

Notes to Designers for Prestressed Girders

BED CAPACITY

Teton Prestress in Idaho Falls

1,900 kips @ 30" cgs from bottom of girder

Maximum number of strand

AASHTO & BulbTee Girders: 42 – 0.6"Ø 60 – 0.5" Ø

WF Girders: forms not available

Central Premix in Spokane

1,900 kips for AASHTO & BulbTee Girders

Maximum number of strand: 42 – 0.6"Ø 60 – 0.5" Ø

3,076 kips for WF Girders

Maximum number of strand: 70 – 0.6"Ø 98 – 0.5" Ø

Hanson Prestress in Caldwell

2,500 kips @ 32" cgs from bottom of girder

Maximum number of strand

AASHTO, BulbTee, & WF Girders: 56 – 0.6"Ø 80 – 0.5" Ø

MAXIMUM NUMBER OF STRAND

The controlling values for the maximum span length curves are based on the following to allow all 3 fabricators the capability of furnishing the girders.

AASHTO & Bulb Tee Girders: 42 – 0.6"Ø 60 – 0.5" Ø

WF Girders: 56 – 0.6"Ø 80 – 0.5" Ø

LATERAL STABILITY

Lateral stability of the girder should be checked at release and erection using the procedure in Article 5.5.4.3 of the Bridge Design Manual. The centerline of the lifting loop should be a minimum of 4' from the end of the girder. The need for adding debonded strand in the top flange for handling should be considered.

PRESTRESSED GIRDER

PRELIMINARY DESIGN CURVES

GIRDER W/CAST-IN-PLACE DECK

Section Properties and maximum span length curves for the AASHTO, Bulb Tee, and Wide Flange girders are included in this Article.

The maximum span length curves should only be used as an aid in preliminary design. The curves on based on the following design parameters:

- AASHTO LRFD Design Specifications
- Simple Span lengths are centerline-centerline bearing
- 42'-0" out-out bridge width
- Girder spacing is for 4,5,6,& 7 girders (6'-0"; 7'-3"; 9'-3"; 12'-0")
- Concrete parapet
- Slab $f'c = 4.0$ ksi
- Girder $f'c = 8.0$ ksi
- 0.6"Ø 270 ksi strand
- Future wearing surface = 28 psf
- HL93 live load
- Harp points at 0.4 & 0.6 points
- Deck thickness determined by $(S+10)/30$ where S is computed in accordance with Article 9.7.2.3
- Minimum 8" nominal deck slab thickness. Structural deck thickness is 0.5" less than the nominal thickness
- The maximum number of straight strand for each girder is:

| | |
|-----------------|-------------|
| AASHTO Type 2 | 16 straight |
| AASHTO Type 3 | 34 straight |
| AASHTO Type 4 | 48 straight |
| Bulb Tee Girder | 24 straight |
| WF Girders | 44 straight |
- No strand added for handling

DECK BULB TEE GIRDER W/ASPHALT OVERLAY

Section Properties and maximum span length curves for the Bulb Tee girders and WF girders with an 8" thick top flange are included in this Article.

The maximum span length curves should only be used as an aid in preliminary design. The curves on based on the following design parameters:

- AASHTO LRFD Design Specifications
- Simple Span lengths are centerline-centerline bearing
- 42'-0" out-out bridge width
- Girder spacing for deck bulb tee girders is for 6, 7, & 8 girders (84", 72" & 63" top flange width).
- Girder spacing for WF deck bulb tee is for 7, 8, & 9 girders (72", 63", & 56" top flange width).
- 2-Tube Curb Mounted Rail with 9½" curb height for 0.2' asphalt pavement
- Total wearing surface = 56 psf (0.2' at initial construction & 0.2' future)
- HL93 live load
- Harp points at 0.4 & 0.6 points
- No strand added for handling

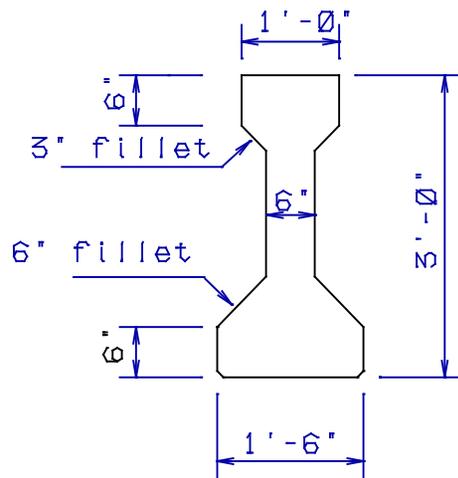
Revisions:

