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Stelling

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[54] PREFABRICATED HIGHWAY SYSTEM

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[52] **U.S. Cl.**.....**94/4,** 94/31

[51] **Int. Cl.**.....**E01c 9/00**

[58] **Field of Search**.....94/4, 11, 12, 18, 31, 33

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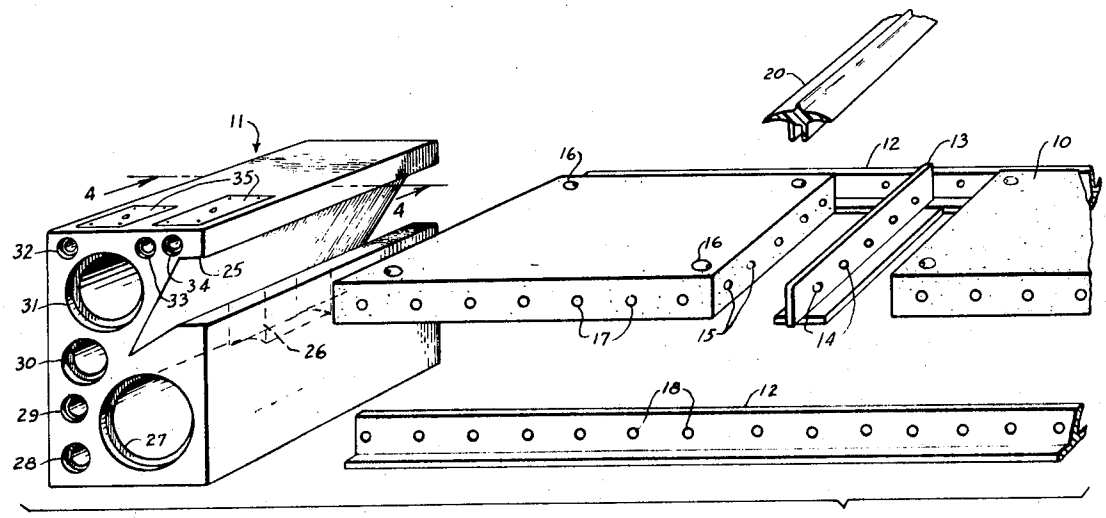
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[57] **ABSTRACT**

A prefabricated roadway system consisting of interconnected roadway slabs constructed from (ferro-cement) reinforced concrete and including a service module or console for location along the sides of the roadway. The module includes a built-in drain gutter which is connected to a sewer pipe going through the modules as well as provision for TV, telephone, and electrical cables, pneumatic mail chutes, water, gas, oil, steam and the like.

