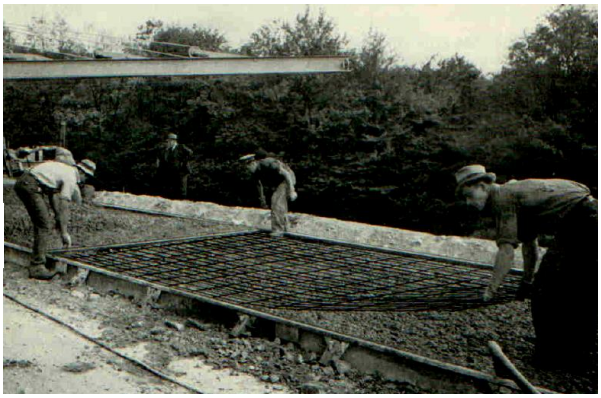
WELDMESH
MANUFACTURER'S ASSOCIATION

http://www.weldedmesh.com



Our Association is a 30 year young group of Manufacturers of Welded Wire Mesh from across the country with the common objective of tackling issues facing our industry and for promoting increased usage of the elegant product in the diverse application areas of Fencing, Animal Enclosures , Gabions , Coating & Concrete Reinforcement, Pavements.

WELDED WIRE MESH FOR ROADS / HIGHWAYS

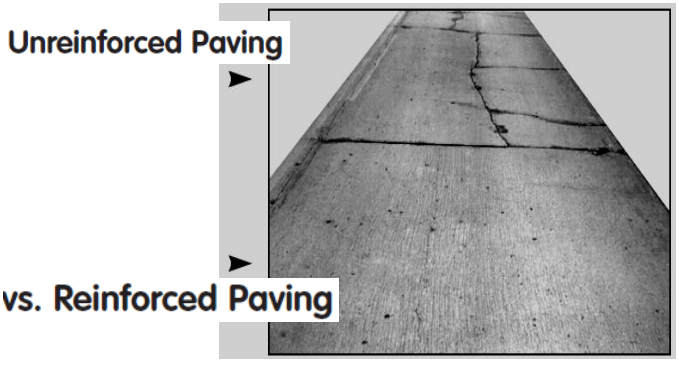
Reinforcing Roads for Stronger & Longer Service

ROADS & HIGHWAYS --The Backbone of a strong nation……
With the 2nd Largest Road Network in the World at 33 Lakh KM,
INDIA is blessed with a Very wide Backbone…
but a rather weak one….
The need of the hour for a Resurgent India with Annual Vehicular Avg. growth > 11%, is to broaden and strengthen this backbone and make it smoother, trouble free for a longer life…..
We need to change the roads into highways …..
We need to add more spine to the backbone…
WELDED WIRE MESH !!!
The potential spine for Stronger and Long lasting Roads……
A Versatile,Strong Fabric for Reinforcing and Barrier applications
Welded Wire Mesh is a prefabricated reinforcement consisting of a series of parallel longitudinal wires with accurate spacing welded to cross wires at the required spacing. The welding of the wires is achieved by electric resistance welding with solid-state electronic control and all the spacings are controlled by an automatic mechanism of high reliability. There is no foreign metal added at the joint. The intersecting wires are actually fused into a homogeneous section thereby ensuring permanency of spacing and alignment in either direction. In India, Weded Wire Mesh manufacture conforms to **IS:1566/1982**.

