THE COUNTRY AROUND CAMP CUSTER.

By Frank Leverett.

INTRODUCTION.

The visitor to Camp Custer can hardly fail to be impressed with the commanding views and the notable scenic features that are there spread before him. The camp stands at a bend in the Kalamazoo Valley west of Battle Creek, on a plain about 100 feet above the river, which commands a view westward down the valley to the city of Kalamazoo, nearly 20 miles distant, and northward and eastward nearly as far over a wide expanse of plains and wooded valleys to ranges of hills of varied and picturesque contour. The Kalamazoo Valley itself affords a pleasing panorama, for the higher parts of the bottom land are dotted with farms and villages and are traversed by steam and electric railways as well as highways. The valley is a mile or more wide, and its long, sweeping curves indicate the work of a larger stream than the present Kalamazoo River, which meanders back and forth in a slender thread across the broad, flat bottom. A comparison of this spacious valley with the small stream that now traverses it gives the visitor the impression that the river must have received the valley as a legacy from some larger and more vigorous stream that occupied it long ago, and this impression is strengthened when he notes that above Battle Creek the large valley can be traced northeastward up a side stream instead of eastward up the Kalamazoo, for above Battle Creek the river flows in a very small valley, scarcely wider than the mill ponds that are strung along its course.

The plain on which the camp stands marks an early stage in the cutting of this great valley, for a low bluff runs along its south edge and the sand and gravel beds beneath it show by their slope that they were laid down by a westward-flowing stream. Though nearly flat, this plain is marked by numerous shallow basins of irregular shape, some of them swampy and others dry. Eagle Lake, near the base hospital, occupies a part of one of the largest basins, nearly half a mile in diameter, and Harts Lake lies in another, in the shadow of the prominent hills of the rifle range.

Southeast of the camp is a slightly higher plain which instead of sloping toward the river slopes southward, directly away from Kalamazoo Valley, to Minges Creek, a small southern tributary of the Kalamazoo. This plain embraces Goguac Prairie, and beyond the prairie, just south of Battle Creek, lies Goguac Lake, which fills a basin larger than that of Eagle Lake and has a reported depth of 80 feet. The wooded shores of the lake are dotted with numerous cottages and provided with facilities for boating, fishing, and other forms of recreation.

South of this higher plain is a range of hills which extends from the rifle range, in the southern part of the military reservation, eastward beyond Goguac Lake and which includes many steep-sided knolls and ridges that inclose basins of irregular shape. Commanding points on the rifle range afford views of wider areas, perhaps, than can be seen from any other point in this district. To the northwest lie Gull Lake and its surrounding plains, and beyond these the wooded hills west and north of Crooked Lake, at the northwestern limits of the area shown on the Camp Custer map. Equally distant views can be had in other directions, that to the northeast reaching nearly to Bellevue and that to the southeast as far as the hills near Burlington, known as "the Alps" (beyond the area shown on this map). The hills still carry so much forest that they present a marked contrast to the bordering plains, nearly every acre of which appears to be under cultivation.

THE CONTOUR MAP.

The form and distribution of the features just mentioned are shown by contour lines on the map on the other side of this sheet. The method of representation of land forms by contour lines is illustrated in figure 1, in which each feature shown in the sketch is represented by contour lines in the map immediately below. Each contour line is so drawn upon a map as to represent an imaginary line on the surface of the land (a contour) all points along which are of equal elevation above a given plane, usually sea level. The contour lines are drawn to indicate regular intervals of elevation. If the contour interval is 20 feet, for example, as in figure 1, each contour line represents a contour 20 feet higher or lower than the adjacent one. If the sea shown in the foreground in figure 1 should rise 80 feet its shore line would be represented by the 80-foot contour line, and if it should rise 260 feet, the part inclosed by the 260-foot contour line would represent an island. The distance between contour lines expresses the slope of the surface, as it is necessary to travel farther to gain 20 feet in elevation, for example, on a gentle slope than on a steep slope. If the slope is gentle the lines are therefore widely separated, but if it is steep they are close together. The contour lines thus express height, shape, and slope of the surface features, such as hills, valleys, and plains. The contour lines on the map on the other side of this sheet are printed in brown, and the heavier lines are drawn at intervals of 100 feet above sea level. As the contour interval on this map is 20 feet many small features, such as knolls less than 20 feet high or hollows less than 20 feet deep, may not be represented. The horizontal scale of the map is approximately 1 inch to the mile, or about 0.6 inch to the kilometer.