4 Claims, 8 Drawing Figures



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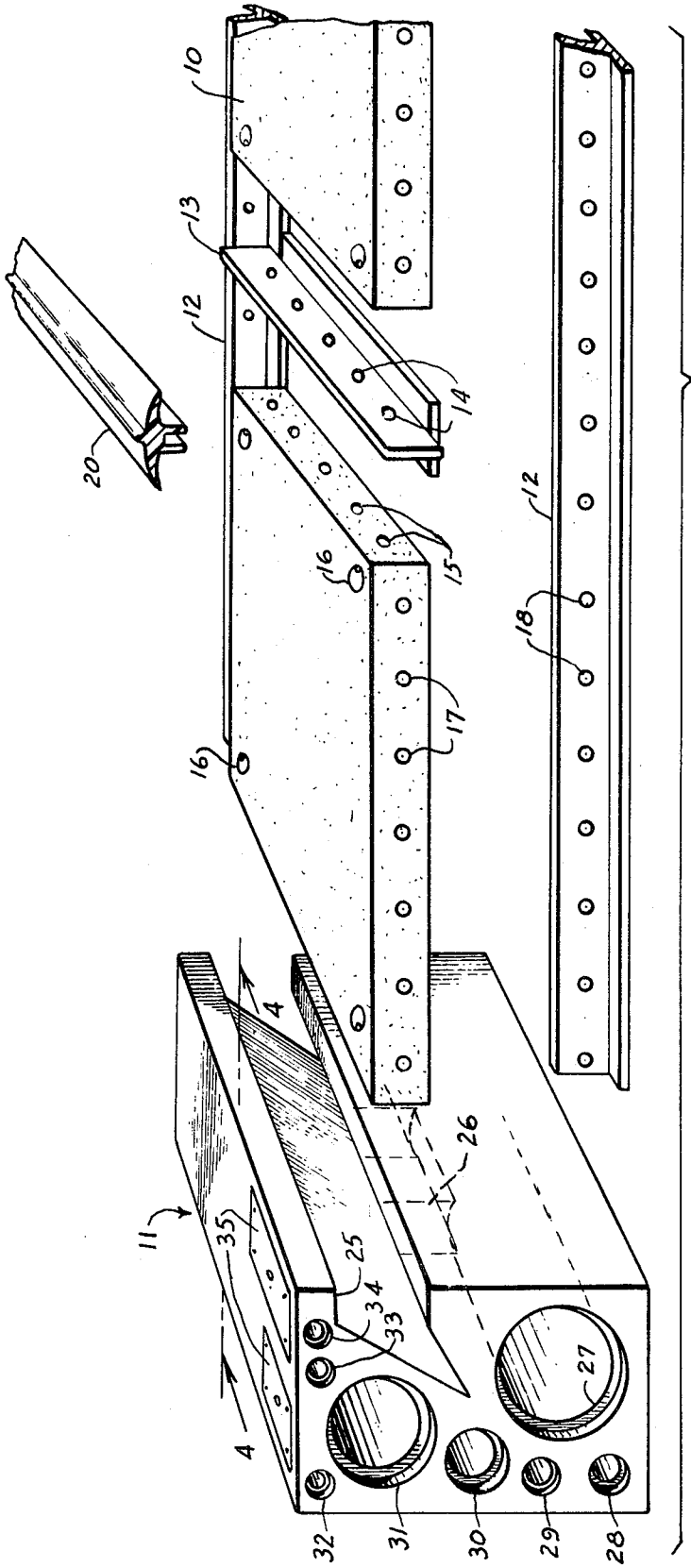