Concrete Pavement Reinforcement
Fencing for Highway Border, Medians &Temporary Project barriers.
Welded Wire Gabions & Wire Walls for Road Embankments and Side slopes
Concrete Pavement Reinforcement

- World Over, experience and research shows that Concrete Pavements are the ideal choice for LONG LIFE, Maintainance free pavements leading to lower life cycle costs with service lifes > 30 years.
- **Concrete Pavements include alternatives of**
  - **JPCP- Jointed Plain Concrete Pavements (Unreinforced but with Dowel Bars at Joints)**
  - **JRCP- Jointed Reinforced Concrete Pavements (Light Mesh Reinforced Pavements with Joints)**
  - **CRCP-Continuously Reinforced Concrete Pavements (Heavy Mesh Reinforced pavements with no Joints)**
  - **CRCP/EJ-Continuously Reinforced Concrete Pavements with Elastic Joints as per IRC-101/1988**

Importance of Reinforcement cannot be overemphasized because of the heterogeneous character of concrete with a poor tensile strength. Concrete irrespective of thickness shall crack. Presence of Reinforcement shall impede the cracks and prevent further loss of strength and integrity.

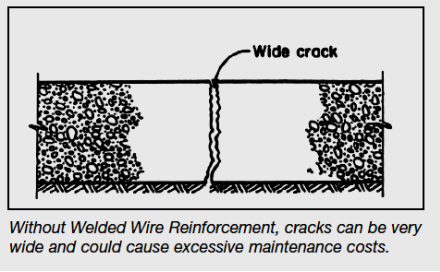


Need for Reinforcement
Concrete Pavements or SLABS on GRADE develop tearing or tensile stresses due to one or more of following effects:
Shrinkage: In new concrete, natural volume changes (shrinking) due to cement-water hydration are restrained by the pavement base and other physical features adjacent to the concrete, causing stresses to develop in the concrete. These stresses build

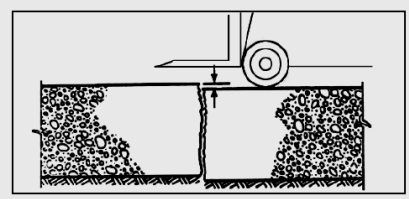
faster than the concrete's strength so, at some point, full-depth cracks form.

<u>Temperature Gradients</u>: Ambient Temperature changes during the day and over seasons and those caused initially due to Hydration result in differential volume changes across the thickness which in turn induce severe stresses leading to cracks or warping due to restraints from sub-base / surroundings.

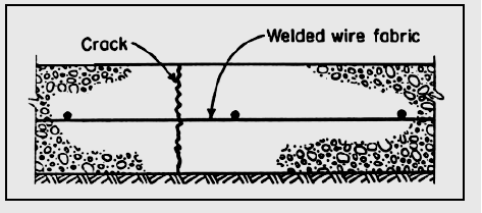
<u>Structural Moments:</u> While a Slab on Grade is structurally expected to be under pure compression, the erosion and pumping of the supporting Sub-base coupled with the heavy traffic loads leads to development of regular structural bending stresses.



Without Welded Wire Reinforcement, cracks can be very wide and could cause excessive maintenance costs.



. . . and if settlement occurs in the sub base displacement can occur.



Reinforcement is provided to limit the opening of the cracks and thereby maintain tighter aggregate interlock. The reinforcement is designed primarily to limit the Crack width and Crack spacing as per desirable limits.

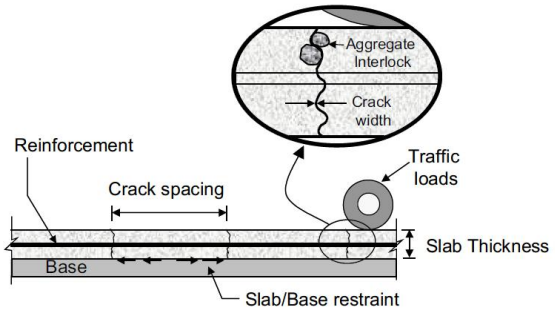
The advantages in using steel reinforcement include:

a) a reduction in the required slab thickness usually is permissible ;

b) wider spacing between the transverse contraction joints may be used ;

c) the width of crack opening is controlled, with the result that load transmission is maintained at a high level at these points and objectionable material is prevented from infiltrating the cracks

d) differential settlement due to non uniform support and/or frost heave is reduced materially.



