ECD Attachments

Example Connection Details

- **Attachment ECD1**: SDC A—Grouted Duct Connection.
  - Example bent cap details for grouted duct connection in SDC A
- **Attachment ECD2**: SDC A—Cap Pocket Connection.
  - Example bent cap details for cap pocket connection in SDC A
- **Attachment ECD3**: SDC B—Grouted Duct Connection
  - Example bent cap details for grouted duct connection in SDC B (minimum joint reinforcement used)
- **Attachment ECD4**: SDC B—Cap Pocket Connection.
  - Example bent cap details for cap pocket connection in SDC B (minimum joint reinforcement used)
- **Attachment ECD5**: SDCs B, C and D—Grouted Duct Connection.
  - Example bent cap details for grouted duct connection in SDCs B, C, and D (additional joint reinforcement required)
- **Attachment ECD6**: SDCs B, C and D—Cap Pocket Connection.
  - Example bent cap details for cap pocket connection in SDCs B, C, and D (additional joint reinforcement required)
- **Attachment ECD7**: SDCs B, C and D—Hybrid Connection.
  - Example bent cap details for hybrid connection in SDCs B, C, and D
- **Attachment ECD8**: SDCs B, C and D—Integral Connection.
  - Example bent cap details for integral connection in SDCs B, C, and D
Note:
1. First column hoop to be spaced from bedding layer hoop to maintain plastic hinge column hoop spacing within bedding layer.
2. For clarity, cast-in-place pier diaphragm and associated dowels anchored into bent cap are not shown.
3. For clarity, all bent cap reinforcement for limit states other than seismic is not shown.

NCHRP PROJECT 12-74
EXAMPLE PRECAST BENT CAP CONNECTION DETAILS

SACRAMENTO STATE

SDC A | SUPER | CONNECTION | CONTECTION DETAIL | GROUTED DUCT
---|---|---|---|---
NON-INTEGRAL

BY: JW/ML | CHK: MS/AW | DATE: 11/24/09 | SCALE: 1/4" = 1'-0" | SHEET: 1 of 1
Note:
1. First column hoop to be spaced from bedding layer hoop to maintain plastic hinge column hoop spacing within bedding layer.
2. For clarity, cast-in-place pier diaphragm and associated dowels anchored into bent cap are not shown.
3. For clarity, all bent cap reinforcement for limit states other than seismic is not shown.

NCHRP PROJECT 12-74
EXAMPLE PRECAST BENT CAP CONNECTION DETAILS

SDC A NON-INTEGRAL CONNECTION DETAIL CAP POCKET

BY: JW/ML CHK: MS/AW DATE: 11/24/09 SCALE: 1/4" = 1'-0" SHEET: 1 of 1
Note:
1. First column hoop to be spaced from bedding layer hoop to maintain plastic hinge column hoop spacing within bedding layer.
2. For clarity, cast-in-place pier diaphragm and associated dowels anchored into bent cap are not shown.
3. Detailing shown corresponds to principal tension in the joint less than 0.11 $f_y$.
4. For clarity, all bent cap reinforcement for limit states other than seismic is not shown.
Note:
1. First column hoop to be spaced from bedding layer hoop to maintain plastic hinge column hoop spacing within bedding layer.
2. For clarity, cast-in-place pier diaphragm and associated dowels anchored into bent cap are not shown.
3. Detailing shown corresponds to principal tension in the joint less than 0.11 $f_{c'}$.
4. For clarity, all bent cap reinforcement for limit states other than seismic is not shown.

NCHRP PROJECT 12-74
EXAMPLE PRECAST BENT CAP CONNECTION DETAILS

<table>
<thead>
<tr>
<th>SDC</th>
<th>SUPER</th>
<th>NON-INTEGRAL</th>
<th>CONNECTION DETAIL</th>
<th>CAP POCKET</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

BY: JW/ML  CHK: MS/AW  DATE: 11/24/09  SCALE: 1/4" = 1'-0"  SHEET: 1 of 1
Note:
1. First column hoop to be spaced from bedding layer hoop to maintain plastic hinge column hoop spacing within bedding layer.
2. For clarity, cast-in-place pier diaphragm and associated dowels anchored into bent cap are not shown.
3. Detailing shown corresponds to principal tension in the joint equal to 0.11 f', or greater.
4. For clarity, all bent cap reinforcement for limit states other than seismic is not shown.

