IT IS THE DESIGNER’S RESPONSIBILITY TO:

- Less than 120 feet for shipping reasons.
- Projecting reinforcing should be kept to less than 10 ft.
- Width: The maximum width of the element including any
  recommended maximum sizes of elements.
- Set the location of the longitudinal reinforcing steel.
- Require all projects to be precast concrete elements.
- All exposed edges and corners.

GENERAL NOTES

- Design precast concrete substructures in accordance with the latest edition of the AASHTO LRFD Bridge Design Specifications.
- Provide clear cover for reinforcing and concrete splices.
- All steel in substructures unless otherwise noted.
- Contractor may substitute alternate leveling devices provided they can produce a structure within the specified erection tolerances.
- All exposed edges and corners.
- Snow estimated shipping designs for all precast elements on contract drawings.

TOLERANCES

- All precast concrete elements to be fabricated to the specified tolerances within the following parameters:
  - Design and check the substructure elements for all anticipated loads.
  - Determine the geotechnical requirements of the site.

SPECIFICATIONS

- Design and check the substructure elements for all anticipated loads.
- Determine the geotechnical requirements of the site and place the applicable information on the plans.
- Place the materials in the correct locations.
- Ensure sufficient detail is added to the design plans to ensure proper fit-up of precast elements in the field.

SPECIAL MATERIALS AND EXCAVATIONS

- The details contained within these standard precast concrete elements can be used to form the basis for other details that may not be typically found in precast concrete elements.
- This is a list of special materials and excavations that are shown in these specific details.
  1. Corrugated metal pipe (CWP) is used where specified.
  2. Gritty soil foundations are used when specified.
  3. Concrete is used when specified.

CONCRETE NOTES

- General notes for precast concrete substructures.
- Through the use of this work, the designer should specify concrete strengths that will be used in the design of the substructures.

