ASCE-INDOT
STRUCTURAL SUBCOMMITTEE
MEETING NO. 59 MINUTES
May 24, 2013

The meeting was called to order at 9:00 a.m. by Anne Rearick. Those in attendance were:

Anne Rearick	INDOT, Bridge Division
Elizabeth Phillips	INDOT, Bridge Division
Naveed Burki	INDOT, Bridge Division
Mahmoud Hailat	INDOT, Bridge Division
Merril Dougherty	INDOT, Structural Services
Mike Wenning	GAI Consultants, Inc.
Mike McCool	Beam Longest & Neff, LLC.
Pete White	R. W. Armstrong
Mike Halterman	USI Consultants, Inc.
Michael Matel	Butler, Fairman and Seufert, Inc.
Burleigh Law	HNTB Corp.
Kurt Heidenreich	Engineering Resources, Inc.

In addition to the attendees, these minutes will be sent to the following:

Keith Hoernschmeyer	Federal Highway Administration
Jason Yeager	Gohmann Asphalt Company
Jim Reilman	INDOT, Construction Management
Tom Harris	INDOT, Construction Management
Celeste Spaans	Prestress Services, Inc.
Troy Jessop	R. W. Armstrong
Michael Eichenauer	Butler, Fairman and Seufert, Inc.

A meeting agenda had previously been distributed and the following items were discussed:

1. The March 15, 2013, meeting minutes were approved as written, and have been placed on the INDOT website.

2. No action was taken on the PTFE plates. (Wenning)

3. No action was taken on the Bearing Pad Details. (Jessop)

4. No action was taken on the pavement ledge details. (Phillips)

5. The R.C. Bridge approach detail revision will require a Design Manual change. The transverse bars will be changed to run perpendicular to the centerline of the roadway. This will also make phased construction easier. Fanned bars will be placed in acute corners. Elizabeth Phillips will revise the connection details and submit to the Standards Committee. She will also work with Naveed Burki to try this on a bridge this year.

6. No action was taken on the prestressed beam notch issue. (Jessop)

7. Elizabeth Phillips passed out copies of new prestressed beam detail sheets she had developed. Committee members were asked to review and return comments to her by the next meeting.

8. A list of software practice pointers dealing with commonly used design programs was developed by Mike McCool. The committee has 2 weeks to add items then it will be posted and announced via INDOT's listserve.

9. Elizabeth Phillips will pursue a standard drawing detail showing allowable positioning of connection angles for stay in place metal forms.

10. Steel Diaphragm details need to be updated to include Hybrid Girders. No action was taken. (Phillips)

11. Steel Diaphragm details need to be updated for rolled beam sections. The 2012 AASHTO allows less than full width bolted connections for rolled beams. Mike McCool will develop details and have them reviewed by Burleigh Law and Mahmoud Hailat. This will reintroduce Fig. 8-405.08A from the old Design Manual.

12. Mechanically Stabilized Walls and riprap turnouts. Elizabeth Phillips presented some possible details and will incorporate comments made by the committee and prepare the figures.

The next meeting for the INDOT Structural Committee is scheduled for 9:00 a.m. on August 16, 2013, in room N642. Mike McCool will distribute an agenda prior to the meeting. This meeting was adjourned at 11:10 a.m.

Respectfully submitted,
GAI Consultants, Inc.

Michael Wenning, P.E.
m.wenning@gaiconsultants.com

Attachments

These rigid load paths are required to preclude the development of significant secondary stresses that could induce fatigue crack growth in either the longitudinal or the transverse member (Fisher et al., 1990).

6.6.1.3.1—Transverse Connection Plates

Except as specified herein, connection plates shall be welded or bolted to both the compression and tension flanges of the cross-section where:

- Connecting diaphragms or cross-frames are attached to transverse connection plates or to transverse stiffeners functioning as connection plates,
- Internal or external diaphragms or cross-frames are attached to transverse connection plates or to transverse stiffeners functioning as connection plates, and
- Floorbeams or stringers are attached to transverse connection plates or to transverse stiffeners functioning as connection plates.

In the absence of better information, the welded or bolted connection should be designed to resist a 20.0-kip lateral load for straight, nonskewed bridges.

Where intermediate connecting diaphragms are used:

- On rolled beams in straight bridges with composite reinforced decks whose supports are normal or skewed not more than 10 degrees from normal and
- With the intermediate diaphragms placed in contiguous lines parallel to the supports.

less than full-depth end angles or connection plates may be bolted or welded to the beam web to connect the diaphragms. The end angles or plates shall be at least two-thirds the depth of the web. For bolted angles, a minimum gap of 3.0 in. shall be provided between the top and bottom bolt holes and each flange. Bolt spacing requirements specified in Article 6.13.2.6 shall be satisfied. For welded angles or plates, a minimum gap of 3.0 in. shall be provided between the top and bottom of the end-angle or plate welds and each flange; the heel and toe of the end angles or both sides of the connection plate, as applicable, shall be welded to the beam web. Welds shall not be placed along the top and bottom of the end angles or connection plates.

C6.6.1.3.1

These provisions appear in Article 10.20 of the AASHTO *Standard Specifications* "Diaphragms and Cross Frames" with no explanation as to the rationale for the requirements and no reference to distortion-induced fatigue.

These provisions apply to both diaphragms between longitudinal members and diaphragms internal to longitudinal members.

The 20.0-kip load represents a rule of thumb for straight, nonskewed bridges. For curved or skewed bridges, the diaphragm forces should be determined by analysis (Keating et al., 1990). It is noted that the stiffness of this connection is critical to help control relative displacement between the components. Hence, where possible, a welded connection is preferred as a bolted connection possessing sufficient stiffness may not be economical.

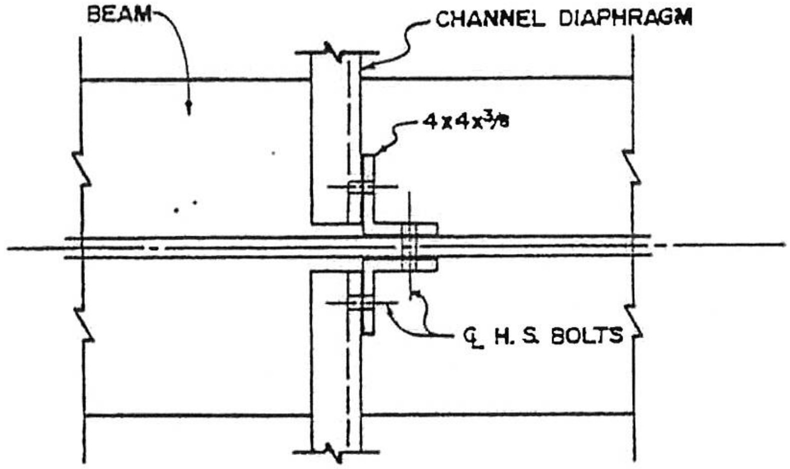
For box sections, webs are often joined to top flanges and cross-frame connection plates and transverse stiffeners are installed, and then these assemblies are attached to the common box flange. In order to weld the webs continuously to the box flange inside the box section, the details in this case should allow the welding head to clear the bottom of the connection plates and stiffeners. A similar detail may also be required for any intermediate transverse stiffeners that are to be attached to the box flange. Suggested details are shown in AASHTO/NSBA (2003). The Engineer is advised to consult with fabricators regarding the preferred approach for fabricating the box section and provide alternate details on the plans, if necessary.

6.6.1.3.2—Lateral Connection Plates

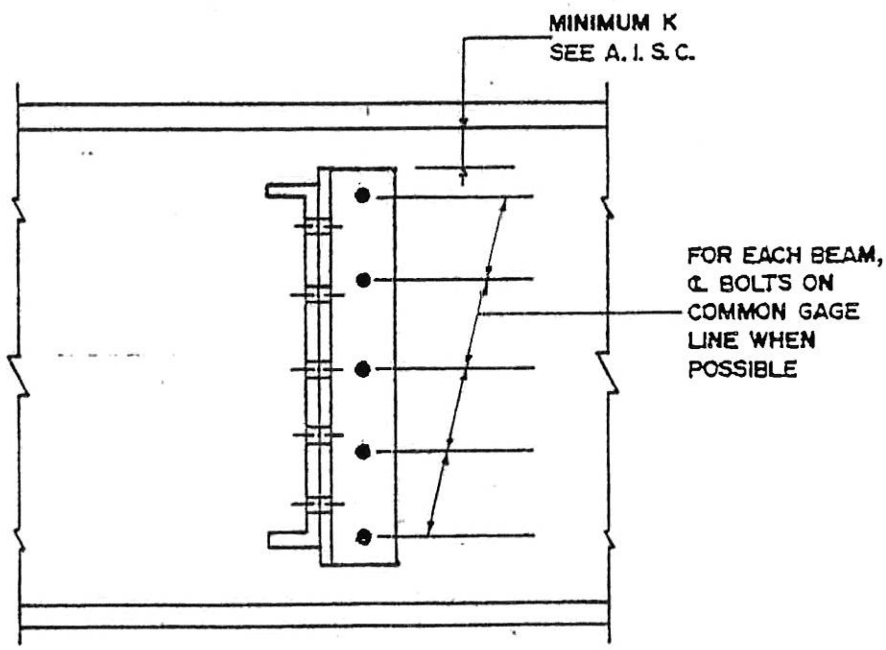
If it is not practical to attach lateral connection plates to flanges, lateral connection plates on stiffened webs should be located a vertical distance not less than one-half the width of the flange above or below the flange. Lateral connection plates attached to unstiffened webs should be located at least 6.0 in. above or below the flange but not less than one-half of the width of the flange, as specified above.

C6.6.1.3.2

The specified minimum distance from the flange is intended to reduce the concentration of out-of-plane distortion in the web between the lateral connection plate and the flange to a tolerable magnitude. It also provides adequate electrode access and moves the connection plate closer to the neutral axis of the girder to reduce the impact of the weld termination on fatigue strength.