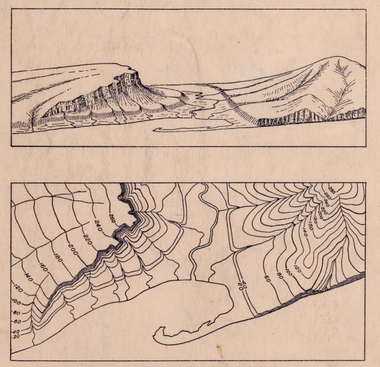

FIGURE 1.—Ideal landscape and corresponding contour map.

The contour lines on the map show that the bottom of the great valley which curves about Camp Custer is broad and nearly flat and slopes from about 880 feet above sea level at Bellevue to 780 feet at Galesburg. The flatness of the bottom land is shown by wide spacing of the contour lines, and the steepness and height of the sides of the valley at different points are indicated by the number and close crowding of the lines. The wide spacing of the lines shows also the flatness of much of the plain on which Camp Custer stands. The sides of the hollows in this plain are represented by lines that are crowded together, and the inclosed depressions are represented by encircling contour lines with short marks on their inner sides.

ORIGIN OF THE SURFACE FEATURES.

Few if any of the present features of the landscape of the region about Camp Custer owe either their form or their origin directly to the bedrock, for except at a few localities in the valleys the bedrock is generally buried beneath 100 to 300 feet of sand, gravel, and stony clay. (See fig. 5.) The material composing the hills and underlying the plains is glacial drift, brought into this region by an ice sheet of continental proportions, which overspread this region from a center of accumulation far to the north, in Canada. Many thousand years ago, in the Ice Age or glacial epoch of geologists, the climate was colder than it is now, so that over the northern half of North America more snow fell in the winters than melted in the summers, the condition being similar to that now existing in the interior of Greenland. The snow became piled up to great depths and was gradually compacted into ice hundreds or even thousands of feet thick, until it began to spread under its own weight and extended over large parts of the country. From such a great ice field east of Hudson Bay the ice moved slowly southwestward across the basins of the Great Lakes into Michigan and other parts of the northern United States. The sheet of ice covered hundreds of thousands of square miles and at its maximum stage extended to the southern parts of Ohio, Indiana, and Illinois and in places even crossed Ohio and Mississippi rivers. (See fig. 2.)

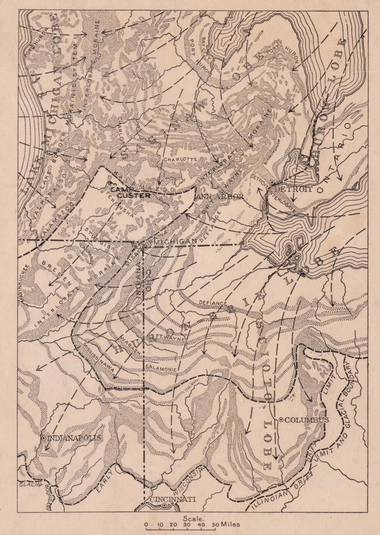

FIGURE 2.—Map of southern Michigan and adjacent regions showing distribution of moraines and directions of ice movement in several lobes of the great ice sheet.

Although hills and valleys were completely overwhelmed by the ice, the basins of the Great Lakes and some of the larger bays controlled to a marked degree the direction of the ice movement and led to the development of several great ice lobes, as shown in figures 2 and 7. Those that reached the region about Camp Custer were the Lake Michigan lobe, the Saginaw lobe, and the Huron-Erie lobe.

Studies both in Europe and in North America have shown that there were several periods of glaciation in which the ice accumulated and spread widely and that between the cold periods there were warmer periods during which the ice melted and perhaps entirely disappeared. At least three such ice invasions reached Michigan, of which the earliest came from the country directly to the north, as shown by the presence in its drift of copper from the Lake Superior region. There were two later invasions from the northeast, which brought in material from Georgian Bay and the east side of Lake Huron. It was in the last cold period that the ridges and other glacial features around Camp Custer were formed.