INDEX OF SHEETS

- 1  Precast Concrete Substructure Notes
- 2  Single Column Reinforcement
- 3  Multi-column Reinforcement
- 4  All Ties
- 5  Column Details
- 6  Precast/Post-Construction Details
- 7  Purpose Details
- 8  Cross Section Details
- 9  Material Details
- 10  Miscellaneous Details
- 11  Additional Elements
- 12  Armament and Wall Element Tolerances
GROUT TUBES (TYP.)
PRECAST SINGLE COLUMN BENT
GROUTED SPLICE COUPLER (TYP.)
SETTING CAST-IN-PLACE HENDER Hệ LUGS AND SOLID PLATE ON SHEET 12. PRECAST BENT CAP
PIER TO FACE OF PIER  SLOPE 1% AWAY FROM  >
PRECAST FOOTING
PRECAST PARTIAL FOOTING (TYP.)
SEISMIC CAST-IN-PLACE TOP OF COLUMN
COLUMN
PRECAST
NOTE: PIER CAP TOP CAN BE MODIFIED TO SUITE STANDARD.
SEE DETAIL, SHEET 6
NOTES
1. ERECTION TOLERANCE ON ELEVATION ± 1/4".
2. ERECTION TO MATCH TO DIAM. OF COLUMN.
3. COLUMN BARS MRP SHOWED FOR CLARIITY.
4. DETAIL BAR EXTENSIONS TO THE LIMITS OF THE BENT CAPS.
5. DETAIL BARS TO BE EXTENDED AS SHOWN IN THE SHEET DETAIL.
6. DETAIL BARS TO BE ERECTED IN THE REINFORCEMENT CONDITIONS.
7. ERECTION TO BE SET TO A TOLERANCE OF 1/4" IN 4 FEET.
8. USE CAST IN PLACE EXTENSIONS TO KEEP SIZE AND WEIGHT OF ERECTION TO SUITE NATIONAL MWP.
SLOPE 1% AWAY FROM
> OF PIER TO FACE
GROUT TUBES
(TYP.)
OF PIER CAP
SET COLUMN IN GROUT BED (TYP.)
GROUTED SPLICE COUPLER (TYP.)
SEE NOTE 2
COLUMN
PRECAST
ELEVATION. SET CAP
PRECAST FOOTING
BENT CAP
PRECAST
GROUT TUBES
IF REQUIRED
CIP CLOSURE POUR
PIER BENT DETAILS
SCHEMATIC
WORKING LINE
PRECAST FOOTING
(BENT)
TOP OF COLUMN
(TYP.)
PRECAST
FOOTING
(BENT)
TOP OF BEAM SEAT
(TYP.)
PRECAST
FOOTING
(BENT)
TOP OF COLUMN
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REINFORCEMENT AND CASTING A CLOSURE POUR, SIMILAR TO DETAILS ON SHEET 7.
SHEAR BLOCK. LOCATION
CAST-IN-PLACE SEISMIC
COLUMN
PRECAST
ELEVATION
BE OMITTED
BEVEL MAY
BE ADDED
TO FOOTING
SEE NOTE 2
TOP OF COLUMN
SEE NOTE 1 (TYP.)
TOP OF BEAM SEAT
(TYP.)
TOP OF FOOTING
SEE NOTE 1
TOP OF BENT CAP
BE OMITTED
REINFORCEMENT MAY BE PLACED BETWEEN OTHER
BEAMS IF REINFORCING CONFLICTS ARISE.
FOOTINGS MAY BE MADE CONTINUOUS BY EXTENDING
TERMINATION POUR TO FORM A COMMON FOOTING.
A COMMON FOOTING.
LIMITS AND TO CONNECT INDIVIDUAL FOOTINGS TO FORM
OF FOOTING WITHIN THE RECOMMENDED MAXIMUM SIZE
6.
ERECTION TOLERANCE ¨ "
ERECTION TOLERANCE ¨ "
ERECTION TOLERANCE ¨ "
SLOPE IS ONLY SHOWN IF VIEW CAP
DRAW SEAT SEE NOTE 2
PRECAST BENT CAP
GROUTED SPLICE COUPLER (TYP.)
GROUT TUBES
(TYP.)
COLUMN
PRECAST
ELEVATION.
SET CAP
PRECAST FOOTING
BENT CAP
PRECAST
GROUT TUBES
TOP OF COLUMN
(TYP.)
TOP OF BEAM SEAT
(TYP.)
PRECAST
FOOTING
(BENT)
TOP OF COLUMN
SEE NOTE 1 (TYP.)
PRECAST FOOTING
(BENT)
TOP OF BEAM SEAT
(TYP.)
PRECAST
FOOTING
(BENT)
NOTES
1. ERECTION TOLERANCE ON ELEVATION ¨ ".
2. ERECTION TOLERANCE ON SEAM SEAT ELEVATION ¨ ".
3. COLUMN SHEAR REINFORCEMENT NOT SHOWN FOR CLARITY.
4. FOOTINGS MAY BE MADE CONTINUOUS BY EXTENDING TERMINATION POUR TO FORM A COMMON FOOTING.
5. SEISMIC KEEPER BLOCK MAY BE PLACED BETWEEN OTHER BEAMS IF REINFORCING CONFLICTS ARISE.
6. FOOTINGS TO BE SET TO A TOLERANCE OF ¨ " IN 4 FEET.
7. USE CAST IN PLACE EXTENSIONS TO KEEP SIZE AND WEIGHT OF FOOTINGS WITHIN THE RECOMMENDED MAXIMUM SIZE.
8. A LEVEL PIER CAP IS PROVIDED TO REDUCE FOUNDATION COSTS. FOUNDATION CAPS ARE IDENTICAL. SEE DETAILS ON
SHEET 6.
NOTE: GROUTED SPLICE COUPLERS AND WALL REINFORCING NOT SHOWN.

ERECTION TOLERANCE " 

OPTION 2: GROUTED FOOTING KEYS + " (TYP)

TOP OF WALL PANEL

FOOTING DOWEL TOLERANCE (SEE NOTE 9)

3'-0" MIN.

NOTE 9

SEE NOTE 1
1. OCTAGONAL CROSS SECTIONS ARE PREFERRED DUE TO EASE OF FABRICATION.

2. SHEAR REINFORCEMENT USED FOR TRANSVERSE COLUMN CONFINEMENT.

3. IT IS RECOMMENDED TO PLACE THE FIRST GROUTED SPLICE COUPLER IN THE COLUMN AXIS LINE TO FACILITATE EASE OF CONSTRUCTION.

4. SOME GROUTED SPLICE COUPLER MANUFACTURERS ALLOW THE USE OF OVERSIZE COUPLERS IN ORDER TO INCREASE THE SETTING TOLERANCES FOR THE ELEMENTS. THIS SHOULD ONLY BE ALLOWED IF SUPPORTED BY TEST DATA.

**GROUTED SPLICE COUPLER CONNECTION SEQUENCE**

1. FOLLOW THE WRITTEN INSTALLATION PROCEDURES OF THE COUPLER MANUFACTURER. THE FOLLOWING ARE GENERAL PROCEDURES THAT APPLY TO MOST COUPLER MANUFACTURERS.

