

A street car that makes good time attracts more people and gives more time to shop, while it distributes business uniformly along the street. For this reason, when a street becomes too congested it becomes necessary to widen the street in order to secure ample roadway or place the car line on an elevated structure or in a subway. It is an extremely important question to decide whether it is better to build a subway in a congested business street or use the money to widen the street and keep the car traffic on the street surface and easily accessible.

Layout of Surface of Pavement.—The contour of the pavement surface is important. For the purpose of drainage and maintenance the pavement is built with a convex or crowned surface. Table III. shows general or con-

TABLE III.

Pavement.	General or constant ft.	—Chicago—	
		Max. ft.	Min. ft.
Earth .....	.025 to .030	....	....
Gravel .....	.022 to .025	....	....
Macadam .....	.020 to .025	.035	.020
Asphalt .....	.012	.025	.011
Asphaltic concrete.	.015	.025	.012
Brick .....	.012	.025	.010
Creosoted wood ..	.010	.024	.010
Granite .....	.015	.025	.010
Concrete .....	.010	.020	.010

stant maximum and minimum crown for various types of pavements, as followed in Chicago. A formula for height of crown is $C = WF$, where C = crown, F = constant or crown ratio, and W = width of roadway.

As usually built, the surface is either an arc of a circle or a parabola. Experience has demonstrated that the parabola form is preferable for residence streets, and the "compromise" form for business or car-line streets, and particularly pavements having macadam base. Country roads can usually be built with a constant crown since they follow the contour of the natural surface and have sufficient longitudinal grade. If the grade is level, the drainage can be taken care of by sloping the grade of the side ditches. The two forms of crown noted above are proportioned as follows, C being the crown and the other figures the offsets below the horizontal line from curb to centre.

		$\frac{1}{4}$ width.	$\frac{1}{2}$ width.	$\frac{3}{4}$ width.	Centre.
Parabola ...	C	.56C	.25C	.06C	o
Compromise.	C	.61C	.32C	.12C	o

With city streets, which are invariably curbed, if the longitudinal grade is not sufficient to carry off the water, drainage must be provided. This is done by building sufficient sewer inlets and establishing summits between them whose location depends upon the grade of street, slope required to drain, and the permissible depths below the curb of the summits and the inlets. The following formula is given for locating summits (in the gutter): $X = (I \div 2) - (D \div 2R)$. Here X = distance of summit from higher inlet; L = distance between inlets; R = grade of gutter (6 in. fall per 100 ft. = .005); D = difference of elevation at inlets (or usually, difference of elevation of curbs). On a concrete gutter the assumed value of R should not be less than .004. For any block pavement, including alleys, this value should be not less than .005.

The following formula is given for determining depth of summit and depth of inlet below curb (or grade) to

satisfy values in formula No. 2. Here J = depth of inlet below curb (8 to 12 in.); K = depth of summit below curb (usually 3 in.). This formula is $J = K + RX + (DX \div L)$ or, $K = J - RX - (DX \div L)$. The minimum crown from Table III. is used at the summits, and the maximum crown is permitted at the inlets. This reduces the grade along the centre line of the pavement to about one-half the gutter grade, and gives a comfortable surface for travel.

Use of the Street.—In designing the contour of the surface of a city pavement, there are the often overlooked factors of comfort and safety of the users of the pavement; both pedestrian and vehicle traffic. About ten pedestrians cross a pavement to every vehicle travelling along that street. In practically all streets (of whatever character) while the ratio may not be 10:1, yet the number of pedestrians having occasion to use the pavement in crossing the street, greatly exceeds that of the vehicles using the street. It should be rational, therefore, to so pave the street as to afford pedestrians the maximum degree of comfort and safety, while not interfering with the right of safety and comfort of the vehicle users. In relation to this matter some interesting, if not exceptional methods have been developed and their success established.

In retail business and residence streets it is the general policy to eliminate the usual step at all street intersections and alley returns where pedestrians cross. This is done by paving the street or alley flush with the curb in line with the continuation of the usual 6 ft. sidewalk. To drain the intersection, the catchbasin inlet at the curb corner is set 4 to 6 in. below the top of the curb. From the line of the outer edge of the sidewalk the pavement slopes on a straight line to the nearest sewer inlet. In residence districts, where there are no sewers in the side frontage streets, and the catchbasins are already built in the customary manner (at the curb corners and in the middle of the standard 600 ft. block) it is often advisable to save expense by a method originated by the writer. This consists of building a raised header in the combined curb and gutter with its top 1 in. below the curb and recessed in the middle of its top for a slab 5 in. x 6 ft. which is an extension of the adjacent 6-ft. sidewalk. The header is 6 in. thick and is so built as to make the width of gutter between the curb and header wider at the end nearest the inlet. The gutter is built with an increased slope under the slab.

The purpose of this arrangement is to render the gutter, especially under the slab, self-cleaning. The header is connected to the surface of the gutter by a reverse curve for a distance of 6 ft. on each side of the extended sidewalk, or slab cover, making the header 18 ft. long. This construction has been in use for four years, and has proved satisfactory. It eliminates the step at the crossing, covers the usual dangerous opening where a false gutter is employed, affords a dry and clean crosswalk at all times, prevents breaking of curb through expansion of sidewalk, is self-cleaning, and has a slab cover which is not slippery and cannot be displaced. The writer secured a patent on the novel feature of this construction and has given the city of Chicago the right to use it free of any charge or royalty. At alley returns the pavement is brought flush with the top of the curbs for the full width of the sidewalk. At the end of the return or street line, the centre of the alley is dished at the rate of 1 in. per 5 ft. of width and this point connected on a straight line to the gutter line of the street proper, affording good drainage and keeping the crossing dry and clean.

The ideal solution for a business and two car line street is to bring the pavement flush with the walk of the