FIG.1

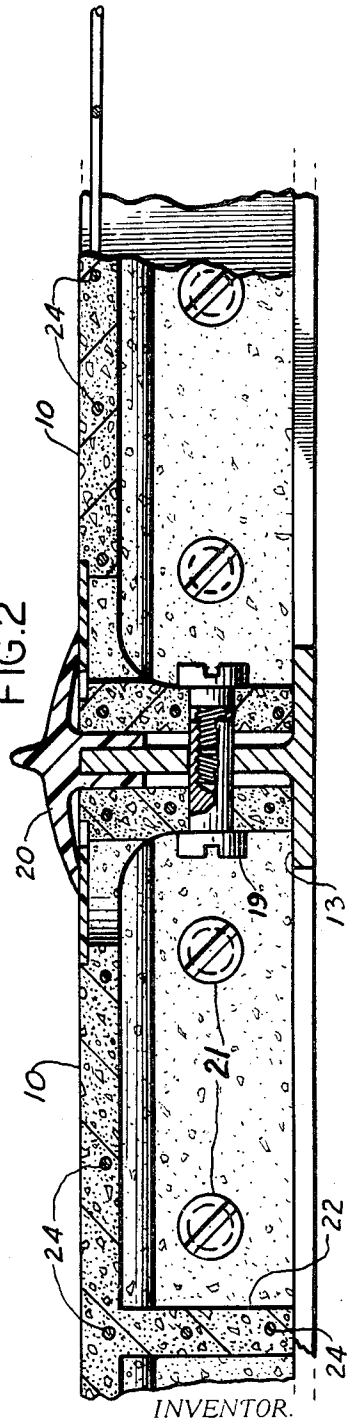


FIG.2

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FIG.3

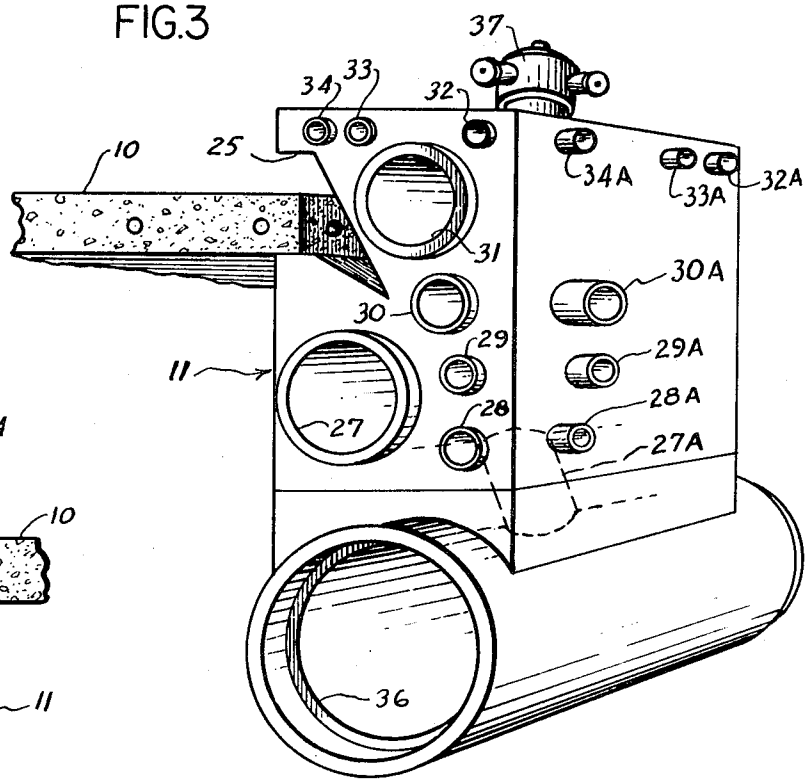


FIG.4

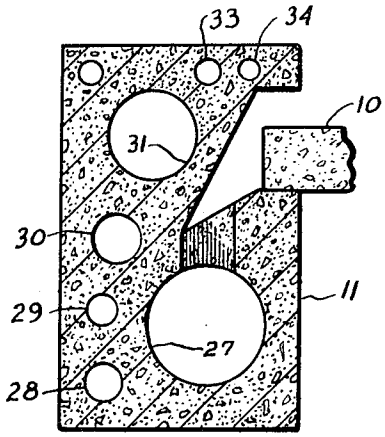
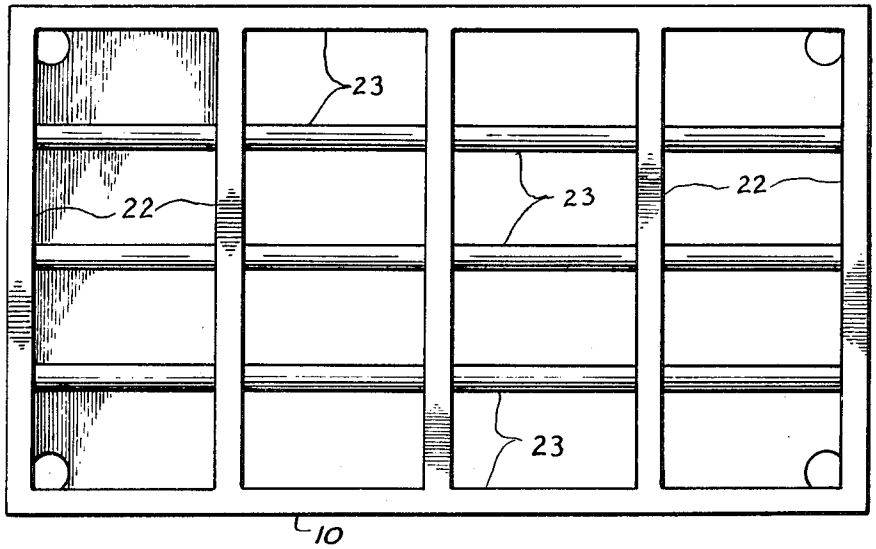