2. PLACE ONE EXTRA GROUTED SPLICE COUPLER, THESE REQUIREMENTS SHALL BE CHECKED DURING THE DEVELOPMENT OF SHOP DRAWINGS.

**GROUTED SPLICE COUPLER DIMENSIONS**

<table>
<thead>
<tr>
<th>BAR</th>
<th>OUTSIDE DIAMETER</th>
<th>LENGTH OF COUPLER</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>7.000</td>
<td>28.25</td>
</tr>
<tr>
<td>6</td>
<td>8.000</td>
<td>28.25</td>
</tr>
<tr>
<td>8</td>
<td>10.000</td>
<td>35.31</td>
</tr>
<tr>
<td>10</td>
<td>12.000</td>
<td>35.31</td>
</tr>
<tr>
<td>12</td>
<td>14.000</td>
<td>42.57</td>
</tr>
<tr>
<td>14</td>
<td>16.000</td>
<td>42.57</td>
</tr>
<tr>
<td>16</td>
<td>18.000</td>
<td>49.73</td>
</tr>
<tr>
<td>18</td>
<td>20.000</td>
<td>49.73</td>
</tr>
</tbody>
</table>

USE THIS TABLE FOR DETAILING OF ELEMNT REINFORCEMENT INCLUDING SPACING, COVER, AND EMBEDMENT LENGTHS. IN MOST CASES, THESE DIMENSIONS WILL WORK FOR OVERSIZED COUPERS. IF THE FABRICATOR WANTS TO OVERSIZE A COUPLER, THEIR REQUIREMENTS SHALL BE CHECKED DURING THE DEVELOPMENT OF SHOP DRAWINGS.

**SOURCES:** MATERIAL SPECIFICATIONS FROM THE THREE MOST COMMON SUPPLIERS (LAC-BRIDGE, DAYTON SUPERIOR, LENTON-ERICO, DAYTON SUPERIOR).

**NOTES:**

1. OCTAGONAL CROSS SECTIONS ARE PREFERRED DUE TO EASE OF FABRICATION.

2. SHEAR REINFORCEMENT USED FOR TRANSVERSE COLUMN CONFINEMENT.

3. IT IS RECOMMENDED TO PLACE THE FIRST GROUTED SPLICE COUPLER IN THE COLUMN AXIS LINE TO FACILITATE EASE OF CONSTRUCTION.

4. SOME GROUTED SPLICE COUPLER MANUFACTURERS ALLOW THE USE OF OVERSIZE COUPLERS IN ORDER TO INCREASE THE SETTING TOLERANCES FOR THE ELEMENTS. THIS SHOULD ONLY BE ALLOWED IF SUPPORTED BY TEST DATA.
1. Adjust shim stack height to control elevation.
2. Add corrosion bars below bar required and cut to proper height after installation of upper element.
3. Column to column splice shown. This detail may be used for tall columns. Column to footing details similar.
4. Shear reinforcement to be spirals or hoops with resistance duty basis.
5. See sheet 5 for grouted splice coupler connection sequence.
**PRECAST FOOTING NOTES**

1. Cast-in-place extensions should be provided to extend footing to required depth in accordance with the footing and pile pocket details.

2. If total width of footing exceeds pile pocket width, extend footing beyond pile perimeter.

3. Footing reinforcement should extend to the limits of the footing if possible. If necessary, extend footing to meet minimum clearance or sheathing limits.

4. Cast-in-place extensions may be used to extend footing within the recommended maximum height limits.

5. Partial precast footings may be used with diaphragm reinforcement.

6. Partial precast footings may be used to connect adjacent footings to form a continuous footing.

7. Steel plates should be placed directly under the footing unless all reinforcing conflicts can be resolved.

8. In most cases, a pile should not be placed directly below the column unless all reinforcing conflicts can be resolved.

9. Use grease or oil nut & bolt threads to facilitate leveling and removal.

10. Reinforcement bars are weldable ASTM A706.

**FOOTING INSTALLATION DETAIL**

1. Alternate leveling devices may be substituted with the approval of the engineer.

2. Steel plates on the inside of footings are necessary. Steel plates to be galvanized according to ASTM A153 and coated with a minimum of 100 galvanized steel to a minimum of 100 galvanized steel.

3. Reinforcement bars are weldable ASTM A706.

4. Grease or oil nut & bolt threads to facilitate leveling and removal.

5. Bolt may be removed after the flexible fill has set.

**NOTE:** Use this option for footings with closely spaced piles.

**CONSTRUCTION NOTES:**

1. Prepare diaphragm and install piles (if pile-supported).

2. Set steel plates.

3. Install footing reinforcement. Bars may be placed prior to setting column or wall if adequate clearances are provided. Nosed columnar bars may be preferred for this option.

