METHOD OF CONSTRUCTION FOR STREETS AND THE LIKE

An invention relates to a method of construction for streets and the like and more particularly to a method wherein the curb is extruded into a trench in the prepared subgrade and base of the roadway.

Heretofore in the construction of flexible base streets it has been the general practice to excavate the roadway to the desired depth after which the curbs are poured. After finishing the curbs, the subgrade is prepared and the base course deposited. Finally, a prime or tack coat is distributed on the surface of the base and the wearing surface laid thereon.

In such prior art method the excavated subgrade remains exposed to weathering for approximately ten days to two weeks or for such period of time required for the placement of the curb forms, pouring, removing the curb forms and finishing operations. Obviously the exposed surface of the excavation is subject to damage during this time and the natural moisture in the subgrade may either be lost or such subgrade saturated due to rains.

Furthermore, it is well known that the forming for such curbs must extend the full depth of the concrete and such forms must be braided so that the placing and tamping of the concrete therein will not bulge the forms. After the forms are removed, all exposed surfaces of the curbing must be floated and brushed.

Thereafter, during the working of the subgrade and base courses with heavy equipment, the face of the curbing is frequently defaced or the curbing is pushed out of alignment.

In the process of the subject invention, on the other hand, the subgrade may be worked immediately upon reaching the desired depth; after the base course is deposited and compacted, the prime or tack coat prevents damage to the foundation due to weathering. Obviously, the period of time that the foundation is exposed is minimal and the natural moisture is retained in the subgrade.

The trench provided in such foundation to receive the extruded curb not only eliminates the costly forming steps but such curb completely fills the trench and seals the foundation at each side of the roadway. All finishing steps are eliminated as the curb mold provides the finish operations.

The principal object of the invention is the provision of a method of constructing a street of desired width wherein all costly concrete forming and finishing operations are eliminated.

Another object is to provide such a method wherein the compacted foundation courses extend rearwardly of the curb and provide additional support therefor.

Still another object is to provide an embedded curb which is stronger than conventional curbing due to the low slump of the concrete used and compaction of such concrete by an extrusion process.

A still further object is to provide an improved process wherein the subgrade is exposed to weathering a minimum period of time.

A final object is to provide an improved method which is simple to practice, eliminates costly and time consuming hand operations, is capable of mass production techniques, and is universal in its adaptability

Other objects and features of the invention will become apparent to those skilled in the art as the disclosure is made in the following detailed description of preferred embodiments of the invention as illustrated in the accompanying sheet of drawing in which:

FIG. 1 is a diagrammatic view showing the prior art method of forming a curb before preparing the foundation of a proposed roadway.

FIG. 2 is a diagrammatic view illustrating the first steps of the subject process wherein the foundation is prepared and a tack coat is applied thereon after which a trench is provided along a desired line in such foundation.

FIG. 3 illustrates a curber in position preparatory to extruding a concrete curb into the trench of FIG. 2 of the drawings.

FIG. 4 illustrates a finished street with backfill rearwardly of the curb and asphalt laid on the foundation.

FIG. 5 illustrates a curb and gutter extruded into a trench in accordance with the principles of the subject invention.

FIG. 6 illustrates a water-impenetrable material deposited beneath an extruded curb in accordance with a modification of the subject invention.

There is illustrated in FIG. 1 of the drawings the prior art method of constructing a street of the flexible base type which terminates laterally in a concrete curb 10 on at least one side thereof. In such method of construction, the line for the top of the curb, indicated by 11, and the width of the proposed street between opposite curbs is provided the contractor prior to the start of construction.