<u>History of Welded Wire Mesh as Pavement Reinforcement.</u>

The World's Largest Democracy <u>India</u> can truly learn from the Worlds Oldest Democracy <u>USA</u> in regard to the history of Highway Pavements development.

The Worlds Largest Network of Roads in the USA at 64.4 Lakh KM owes its single largest development boost to the INTERSTATE System initiated in 1956. A program for construction of 69,000 km of dual lane highways was initiated then.

Interstate pavement under construction. This is mesh-dowel pavement going into place on the largest overall highway construction program ever conceived and built in the history of the world.

In the period 1950 to 1975, it is estimated that <u>Welded Wire Mesh pavement reinforcement fabric equivalent to 1.11 Lakh two-lane KM</u> was consumed mostly in the Interstate projects with Mesh-Dowel Design (JRCP).

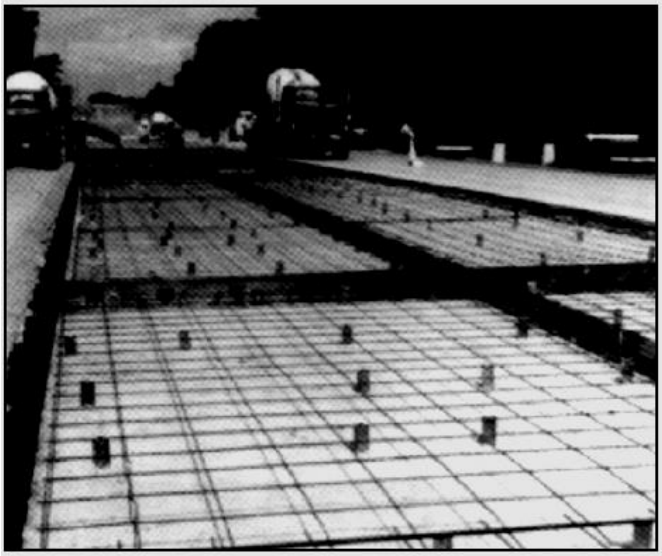
Prior to the Interstate Expressways, it was Turnpikes like the Pennysylvania Turnpike, the Ohio Turnpike, The New York Turnpike, The Illinios Toll Way system , The Oklahoma Turnpike, all of which employed Welded Wire mesh Dowel Reinforced Pavements in 1940-60, many of which are still in service.

Apart from the USA, Germany used concrete pavements extensively in the construction of its Auto Bahns (expressway) system. Between 1935 and 1939, some 3,500 km of motorways were built in Germany with a pavement cross-section of about 220 mm of wire-mesh reinforced concrete on 100 mm of sand base course, and expansion joints every 10 to 20 m.

Until the early 1960s, Germany built primarily jointed reinforced concrete pavements (JRCP) on unbound base courses, using expansion joints and transverse contraction joints spaced 7.5 to 10 m apart.

A 2007 Study Report by United States Department of Transportation - Federal Highway Administration on History of Pavements in Europe & Canada clearly shows that CRCP (Continuously reinforced) pavements offer a Heavy Duty and Long Life Alternative with average 10% reduction in Concrete Thickness vis-a-vis JPCP (Un reinforced) pavements.

JOINTED REINFORCED CONCRETE PAVEMENTS-MESH DOWEL SYSTEM
A vast Majority of the Reinforced Pavements in the 1940 -1980 period in developed economies comprised of JRCP or Mesh Dowel System. These economies have lately progressed mostly to the costlier CRCP model.
However for developing economies like India the JRCP technology is very much relevant due to its lower costs.
Reinforcement in JRCP is primarily distribution steel acting against Shrinkaage and Temperature stresses. It is lighter – approx 0.08 to 0.3% of Cross-Section in Longitudinal Direction and Transverse Steel of approx. 50% of the Long. Steel.