As the ice moved over the surface great quantities of clay, sand, gravel, and boulders became embedded in its lower part and were carried along southward. Some of this material lodged beneath the ice and was overridden; the rest was let down on the surface of the ground when the ice melted. The former hills and valleys were thus completely buried in drift, and hills and plains of glacial type were made. Streams flowing from the melting ice were also actively engaged in sorting and depositing drift and in carving out new valleys.

The glacial features in and about Camp Custer include terminal moraines, outwash plains, and till plains, or ground moraines. (See fig. 3.) Distinctive names have been given to some of these features.

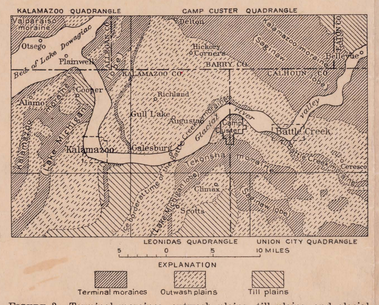

FIGURE 3.—Terminal moraines, outwash plains, till plains, and glacial river valley in vicinity of Camp Custer.

The manner in which these glacial features were formed may be illustrated as follows: Suppose a long slab of dirty ice is shoved toward a furnace at the same rate as the heat melts the end of the slab. The melting ice will then drop its burden of dirt at the heated end of the slab and thus eventually form a narrow dirt pile as long as the width of the slab. If the end of the slab is melted back faster than it is shoved ahead the dirt will be distributed more widely and will tend to form a network of little ridges with inclosed basins. Also, if the ice edge is shoved ahead beyond the point to which it has been melted back, the dirt is likely to be crowded into irregular heaps. In this way a dirt belt in the zone over which the melting ice edge has been moved back and forth may be given, in miniature, what is called a knob and basin or swell and sag topography, such as is displayed by the terminal ridges (moraines) of the great ice sheet.

The water derived from the melting ice slab may wash away some of the dirt and spread it out beyond the terminal ridge in a thin sheet representing what is known as an outwash plain. (See fig. 4.) The distance beyond the ridge to which the dirt is carried and the coarseness of the outwash material are determined by the slope of the surface and the force of the moving water.

If the heat of the furnace is increased while the ice slab continues to be pushed ahead at the same rate the edge will be melted back a greater distance from the furnace until it reaches a point where the melting again just balances the rate of ice movement. Here another dirt ridge will be formed, and the deposit between the two ridges will be left with a relatively smooth surface, because it has not been roughened by ice shove since it was dropped. This smooth deposit represents a glacial ground moraine or till plain. It may be made still smoother by outwash from the ice in its new position. If the surface over which the slab of ice is shoved is an uneven mass of clay, sand, and gravel the weight and forward movement of the slab may smooth out some of the irregularities and the ice may pick up and carry along some of the loose material, which will be dropped when it reaches the point where the ice is melting.

In the illustration just given the slab of ice represents the great glacier, hundreds of feet in thickness and thousands of square miles in extent, and the changing furnace heat represents the changing climate, which depended on the sun's heat and other factors. The ancient land surface was modified by the glacier, just as the uneven surface over which the ice slab is shoved is modified.

The hilly belt south of Camp Custer, forming what has been named the Tekonsha moraine, shown in figure 3, is several miles wide and marks the first position held by the front of the ice sheet in this immediate region as it retreated northward. The moraine is the result of a long-continued stand of the ice margin. The hills, from the rifle range, west of Harts Lake, to Portage Lake, were piled up in the angle between the fronts of the Lake Michigan lobe and Saginaw lobe of the ice sheet. (See fig. 2.) The hills are composed largely of unsorted material, known as till or boulder clay, though they include much assorted material (sand and gravel). Large stones are embedded in the till, and boulders are also conspicuous features on the surface of the hills.

