Appendix D Example 1 – Clearances at Falsework Openings

Prior to falsework erection the theoretical impaired clearance is calculated to provide advance notice to the Resident Engineer (RE) and Traffic Operations. This calculation will require determining clearance between the bridge and the roadway and the clearance under the falsework. When the stringers are placed, vertical clearance shall be physically measured to ensure that vertical clearance is equal to or greater than the reported vertical clearance. The measured vertical clearance needs to be reported to Resident Engineer and Traffic Operations. Note both vertical and horizontal clearances are required to be reported in TR-0029 form.

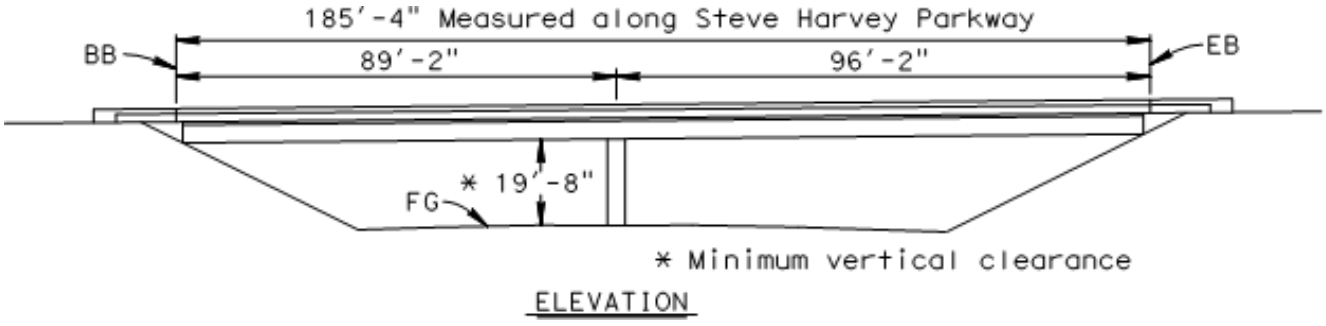
Determine the impaired clearance for the bridge and the falsework configuration given below.

Given Information

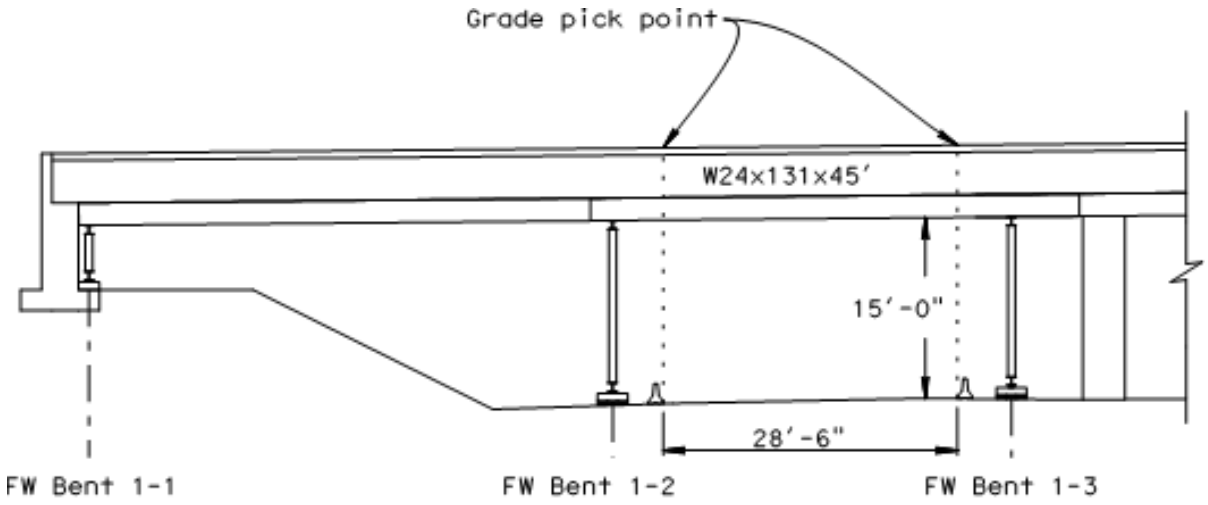
General Plan:

Pick the Point of Minimum Clearance = 19'-8" (236.00").

(Note: This point is the minimum clearance between the bridge and the finished roadway without the falsework. It should be noted that during construction due to overlay, stage construction, or roadway profile changes, the point of minimum clearance and location may be different from that shown on the project plans.)



