

BELOIT, WISCONSIN: A STUDY IN URBAN GEOGRAPHY

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THE CITY PATTERN

Astride the Rock River as it approaches and crosses the southern boundary of Wisconsin lies the Beloit urban development, made up of two municipalities, Beloit, Wisconsin, and South Beloit, Illinois. Though separated politically by the State Line and their own municipal limits, the division is artificial, and in most of the activities of the district the two political units function as one, to the advantage of each. Originating as a small village on the valley bottoms of the Rock River and Turtle Creek, the specific site being the point of land between these streams just above their confluence, the community has spread in all directions (Plate X).

During the period of city growth there have been many adjustments to Rock River, to Turtle Creek, and to the land form conditions resulting from the erosive work of these streams. The major departures of the city pattern from the common rectangular forms are related to these natural elements in the landscape. For example, the rectangular street pattern is deranged at the approaches of the bridges crossing the Rock River, and since a bridge is impracticable when each street abuts on the river, a large proportion of east-west streets end at or near the stream.

Turtle Creek, the only permanent tributary of Rock River in the vicinity of Beloit, flows in a generally westerly direction, part of the course being in Beloit, though its junction with the Rock River is south of the State Line. As Pleasant Street follows the base of the bluff along the Rock River, so East Grand Avenue marks the base of the valley side of Turtle Creek from Prospect Street to Wisconsin Avenue. On the west side of the river, the failure to plat the area north of Olympian Boulevard, and south and west of Ridgeland Avenue, is obviously due to the valley of an intermittent stream, known as Lenigan Creek. This stream floods its bottom land with a fair degree of regularity, definitely curtailing the desirability of that land for residential

use. The utilization of this land as a municipal golf course is a happy adjustment to the natural conditions.

Angling streets, with resulting odd-shaped blocks, odd-shaped lots, and five corners, are particularly common on the older, east side of the city, though they are found as well on the west side and in South Beloit. The most extensive area of angling streets is found adjacent to Prairie Avenue on the east side. Prairie Avenue is the longest of these streets, and apparently the key to an explanation of the angling pattern. The original rectangular plat ended on the north with Woodward Avenue. Beyond this section the land was not platted, and since the main road to Janesville followed the upland or "prairie" along the section line which is now the eastern limit of the city, it was natural that travelers should follow a straight line between the platted section of the city, and the section line road. In the platting of the district north of Woodward Avenue the angling road was perpetuated, together with certain streets paralleling it.

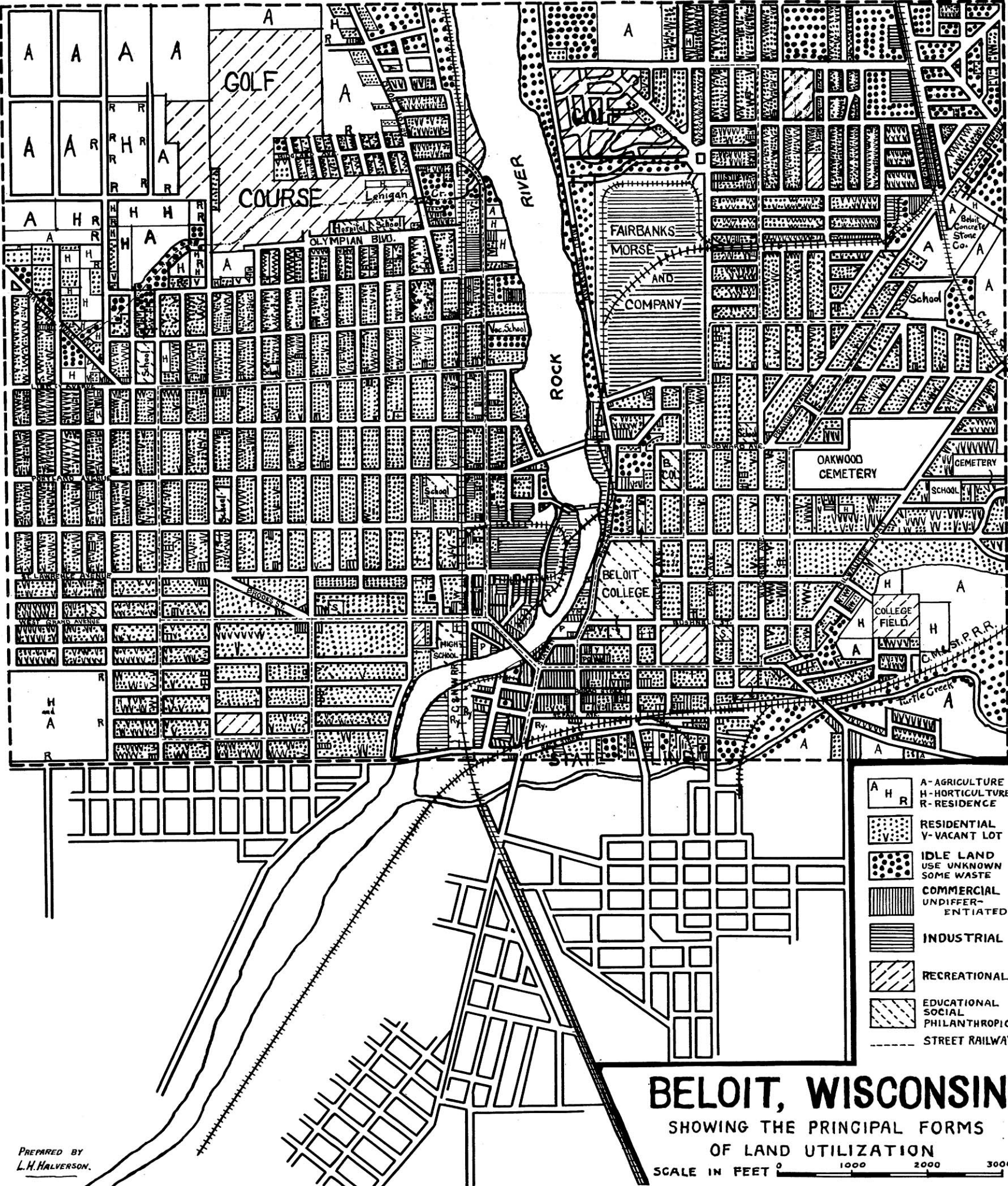
Another factor of fundamental significance to the city pattern of Beloit is the fact that the site is generally underlain by gravels which permitted roads to be located wherever the early settlers willed, except on the lowest bottom lands, and the steep valley sides. As one historian put it, "they [the early settlers] knew the . . . value of having gravel under their feet."¹ That most of the area is more or less deeply covered with surficial deposits of gravel and sand, carried by glacial streams from the Wisconsin ice front, is important in several other connections also. The exploitation of these deposits is continuously carried on.