Heretofore it has been the general practice to first excavate to a depth of approximately sixteen inches below the plane of the proposed top line of the curb, dependent upon the thickness of the base course, or if necessary, provide fill material to such level, said cut or fill extending at least one foot beyond the rear surface of the proposed curb on each side of the roadway. A depression, indicated generally by 12, is thereafter provided as by means of a maintainer or the like in proximity to each side of the proposed street whereby a cushion 13 of sand or gravel at least two inches in thickness may be provided under such curb. Curb forms are suitably placed in such depression and after the concrete has been poured and allowed to set for the required period of time, the curb forms are removed, the curb is finished, backfill placed rearwardly of such curb and loosely packed. The curb on the opposite side of the proposed street is constructed in like manner.

Thereafter the subgrade is prepared and the base course deposited thereon between the finished curbs and compacted, in a conventional manner; a tack or primer coat is applied to such base as by means of an asphalt distributor, followed by one or more courses of a wearing surface such as asphalt.

Referring now to FIGS. 2-6 of the drawings, wherein like reference characters designate like or corresponding parts throughout the several views, there are shown the several steps in the practice of preferred embodiments of the subject process. For purposes of convenience only,
3,518,924

henceforth throughout the specification and claims the term street is used in a generic sense and includes but is not restricted solely to highways, minor streets, collector streets, marginal residential access streets, marginal commercial access streets, driveways and parking areas; also, although only a single curb and that portion of the sub-
grade, base and wearing surface, respectively, adjacent thereto are illustrated in the several views, it is to be
understood that an extruded curb may also be formed upon the opposite side of the street in like manner and the
principles of the invention hereinafter to be described in
detail are applicable for the construction of a street of
any desired width.

In the practice of the subject invention, as best seen in
FIG. 2 of the drawings, the roadbed for the proposed
street is generally excavated to a depth of sixteen inches
below the top of the proposed curb, dependent upon the
thickness of the base, said excavation preferably extends
at least six inches beyond the rear surface of the pro-
posed curb. Such excavation is shaped in conformity with
the typical sections as shown on the plans and to the estab-
lished lines and grades. The subgrade 14 is the founda-
tion for the roadbed and normally consists of the material in
the excavation or cut which is worked to a depth of six
inches; however, the subgrade may range from zero to a
twenty-four inches in thickness. Soils classified as A–1 to
A–4 as designated by the Bureau of Public Roads are
suitable for use as subgrade materials. All unstable or
otherwise objectionable material is removed from the sub-
grade and replaced with approved material; all holes, ruts
and depressions are filled with approved material and, if
required, the subgrade is thoroughly wetted with water
and reshaped and rolled to place the subgrade in accep-
table condition to receive the base material. Subgrade 14
thus formed is compacted from eighty to ninety-five per-
cent density as determined by the modified Proctor test
and the surface finished to line and grade as established and
in conformity with the typical sections shown on the
plans.

A flexible base, indicated generally by 15, composed of
crushed rock, gravel, disintegrated granite, waterbound-
Macadam or bituminous base is provided, in one or more
courses, upon such subgrade. The base material is de-
posited, spread and shaped and, if required, sprinkled
and then bladed, dragged and shaped to conform to typical
sections shown on the plans. All segregated coarse or fine
materials are removed and replaced with well graded
materials. Although the base course is normally approxi-
mately twelve to fifteen inches in thickness for
four to twenty-four inches; the said base is compacted by
conventional methods to a uniform density ranging from
ninety to one hundred percent, as determined by the said
modified Proctor test.

Thereafter the upper surface of the base is cleaned as
by sweeping or the like and an asphalt prime coat 16 such
as MC-0 or MC-1 in accordance with Asphalt Institute
Specification P-1, or a tack coat such as conforms to the
American Association of State Highway Officials designa-
tion M81-42 or M82-42 deposited thereon; preferably such
coating should extend behind the rear surface of the
proposed curb.