The Lake Michigan ice lobe covered the whole of the Lake Michigan basin and extended into Indiana, Illinois, and eastern Wisconsin as well as into western Michigan. (See fig. 7.) The bottom of the lake basin is in places below sea level, and the tops of the highest hills south of Camp Custer are more than 1,000 feet above sea level. As the surface of the ice must have been higher in the center of the lobe than at the edge in order to spread toward the margin, the ice must have been considerably more than 1,000 feet thick in the deepest part of the Lake Michigan basin.

East of Portage Lake and extending thence southwestward on the south border of the Tekonsha moraine (fig. 5) is a high outwash plain of sandy gravel including Climax Prairie. It slopes southward from an altitude of about 1,000 feet at its northeast end to 980 feet at the south edge of the area shown on the map. This plain is formed of gravel and sand washed out and distributed by streams of water that issued from the melting ice. (See figs. 4 and 5.)

After the Tekonsha moraine was formed the ice margin was melted back a few miles, about to the south side of the present Kalamazoo River valley east of the camp and to the north side of the valley opposite the camp and for a few miles farther west. The Kalamazoo Valley had not then been cut down to its present depth. The ice

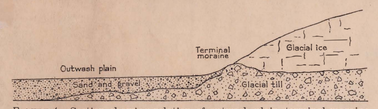

FIGURE 4.—Section showing relation of outwash plain, terminal moraine, and front of the glacier. (By W. C. Alden.)

front held this position long enough to form the relatively small Battle Creek moraine (fig. 3), and the glacial waters spread out the sand and gravel that form the southward-sloping plain between the camp and Goguac Lake. This plain slopes gently from an elevation of 950 feet near Goguac Lake southward to 920 feet or less at the valley of Minges Creek and westward to about the same elevation at the swamp in sec. 16, Battle Creek Township. Streams such as that flowing northeast from Harts Lake did not, of course, then exist.

FIGURE 5.—Diagram showing relations of the Camp Custer plain to the Battle Creek moraine, Kalamazoo Valley, and the Tekonsha moraine.

The presence of such basins as that now occupied by Goguac Lake is explained by the fact that when the glacier was melting back from the Tekonsha moraine, south of the lake and of Camp Custer, large masses of ice became detached from it and were buried in the sand and gravel outwash while the main glacier front continued to recede. When the buried ice blocks finally melted the places they had occupied became hollows in the present surface. (See fig. 6.) The sides

FIGURE 6.—Diagram showing probable origin of many basins on the drift surface. *A*, Block of ice recently broken from a glacier; *B*, same block after part has been melted and the remainder covered with sand and gravel; *C*, hollows or basins resulting from complete melting of the ice. (After M. R. Campbell.)

of most basins formed in this way are very steep—about as steep as the material will lie without sliding. Goguac Lake occupies the largest basin on this outwash plain.

Between Camp Custer and Battle Creek the outwash plain was built up as high as the top of the moraine, and here the moraine is represented only by a knolly and boulder-strewn slope leading from the edge of the outwash plain down to the lower land on which the glacier lay. Later some of the moraine was cut away by erosion. Farther southeast the moraine stands higher than the plain south of it. It is also higher at the ridge on which are the water tanks and the remount station, in the northern part of the camp. (See fig. 5.) At the time the outwash plain on which Camp Custer stands was being formed the waters continued for only a few miles down the course of the Kalamazoo Valley, for the ice still covered the region west of Galesburg through which the river now flows. Directly south of Galesburg there was an outlet southward, at an elevation of 880 feet above sea level, across a sandy plain that extended to St. Joseph River. There may have been basins along the line of the Kalamazoo Valley above Galesburg, even at the time the outwash plain around Goguac Lake was being formed, but it is not likely that the valley as a whole, between the camp and Galesburg, was cut down below the level of the outlet at Galesburg. The grade of the outwash plain was determined by the height of that outlet, hence the plain stands well above the bottom of Kalamazoo Valley instead of sloping down to its level. The valley was cut to its present depth at a later time. In connection with this deepening the plain on which the camp buildings and headquarters stand was formed. This plain is, however, only about 20 feet lower than the bordering part of the outwash plain.

The country north of Kalamazoo River embraces a great gravel plain which at the north merges into the Kalamazoo moraine. (See fig. 3.) The full width of the moraine is included in the northeastern part of the area mapped, but elsewhere only the southern edge lies within this area. A few square miles of till plain or ground moraine is included in the northeast corner of the area, on the inner side of the Kalamazoo moraine.