FIG.5



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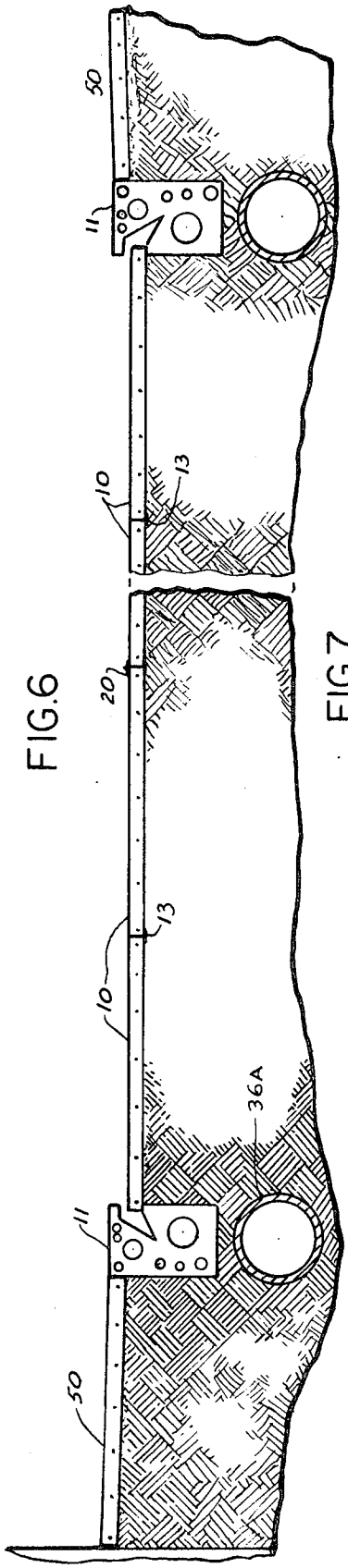