The City as a Star-Shaped Developing Organism. Cities as they develop tend to become roughly star-shaped,² as a result of what has been called axial growth.³ In the case of Beloit the land form conditions have tended to concentrate the urban development along the long axis of the Rock River valley. The

¹ Whitney, Henry M. Wisconsin Historical Society Proc. 1898, p. 135.

² When one considers the general shape of an urban development, it is necessary to consider the pattern irrespective of political boundaries. The scale of the accompanying map, and the arbitrary limiting of this detailed study to the corporate limits of Beloit and South Beloit, cuts off certain of the star-point extensions.

³ Dorau, H. B. and Hinman, A. C. *Urban Land Economics*, Macmillan 1928, pp. 62-64.



metropolitan area (urbanized area irrespective of political boundaries) has as a result a greatly elongated star-point to the north along both sides of the Rock River, though more extensively developed on its eastern bank. Possibly this northward extending point is related to the interurban electric rail line to Janesville which earlier followed the east side of the river north of the city, as well as to the more favorable sites available there for summer residence locations. The summer residences were followed by year-around residences in many instances. At present the concrete road and the cheap automobile give accessibility to this section. The other greatly elongated star-point is found in South Beloit east of the river, extending somewhat over a mile south of the State Line. This southward extension occupies in the main a valley bottom site, made up in part of the Turtle Creek bottoms and in part of the Rock River bottoms.

On the east and west sides of the metropolitan area the relatively uniform extension of urban population is related to the general uniformity of the upland surface. Peripheral irregularities here are insignificant, and are commonly related to the earlier improvement of the more important highways. The rather abrupt termination of urban development on the southeast margin of the city is related to the wet valley bottoms of Turtle Creek, which serve as a definite barrier to urban utilization. It is apparent that while the outline of the Beloit metropolitan district conforms somewhat, though very crudely, to the star-shaped development, its features are related to the physiographic conditions of its site, particularly to its north-south trending Rock River valley.

THE INDUSTRIAL CITY

Industries serving the local community and a small tributary area developed in Beloit with the earliest settlement. Turtle Creek offered power for the sawing of logs for house building, and for the grinding of wheat for flour. It is safe to assume that the presence of Turtle Creek, small and easy to harness, but providing sufficient power for the tasks at hand, was one of the very potent factors in the selection of the particular site upon which the early settlement was located. While there is some conflict of opinion over the actual dates, one record states that the first boards were sawed in the first mill, commonly

known as Goodhue's, on April 15, 1837.⁴ A grist mill was built the year following the completion of the saw mill. The site near the mouth of Turtle Creek favored the utilization of water from the stream, for from Beloit Junction to the mouth of the creek at the Rock River the fall is 27 feet.⁵ In 1884 Turtle Creek was utilized by another mill upstream from the first, with a head of water of sixteen feet.

But Turtle Creek furnished only enough power to run small semi-subsistence industries, while the larger Rock River offered greater possibilities. The legislative act authorizing a dam was dated April 1, 1843, and the construction was begun in the month of August, 1844.⁶ The head of water at the dam was 6 feet, and the total flow for power development was figured at 13,333½ inches, to be divided among the users of power. The Beloit Waterpower Company was not organized until 1871, but was at that time, and is still, made up of owners of inches of waterpower. The first use of the power was in an extensive saw mill, capable of cutting 4,000 feet of hardwood in 24 hours.⁷

At the dam the river was near the eastern valley side, the more extensive valley bottom land being west of the river, and as a result the raceway was led off on the west side. The importance of this raceway and the associated natural conditions can hardly be overestimated in explaining the early direction of growth taken by the city and its accompanying manufactural development. The early establishment of the west side industrial district may be definitely related to the favorable conditions there for the development of the waterpower, as well as to the favorable site locations for factories on the flattish, though wet, valley bottoms. With equally direct dependence upon the natural set-up of conditions, the power-using industries of the east side were using Turtle Creek, and were, therefore, situated on the Turtle Creek bottoms. The raw materials, with the exception of iron, were mainly of local origin, wagoned to the settlement from the surrounding countryside. Any power-using industry in the early period had to be located within the distance traversible by a power shaft motivated by the

⁴ Brown, William Fiske. *Rock County, Wisconsin, A History of its Cities, villages, Etc., from the Earliest Time Up to Date.* 2 Vols. Vol. 1, p. 132.

⁵ Wheeler, W. H. In an interview, Nov. 1, 1929.

⁶ *The History of Rock County, Wisconsin.* Western Historical Company, Chicago 1879, pp. 617, 641.

⁷ *Ibid.*, pp. 617, 641.

waterwheels turned by the waters of the Rock River or Turtle Creek. The present congestion in the west-side valley bottom industrial district of Beloit, adjacent to the raceway, is a direct heritage from the early days when, before the coming of coal by rail into the community, the wheels of industry were turned by direct waterpower. Even when coal became available, and steam power was in use, industries capable of making some use of the waterpower located beside it.

*Industries from the Opening of the Railroad Period
to the Present.*

With the coming of the railroads during the decade following 1850, and later, Beloit manufacturers were able to reach outside the local area both for raw materials and markets. Many new industries were organized, and older industries reorganized, in the years between 1860 and 1914. It was during these years that most of the present industries began or expanded rapidly. The period of the World War saw a few years of exceedingly great activity, for Beloit, a city with a large number of metal working establishments, was particularly well equipped to take advantage of the needs of the war years.

The industries of Beloit group themselves by the nature of their activities and products into a few general types, as follows: metal working, shoe making, public utilities, gravel and its products, knitting and sewing of wearing apparel, processing foodstuffs, and miscellaneous minor industries. Of these industries, the metal working group is by far the most important, including not only the single establishment employing the largest number of men but also employing a large proportion of all the wage earners of the city. In the winter of 1929-30,⁸ four of the largest metal-working establishments together employed a few more persons than the total number of wage-earners reported for the city in 1927.⁹

The Metal Working Group. Uniformity of type of manufacturing processes among the industries of Beloit is a fact that must impress any close observer of the present-day industries

⁸ During the course of this study (September, 1929 to June, 1930) the industries were in a normal, healthy condition, with rather an upward trend during 1929.

⁹ Data for 1929-30 based upon interviews.