The great gravel plain as well as the moraine is thickly set with basins and marshy depressions. Such a plain is known as a pitted plain. There is, however, a large flat plain with only a few deep basins in Richland Prairie, west of Gull Lake, and around Hickory Corners, northeast of the lake. Gull Lake itself, which is more than 4 miles long and in places over a mile wide, occupies the largest basin in this plain. Another depression, about half as large, lies in the northeastern part of Ross Township, but its bottom is a marsh. It probably at one time held a lake which has been drained by the cutting down of the outlet along Augusta Creek. Around this depression, as well as around Gull Lake, there are extensive areas of flat plain that extend eastward into Bedford Township, Calhoun County; northward into Barry Township, Barry County; and southward and westward for 1 to 2 miles in Ross Township, Kalamazoo County. Between this plain and the Kalamazoo Valley, in Ross and Bedford townships, is the segment of the Battle Creek moraine noted above as lying north of Kalamazoo River. It is little more than a mile wide, however, and most of it lies east of Augusta Creek.

The gravel plain west of the lower part of Augusta Creek is so much broken by basins that the portion of the map representing this area looks like the map of a hill country rather than a plain. But to one standing on the top of any of the high points in this area it is evident that were the hollows filled up to the general level the whole would be a plain fitting in with the extensive plains on both sides of Gull Lake that are shown so clearly on the map.

Much of the gravel plain in Bedford Township is greatly interrupted by basins, but a view from its general level gives the impression of a plain. From Battle Creek eastward a larger percentage of the plain stands at the general level than between Sevenmile Creek and Battle Creek, so the portion of the map representing this area conveys a better idea of the presence of a plain.

The passage from the gravel plain into the moraine is easily recognized in the field, even in places where it is most difficult to draw the line with the aid of the map alone. There is a striking contrast between the plain and the moraine, both in surface appearance and in kind of material. The moraine consists of boulder-strewn hills of various heights and has none of the appearance of a pitted plain. The hills are composed largely of boulder clay, and their slopes are thickly strewn with large stones, whereas on the gravel plain large stones are lacking. Some of the hills along the border line rise 50 feet or more above the adjacent part of the gravel plain and more than 100 feet above some of the interspersed lakes and basins.

The extreme northwest corner of the area mapped includes a small part of the Kalamazoo moraine that was formed by the Lake Michigan lobe (see fig. 3), but in the area extending from Delton eastward the deposits belong to the part of the Kalamazoo moraine that was formed by the Saginaw lobe.

Owing to a recurrence of warmer climate the ice border finally melted back several miles to the north and west, beyond the limits of the Camp Custer quadrangle. The next stand made by the ice front was at the position shown by the heavy line in figure 7, and at that time the wide valley that is followed by Battle Creek and Kalamazoo River was formed. A river of glacial waters, which headed in Oakland County and received the drainage from the Saginaw ice lobe and also from the neighboring portion of the Huron-Erie ice lobe followed the margin of the Saginaw lobe for about 90 miles westward to the site of the city of Charlotte, in Eaton County, and there it turned southwestward and crossed the Kalamazoo moraine below Bellevue, in the Camp Custer quadrangle. It was this stream, which probably had as large a volume as the Ohio at Pittsburgh or the Mississippi at St. Paul, that cut the large valley now occupied by Battle Creek and by Kalamazoo River where it flows past the camp (see fig. 3). The recession of the margin of the Lake Michigan ice lobe to the Valparaiso moraine opened a new and lower outlet for the glacial waters than that to the south from Galesburg, so that the stream flowed northward from Kalamazoo for about 10 miles and there

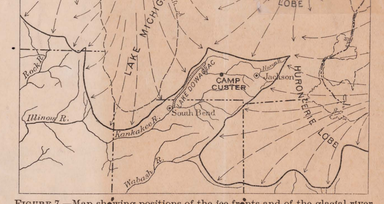

FIGURE 7.—Map showing positions of the ice fronts and of the glacial river that flowed past the site of Camp Custer at the time of formation of Valparaiso and Charlotte moraines.

entered a temporary lake, called Lake Dowagiac, formed in a belt of low country west of the Kalamazoo moraine. This lake, which was formed by the damming of northward-flowing streams by the ice mass, discharged southwestward past South Bend, Ind., to Kankakee River and thence through Illinois and Mississippi rivers to the Gulf of Mexico.

