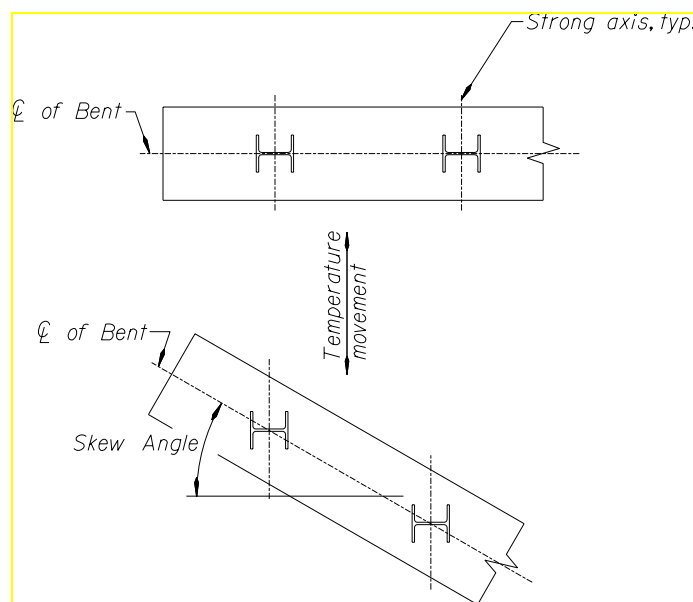


#### 1.1.8.4 End Bents – (continued)

1. When bed rock is a minimum of 12 feet from the bottom of the pile cap. Avoid using pre bored piles when bed rock is close to the surface, since this type of construction has been uneconomical.
2. When there is negligible potential of abutment settlement.
3. When the radius of horizontal curvature is greater than 1200 ft.
4. When the skew angle is less than 30 degrees.
5. When, for all service limit states, movement at the top of integral abutment piles does not exceed  $\pm 1.5$  inches from the undeflected position. The corresponding range of pile movement is therefore 3.0" if the superstructure is made integral with the piles at the mean annual temperature.

#### Design Guidelines for Integral Abutments:

1. Use a U-shaped abutment (wingwalls parallel to roadway alignment) if possible.
2. Use H-pile with strong axis in the direction of temperature movement See Figure 1.1.8.4A.



**Figure 1.1.8.4A**

3. Embed piles into the pile cap to develop moment fixity. See 1.1.5.4 Piling Details (1)