- July 2009 Added design parameters on page 1
 Added WSDOT WF girder data
 Added Deck Bulb Tee Girder maximum span curves
- Feb 2012 Revised maximum span graphs for refined losses
 Changed from 7.5 ksi concrete to 10 ksi concrete
- June 2013 Added Bed Capacity and Maximum Number of strand data
 Revised maximum span graphs for maximum number of strand
- Mar 2015 Maximum span curves checked for lateral stability during handling without adding additional strand using the procedure in Article 5.5.4.3 of the Bridge Design Manual.
 All maximum span curves based on $F'_c=8$ ksi and 0.6"Ø strand.
 BT37x84 girder deleted from the standards due to lateral stability during handling
 BT48 Series girders deleted. The BT37 Series girders provide a narrower top flange that can better accommodate superelevation.
 DeckTee girders with asphalt overlay designed for a total of 0.4' asphalt to protect spray-applied membrane seal.
 DeckTee girders with asphalt overlay designed for a 2-tube curb mounted rail with 9½" curb height.
 DeckTee girder with 5" c-i-p deck preliminary design curves deleted.

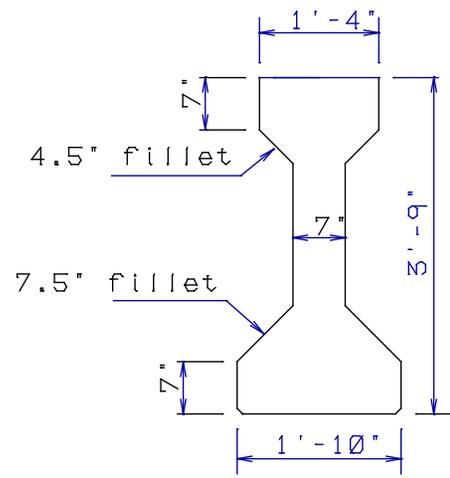
AASHTO GIRDER SECTION PROPERTIES

| DEPTH | AREA | CENTER OF GRAVITY | | MOMENT OF INERTIA | SECTION MODULUS | | WEIGHT LB/FT |
|-------|--------|-------------------|--------|-------------------|-----------------|--------|-----------------|
| | | TOP | BOTTOM | | TOP | BOTTOM | |
| 36" | 368.44 | 20.147 | 15.853 | 50,842 | 2524 | 3207 | 384 |
| 45" | 558.94 | 24.706 | 20.294 | 125,165 | 5066 | 6168 | 582 |
| 54" | 788.44 | 29.249 | 24.751 | 260,403 | 8903 | 10,521 | 821 |