Data for 1927: *Market Data Handbook of the United States*, Domestic Commerce Series No. 30, p. 215.

of the city. Regardless of what the name of the plant may imply as to the processes carried on, upon investigation one will find the business to involve, in the great majority of cases, the secondary processing and machining of metals. This type of industry has been important since the early industrial development of the city and has resulted in a large group of workers trained and experienced in the operation of machines used in the various processes. The industrial establishments of this group occur on three types of sites; first, on the valley bottoms of Rock River and Turtle Creek, second, on the upland surface adjacent to the valley side, and third, on the upland in the northeastern corner of the city, adjacent to the tracks of the Janesville branch of the "Milwaukee" railroad. The valley bottom site is the most favored from the standpoint of the number of industries so located. The bottoms of Turtle Creek are used as industrial sites only in South Beloit, since they are most largely within its area. In Beloit proper the greatest concentration of industrial establishments is west of the river on the valley bottoms adjacent to the waterpower, thereby reflecting the early dependence of the industries upon that power. This section is at present congested, and the industries have little or no room for expansion. At least one of the larger establishments owns land in South Beloit on which it might erect a new plant, but the cost of moving would probably be excessive. It should not be thought that the valley bottom of the west side is completely utilized by industries, for that portion above or north of waterpower is largely occupied by mediocre to poor residences. It is apparent that this upstream portion of the bottom lands in the period of direct waterpower could not be utilized as industrial sites, and as a result was built up early. Now the section might be called a "blighted" or low grade residential area, yet the price at which land is held prohibits its purchase for industrial expansion. It is a typical case of the impasse which may develop as the result of the totally undirected growth which has been so characteristic of American city development. This residential section, with poor drainage, and other undesirable characteristics, adjacent to an industrial area, can never improve greatly, yet at the present time at least it can not be economically turned to a use to which it is more suited. Were this land available to industries, it would solve to a degree the expansion problems of certain of the present establishments.

The outstanding manufacturing industry of the city is that of Fairbanks, Morse and Company. It occupies a site east of the river on the upland adjacent to the valley site, spilling over the edge of the bluff at some points. This was not the site of the original plant, which manufactured windmills, that being early located on the millrace west of the river. Later the plant of the Beloit Wagon Works on the present site was acquired. With ample room for the expansion which followed the shift to steam power, this establishment has not suffered from the congestion which at present hinders expansion and the development of "straight-line" production methods along the waterpower west of the river. Although the site of this establishment is isolated from those of other industrial developments, the building of the Joint Switch track has given it connections with each of the railways serving the city.

Since there are no available industrial sites on which to build modern plants in the older industrial sections of Beloit proper, a new manufactural district has been developed recently in the city. The type of industry common in Beloit uses power in relatively small quantities as compared with the primary metal industries, and individual electric motors, or carbo-electricity produced in the plant, are the two most common forms of power in the newer factories. Thus the site requirements are cheap level land and a railroad siding. These requirements were met in the northeastern section of the city, and two establishments have located there. There is room for other plants in that district. Across the State Line in South Beloit is an industrial section analagous to that west of the river in Beloit.

From this consideration of the metal-working industries and their locations in Beloit, it is clear that they are of about the same type as to materials and labor requirements. Relatively small quantities of the heavier raw materials are required, since the operations are of the secondary type. Pig iron, scrap iron, coal and coke are used in some quantity, but in small quantities as compared with those used by the primary metal industries. Semi-finished materials are used, but these generally are sufficiently valuable to stand some transportation, and the distance from Gary, or even from the Pittsburg district, is not excessive for the relatively small quantities of the type of materials moved. Finished accessories assembled with the manufactured product are sufficiently valuable to stand long hauls, especially

when moved in large quantities. Further, certain classes of the required materials are distributed from Chicago or Milwaukee, and the transport costs are based upon the distance from these factory branches. In obtaining this class of materials Beloit enjoys a distinct advantage. For all of the larger establishments shipments of raw materials and the finished products are in carload lots.

Perhaps the most commonly recognized factor in the success of the metal-working establishments in the Beloit district is the quality of the labor available. The early establishment of the metal-working industries, and their growth and expansion through several decades, has produced not only skilled machine operators, but technical and engineering skill of a very high order. It appears that the Beloit sites, and the situation of the city in the nation with relation to materials and markets, are sufficiently advantageous to enable the present metal-working establishments to continue successfully, providing efficient management exists in manufacturing and sales organizations. New industries of the same type should find here also a set of conditions favorable to successful operation.

The Shoemaking Establishments. Beloit village in 1845 listed among its industries two shoemaking shops.¹⁰ In 1870 John Foster organized an establishment, said to have employed 60 hands in the manufacture of fine shoes, with a daily production of 12 dozen pairs.¹¹ In addition there was an early glove and mitten factory, which may have been a factor in providing workers experienced in cutting and sewing leather. In short, when the managers of the present establishments came to Beloit, there was something of a supply of labor experienced in the operation of shoemaking machinery, and with the expansion of the present establishments the supply has been gradually increased. Normally in the grade of shoes produced in Beloit over half of the wage-earners are women. The light nature of the materials and machinery used makes possible the use of second or even third floor levels in certain manufacturing processes. The larger establishment occupies a site on the Rock River valley bottom on the east side, a short distance north of the State Line. This is essentially a continuation of the west side valley

¹⁰ *History of Rock County*, Western Historical Company, p. 617.

¹¹ *Ibid.*, p. 264.

bottom industrial district type of site, though the river and the West Grand Avenue commercial section intervene. The site of the other establishment is adjacent to the Joint Switch track, in the northeastern part of the city, but not as far northeast as the new industrial section. The cheap handling of raw materials in carload lots demands a railroad siding, and both establishments have that service. Both have room for expansion, and expansion upward is always possible, if for any reason lateral expansion is not feasible.

These establishments exemplify the decentralization of the shoemaking industry in recent decades. Chicago is the principal market, and shoes are largely moved to market by motor truck. The situation of Beloit is excellent with respect to leathers obtained from the Milwaukee tanneries and apparently is without particular disadvantages in relation to the bringing in of raw materials from distant sources, while its advantageous situation with regard to the Chicago market is important. Perhaps the most important factor, at least in bringing the establishments to Beloit rather than to some other city having equal advantages of situation, was the supply of labor. Other shoe manufacturing establishments could find equally satisfactory sites in Beloit, with definite advantages of situation and labor supply, and with equally satisfactory management should make comparable success.

The Public Utilities. The early importance of waterpower in the development of the Beloit district has been emphasized. The power potentialities of Turtle Creek are now too small for economical development in these times of large power demands. The Rock River is still used to a small degree, although a public utilities corporation now owns a voting control of the waterpower. Through a period of years all the public utility services, with the exception of the street railway and the telephone systems have been united under the ownership of the Wisconsin Light and Power Company. This corporation, through its district and city organizations provides gas, water, and electric services, and in addition has an important commercial function in marketing electrically operated appliances. The company serves a large area in southern Wisconsin.