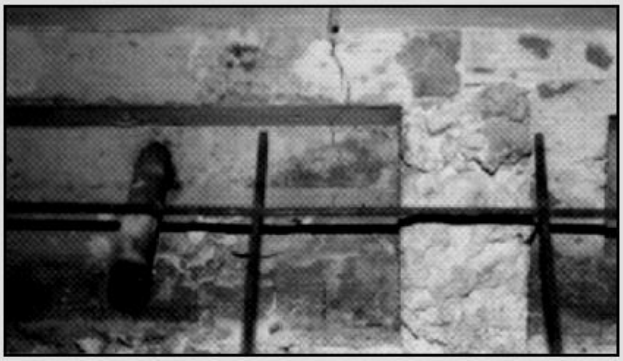


Welded wire reinforcement for highway paving and white topping is being specified more today– properly supported WWR helps protect against damaging transverse and longitudinal cracking.

Dowel Joints are provided every 6 to 10 m.

A reduction in Concrete thickness vis-a vis JPCP of approx 10% is generally available by design.

A time tested design methodology is provided in the US Army Corp- Reinforced Rigid Pavement design EM 1110-3-132 of 9 Apr 84



Properly positioned steel below the saw cut control joint allows concrete to crack the full depth and adds load transfer capacity across the joint.

CONTINUOUSLY REINFORCED CONCRETE PAVEMENTS
Continuously Reinforced Concrete Pavments are the most popular alternative for all Important Expressways in developed economies. Such pavements can be expected to provide over 40 years

of exceptional performance with minimal maintenance. These attributes are becoming increasingly important in high-traffic, heavy-truck areas, where delays are costly and a smooth ride is expected.

Figure 1. Newly constructed CRCP in Virginia

. In CRCP the continuous reinforcement allows transverse cracks to occur relatively closely together and holds them tightly closed for maximum aggregate interlock. As a result, load transfer between pavement slabs is maximized, and flexural (bending) stresses due to traffic loads and curling and warping are minimized.

The Reinforcement in CRCP is heavy and aims to limit the Crack width to 1mm with maximum Average Crack spacing of 1.80m. The most widely accepted Design Procedure is as per AASHTO-86/93 Guide. The Longitudinal Reinforcement Areas are in the range of 0.6 to 0.8% with Deformed bars of 420 Mpa.Transverse Reinforcements are of the order of 0.15 to 0.4%.

The reinforcement may be provided as 2 layers of Deformed wire Welded Fabric Sheets or else as a combination of a basic Mesh providing the Transverse Steel and some Long. Steel along with Extra Bars tied/ welded to the basic mesh.

CONTINUOUSLY REINFORCED CONCRETE PAVEMENTS with ELASTIC JOINTS

IRC-101/1988 offers the more affordable via-media of CRCP with Elastic Joints. The Longitudinal reinforcement is continued across the Elastic Joints of Grooves filled with Bitumen coated strip.

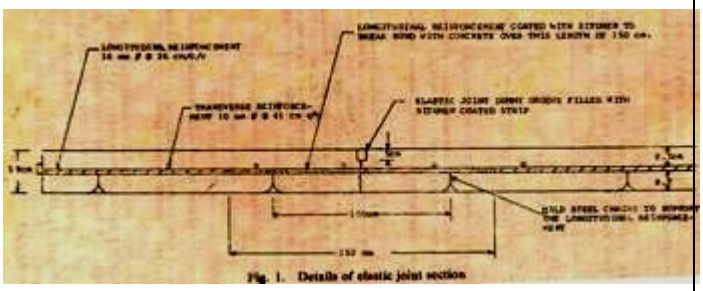
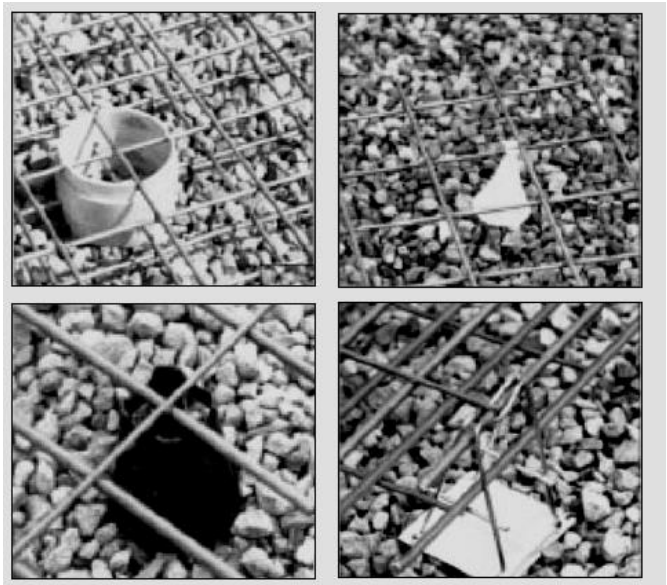


