**Details for Attaching Metal Rail to End Post**

**Fixed**

1. **Face**
   - **Roadway**
   - **Elevation**

2. **Top View**
   - **End View (2:1 and Exp.)**
   - **Section H-H (Exp.)**
   - **Section H-H (Fix.)**

3. **Plan of Rail Post Spacings**

**Expansion**

1. **Face**
   - **Roadway**
   - **Elevation**

2. **Top View**
   - **End View (2:1 and Exp.)**
   - **Section H-H (Exp.)**
   - **Section H-H (Fix.)**

**Notes**

**Structural Concrete Insert**

The structural concrete insert assembly shall consist of the following components:

A. **Fixed**
   - 12mm plates shall be made from steel meeting the requirements of ASTM A572, Grade 50 and shall have a minimum length of threads of 28mm.

B. 19.05mm x 41mm bolt with washer. Bolt shall conform to the requirements of ASTM A307.
   - **Fixed**
   - **Expansion**

C. Head cap screws for rail attachment to angle shall conform to the requirements of ASTM F593. Stainless steel cap screws shall be centered in slots at 16mm.

D. Standard clamp bars (see metal rail sheet).

E. **Fixed**
   - **Expansion**

**Metal Rail to End Post Connection**

The metal rail to end post connection shall consist of the following components:

A. **Fixed**
   - **Expansion**

B. **Fixed**
   - **Expansion**

C. **Fixed**
   - **Expansion**

D. **Fixed**
   - **Expansion**

E. **Fixed**
   - **Expansion**

**Structural Concrete Insert**

The structural concrete insert assembly shall consist of the following components:

A. **Fixed**
   - **Expansion**

B. **Fixed**
   - **Expansion**

C. **Fixed**
   - **Expansion**

D. **Fixed**
   - **Expansion**

E. **Fixed**
   - **Expansion**

**Notes**

- The cost of the standard clamp bars and cap screws used in the metal rail to end post connection shall be included in the unit contract price bid for systems of 1 or 2 bar metal rails.

- The structural concrete insert assembly shall be assembled in the shop.

- The cost of the structural concrete insert assembly and the 12mm plates complete in place shall be included in the various pay items.

- The connection at this option may use an adhesive bonding system in lieu of the structural concrete insert. Adhesive bonding systems are used. The bonds of a 19.05mm x 41mm bolt with washer shall be made with an adhesive of a 19.05mm x 41mm bolt and 51mm washer. All specifications that apply to the 19.05mm x 41mm bolt shall apply to the 19.05mm x 41mm bolt. Field testing of the adhesive bonding system is not required.

- The contractor, at his option, may use an adhesive bonding system in lieu of the structural concrete insert.