TxDOT's Bridge Program Statistics

- Texas has about 50,000 bridges, about 40% more than any other state
- 2005 - TxDOT procures 1,000,000 linear feet of precast I girders in new bridges
- 2007 - Texas/Wisconsin led U.S. for lowest cost structures on a per-square-foot basis ($50-$85)

WSDOT's Bridge Program Statistics

- Washington State has about 3,500 bridges
- Precast-Prestressed Concrete Bridges
  - $145-$175/sq ft

TxDOT Bridge Engineering

- Staff
  - 100 in-house engineers
  - 170 consulting firms

- Highly refined processes for designing and detailing bridges
  - Detailed superstructure design in about ½ day

WSDOT Bridge Engineering

- Staff
  - 60 in-house engineers
  - 10-20 consulting firms (varies with workload)
- Highly refined processes for designing and detailing bridges
  - Detailed superstructure design in about ½ day

Winds of Change

- FHWA Mandate, October, 2007: AASHTO LRFD Bridge Design Specifications
  - Forced reexamination of all design and production practices
  - TxDOT's existing precast girder design program PSTRS14 needed significant updating
  - WSDOT's PGSuper software supported the latest AASHTO LRFD specifications

Some Requirements for an Engineering Design Process

- Quality
  - Consistency in design
  - Common practice and standards
  - Verification of calculations
- Adaptability
  - Deal with non-standard configurations
  - Quickly respond to industry changes
  - Rollout of specification changes and innovation
- Efficiency
  - Full automation for common configurations

Design Software,
A Key Component in Process

- Today's precast design
  - 1,000's of computations/evaluations

- Requirements
  - Quality
  - Adaptability
  - Efficiency

TxDOT's
Software Requirements Study

- Vetted by IT and Engineering Staff
- About 100 Main Requirements
  - Weighted by priority
  - 7 categories

TxDOT's Quest for Precast Girder Design Software

- Several Avenues Were Explored/Pursued
  - Upgrade PSTRS14
  - Develop New Program In-House
  - Commercial Options
  - AASHTOWare
  - Free and Open-Source Alternatives

# After Long Review, PGSuper Best-Fit Requirements

- Nearest Fit to TxDOT's Design Process
- Based on Solid Technology
  - Modern, Interactive User Interface
  - Object-Oriented Software Architecture
- Shared Resources
  - Collaborative Development
  - Precast Technology Transfer
- Minimal Project Risk and Cost
  - Open Source License

Open Source Software

- Copyrighted software licensed with special terms
  - Allows use without restriction
  - Allows redistribution without restriction
  - Allows the creation of derivative works
  - Requires the distribution to include source code
  - Requires all these rights be passed along

- Zero risk for collaborative relationship
  - At any time, either party can walk away with everything, leaving the other party with everything!!!

Collaborative Effort Is Born

- Collaboration Deemed Best Alternative
- Mid-2006 - Collaboration Begins
  - BridgeSight Inc. selected as contractor
  - Only two TxDOT/WSDOT/BridgeSight meetings
    - High reliance on Tele-collaboration
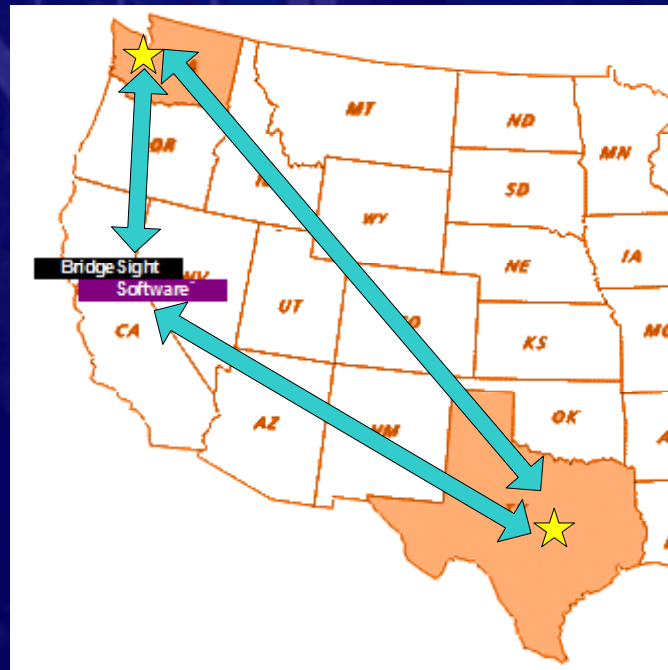
Keys To Successful Collaboration

- Fluid Decision Making Process
  - Small Group
  - Proper level staff available
    - Technical competence
    - Quick turnaround - Decisions often made on spot

Keys To Successful Collaboration

- Internet-Based Tools
  - Email
  - Issue Tracking System
    - Requirements
    - Bug Tracking
  - Project Wiki
    - Documentation, Pre-Releases, Testing