Fig. 1. Details of elastic joint section

Elastic Joints are provided at 4 to 5m and the reinforcement is painted with a bond-breaking medium over a specified design length on either side of the joint. The use of joints reduces the reinforcement stresses. Longitudinal Steel is in the range of 0.1 to 0.6% with Transverse steel being 25% of the Long steel. Reinforcement Steel Stresses are limited to 140 N/mm2 as against the full strength of 280 N/mm2. A reduction in thickness of the Unreinforced Concrete Pavement thickness by using Mallinger's Chart based on Modular ratio equivalence of steel to concrete.

A typical Design Example of an Unreinforced 250mm thk Pavement in Delhi for 5100 kgs Design Wheel Load and 300 Vehicles/Day Traffic Intensity can be replaced with a CRCP-EJ Slab of 192 mm thickness alongwith Reinforcement area of 0.4% provided by a single layer Welded Wire Mesh of 100x 250x10.0x8.0mm weighing 8 kgs / Sq.mtr. The Mesh may be placed on chairs between 35% to 50% of height from top.



Various supports for welded wire reinforcement. Place supports 2-3 feet apart for proper positioning of welded wire reinforcement during concrete placing. Concrete block, wire or plastic supports to hold reinforcement. These units are economical and effective.

Advantages of WELDED WIRE MESH over Manually Assembled Individual Bars

Factory controlled manufacture of Mesh Sheets provide for obvious advantages vis-à-vis Manual Bars Assembly such as

READY TO LAY CUT TO SIZE SHEETS

SIGNIFICANT SAVINGS IN LABOUR & TIME DUE TO NO CUTTING & SPACING OUT OR BINDING AT SITE

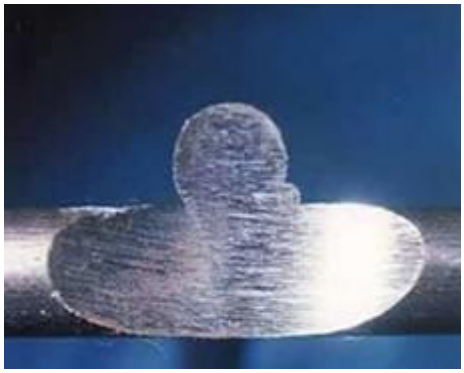
NO WASTAGES AT SITE

NO NEED FOR SITE CHECKING OF STEEL DUE TO MACHINE ACCURACY OF SPACING AND PRE-WEIGHED MESHES.

It only takes two workers to easily carry two 8'x 15' sheets of WWR, while rebar requires more expense to tie and place the material.

SUPERIOR BONDING BEHAVIOR

The rigid welded interconnections each capable of resisting upto 210 N/mm2 of shear stress in the larger of the welded wires ensure quick and complete stress transfer within 2 welded joints from the critical section and are primarily responsible for stress transfer from concrete to steel in the case of WWF ,as against only the peripheral surface area which is responsible for bonding to concrete with individual HYSD or Mild Steel bars.



This mechanical bonding provides for vastly superior aggregate interlock due to the closer spaced wires and more uniform and homogeneous stress distribution.

