Orlando, FL

November 7-8, 2024

2024 TRANSPORTATION SYMPOSIUM

Use of ACROW Bridges on FDOT Projects

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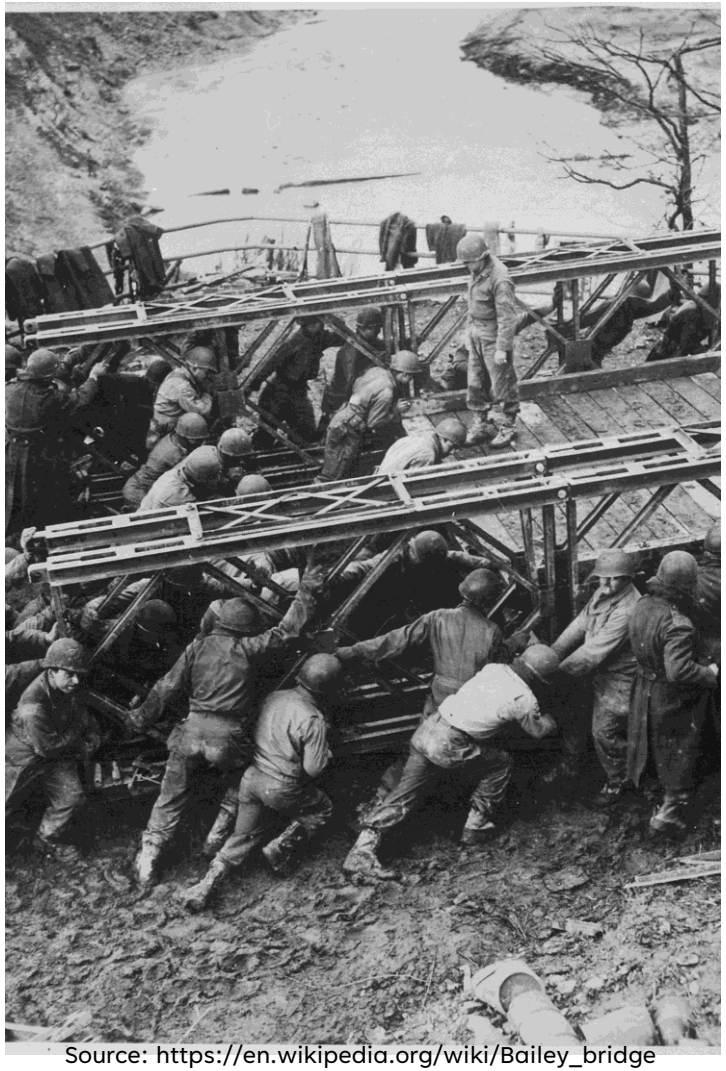
FDOT | ACROW

FDOT

Objectives

- What is ACROW?
- What does the Department own?
- How to request it?
- How to Deploy 300 Series
- How to Deploy 700XS Series
  - ACROW Bridge Design & Construction Considerations
  - ACROW 700XS® / FDOT Standards
  - Installation methods
  - Examples

What is ACROW Bridging?



Source: https://en.wikipedia.org/wiki/Bailey_bridge

- Proprietary steel design derived from the original Bailey Bridge of WWII
- World leader in design, engineering and manufacture of prefabricated modular steel bridges
- Headquartered in Parsippany, NJ
- Offices across USA, Canada, Italy, UK, Poland
- Manufacturing facilities in Milton, PA; and Lydney, Gloucestershire, UK
- Staging yards in Lafayette, NJ; Eden, NC; and Centralia, WA

What is ACROW Bridging?

ISO 9001
CERTIFIED

AISC CERTIFIED FABRICATOR

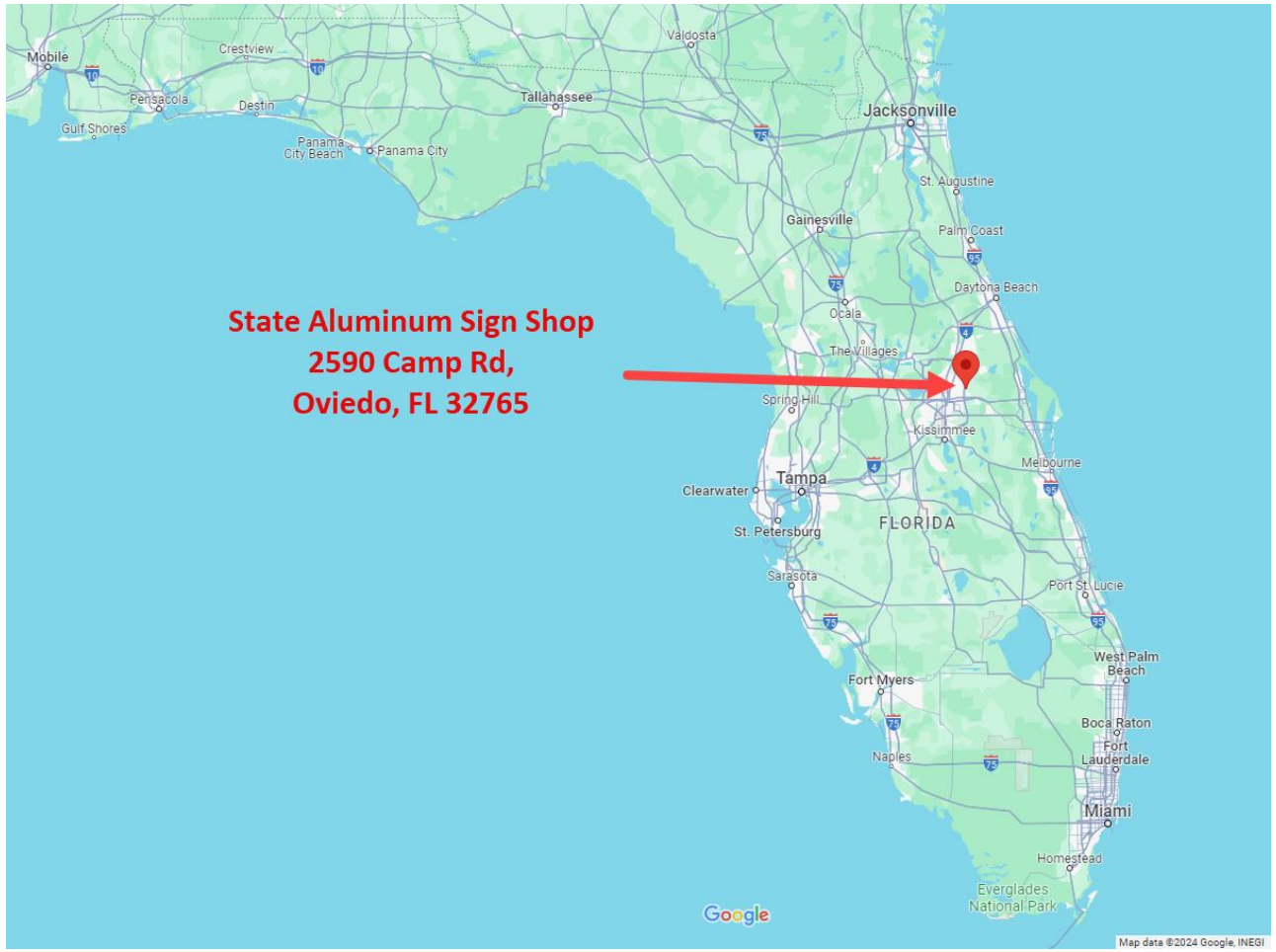
Advance Major Bridge w/ fracture critical endorsement

NATIONAL STEEL BRIDGE ALLIANCE
NSBA
FOUNDED 1995

MADE IN USA

SHORT SPAN STEEL
BRIDGE ALLIANCE™

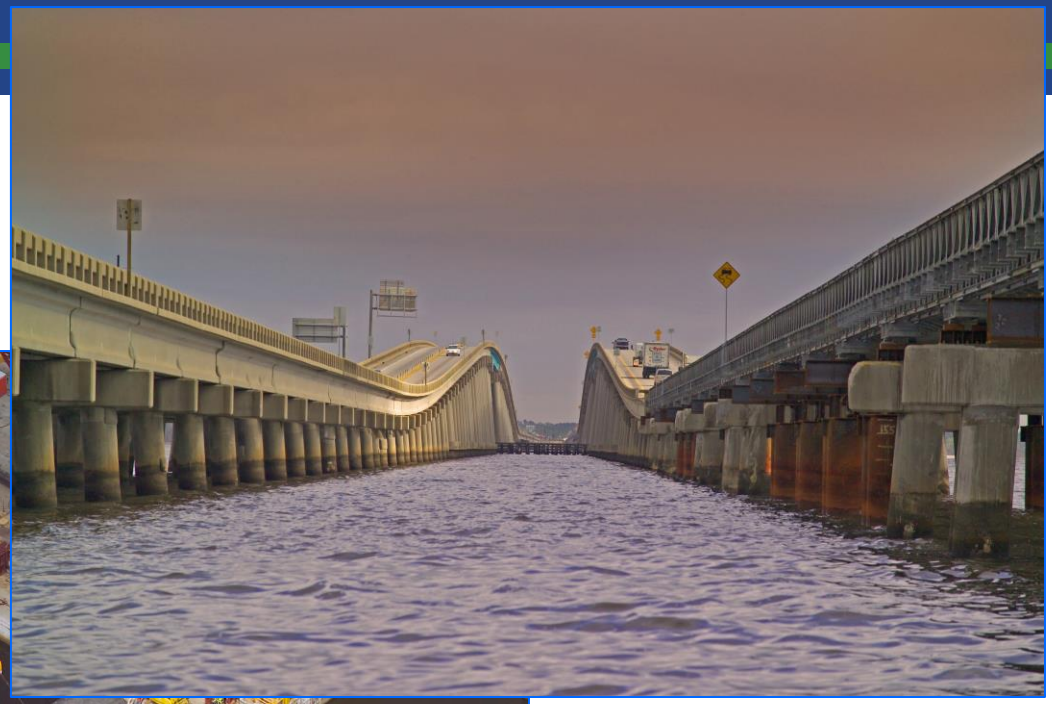
What is ACROW Bridging?



- Initial bridging created in 1989
  - Combination of Bailey Bridging and ACROW
- Virtually all single laned bridging initially
- Previous Inventory Locations
  - Defuniak Springs – NW Florida
  - S. Dade – South Florida
- Current Location
  - Oviedo – Central Florida

What does the Department own?

- I-10 Escambia Bay Bridges suffered damage.
- 45 roadway sections removed
- 25 concrete piers reconstructed
- 3,720 LF of ACROW Bridge
  - 300 Series



https://www.massman.net/project/display/338

What does the Department own?

- In June 2007 Bailey bridging was released to District 3
  - Much of it ended up with Forestry Department
- Defuniak yard was eliminated
- South Dade yard inventory moved to Oviedo
- Old extra wide single lane ACROW was ultimately surplused.
  - Roughly 2000 ft of bridging
- All ACROW bridging and components were centralized to Oviedo.

What does the Department own?

	Linear Feet			
	Total	Deployed	In Repair	Available
ACROW Series 300 Two Lane (24')	6,000	1,010	430	4,560
ACROW Series 700XS Two Lane (24')	3,000	0	0	3,000
ACROW Series 700XS Three Lane (36')	1,300	160	0	1,140
ACROW Series 700XS Three Lane (42')	320	70	0	250

All ACROW Bridging kept at:
State Aluminum Structures Shop
2590 Camp Road
Oviedo, FL 32765

What does the Department own?

300 Series

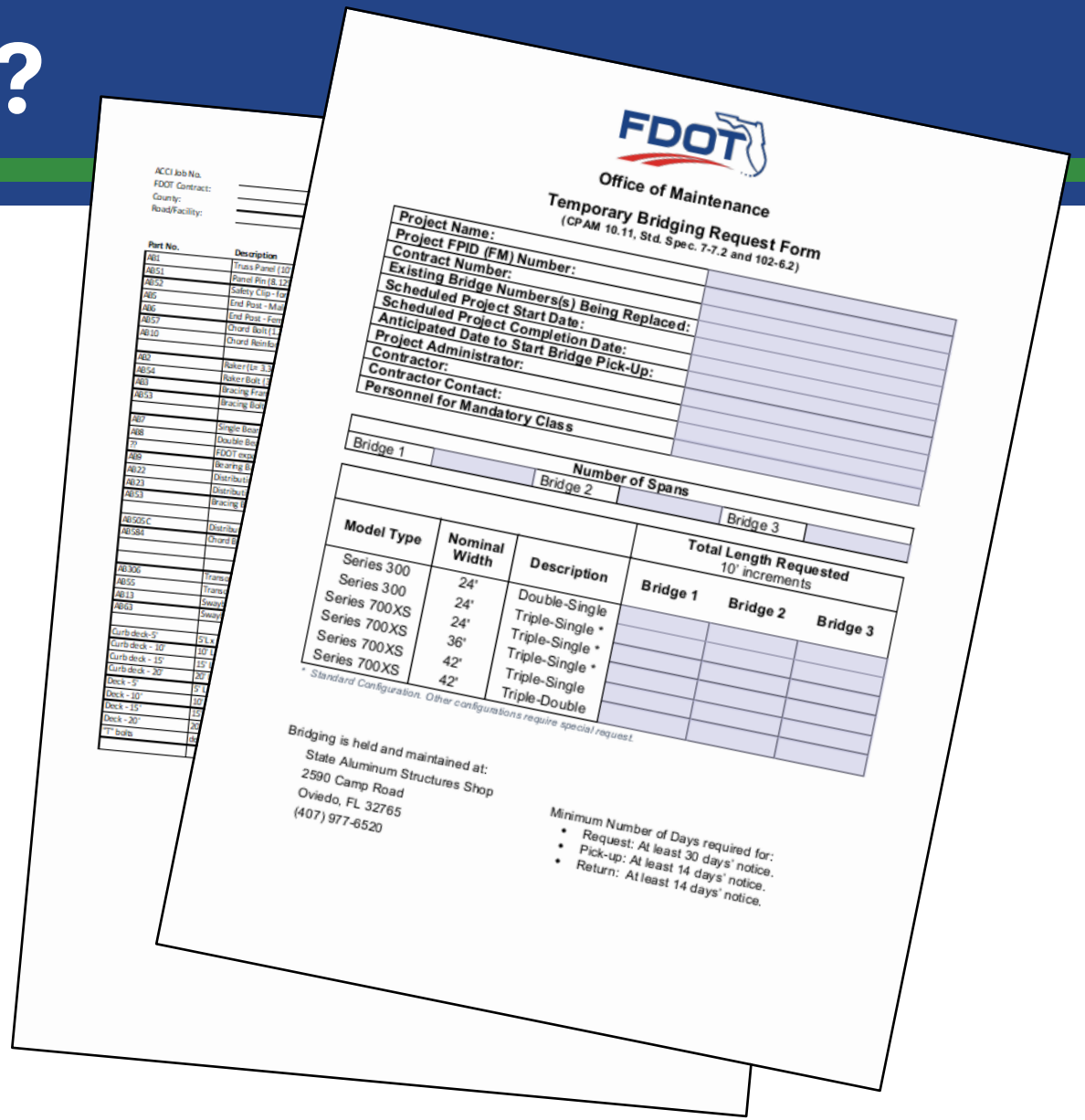
- <45mph
- Only available in 24ft roadway width.
- Used with a Standard Plan.
  - 60ft max span

700XS Series

- >45mph
- Can accommodate widths of 24ft, 36ft, and 42ft.
- ACROW must be involved with design.
- Can be launched from a single side.

How to Request ACROW?

- Contact Central Office (me)
- Fill out the request form and provide parts list
- Coordinate pick-up
- Lead times to follow:
  - 30 day for request form
  - 10 days for pick-up
  - 10 days for drop-off
- Initial Inspection for 300 series performed by Department. (me again)



FDOT

Office of Maintenance

Temporary Bridging Request Form

(CPAM 10.11, Std. Spec. 7-7.2 and 102-6.2)

Project Name:	
Project FPID (FM) Number:	
Contract Number:	
Existing Bridge Numbers(s) Being Replaced:	
Scheduled Project Start Date:	
Scheduled Project Completion Date:	
Anticipated Date to Start Bridge Pick-Up:	
Project Administrator:	
Contractor:	
Contractor Contact:	
Personnel for Mandatory Class	

Number of Spans: Bridge 1 | Bridge 2 | Bridge 3

Model Type	Nominal Width	Description	Total Length Requested 10' increments: Bridge 1	Bridge 2	Bridge 3
Series 300	24'	Double-Single			
Series 300	24'	Triple-Single *			
Series 700XS	24'	Triple-Single *			
Series 700XS	36'	Triple-Single *			
Series 700XS	42'	Triple-Single			
Series 700XS	42'	Triple-Double			

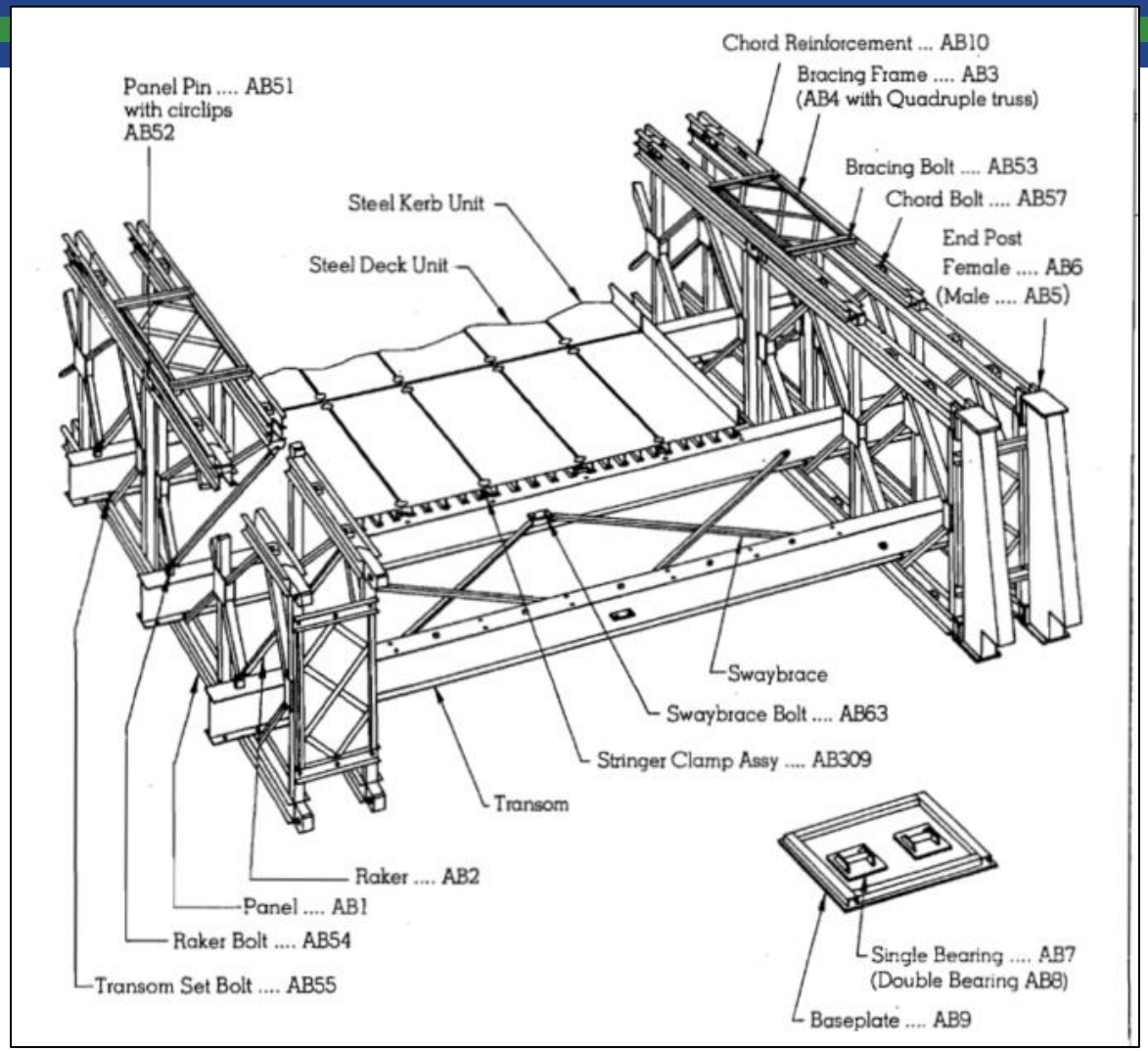
* Standard Configuration. Other configurations require special request.

Bridging is held and maintained at:
State Aluminum Structures Shop
2590 Camp Road
Oviedo, FL 32765
(407) 977-6520

Minimum Number of Days required for:
- Request: At least 30 days' notice.
- Pick-up: At least 14 days' notice.
- Return: At least 14 days' notice.

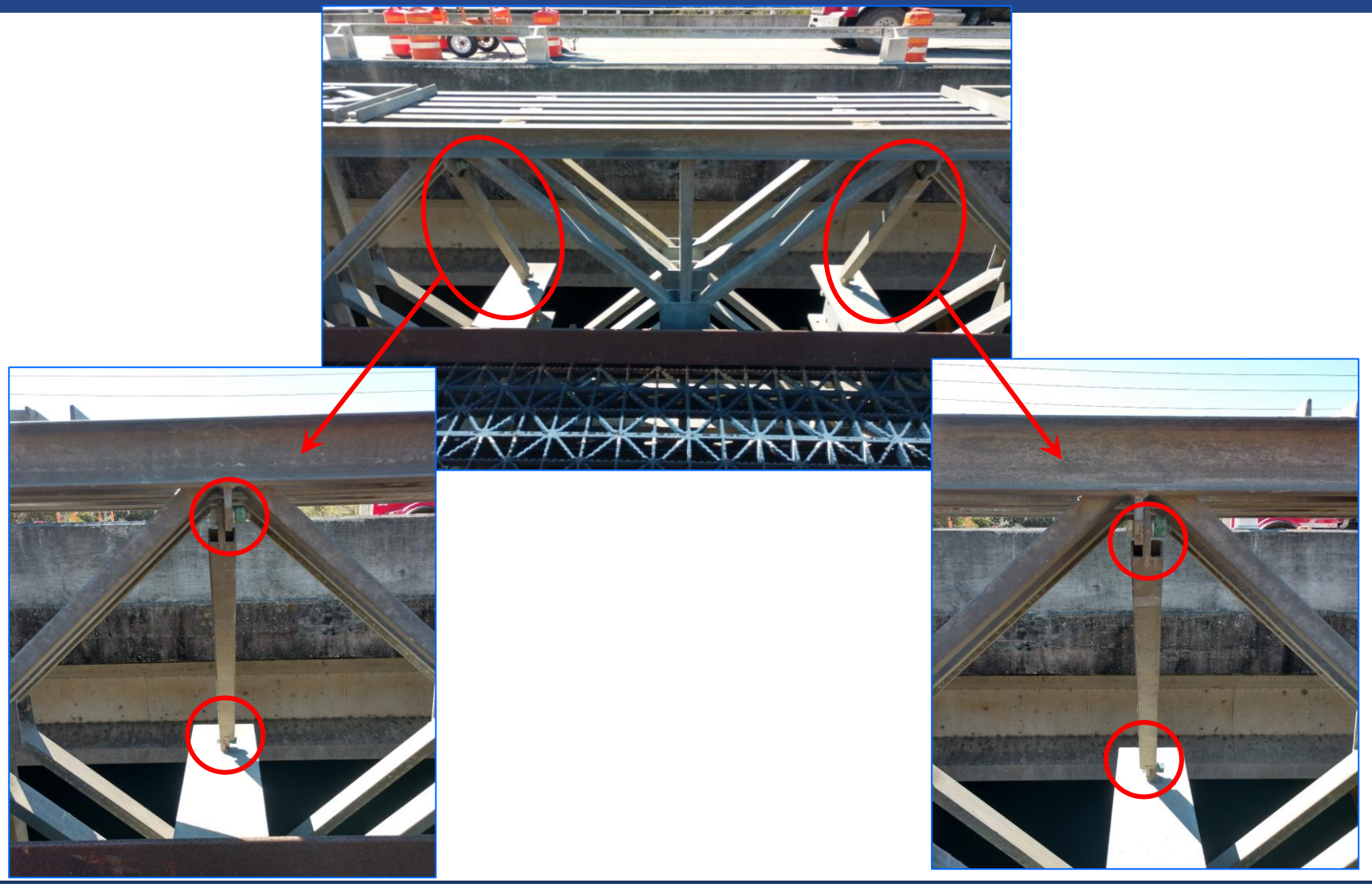
How to Deploy 300 Series

- Relatively simple to assemble.
- ACROW Bridge manager (me) performs initial inspection.
- Contractor must provide personnel for training at Oviedo.
- A sample bridge is kept erected on site to instruct staff.
- All repairs are made on site to bridging.
- Always placed with a crane.



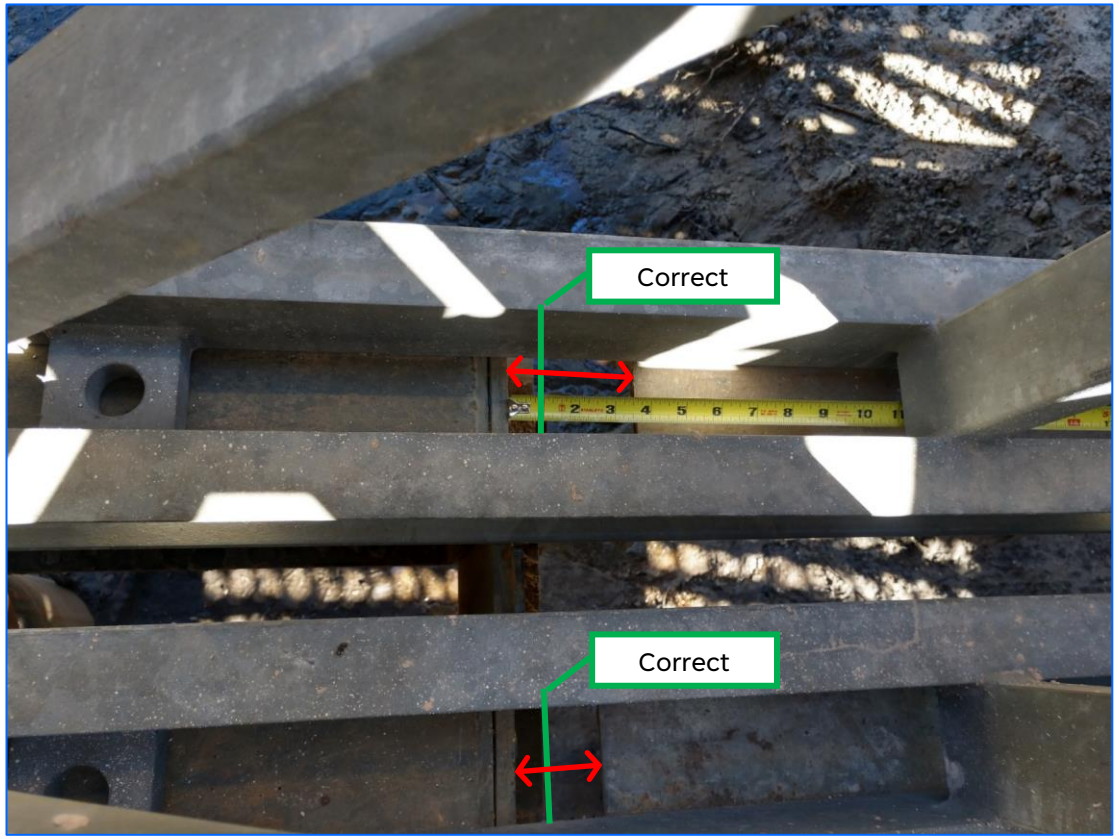
TRANSPORTATION SYMPOSIUM

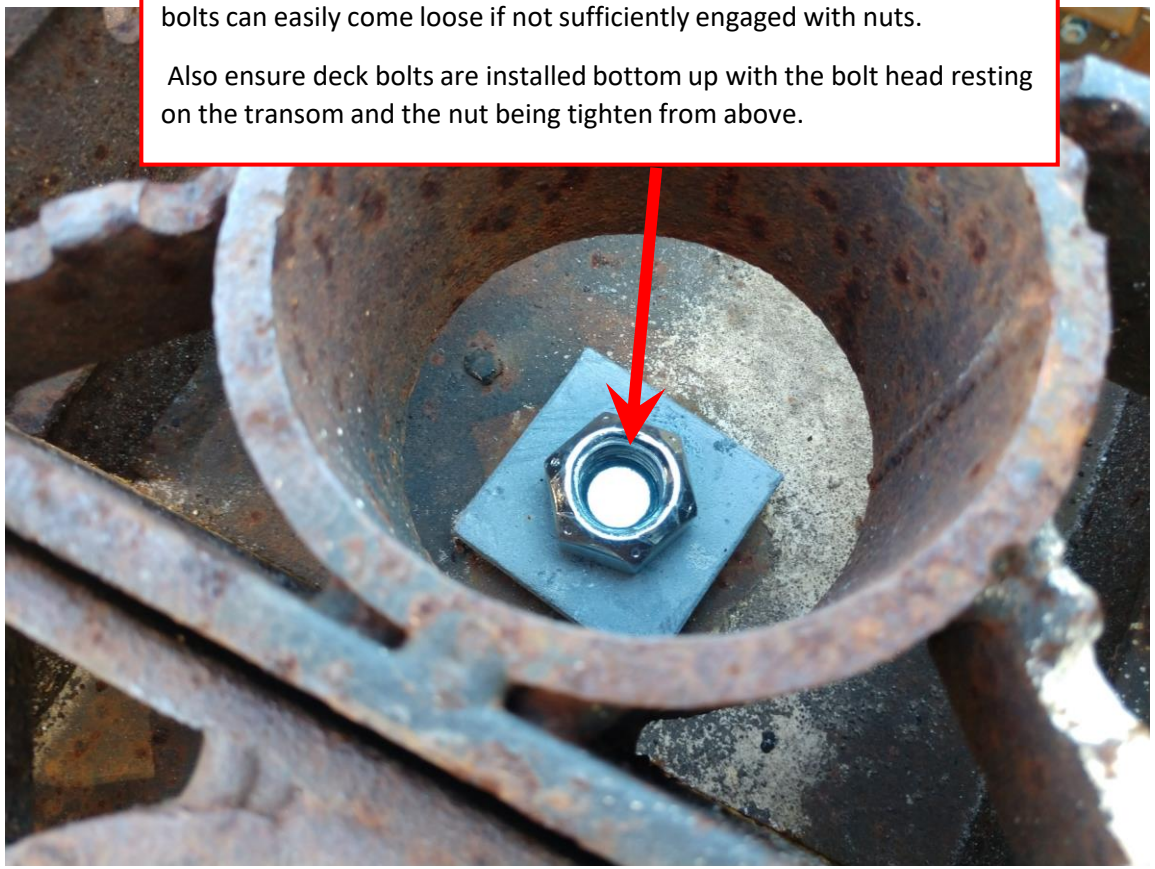
How to Deploy 300 Series



TRANSPORTATION SYMPOSIUM

How to Deploy 300 Series





How to Deploy 700XS Series

Three Main Components

1. Truss Panel – AB701, Shear Truss Panel – AB702, Heavy Shear Truss Panel – AB708. Dimensions = 10’ long x 7.5’ wide, pinhole to pinhole.

2. Orthotropic AB601 Deck & AB602 Curb Unit – 10’ x 6’. Curb unit is the same but has 6” high welded curb. FDOT owns plain steel decks. Bridges using plain steel decks require an asphalt overlay typically to provide a crown or cross slope.

3. Transom Beams – SC0017 - 24’ roadway width, AB957 - 36’ roadway width, and AB978 – 42’ roadway width.

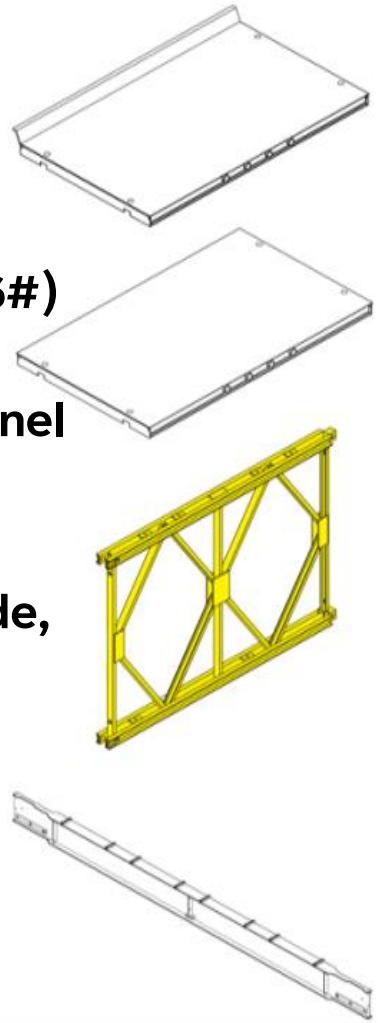
700XS Series / Truss Panel (AB701/AB702/AB708)

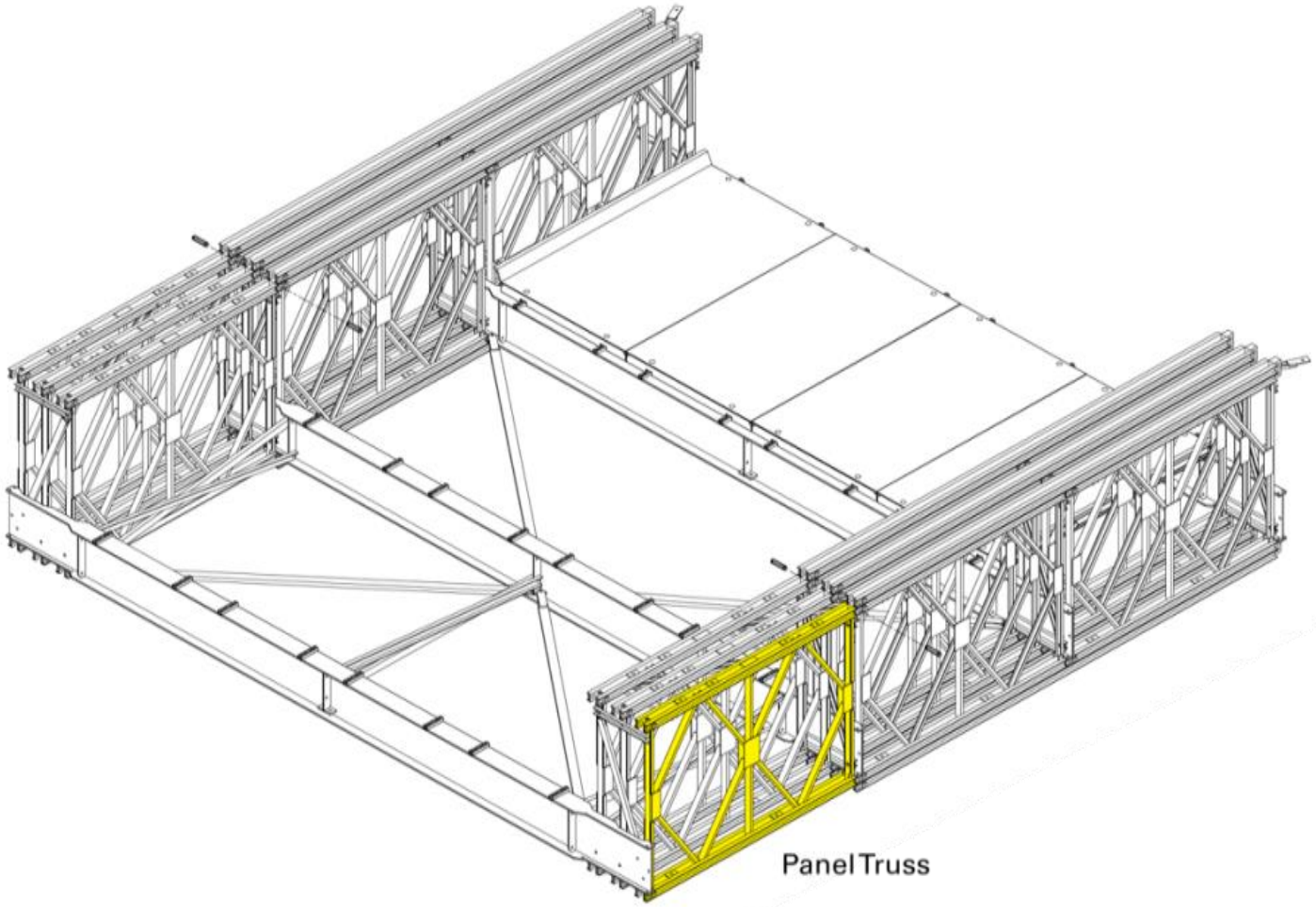
*AB701 - Truss Panel (693#)

*AB702 - Shear Truss Panel(896#)

*AB708 - Heavy Shear Truss Panel (1300#)

Dimensions = 10’ long x 7.5’ wide, pinhole to pinhole.

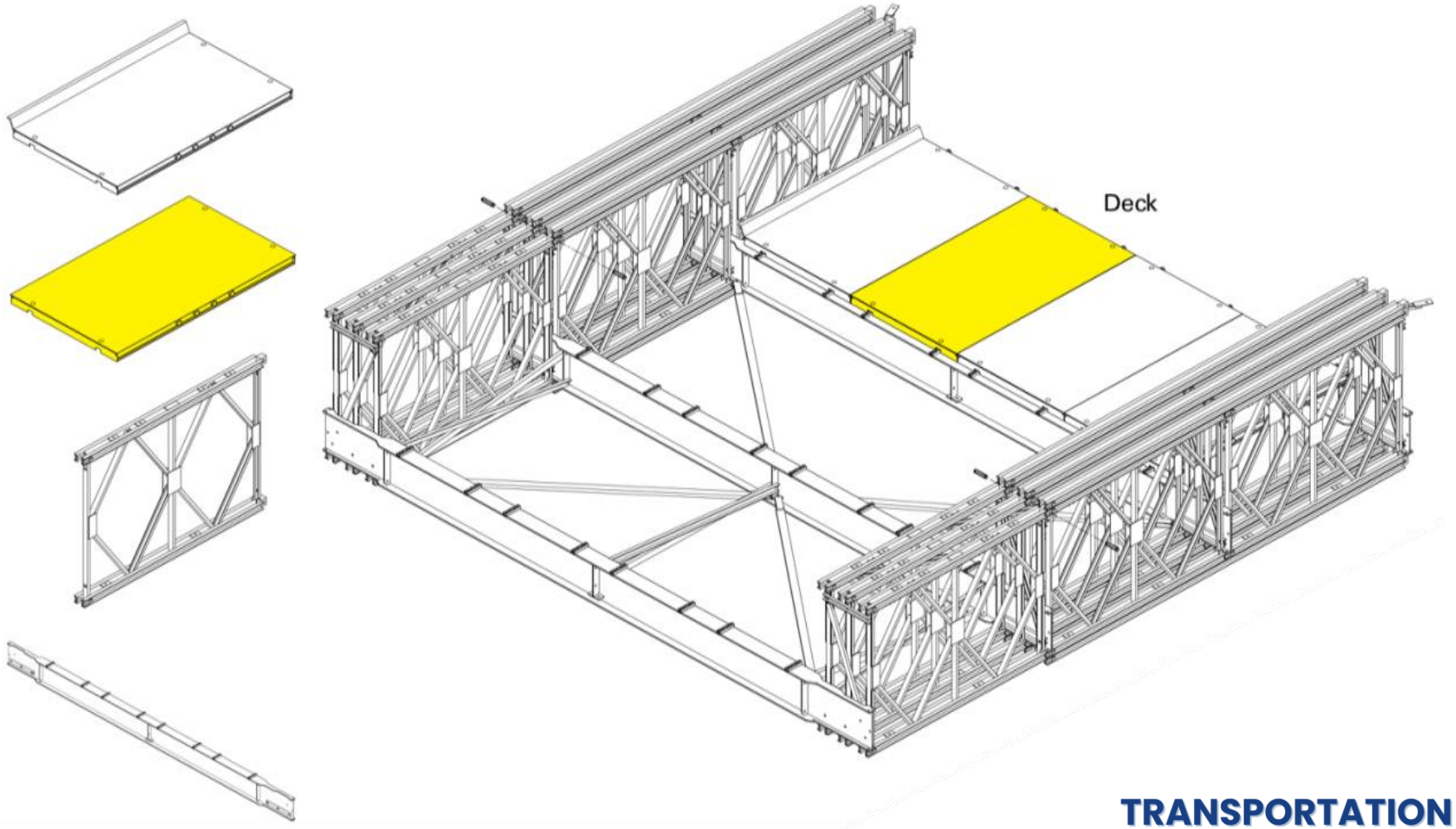




700XS Series / Deck Panel (AB601)

<u>Orthotropic AB601 Deck Unit</u>
*Dimensions– 10’ x 6’ x 5 3/8”. (1525#)

FDOT owns plain steel curbs. Bridges using plain steel decks require an asphalt overlay typically to provide a crown or cross slope.

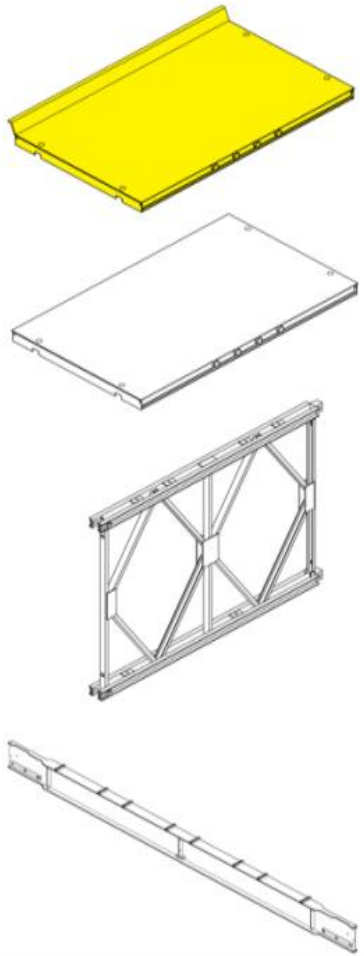


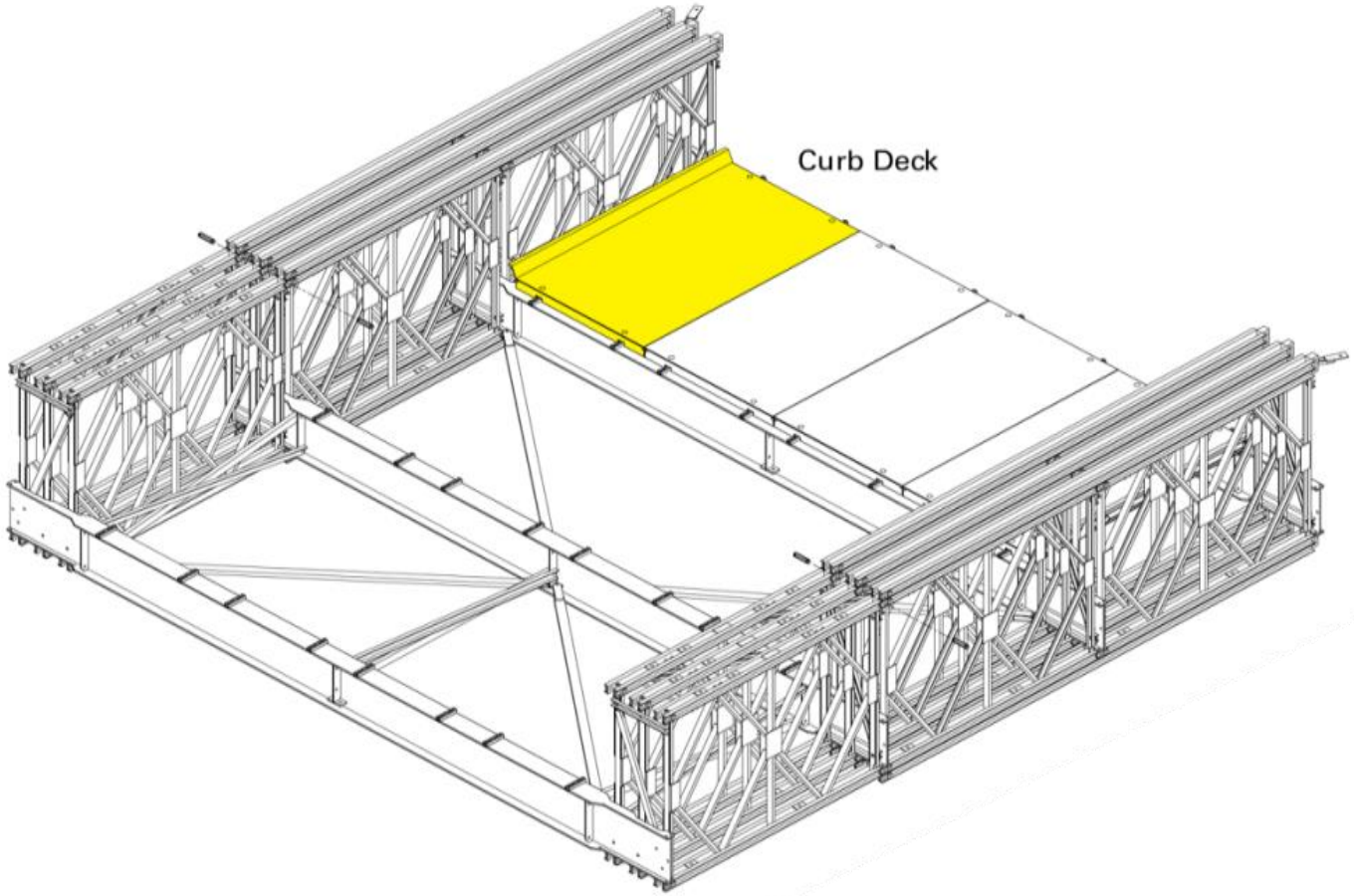
TRANSPORTATION SYMPOSIUM

700XS Series / Curb Panel (AB602)

<u>Orthotropic AB602 Curb Unit</u>
*Dimensions– 10’ x 6’ x 5 3/8”.
*Curb unit is the same but has 6” high welded curb. (1632#)

FDOT owns plain steel curbs. Bridges using plain steel decks require an asphalt overlay typically to provide a crown or cross slope.





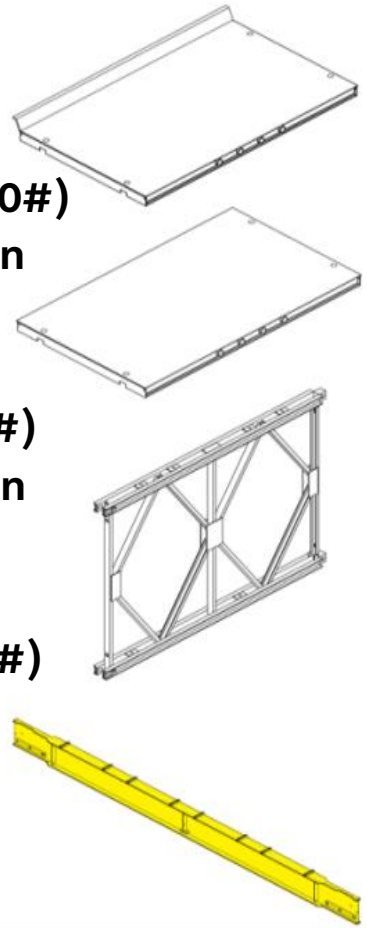
700XS Series / Transom Beams
(SC0017-24’ / AB957-36’ / AB978-42’)

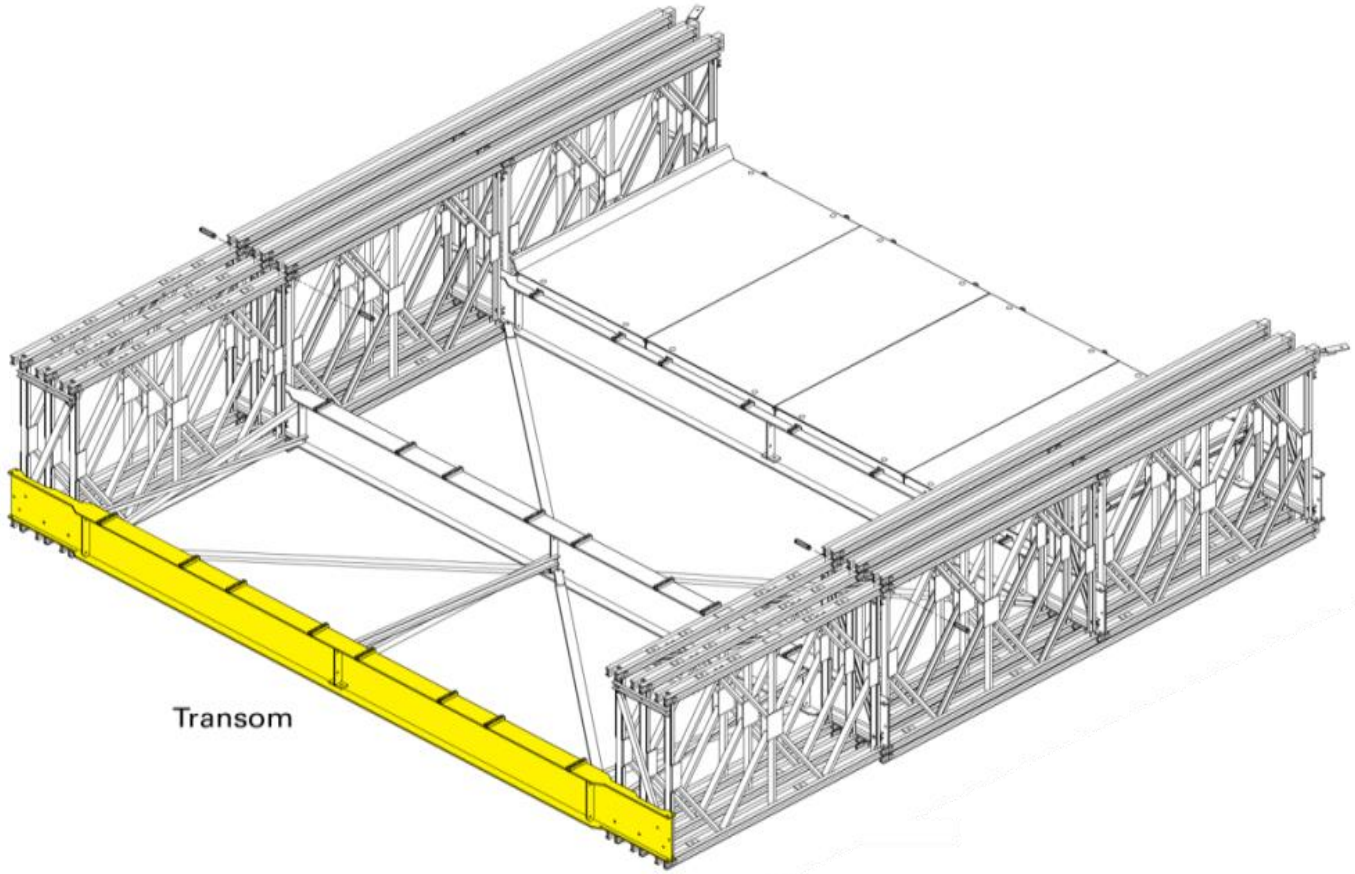
Transom Beams

*SC0017 - 24’ roadway width (3,000#)
- Approximately 3,000’ available in FDOT inventory

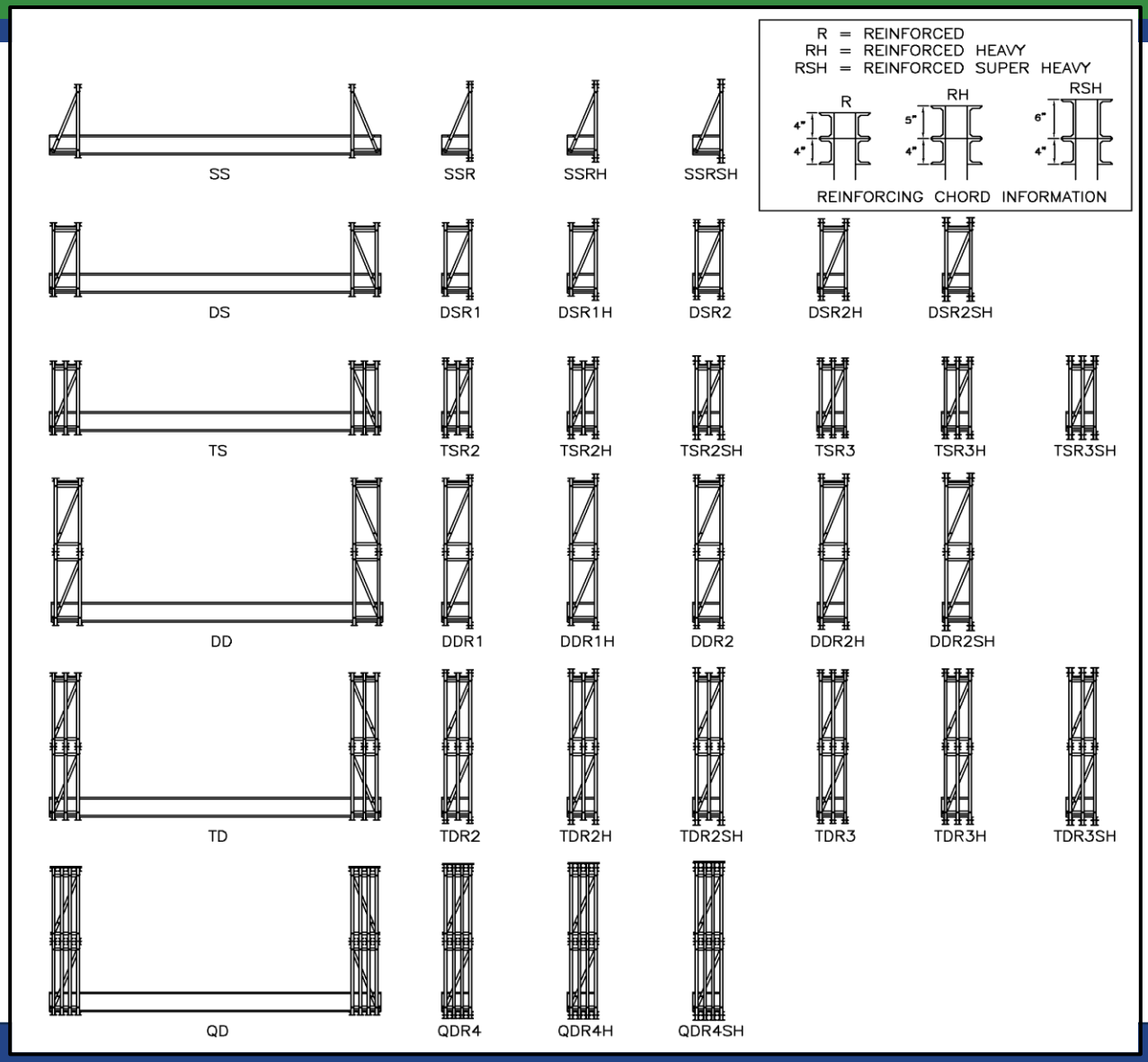
*AB957 - 36’ roadway width (7600#)
- Approximately 1,320’ available in FDOT inventory

*AB978 – 42’ roadway width (9600#)
- Approximately 280’ available in FDOT inventory





700XS Series / Truss Configurations



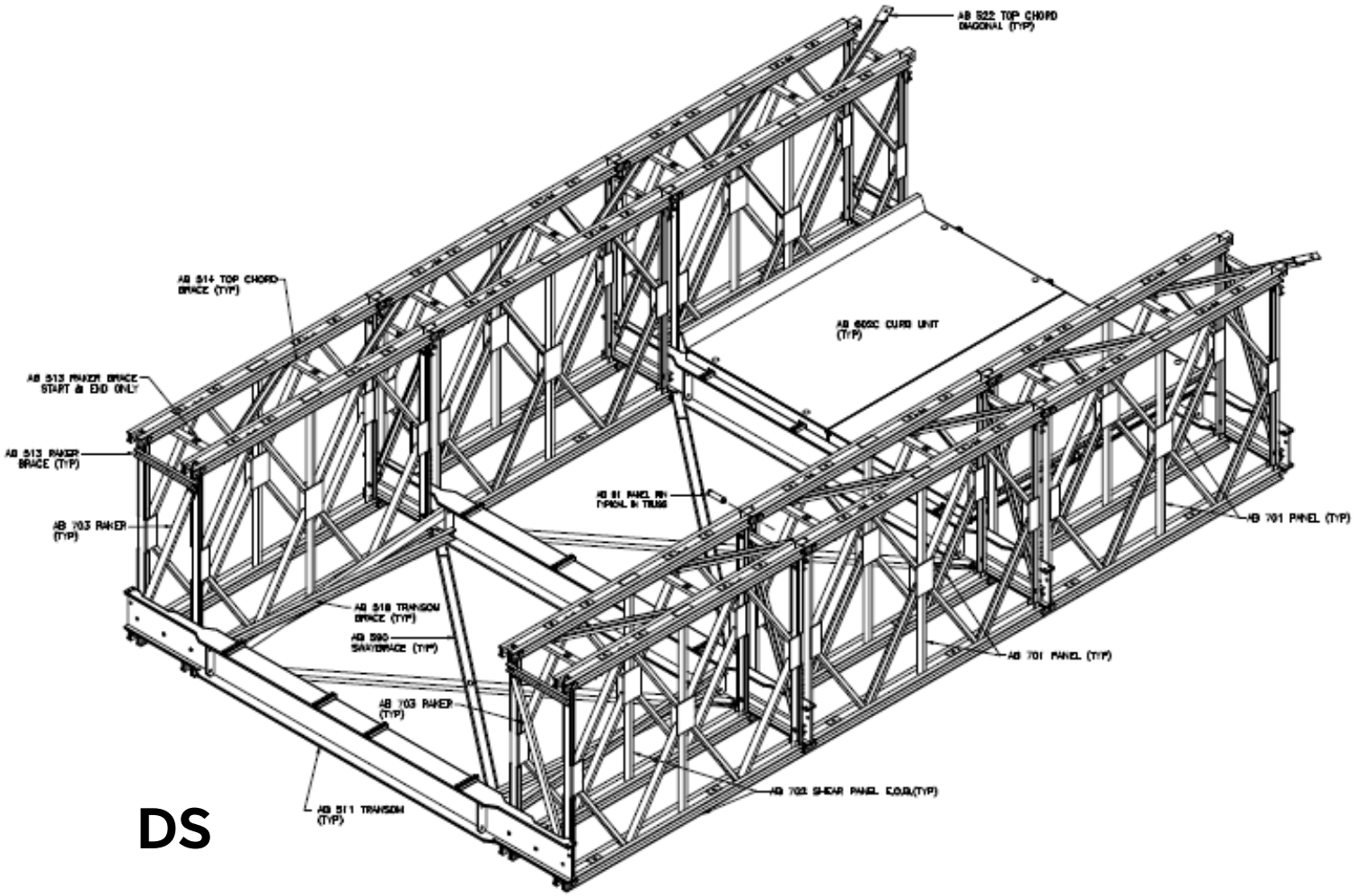
TRANSPORTATION SYMPOSIUM

700XS Series / Truss Configurations

DOUBLE

SINGLE

(DS)



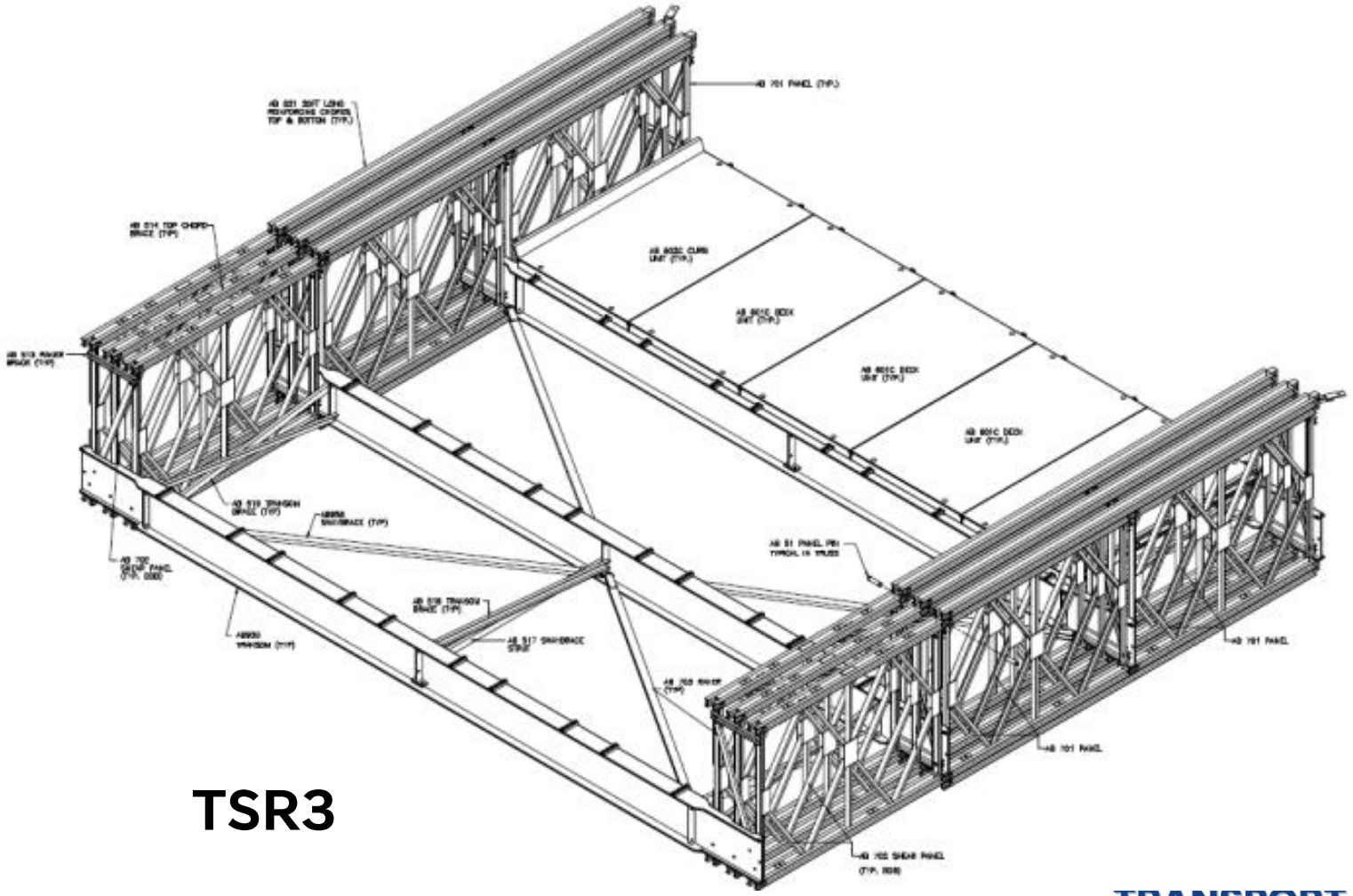
DS

700XS Series / Truss Configurations

TRIPLE

SINGLE

(TS)



TSR3

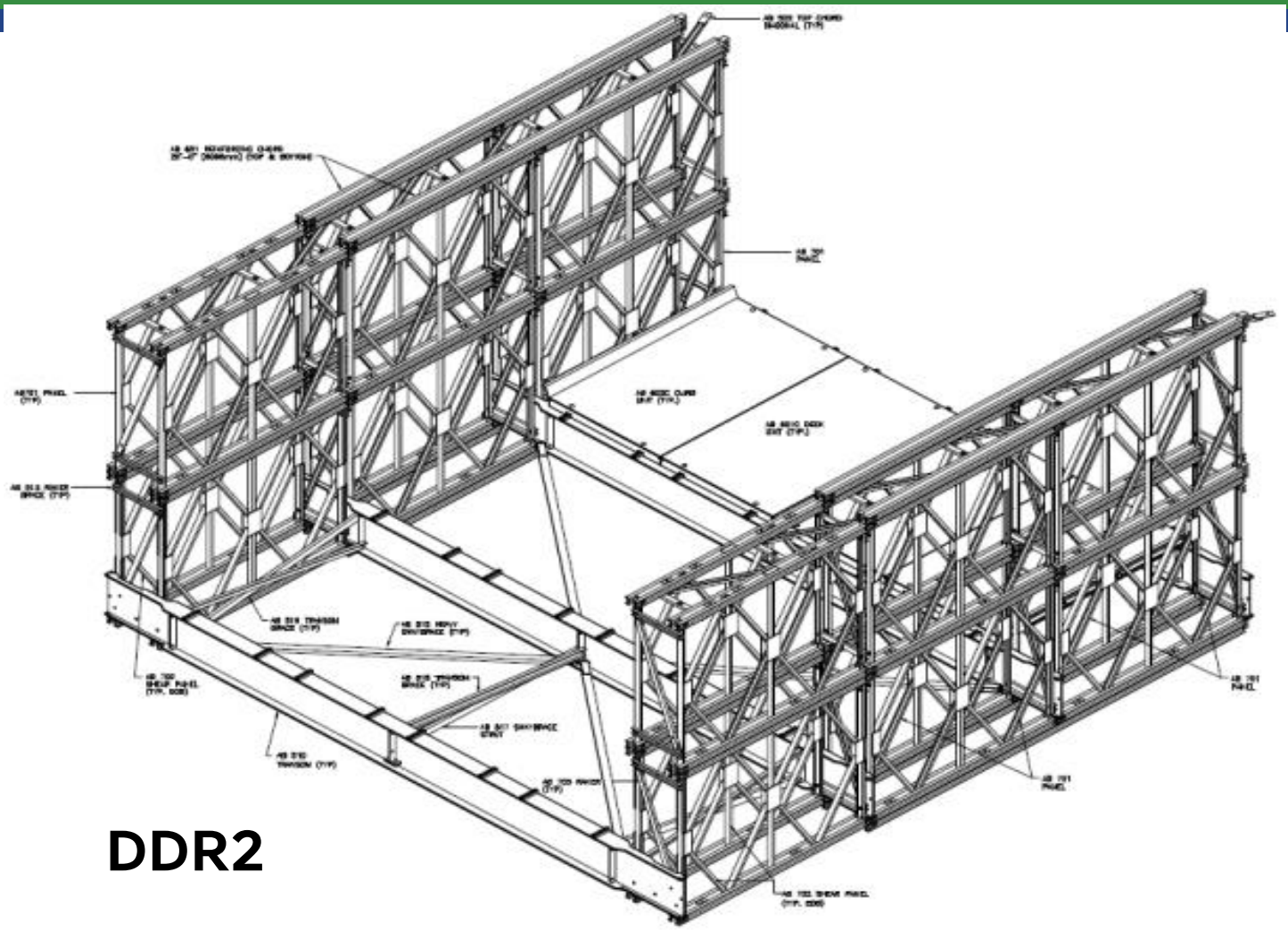
TRANSPORTATION SYMPOSIUM

700XS Series / Truss Configurations

DOUBLE

DOUBLE

(DD)



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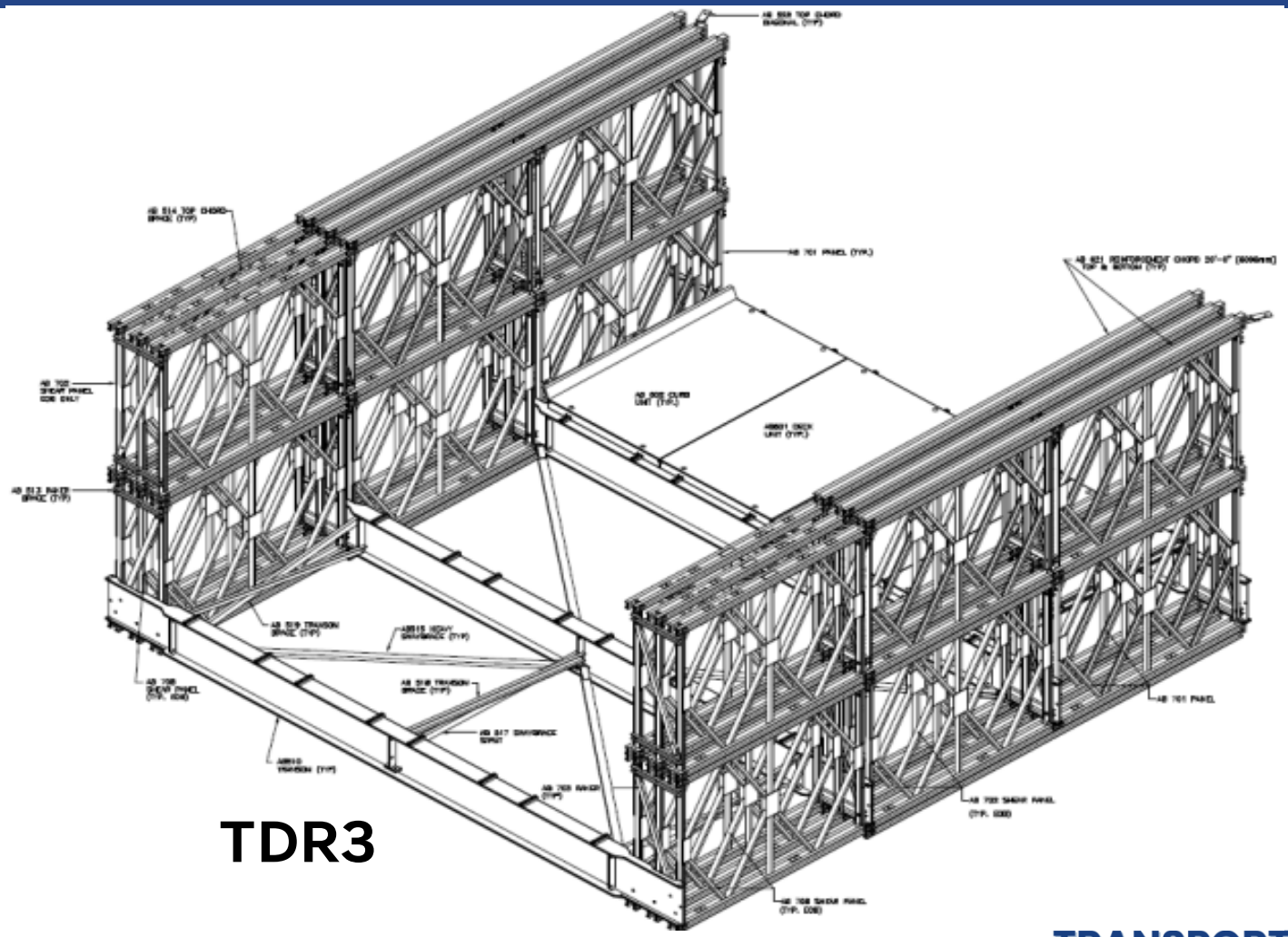
TRANSPORTATION SYMPOSIUM

700XS Series / Truss Configurations

TRIPLE

DOUBLE

(TD)



TDR3

TRANSPORTATION SYMPOSIUM

700XS Series

Engineering/Consultant Support

- Contact Acrow (ME) about pre-planning & engineering support.
- If an FDOT owned Acrow 700XS is required, truss construction, preliminary general arrangement drawings and preliminary reactions can be provided to assist with the project design including the substructure design.
- Acrow only provides superstructure submittals which includes the design from the bottom of the bearings up. Design of substructure is by others.

700XS Series

Engineering/Consultant Design Criteria

When designing.....Specify:

- Bridge length, single or multiple spans, span lengths & roadway width.
- Loading Design – Typically LRFD HL93 and load rating if required for highway bridges based on FDOT 120 Permit loads
- Bridge deck type:
  - ✓ FDOT owns plain steel deck requiring an asphalt overlay
  - ✓ If a highway application, a paving membrane is also required
- Bridge profile: Prefer crown, can accommodate some superelevation/cross slope. Both crown and superelevation using asphalt with limits or special beams for superelevation
- Bridge Rail Test Level Design TL-2 up to TL-4

700XS Series

Consultant/Construction Support

- For projects utilizing FDOT owned Acrow 700XS bridging Acrow provides PE stamped superstructure submittals and load rating if required
- Develop site-specific bridge assembly and installation procedure with contractor using one of three methods; either cantilevered launch, crane-assisted launch, or crane lift-in
- Onsite field support / advisor for contractor's installation
- Rental of required launch equipment. This usually involves rollers, and bridge components for the launch "nose" and/or launch "tail"
- Bridge inspections and certification as needed

700XS Series

Performed by “Others”

- Assembly & erection by contractor/installer
- Abutment engineering & abutments including bolsters for end-of-span floorbeams
- Asphalt overlay & paving membrane (if required). See info on paving thickness in FDOT 700XS standards
- Approach guard rail to bridge guide rail transitions (FDOT has standard design)
- Anchor bolts and retention angles
- Lighting or signage (if required)
- Bridge inspections and certification, if not provided by Acrow
- Bridge assembly tools, including jacks (tool list provided to installer/contractor)

FDOT ACROW 700XS DESIGN STANDARDS

- ✓Developed by FDOT in coordination with Acrow Bridge
- ✓Based specifically on the Acrow 700XS components owned by FDOT and stored in the Oviedo, FL yard
- ✓Other options available but would have to be rented and/or purchased from Acrow.

FDOT ACROW 700XS DESIGN STANDARDS / General Notes & Details

This Index is only applicable to the current FDOT inventory of temporary bridge components which are manufactured in accordance with Acrow Series 700XS three Lane 24',36', and 42' widths. Asphalt Overlay is required on the Bridge deck, see Sheet 2 for details.

Work this Index with Index 102-210, 102-220 and 102-230.

STRUCTURAL STEEL:
Steel Plates shall be ASTM A709 Grade 36.

EXPANSION BEARINGS:
Inspect the PTFE (Teflon) layer and stainless steel plate prior to installation.
Do not use bearings that have a severely damaged or unbonded PTFE layer.
Clean PTFE of all grit and grime prior to installation.
Clean Stainless steel plate of all grit and grime prior to installation and finish to a smooth buffed surface.

DISTRIBUTION BEAMS:
Distribution beam stops restraining the distribution beams may be lengthened or shortened to center the distributing beam bearing on the cap beam.
The longitudinal stops are to bear on the distributing beam end frame.

EXPANSION JOINT SETTINGS:
Install the expansion joint considering the total continuous bridge length, location of fixed bearings and ambient temperature at the time of installation, assume a 2" expansion joint opening at 70 degrees F, (Expansion joint depends on span/bridge length and configuration).

STORAGE FACILITY:
Contact
FDOT Statewide Aluminum Shop
2590 Camp Rd.
Oviedo, Fl.
407-278-2727
For shipping weights and dimensions of Temporary Bridge elements.
Contractor to coordinate with Storage Facility and Acrow to obtain required parts list.
Shipping weights and dimensions of other bridge components can be referenced in "Acrow Panel Bridging, Series 700XS, Technical Handbook".

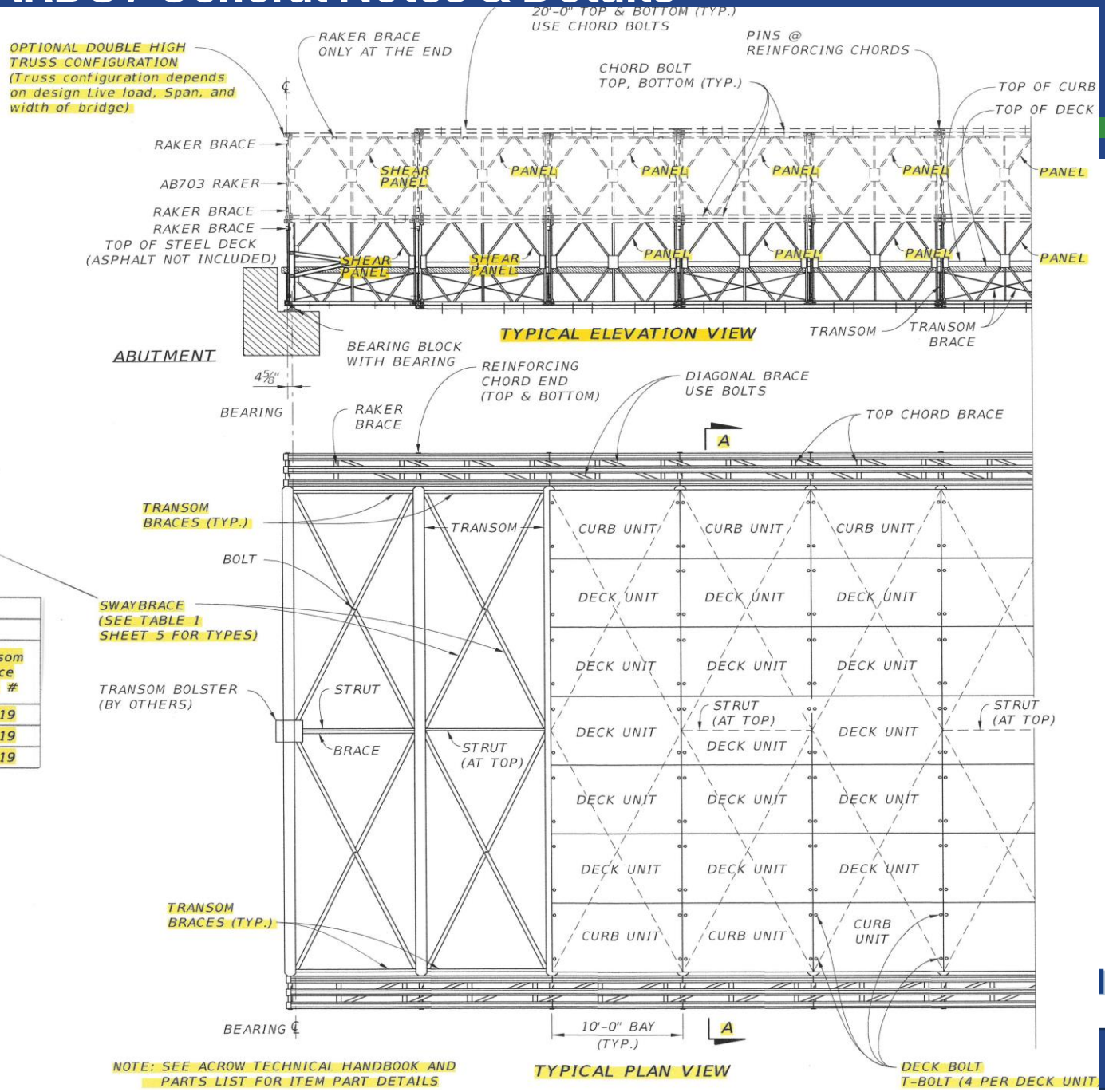
TABLE 1

Swaybrace / Transom Brace

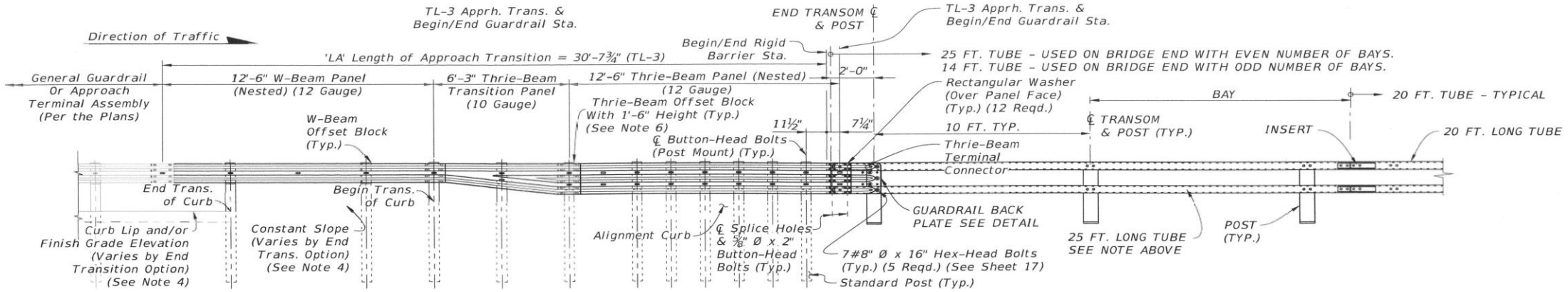
Bridge Roadway width (ft)	Transom	Swaybrace Part # (Single)	Swaybrace Part # (Double)	Transom Brace Part #
24	SC0017	AB590	AB515	AB519
36	AB957	AB891	AB891	AB519
42	AB978	AB979	AB979	AB519

PAYMENT:
Temporary Detour Bridge is to be paid for under Contract Unit Price for Special Detour. If a temporary bridge system other than that shown herein is used, the Contractor is responsible for renting or purchasing their own system. Payment for Temporary Guardrail work and Transition Block will be made under Pay Item Temporary Guardrail, LF.

Furnish and install Bridge Thrie-Beam Panels and all associated hardware as shown. Payment will be made with the Temporary Detour Bridge under the Pay Item Special Detour, LS. Turn over Bridge Thrie-Beam Panels and all associated hardware to the Department with the Detour Bridge components per Specifications Section 102-6.



FDOT ACROW 700XS DESIGN STANDARDS / Beam & Guardrail Details



TL-3 APPROACH TRANSITION INSTALLED ELEVATION

GUARDRAIL LAYOUT - ELEVATION

SECTION A-A
(Double High Truss shown, Single High Truss Similar)

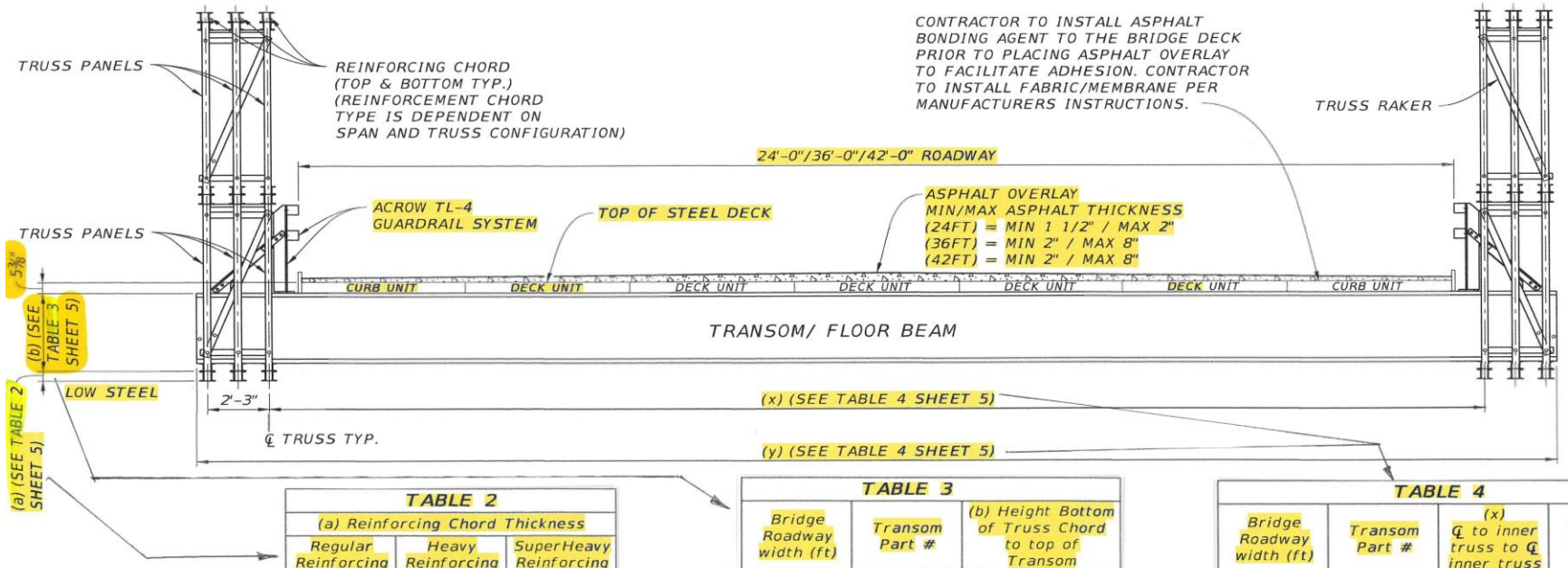


TABLE 2

(a) Reinforcing Chord Thickness		
Regular Reinforcing Chord Thickness	Heavy Reinforcing Chord Thickness	SuperHeavy Reinforcing Chord Thickness
4"	5"	6"

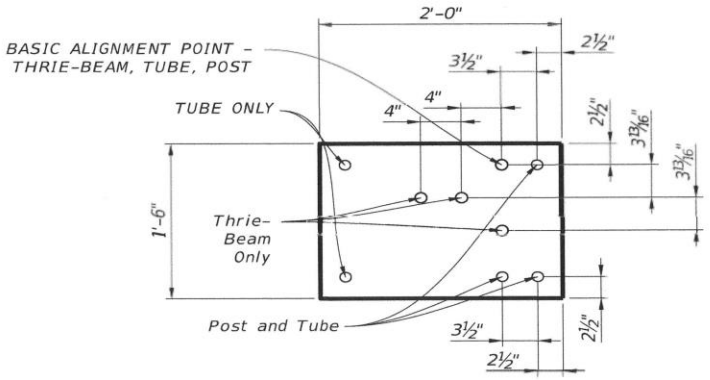
TABLE 3

Bridge Roadway width (ft)	Transom Part #	(b) Height Bottom of Truss Chord to top of Transom
24	SC0017	28 5/16"
36	AB957	40 3/16"
42	AB978	43"

TABLE 4

Bridge Roadway width (ft)	Transom Part #	(x) ℄ to inner truss to ℄ inner truss	(y) Transom Beam Length
24	SC0017	26'-1"	31'-4"
36	AB957	38'-4 13/16"	43'-7 13/16"
42	AB978	44'-4 3/8"	49'-7 3/8"

Guardrail Transition designed by others
(Must allow for expansion of tube rails)



GUARDRAIL BACK PLATE DETAIL

FDOT ACROW 700XS DESIGN STANDARDS / Other Typical Details

TYPICAL RAILING POST CONNECTION DETAIL

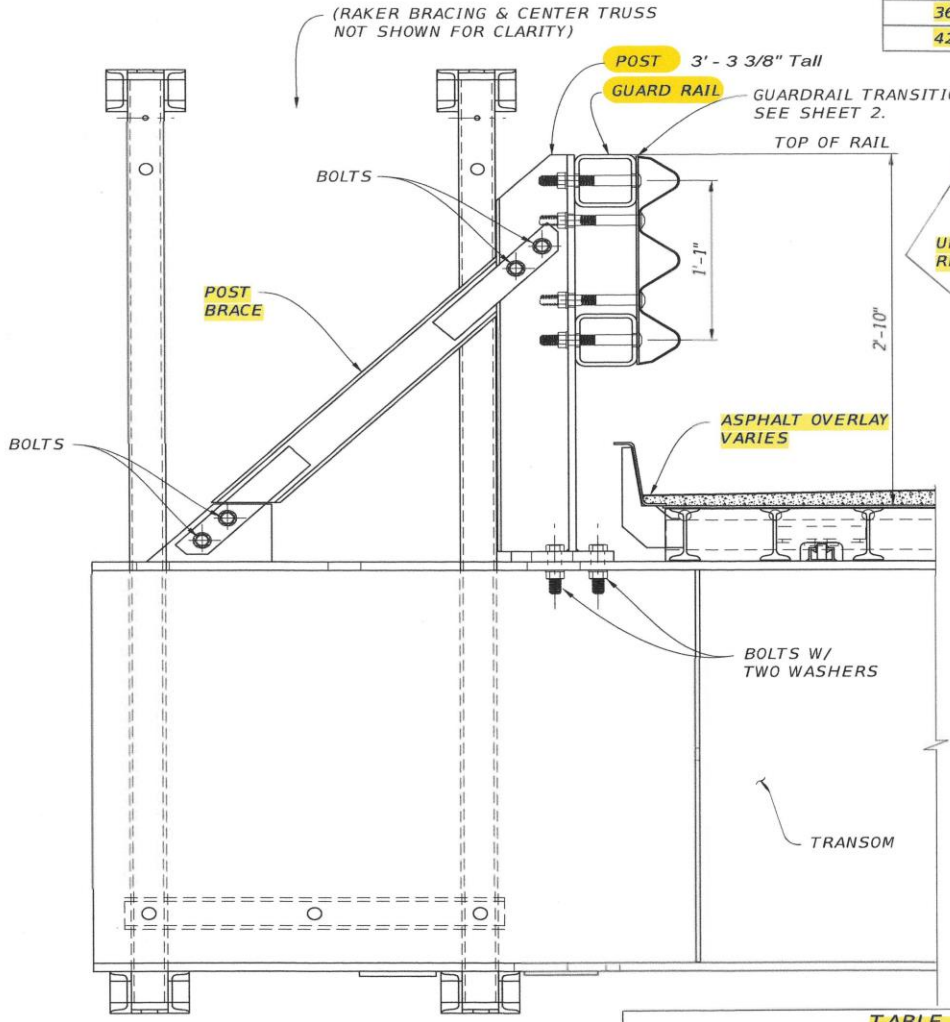
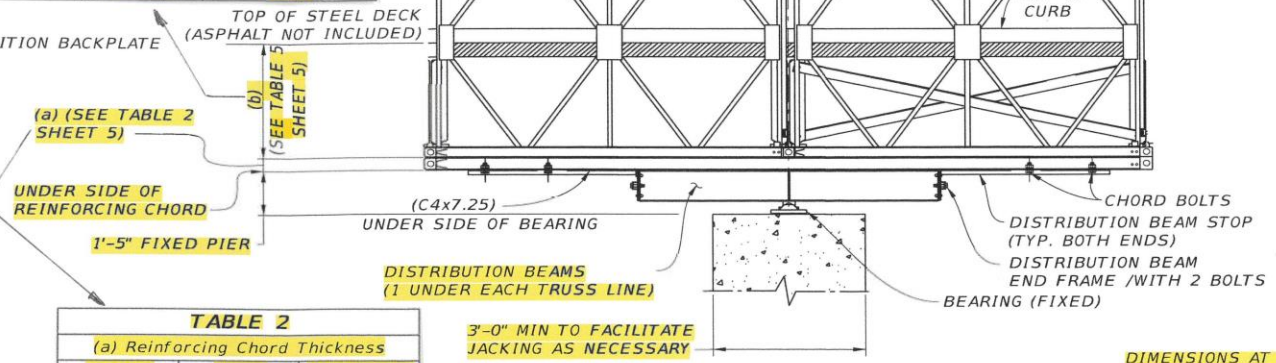


TABLE 5

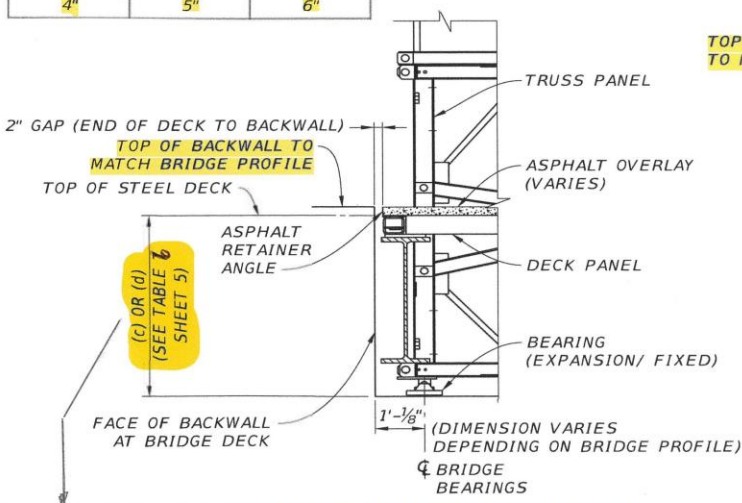
Bridge Roadway width (ft)	Transom Part #	(b) Height Bottom of Truss Chord to top of Deck
24	SC0017	33 1/16"
36	AB957	45 9/16"
42	AB978	48 3/8"



TYPICAL DETAIL AT INTERMEDIATE PIER (FOR CONTINUOUS SPAN DESIGN)

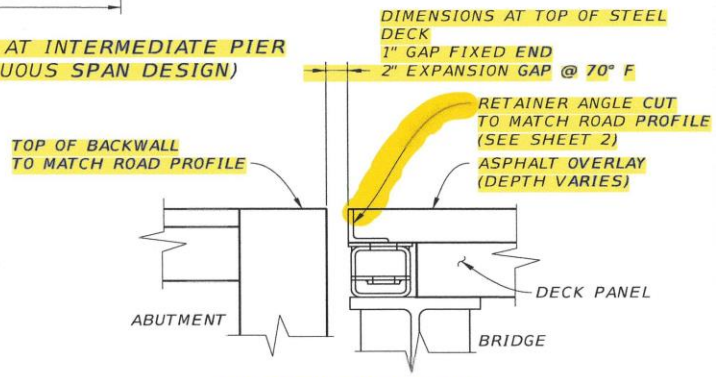
TABLE 2

(a) Reinforcing Chord Thickness		
Regular Reinforcing Chord Thickness	Heavy Reinforcing Chord Thickness	SuperHeavy Reinforcing Chord Thickness
4"	5"	6"



TYPICAL DETAIL AT ABUTMENTS

(Note: Expansion joint depends on span/bridge length and configuration)



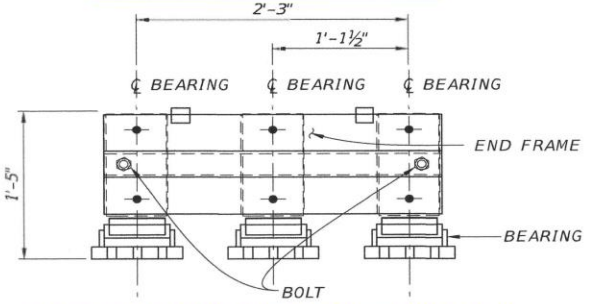
EOB AT DECK DETAIL

(Note: Expansion joint depends on span/bridge length and configuration)

TABLE 6

Bridge Roadway width (ft)	Transom Part #	(c) Height Bottom of fixed bearing to top of Deck	(d) Height Bottom of expansion bearing to top of Deck
24	SC0017	39 1/16"	39 7/16"
36	AB957	50 15/16"	51 5/16"
42	AB978	53 3/4"	54 1/8"

NOTE: SEE ACROW TECHNICAL HANDBOOK AND PARTS LIST FOR ITEM NUMBER DETAILS.



DISTRIBUTION BEAM DETAIL – END VIEW (Triple Truss Shown)

FDOT ACROW 700XS DESIGN STANDARDS / Bearing Layout Details

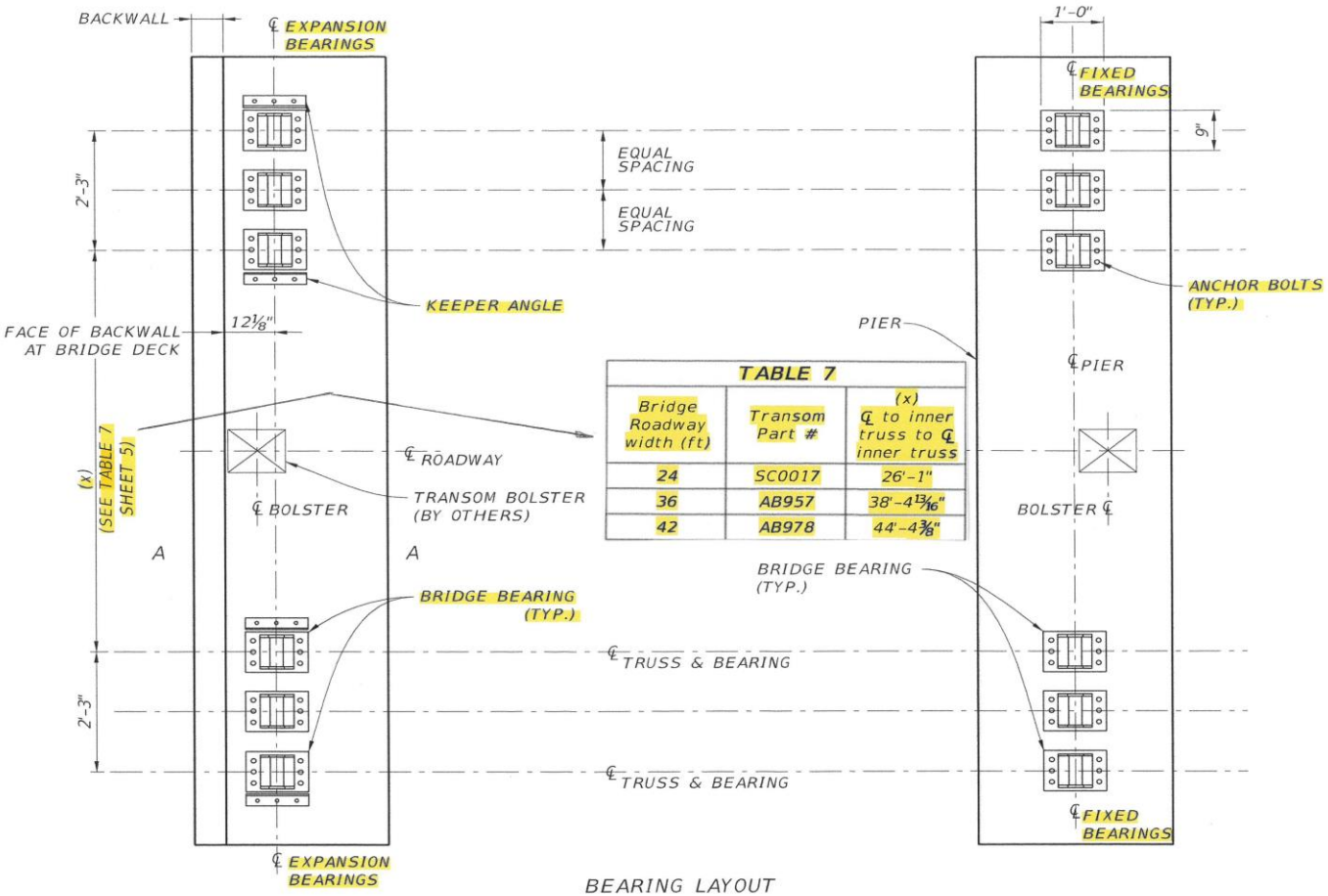
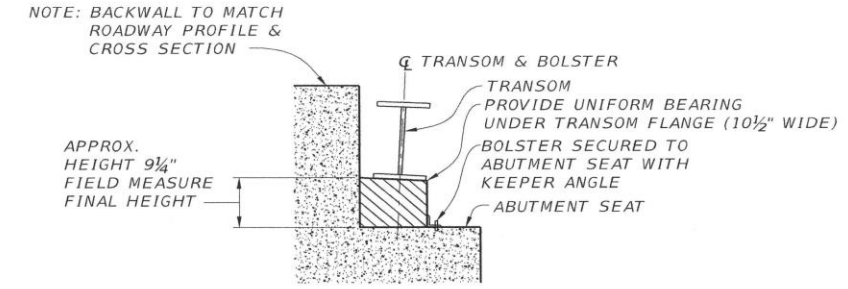


TABLE 7		
Bridge Roadway width (ft)	Transom Part #	(x) ℄ to inner truss to ℄ inner truss
24	SC0017	26'-1"
36	AB957	38'-4 13/16"
42	AB978	44'-4 3/8"

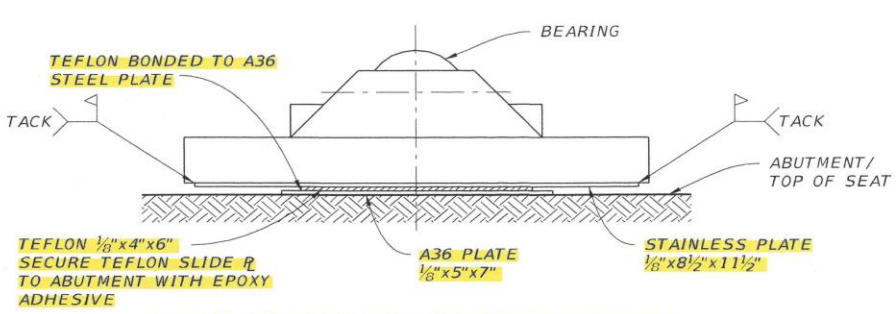
BEARING LAYOUT



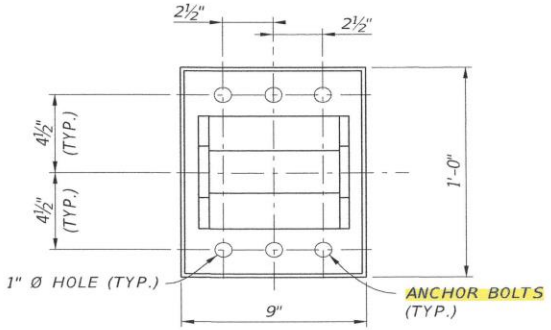
BOLSTER DETAIL SECTION A-A

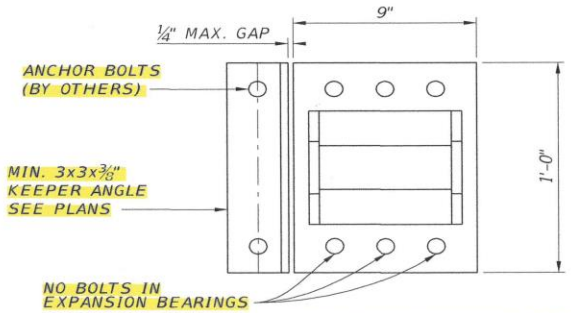
NOTE:

- HARDWOOD BLOCKING IS RECOMMENDED; SEE PLAN FOR FINAL BOLSTER DESIGN.
- INSTALL BOLSTER TO A TIGHT FIT AFTER BRIDGE & DECK ARE IN PLACE.
- BOLSTER HEIGHT WILL VARY BASED ON TRANSOM TYPE/ DEAD LOADS.
- BOLSTER TO BE SECURED FROM MOVEMENT AFTER INSTALLATION.
- BOLSTER TO MATCH SLOPE OR TRANSOM FLANGE.



EXPANSION BEARING ELEVATION VIEW A-A
(ANGLE & BACKWALL NOT SHOWN FOR CLARITY)





EXPANSION END - BEARING DETAIL

700XS Series

1. Cantilevered

- ✓ The exact method & procedures are determined by site specific conditions such as bridge design, build area, equipment availability, grade and contractor experience. The goal is to keep the COG behind the home abutment.

2. Crane-Assisted

- ✓ The exact method & procedures are determined by site specific conditions such as bridge design, build area, equipment availability, grade and contractor experience. Like with the cantilevered launch, the goal is to keep the COG behind the home abutment.

3. Crane Lift-in

CANTILEVERED

CRANE-ASSISTED

ACROW

CRANE LIFT-IN

FDOT ACROW 700XS DETOUR EXAMPLES

- Considered Accelerated Bridge Construction (ABC)
- Ensures safe detours around construction sites
- Compliant with AASHTO and state design codes
- Increases safety for motorists & workers
- Rapidly installed in days
- Expert site support services as required

I-75 Sarasota, FL / Diverging Diamond

- I-75 NB/SB
- Heavily-travelled interstate traffic
- In place for 2 years
- 2% crown using asphalt with paving fabric (fabric helps asphalt adhere to deck)
- Length: 280’ two-span
- Width: 42’ (widest yet in US)
- Design Load: HL-93 + Florida 120 permit loads

TRANSPORTATION SYMPOSIUM

I-75 Tampa, FL / over Bruce B. Downs Blvd.

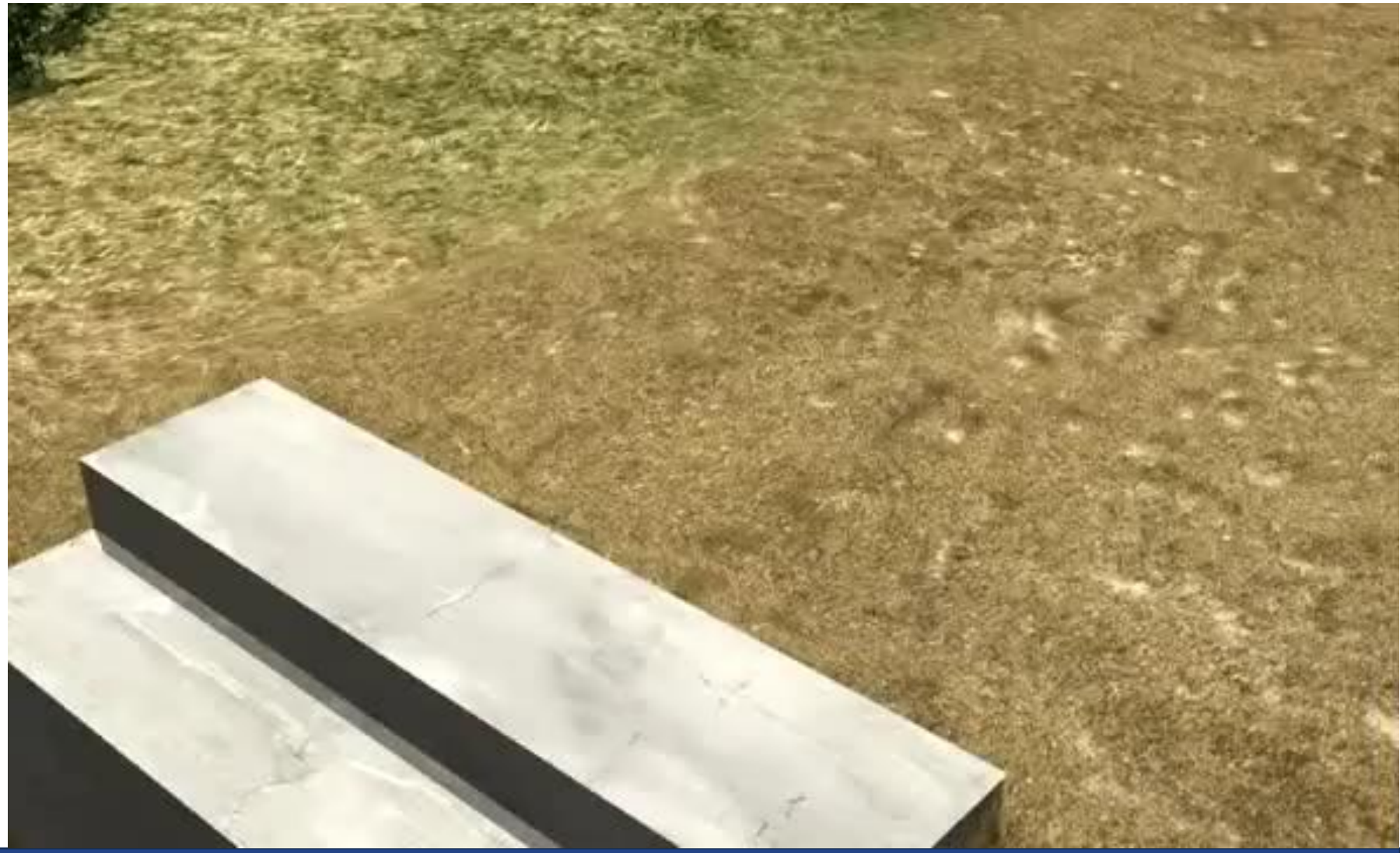
- I-75 NB/SB
- Heavily-travelled interstate traffic
- In place for 2 years
- Offset 2% crown using asphalt with paving fabric (fabric helps asphalt adhere to deck)
- Length: 320’ three-span
- Width: 36’ for 2-lanes
- Design Load: HL-93 + Florida 120 permit loads

700XS Series

Superelevated/Cross Sloped Roadways

- Starting to see more requirement for an increasing amount of cross slope
- A cross slope can be achieved in different ways on a truss panel bridge
    1. Asphalt overlay higher on one side with a 2” thick base layer
        - Membrane required for highway bridges to assist with asphalt adhesion.
        - SC0017 24’ roadway transom -> 2” base + 4” asphalt on high side = 1.4% cross slope. (The SC0017 transom can only accept a 2” average max overlay using HL93 design load)
        - AB957 36’ roadway transom -> 2” base + 4” asphalt on high side = 0.92% cross slope
        - AB978 42’ roadway transom -> 2” base + 4” asphalt on high side = 0.8% cross slope
    2. Tilt Bridge (NOT PERMITTED). Per AASHTO bridge girders “must” be in vertical plane.
    3. PREFERRED - Prefer a crown be designed into the bridge profile, or an even layer of asphalt applied. Special transoms with cross slope built in can be utilized but they are not part of the FDOT inventory.

CANTILEVER INSTALLATION



Safety Message

Contact Us

Thank you!

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