spaces and to provide visibility along streets in unincorporated portions of the county "developed to such a degree as to possess urban characteristics, or which in the course of natural or probable development will possess urban characteristics.")

Los Angeles County, California, 1957

"Open Area District" as a Buffer

This district is designed to provide open space to serve as a buffer between industrial or commercial districts and adjoining residential districts or public streets.

April 1960
Uses Permitted:

(a) Landscaping and screen planting.

Uses Requiring Use Permits as provided in Article 23.

(a) Fences not to exceed six (6) feet in height
(b) Non-commercial recreation
(c) Off-Street parking and loading
(d) Minor local service streets

Palo Alto, California, 1953

Landscaped Area Between Business and Residential Zones

A landscaped area not less than twenty (20) feet in width, measured at right angles to the property lines, shall be established along the entire length of and contiguous to each property line adjoining any property zoned as a residence district; said area shall be so designed and planted as to be eighty per cent (80%) or more opaque when viewed horizontally between two (2) feet above average ground level and ten (10) feet above average ground level; said area shall be established and maintained in a neat and clean condition at all times and the setting and selection of plants shall be such as to assure securing eighty per cent (80%) opacity within twelve (12) months after the landscaping is begun; failure to comply with the landscape requirements set out in this paragraph shall be ground for the Administrative Officer to revoke the Certificate of Occupancy covering the land, buildings and structures intended to be screened by such landscaped area; provided, however, that when any land zoned as "BA-2" business district is separated from nearby land zoned for a residence district, by a street, alley, or other thoroughfare or public area, then the Administrative Officer is authorized to waive all or a portion of such landscaping requirements along the street, alley or public area frontage of the "BA-2" business district property and his discretion in doing so shall be governed among other things by the width of the street in question, the effect on traffic of opaque plantings at the location in question, and the nature and development of the nearby residence district. No part of said landscaped area shall be used for vehicular parking area.

Sarasota, Florida, 1935 (amended to 1954)

Uses in Yard Area Abutting a Residential Street

Every use permitted shall be subject to the following conditions and limitations:

(a) When an industrial area fronts or sides upon a street the opposite side of which is classified for "R" purposes, there shall be maintained a
building line setback of ten (10%) per cent of the average depth of the lots in each block of such industrial area, provided such setback shall not be less than ten (10) feet, nor be required to exceed fifty (50) feet in depth. A minimum strip of landscaping approved by the Planning Commission shall be maintained along all frontage of the setback area. In addition thereto the following uses may be located in the setback area:

(1) Landscaping.
(2) Parking area.
(3) Employee's recreational area without structures.
(4) Driveways.
(5) Railroad spur tracks, excluding storage of railroad motive power equipment or rolling stock.
(6) An ornamental type fence located not closer than ten (10) feet to the front lot line.

(b) All uses shall be conducted wholly within a completely enclosed building, or within an area enclosed on all sides with a solid wall or uniformly painted fence not less than six (6) feet in height.

(c) No operation conducted on the premises shall be objectionable by reason of noise, odor, dust, mud, smoke, vibration or other similar causes.

Modesto, California, 1957

Buffer Strip in Industrial Zones

INDUSTRIAL BUFFER REQUIRED: Where industry adjoins, faces or confronts residential property or a major or secondary thoroughfare, such industrial use shall provide a yard of not less than 10% of the lot depth or width on the side or sides abutting, facing or confronting said uses, but such yard need not exceed 50 feet unless a greater depth or width is required by the general setback provisions of this Ordinance, or general or special setback provisions of any existing setback ordinance. Such yard may be improved with any of the following:

a. Parking lot
b. Recreational space for employees, or landscaping

Pima County, Arizona,
1952 (revised to 1956)

Buffer Area in Highway Commercial Zone

Buffer Area. Where a CO Commercial District abuts a Residence District there shall be a buffer area along the district boundary line within the CO Commercial District, the depth of which shall be at least 20 feet meas-
ured from the district boundary line; where such line is along a street the depth of the buffer area shall be at least 10 feet from the side line of the street. The buffer area may be included in any front, rear or side yard area required under the provisions of this Section. The buffer area shall be used for no purpose other than planting and screening, and there shall be not more than one entrance and one exit from each lot to any street except that additional entrances and exits from a buffer zone—in locations approved by the Police and Highway Departments—may be permitted when authorized as a special exception.

Lower Merion Township, Pennsylvania, 1953

ARTICLE 25
B ZONE

SECTION 2230

B Buffer Zone. Land classified in a B Zone may also be classified in another zone, except in the C and M zones, and the regulations set forth in this Article shall apply in the B buffer zone unless otherwise provided in this Chapter.

SECTION 2231

Uses Permitted.

A. Any use permitted in the other respective zone in which the land is classified and with which the B zone is combined, provided, however, as follows:

1. No outdoor advertising sign or outdoor advertising structure shall be placed and/or maintained in any B zone, provided, however, that there may be displayed on the premises occupied by any permitted business use which is located in any B zone outdoor advertising signs and outdoor advertising structures for the advertising only of such business; and the total area of all outdoor advertising signs and outdoor advertising structures in the aggregate displayed by or for any one place of business shall not exceed the equivalent of one (1) square foot for each one (1) foot of frontage actually occupied by such business, including the widths of driveways directly appurtenant thereto.