FIG.6

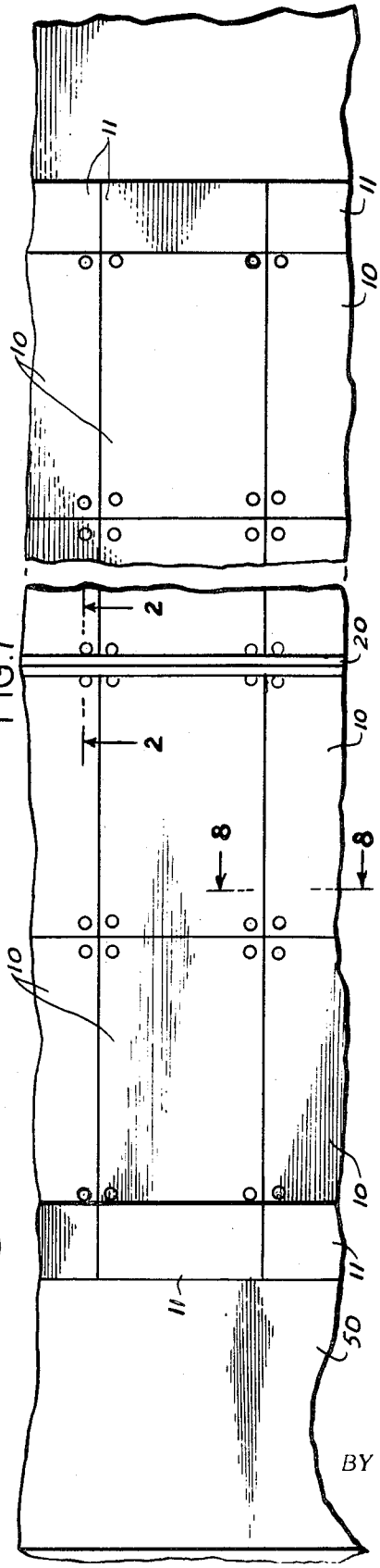


FIG.7

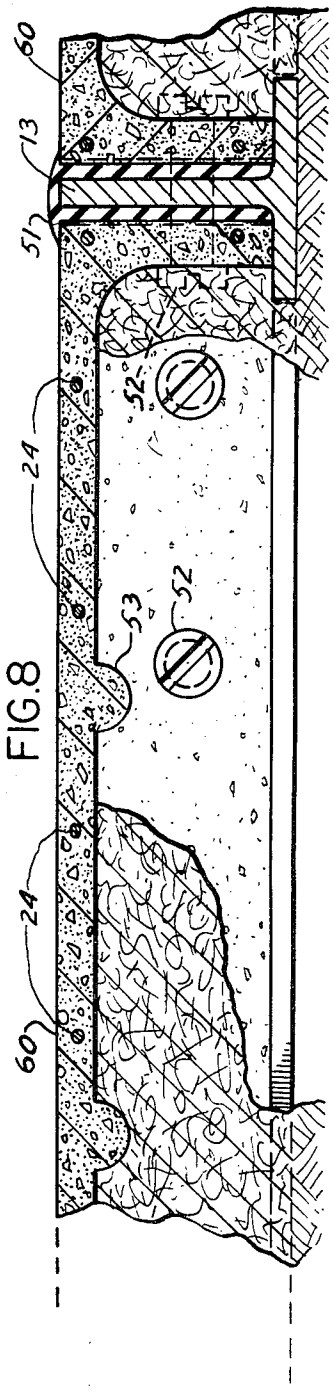


FIG.8

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PREFABRICATED HIGHWAY SYSTEM

This invention relates to prefabricated roadways and the like.

More specifically, this invention relates to prefabricated roadway systems and service facilities which are constructed from interconnected concrete slabs and consoles and the like.

Conventional roadway systems are generally constructed over land surfaces by grading the surfaces and constructing a road bed onto which is further fabricated, a steel grid so as to receive concrete of a predetermined thickness. Drains and electrical facilities which are generally associated with the conventional roadway are also permanently constructed by laying electrical cables and sewer pipes beneath the ground, either adjacent or underneath the established roadway. This conventional method of constructing roadways is considered costly since a great deal of handwork is involved to complete the roadways and completion of the roads is subject to seasonal delays such as bad weather. Attempts to overcome the disadvantages of constructing conventional roadways consist of fabricating prestressed concrete slabs of predetermined width and length in a factory or remote location, and then transporting the slabs to the desired location for securement to a road bed.

Accordingly, the present invention provides a complete roadway system constructed from prefabricated materials which not only establish the roadway in a quick and economical method, but also establish the roadway service facilities such as drainage and electrical supply. In the present invention, the roadway surfaces are constructed from substantially flat concrete slab sections which are reinforced and include holes along the sides of the slabs to serve as a means for interconnecting adjacent slabs. Running along the side of the road bed is a service module or console which provides a drain open to the edge of the roadway, and also includes a plurality of tubes and pipes for service facilities. The drain can be connected to a sewer pipe already within the module which can be connected to a larger sewer pipe which is permanently buried below the road bed. The service module may also include a pneumatic mail tube, electrical conductors, TV cable services, water, gas and oil facilities. The modules are interconnected endwise and are sealed against leakage. Specialized modules can also be provided for fire hydrants, mail facilities and services to buildings. The sidewalks are also constructed from concrete slabs similar to that of the roadways but narrower in width, and mounted adjacent to the service modules.

It is, therefore, an object according to the present invention to provide a precast roadway and service facility.

It is another object according to the present invention to provide a precast roadway and service facility which is readily adapted for fast installation at lower costs.

It is still a further object according to the present invention to provide an improved roadway system which is simple in design, easy to manufacture and efficient in operation.

Other objects and features of the present invention will become apparent from the following detailed description considered in connection with the accompanying drawings which disclose the embodiments of the invention. It is to be understood, however, that the drawings are designed for the purpose of illustration only and not as a definition of the limits of the invention.

In the drawings wherein similar reference characters denote similar elements throughout the several views:

FIG. 1 is a partially exploded perspective view of the roadway system according to the invention;

FIG. 2 is a cross-sectional view taken through one section of the roadway system;

FIG. 3 is a perspective view of a service module of the roadway system;

FIG. 4 is a cross-sectional view taken through section 4—4 of FIG. 1;

FIG. 5 is a plan view of the bottom of the concrete runway slab of the invention;

FIG. 6 is a cross-sectional view showing the placement of the roadway system of the invention along a ground surface;

FIG. 7 is a top plan view of the roadway system of FIG. 6; and

FIG. 8 shows another embodiment of a roadway slab of the present invention.