The various units of this company in Beloit are housed separately, because they were earlier individually owned and oper-

ated and their functions, to a degree, resulted in different site demands. The gas producing unit is located on the valley bottom adjacent to the river on the east side, and between the river and the Northwestern Line tracks. This location when purchased gave cheap land for producing and storage units. These units have a capacity at present which permits production far in excess of the needs of the Beloit district, and a pipe line has been constructed to Janesville and Edgerton, and is projected farther, eliminating multiple plant investments and coal transport. The producing unit is located in Beloit, as the district consumes about four times the volume of gas consumed in Janesville. The important raw materials are coal and fuel oil, the source of the coal being eastern Kentucky. Even with this grade of coal, supplementary fuel oil is used to "step-up" the gas to the required B. T. U. level. The location of the plant is central in location in relation to the two sides of the river, and not far from South Beloit.

The Water Supply. The natural conditions are favorable to the procuring of a large supply of good water from shallow wells at the water horizon of the glacial gravels, deeper wells tap the St. Peter Sandstone, while the deepest wells reach the horizon of the Cambrian Sandstone, with its great supply of water. From the standpoint of organic impurities all of these sources are safe if the wells are properly cased. A drawback for certain industrial uses is the hardness of the water, producing scale in boilers. The pressure is maintained by means of a standpipe of 200,000 gallons capacity, located upon the top of the bluff on the east side of the river. The Wisconsin Light and Power Company uses water from its mains in the gas-producing plant, but the large volume of water used in the carbo-electric plant, in boilers and condensers, averaging 1,500 gallons a minute, comes from the Rock River.

The Electrical Energy Supply. The electrical energy supplied locally is generated on a typical riverside site, (whether the source be a carbo-electric or hydro-electric). The plants are at the east end of the dam across the Rock River, on the relatively narrow valley bottom between the mill pond and the eastern valley side. As has been stated, a large volume of river water is used in the carbo-electric unit, and the availability of such a water supply is one of the prime site requirements of

such an installation. The plant is served by a siding from the Joint Switch track, making coal available in carload lots. This carbo-electric installation has a generating capacity in the neighborhood of 10,000 kilowatts. In addition, the unit installed in the hydro-electric development on the same site has a capacity of about 475 kilowatts, the total output of the two types of installations being the electrical energy possible of development under ideal conditions. The Rockton installation a few miles south now has a capacity of about 1,300 kilowatts, the energy feeding in to Beloit. These three installations comprise the total electrical energy capacity of the Beloit area, and power needs over and above the volume produced must come from outside sources. To supplement the power resources already named, the corporation has a high tension line from Belvidere, Illinois, which feeds energy north into southern Wisconsin. It would seem that Beloit is tied up with an electrical power supply system not only capable of meeting the industrial demands of the present, but capable of expansion to meet future demands.

Waterpower. The head of water at the dam at Beloit is figured normally at about 8 feet, and the flow at 8,000 second-feet. With an efficient centralized hydro-electric installation there might be developed a power supply of about 2,000 kilowatts. The present capacities of the water wheels total about 1,500 horsepower, but it has been estimated that the power actually developed is not over 500 or 600 horsepower. The small users of power along the race-way in the industrial district west of the river develop power from shafting connected with old style water wheels. There is little incentive for any individual owner or group of owners of waterpower shares to develop a modern installation, since the fluctuation of flow characteristic of a river such as the Rock makes an auxiliary source of power necessary, if the power needs are at all large. As a result many of the holders of shares in the waterpower have sold to the Wisconsin Light and Power Company. The position of this public utility company in the utilization of the potential hydro-electric power development is quite different from that of an individual owner-user. This company could more efficiently use the small quantity of power developed, since it already has multiple sources of power, so that the drawbacks of fluctuations would be minimized. This corporation has as

well a full 24 hour demand for power, with multiple sources of outlet through its various services, while its interlocking transmission lines make possible the sale elsewhere of any excess energy developed in the Beloit district. It should be realized, however, that the natural conditions are not favorable to a large power development on the Rock River, and it would not be economical for the utility company to develop the potential power resource, when it already has energy producing units in efficient operation, unless the costs of the development, including the cost of procuring the shares in the waterpower, were kept at an absolute minimum. Yet it would be unfortunate if the present inefficient utilization of the power potentialities of the Rock River at Beloit should be continued indefinitely.

The Gravel and Sand Industries. This development, most active in South Beloit, is of a dual nature, in that in at least one instance affiliated establishments carry on different activities. The major activity is the exploitation of outwash gravel deposits, with sand as a by-product. Accessory to the gravel exploitation is the manufacturing of cement and concrete products, with sand, and some gravel, as the raw materials. Cement blocks, concrete pipe and tile, are the finished products. The working of the gravel pits is seasonal, the work stopping in the winter, but the manufacturing activity may be carried on throughout the year, with somewhat greater activity in the warmer season. The total male labor employed in all the gravel producing and using industries was reported as numbering 138.¹² The manufacturing phase of the gravel industry is an attempt to find a profitable outlet for the sand, which normally is a drug on the market.

There are at least two factors of geographic significance to be considered in dealing with this industry. They are, first, the concentration of gravel deposits of high grade in great thickness, related to the glacial history of the area, and, second, the situation of these rich deposits of fresh gravels within a short distance of the Chicago metropolitan market. The deposits now being worked are being utilized first, and at the lowest cost, because of their situation with relation to railroad transport already on the ground. The gravel produced in the Beloit area must compete with gravels from points much nearer Chicago,

¹² Beloit Industrial Survey, 1927, pp. 54-55.

such as those deposits located west of the Valparaiso morainic system at Joliet and at other points less than 50 miles from Chicago. While a large proportion of the gravel goes into the Chicago district, the market for the products of the manufacturing is quite different. The small manufacturers of concrete blocks market locally, but the concrete tile and pipe find more distant markets in Wisconsin, Illinois, and Iowa. The gravel exploitation industry, and manufacturing activity growing out of it, are type cases of human utilization of natural resources which are particularly favorably situated. While the industries are not heavy employers of labor, they do their share along with other industries, in the upbuilding of the district. They are particularly important in that they provide a large share of the railway freight tonnage moving out of the Beloit district.