PLAN



ELEVATION

New	BEAM	Old DIAPHRAGM	HIGH STRENGTH BOLTS
Bent Plate	W 36	M C 18x42.7	5-7/8" ø
Bent Plate	W 33	C 18x42.7	5-7/8" ø
MC 18x42.7	W 30	C 15x33.9	4-7/8" ø
C 15x33.9	W 27	C 15x33.9	4-7/8" ø
same	W 24	C 12x20.7	3-3/4" ø

Figure 8-405.08A

TYPICAL DIAPHRAGM
CONTINUOUS SUPPORTS
ITERMEDIATE SPAN POINTS

INDOT Practice Pointers 5-1-13

Software

Merlin-Dash

- Haunch includes top flange

Conspan

- Toggle Exclude Non-Composite Moments from Mu
- Toggle Exclude Beam and Slab Contribution from Vu
- When designing multi-span bridges, ensure that the Double Truck and Double Tandem Live Loads are selected in the live load window. Conspan has been known to accidentally remove these during multiple runs.
- "When Importance is set to 1.05 and "Non-composite moment effects are EXCLUDED from Mu" is toggled, the Mu-req'd in the "Reinforced Design" does not compute correctly. If "INCLUDED" is used and/or importance = 1.0, the numbers are correct, but the combination of the two causes unconservative results. The solution can be to run with Eta = 1.00 and then scale up the steel required by 5%.
- Adjust the design importance factors under the "analysis factors" tab per Indiana Design Manual Guidelines
- Under the "project design parameters tab", alter the relative humidity from 75% to 70% per INDOT guidelines
- Adjust deflection multipliers within the "project design parameters" tab. Conspan defaults the at erection deflection multipliers to 1.85. Per Indiana guidelines, these should be adjusted to 1.75 unless more accurate methods are utilized.
- Under the "project design parameters tab", check the box titled "check at lifting point". Due to the large amount of strand that can sometimes be placed in certain beam types, beams can fail due to concentrated stresses and the lifting points. This will provide an additional check for stresses at the lifting points allowing the designer to adjust mild reinforcement within the beam to compensate for this
- Under the "project design parameters tab", check the box for horizontal shear auto designed for intentionally roughened surface.
- Conspan was not applying the resistance factor correctly for semi-lightweight concrete for the vu/f'c computation to determine the max stirrup spacing for vertical shear and horizontal shear. It always used 0.9. This is most likely the case for 0.7 (lightweight concrete) as well.
- Have had difficulties matching the values for dv and a. This tracks through the rest of the results.
- Have had difficulties matching the values for longitudinal reinforcing.
- For bearing design, people incorrectly use the deflections provided by conspan. This is for live load deflection which involves only one truck and no lane. If used for bearing design, this provides unconservative results.

- For bearing design, make sure that the load applied and the resulting deflection are concurrent. Using the maximums for both could be unconservative for the rotation check. However, this has been removed in the 2012 LRFD.
- We have not been able to reproduce Conspans fps, c & a results for ultimate moment.
- Haunches – Don't input thickness since CONSPAN will use for composite section properties, but input as a non-composite load on precast.
- Include additional concrete due to residual camber and vertical curve correction as a trapezoidal precast DC load. These can be adjusted along the length of the beam to account for additional concrete dead load associated with differences between beam camber and the profile grade.
- Bursting or Anchorage Zone Steel in Prestressed Beams is one value. Designers need to make sure they are looking at the top of beam and bottom of beam separately when they are draping strands.
- Flared beam analysis - After entering all the geometric data, if you go back and change any information in the "Layout" dialogue (like deck widths & offsets or abutment widths & offsets), then the beam analysis goes haywire. As a temporary solution, you just need to wipeout and reenter all the beam data in the "Cross Section" dialogue after you've made all changes to the "Layout". (Version 11.00.01.05)
- Deck thickness should be entered as the structural thickness (typically 7.5"). Sacrificial thickness (typically 1/2") should be added as a non-composite dead load.
- Beams are supported at their bearing locations within the yard. The designer should consider having their release span and bearing to bearing span match within the program.
- When the designer has finished generating their strand pattern, if the design stresses pass, but you still receive a "NG" under release stresses, this is due to the beam failing at the lifting points. The designer can view these stresses in the report under "positive envelope stresses". The second table reports the stresses at the lifting point. The designer can add additional mild steel or increase the allowable release strength improve this.

RC Pier

- In the past, RC-Pier calculated the live load reactions incorrectly. It did not apply the 90% for the dual truck load to the lane. This may have been corrected in a new release.
- RC Pier incorrectly applies the eta factor for the minimum case. It should be 1/eta. RC Pier always multiplies by eta. This can be unconservative. We alter the min and max load factors to account for this, however, this leads to very long run times for Strength V.
- For cap design, RC Pier is overly conservative by applying the max torsion with the max vertical shear when they are not concurrent.
- For cap design, RC Pier appears to always use dv = d-a/2 and does not account for 0.72 H or 0.9 de.
- RC Pier conservatively calculates the max pile load and assumes that this load is present in all piles. Very conservative.
- In the last release, it appears that RC Pier incorrectly calculates pile reactions for Extreme Event.
- When designing pile footings, RC-Pier takes the conservative approach of designing the footing bending and shear using the maximum pile reaction on all piles across a given width or length. The more appropriate design is to take the controlling load combination axial loads and bending moments to calculate the individual pile reactions based on P/n +/- Mx/Sx +/- Mz/Sz, then use those values to calculate shear and moment in order to determine the needed footing depth and the needed reinforcing bars.

Better description

Same

- To design for a wall type pier, select the "Multi Columns" option and simply enter one column that is the width of your wall pier
- When auto-generating loads within RC-Pier, one should look into importing their reactions from their own Conspan Run. When working within Conspan, the designer can select file, export to rc-pier as an option. This produces a text file that contains all the dead and live loads within Conspan. When working within RC-Pier, the designer can then select auto-generate loads, import from Conspan, and select the text file they wish to use. Superstructure data from both runs must match exactly, including skew, in order to allow the loads to be imported.
- When generating live load combinations within RC-Pier, the designer can sometimes be left with 20 – 30 LL cases with only 1 braking or centrifugal case. RC-Pier does not allow a standard analysis when the number of braking and centrifugal cases does not match the same number of LL cases, thus requiring cross combinations to be generated. This can result in millions of analysis tables being generated, or several hours of analysis runs. To cut this time in half, or more, the designer can simply copy his braking and centrifugal force to match the number of LL combinations. This will allow the program to run standard combinations and cut the run time by almost 75%.
- Like above, the designer can look to reduce some of the generated wind cases to cut down on run time. Using discretion, the engineer could choose to only investigate 0, 30, and 60 degree wind angles, or simply 0 and 45 to reduce the number of cases.

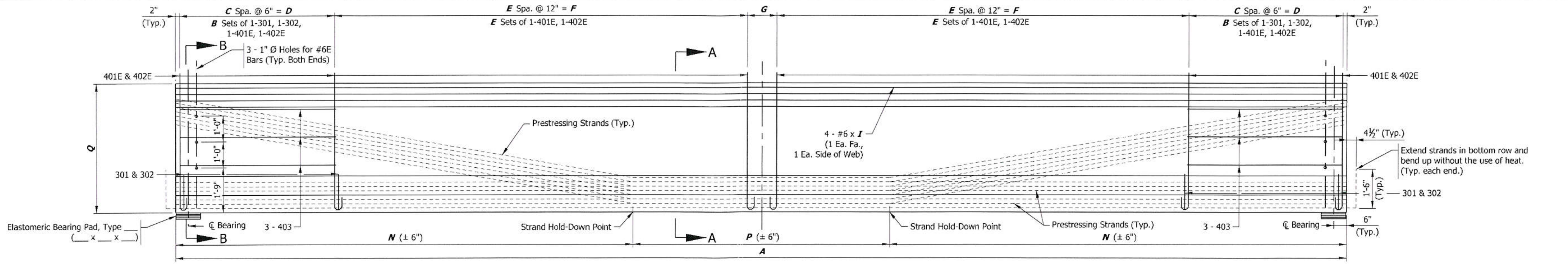
- When designing pier columns within seismic zones, the designer should adjust the minimum reinforcement area to meet AASHTO specific criterion for their specific seismic zone.

- When designing wall piers with more than 4 lanes of traffic, the designer must manually calculate and input the live load. The maximum number of lanes that can be input is 4.

Bridge Detailing

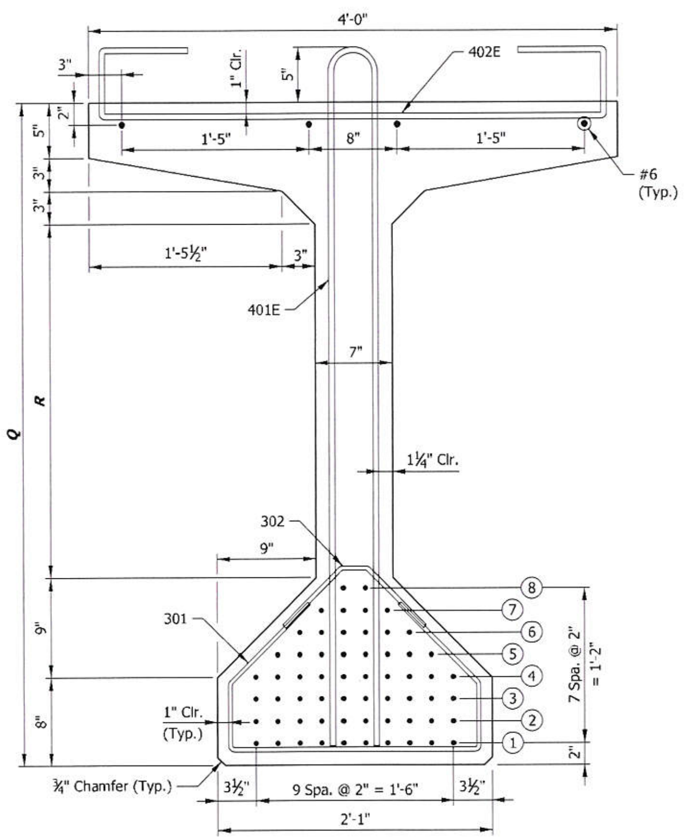
Hold-Down Points in Prestressed Beams - While not recommended as standard practice, but when needed, hold-down points may be staggered from 15" to 18" in order to facilitate the use of more draped strands and to minimize the hold-down force at an individual location.

Semi-integral End Bent Diaphragms - Ensure that the side faces of the keyways are parallel to the bridge/beams to allow for longitudinal movement.