2. No junk, salvage or auto wrecking yard shall be established in any B zone unless the same is completely enclosed within a building or within a fence approved by the Planning Commission.

B. The following additional uses, if not permitted in the other zone, may be permitted in a B zone upon the granting of a conditional-use permit:

1. Automobile parking areas
2. Automobile service stations
3. Directional or informational signs of a public or quasi-public nature
4. Drug stores
5. Garages, public, including repairing and servicing
6. Grocery, fruit and vegetable stores
7. Hotels, apartment houses and multiple residences
8. Motels, auto courts and tourist courts
9. Meat markets or delicatessen stores
10. Professional offices
11. Restaurants, tea rooms and cafes

SECTION 2232

Building Height, Front, Side and Rear Yards, Area Requirements and Distance Between Buildings on the Same Lot. None, except that on parcels or lots of less than ten thousand (10,000) square feet in area, said regulations shall be the same as required in the R-3 zone; and provided that all buildings, except temporary stands, shall be located not nearer than ninety (90) feet from the centerline of any public street or highway.

Kern County, California, 1957

Information Report No. 133
1. Most uses that would need landscaping happen to be classified as "Uses Permitted Only By Special Permit". In order that such a use may be approved, the City Planning Commission must make certain findings, one of which is that the proposed use "will be appropriate in the proposed location and will have no material adverse effect on existing or prospective conforming development". The existence or provision of landscaping or landscaped screening may have an important bearing on whether such a finding can be made by the Planning Commission. Such requirements have been made in certain plans approved to date.

In connection with off-street parking areas for such uses, the Commission must make a finding that such areas are "properly screened from adjoining residential uses". While such screening could consist of a fence or wall, it is usually landscaping.

(For the above, see Section 9 - 4.4, paragraphs (b) and (c), respectively. Also, see Section 9 - 4.52 (b) for a similar screening requirement for office buildings in B-4 District

2. Where a Business District abuts Residence Districts, "a strip at least 10 feet wide shall be planted and maintained with shrubbery or other natural screening". (Section 9 - 5

3. Where a B-6 Business District faces a Residence District across a street, there shall be a front yard at least as deep as that required in such Residence District and "said front yard shall be planted and maintained with trees or shrubbery sufficiently dense to screen from view from the street any business operations not hidden by building or other walls". (Section 9 - 5.71.)

4. In connection with educational uses (public, parochial and private schools), welfare uses, and public or private recreational uses, buildings, parking areas and playgrounds must be set back specified distances, depending upon the zone, and the intervening area shall be "so densely landscaped as to provide effective visual and sound screening of such activities from adjoining property zoned for residence or left in its natural state if this will fulfill the screening objective". (Section 9 - 6.1.)

5. Outdoor play areas for nursery schools, a special permit use, must be "so screened from an lot line and from any residential structure on an adjoining lot so as to avoid a noise nuisance" (Section 9 - 6.1 - 2 (7).)

6. Off-street parking areas in Business Districts are also subject to special requirements as to screening. (Section 9 - 6.2.)

7. Open storage of contractors' equipment, coal, wood, lumber, new building material or other similar storage yards which are permitted only in B-1 Business Districts, must be "effectively screened from view of adjoining property in a Residence District". (Section 9.

F. P. Clark, June 25, 1959
13.06.250 Transitional districts—Purpose. The purpose of all transitional districts is to minimize, subject to proper safeguards, conflicts and frictions between zoning districts. The objective to be achieved is stability—of land use, of desirability and of values—through minimizing adverse influences of land use patterns at the edges of two dissimilar districts or between residential and institutional areas. The City Council may, from time to time, as warranted, establish and superimpose transitional districts upon other regular zoning districts. Land classified in the transitional district also shall be classified in one or more of the regular zoning districts. The zoning of such land shall be designated by a combination of symbols; e.g., "R-3-T" Transitional District in a Two-Family Residential District. (Ord. 14783 § 20A part; added by Ord. 15062 passed Aug. 9, 1954).

13.06.260 "T" Residential-Commercial transitional district—Use restrictions—Height—Area—Parking. This section will permit the establishment of a district designed primarily for office and institutional land uses having only a limited contact with the general public, not involving the sale of merchandise at retail except incidentally, and which may be carried on with no offensive noise, smoke, odors, fumes, or other objectionable conditions in structures surrounded with ample open space for yards and for off-street parking and the loading of vehicles. The following are the regulations of the "T" Residential-Commercial Districts:

A. USE REGULATIONS.

a. The uses of property permitted in the regular residential zoning district with which the "T" District is combined.

b. The following permitted uses, provided that the residential character of the neighborhood is maintained by the provision of adequate open space setbacks and the control of advertising with one non-illuminated sign on each street frontage:

(1) Business colleges, trade schools, music conservatories, and similar organizations offering vocational training in a specific field.