Knitting and Sewing Industries. The knitting and sewing industries are relatively unimportant in the Beloit district. Among the various types of such establishments in operation there is something of a division on the basis of the labor used. These establishments find cheap land or cheap rentals important, with the added requirement of easy accessibility to a female labor supply. The sites in Beloit represent varying compromises. Before any new industry of this general type is brought to Beloit a careful analysis of the particular type of labor demanded should be made. There is apparently some surplus of female labor in Beloit, but it is of various types, not equally suited to all industries.

Foodstuffs Processing Group. The establishments considered under this heading are mainly engaged in the processing and manufacturing of milk and its products, and the making of breads and pastries, with flour as the bulk raw material. In addition there is a little slaughtering of meat animals, some candy making, and bottling of beverages. In practically all cases the markets are limited to the Beloit district, and a small immediately tributary area.

The sites of the establishments processing, bottling, and manufacturing dairy products are apparently located in part in relation to the distribution locally of the merchantable products. The largest single establishment is located west of the river, but its site is such in relation to river crossings that it can serve the east side as well as the west. Further, it is accessible to farm

territory on either side of the city, without crossing the whole city. This establishment handles a full line of dairy products from bottled milk to ice cream and butter. Other establishments occupy less central sites, possibly related to areas served in the city, as well as the farm area outside the city from which raw milk comes.

A bakery establishment has two possible outlets for its products—the wholesale and the retail trade. The choice of site for the establishment will depend to a degree upon the nature of the outlet. In Beloit the bakeries are in two types of locations, depending upon whether their outlet is wholesale or retail, or both. Retailing in turn is of two phases, that of merchandising over the counter in a desirable commercial location, and through vending the product on established routes through the residential section of the city. One baking establishment mainly engaged in wholesaling is located on the far west side, even though much of its selling is to grocers on the east side. This location, in the heart of a residential district, is an attempt to avoid the high rents charged in more central locations. The site is not favorable in relation to the marketing of the products, but apparently in this case the advantage of a cheap site is of more importance than nearness to consumers. Three establishments have sites in the downtown commercial district and retail their products over the counter. The largest of these has its plant in the rear on cheaper land off the thoroughfare, but the site is such that it is accessible to both sides of the river on wagon routes. Various combinations of marketing functions exist in the case of the baking industry in the Beloit area in an attempt to get volume sales in the face of chain store and other competition.

Miscellaneous Industries. There are industries which do not fall naturally into any of the groups so far enumerated, yet industries of some significance, such as the Central Radio Corporation, Young Manufacturing Company, Beloit Box Board Company, and a number of others.

The Beloit Box Board Company is an interesting modern industry, for the paper making industry early developed in Beloit, using rye straw as a raw material, and through much of the life of the city there has been an operating mill within its borders. The present mill manufactures box boards and build-

ing paper. The raw materials are waste paper and rags collected largely from nearby sources. Sulphite pulp comes from Nekoosa, Wisconsin. Though steam is now the main source of power, direct waterpower is still used to some extent. As might be expected, the site of this mill is at the end of the dam across the Rock River, on the west side of the valley bottom.

Beloit Industries: Conclusions

The industries of the Beloit district have been treated in varying detail as regards their geographic aspects, but from that consideration rather definite conclusions may be drawn: (1) Beloit industries use relatively light weight valuable raw materials, capable of bearing fairly heavy transportation costs. (2) The industries use relatively large quantities of semi-finished and finished accessories, capable of bearing heavy transport costs when moved in quantity. (3) The industries use materials which suffer little loss in weight through use. Coal is the marked exception, and industries using large quantities of coal so far from the source of supply are paying freight charges on a large quantity of tare, in the form of ash, moisture, and other unused constituents. (4) Beloit industries give a high proportion of added value to the materials used, through the expenditure of relatively large quantities of skilled labor upon them, with an additional increment in value as a result of the costly highly specialized machinery used in the operations. (5) For industries of most types Beloit has a supply of highly satisfactory labor, both common and skilled, not only drawn from the Beloit district proper, but from the adjacent villages and cities within automobile commuting distance. (6) There is an adequate supply of reasonably priced electrical energy available for the use of industries of the district. (7) Certain Beloit industries in the valley bottom west of the river are in need of room for expansion. Though there is ample room for expansion in new sites, the cost of such a change is likely to be too high. (8) Industries find in Beloit a situation with relation to the great middle western consuming market, including the Chicago metropolitan area, which is favorable to the distribution of the relatively high valued products. (9) Industries find in the Beloit district excellent home-owning possibilities for their wage-earners, leading to a settled, dependable, wage-earning group, an asset to any industrial section.

The public utilities and foodstuffs processing group, since they specialize in service to the community, do not conform to the above pattern, nor do the gravel industries, directly located to exploit that resource. Though there are other exceptions in varying degrees to the above generalizations, they cover in a broad way the industrial complex in the Beloit district. The congestion in the industrial district west of the river is a condition which must be met step by step as acute periods develop, but safeguards should be developed to prevent the same condition arising again as industry projects itself into new areas. Constructive, directive planning should begin now to insure that within 20 years the present far northeastern district industries are not so circumscribed by residential developments as to make desirable expansion impossible.

THE COMMERCIAL CITY

The situation of the Beloit community, in this period of automotive transportation, is unfavorable to the development of any extensive wholesale activity. The trade area is notably circumscribed, being cut off to the north about half-way to Janesville by the competition of that city, while to the south the Rockford trade area extends more than half-way to Beloit. On the west the county line marks off a fairly definite division between the trade areas of Beloit and Monroe, while to the northwest the area is cut off about three miles short of Orfordville due again to the competition of Janesville. Though there are several small towns to the east, the Beloit trading area apparently extends to about a north-south line through Clinton, since east of this dividing line Delavan and Harvard are centers of importance. The area thus outlined might be termed the immediate trading territory, while in certain specialties, such as furniture, electrical equipment, and radios, there is an extensive twilight zone which includes localities which are by no means limited to Beloit in their buying. The almost entire absence of wholesale establishments, except those distributing perishable products such as meats, fruits, and ice cream, is concrete evidence that no important local wholesale trade serving this very circumscribed area exists.

The explanation of this condition is not difficult to find. The development of concrete and other types of surfaced roads has

made accessible to truck delivery all of the smaller towns of the district, and in turn has made Beloit accessible to truck delivery from Chicago and Milwaukee. In addition, the surfaced roads have made it possible for sales representatives from the large centers to call weekly or oftener at the retail stores. This combination of conditions, related in the main to changed modes of selling and distribution, has effectually eliminated the small wholesaler who carried a stock on hand from which the local retailer could order daily to meet local needs. Further, the price competition forced by the omnipresent chain store, particularly in the grocery field, has so narrowed the margin in handling the merchandise that the small wholesaler can no longer profitably stay in business. These findings as related to the grocery field are borne out by the investigations of the United States Department of Commerce, showing Chicago and Milwaukee as the wholesaling centers which serve most of southern Wisconsin and northern Illinois.¹³ The same methods and conditions which have eliminated the wholesaling of any but perishables in the foodstuffs line, have operated in a similar fashion in most other lines. It is apparent that the advantages of situation which have made the great Chicago market accessible to the manufactured products of the Beloit district have reacted generally to eliminate the local wholesaler in favor of Chicago and other large city establishments.