NCHRP PROJECT 12-74
EXAMPLE PRECAST BENT CAP CONNECTION DETAILS
Note:
1. First column hoop to be spaced from bedding layer hoop to maintain plastic hinge column hoop spacing within bedding layer.
2. For clarity, cast-in-place pier diaphragm and associated dowels anchored into bent cap are not shown.
3. Detailing shown corresponds to principal tension in the joint equal to 0.11 $f_y$ or greater.
4. For clarity, all bent cap reinforcement for limit states other than seismic is not shown.
Notes:
1. First column hoop to be spaced from bedding layer hoop to maintain plastic hinge column hoop spacing.
2. For clarity, cast-in-place pier diaphragm and associated dowels are not shown.
3. Detailing shown corresponds to principal tension in the joint equal to or greater than 0.11 fpc.
4. For clarity, all bent cap reinforcement for limit states other than seismic is not shown.
5. Bedding layer grout shall have a minimum 3 lb per cy fraction of polypropylene fibers.
6. Column post-tensioning shall be unbonded. Use sheathed tendon or otherwise protect tendon from corrosion.

**NCHRP PROJECT 12-74**

**EXAMPLE PRECAST BENT CAP CONNECTION DETAILS**

**SDC B, C & D**  **NON-INTEGRAL**  **CONVENTIONAL HYBRID (High Joint Stress)**

**BY:** MJT  **CHK:** JR  **DATE:** 12/31/2009  **SCALE:** NTS  **SHEET:** 1 of 1
Notes:
1. First column hoop to be spaced from bedding layer hoop to maintain plastic hinge column hoop spacing
2. For clarity, cast-in-place pier diaphragm and associated dowels are not shown
3. Detailing shown corresponds to principal tension in the joint less than 0.11 ksf
4. For clarity, all bent cap reinforcement for limit states other than seismic is not shown
5. Bedding layer grout shall have a minimum 3 lb per cy fraction of polypropylene fibers
6. Column post-tensioning shall be unbonded. Use sheathed tendon or otherwise protect tendon from corrosion

---

EXAMPLE PRECAST BENT CAP CONNECTION DETAILS

SDC B, C & D  NON-INTEGRAL  CONVENTIONAL HYBRID (Low Joint Stress)

BY: MJT  CHK: JR  DATE: 12/31/2009  SCALE: NTS  SHEET: 1 of 1
See Sheet 3 for notes

NCHRP PROJECT 12-74

EXAMPLE PRECAST BENT CAP CONNECTION DETAILS

SEISMICITY: SDC B, C & D
SUPER. CONNECTION: INTEGRAL
CONNECTION DETAIL: POST-TENSIONED INTEGRAL SYSTEM

BY: MJT CHK JR DATE: 12/31/2009 SCALE: NTS SHEET: 2 of 6
GIRDER END DETAILING

Girder hanger reinf. for shear resistance with joint opening

Blockout for splicing of post-tensioning ducts

Closed hoops spaced with vertical shear reinf. throughout end block region (see note 6)

Limit of closed hoops
End block length
Minimum length = Ds

GIRDER END REGION

NOTES:
1. First column hoo to be spaced from bedding layer hoo to maintain plastic hinge column hoo spacing
2. For clarity, all bent cap reinforcement for limit states other than seismic not shown
3. Bedding layer and superstructure closure joint grout shall have a minimum 3 lb per cy fraction of polypropylene fibers
4. For superstructure closure joints greater than 3", joint shall be constructed of concrete and reinforced to ensure the integrity of the joint is maintained
5. Extend bent cap depth past bottom of girder to allow for splicing of continuity post-tensioning through bent cap
6. Closed hoops shall be the same size as conventional girder shear reinf. in end block

Blockout for splicing continuity duct

Intentionally roughen surface of face

Blockout for splicing post-tensioning ducts

NCHRP PROJECT 12-74
EXAMPLE PRECAST BENT CAP CONNECTION DETAILS

SEISMICITY: SDC B, C & D
SUPER. CONNECTION: INTEGRAL
CONNECTION DETAIL: POST-TENSIONED INTEGRAL SYSTEM

BY: MJT CHK JR DATE: 12/31/2009 SCALE: NTS SHEET: 3 of 6
Set precast segment using shims or friction collar

Grout bedding layer and corrugated ducts

Set middle segment using strong-back

Splice PT ducts and cast closure joint

Post-tension tendons and grout ducts

Remove strong-back after post-tensioning

NOTE:
Bent cap can be fabricated as single piece or as segmental member, as shown

NCHRP PROJECT 12-74
EXAMPLE PRECAST BENT CAP CONNECTION DETAILS

SEISMICITY: SDC B, C & D
STRENGTH: INTEGRAL
CONNECTION DETAIL: POST-TENSIONED INTEGRAL SYSTEM

BY: MJT CHK JR DATE: 12/31/2009 SCALE: NTS SHEET: 4 of 6
Set girders using strong-back system

Splice post-tensioning ducts and cast grout joint

Thread post-tensioning and perform stage 1 stressing

Thread continuity tendons and grout ducts

Construct deck

Thread post-tensioning and perform stage 2 stressing

NOTE:
1. Construction staging effects shall be explicitly considered in design of structure for all load cases
2. Deck system can be constructed as cast-in-place or with precast partial depth precast deck panels
NOTE:
Design strong back to provide adequate access to blockouts for splicing of post-tensioning ducts

- STRONG BACK EXAMPLE -