4. Cast and pour footing.

5. Remove bracing.
INTEGRAL ABUTMENT

INTEGRAL WINGWALL
(TYP.)

BACKWALL (TYP.)

PRECAST INTEGRAL VOID (TYP.)

PILE (TYP.)

PRECAST ABUTMENT STEM

INTEGRAL ABUTMENT NOTES:

SHEAR KEYS. MATCH CASTING OF STEM ELEMENTS SHOULD BE USED FOR

7. TRANSVERSE POST TENSIONING MAY BE USED IN LIEU OF THE VERTICAL
ABUTMENT STEM ASSUMING FIXITY AT THE SUPERSTRUCTURE CONNECTION.

SHEAR KEYS. VERTICAL BARS SHOULD BE USED AS THE MAIN REINFORCEMENT

6. DESIGN REINFORCING IN STEMS ASSUMING A PINNED JOINT AT THE VERTICAL
CONSIDER CLOSURE POUR MOMENT CONNECTION BETWEEN SINGLE PILE
ELEMENT UNLESS REQUIRED BY DESIGN.

5. USE TWO PILES PER ABUTMENT CAP ELEMENT. IF THIS IS NOT POSSIBLE,
DO NOT COMBINE DIFFERENT FOUNDATIONS ON ANY ONE SUBSTRUCTURE

2. DIFFERENT FOUNDATIONS ARE SHOWN TO DEPICT DIFFERENT DESIGNS.

INTEGRAL ABUTMENT ELEVATION

INTEGRAL ABUTMENT PLAN

NEXT BEAMS

PRECAST ABUTMENT STEM

TOP OF BACKWALL (TYP.)

PILE OR DRILLED SHIFT

INTEGRAL ABUTMENT SECTION:

MAIN ABUTMENT TYP.

BACKWALL (TYP.)

PIPE VOID (TYP.)

CORRUGATED METAL

WALL SEGMENT CAN BE CAST INTEGRALLY WITH ABUTMENT
REQUIREMENTS PERMIT

NOTE: 1. THIS DETAIL IS BASED ON DETAILS FROM SEVERAL STATES.
2. ALL REINFORCEMENT NOT SHOWN FOR CLARITY.
3. BACKWALL MAY BE PRECAST INTEGRALLY WITH THE ABUTMENT
   STEM.
4. MECHANICAL BAR SPLICES MAY BE USED FOR BARS
   CONNECTING TO PILE OR DRILLED SHIFT.
5. SHEAR KEYS TO BE USED WITH PRECAST BACKWALLS ONLY.
6. COUPLERS TO BE USED WITH PRECAST BACKWALLS ONLY.

2. DIFFERENT FOUNDATIONS ARE SHOWN TO DEPICT DIFFERENT DESIGNS.

PRECAST ABUTMENT STEM
FILL VOID WITH CONCRETE
PRECAST ABUTMENT STEM
CORRUGATED METAL PIPE VOID
PRECAST BACKWALL
PRECAST ABUTMENT STEM
PRECAST INTEGRAL STEM IF SHIPPING AND HANDLING

PRECAST INTEGRAL

NEXT BEAMS

INTEGRAL ABUTMENT ELEVATION

INTEGRAL ABUTMENT PLAN

NEXT BEAMS

PRECAST ABUTMENT STEM

TOP OF BACKWALL (TYP.)

PILE OR DRILLED SHIFT

INTEGRAL ABUTMENT SECTION:

MAIN ABUTMENT TYP.

BACKWALL (TYP.)

PIPE VOID (TYP.)

CORRUGATED METAL

WALL SEGMENT CAN BE CAST INTEGRALLY WITH ABUTMENT
REQUIREMENTS PERMIT

NOTE: 1. THIS DETAIL IS BASED ON DETAILS FROM SEVERAL STATES.
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PRECAST ABUTMENT STEM
FILL VOID WITH CONCRETE
PRECAST ABUTMENT STEM
CORRUGATED METAL PIPE VOID
PRECAST BACKWALL
PRECAST ABUTMENT STEM
PRECAST INTEGRAL STEM IF SHIPPING AND HANDLING

PRECAST INTEGRAL

NEXT BEAMS

INTEGRAL ABUTMENT ELEVATION

INTEGRAL ABUTMENT PLAN

NEXT BEAMS

PRECAST ABUTMENT STEM

TOP OF BACKWALL (TYP.)

PILE OR DRILLED SHIFT

INTEGRAL ABUTMENT SECTION:

MAIN ABUTMENT TYP.

BACKWALL (TYP.)

PIPE VOID (TYP.)

