# SEISMIC JOINT (TYPE I, FULL CHANNEL)

<table>
<thead>
<tr>
<th>XS Sheet Numbers</th>
<th>xs8-070-1 thru xs8-070-9</th>
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<tbody>
<tr>
<td><strong>Description of Component</strong></td>
<td>The Seismic Joint is based on a very simple concept and can be used for service and/or seismic demands. The Joint can accommodate large translational movements in the longitudinal and transverse directions, large rotations about the vertical axis, and limited vertical movements by allowing rotation about the transverse axis at its pinned end. Limited rotation about the longitudinal direction is also permitted due to flexible rubber washers at the pin. Unlike other joints systems, it shifts potential joint damage away from the critical joint opening, therefore preventing joint collapse and traffic disruption even after a major seismic event.</td>
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| **Standard Drawing Features** | The Seismic Joint is a steel plate sliding system and comes in a modular form. Each module covers a half traffic lane and is made of i) a Box/Channel Assembly, ii) the Support Plate, iii) the Deck Plate and iv) the elastomeric sealant. The Deck Plate spans the joint opening and slides over the Support Plate. The elastomeric sealant accommodates the service demands and it is considered a sacrificial element at seismic. Since the sealant is located away from the joint opening on the bridge deck, the joint is still able to carry traffic after a major seismic event and the sealant could be replaced at a later time. |

| **Design/General Notes** | - A minimum Deck Plate thickness $T_d$ equal to 1.5 inches is required for joint openings up to 2 feet at 70 °F. Similarly, $T_d$ equal to 2 inches is required for joint openings from 2 to 4 feet at 70 °F. For larger openings, contact the Joint Seals & Bearings Specialist  
- xs 8-070-8. The construction sequence is included. Any alternative construction sequence shall be reviewed and approved by the Engineer.  
- xs 8-07 0-9. An optional barrier detail is provided. The Engineer shall provide barrier details approved for the project.  
- To access the Channel Assembly remove the Cover plate from the bridge deck. |

| **Additional Drawings Needed to Complete PS&E** | xs8-070-1 Joint information Table must be filled by the Engineer.  
Joint opening @ 70 °F, $\min \alpha_{70}$ (in) = $\{(\text{SEE (seismic closing)}) + (\text{temp, rise})\}$  
For $\alpha_{70} < 24”$; $\min T_d=1.5”$ and for $24” \leq \alpha_{70} \leq 48”$; $\min T_d=2”$  
The thickness of the Cover plate, $T_c$, is equal to that of the deck plate $T_d$; $T_d=T_c$ |
### Deck plate length, \( L_d \) (in)

\[
L_d = (12'' \text{, channel seat}) + \text{(joint opening @70 °F)} + \text{(creep & shrinkage)} + \text{(temp. drop)} + \text{(SEE (seismic) opening)} + 4''\frac{1}{\cos(\text{skew})}
\]

Note that the Deck/Cover plates are made of a steel plate and are covered by a 3/8” thick multilayer polymer overlay.

### Support plate length, \( L_s \) (in)

\[
L_s = \text{(creep & shrinkage)} + \text{(temp. drop)} + \text{(SEE (seismic) opening)} + 4''\frac{1}{\cos(\text{skew})}
\]

To account for the skew at the joint location the joint capacity is increased by \( \frac{1}{\cos(\text{skew})} \).

### Restrictions on Use of Standard Drawings

- The Seismic Joint Type I Full Channel may be used when the maximum Service (non-seismic) Movement Rate (MR) demand is 4 inches.
- The access to the joint is performed by removing the Cover plate from the bridge deck.

### Special Considerations

- Seismic joints must be completely assembled at the fabrication plant including painting, application and curing of the multi-layer polymer overlay.
- Each joint module is assembled at its rest position (70 °F)
- The installation of the joint shall take place after 1) constructing concrete barriers or bike paths, 2) placing deck overlays and 3) installing utilities
- Each joint module is assembled at the shop, shipped and installed as one unit.

### Design Example

Given: skew = 25° at joint location, Temp. 3”/3”, Cr & Sh=2”, SEE=10”/12”,

Joint opening @ 70 °F, min \( a_{70} \) (in) = [(SEE (seismic) closing) + (temp, rise)] = 10” + 3” = 13”

Min \( T_d = 1 1/5'' \); because \( a_{70} < 24'' \)

\( T_c = T_d = 1 1/5'' \)
Deck plate length, $L_d$ (in) =\((12\text{"}, \text{channel seat}) + (\text{joint opening at } 70\text{ °F}) + (\text{creep & shrinkage}) + (\text{temp. drop}) + (\text{SEE (seismic opening)}) + 4\text{"}) \times (1/\cos(\text{skew})) = \{12\text{"} + 13\text{"} + 2\text{"} + 3\text{"} + 12\text{"} + 4\text{"}\} \times (1/\cos(25\text{°})) = 50.8\text{"}

The Deck/Cover plates are made of a 1.5\text{"} thick steel plate and are covered by a 3/8\text{"} thick multilayer polymer overlay.

Support plate length, $L_s$ (in) =\((\text{creep & shrinkage}) + (\text{temp. drop}) + (\text{SEE (seismic opening)}) + 4\text{"}) \times (1/\cos(\text{skew})) = \{2\text{"} + 3\text{"} + 12\text{"} + 4\text{"}\} \times (1/\cos(25\text{°})) = 23.2\text{"}