SYNOPSIS
This article endeavors to clarify some of the facets of the use of joint reinforcement, pointing out what it is, what the code restrictions are, how it may be used, some examples of use, and some words of caution.

There is some difficulty in establishing some of the definite facts or truths in this field of joint reinforcement. Some items are actual or real facts, some are code statements or limitations, some are interpretations or misinterpretations of the code wording and intent.

However, we will try to clarify this by:
1. Indicating the code provisions.
2. Describing types of joint reinforcing that are most appropriate in our West Coast areas.
3. Discussing some examples of use.
4. Showing some details.

As a further limitation on this article, it must be emphasized that this report is too brief to cover all the facets of joint reinforcing.

We will try to cover only the major and probably most generally interesting items. The Uniform Building Code indicates the use of joint reinforcement in several sections e.g.
Section 2414. (b) Construction:

(b) Construction. The thickness of grout or mortar between masonry units and reinforcement shall be not less than one-fourth inch (1/4") except that one-fourth-inch (1/4") bars may be laid in horizontal mortar joints at least one-half inch (1/2") thick and steel wire reinforcement may be laid in horizontal mortar joints at least twice the thickness of the wire diameter.

This section definitely that wire type of reinforcement may be used in joints, and relates the size of wire to size of joint.

Another pertinent provision is the item of Section 2417.
that wire reinforcement may be used as joint reinforcement, and it may be used as temperature steel.

Also, it implies when it is there, either for temperature requirement or the anchorage requirement as in stack bond, it may be considered as part of the "arbitrary" reinforcement.

This paragraph, of course, also is referring to the reinforcement required for the stress since this is under a discussion of stress.

It is obviously reasonable, of course, to consider the steel in resisting the stress since it must resist the stress.

Also, in general, the joint reinforcement is wire and will develop much greater strength than the lower strength reinforcing bar as well as having better bond area.

Another use of joint reinforcement is not spelled out clearly in the codes and that is the reinforcement of grills or screen walls. These must be referred to as "non-bearing walls," and then would come under the requirement of Section 2419.

(a) General:

\[ \text{Figure 1.} \]

Bond Beam Unit

GROUTED

1-1/2 BAR FOR 4' HEIGHT
(3-8 BARS FOR 10' HEIGHT)

* BOLTS IN GROUTED UNITS AS REQUIRED

1-9/16 BAR IN GROUTED CELLS AT 48" O.C.
AT ENDS OF WALL & AROUND OPENINGS

\[ \text{Figure 2.} \]

Typical Wall Section

8" block shown, 6" is similar.

* For running bond use heavy duty, 24-gauge wire, at 18" O.C. (optional).

* For 4" high block use wall mesh at 9" O.C. & 1-1/4" max. in footing.

NOTE: Above provides for minimum temperature reinforcing. Additional reinforcing may be required for wind, seismic & other loads.

Ungrouted wall portion may be filled with vermiculite for insulation. See other details for bolts, special reinforcing, etc.

Wall Mesh as Temperature Steel

Concrete Block

Notbearing Walls

Sec. 2419. (a) General. Nonbearing walls may be constructed of any masonry as specified in this Chapter.

The most commonly accepted method of designing these screen walls is to recognize that horizontal joint reinforcement provides the tensile strength in the wall to resist the wind and earthquake loads spanning horizontally to supports, which may be pilasters, or steel supports, and then these supports span vertically to whatever other structural support is provided as indicated in Figure 1.

The joint reinforcement is assumed in the joint to work with the two adjacent portions of the grill unit to form a small beam limited by the size of the perimeter element of the grill units, and spanning horizontally as reinforced concrete beams.

A refinement of the design might be to consider also the benefit of the steel on the compression side, as well as the tension side. However, if one refines calculations for higher stress it may be necessary to consider the deflections as well, since they may become excessive for architectural reasons.

An example of the use of joint reinforcement for temperature reinforcement and for stack bond reinforcement is as shown in the concrete block detail drawings in Figure 2.

Incidentally, these concrete block details have been shown to be the most economical use of reinforcement commonly used in block walls.

In addition to being economical of construction there is the possibility of insta...
These were developed by Krahtle in Nilas or Fremont, California, and have been used very successfully to provide finish walls economically that are reinforced as structural walls.

The basic principle of the joint reinforcement is that the walls span horizontally from intersection to intersection, or from support to support.

The variable in this type construction has been proven by tests of Krahtle at Stanford, which showed that the values were much higher than might have been anticipated.

Another use of joint reinforcement that is very effective is that of the combination high lift glass ties and joint reinforcement recently developed for this newer type of construction. These so-called "ladder bars" (see Figure 6) place the reinforcement out in the mortar bed joints, and leave the interior glass space clear and free for easy pouring of grout. In addition, they space the ties properly, and also reinforce the exterior wythes.

Another use of joint reinforcing is that illustrated in the past and barreled panels which have been used in some areas. See Figure 7. The types of reinforcement used for joint reinforcing should be the so-called "ladd...
One of the advantages of using joint reinforcing is that the steel will begin to function much earlier with less cracking of the masonry than if the steel is at the center in a bond beam unit.

Another advantage of the use of the "ladder or truss" type of reinforcement is that bond is automatically developed to a high degree by the cross elements, developing what might be called "special anchorage" for assurance of the proper functioning of the reinforcement.