Falsework Plans

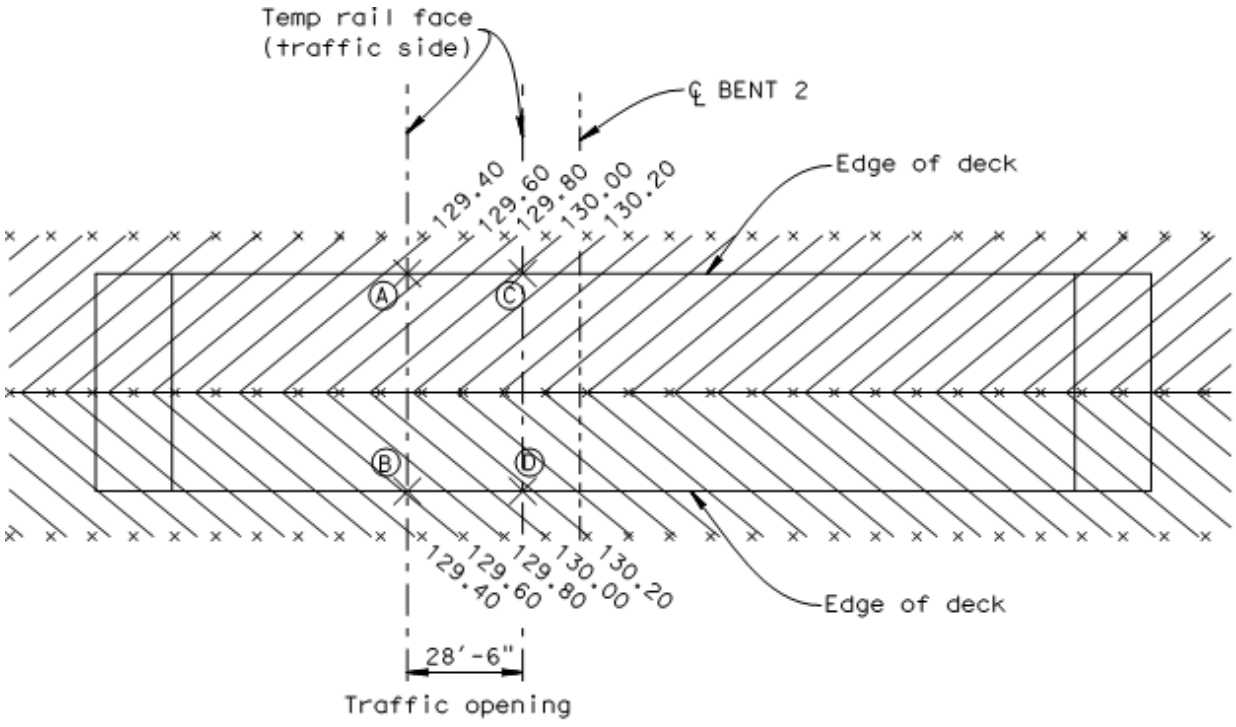


PARTIAL FALSEWORK ELEVATION

Special Provisions

Vehicle openings: 20'-0" wide and 15'-0" height.

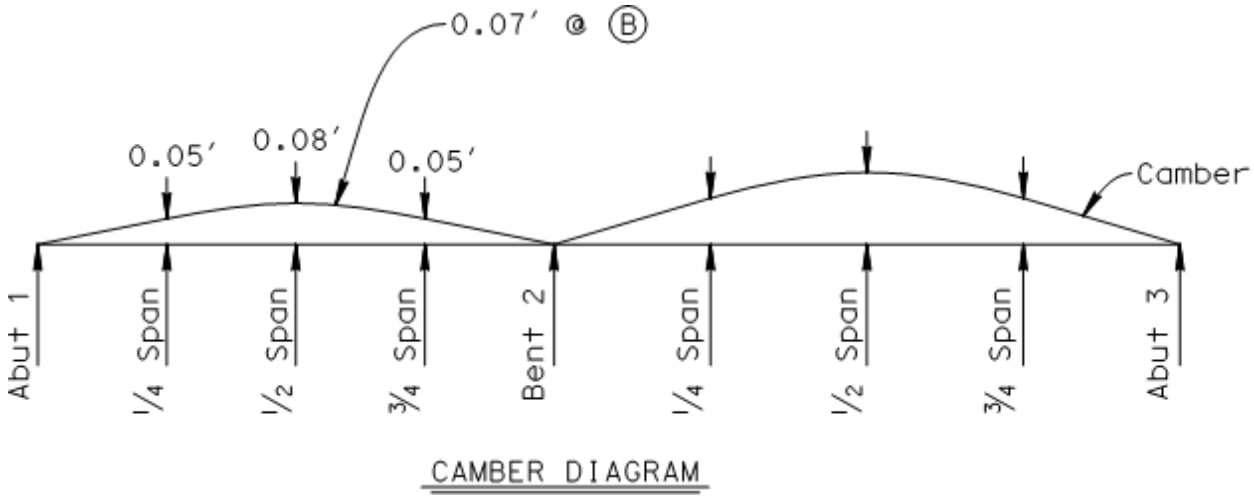
Deck Contour Sheet (4-Scale):