Still referring to FIG. 2 of the drawings, downwardly
extending trench 17 consisting of outer and inner walls
18–19 and bottom 20 is provided in the roadway thus
formed; the most lateral or outer wall 18 of such trench
is vertical to the plane of the rear surface of the base
of the proposed curb. A trench eight inches in width and
extending downwardly approximately eleven and one-
half inches provides advantageous results. Under nor-
mal conditions such trench extends through the base
course into the subgrade. During the trenching operation,
bases may be formed by hand filling the trench into
forming a cushion 21; additional material may be de-
posited, if required, to form a cushion of approximately
two inches. Alternatively, a trench approximately nine and
one-half inches in depth may be provided and approxi-
mately two inches of the subgrade therebelow loosen
ed to form a cushion. In either method, however, the material
removed from trench 17 is subsequently to be used as
backfill.

Referring now to FIG. 3 of the drawings, a curb form-
ing machine 22 such as manufactured by Power Curber,
Incorporated, of Salisbury, N.C., under U.S. Letters Patent
Nos. 2,707,422 and 2,818,790, includes a curb mold 23
which terminates downwardly in sides 24–25 which ex-
tend into trench 17 approximately two inches. A relatively
dry or "still" concrete mix is used and the curb is not
only extruded into but also is embedded in such trench.
During extrusion concrete first completely fills and con-
forms to the lower part of the trench, after which the
concrete passes upwardly and outwardly of sides 24, 25
forming a shoulder between the rear surface of the curb
and outer wall 18 of the trench and the front surface of
the curb and inner wall 19 of the trench, respectively;
such shoulders terminate upwardly in proximity to the
upper surface of the base course, as illustrated in FIG. 4
of the drawings.

The exact concrete mix used to provide a "zero slump"
is dependent upon the type of sand and coarse aggregate
available, its moisture content and the specifications for
the particular job. Preferably the aggregate used should
be smaller than three-quarters inch. A desirable mix for
one cubic yard of concrete consists of 1,950 lbs. sand
SSD 4% moisture, 517 lbs. (5½ sacks) cement, 1,422
lbs. 3% gravel SSD and 16 gallons of water.

As best seen in FIG. 4, approximately twenty-four hours
after the curb forming machine 22 has extruded curb 26,
backfill 27 is packed against the rear surface thereof.
A wearing surface 28 such as asphalt is then applied to
the prime or tack coat 16 in a conventional manner.

There is shown in FIG. 5 of the drawings a modification
of the process of the subject invention wherein after the
subgrade 14, base 15 and tack coat 16 are prepared in
accordance with the principles heretofore described in
detail, a trench 29 five and one-half inches in depth and
twenty-one inches in width is provided in base 15 in a
conventional manner. More specifically, the outer wall 30
of such trench 29 is vertically aligned with the rear surface
of the proposed curb. A curb forming machine of the
type heretofore described extrudes curb and gutter 31
into trench 29; if desired, reinforcing steel 32 may be
placed in such extruded curb and gutter. Backfill 33 is
provided rearwardly of the curb and a base course of
thirty-four inches of asphalt or the like, approximately one
and one-half inches in thickness, applied in a conventional
manner on tack coat 16 to complete the street.

In the embodiment of FIG. 6 there is shown a still
further modification of the process of the subject inven-
tion. More particularly, subgrade 14, base 15 and tack
or primer coat 16 are prepared in accordance with the
principles heretofore described in connection with FIG. 2
of the drawings. In such modification to the process,
trench 35 is provided, in a conventional manner, to a
depth ranging from twenty-two to thirty-four inches into
the base, subgrade and underlying structure, respectively.
A water-impermeable material 36 is next deposited in
the lower portion of trench 35 and compacted; such material
consists of a mixture of one cubic yard of the base ma-
terial with two sacks of portland cement, or other mixture
which forms a four inch slump; the four inch slump for
such material extends to a height approximately ten inches
below the tack or prime coat 16 and curb 37 is extruded
into the upper portion of trench 35 in the manner here-
tofore described. Material 36 forms an impervious barrier
which prevents water from percolating through or under
the subgrade and/or base with resultant damage to the
street. Backfill 38 is again provided atop the base of curb 37 and
a wearing surface 39 laid on tack coat 16.