Welded Wire Fencing for Roads / Highways

Welded Wire Mesh Fencing in the form of Framed or Free standing Panels offer a very elegant and sturdy option for Fencing of Highway & Expressway alignment borders and medians.

Vis-à-vis alternatives such as Chain-Link Mesh , Welded Wire Mesh Fencing panels are much stronger and maintain their shape and flatness much longer. They can be provided in various Powder coated shades and can also be provided with Anti-climb features such as out-of plane corrugations at multiple levels.

They are extensively used in Europe, Australia, China and USA.

Temporary Welded Wire Barrier Panels

Welded Wire Barrier panels in the form of modular tube framed panels are an extreamely popular construction site barrier.

Sites for Pavement casting, excavation for bridge piers , site casting yards are as standard practise demarkated using such Welded Wire Barrier panels.

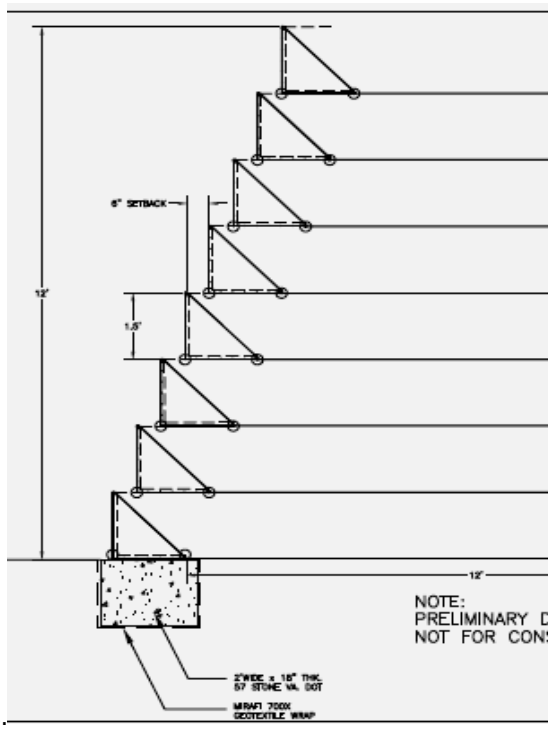
Vis-à-vis common alternatives such as GI Corrugated Sheets , Welded Wire Temporary barriers offer advantages of being Light-weight, reusable, Easy to install & dismantle.

Welded Wire Gabions for Road Embankments

The Rigid, Uniform and Neat Aesthetics of Welded Wire Gabions (Crates of Welded Wire mesh with Edges joined using Preformed Wire Spirals) lend themselves elegantly for quick , cheaper and elegant looking solutions for Embankments and slope side protection.

Welded Wire Walls for Road Side Slopes

Layers of Bent Welded Wire Mesh along with Hook Tie Bars in combination with Geo Textile Fabric offer the simple and elegant solution of Welded Wire Walls for Cut Slope sides.



The System has tremendous potential for enormous cost savings by making possible steep cut slopes. The savings due to reduced Earthwork Fills and reduction of

road alignment area lost has made this solution extremely popular in recent times.

Range of Sizes of WELDED WIRE MESH:

Welded Wire Mesh is generally made using Wires of diameters from 2.0 mm to 12.0 mm with spacings of 25mm to 400 mm in either direction in square or rectangular openings. Maximum width is generally 2.40 to 3.20 metres from transportation limitations.

The Wires used can be either Plain Hard Drawn Wires or Cold Rolled Ribbed / Deformed Wires. Physical Properties generally conform to IS:1566/1982 and IS:432(ii)/1982 with Min. UTS of 570 N/mm2 and Characteristic Strength of 480 N/mm2.

It can be supplied in form of easily transportable & storable continuous Rolls for flooring / coating applications

Else it is supplied in tailor made cut to size flat sheets for structural slab / wall panels/ Pavements.

Our Association Member Manufacturers across the country are committed to manufacture best quality of Welded Wire Mesh / Reinforcement for the Highways Applications.