The Battle Creek-Kalamazoo valley was cut mainly in loose gravel and sand in the Camp Custer quadrangle, but in places it is cut down into glacial till, or stony clay. Bedrock consisting of limestone and shale was encountered in the valley bottom at one place near Bellevue. At Verona Mills, in the northeastern part of the city of Battle Creek, and near the mill pond in the southern part of the city the stream reached sandstone. The large size of the valley is due to the fact that the stream carried the drainage from a frontage of many miles of the great ice sheet as well as from a larger drainage area than is now tributary to Kalamazoo River. This valley is in marked contrast with the small valley which the Kalamazoo has formed east of Battle Creek. When further recession of the fronts of the ice lobes opened other outlets for the glacial waters the river dwindled to its present small size.

Battle Creek has a much lower rate of fall in the part within the region represented on this map than Kalamazoo River has above their junction, the fall of Battle Creek being 40 feet in a distance of 13 to 14 miles and that of Kalamazoo River 70 feet in the 12 miles just east of the city of Battle Creek. The fall of the Kalamazoo has been utilized for water power at two dams in and near Battle Creek and one at Ceresco. In the large valley below the city the rate of fall is much less, being only 43 feet in 23 miles to Kalamazoo, and no water power is developed in this part of the valley. On account of this low gradient the diminutive stream, which is only about 50 yards in average width in this part, meanders back and forth across the broad, flat bottoms. Several sharp curves, or oxbows, have been cut off and abandoned by the stream cutting new channels across the bends. Some of the tributaries have a rapid fall in their lower courses as they come down to the large valley, and this fall has been utilized for water power on Augusta Creek and on the outlet of Gull Lake.

On Battle Creek water power has been utilized at Bellevue and at Verona Mills, near the north limits of the city of Battle Creek. In places the creek has begun to cut into the broad valley bottom, but elsewhere it is meandering back and forth across the flat bottom land.

NATURAL RESOURCES, CLIMATE, AND INDUSTRIES.

From the foregoing description it will be seen that the form and character of the natural features of this region and their adaptability to human uses, either for peace or war, depend very largely on their history and mode of origin. The country around Camp Custer is like much of the rest of the southern peninsula of Michigan. At the time settlement began part of the plain near the camp was prairie and part was occupied by oak groves. The hills were forested with a thrifty growth of white oak, black oak, and hickory where the soil is of loose texture and with beech and maple where the soil is clayey; in the swamps among the hills there is some tamarack, and on the river bottoms elm, ash, and other wet-land trees are growing. Nearly all the forest has been cleared, and only wood lots remain. Other prairies similar to Goguac Prairie are found around Richland and around Climax, south of the camp.

Many basins in the outwash plains and among the morainal ridges and hills contain small lakes, others contain peat bogs, and still others have dry bottoms. The dry basins are too shallow to extend down to the level of permanent underground water. Peat bogs are due to the growth and accumulation of vegetal material in swamps and lakes, and many of the present lakes are being reduced in area by vegetation encroaching on their borders. It is estimated that about 12 per cent of the area of the Camp Custer quadrangle is occupied by lakes and peat bogs. Besides enhancing the beauty of the landscape the lakes have considerable value as resorts for recreation and as producers of fish and ice, and perhaps at no very far distant time the peat may be of much value as fuel.

The outwash plains vary considerably in fertility. In portions of them, such as Goguac, Climax, and Richland prairies and the Hickory Corners plain, the sand and gravel are covered to a depth of several feet with rich black or brown loam which is as productive as the ordinary clay soil. Other portions have a loose sandy soil, of relatively low fertility. The morainal hills generally include clay and loam in their soils, even where they contain a large amount of gravel and sand. Their average fertility is about the same as that of the best part of the gravel plain. Some of the hills, however, are so steep-sided as to be difficult to cultivate, and many of them are also thickly set with boulders. The river and creek bottoms include much wet land that is too near stream level to be easily drained. In places on the bottoms there are rich peat bogs which have been drained artificially and converted into gardens for growing celery, onions, and other vegetables. A part of the Kalamazoo Valley near the city of Kalamazoo is noted for its crop of celery. Large boggy tracts within the area shown on the map, which are now waste land, might be converted into productive gardens at moderate cost.

