DESIGNER NOTES

All bar spacing to be based on CLASS C - DESIGN CAP SPACING UNLESS OTHERWISE SHOWN.

Optional keyed construction joints in shafts may be used if provided. One may use normal water elevation. Optional keyed construction joints in shafts may be provided if they are greater than 25'-0" without consideration of construction joints in the design. Optional keyed construction joints shall be formed by beveled keyway at depth of 1/3 thickness of shaft x 4" max. less than length of shaft.

A standard shaft taper of ice may be used at the option of the design engineer's discretion only.

The following rules apply when the vertical reinforcement is less than one member of a cross section.

Normal water elevation is provided for beam seats of normal caps that are 4 inches or more above the lowest beam seat.

When the bottom of the girder slopes more than 1%.

For girders with 1" elastomeric bearing pads, beam seats may be placed at the option of the design engineer. (Lateral direction only)

Shaft may be tapered in one or two directions when required for structural reasons.

Normal water elevation shall be level except for the two cases listed below:

1. For girders with restricted bearing pads, the bottom of the girder slope more than 1%.

2. For concrete slab superstructures make the top of cap parallel to grade, see standard 12.02.

Beam seats may be used to anchor steel at the option of the design engineer's discretion.

See standard 12.02 for additional reinforcement and steel in bearing areas for beam seats of normal caps that are 4 inches or more above the lowest beam seat.

The maximum shaft cross-section shall be provided only when the vertical reinforcement is less than one member of a cross section.

See standard 12.02 for normal water elevation to sides of cap and to adjacent bearing seats.

Cross cut bar steel down to top of footings in all parts under expansion joints and on all parts of grade separations.

Increase the dimension if necessary to prevent battering steel from contact. Steel cut off at grade level and placed at least 4 feet above grade level for foundation continuity and to facilitate installation of bearing seats.

Increase the dimension if necessary to facilitate continuous seating. If the shaft is greater than 10" at the top of shaft, the cross section of the shaft may be increased to meet structural requirements. Place footing, dowels, and footing steel to be fully developed.

Normal water elevation shall be provided at the top of footing to be used to anchor steel at the option of the design engineer. (Lateral direction only)

Maximum spacing between unrestrained vertical bars and rebar increases across horizontal bar is 24 inches.

PLAN NOTES

* The bar splices at the optional keyed construction joints may be eliminated whether or not the joint is utilized. Payment will be for the actual bars installed.

ELEVATION

Levels of station

PLAN

ALTERNATE SECTION P1

SECTION P1

HUMMERHEAD PIER

BUREAU OF STRUCTURES

APPROVED

Bill Oliva

DATE: 1-15

STANDARD: 13.02
PILING 2" PER FT.

BATTER EXTERIOR ELEVATION

LOOKING UP STATION

PILE SPA. (MEASURED AT BOTTOM OF CAP)

PIER SET HAS TAKEN PLACE. IS POURED BUT BEFORE INITIAL MAY BE PLACED AFTER CONC. #5 BARS @ 1'-0" (2'-0" LONG) PLACE AS SHOWN

DESIGNER notes

SECTION A-A

END VIEW

STREAMBED STABLE

PLAN

OF STRUCTURE

SYM. ABOUT "OF BEAM SEATS GIVE ELEVATIONS ROADWAY REF. LINE SKEW ANGLE " OF PIER DISPLACE TO MISS PILING #5 STIRRUPS @ 1'-0"

ENGINEER'S DISCRETION.

BEAM SEATS MAY BE ANGLED TO MATCH SKEW AT THE DESIGN ENGINEER'S DISCRETION.

SEE STANDARD 13.04 FOR ADDITIONAL REINFORCING STEEL IN BEARING AREA FOR BEAM SEATS OF NON-SLOPED CAPS THAT ARE 2' OR MORE ABOVE LOWEST BEAM SEAT.

1. FOR CONCRETE SLAB SUPERSTRUCTURES MAKE THE TOP OF THE CAP PARALLEL TO GRADE. SEE STANDARD 18.01.

2. FOR GIRDERS WITH " ELASTOMERIC BEARING PADS USE MINIMUM WALL THICKNESS OF 3".

ENGINEER'S DISCRETION.

ENGINEER'S DISCRETION.

SEE STANDARD 12.09 FOR ALTERNATE CONSTRUCTION JOINTS.

SEE STANDARD 12.09 FOR ALTERNATE CONSTRUCTION JOINTS.

SAME AREA AS PER STRUCTURE

MAX. LENGTH OF A SINGLE POUR = 65 FT. WHEN REQ'D USE A KEYED CONCRETE JOINT BETWEEN PILES.

SEE STANDARD 13.01 FOR CRITERIA STANDARD 13.02 FOR DETAIL.

MIN. SPA. = 3'-0", MAX. SPA. = 8'-0" (MIN. OF 5 PILES)

BEAM SEATS ARE 4" OR MORE ABOVE LOWEST BEAM SEAT.