PLAN

Points A, B, C and D grades are taken at the edge of deck at the temporary railing face.

Bridge Camber Diagram:



CAMBER DIAGRAM

Check Vertical Clearance

1. Calculate vertical clearance between bridge and roadway:

   Points A, B, C and D are the edge of deck grade above the four corners of the traffic opening defined by the face of temporary rail and edge of deck.

   Determine the elevation of the pavement (roadway grade) by field surveying below the points described above. The number of plotted points can be more than four for complex layout. Note in the following table, bridge camber value determined by plotting on the 4-scale at the falsework bent is included.

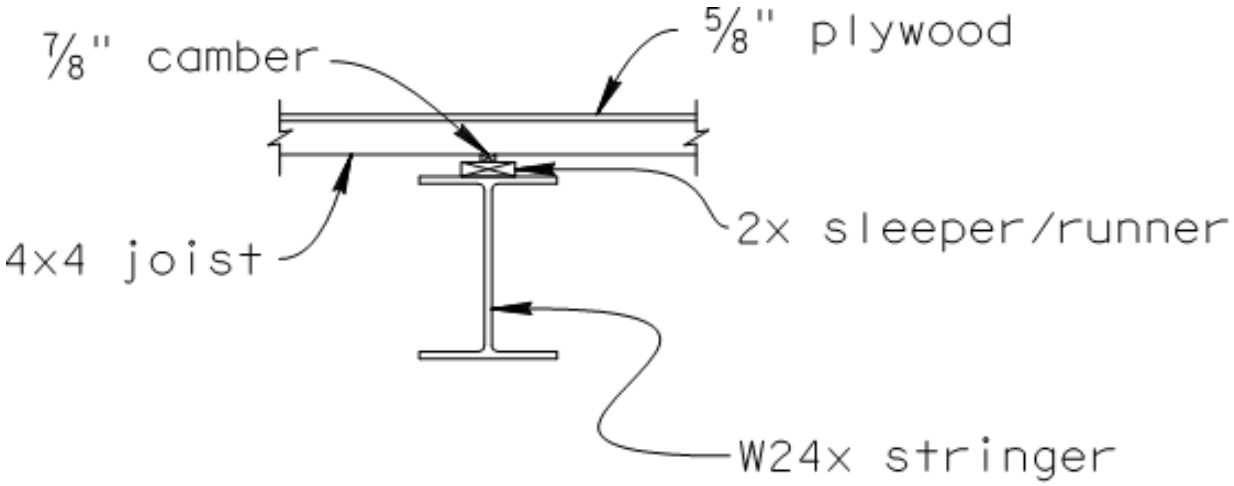
Point	Deck Grade (ft)	Roadway Grade (ft)	Box Girder Depth (ft)	Bridge Camber (ft)*	Clearance (ft)	Clearance (inch)
A	129.50	106.00	4	+0.07	19.57	234.84
B	129.62	106.70	4	+0.07	**18.99**	**227.88**
C	130.04	104.34	4	+0.01	21.71	260.52
D	130.12	105.96	4	+0.01	20.17	242.04

   The minimum vertical clearance between the bridge and the roadway at the traffic opening is Point B with 227.88" (18'-11 7/8") height.

   * Camber is additive for positive camber.