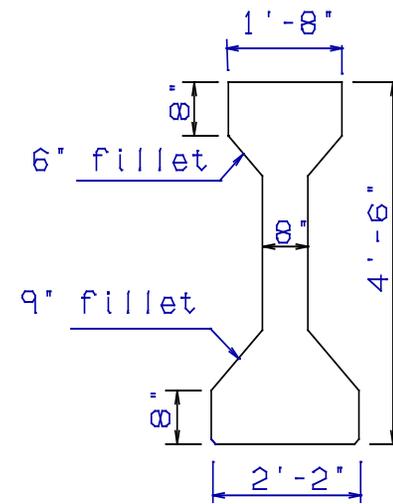
ALL UNITS IN INCHES EXCEPT WEIGHT



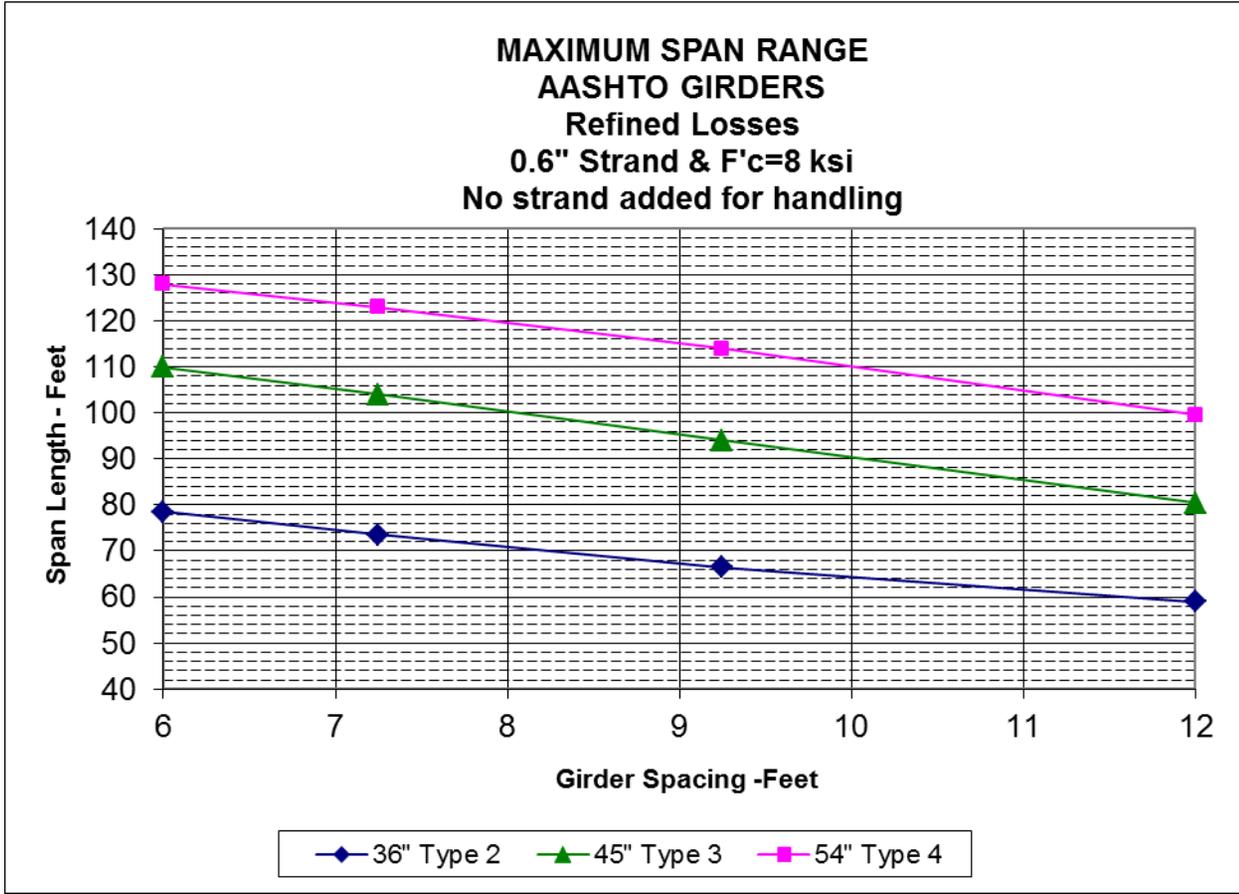
TYPE 2 GIRDER



TYPE 3 GIRDER

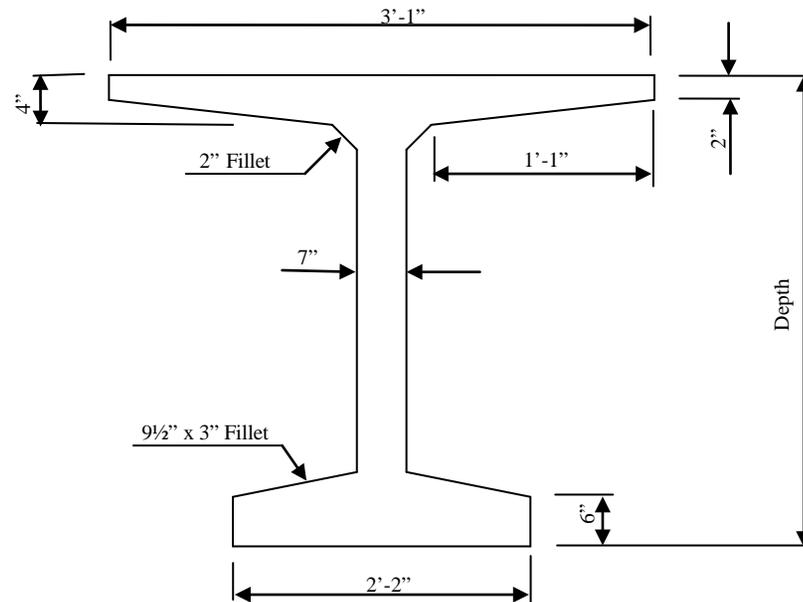


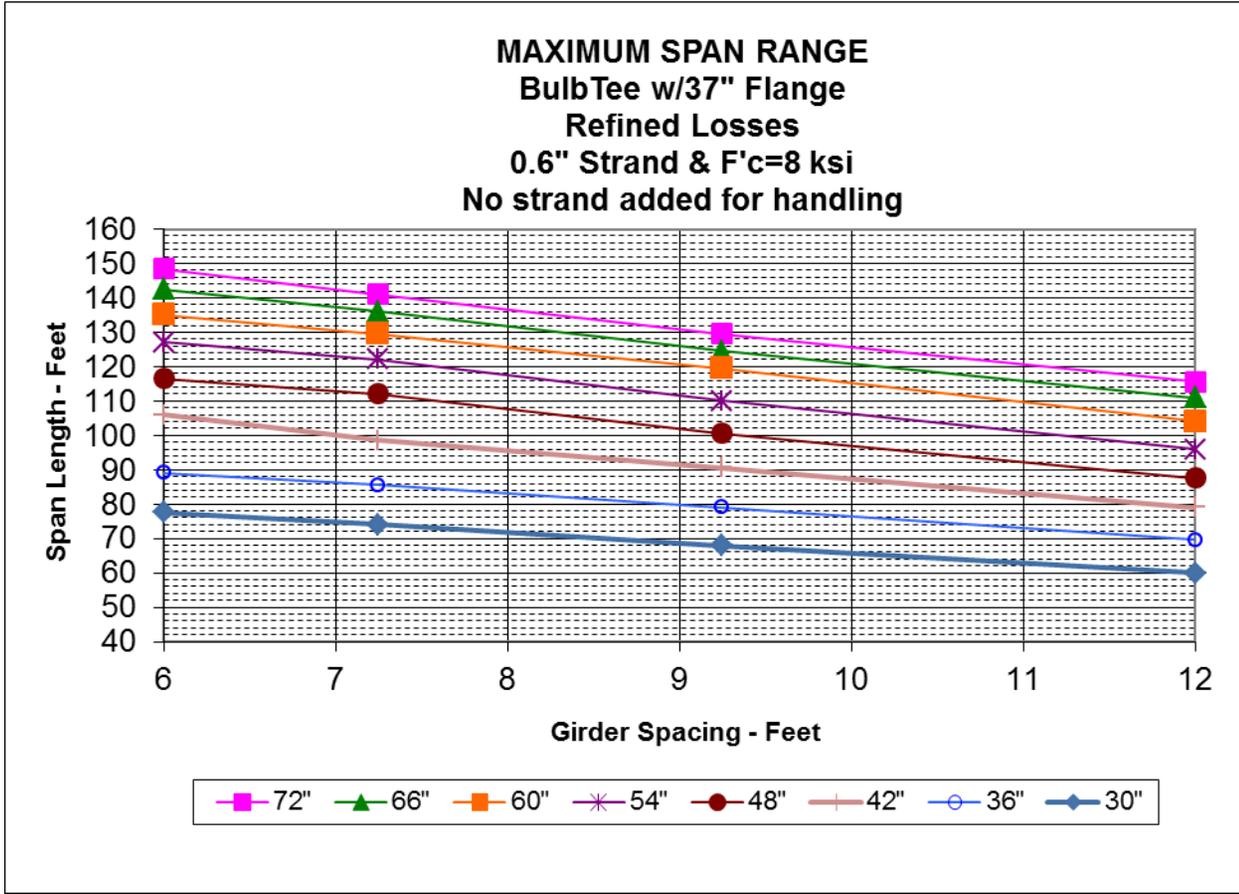
TYPE 4 GIRDER



37" TOP FLANGE BULB TEE GIRDER SECTION PROPERTIES

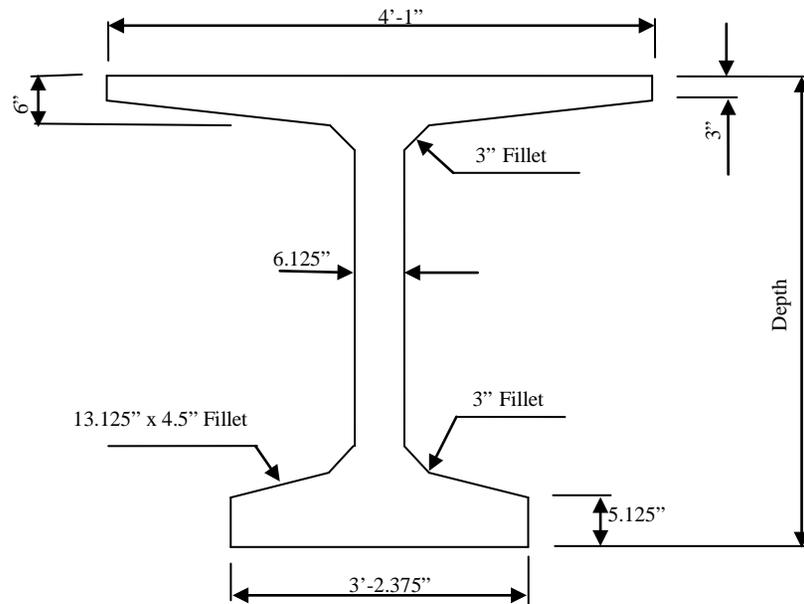
| DEPTH | AREA | CENTER OF GRAVITY | | MOMENT OF INERTIA | SECTION MODULUS | | WEIGHT LB/FT |
|-------|----------|-------------------|--------|-------------------|-----------------|--------|--------------|
| | | TOP | BOTTOM | | TOP | BOTTOM | |
| 30" | 449.9375 | 15.644 | 14.356 | 51,361 | 3,283 | 3,578 | 469 |
| 36" | 491.9375 | 18.857 | 17.143 | 82,126 | 4,355 | 4,791 | 512 |
| 42" | 533.9375 | 22.036 | 19.964 | 121,708 | 5,523 | 6,096 | 556 |
| 48" | 575.9375 | 25.190 | 22.810 | 170,872 | 6,783 | 7,491 | 600 |
| 54" | 617.9375 | 28.322 | 25.678 | 230,379 | 8,134 | 8,972 | 644 |
| 60" | 659.9375 | 31.438 | 28.562 | 300,990 | 9,574 | 10,538 | 687 |
| 66" | 701.9375 | 34.539 | 31.461 | 383,465 | 11,102 | 12,189 | 731 |
| 72" | 743.9375 | 37.630 | 34.370 | 478,562 | 12,718 | 13,924 | 775 |