CORRUGATED METAL

WALL SEGMENT CAN BE CAST INTEGRALLY WITH ABUTMENT
REQUIREMENTS PERMIT

NOTE: 1. THIS DETAIL IS BASED ON DETAILS FROM SEVERAL STATES.
2. ALL REINFORCEMENT NOT SHOWN FOR CLARITY.
3. BACKWALL MAY BE PRECAST INTEGRALLY WITH THE ABUTMENT
   STEM.
4. MECHANICAL BAR SPLICES MAY BE USED FOR BARS
   CONNECTING TO PILE OR DRILLED SHIFT.
5. SHEAR KEYS TO BE USED WITH PRECAST BACKWALLS ONLY.
6. COUPLERS TO BE USED WITH PRECAST BACKWALLS ONLY.

2. DIFFERENT FOUNDATIONS ARE SHOWN TO DEPICT DIFFERENT DESIGNS.

PRECAST ABUTMENT STEM
FILL VOID WITH CONCRETE
PRECAST ABUTMENT STEM
CORRUGATED METAL PIPE VOID
PRECAST BACKWALL
PRECAST ABUTMENT STEM
PRECAST INTEGRAL STEM IF SHIPPING AND HANDLING

PRECAST INTEGRAL
1. Abutment connections not shown for clarity.
2. Different foundations are shown to depict different designs. Do not combine different foundations in any one substructure element unless designed by the designer.
3. Larger voids may be used with pipe sleeves to reduce weight.
4. Wall panels connected to footings using grouted splice couplers.
5. Footing layout and detailing similar to wall pied. See Sheet 4.
GROUTED SPLICE COUPLER

NOTES:
1. USE WOODEN TEMPLATES AND JIGS FOR THE LOCATION OF REINFORCEMENT AND GROUTED SPLICE COUPLER PLACEMENT WITHIN THE ELEMENTS TO CONTROL CRITICAL DIMENSION "C".
2. CONSULT MANUFACTURER OF THE GROUTED SPLICE COUPLER FOR PROPER CRITICAL DIMENSIONS "B" AND "C" AND FOR TOLERANCE ON THESE DIMENSIONS.
3. BEFORE EXECUTING GROUTED SPLICE COUPLER ASSEMBLIES, ALWAYS SEEK INSTALLATION RECOMMENDATIONS FROM THE MANUFACTURER OF THE GROUTED SPLICE COUPLER JOINT.

GROUTED SPLICE COUPLER DETAILS

- SPLICE COUPLER USED.
- CONSULT MANUFACTURER OF THE GROUTED SPLICE COUPLER FOR PROPER CRITICAL DIMENSIONS "B" AND "C" AND FOR TOLERANCE ON THESE DIMENSIONS.
- BEFORE EXECUTING GROUTED SPLICE COUPLER ASSEMBLIES, ALWAYS SEEK INSTALLATION RECOMMENDATIONS FROM THE MANUFACTURER OF THE GROUTED SPLICE COUPLER JOINT.

GROUTED SPLICE COUPLER TOLERANCES

| A | SKIN PACK HEIGHT | 1/4" ± 1/8" |
| B | DOWEL HEIGHT | CONSULT MANUFACTURER |
| C | LOCATION OF COLUMN REINF OR COLUMN ASSEMLY MEASURED FROM A COMMON REFERENCE POINT | ± 1/4" |
| D | GAP BETWEEN DOWEL AND COLUMN REINF | CONSULT MANUFACTURER |

WALL PANEL FABRICATION TOLERANCES

| A | LENGTH | ± 1/8" |
| B | WIDTH (OVERTALL) | ± 1/8" |
| C | DEPTH (OVERTALL) | ± 1/8" |
| D | VARIATION FROM SPECIFIED PLAN AND SLOPINESS OF PANEL | 1/4" IN 10 FEET |
| E | VARIATION FROM SPECIFIED ELEVATION AND SLOPINESS OF PANEL | 1/4" IN 10 FEET |
| F | LOCATION OF GROUTED SPLICE COUPLER | ± 1/4" |
| G | LOCATION OF BLOCKOUT FOR PILES OR VOIDS | ± 1/4" |
| H | LOCAL SMOOTHNESS OF ANY SURFACE | ± 1/4" |

WALL PANEL ERECTION TOLERANCES

- TOP ELEVATION FROM NOMINAL MAXIMUM HIGH MAXIMUM LOW MAXIMUM HIGH MAXIMUM LOW
- TOP ELEVATION FROM NOMINAL MAXIMUM HIGH MAXIMUM LOW MAXIMUM HIGH MAXIMUM LOW
- MAXIMUM PLUMB VARIATION OVER HEIGHT OF PANEL |
- PLUMB IN ANY 10 FEET OF PANEL HEIGHT |