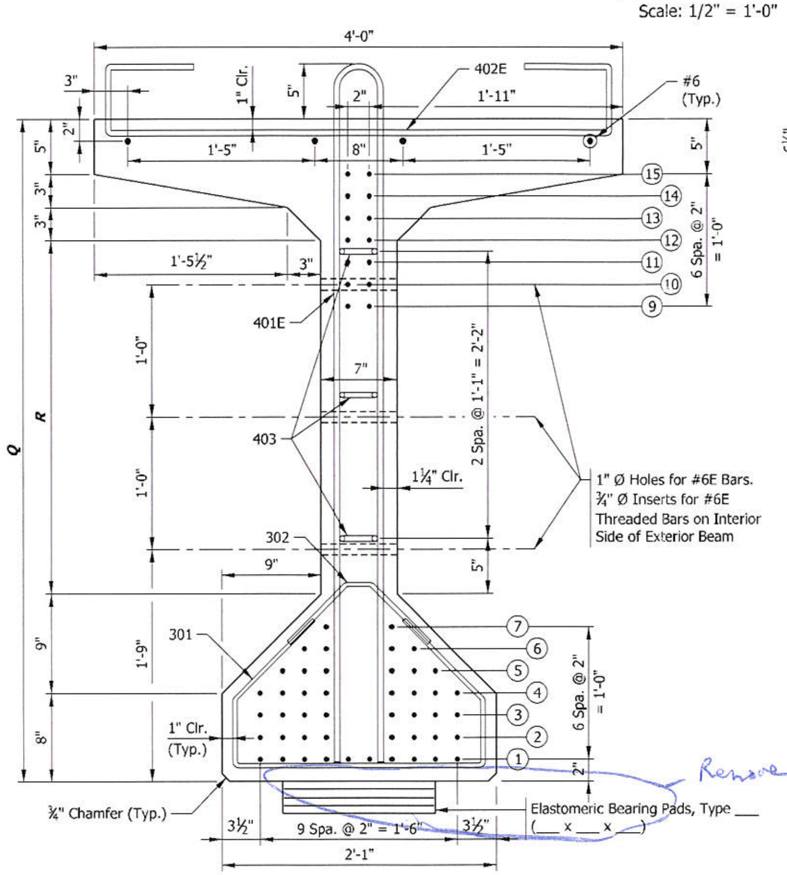
BEAM ELEVATION

Scale: 1/2" = 1'-0"



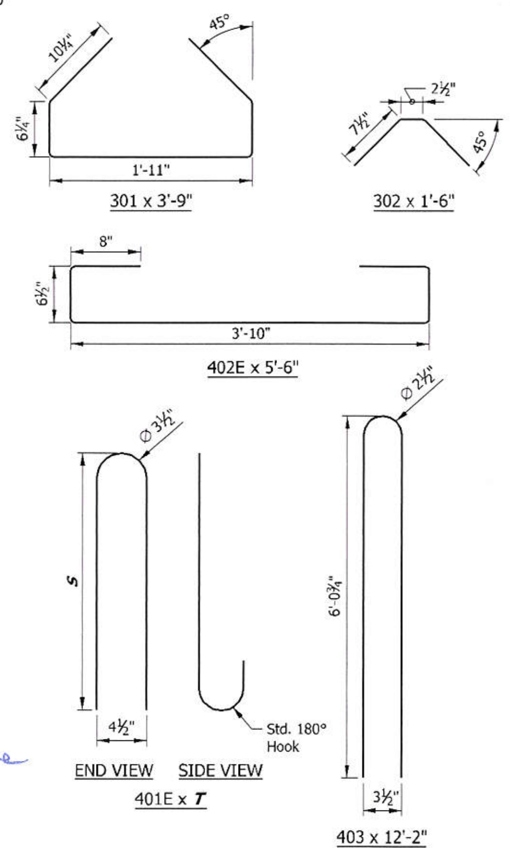
MIDSPAN SECTION A-A

Scale: 1" = 1'-1½"



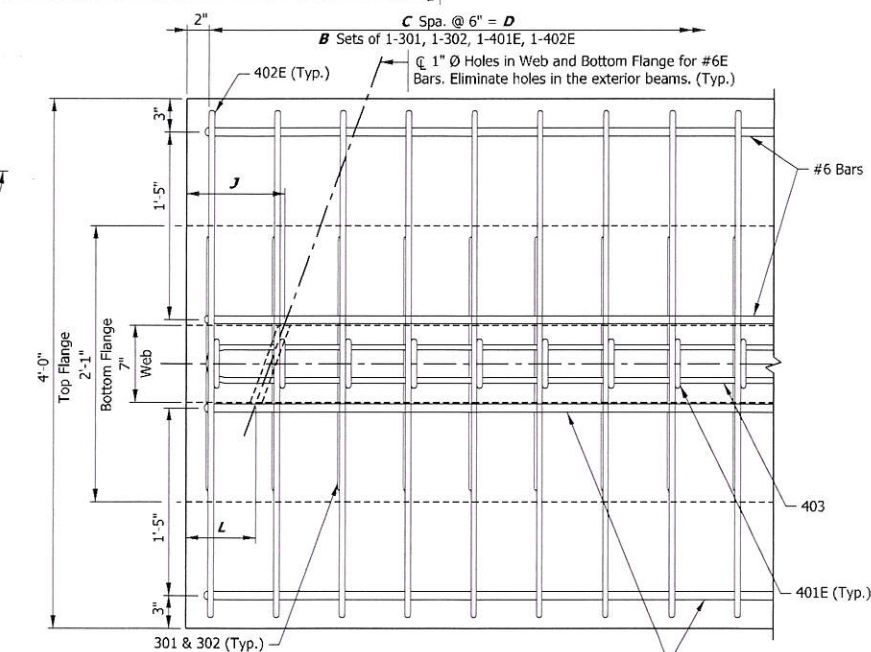
END SPAN SECTION B-B

Scale: 1" = 1'-1½"



BAR BENDING DETAILS

Not to Scale



TYPICAL END TREATMENT PLAN VIEW

Scale: 1½" = 1'-0"

PRESTRESSING STRAND DATA

SPAN	MIDSPAN (SECTION A-A) ①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	END (SECTION B-B) ①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	TOTAL NO.
A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	00

BEAM DATA

COUNTS & DIMENSIONS

A	B	C	D	E	F	F	G	H		J		L		N	P	Q	R	S	T
00'-0"	00	00	0'-0"	00	00'-0"	0'-0"	0'-0"	0'-0"		00⅝"		00⅝"		00'-0"	00'-0"	00'-0"	00'-0"	00'-0"	00'-0"

GENERAL NOTES - BEAMS

1. Beams shall be cast a minimum 15 days prior to pouring the deck.
2. Beams are to be lifted and supported at the bearing points during handling, storage, and transportation.
3. Estimated elastic shortening is 0.104 in.
4. Allowance in the beam length should be made during fabrication.
5. For Elastomeric Bearing Pads, see Standard Drawings E 726-BEBP-01 through -03.
6. For Fabrication Tolerances of Prestressed Beams, see Standard Drawings E 707-BPBF-01 through -04.
7. For Reinforcing Bar Notes, see Standard Drawing E 703-BRST-01.
8. Reinforcing bars designated "E" shall be epoxy coated.
9. Suitable restraint shall be provided to prevent the rotation of the beams, particularly the outside beam, from construction load, such as the weight of the concrete deck, finishing machine, forms, etc.

DESIGN DATA

This bridge designed for HL-93 loading in accordance with AASHTO LRFD.
Prestressing steel shall be 0.5" uncoated, low relaxation, seven-wire strand, 270 ksi (ASTM A416).
Initial pull per strand, 202.5 kips.
Concrete strength at release, f'_{ci} = 6,000 psi.
Concrete strength at 28 days, f'_c = 7,000 psi.
Reinforcing steel shall be Grade 60 ksi minimum yield strength.

TABLE OF CAMBERS (in.)

	SPAN A	SPAN B	SPAN C	SPAN D	SPAN E	SPAN F	SPAN G
Initial Camber	0.000						
Dead Load Deflection	0.000	use nearest 1/8" or so.					
Residual Camber	0.000						

PE SEAL

RECOMMENDED FOR APPROVAL $ENG_SIGNATURE$ SIG_DT
DESIGN ENGINEER DATE

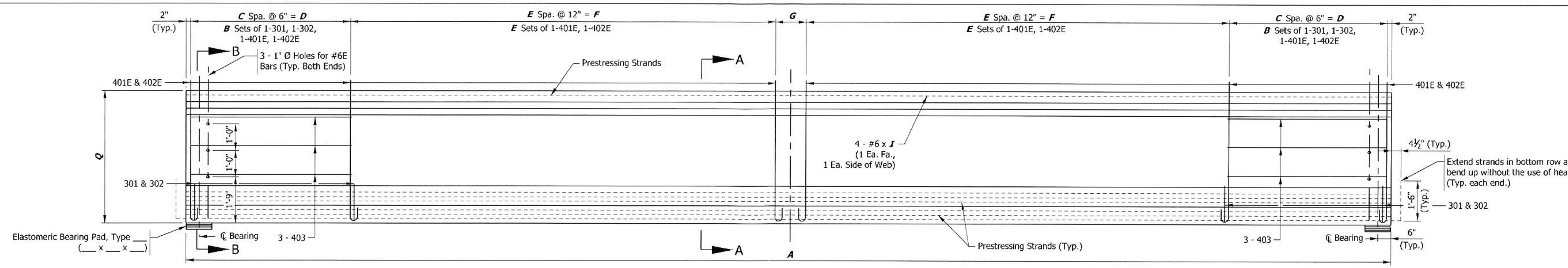
DESIGNED: $DESBY$ DES_DT DRAWN: $DWNBY$ DWN_DT
CHECKED: $DESCHKBY$ $DESCHKBY_DATE$ CHECKED: $DWNCHKBY$ $DWNCHK_DT$

INDIANA
DEPARTMENT OF TRANSPORTATION

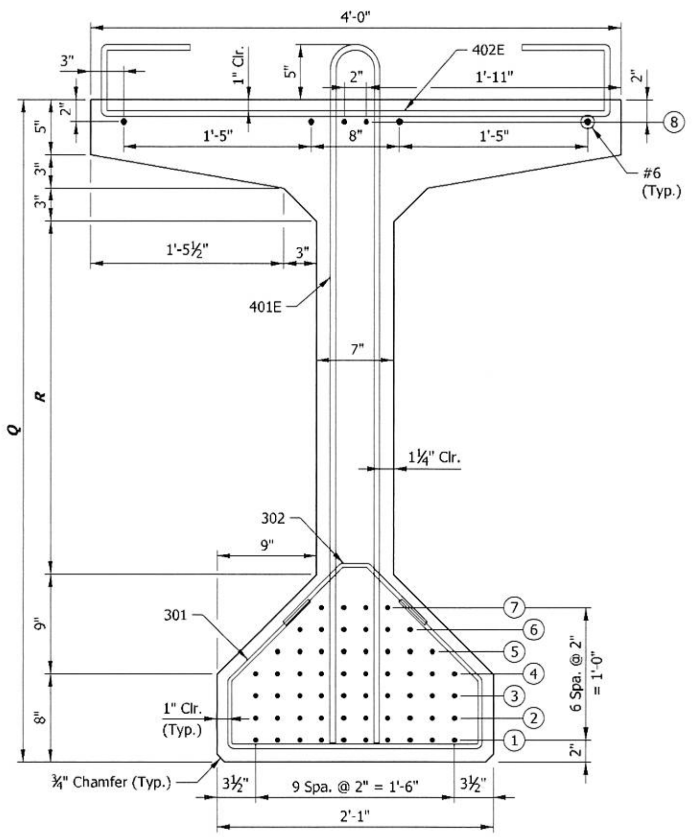
BEAM DETAILS
BULB-TEE BEAM, 7" WEB X 48" TOP