This district has direct transportation eastward to New York City by way of the Michigan Central and New York Central railroads and to Montreal by the Grand Trunk Railway and westward to Chicago by the Michigan Central and Grand Trunk lines. There are also several minor railway lines. An interurban electric line from Detroit to Kalamazoo traverses the Kalamazoo Valley past Camp Custer, and another line connects the camp with the city of Battle Creek.

Nearly all the large manufacturing plants in this area are in Battle Creek, though there is a Portland cement mill at Bellevue, and flouring mills are in operation in each of the villages. Battle Creek is perhaps best known as the "health-food city," but it has several other important industries. The value of the annual product of its several food concerns amounts to about $16,000,000; the other leading industries have an annual output worth about $10,000,000, notably in threshers, pumps, stoves, and printing presses. About 4,000 wage earners, or one-eighth of the present population of the city, find employment with the leading firms, and numerous minor industries give employment to fully as many more.

Nearly all the well-drained land of this area has been brought under cultivation, though about 10 per cent still remains in wood lots and forest. Cereals represent about two-thirds of the crop value but less than two-thirds of the acreage. Hay and forage, vegetables, and fruits are the leading products. Few cattle are raised for the market, but small dairies abound. There are also numerous small flocks of sheep and herds of swine. Poultry raising is a business of some prominence, and about half the fowls are marketed.

The mean annual temperature of the region around Camp Custer is about 48°. The lowest recorded temperature is 25° below zero and the highest 101°. The average annual precipitation recorded at Battle Creek for 22 years, 1896 to 1917, inclusive, was 34.58 inches. There is a variation from year to year of several inches in the annual precipitation, but the rainfall is rarely so deficient in the summer as to cause serious injury to crops.

The wells of this region obtain abundant supplies of good water throughout the farming districts from beds of sand and gravel included in the glacial deposits. In the area north and east of the main camp the glacial drift is generally underlain by sandstone. (See fig. 5.) This sandstone is porous and thus well adapted to hold water, and as it is of wide extent it is one of the most valuable sources of ground water in the State. Battle Creek and many other cities and villages and also Camp Custer obtain their water supply from it. South and west of the camp the sandstone is lacking, and in that part of the State water must be drawn wholly from the glacial drift or from lakes and streams, for the bedrock is a clayey shale which contains but little water and that usually brackish.

Rock suitable for building stone has been quarried from the sandstone at Battle Creek and near Ceresco, and limestone and shale that lie above the sandstone are quarried near Bellevue and used in the manufacture of Portland cement.

