## TYPICAL PLAN

**Note**
Negative values for "$F_L$" or "$F_R$" indicates that corner of top slab extends beyond end of girder web.

Flare #3 transverse bars @ 6" max. ctrs. as req'd

12" min.

#4 "U" bars @ 12" max. each end of girder

"$F_L$" "$E_L$" "$E_R$" "$F_R$"

| Girder Type | min. # "a" spaces |
|---|---|
| BT48 | 4 |
| BT60 | 7 |
| BT72 | 10 |
| BT84 | 13 |

Use staggered diaphragm beams when θ < 65°. Provide 4 conc. inserts in each girder web at each diaphragm beam.

See Deck Plans for diaphragm beams

End beam per project plans

Pour this part of flange for exterior side of exterior girders unless shown otherwise on detail plans, typ. each end

2" dia. vent holes at diaphragm beams.

Use in line diaphragm beams when θ ≥ 65°. Provide 4 conc. inserts* in exterior girder webs and 2" dia. holes thru interior girder webs for 4-#6 x 5'-0" bars.

Negative Direction   Positive Direction
"$D_L$"   "$D_R$"

Chamfer corners when angle is less than 60°

"$D_L$" and "$D_R$" = Girder spacing 2 x tan θ

## TYPICAL ELEVATION

7-#5 "U5" stirrups each end. Vary spacing to avoid insert or hole locations

2" 6@2½" 9@4" "a" spaces @ 6" "b" spaces @ 12"
15" #4 "U4" #4 "U4" stirrups #4 "U4" stirrups

1'-6" max. #4 "U4" stirrups (2 bars each stirrup, typ.)

6" 6" 1'-6" max. #4 "U4" stirrups 6" 6" 1'-6" max. #4 "U4" stirrups

Diaphragm ₵'s when θ < 65°

4-1" dia. conc. inserts (*) in exterior girder webs and 4-2" dia. holes thru interior girder webs for 4-#6 x 5'-0" bars (unless shown otherwise on detail plans)

2-#5 x 4'-0" L-bars (std. 90° hook)

1" dia. hole for cable restraint when Alternate A restraint is used (typ.) "x" = 0.50 girder depth.

* **CONCRETE INSERTS**
Expanded coil concrete inserts with closed-back ferrule threaded to receive 1" dia. x 2'-3" rods AASHTO M314, Gr36 (ASTM A307) threaded full length.

6" to 2'-6" equal spacing
₵ dual hold downs (deflected strands >14)
Strand c.g.

6" (typ.)
#4 "U4" stirrups

8" 3"
4" 7" Strand c.g.
4"
12"
1'-2"
1'-4"
1'-6"
BT48 BT60 BT72 BT84
"x"
"yc"
"ye"

#4 "U" bars @ 12" max. ctrs. each end of girder

2-#5 "U6" bars at each end of girder

8½"
₵ Bearing
#3 "U3" bars
0.4 Span Length (ctr. - ctr. bearing) ±2'-6"
₵ hold down
Diaphragm ₵'s when θ ≥ 65°
"yc"
8½"
₵ Bearing

Horizontal girder length "A" (add grade correction and estimated shortening allowance to "A" for fabrication length)

**BACK END OF GIRDER** (on stationing)

**Note**
Girder details are symmetrical except as noted otherwise

**AHEAD END OF GIRDER** (on stationing)

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## MIDSPAN SECTION

4'-0"
4-#5 cont.
½" cl. 6"
#3 x 3'-10" @ 6"
2" 2" 4"
2" 2"
8-#3 x cont. @ 6" (or 6 x 6 – D12 x D12 welded wire reinforcement) [1]
6" web
1'-9"
#4 "U4" stirrups (2 bars each stirrup)
1" min. cl. unless shown otherwise (typ)
4'-0" BT48
5'-0" BT60
6'-0" BT72
7'-0" BT84
#3 "U3" bars (#3"U3a" bars where deflected strands conflict) at each "U4" stirrup and at alternate "U5" stirrup
9"
3"
6"
See Bulb Detail

## END VIEW

5¼"
7-#5 "U5" stirrups (2 bars each stirrup)
2-#5 x 4'-0" L-bars (std. 90° hook)

**Note**
Ensure ends of girders are vertical when under full dead load unless shown otherwise on detail plans.

Deflected strands @ 2" ctrs.
"he"
c. g. strands
"ye"
2-#5 "U6" bars at each end of girder
2'-0"

**END BLOCK NOTE**
When End Block is required, see Girder Schedule for details

6"
6" 5'-0"
**BAR "U6"**

## BAR BENDING DETAILS

3"
0-0
3'-8"
**BAR "U"** (ASTM A706)

11"
9½"
1'-10"
3" 3'-10"
7⅞"
3½"
**BAR "U3"**

**BAR "U3a"** (Use in lieu of "U3" bars when deflected strands conflict).

₵ Girder
Strand
6"
"m" Girder depth + 4¼"
2" dia. tight bend for #5 bars this bend only
1'-1"
0-0
4"
**BAR "U4" or "U5"**

Slant bars as required to fit inside "U5" stirrups

## BULB DETAIL

Lower deflected strand group (14 max. except 16 when the number of strands N is 58 or greater).

Upper group contains deflected strands in excess of 14 unless shown otherwise

½" spacing deflected strands at midspan

c. g. strands at midspan

2" 3@1¾"
5¼" 1¾"
7⅞"
2¼" 4@1¾" = 7" 1¾" 1" (typ.)
2'-0"
"yc"
"hc" ≥ 3" at midspan
Chamfer soffit corners 1" max.

## TYPICAL DETENSIONING ORDER

**DETENSIONING NOTE**
Detension strands in a systematic order about girder ₵ to limit eccentricity.

⑧ ① ② ⑦
⑨ ④ ③ ⑩
⑫ ⑤ ⑥ ⑪

**BULB-T GIRDER NOTES**
Girders designed for live loading and superimposed dead load as shown in the General Notes. Provide reinforcing steel as shown in the General Notes except as noted. Provide welded wire reinforcement conforming to ASTM A1064. [1]
Provide ½" dia. 7-wire low relaxation prestressing strands conforming to AASHTO M203 (ASTM A416), Grade 270, Supplement 1. Provide an initial tensioning (after harping deflected strands) of 31.0 kips per strand unless shown otherwise on Girder Schedule.

Provide the class of concrete shown on Girder Schedule.
Keep girders in an upright position w/the support points within 2'-0" of the girder ends.
Deflected strands may be bundled between hold-down points.
Provide temporary diaphragm beams as required, see BR350.

Accompanied by dwgs. BR350 and DET3315

CALC. BOOK NO. _

SDR DATE: 05-January-2022

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

## OREGON STANDARD DRAWINGS
## BULB-T (PRECAST PRESTRESSED CONCRETE GIRDERS)

2022

| DATE | REVISION DESCRIPTION |
|---|---|
| 01-2022 | Revised welded wire reinforcement specification. |
| - | - |
| - | - |
| - | - |

BR310

**Effective Date: June 1, 2022 - November 30, 2022**   **BR310**