Referring to FIG. 1, there is shown a partially exploded view of the roadway system according to the present invention having a plurality of prestressed concrete slabs **10** which are capable of supporting heavy loads, such as those experienced on the roadway. Slabs **10** are supported on the flanges of T-shaped beams **12** and **13**. Beam **12** includes a plurality of spaced-apart holes **18** which correspond to holes **17** along the edge of slab **10**. Fastening devices are inserted through holes **18** for connection to holes **17** to firmly support and secure slab **10** to beam **12**. Likewise, beam **13** includes a plurality of spaced-apart holes **14** which correspond to holes **15** along the other edge of slab **10** for fastening and securing the slab to the beam. Each of slabs **10** also include corner holes **16** which permit the manual control of the connecting manuals. A plastic disc is utilized to cover each of these holes **16** after the roadway has been assembled. Along the center median between segments of slabs **10** are disposed a divider **20** which includes a vertical longitudinally extending slot for receiving the top edge of beam **13**. As shown in detail in FIG. **2**, divider **20**, which may be constructed of a plastic material, is held in place by the compressive forces exerted by fastening devices **19** which join adjacent flanges of hollow slabs **10** along their line of interconnection. Fastening devices **19** are fitted through holes **15** on slab **10**, and holes **14** on beam **13**. Likewise, fasteners **21** on the adjacent corners of the slabs **10** are connected through holes **18** of beam **12**, and holes **17** of slabs **10** to complete the longitudinal securement of the slabs.

As shown in detail in FIG. **5**, each of slabs **10** are constructed with a plurality of spaced-apart longitudinal ribs **22** which intersect at right angles, lateral ribs **23**, so as to form a plurality of hollow chambers throughout the bottom surface of the slab. Ribs **22** and **23** are integrally formed with the entire slab construction and further include reinforcing rods **24** which may be steel rods as shown in FIG. **2**.

Disposed along the edges of roadway slabs **10** are a plurality of service modules **11** having a drain opening **25** for receiving the drain water from slabs **10**. The drain water which is collected from opening **25** passes through apertures **26** into sewer line **27** which lies along the bottom of service module **11**. Service module **11** also includes an integrally formed steam pipe **28**, and oil pipe **29**, a water pipe **30**, and a pneumatic mail pipe **31** which permits messages to be transmitted under pressure. Service module **11** also includes TV cables **32**, electrical cable **33**, and telephone cable along its top surface. Covers **35** along the top surface of module **11** provide access to cables **32–34** for service and maintenance. Each of pipes or tubes **27–34** are recessed slightly on one end of service module **11** to receive correspondingly projected pipes from the other end of an adjoining service module so as to provide an overlapping of the pipes and permit a sealant to completely seal the pipes when adjacent modules are joined together. These projected portions of pipes or tubes **27–34** are shown in detail in the module of FIG. **3**.

As shown in FIGS. **3** and **4**, slab **10** rests on the entrance shelf of drain opening **25**. In this particular embodiment of service module **11**, the various services are brought outside of the module as shown in pipes **28A–34A** for connection to a building structure and the like. A fire hydrant **37** is also shown mounted on the top surface of module **11** and connects to water pipe **30** through the internal structure of the module (not shown). Sewer pipe **27** connects through line **27A** to a larger sewer pipe **36** which may be located below service module **11** or be disposed many feet below the ground as is well known in conventional sewers.

Referring to FIGS. **6** and **7**, there is shown the completed roadway system consisting of a plurality of interconnected slabs **10** which are longitudinally secured by T-shaped beams **13**, and include median strip **20**. Slabs **10** may be laid flat or slightly camel backed to permit surface waters to drain into openings **25** of modules **11** positioned on each side of the slabs. Sidewalks **50** which are constructed in a similar manner to slabs **10** slope downward toward the roadway of slab **10** so that they can drain across the top of service modules **11** into slot **25**. A buried sewer pipe **36A** which can be similar to pipe **36** of FIG. **3** will serve as the main sewer for receiving a discharge from pipe **27** located in modules **11**.