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TOPOGRAPHY

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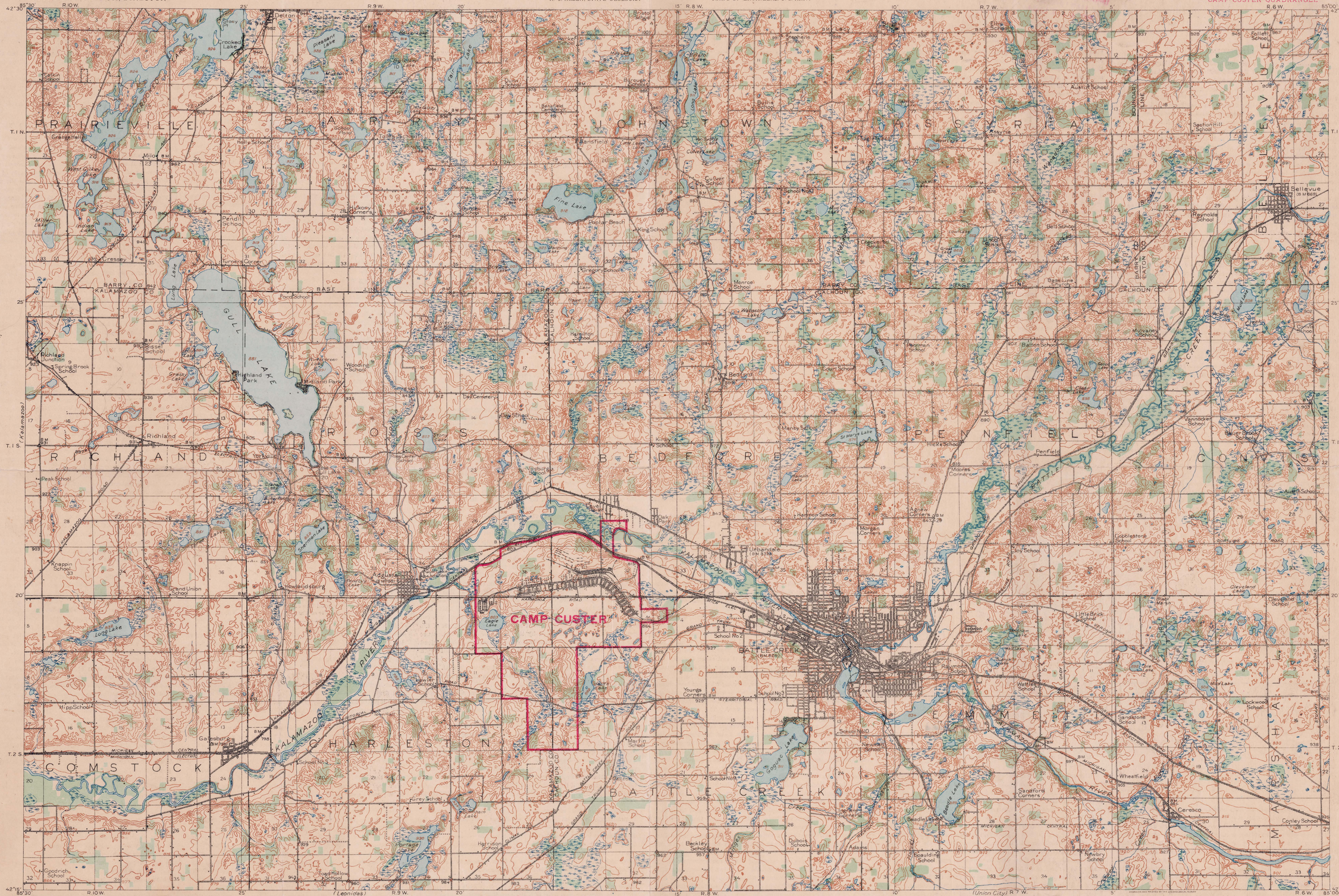
MICHIGAN
CAMP CUSTER QUADRANGLE

CONVENTIONAL SIGNS

- City or village
- Roads and buildings
- Metaled road
- Private or secondary road
- Railroads
- Electric railroad
- Bridges
- Dam
- U.S. township and section lines and located corner
- County line
- Civil Township line
- Camp boundary
- City or village line
- Primary traverse station
- Bench marks (× 906 / BM × 862)
- Cemeteries (CEM)
- Church, School
- Figures (showing heights above mean sea level, instrumentally determined)
- Contours (showing height above sea level until first, and steepness of slope of the surface)
- Depression contours
- Streams
- Intermittent streams
- Lake or pond
- Marsh
- Woods



This map is made by combining U. S. Geological Survey maps of the Galesburg and Battle Creek quadrangles.
Surveyed in 1917.
R. B. Marshall, Chief Geographer.
W. H. Herron, Geographer in charge.

SURVEYED IN COOPERATION WITH THE WAR DEPARTMENT AND THE STATE OF MICHIGAN.

Names of maps of adjoining areas published by U. S. Geological Survey are printed on the margins.

Galesburg / Battle Creek

Scale 62500

1 0 1 2 3 4 Miles
1000 500 0 1000 2000 3000 4000 5000 6000 7000 Yards
1 0 1 2 3 4 5 Kilometers

Contour interval 20 feet
Datum is mean sea level

Edition of 1918

APPROXIMATE MEAN DECLINATION, 1917

CAMP CUSTER