The Retail Trade and Trade Area of Beloit. To some degree the same circumscribing limits which apply to Beloit as a wholesaling center apply in relation to the retail trade. The Beloit retailer feels the competition of the neighboring cities, particularly to the north and south. This competition may be concretely illustrated by the sales of establishments handling certain types of merchandise in Beloit contrasted with sales of similar establishments in other Wisconsin cities. Definite merchandising quotas are determined for such establishments on the basis of population, number of telephones in service, or on other bases known only to the members of trade associations. A comparison of the projected quotas and the actual merchandise sales for Beloit and a comparable city are given in Table I. These data demonstrate that Beloit in this particular line of merchandise does not have a market capable of absorbing goods

¹³ Domestic Commerce Series No. 30, Map of Wholesale Grocery Territories.

in as high a proportion as a comparable city, but a city with a less circumscribed trade area. This point is further emphasized by the fact that in Beloit proper, not including South Beloit, in 1927, almost a million dollars more in wages was paid than in the city with which it was compared. In addition, the industries of South Beloit, which is a unit commercially with Beloit, pay in the neighborhood of a million dollars in wages annually. This indicates that it must be the more extensive trading area in the case of the comparable city which gave it the advantage in sales during the period involved. In retail grocery establishments, some index to the staple consumption of a district, the Beloit metropolitan district out-numbers the comparable city about two to one.

TABLE I

City	Index figure	Mdse. Quota	Mdse. Sales	Mdse. sales per residence customer per month
Beloit (1929)-----	9,605	\$110,057	\$ 94,100.07	.74
Comparable city (1929)---	9,235	105,829	123,255.18	.96

A study of national scope dealing with retail selling through department stores shows Beloit to lack importance as an outlet for the types of merchandise handled by such establishments.¹⁴ It is apparent that the retail establishments are largely dependent upon the trade of the local urban area, including the college population as a significant element, plus the rural trade of a relatively circumscribed area. If the trade area is to be extended, the most logical lines of expansion are due west and southwest into a section not now served by concrete roads leading to Beloit, and southeast into a section of Illinois which is relatively isolated. The expansion of the Beloit trade area to include these favorably located sections will depend largely upon road improvement developments within the next few years. Local merchants should realize that even though trade does not naturally flow to Beloit in volume, conditions are not so unfavorable but that by aggressive methods the trading zone may be extended, to the particular advantage of retailers dealing in

¹⁴ Domestic Commerce Series No. 30, maps showing the Retail Shopping Area by Important County Centers, by the J. Walter Thompson Company.

other than staple foodstuffs, though the latter should benefit to an appreciable degree.

The Sites of Retail Establishments. The sites of retail establishments may be roughly classified as (1) downtown central commercial district, (2) strategic outlying commercial centers, and (3) neighborhood sites. The river crossing by means of the Grand Avenue bridge is a strategic factor in the development of the central commercial district, and Grand Avenue, on both sides of the river, is the strategic street. Traffic converges on East and West Grand Avenue as the bridge is approached, resulting in the most dense traffic stream developed in the city. It is this concentration of traffic flowing to and fro across the bridge that makes frontage on downtown Grand Avenue most desirable for commercial establishments able to afford the rentals such sites entail. The central commercial district in Beloit, as in most cities of its size, covers a considerable area and the actual area covered is related to natural conditions. Since there is here available a large area of valley bottom which is suited to commercial utilization, with resulting relatively low priced ground rents, commercial sites are not used intensively. This is reflected in the prevalence of two story buildings in the retailing district, with the district stretched out rather thinly. Concentrated development is normally much easier for the shopper, since establishments are more accessible to each other, with resulting saving in time and effort. One of the very necessary elements in the extension of the trade area of Beloit lies in providing some solution of the automobile parking problem in the downtown commercial district. This problem results in part from the wide extent of the district and the tendency of patrons to shop by automobile rather than on foot.

Zonation in the Central Commercial District. Within the downtown commercial district there is zonation. For a long period the downtown corner occupied by the Goodwin Block has been the most intensively used piece of real estate in Beloit. The ground floor of this building is in part occupied by a chain drug store, a typical use of such key sites. Shoe stores, jewelry shops, and department stores are found in the heart of the district. Furniture stores, with their large showroom space requirements are normally just outside the center of the district, where rents are somewhat lower. Grocery stores, meat mar-