IN BEARING AREA FOR BEAM SEATS OF NON-SLOPED CAPS THAT ARE 2' OR MORE ABOVE LOWEST BEAM SEAT.

BEAM SEATS MAY BE ANGLED TO MATCH SKEW AT THE DESIGN ENGINEER'S DISCRETION.

SEE STANDARD 13.01.

WHEN THE BOTTOM OF THE GIRDER'S SLOPE MORE THAN 1%.

BEVELED 2"X6" KEYWAY. SEE CONCRETE JT. FORMED BY SURFACED 3'-6" COATED LAP (1'-5" UNCOATED LAP

ENGINEER'S DISCRETION.

ENGINEER'S DISCRETION.

SEE STANDARD 13.01.

WHEN THE BOTTOM OF THE GIRDER'S SLOPE MORE THAN 1%.

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ENGINEER'S DISCRETION.

ENGINEER'S DISCRETION.

SEE STANDARD 13.01.
**SEAT DETAILS**

**SLOPING BEAM**

**SEAT DETAILS**

**MULTI-COLUMNED PIER WITH RECTANGULAR COLUMNS**

**DESIGNER NOTES**

All bar splices to be based on "class c" tension lap splice unless otherwise shown.

Slabs top of column to match cap when the bottom of the cap is sloped. Typical system of cap reinforcement to clear vertical concrete reinforcement.

Laps may be more than 42" on piles if the extra width is necessary to satisfy the minimum edge distance criteria adjacent to bearings.

Bearing seat areas will be level except for the two cases below:

1. Formed concrete with elastomeric bearing pads where the bottom of the cap is more than 11/2", see standard 12.09.
2. When a cap is used for concrete slab superstructures, the top of the cap parallels the grade, see standard 12.1.

Beam seats may be angled to match the design engineer's direction.

See standard 12.02 for additional reinforcing steel in bearing areas for beam seats of nonlevelled caps that are 4' or more above a level beam seat.

Prestress bar steel downs to top of footings on all exterior column anchors and on all pile caps at grade.

2" stirrups in each column anchor plate required. Typical system of cap reinforcement to clear vertical concrete reinforcement. Maximum required bar steel is detailed in lengths as required for constructibility.

Maximum length of single pour = 65'-0" when required. Place keyed vertical construction joint near point of deadload contraflexure (see standard 12.09 for alternate construction joint details).

Span structures and for all concrete slab column when cap is sloping give elevations at center of column height.

Beam seats give elevation of footing length.

Given column heights give elevations at level (see standard 13.01).

SEAT DETAILS

BOLTS ON STEEL

TO CLEAR ANCHOR

DIMENSION BARS

HORIZONTAL BARS

EDGE OF NEAREST PIER

ANCHOR BOLTS

IN FIELD TO MISS SPACE STIRRUPS

 tied longit. bars are minimum spaced at 6"

#5 U-BARS

LONGIT. BARS ARE MINIMUM SPACED AT 6"

2'-4" CL.

2'-7" CL.

2'-0" CL.

1" BEVEL

MAXIMUM LENGTH OF SINGLE POUR = 65'-0" WHEN REQUIRED

PLACE KEYED VERTICAL CONSTRUCTION JOINT NEAR POINT OF DEADLOAD CONTRAFLUXURE

SEE STANDARD 12.09 FOR ALTERNATE CONSTRUCTION JOINT DETAILS

MAXIMUM LENGTH OF SINGLE POUR = 65'-0" WHEN REQUIRED

PLACE KEYED VERTICAL CONSTRUCTION JOINT NEAR POINT OF DEADLOAD CONTRAFLUXURE

SEE STANDARD 12.09 FOR ALTERNATE CONSTRUCTION JOINT DETAILS

STANDARD 13.07

APPROVED:

Bill Oliva

DATE:

1-14

STANDARD 13.07

MULTI-COLUMNED PIER WITH RECTANGULAR COLUMNS

BUREAU OF STRUCTURES
**Designer Notes**

Provide 4" min. clearance between anchor bolts and reinforcement.

For pier caps up to 3'-6" wide, provide at least one 3" min. clearance between reinforcement bars for concrete placement by tremie and for vibration. For caps greater than 3'-6" wide, provide at least two such gaps.

Show anchors locations on pier cap sheets, abutment reinforcement layout similar to pier cap reinforcement details.

**Note**

Displace transverse stirrup bars as needed to provide 4" min. clearance between anchor bolts and reinforcement.

Provide adequate clearance for post-installed anchors.

**Plan**

Provide multiple layers of bar steel to avoid spaces that are too tight. Bundled bars may be used. Avoid lapping bundled bars.

Provide reinforcement necessary to support and reinforce.

**Section Thru Pier Cap**

**Approved:** Bill Oliva

**Date:** 1-17