(2) Dental and medical clinics including a medical pharmacy as an accessory use of the clinic.

(3) Governmental office buildings, post offices, telephone exchanges, and other administrative functions.

(4) Professional offices offering recognized professional services such as the following: dentists, doctors, lawyers, architects, engineers, etc.

(5) Libraries, museums and art galleries.

c. Conditional uses only when authorized by the City Planning Commission:

(1) Offices for organizations used primarily for accounting, correspondence, or research except those which involve equipment processes or materials prohibited or first listed as a permitted use in any "C" District; provided that the occupancy does not regularly involve contact, in person, with clients, members, or customers and, provided that no merchandise is handled, nor any merchandising services are rendered on the premises; provided further that there is no display of merchandise.

(2) Private clubs, lodges, and social and recreational buildings except those carried on as a commercial enterprise.

B. HEIGHT REGULATIONS. The height regulations shall be the same as the residential district with which the "T" District is combined.

C. AREA REGULATIONS. Unless otherwise provided by this section, the following are the area regulations for "T" Districts:

a. Yard Setbacks:

(1) Front and rear setback regulations shall be the same as the residential district with which the "T" District is combined.

(2) Side yard setbacks shall be as follows:

- "R-1" District .......................................................... 20 feet
- "R-2" and "R-3" District ..................................... 15 feet
- "R-4" and "R-5" District .................................... 10 feet

b. Area: The minimum lot area shall be the same as the residential district with which the "T" District is combined.

D. PARKING AND LOADING REGULATIONS. Unless otherwise provided in this section, the off-street parking and loading regulations shall be the same as provided in Section 13.06.350. The following specific uses are exceptions to the regulations of Section 13.06.350(A).

a. Museums, art galleries, libraries, and all office buildings: One space for every 400 sq. ft. of floor space.

b. Business colleges, trade schools, etc.: One space for every six students. (Ord. 14783 § 20A part, added by Ord. 15062 passed Aug. 9, 1954).

13.06.270 "TM" Medical Center transitional district—Use restrictions—Height—Area—Parking. This section will permit the harmonious development of medical centers within the City of Tacoma with a large public or quasi-public hospital as its focus. Since these institutions are now located in residential areas, a further purpose of this section is to establish standards which will make such centers compatible with their residential surroundings. The following are the regulations of the "TM Medical Center Transitional Districts:

A. USE REGULATIONS.

a. Any use permitted in the "R" District in conjunction with which this transitional district is established.

b. Dental and medical clinics including a medical pharmacy as an accessory use.
c. Hospitals or sanitariums properly licensed by the state, county or city (except correctional institutions and those for mental, alcoholic or drug addict cases and animal clinics), provided that the building or buildings be located not less than fifty feet from any side lot line.

d. Nursing homes, properly licensed by the state, county or city, provided that the following lot area, yard setback and frontage regulations are complied with:

(1) Where not more than five persons are cared for:
   Total lot area: 6,000 sq. ft.
   Frontage: 50 ft.
   Yard setback: Same as the residential district with which the "TM" District is combined.

(2) Where more than five but not more than ten persons are cared for:
   Total lot area: 15,000 sq. ft.
   Frontage: 75 ft.
   Yard setback: Same as the residential district with which the "TM" District is combined.

(3) Where eleven or more persons are cared for:
   Total lot area: 20,000 sq. ft.
   Frontage: 150 ft.
   Yard setback: 20 feet from all property lines.

e. Conditional uses only when authorized by the City Planning Commission. Hospitals or sanitariums treating epileptics, drug addicts or alcoholic patients and asylums for the mentally ill, properly licensed by the state, county or city, provided that the building or buildings be located not less than fifty feet from any side lot line.

B. HEIGHT REGULATIONS. The height regulations shall be the same as the residential district with which the "TM" District is combined.

C. AREA REGULATIONS. Unless otherwise specified in this subsection the area regulations shall be as follows:

a. Yard setbacks:

   (1) Front and rear yard setback regulations shall be the same as the residential district with which the "TM" District is combined.

   (2) Side yard setbacks shall be the same as a "T" District, except that uses allowed in residential districts with which the "TM" District is combined shall have the same yard regulations for all permitted uses; any conditional use specified as a permitted use in this subsection must meet the yard regulations of a "T" District.

b. Area: The minimum lot area shall be the same as the residential district with which the "TM" District is combined.

D. PARKING AND LOADING REGULATIONS. Unless otherwise provided in this section the off-street parking and loading regulations shall be the same as provided in Section 13.06.350. The following are specific exceptions to the regulations of Section 13.06.350(A).

a. Auditoriums: Each auditorium or any similar place of assembly shall provide one parking space for every five seats or ten feet of bench.

b. Hospitals and Sanitariums: One space per five beds.

c. Medical and dental clinics: One space for every 400 feet of floor area.

d. Nursing homes: One space per five beds. (Ord. 14793 § 20A; added by Ord. 15062 passed Aug. 9, 1954).
REFERENCES

ASPO Newsletter, July 1959. "Buffer Zones."