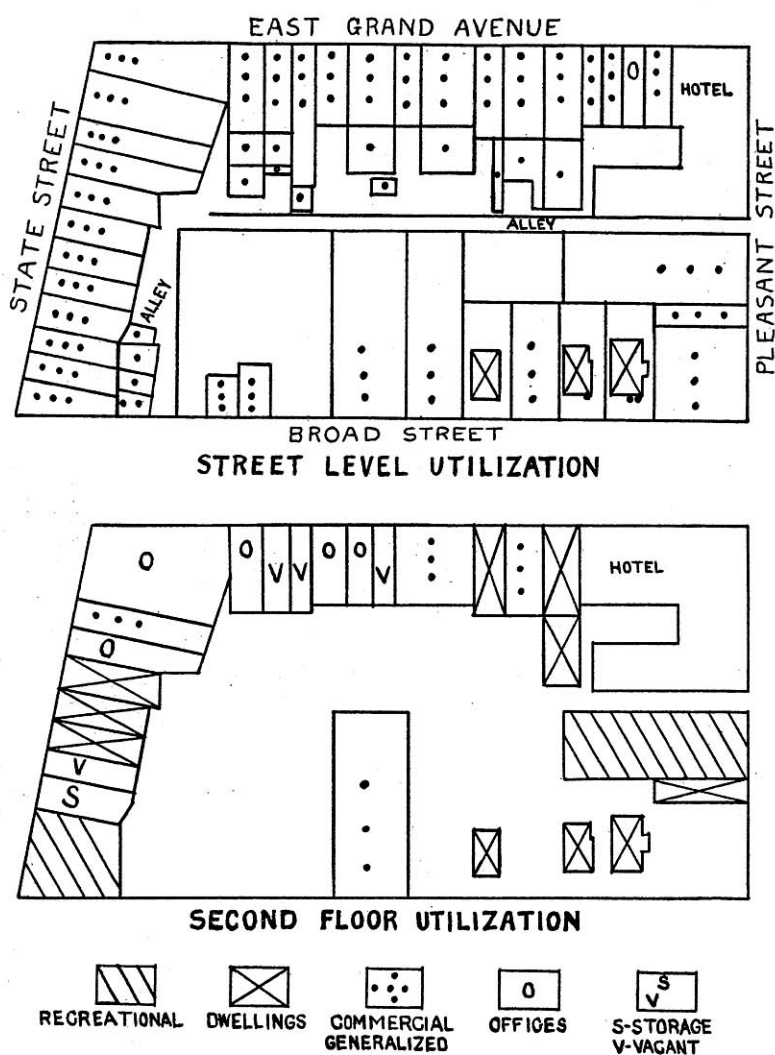


FIG. 1. Diagrams showing site use in the commercial district. Only the first and second floors are shown. The office building on the upper left has four floors; the recreational building on the lower left and the hotel on the upper right have three floors; otherwise there are no buildings in this block more than two stories high.

kets, and other providers of staples are commonly on the outer fringes of the central retailing district, though there are special exceptions. The general exceptions to the conditions outlined are provided by the chain stores, regardless of the line of merchandise handled. Illustrations of this condition are numerous in the Beloit downtown commercial district.

A sample of the type of drawing designed in connection with this study to show the lack of intensive use of high grade sites in the central commercial district is shown in Fig. 1. From such drawings several conditions of significance may be determined, and generalizations formulated as follows: (1) The average number of floors above the basement is two. (2) Passenger elevators are few in number in Beloit, as a result of the lack of intensive use of any but a few of the most strategic sites. (3) The spread of the retailing district discourages the shopper going from store to store to compare values, and the difficulty in making such comparisons may deter out-of-town buyers from attempting to purchase in Beloit. (4) Second floor levels very near to the most strategic corner in the central commercial district, that at the intersection of East Grand Avenue and State Street, are used as dwellings. This use is very common toward the edges of the district. (5) The lack of intensive use of even some of the more strategic sites is without question in part related to the attempt to develop dual commercial centers, one on either side of the river.

Sub-surface utilization is not indicated in detail, since with the lack of intensive use of the surface, with few exceptions basements are used only for storage. One exception is significant, in that a furniture store affiliated with a chain uses some basement space for the showing of kitchen goods. This establishment is located in a central site where rentals are sufficiently high to cause it to use but the first floor of the building, supplemented by the basement space. An independent furniture store could not well function under such an arrangement as it needs more show-space for stock which it does not turn over as rapidly as does the chain store. Furniture stores on more typical sites toward the edge of the central commercial district utilize second or even third floors for show room and storage space.

Outlying Commercial Centers. The sites of outlying commercial centers are apparently related to three factors of signi-

ficance, first, distance from the downtown commercial district, second, concentration of traffic flow, and third, the character of the tributary neighborhood area. Outlying centers are located in many cases, on sites which were once the commercial frontiers of the city. As the city grew outward new commercial centers developed to care for the retailing needs of the new urban developments, in fact in some cases anticipating those needs too far in advance. In the vanguard of this outer fringe of urban development today is the gasoline and oil service station.

Another location favorable to retail commercial development is at the crossing of streets which are important traffic carriers, outside of the central commercial district. The neighborhood stores do not reveal in their sites the operation of locating factors as do the outlying trading centers. There is normally an attempt to serve a small neighborhood free of competitive establishments, yet in some instance the stores are very close together. Probably the most important factor in site selection is remoteness from the downtown commercial district. Prior to the general use of the automobile the neighborhood store undoubtedly occupied the place on the city's frontier now occupied by the oil and gas station. Many of the neighborhood groceries were established on the outskirts of the city, and now the city has surrounded them.

The Eastward Trend of Commercial Development. An eastward trend in the expansion of the commercial district is manifesting itself, indicated by the site of the new theatre and the movement of other retailing establishments. One of the factors involved in the lack of new developments in the commercial district west of the river is lack of suitable space for expansion. The slope of the valley side at the western edge of the district along West Grand Avenue makes the real estate less desirable for commercial utilization. The railroad tracks are somewhat of an obstacle to westward expansion, but their removal would not offset the other disadvantage. The fact that there is not room for expansion need not mean that the section will become decadent, as its situation with relation to the populous residential and active industrial areas west of the river gives it noteworthy possibilities. A possibility is to develop a grouping of definite types of stores in this district. Furniture stores should

find here satisfactory site conditions, and if a number of such establishments were grouped here the buyer would hesitate to shop for such merchandise without visiting this district. It must be by the exercise of such constructive judgment that this portion of the downtown district west of the river will be enabled to maintain healthy retail establishments.

From this consideration of the commercial aspect of the Beloit district in the light of its geographic implications rather definite conclusions may be drawn:

1. It is to the mutual advantage of both Beloit and South Beloit that they be served by a single central commercial district, since it makes available to residents of South Beloit a trading center far more complete than the buying power of that community alone would warrant, while it gives added volume of business to the merchants of Beloit, making more and better establishments possible, to the advantage of all.

2. More intensive utilization of the most central sites is desirable, making shopping less difficult and more satisfactory. A long train of minor advantages should follow the accomplishment of this ideal.

3. The Beloit central commercial district is spread out thinly. Greater concentration is desirable and is certain to occur. The outer edges of the central district should meet the concentration of certain types of establishments in the heart of the area by specialization by districts, comparable to the specialization in automobile sales in the Broad Street area, but more concentrated in its nature.

4. The situation of Beloit with relation to competing trading centers, such as Janesville, Rockford, Milwaukee and Chicago, necessitates a conscious effort on the part of local establishments to hold and extend the trade area. At present the parking problem aggravates this unsatisfactory condition, and before a campaign to draw in trade is begun, means of handling the traffic must be provided.

5. While the situation of Beloit is far from ideal for the development of an outstanding commercial center, there are possibilities beyond the present level of utilization. These possibilities can be realized only through the fullest co-operation of the merchants and other agencies in the community, with constructive planning to make the most of the natural endowment of site and situation.

