4. MEMBER DESIGN PROCEDURE

4.1 ANALOGUE

4.1.1 Analogue Joint Types

(a) Pitch Break Joint: A joint formed by the intersection of two non-parallel chords (see Fig 4.1.2).

(b) Heel Joint: A pitch break joint consisting of a non-vertical top chord and non-vertical bottom chord (see Fig 4.1.2).

(c) Splice Joint: A joint formed by two parallel and adjacent chords (see Fig 4.1.2.3).

(d) Lapped Joint: A joint formed by one end of a chord placed parallel and in contact with the adjacent chord along one of its edges (see Fig 4.1.2.4).

(e) Web Joint: A joint formed by one or more webs along one edge of a given chord (see Fig 4.1.2.5).

(f) Internal Joint: A joint formed by two web joints on opposite edges of a given chord such that their contact lengths overlap along the axis of the chord (see Fig 4.1.2.6).

(g) Tail Bearing Joint: A joint consisting of a single member going to a support. (see Fig 4.1.2.7)

(h) Top Chord Bearing Joint: A joint consisting of two or more members connecting at an exterior support. (see Fig 4.1.2.8)

(i) Bearing Joint: A joint where a bearing touches a chord. (see Fig 4.1.2)

4.1.2 Analogue Points

(a) Simple Analogue Point: An analogue point consisting of only one point formed by two uniquely identifiable lines.

(b) Compound Analogue Point: Analogue formed by two or more joints located at the same physical joint. (see Fig 4.1.2)

Except as in 4.1.3, analogue points shall be constructed as described in this section.

4.1.2.1 Heel Analogue: The heel analogue is a compound analogue consisting of three simple analogue points and three fictitious members. (see Fig 4.1.2.1.A-G)

a) First analogue point shall be determined as follows: Construct a vertical line at the end of TC or BC member whichever is shorter. (For Girder Heel, end of BC is always used to construct this line. See Fig 4.1.2.1.B) Find the intersection of the vertical line with the centrelines of the TC and BC. First heel analogue point shall be the lower of the two intersection points. This is the bearing point except as mentioned in (f) below.

b) The second heel analogue point shall be located at the intersection of the centreline of BC and a vertical at 75% of scarf length from the first analogue point. This vertical may not be more than 610mm (24") away from the first analogue point.

c) The third heel analogue point shall be located along the centreline of the top chord directly above the second heel analogue point.

d) Where the second and the third points are closer to the first point than 2", remove the second and third points and reduce the heel analogue to simple analogue.

e) In the case of a reinforcing member, a fourth point is required. The reinforcing member acts as the fourth member. The fourth point is the intersection of the centreline of the chord with a line perpendicular to the chord at a distance "d/2" where "d" is the depth of the chord. (see Fig 4.1.2.1.C & D)

f) In the case of a reinforcing web, the analogue is similar to the reinforcing member analogue with the following exceptions:

1. The fourth analogue point is the analogue point of the adjacent joint.
2. The fourth member is the reinforcing web.
3. The bearing point is the first analogue point only if any part of the bearing surface falls between the first and second analogue points inclusive. (see Fig 4.1.2.1.C & E) Short cantilever and high heel rules apply. (see Appendix "A")
4. If any part of the bearing surface falls past the second analogue point, the bearing point is at the second analogue point or a new bearing joint is introduced depending on the contact between the bearing surface and the scarf of the reinforcing web. (see Fig 4.1.2.1F) Short cantilever and high heel rules do not apply for this condition.
5. If the reinforcing web is not fully parallel and touching the chord, two separate joints are constructed; a heel joint and a web joint. (see Fig 4.1.2.1G)

4.1.2.2 Pitch Break Analogue Point: The pitch break analogue point shall be located along a plumb line through the outside edge intersection of the two chords. The analogue point shall have the same X coordinate as the plumb location and Y coordinate equal to the average Y coordinates formed by intersection points of the chord centrelines and the plumb line. (see Fig 4.1.2.2)

In case of a mitre cut pitch break, the analogue point is the intersection of the centrelines of the chords. (see Fig 4.1.2.2.A) For corner joints, the analogue point shall be the intersection of the centreline of the chord and a line at the end of the chord. (see Fig 4.1.2.2.B)

4.1.2.3 Splice Joint Analogue Point: Analogue point shall be the point located at the halfway point between the intersection points of the centrelines of the two chord members and the splice line. (see Fig 4.1.2.3)

4.1.2.4 Lapped Joint Analogue Point: Analogue point shall be the point located at the halfway point between the intersection points formed by the end cut and centrelines of the chord members on the two sides of the joint. (see Fig 4.1.2.4)

4.1.2.5 Web Joint Analogue Point: Analogue point shall be the intersection of the centrelines of chord and a line perpendicular to the chord passing through the centre of contact area between the webs and the chord. (see Fig 4.1.2. and Fig 4.1.2.5)

4.1.2.6 Internal Joint Analogue Point: Analogue point shall be the intersection of the centreline of chord and a perpendicular through the centre of common contact area, from both sides, between the webs and the chord. (see Fig 4.1.2.6)

4.1.2.7 Tail Bearing Joint Analogue Point: Analogue point shall be at the intersection of the centreline of the chord and a vertical through outside corner of support. For a vertical tail bearing, use the horizontal through the outside corner of bearing instead of the vertical. (see Fig 4.1.2.7)

4.1.2.8 Top Chord Bearing Joint: Except as in 4.1.2.9 the top chord bearing joint analogue is compound and consists of two points. The first point is the bearing point and it is the intersection of the centreline of the top chord with a vertical through the centreline of the required bearing size based on the clear span. The second point is the intersection of the centreline of the top chord with a vertical through the inside edge of the bearing. (see Fig 4.1.2.8)

4.1.2.9 Top Chord Bearing Joint With End Vertical and Block: The analogue of this point is compound and consists of three points and two ficitious members. The first joint is the bearing point and it is the intersection of a vertical through centreline of the required bearing size and surface of bearing. The second point is the intersection of a horizontal through the first point and the outside edge of end vertical. The third point is intersection of the centreline of the top chord and the outside edge of end vertical. (see Fig 4.1.2.9)

Top chord bearing joint guidelines in section 4.6.6 must be observed when using the analogue described in the above sections (4.1.2.8 and 4.1.2.9)

4.1.3 Analogue Modifications

4.1.3.1 Analogue points shall be constructed using the following heirarchy: Pitch break joints, then, most member to least member web joints. All other joints not mentioned here may be constructed in any order.

4.1.3.2 Analogue points for joints connected by a vertical web to joints of higher hierarchy shall be obtained as intersection of vertical through the higher hierarchy joint and the centreline of chord.

4.1.3.3 Two analogue points closer to each other than 2" (unprojected) shall be reduced to one joint located between the two original joints.