SCALE	BRIDGE FILE
AS NOTED	12345
	DESIGNATION
	0001250
SURVEY BOOK	SHEETS
12345	$PAGE_NUM$ of $TOTAL_PAGES$
CONTRACT	PROJECT
R-25542	12345

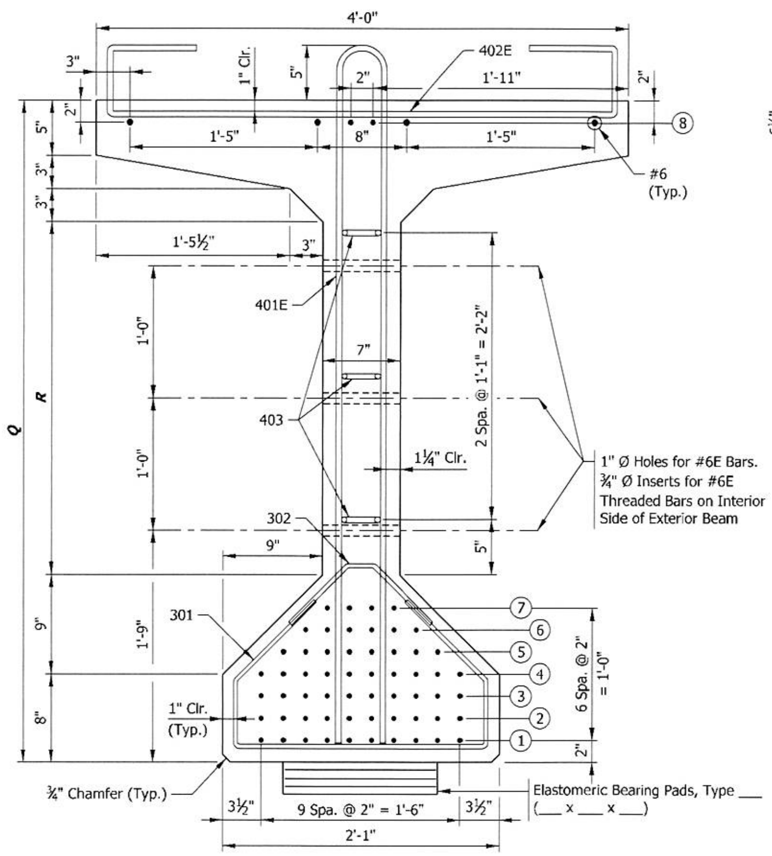
$FILE$



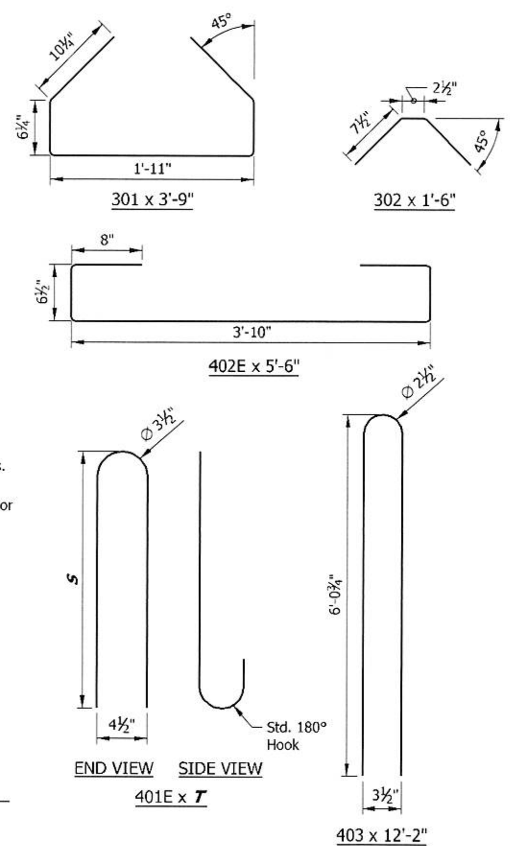
BEAM ELEVATION
Scale: 1/2" = 1'-0"



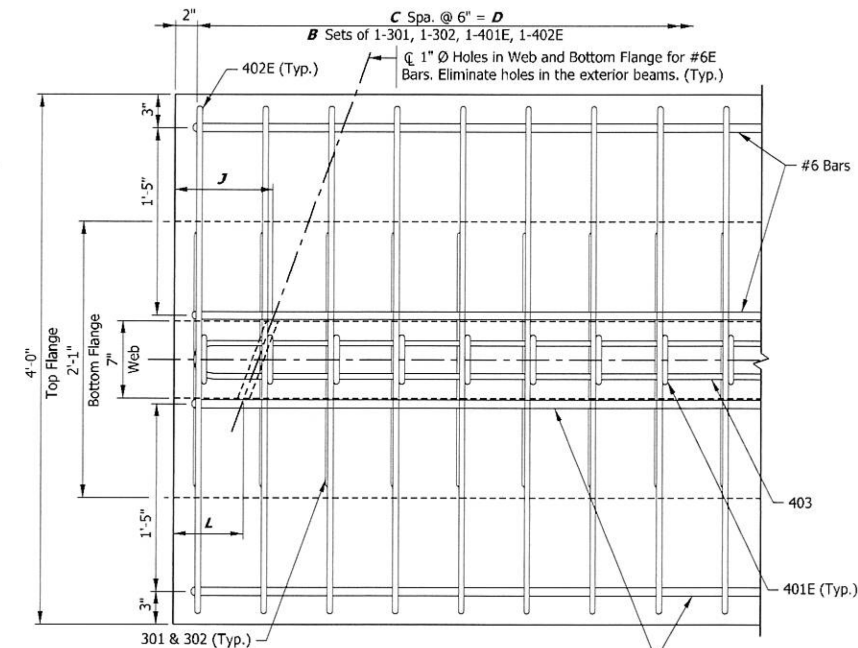
MIDSPAN SECTION A-A
Scale: 1" = 1'-1½"



END SPAN SECTION B-B
Scale: 1" = 1'-1½"



BAR BENDING DETAILS
Not to Scale



TYPICAL END TREATMENT PLAN VIEW
Scale: 1½" = 1'-0"

GENERAL NOTES - BEAMS

1. Beams shall be cast a minimum 15 days prior to pouring the deck.
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4. Allowance in the beam length should be made during fabrication.
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Concrete strength at 28 days, f'_c = 7,000 psi.
Reinforcing steel shall be Grade 60 ksi minimum yield strength.

PRESTRESSING STRAND DATA

SPAN	MIDSPAN (SECTION A-A)																END (SECTION B-B)																TOTAL NO.
	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	
A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	00

BEAM DATA

COUNTS & DIMENSIONS																			
A	B	C	D	E	F	F	G	H		J		L		N	P	Q	R	S	T
00'-0"	00	00	0'-0"	00	00'-0"	0'-0"	0'-0"	0'-0"		00%"		00%"		00'-0"	00'-0"	00'-0"	00'-0"	00'-0"	00'-0"

TABLE OF CAMBERS (in.)

	SPAN A	SPAN B	SPAN C	SPAN D	SPAN E	SPAN F	SPAN G
Initial Camber	0.000						
Dead Load Deflection	0.000						
Residual Camber	0.000						

PE SEAL

RECOMMENDED FOR APPROVAL $ENG_SIGNATURE$ SIG_DT
DESIGN ENGINEER DATE

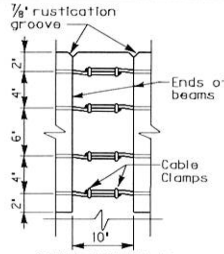
DESIGNED: $DESBY$ DES_DT DRAWN: $DWNBY$ DWN_DT
CHECKED: $DESCHKBY$ $DESCHKBY_DATE$ CHECKED: $DWNCHKBY$ $DWNCHK_DT$

INDIANA
DEPARTMENT OF TRANSPORTATION

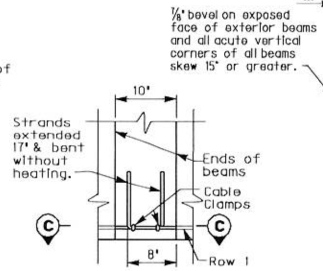
BEAM DETAILS
BULB-TEE BEAM, 7" WEB X 48" TOP

SCALE	BRIDGE FILE
AS NOTED	12345
	DESIGNATION
	0001250
SURVEY BOOK	SHEETS
12345	$PAGE_NUM$ of $TOTAL_PAGES$
CONTRACT	PROJECT
R-25542	12345