THE RESIDENTIAL CITY

In the Beloit community the industries have spread out of the valley bottom to the upland, the forms of commercial utilization have likewise encroached upon the upland, but though there is residential utilization of portions of the valley bottoms, there is no first-class residential district upon such a site. This single fact is significant in showing a definite relationship between site and the quality of residential development. The residential section of the city in the period of early settlement was in the valley bottom, but allocation of land use between the industries, commercial establishments, and residential utilization early developed, as is indicated by the following quotation: "The division of the city which put the factories and business center in the valley and the homes on the hill was a most fortunate one. . ." ¹⁵ The natural vegetative cover may have been an additional factor in causing the inhabitants early to utilize the higher upland sites for residences, as "burr oak openings" were typical of this section, while a "grove of heavy timber covered the lower grounds, now the business part of the city." ¹⁶

The Upland. On the upland where much of the residential area of Beloit has developed, there still are variations in the desirability of sites resulting from differences in natural conditions. The most desirable natural site is at the edge of the upland overlooking the valley. Sites overlooking the valleys of the Rock River and Turtle Creek are occupied by such developments as the Beloit College campus, Hillcrest, Bluff Street through part of its extent, and the residential sites outside of the city along the east side of the River Road. Fairbanks, Morse and Company's plant on this type of site is an accident growing out of a set of circumstances of no general significance. The remaining expanse of the upland level offers few relief features of significance in affecting residential utilization.

The Spotted Nature of Residential Land Utilization. The natural conditions which are characteristic of a first class residential site have been tabulated as follows: moderate elevation, good drainage, access to sunshine and air, and attractive views. To these has been added for large cities, proximity to a boule-

¹⁵ Beloit Daily News, June 22, 1897.

¹⁶ Brown, William Fiske, *History of Rock County*, Vol. I, p. 130.

vard system, making the site accessible through the use of the automobile.¹⁷ It must be understood that the encroachment of a single undesirable factor, such as a railroad right-of-way, or an industrial or commercial establishment, may partially or completely nullify the natural advantages. The presence of the Fairbanks, Morse and Company plant has made undesirable for high grade residential use natural sites near it that have inherently excellent qualities. Since this industry has long occupied its present site the residential development adjacent is in harmony with the presence of the establishment.

The presence of industrial and commercial establishments on upland sites in Beloit is a factor of great significance in residential land utilization. The Joint Switch track opens a large area of land to industrial and commercial use, yet the potentialities of such use apparently were not generally realized until recently. The Joint Switch track, with its adjacent storage, commercial, and industrial establishments, cuts a swath directly through the residential section of the east side.

The Valley Bottoms. The valley bottoms present a much more uniform condition in relation to classes of residential land use than does the upland. On the valley bottoms the status of residential site improvements is only fair in the better sections and very poor in the worst. Thus, on the bottoms adjacent to Turtle Creek along Race Street, veritable hovels house a portion of the Negro, Mexican, and other population of the community. The nearness to the industries and railroads, added to the natural factors of low elevation and poor drainage, causes these sites to be so low in real value that no quality improvements are justified.

Beloit, like most unplanned America cities, is characterized by great variation in residential improvements, in many cases totally unrelated to the site characteristics, and presenting a condition which when mapped in great detail shows great variations within short distance. The selection of a site by the prospective home owner in Beloit consequently presents a complicated and difficult problem. As a result of the continuously changing condition of urban land utilization to meet the needs of industrial, commercial, and residential establishments, and the lack of directive planning and comprehensive zoning of any high scientific quality, there are too many variable items con-

¹⁷ Dorau and Hinman, *op. cit.*, pp. 68, 312.

fronting the investor. It is to the owner of the cheaper home that this problem is particularly acute. There are many owners of cheap homes in Beloit who have seen their property depreciate greatly in the last fifteen years through the development of nuisances beyond the control of the individual.

Summary

1. The valley bottoms with their typical industrial commercial, and railroad utilization, are marked by residential utilization of rather low grade, due to the natural characteristics of this type of site, as well as to the major forms of utilization.

2. The spotted nature of the residential development on the upland is mainly related to the presence of industrial, commercial, and railroad forms of utilization, and the lack of functioning private or public controls in residential real estate development.

3. The condition of urban site use cannot be revolutionized, since industrial, commercial, and railroad utilization of the upland areas is an established fact, but future residential utilization should show intelligent adjustments to the presence of such forms, as well as to the site characteristics desirable in residential land.

4. Controls and restrictions should make difficult the subdivision of unripe sites, unable to meet the restrictive requirements of moderately good grade residential developments. This should eliminate the most undesirable forms of garage-house occupancy of sites.

THE CULTURAL CITY

The New England cultural background is outstanding in the Beloit community. Though not the first settlers on the site, the members of the New England Emigration Company with their arrival and settlement gave a quality to the community which has persisted. Representatives of this group of settlers searched the middle west for a desirable site, and finally selected Beloit. It is apparent that certain of the site conditions made a definite appeal to the agents of the company. There were prairie lands not needing clearing, oak openings which furnished fuel and fence material, as well as easily harnessed sources of water-power to turn the wheels of grist and saw mills.¹⁸ It is further

¹⁸ Western Historical Company, *op. cit.*, p. 609.

suggested that they were attracted by the New England-like look of the country.¹⁹ That the land available for purchase included a hundred acres already broken may have been an additional factor of some significance in influencing the selection.

New England traditions demanded schools for the children of the community, and when the general organizations of the Congregational and Presbyterian churches projected an institution of higher learning for the new region of the Northwest Territory opened for settlement by the Blackhawk War, citizens of Beloit made a determined effort to secure the college, in which they were successful. In the selection by the church organizations of the place in which the projected college was to be situated, the location of Beloit at the territorial boundary line, in a position to draw students from both Illinois and Wisconsin, was a situation factor of significance.²⁰ The situational advantage of Beloit, about half-way between Lake Michigan and the Mississippi River, has been suggested as another factor considered as favorable in its selection.²¹ Through the years the college faculty and their families have been the moving spirits in the cultural history of the Beloit community. Their direct and indirect influence in the spiritual, cultural, educational, and even commercial and industrial activities in the city has been immeasurable. It is apparent that there are elements of geographic import related to the New England settlement on the Beloit site, the establishment and persistence of the college in its situation, and the resulting cultural personality of the community.

In conclusion it may be said that the Beloit community, but more especially Beloit proper, has a rather definite personality, related to its New England cultural background, and the New England elements which still persist in its population. Its industries today reflect the influence of typical New England ingenuity and mechanical skill. Its outlook is essentially conservative, but not reactionary. In its city improvements, its recently adopted city-manager form of government, and its attempts to meet the problems of urban land utilization by a zoning act, the municipality demonstrated that it is alive to its local problems.

¹⁹ Whitney, *op. cit.*, p. 133.

²⁰ Chapin, R. C. Semi-Centennial Anniversary of Beloit College, June 1897, p. 44.

²¹ Smith, Professor E. G. Interview.