Referring to FIG. **8**, there is shown another embodiment of the invention, wherein slab **60** includes reinforcement rods **24** and a plurality of extending ribs **53** which have a semicircular cross section. Fasteners **52** are utilized to join adjacent sections of slabs **60** together through beam **13**. A resilient coupling **51** is fitted over beam **13** and serves to cushion the securing sides of slabs **60** with respect to the surface of beam **13**. Slabs **10**, **50** and **60** may be constructed from reinforced concrete, plastocement, ferro-cement or other types of synthetic and nonsynthetic building materials. Likewise, service modules **11** may also be constructed from similar materials. Beams **12** and **13** may be constructed from any rigid supporting material, such as steel or aluminum, which will provide additional rigidity and support for slabs **10**, **50** and **60**. Road divider **20** may be constructed of any resilient material, such as neoprene, plastic or rubber, and its top surface may be colored yellow, red or other identifying color in conformance with safety regulations. Likewise, insert pad **51** may be constructed from any resilient material, such as rubber, neoprene, plastic and the like, which serves to cushion adjacent slabs when they are mounted to their respective beams.

While only a few embodiments of the present invention have been shown and described, it will be understood that many changes and modifications may be made thereunto without departing from the spirit and scope of the invention.

What is claimed is:

1. An improved prefabricated roadway system, comprising:

a plurality of rectangular-shaped, longitudinally extending rigid slabs of material, having a smooth top surface reinforced by a plurality of cylindrical rods embedded therein, and a plurality of intersecting reinforcing ribs, integrally formed on the bottom surface of said slabs perpendicular to each other and to the edges of said rectangular slabs, the peripheral edges of said slabs also including a plurality of spaced-apart mounting apertures therein;

a plurality of T-shaped beams having a plurality of spaced-apart mounting apertures provided in the edges thereof, for engaging and supporting the edges of said slabs, said apertures in said beams being positioned in alignment with said apertures provided in said slabs;

a plurality of fastening means slidably disposed through said apertures in said beams and said slabs at adjacent edges thereof for securing said slabs and said beams together to form a roadway;

a plurality of curb members disposed endwise together at the lateral edges of said roadway formed by said slabs and having an elongated, horizontally-disposed, rectangular-shaped aperture provided therein, the lower edge of which receives and supports the lateral edges of said slabs of said roadway, and further including at least one longitudinally extending annular drain pipe integrally formed therein coupled to said rectangular opening by a triangular drain passage for draining the water from the surface of said slabs; and

a T-shaped, resilient coupling member, having a vertically disposed, elongated slot provided in the vertical leg thereof, and disposed between adjoining slabs over said T-shaped beams, the top surface of said member being arc shaped so as to project slightly above the top surface of said adjoining slabs, and having an elongated vertically disposed strip affixed thereto for providing a roadway divider.

2. The roadway system as recited in claim **1**, wherein said curb members are provided at one end thereof with circular bores, adjacent the ends of said plurality of tubes and said drain pipe, having a diameter slightly larger than said tubes and said drain pipes, and a plurality of annular projections at the other end thereof affixed to the ends of, and having the same diameter as said tubes and said drain pipe, said annular projections being received by said annular bores so that said curb members are coupled together endwise adjacent the ends of said slabs.

3. The roadway system as recited in claim 2, wherein said curb members further comprise a plurality of elongated, isolated, parallel, longitudinally extending tubes, integrally formed within said curb members, for receiving electrical power cables, RF signal transmission cables, oil, steam, gas and water flow pipes, and pneumatic mail chute pipes.

4. The roadway system as recited in claim 3, wherein said curb members further comprise a plurality of annular tubes disposed perpendicular to said plurality of elongated tubes and said drain pipes and coupled thereto for connecting corresponding service pipes to said drain pipes, electrical power cables, RF transmission cables, oil, steam, gas and water pipes, and pneumatic mail chute pipes.

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