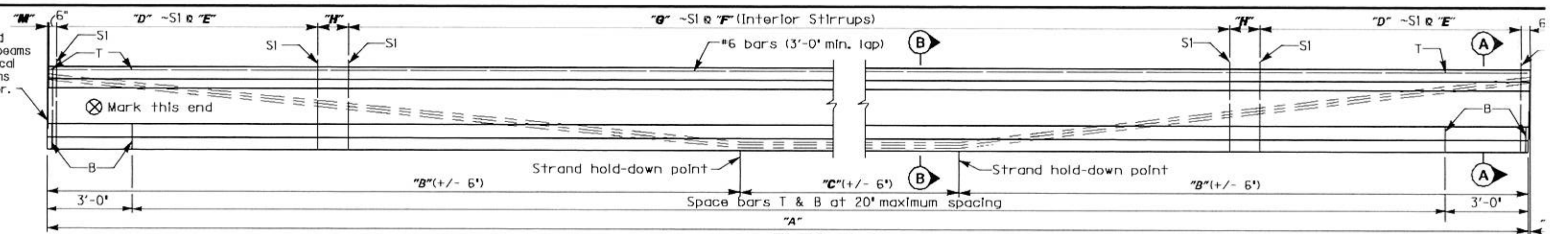
$FILE$



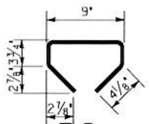
SECTION C–C



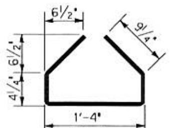
STRAND SPLICE DETAIL



ELEVATION OF BEAM

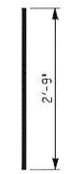


T Bar
~Size #4~



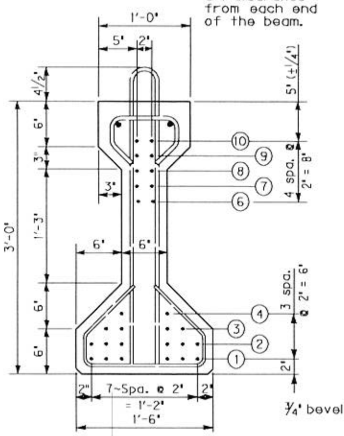
B Bar
~Size #3~

S1(e)
~Size #4~

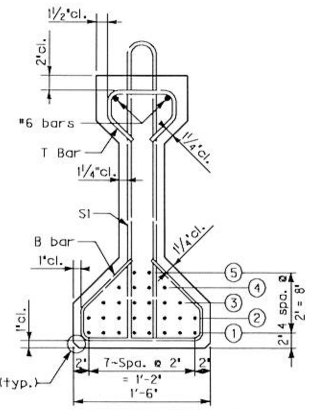


S2
~Size #5~

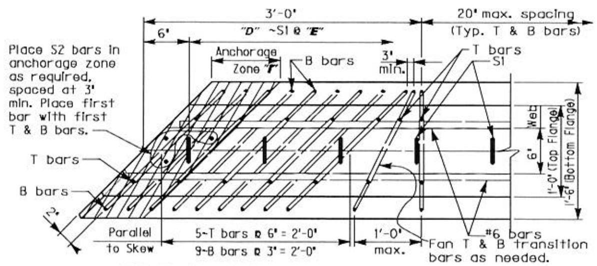
NOTE: Ensure #6 bars maintain a 1" clearance from each end of the beam.



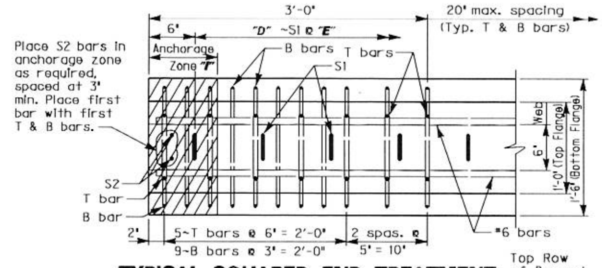
SECTION A–A



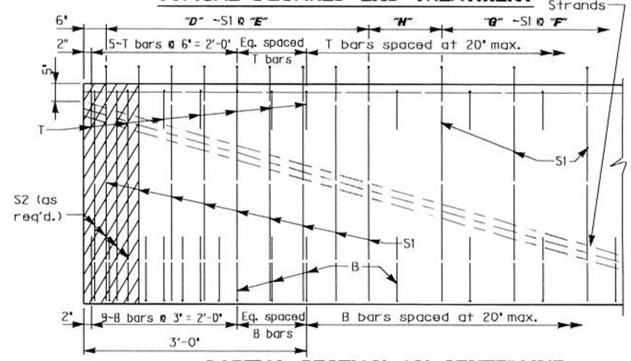
SECTION B–B



TYPICAL SKEWED END TREATMENT



TYPICAL SQUARED END TREATMENT



PARTIAL SECTION ON CENTERLINE

General Notes

CONCRETE: Ensure prestressed girder concrete is in accordance with these plans and the specifications.

MATERIALS DESIGN SPECIFICATIONS: For prestressed beams:
FY = 60,000 psi F'S = 270,000 psi

PRESTRESSING REINFORCEMENT: Ensure that strands are ½" (nominal diameter, 0.153 sq. in.), uncoated seven-wire stress relieved, low-relaxation conforming to AASHTO M 203, Grade 270. Billing of the cost for redesign of beam and subsequent plan modifications will be made for any request of alternate strand type or arrangement. The designer of the original plans is responsible for the billing and work.

CONSTRUCTION METHOD: Pretension all beams. Ensure concrete has attained f'ci (shown in the table) in standard test cylinders that are made and cured identically with the beams without bond stresses being transferred to the concrete or releasing the end anchors. Attain f'c (shown in the table) at or prior to 28 days. Apply an initial force of 31,003 lbs. per low-relaxation strand to develop a stress of 202,500 psi. No beam will be accepted that is honeycombed to the extent that strength of the beam or resistance to deterioration has been affected. An allowance of 0.0005L is made for shortening of beams due to shrinkage and elastic change. Show a detensioning plan by sequential numbering of the strand pattern on the shop plans.

LIFTING DEVICES: Detail lifting devices on the shop plans. Loads are to be distributed equally to each device.

BEARING DEVICES: Include the price for lead plates and/or bearing pads in the bid for precast beams.

FABRICATION: The "Maximum Allowable Camber" shown on the beam sheet is the amount of camber, measured prior to casting the deck, above which the beam will begin to encroach into the slab. If the measured camber is greater than the "Maximum Allowable Camber" the contractor will be responsible for any necessary adjustments to assure a minimum slab thickness of eight (8) inches as shown in the plans. This work will be considered incidental to the completion of the structure and have the approval of the Engineer.

Mark	*Strand Data with number indicated in rows* Midspan (SECTION B–B)								End (SECTION A–A)																Total	Concrete Stress (psi)		No. of S Bars		Hold-Down Capacity	*Beam Data (measured along centerline)* Total	Dimensions											Approximate Weight	Maximum Allowable Camber
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	No.	f'ci	f'c	S1	S2	lbs.	No.	A	B	C	D	E	F	G	H	I		M		

REVISION	DA

DATE: | CHECKED BY
DESIGNED BY:
DETAILED BY:

Commonwealth of Kentucky
DEPARTMENT OF HIGHWAYS

COUNTY

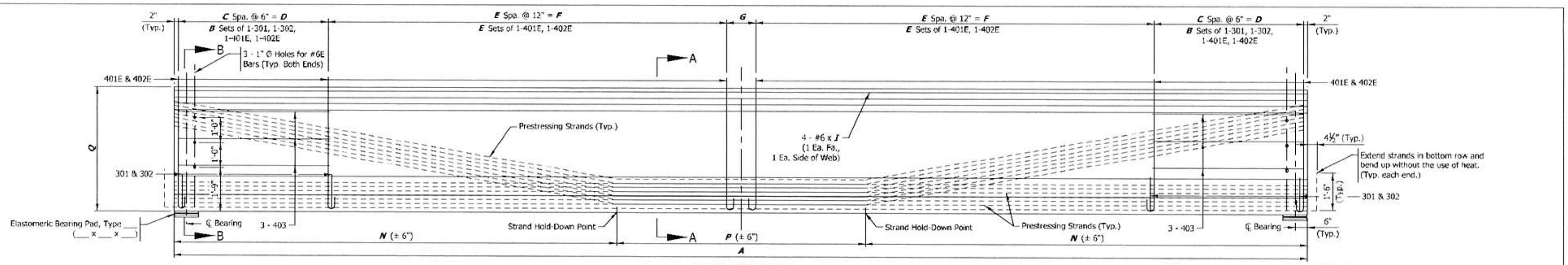
ROUTE | CROSSING

ITEM NUMBER

PPC I-BEAM, TYPE 2, DETAILS

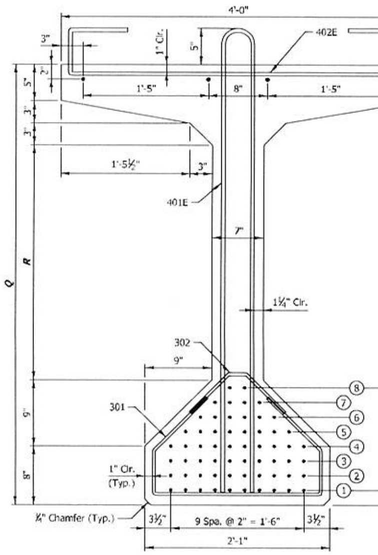
PREPARED BY
Division of Structural Design

SHEE
DRAWI



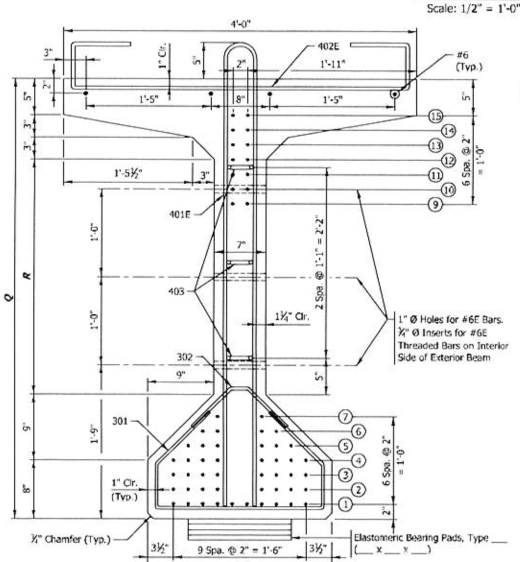
BEAM ELEVATION

Scale: 1/2" = 1'-0"



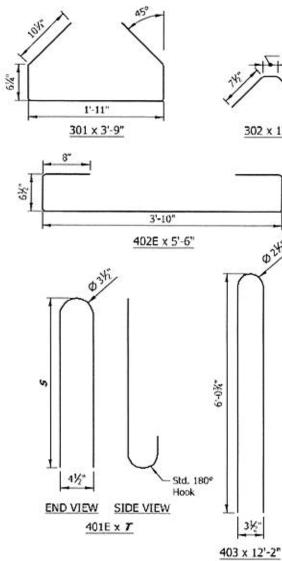
MIDSPAN SECTION A-A

Scale: 1" = 1'-1½"



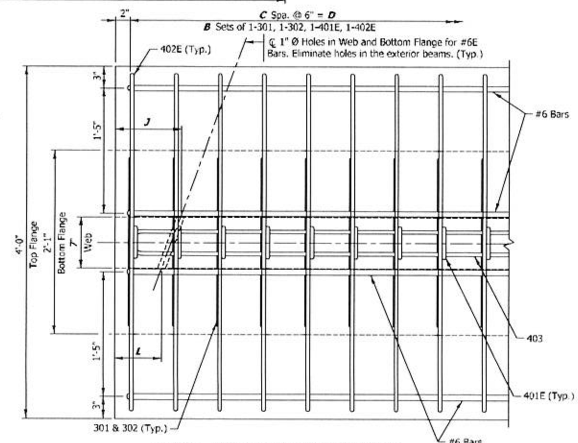
END SPAN SECTION B-B

Scale: 1" = 1'-1½"



BAR BENDING DETAILS

Not to Scale



TYPICAL END TREATMENT PLAN VIEW

Scale: 1½" = 1'-0"

GENERAL NOTES - BEAMS

1. Beams shall be cast a minimum 15 days prior to pouring the deck.
2. Beams are to be lifted and supported at the bearing points during handling, storage, and transportation.
3. Estimated elastic shortening is 0.104 in.
4. Allowance in the beam length should be made during fabrication.
5. For Elastomeric Bearing Pads, see Standard Drawings E 726-BEBP-01 through -03.
6. For Fabrication Tolerances of Prestressed Beams, see Standard Drawings E 707-BPBF-01 through -04.
7. For Reinforcing Bar Notes, see Standard Drawing E 703-BRST-01.
8. Reinforcing bars designated "E" shall be epoxy coated.
9. Suitable restraint shall be provided to prevent the rotation of the beams, particularly the outside beam, from construction load, such as the weight of the concrete deck, finishing machine, forms, etc.