2. Calculate vertical clearance between falsework and roadway:
   a. Calculate Minimum Vertical Clearance:

Bridge Clearance from table above	= (+) 227.88"
Falsework Depth	
Plywood = 5/8"	= (-) 0.63"
Joist (4 x 4)	= (-) 3.50"
Camber (0.07')	= (-) 0.84"
Runner (2x wood)	= (-) 1.50"
Stringer (W24X131)	= (-) 24.48"
Calculated Minimum Vertical Clearance = 196.89" (16'-4 7/8")	



FALSEWORK PLANS

   b. Subtract Pavement elevation changes (- or 0):

      If the roadway under the bridge is to be paved prior to removal of the falsework, the net thickness of overlay will need to be subtracted from the clearance. The net thickness accounts for any grinding that may take place prior to paving.

      $\Delta_b = 0$ (For no paving)

   c. Subtract Adjustment of Falsework grades (- or 0):

      Often contractors set the falsework bent lower prior to final grading. In that case subtract the value. If the falsework is kept higher than theoretical value and then adjusted downward a value of zero must be used.

$\Delta_c = 0$ (In this example no FW adjustment)

d. Subtract Falsework settlement (-):

The probable or anticipated settlement of the falsework per falsework plans. Note theoretically, this value can be zero because the falsework will be erected higher to account for settlement.

$\Delta_d = -0.8"$ (It is conservative to include)

e. Subtract Falsework stringer deflection (-):

Note that stringer will deflect even with the use of camber strips. Conservatively, in this calculation stringer deflection at the center of falsework span is used.

$\Delta_e = -1.13"$

f. Subtract Release of sand jacks/ wedging (-)
If traffic will be allowed under the structure after the sand jacks/wedging is blown /removed and prior to stringers being removed, then this allowance needs to be included:

$\Delta_f = -5.5"$ (Sand jacks w/ 2 X 6 side members)

g. Calculated ultimate actual clearance:

This is equal to the value of line “a” plus summation of bullet “b” thru “f”:

a) Min. Vertical clearance	**196.89"**
Subtract Bullet “b” through “f” below	
b) Pavement Surfacing	-0.00"
c) Falsework Grade	-0.00"
d) Falsework Grade	-0.80"
e) Deflection	-1.13"
f) Sand Jack	-5.50"
g) Min Vertical Clearance	= **189.46"**

Net vertical clearance height 189.46" = 15'- 9 1/2" > 15'-0"

Value is greater than or equal to that given in the Special Provisions therefore acceptable.

h, Clearance to report:

This is the value “g” rounded down to the nearest 3"

From 15'-9 1/2" to 15'-9"

Value = 15'- 9" > 15'-0"

Check Horizontal Clearance

The horizontal opening shown on the falsework plans is 28'-6" which is greater than 20'-0" given in the contract Special Provisions, Section “Maintaining Traffic,” and therefore acceptable.

Summary

1. Use items a to h above to complete Form No. SC-4103, *Report of Falsework Clearance.*
2. Use 28'-6" for clear horizontal opening in Form No. SC-4103.
3. Items 1 & 2 above provide all the values required to complete Form No. SC-4103. Refer to the following BCMs to complete form Forms TR-0019 or TR-0029 when required to complete them on behalf of the Resident Engineer:
   a. BCM C-4.14, *Notice of Change in Structure Clearance or Permit Rating*
   b. BCM 120-2.0, *Impaired Clearances at Falsework Traffic Openings*
   c. BCM 120-2.1, *Reporting of Impaired Clearances at Falsework Traffic Openings*

Completed Form No. SC-4103 (Rev 12/17/13)

Department of Transportation
REPORT OF FALSEWORK CLEARANCE
Form No. SC-4103 (Formerly SC-12.6.1) (Rev. 12/17/13)

Job Stamp:
Falsework Manual
Appendix D
Example 1

Date: 1/1/2020

Bridge name: Any Bridge

Br. No. XX-XXXX

Co/Rte/PM: XXXX

Direction of travel: Northbound

Determination of falsework clearance:

a)	Calculated or Measured Minimum vertical clearance:	196.89 "
	Allowances:	
b)	Pavement elevation changes (- or 0)	0.00"
c)	Adjustment of Falsework grades (- or 0)	0.00"
d)	Falsework settlement (-)	0.80"
e)	Falsework stringer deflection (-)	1.13"
f)	Release of sand jacks (wedging) (-)	5.50"
g)	Calculated ultimate actual clearance[1]	189.46"
h)	Clearance to report[2]	15'-9"

[1] This value must be greater than that given in the Special Provisions
[2] Calculated ultimate actual clearance rounded down to the nearest 3"

The clear horizontal opening 28.5 is feet wide.

Remarks: