



Fred Hartman Bridge over Houston Ship Channel
Baytown/LaPorte, Texas

Aesthetically pleasing bridge rails... isn't that one of the most significant concerns to you as a bridge engineer? Although bridge rail constitutes only 2 to 5 percent of the total cost of a bridge, it is of incalculable value to the citizens for whom the bridge is built. No matter how magnificent the bridge design, a visually-appealing railing will impact public acceptance. That is why an elliptical bridge rail is the choice of an ever increasing number of bridge engineers across the nation.

With over 40 years of highway use, elliptical bridge railing is still the right choice on today's bridges. Texas,

Product

Tex-Tube Elliptical Bridge Rail

Specifications

API 5L GRADE X52 PSL1 TYPE E
4-7/8" x 8" x .188" (various lengths)
12.94 lbs/ft
Radii to 16'

Some Current Rail Types

TxDOT HT Rail (TL5)
TXDOT T401 & C402 Rail (TL3)
PennDOT HT Rail (TL5)
FDOT Special Rail (TL4)

Contact

GSI Highway Products
www.gsihighway.com
(972) 225-1660
sales@gsihighway.com

Pennsylvania, Florida, Maryland, and other are currently using elliptical tube in NCHRP 350 Test Level 3 (TL3) and Test Level 5 (TL5) bridge rail applications. Although having other advantages, the primary motivation behind this use is that elliptical rail provides an open and aesthetically pleasing bridge rail... it simply looks good!¹

It has been used on signature projects like the Fred Hartman Bridge over the Houston Ship Channel in Texas, the Woodrow Wilson Bridge between Maryland and Virginia just outside of Washington D.C., and the soon to be built Santiago Calatrava Bridge on IH30 over the Trinity River in Dallas, Texas. Elliptical railing is one of the railings most commonly used by T x D O T . Florida DOT has developed an elliptical rail to retrofit many of the older concrete bridges throughout the state; the pilot projects lets late 2007.

Another advantage is its crashworthiness. There is increased strength in the long axis against bending due to the elliptical shape.² The elliptical shape offers the strength of 6 inch pipe with the visual impact of 4 inch pipe. Field experience in Texas has shown this to be true with the elliptical rail performing ideally under tremendous impact forces.¹

The elliptical tube supplied by GSI Highway Products offers some additional advantages over "squashed" elliptical tubes on the market today. GSI is the master distributor for mill-rolled elliptical tube produced by The Tex-Tube Company of Houston, Texas. Tex-Tube's elliptical shape is continuously produced off the pipe mill to the API 5LX(52) specification thus having a higher strength-to-weight ratio than standard round pipe. A mill-rolled mating splice tube is also available with a superior fit which has held up in crashes beyond DOT expectations.¹

The higher strength-to-weight ratio produces an elliptical pipe that is 12.94 pounds per foot compared to the 18.97 pounds per foot of a "squashed" standard schedule 40 round pipe. This allows for reduced material costs and easier field handling thus stretching valuable tax dollars.

The lack of consistency in the "squashed" shape has been a hindrance to DOT adoption of elliptical rail in the past. This is no longer an issue. GSI's Tex-Tube *mill-rolled* elliptical rail offers superior consistency in the elliptical shape and splice tube fit.

GSI's Tex-Tube elliptical tube is truly the best source for your state's elliptical bridge rail needs.

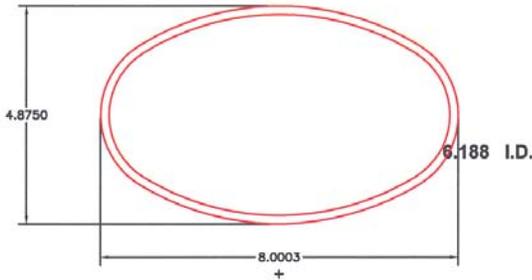
¹ Mark Blosscock, Bridge Engineer, TxDOT, (512) 416-2178

² Dr. Dean Alberson, Assistant Director, TTI, (979) 458-3874

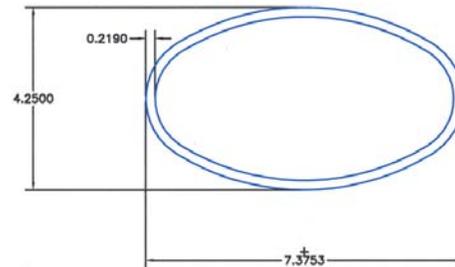
Technical Information

Tex-Tube bridge rail is produced continuously off the pipe mill in an elliptical shape in accordance with the chemical, mechanical, and testing requirements of **API 5L Grade X52 PSL 1 Type E MOD.**

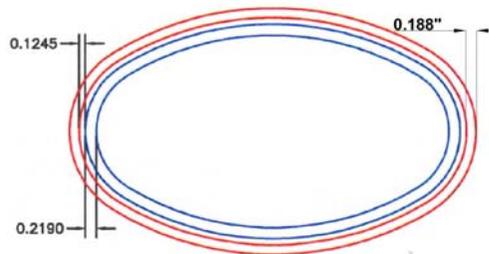
Outside Tube



Inside (Splice) Tube



Outside/Inside Tube Together



Specifications

- API 5L GRADE X52 PSL1 TYPE E
- Tube: 12.94 lbs/ft
- Splice: 13.9 lbs/ft
- 52,000 psi min yield strength
- 66,000 psi min tensile strength

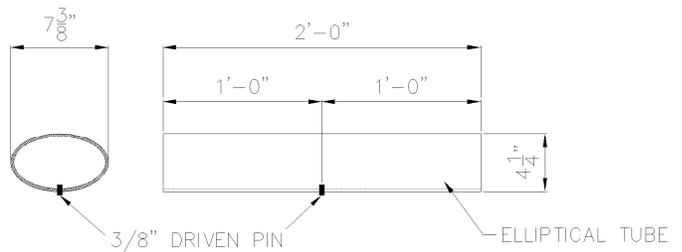
Chemical Composition, max %

C	Mn	P	S	Cb
.26	1.40	.030	.030	.008 min.

Dimensions

- Tube: 4-7/8" x 8" x .188"
- Splice: 4-1/4" x 7-3/8" x 2' x .219"
- Stocked in lengths 30' to 50'
- Can be produced in lengths to order
- 15 pieces per bundle / 8 bundles per truck
- Can be radiused down to 16'

Typical Splice Tube



Typical DOT Dimensional Specification

TUBE & SLEEVE MEMBERS		
8" x 4 7/8" Ellipse	Splice Member	
Material	Material	Thickness
6" Dia Std Pipe ASTM-A53 E or S Gr B)	ASTM-A53 Gr B	0.353"
	A36 or A500 Gr B	0.339"
	API-5LX52	0.224"
6 3/4" O.D. Pipe x 0.188" API-5LX52	ASTM-A53 Gr B	0.339"
	A36 or A500 Gr B	0.325"
	API-5LX52	0.188"

Notes: Other sections of equal or greater strength are acceptable for sleeves. The major and minor diameters of the rail member may vary +/- 0.1875 inches from plan dimension. However, the difference between the outside diameters of the sleeve and the inside diameters of the rail shall not exceed 0.25 inches.



GSI Highway Products is the United States master distributor for Tex-Tube Elliptical Rail for bridge rail applications.

GSI has been serving the Highway, Bridge, and Utility construction markets since 1970. GSI is located in a Dallas suburb, Hutchins, Texas.

For more information or pricing
 GSI Highway Products
 720 West Wintergreen Road
 Hutchins, Texas 75141
 (972) 225-1660
sales@gsihighway.com

Problem: Retrofit Obsolete Concrete Bridge Railing
Solution: FDOT Elliptical Bridge Rail (TL4) (Standard Pending)
Project: Project Expected Letting Fall 2007, 6 bridges in FDOT District 4

An FDOT District Engineer needed to bring an obsolete bridge railing in Florida up to current TL-4 standards; **a situation states across the nation are facing today**. This district engineer contacted, Charles E. Boyd, P.E., FDOT Senior Structures Design Engineer, to discuss the options available. At that time, the options were to replace the safety shape or parapet type railing with a new F-shape railing, or retrofit the parapet type railing with a vertical face or thrie beam retrofit. Although effective options, these are all **costly and time consuming**.

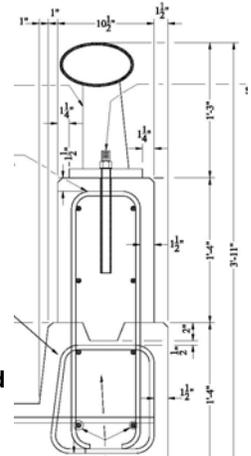
Mr. Boyd had an idea! Being familiar with the extensive use of elliptical bridge throughout Texas, he called his long-time friend, Mark Bloschock, TxDOT Bridge Engineer, to discuss whether the **TxDOT elliptical bridge railing** could be used to retrofit this obsolete bridge. Mr. Bloschock relayed that **it had already been done**.

Thinking about other bridges throughout the state, Mr. Boyd asked **Texas Transportation Institute (TTI)** utilize the TxDOT T402 (TL3) and develop a TL4 elliptical railing to retrofit 4 obsolete concrete bridge railing designs. TTI had helped TxDOT develop their current elliptical bridge railing standards.

The result was a elliptical rail that can be used to retrofit all 4 types of existing obsolete bridge traffic railings to bring them up to the required FDOT TL-4 standard. The first project will be let in 2007 and will utilize the design pictured to retrofit 4 bridges. This will **save the state countless dollars** compared to the other options presently available to retrofit these types of bridges.

For the safety shape and parapet type railings with existing metal rails on top, the existing metal rail is simply removed and the new metal rail is installed in its place using new adhesive bonded anchor bolts. For the safety shape railing that does not have an existing metal rail on its top, all that is necessary is to install the new metal rail. Existing approach guardrail transitions will likely also need to be replaced or retrofitted as is currently done.

Savings will be seen with significantly **reduced construction times** by using this retrofit rather than a standard thrie beam or vertical face retrofit. The new retrofit design does not require any concrete demolition and reconstruction, thus **much less traffic control** will be required to construct it. With reduced construction time, both state inspectors, construction workers, and the public will have less exposure to potential injury. And finally, the best result will be that **overall safety will actually be increased bringing the bridge up to current standards design to protect the types of vehicles on the roads today.**



Obsolete FDOT Bridge Traffic Railings Bridges throughout Florida

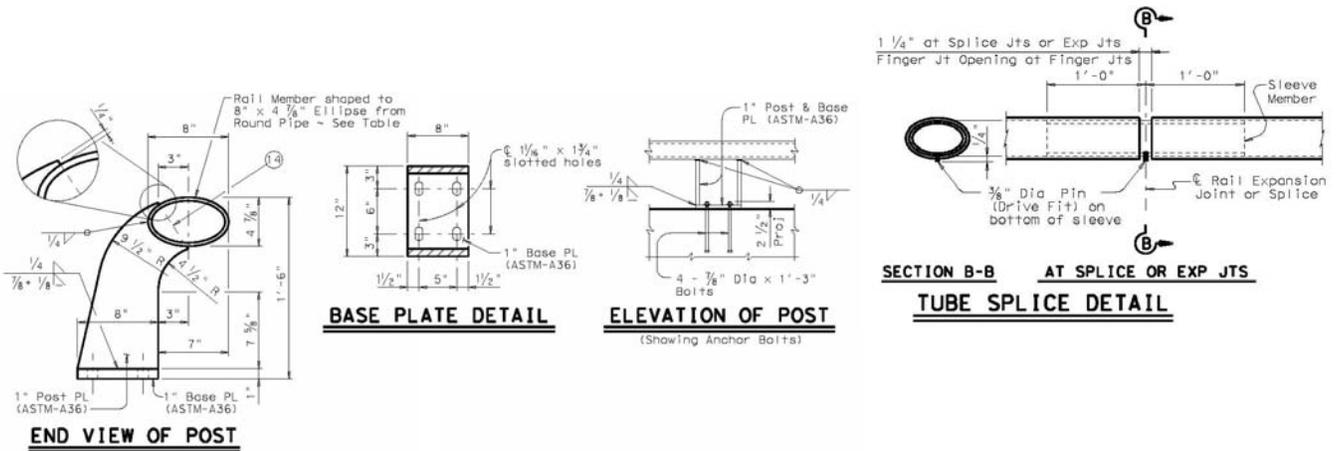
<p>Parapet Type with Aluminum Railing</p>	<p>Jersey Shape with no Railing</p>	<p>Jersey Shape with Railing</p>	<p>Parapet Type With Aluminum Railing</p>
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New FDOT Elliptical Bridge Rail (TL4) Developed by TTI for FDOT from TxDOT T402 Standard
Contact Charles E. Boyd, FDOT Senior Structures Design Engineer, (850) 414-4275

<p>1" Post PL (ASTM-A36) 1 1/4" Base PL (ASTM-A36) 1 1/8" x 1 3/4" Slots</p>	<p>ELEVATION</p> <p>SECTION THRU RAIL</p>
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(TL5) TxDOT HT Heavy Truck Traffic Rail (50" tall)

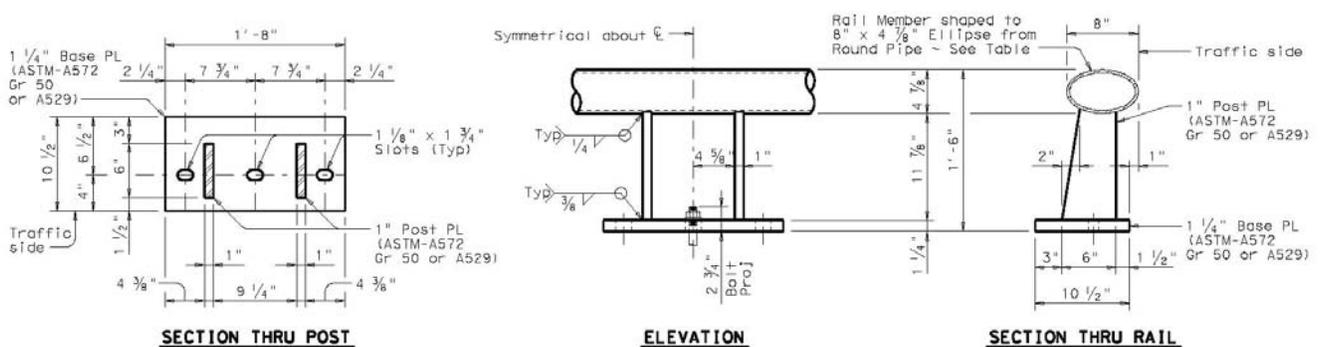
Beltway 8, Houston, Texas



For Texas Department of Transportation (TxDOT) usage, contact:
 Mark Bloschock, Bridge Engineer, mbloscho@dot.state.tx.us, (512)416.2178
 View TxDOT Bridge Standards at <http://www.dot.state.tx.us/business/standardplanfiles.htm>

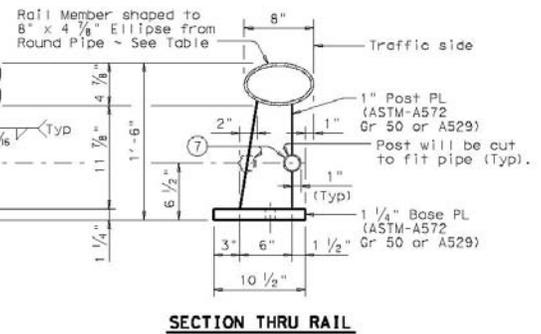
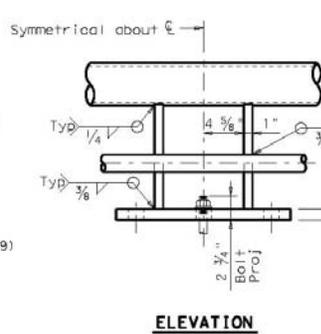
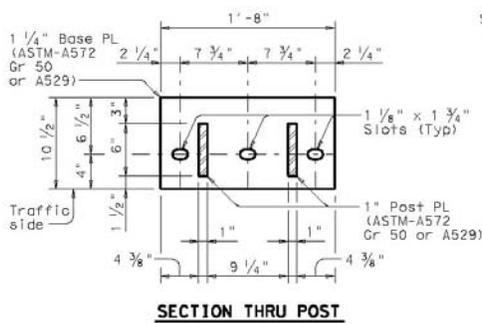
(TL3) TxDOT T402 (42" tall)

Northshore Park, The Woodlands, Texas



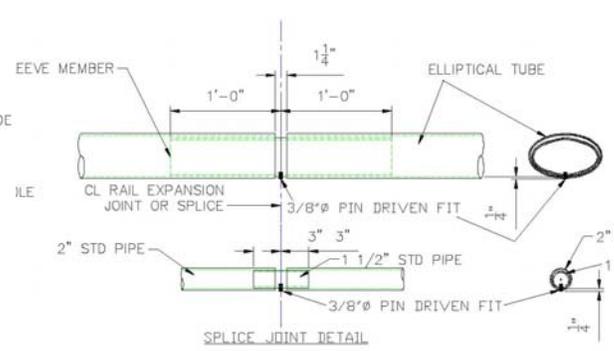
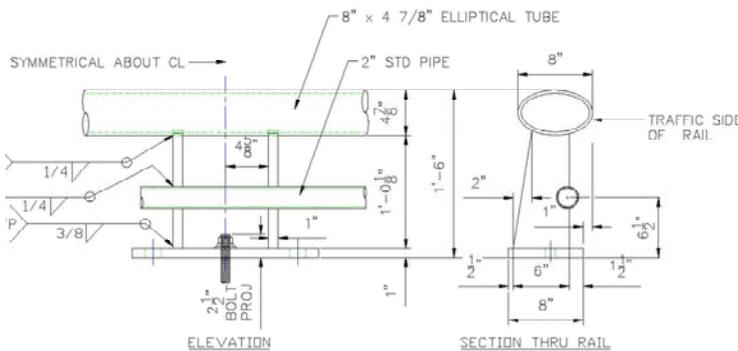
(TL3) TxDOT C402 (42" tall)

FM 620 & US 183, Austin, Texas



(TL3) Florida DOT Special Project (TxDOT C402MOD)

Plantation Preserve Golf Course, Plantation, Florida



For Florida Department of Transportation (FDOT) usage, contact:
 Charles E. Boyd, P.E., Senior Structures Design Engineer, Tallahassee, Florida, (850) 414-4275
 View FDOT Bridge Standards at <http://www.dot.state.fl.us/structures>