DESIGN DATA

This bridge designed for HL-93 loading in accordance with AASHTO LRFD.
Prestressing steel shall be 0.5" uncoated, low relaxation, seven-wire strand, 270 ksi (ASTM A416).
Initial pull per strand, 202.5 kips.
Concrete strength at release, f'_{ci} = 6,000 psi.
Concrete strength at 28 days, f'_c = 7,000 psi.
Reinforcing steel shall be Grade 60 ksi minimum yield strength.

PRESTRESSING STRAND DATA

SPAN	MIDSPAN (SECTION A-A) ①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	END (SECTION B-B) ①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	TOTAL NO.
A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	00

BEAM DATA

COUNTS & DIMENSIONS

A	B	C	D	E	F	F	G	H	J	L	N	P	Q	R	S	T
00'-0"	00	00	0'-0"	00	00'-0"	0'-0"	0'-0"	0'-0"	00⅝"	00⅝"	00'-0"	00'-0"	00'-0"	00'-0"	00'-0"	00'-0"

TABLE OF CAMBERS (in.)

	SPAN A	SPAN B	SPAN C	SPAN D	SPAN E	SPAN F	SPAN G
Initial Camber	0.000						
Dead Load Deflection	0.000						
Residual Camber	0.000						

PE SEAL

RECOMMENDED FOR APPROVAL $ENG_SIGNATURE$ DESIGN ENGINEER SIG_DT DATE

DESIGNED: $DESBY$ DES_DT DRAWN: $DWNBY$ DWN_DT

CHECKED: $DESCHKBY$ $DESCHKBY_DATE$ CHECKED: $DWNCHKBY$ $DWNCHK_DT$

INDIANA
DEPARTMENT OF TRANSPORTATION

BEAM DETAILS
BULB-TEE BEAM, 7" WEB X 48" TOP

SCALE	BRIDGE FILE	
AS NOTED	12345	
	DESIGNATION	
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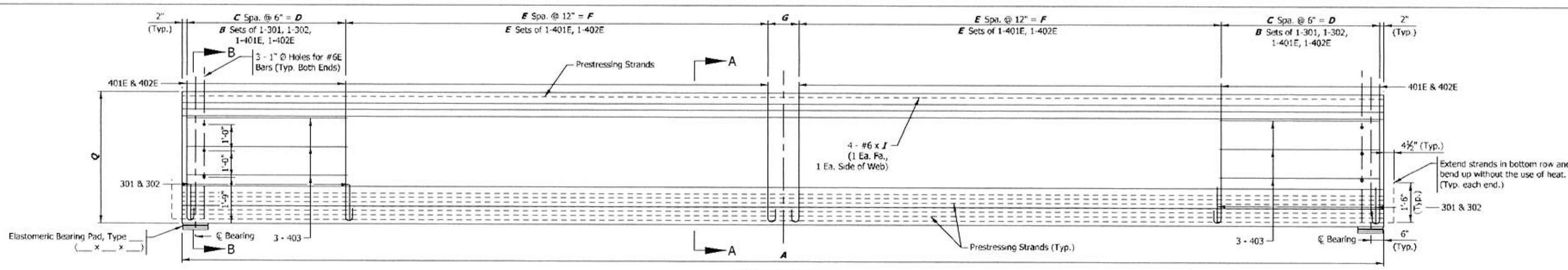
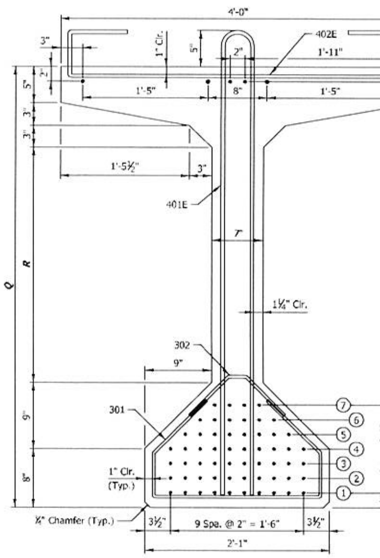
SURVEY BOOK	SHEETS	
12345	$PAGE_NUM$	of $TOTAL_PAGES$
CONTRACT	PROJECT	
R-25542	12345	

$FILE$



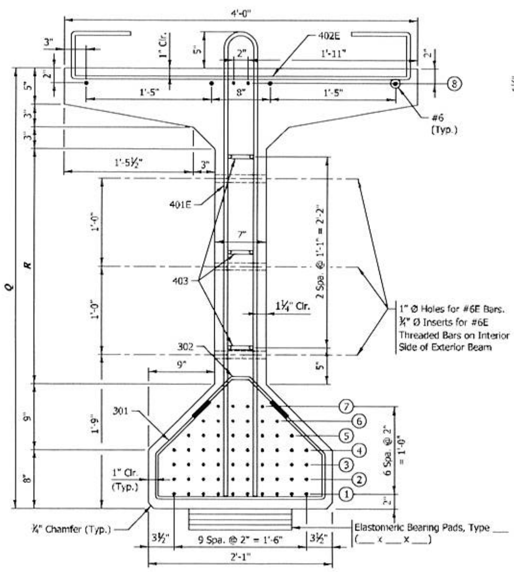
BEAM ELEVATION

Scale: 1/2" = 1'-0"



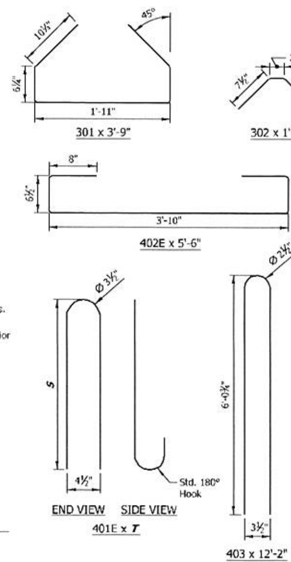
MIDSPAN SECTION A-A

Scale: 1" = 1'-1½"



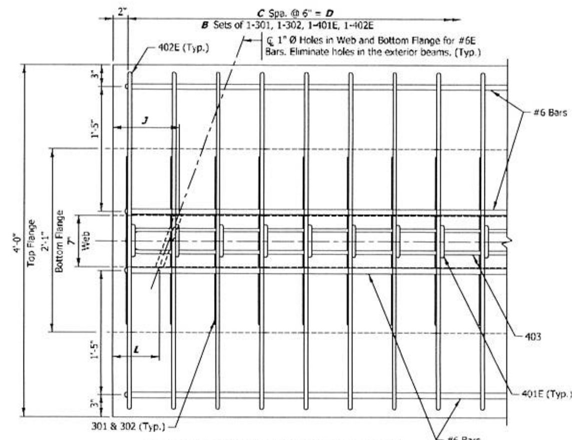
END SPAN SECTION B-B

Scale: 1" = 1'-1½"



BAR BENDING DETAILS

Not to Scale



TYPICAL END TREATMENT PLAN VIEW

Scale: 1½" = 1'-0"

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Reinforcing steel shall be Grade 60 ksi minimum yield strength.

PRESTRESSING STRAND DATA

SPAN	MIDSPAN (SECTION A-A) ①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	END (SECTION B-B) ①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	TOTAL NO.
A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	00

BEAM DATA

COUNTS & DIMENSIONS

A	B	C	D	E	F	F	G	H		J		L		N	P	Q	R	S	T
00'-0"	00	00	0'-0"	00	00'-0"	0'-0"	0'-0"	0'-0"		00⅝"		00⅝"		00'-0"	00'-0"	00'-0"	00'-0"	00'-0"	00'-0"

TABLE OF CAMBERS (in.)

	SPAN A	SPAN B	SPAN C	SPAN D	SPAN E	SPAN F	SPAN G
Initial Camber	0.000						
Dead Load Deflection	0.000						
Residual Camber	0.000						

PE SEAL

RECOMMENDED FOR APPROVAL $ENG_SIGNATURE$ — DESIGN ENGINEER — SIG_DT DATE

DESIGNED: $DESBY$ DES_DT | DRAWN: $DWNBY$ DWN_DT

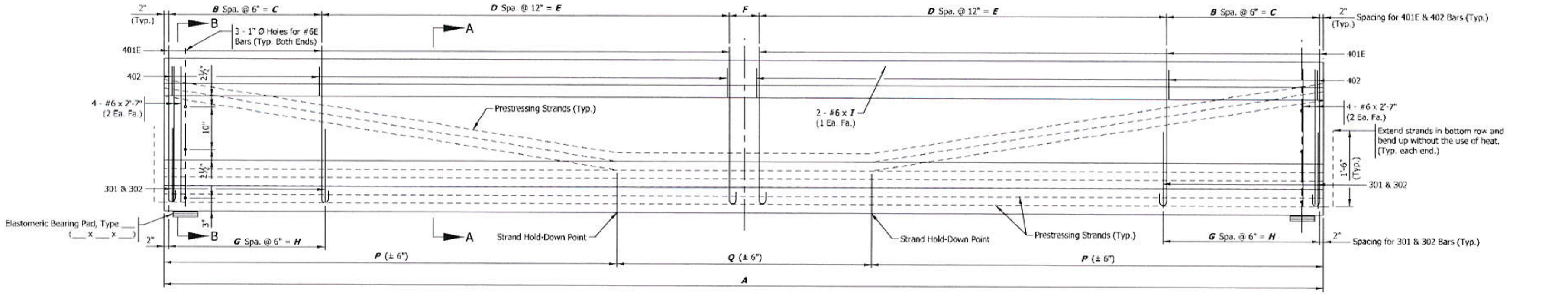
CHECKED: $DESCHKBY$ $DESCHKBY_DATE$ | CHECKED: $DWNCHKBY$ $DWNCHK_DT$

INDIANA
DEPARTMENT OF TRANSPORTATION

BEAM DETAILS
BULB-TEE BEAM, 7" WEB X 48" TOP

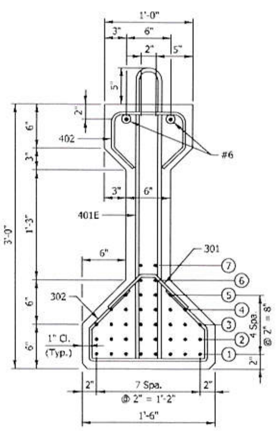
SCALE	BRIDGE FILE
AS NOTED	12345
	DESIGNATION
	0001250
SURVEY BOOK	SHEETS
12345	$PAGE_NUM$ of $TOTAL_PAGES$
CONTRACT	PROJECT
R-25542	12345

$FILE$



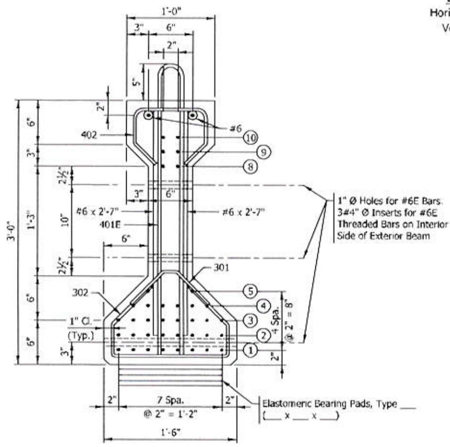
BEAM ELEVATION

Horizontal Scale: 1/2" = 1'-0"
Vertical Scale: 1" = 1'-0"



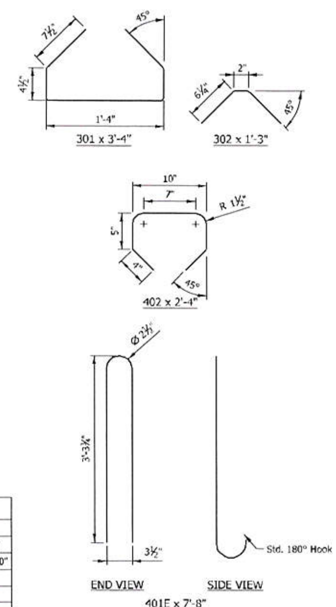
MIDSPAN SECTION A-A

Scale: 1" = 1'-1½"

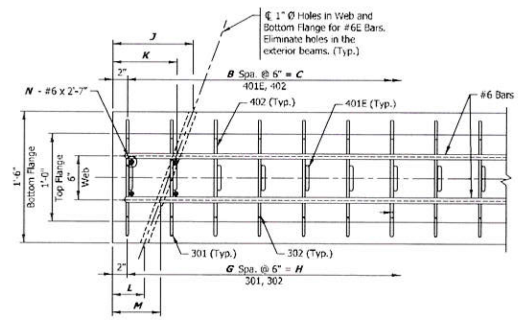


END SPAN SECTION B-B

Scale: 1" = 1'-1½"



BAR BENDING DETAILS



TYPICAL END TREATMENT PLAN VIEW

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SPAN	MIDSPAN (SECTION A-A) ①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	END (SECTION B-B) ①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	TOTAL NO.
A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	00

BEAM DATA

COUNTS & DIMENSIONS

A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	Q
00'-0"	00	0'-0"	00	00'-0"	0'-0"	00	0'-0"	0'-0"	00⅝"	00⅝"	00⅝"	00⅝"	0	00'-0"	00'-0"

TABLE OF CAMBERS (in.)

	SPAN A	SPAN B	SPAN C	SPAN D	SPAN E	SPAN F	SPAN G	SPAN H
Initial Camber	0.000							
Dead Load Deflection	0.000							
Residual Camber	0.000							

PE SEAL

RECOMMENDED FOR APPROVAL $ENG_SIGNATURE$ DESIGN ENGINEER SIG_DT DATE

DESIGNED: $DESBY$ DES_DT DRAWN: $DWNBY$ DWN_DT

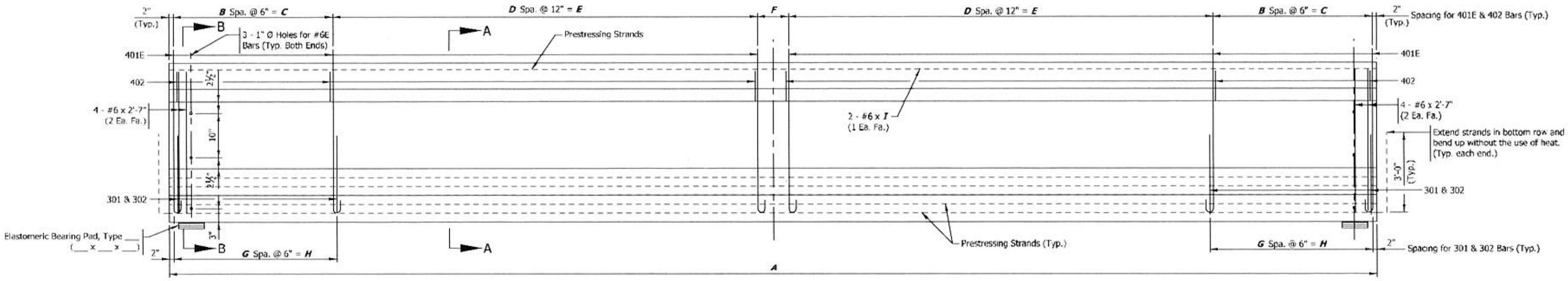
CHECKED: $DESCHKBY$ $CHKBY_DATE$ CHECKED: $DWNCHKBY$ $DWNCHK_DT$

INDIANA
DEPARTMENT OF TRANSPORTATION

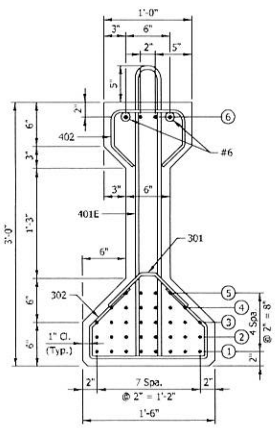
BEAM DETAILS
AASHTO I-BEAM, TYPE II

SCALE	BRIDGE FILE
AS NOTED	12345
	DESIGNATION
	0001250
SURVEY BOOK	SHEETS
12345	$PAGE_NUM$ of $TOTAL_PAGES$
CONTRACT	PROJECT
R-25542	12345

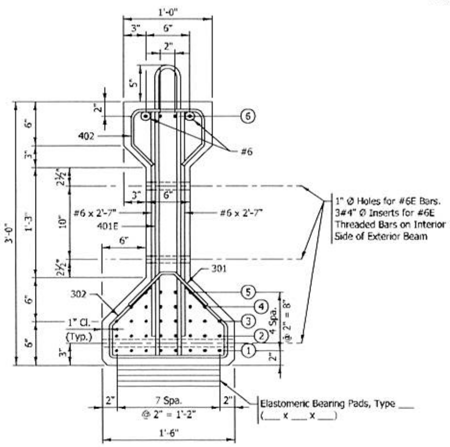
$FILE$



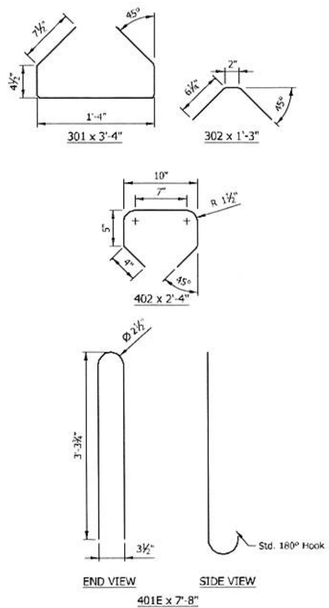
BEAM ELEVATION
Horizontal Scale: 1/2" = 1'-0"
Vertical Scale: 1" = 1'-0"



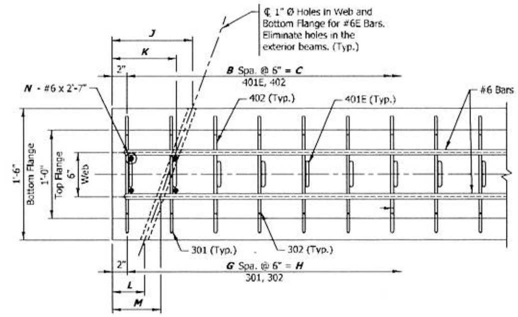
MIDSPAN SECTION A-A
Scale: 1" = 1'-1½"



END SPAN SECTION B-B
Scale: 1" = 1'-1½"



BAR BENDING DETAILS



TYPICAL END TREATMENT PLAN VIEW
Scale: 1½" = 1'-0"

GENERAL NOTES - BEAMS

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PRESTRESSING STRAND DATA

SPAN	MIDSPAN (SECTION A-A) ①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	END (SECTION B-B) ①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	TOTAL NO.
A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	00

BEAM DATA

COUNTS & DIMENSIONS

A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	Q
00'-0"	00	0'-0"	00	00'-0"	0'-0"	00	0'-0"	0'-0"	00⅝"	00⅝"	00⅝"	00⅝"	0	00'-0"	00'-0"

TABLE OF CAMBERS (in.)

	SPAN A	SPAN B	SPAN C	SPAN D	SPAN E	SPAN F	SPAN G	SPAN H
Initial Camber	0.000							
Dead Load Deflection	0.000							
Residual Camber	0.000							

PE SEAL

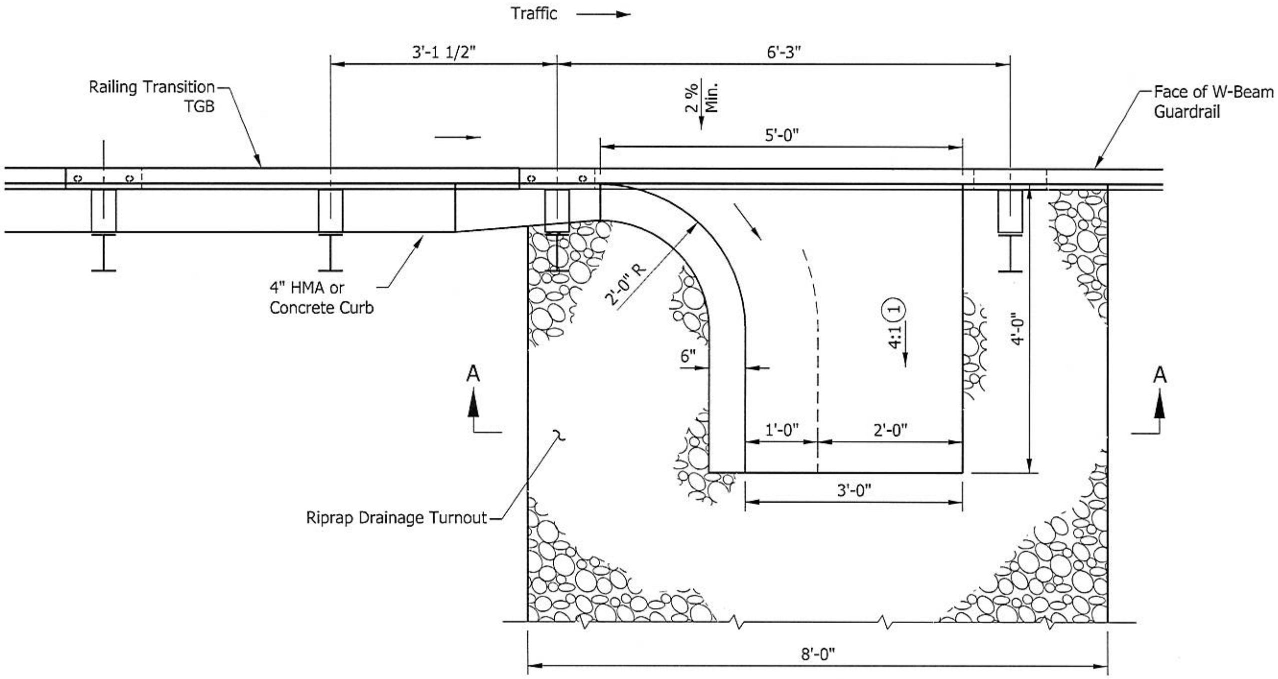
RECOMMENDED FOR APPROVAL	$ENG_SIGNATURE$ DESIGN ENGINEER		SIG_DT DATE
DESIGNED: $DESBY$	DES_DT	DRAWN: $DWNBY$	DWN_DT
CHECKED: $DESCHKBY$	$DESCHKBY_DATE$	CHECKED: $DWNCHKBY$	$DWNCHK_DT$

INDIANA
DEPARTMENT OF TRANSPORTATION

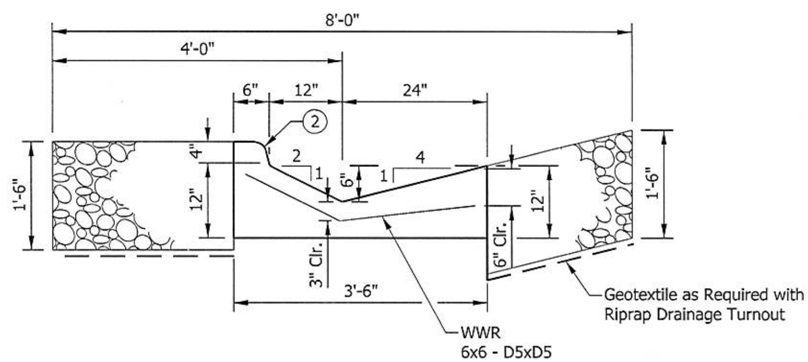
BEAM DETAILS
AASHTO I-BEAM, TYPE II

SCALE	BRIDGE FILE
AS NOTED	12345
	DESIGNATION
	0001250
SURVEY BOOK	SHEETS
12345	$PAGE_NUM$ of $TOTAL_PAGES$
CONTRACT	PROJECT
R-25542	12345

$FILE$



PLAN



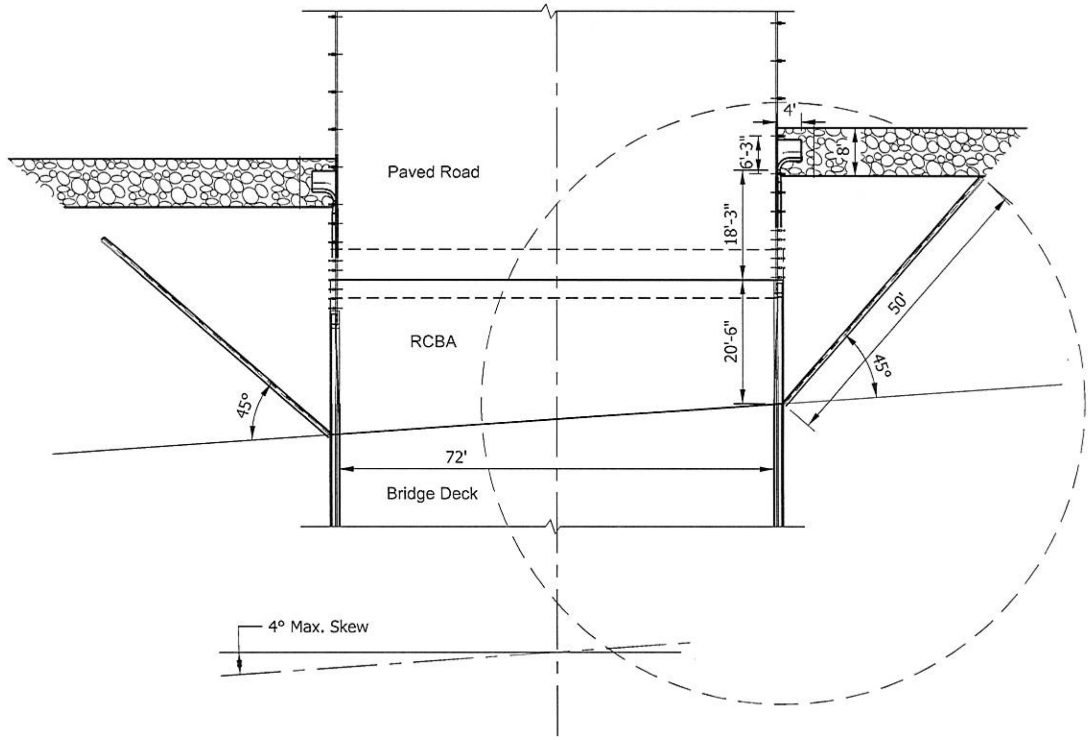
SECTION A-A

NOTES:

1. Slope may be steeper than 4:1 as necessitated by site conditions.
2. Field-shape front face of curb to match HMA curb face.

MODIFIED CONCRETE CURB TURNOUT

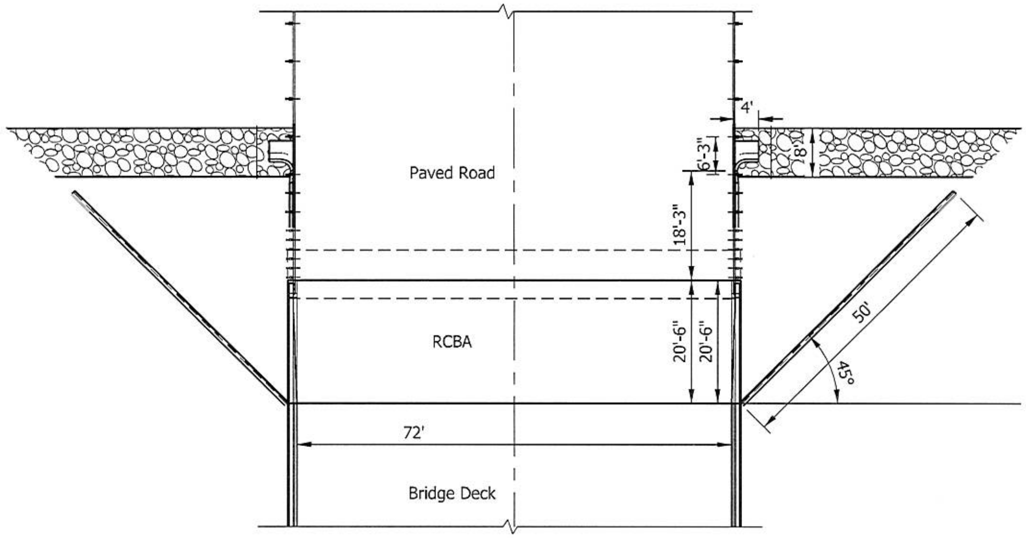
FEBRUARY 2013



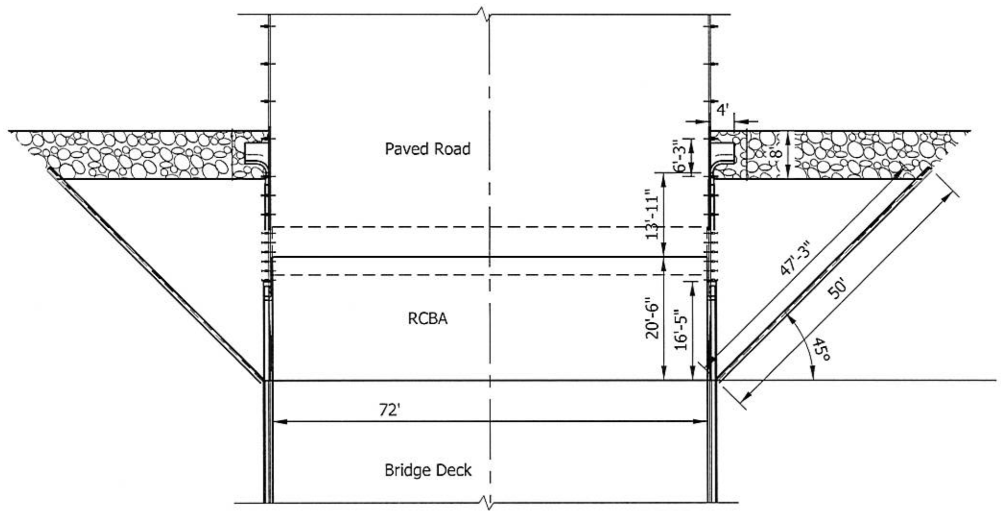
Scale: 1" = 20'

CONCRETE CURB TURNOUT AT MSE WALL
SKEW APPROACH

FEBRUARY 2013



FT BRIDGE RAILING
TFT BRIDGE RAILING TRANSITION



FC BRIDGE RAILING
TFC BRIDGE RAILING TRANSITION

Scale: 1" = 20'

CONCRETE CURB TURNOUT AT MSE WALL
SQUARE APPROACH

FEBRUARY 2013