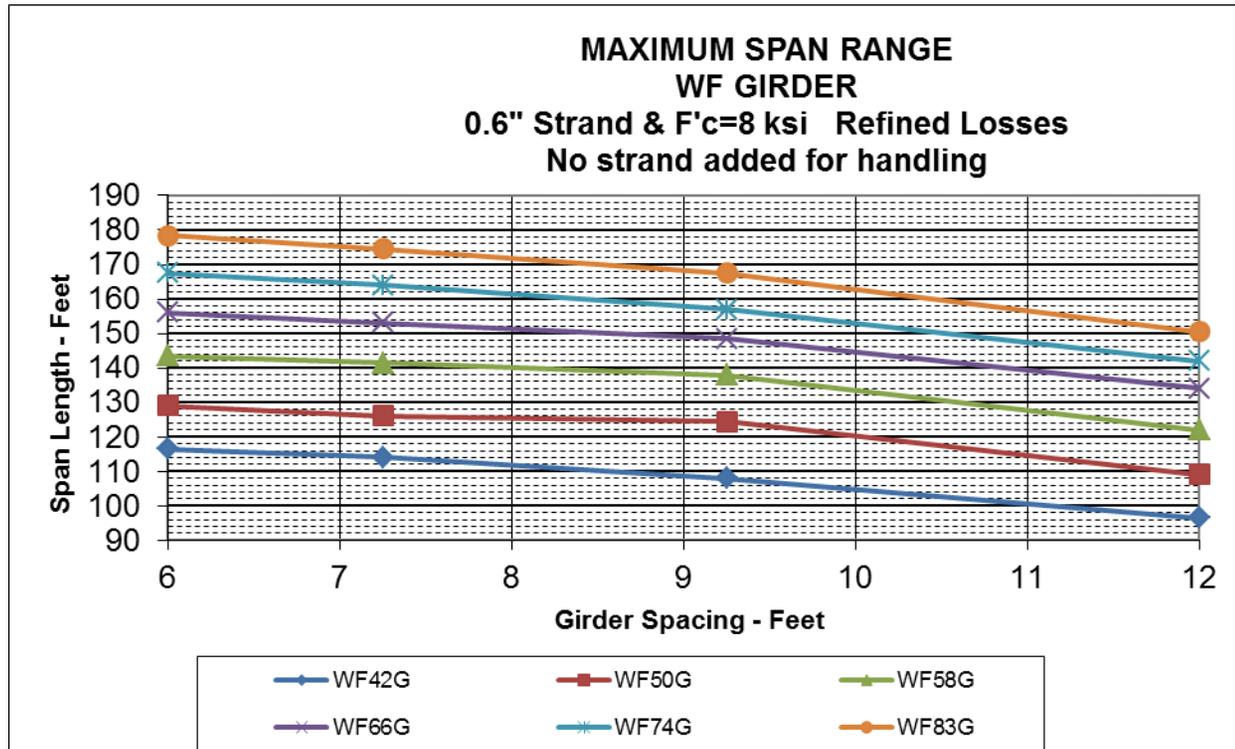




WF GIRDER SECTION PROPERTIES

| DEPTH | AREA | CENTER OF GRAVITY | | | SECTION MODULUS | | WEIGHT LB/FT |
|---------|---------|-------------------|--------|-------------------|-----------------|--------|--------------|
| | | TOP | BOTTOM | MOMENT OF INERTIA | TOP | BOTTOM | |
| 42" | 727.531 | 21.640 | 20.360 | 183,642 | 8,486 | 9,020 | 758 |
| 50" | 776.531 | 25.849 | 24.151 | 282,559 | 10,931 | 11,700 | 809 |
| 58" | 825.531 | 30.033 | 27.967 | 406,266 | 13,527 | 14,527 | 860 |
| 66" | 874.531 | 34.196 | 31.804 | 556,339 | 16,269 | 17,493 | 911 |
| 74" | 923.531 | 38.343 | 35.657 | 734,356 | 19,152 | 20,595 | 962 |
| 82.625" | 976.359 | 42.796 | 39.829 | 959,393 | 22,418 | 24,088 | 1017 |

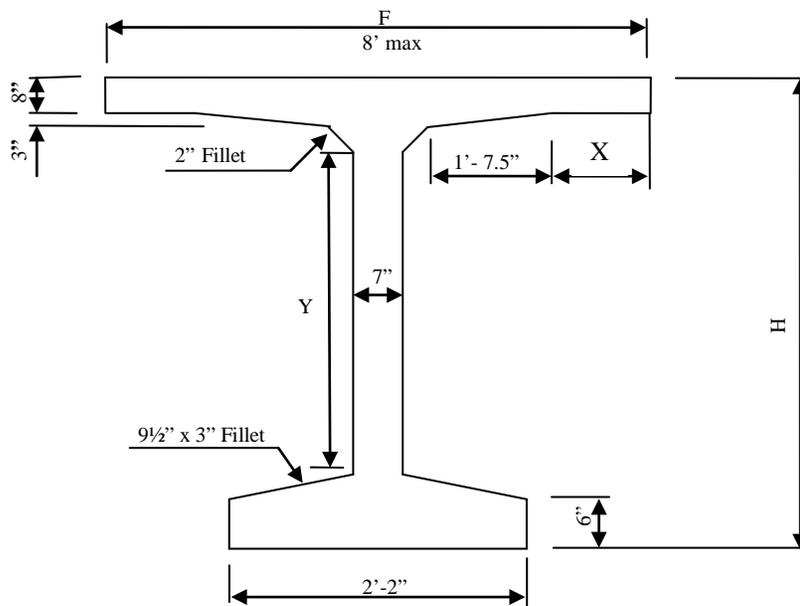


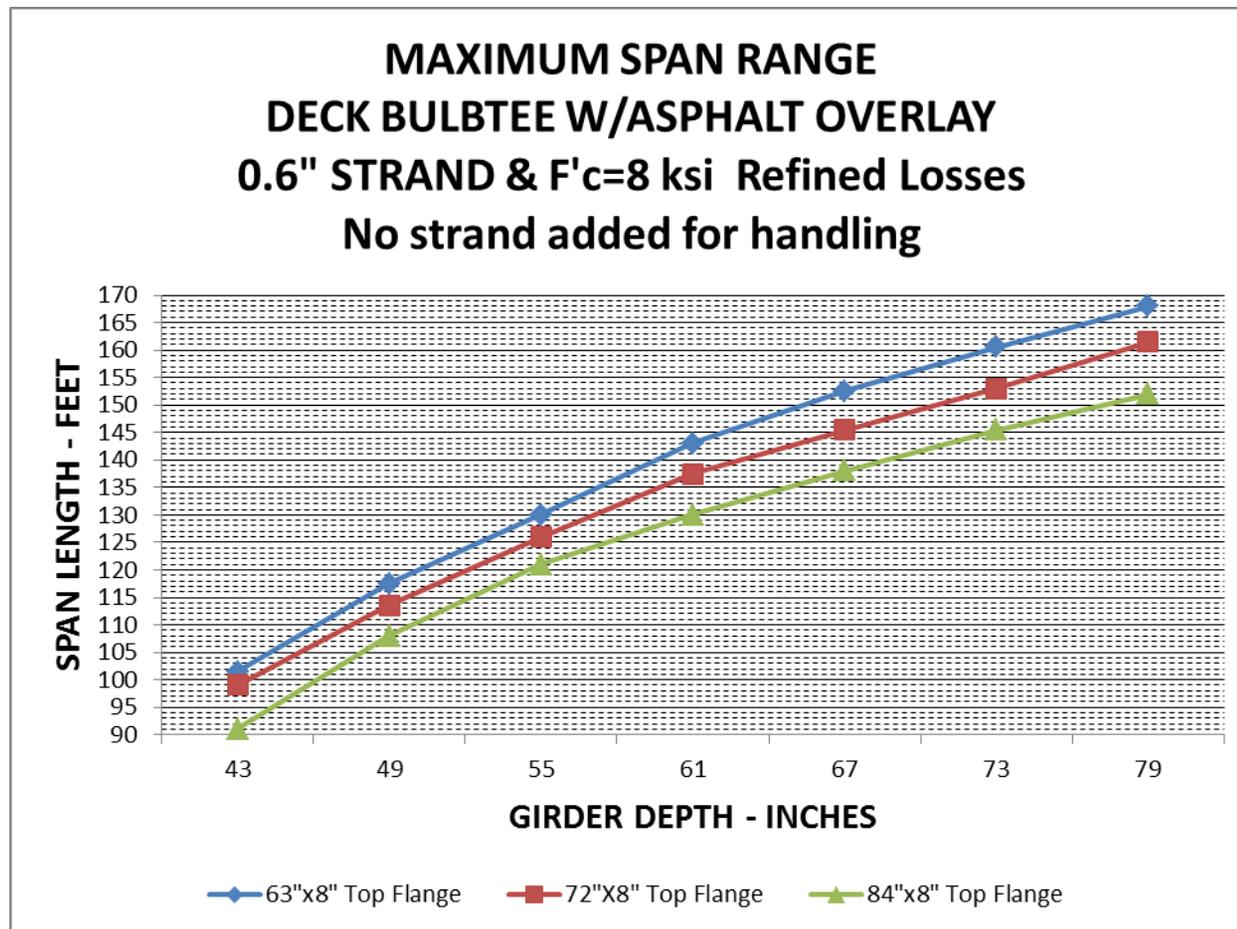


DECK BULB TEE GIRDER W/ASPHALT OVERLAY

| BASE GIRDER | H | Y= (H-22) |
|-------------|----|-----------|
| 30" BT | 37 | 15 |
| 36" BT | 43 | 21 |
| 42" BT | 49 | 27 |
| 48" BT | 55 | 33 |
| 54" BT | 61 | 39 |
| 60" BT | 67 | 45 |
| 66" BT | 73 | 51 |
| 72" BT | 79 | 57 |

$$X = (F-50)/2$$





WF DECK TEE GIRDER W/ASPHALT OVERLAY

| BASE GIRDER | H | $Y = (H-26.625)$ |
|-------------|--------|------------------|
| 42" WF | 47 | 20.375 |
| 50" WF | 55 | 28.375 |
| 58" WF | 63 | 36.375 |
| 66" WF | 71 | 44.375 |
| 74" WF | 79 | 52.375 |
| 83" WF | 87.625 | 61 |

$$X = (F-49)/2$$