It should be understood, of course, that the foregoing
disclosure relates to only preferred embodiments of the
invention and that it is intended to cover all changes and modifications of the examples of the invention herein chosen for the purposes of the disclosure, which do not constitute departures from the spirit and scope of the invention.

What is claimed is:

1. A method of construction for streets terminating laterally in a curb on at least one side thereof comprising the steps of grading the proposed roadbed of such street to a predetermined elevation and at least six inches rearwardly of the proposed curb, working the subgrade at least six inches rearwardly of the proposed curb and compacting said subgrade to 80–95% density, depositing a base on said subgrade and compacting said base to 90–100% density, shaping the upper surface of said base to predetermined lines and grades, distributing a sealant on the upper surface of said base, providing a trench in at least said base, the most lateral side of said trench vertically aligned with the rear surface of the proposed curb, extruding a curb into said trench, and laying a wearing surface on said sealant.

2. A method of construction for streets terminating laterally in a curb on at least one side thereof comprising the steps of grading the proposed roadbed of such street to a predetermined elevation and at least six inches rearwardly of the proposed curb and compacting said subgrade to 80–95% density, depositing a base on said subgrade, said base extending at least six inches rearwardly of the proposed curb, said base compacted to 90–100% density, shaping the upper surface of said base to predetermined lines and grades, distributing a sealant on the upper surface of said base, providing a trench ranging from 9½–11½ inches in depth in at least said base, the most lateral side of said trench vertically aligned with the rear surface of the proposed curb, extruding a concrete curb into said trench, and laying a wearing surface on said sealant.

3. A method of construction for streets terminating laterally in a curb on at least one side thereof comprising the steps of grading the proposed roadbed of such street to a predetermined elevation and extending at least six inches rearwardly of the proposed curb, preparing the subgrade and compacting said subgrade to 80–95% density, depositing a base selected from the group consisting of crushed rock, gravel, disintegrated granite, water-bound-Macadam and bituminous material on said subgrade and compacting said base to 90–100% density, sealing the upper surface of said base, providing a trench ranging from 9½–11½ inches in depth along a predetermined line in at least said base to receive said curb, extruding a curb into said trench, and laying a wearing surface on said sealant.

4. A method of construction for streets terminating laterally in a curb on at least one side thereof comprising the steps of grading the proposed roadbed of such street to a predetermined elevation and extending at least six inches rearwardly of the proposed curb, preparing the subgrade and compacting said subgrade to 80–95% density, depositing a base on said subgrade and compacting said base to 90–100% density, sealing the upper surface of said base, providing a downwardly extending trench along a predetermined line and extending at least into said base, extruding a curb into said trench, and laying a wearing surface on said sealant.

5. A method of construction for streets terminating laterally in a curb on at least one side thereof comprising the steps of grading the proposed roadbed of such street to a predetermined elevation and extending at least six inches rearwardly of the proposed curb, working the subgrade at least six inches rearwardly of the proposed curb and compacting said subgrade to 80–95% density, depositing a base on said subgrade and compacting said base to 90–100% density, sealing the upper surface of said base, providing a trench ranging in depth from twenty-two to thirty-four inches, the most lateral side of said trench vertically aligned with the rear side of the proposed curb, depositing a water-impenetrable material in the lower portion of said trench, extruding a curb on top of said water-impenetrable material in said trench, and laying a wearing surface on said sealant.

References Cited

UNITED STATES PATENTS

829,294 8/1906 Reilly ..................... 94—9
1,445,873 2/1923 DeWitt .................. 94—9
1,546,540 7/1925 Hunt ..................... 94—23
2,196,601 4/1940 Behr ..................... 94—1.5
2,707,422 5/1955 Canfield ................ 94—46

JACOB L. ACKENOFF, Primary Examiner

U.S. Cl. X.R.