File Edit View Favorites Tools Help

http://www.dot.state.tx.us/apps/bugtrack/bridge/bugs.aspx

BT_BRIDGE - issues

BT BRIDGE | Issue Tracker | issues | search | queries | reports | HelpDoc | go to ID | [   ] | search text | [   ] advanced | logged in as gfreeby | logoff | settings | about | help

add new Issue | Project: PGSuper Prestress LRFD ▼ | print list print detail export to excel | screen capture

page 1 of 8 >> [1] 2 3 4 5 6 7 8 | clicking while holding Ctrl key toggles "NOT" in a filter: "NOT project 1"

id	desc	project	category	reported by	reported on	priority	assigned to	status
		[no filter] ▼	[no filter] ▼	[no filter] ▼		[no filter] ▼	[no filter] ▼	[no filter] ▼
123	Jacking Force Update and Ability to Exceed	PGSuper Prestress LRFD	Modification	tretter	2009-04-28 7:06 AM	med	rpickings	New
122	Strand stress related error	PGSuper Prestress LRFD	Bug	gfreeby	2009-04-03 4:36 PM			
121	Regression Testing Framework	PGSuper Prestress LRFD	Enhancement	rpickings	2009-01-22 1:27 PM	high	tbradber	Closed
120	Upgrade to Visual Studio 2008	PGSuper Prestress LRFD	Enhancement	rpickings	2009-01-22 12:47 PM	high	tbradber	Closed
119	Overlay Load	PGSuper Prestress LRFD	Modification	tretter	2008-12-19 11:20 AM	high	tretter	Ready for Testing
118	Transfer Length Set Method in Library	PGSuper Prestress LRFD	Modification	tretter	2008-12-19 11:18 AM	high	rpickings	Closed
117	TxDOT Loss calculation method	PGSuper Prestress LRFD	Enhancement	gfreeby	2008-11-18 10:31 AM	med	gfreeby	Ready for Testing
116	Garbled Characters on stress check repots ~ 2.1.0.8 Beta Testing	PGSuper Prestress LRFD	Bug	gfreeby	2008-10-30 10:21 AM	med	rbrice	Closed
115	The girder comparison report does not contain debond information.	PGSuper Prestress LRFD	Enhancement	rbrice	2008-10-28 1:48 PM	med	rpickings	Authorized
114	Bursting and Confinement Checks	PGSuper Prestress LRFD	Modification	tretter	2008-09-19 8:55 AM	low	rpickings	Ready for Testing
113	Fatal Error - Diaphragm Overlap	PGSuper Prestress LRFD	Bug	vmccamm	2008-05-20 9:47 AM	med	rbrice	Closed
112	New Beam Type - Decked Slab Beams	PGSuper Prestress LRFD	Enhancement	tretter	2008-04-22 8:33 AM	med	rpickings	Authorized
111	Shear Design Algorithm	PGSuper Prestress LRFD	Enhancement	tretter	2008-03-24 8:22 AM	low	rpickings	Authorized
110	Compliance with change to AASHTO LRFD 3.6.1.3.1 regarding dual trucks in a lane	PGSuper Prestress LRFD	Modification	tbradber	2008-03-03 3:21 PM	high	tretter	Closed
109	2004 Loss Equations	PGSuper Prestress LRFD	Modification	gfreeby	2008-02-21 12:24 PM	med	rpickings	Closed

page 1 of 8 >> [1] 2 3 4 5 6 7 8

117 issues returned by query

File Edit View Favorites Tools Help

http://www.pgsuper.com/mWiki/index.php?title=Main_Page

Main Page - PGSuperWiki

article   discussion   view source   history

Main Page

Welcome to the PGSuper Wiki!!

The purpose of this site is to provide a platform for PGSuper collaboration and testing.

Currently Important Topics:

PGSuper Beta Releases For TxDOT

PGSuper2AashtoWare Beta Releases

navigation
- Main Page
- Current events
- Recent changes
- Random page
- Help
- Donations

search

Go   Search

toolbox
- What links here
- Related changes
- Upload file
- Special pages
- Printable version
- Permanent link

Additional Benefits
of Collaboration

- Technology Transfer
  - LRFD Specifications interpretation
  - Faster, more robust, design algorithm
  - Increased product quality due to higher level of testing
- Software Flexibility
  - Highly-parametric configuration
  - Program can be modified to needs of almost any agency using LRFD

PGSuper Status at TxDOT

- Superstructure design in ½ day goal achieved
- Used by all in-house engineers
- Release to consultants soon pending final enhancements.

PGSuper Status at WSDOT

- Committed to ongoing development
  - Adding support for AASHTO LRFD 2009
  - Adding spliced girder design capabilities
  - Increasing geometric modeling capabilities
  - Enhancing support for 3rd party integration

Near-Term Plans

- "Non-Standard" Strand Definitions
  - Alternate Designs From Fabricators
    - Research Underway to Streamline Process
  - More Flexible Strand Input
- Post Tensioning
  - Spliced Girder Construction
  - Continuity
- Third-Party Plug-Ins
  - Extend capabilities by adding, not changing source
  - BridgeSight PGSuper2AASHTOWare Translator

Conclusions

- PGSuper has helped TxDOT get to LRFD
- TxDOT recognized and leveraged Collaborative opportunity
- Successful collaborative development
- Others are encouraged to join in
  - User feedback, development, testing, documentation, funding

Got PGSuper?

- Free download from

    – www.wsdot.wa.gov/eesc/bridge/software

- www.pgsuper.com

    – Free Training

    – Peer to Peer Support

Demo

- More Complex Structures
- Quick Demo Showing Typical Precast Design at TxDOT

Washington State
Department of Transportation

Texas
Department
of Transportation

BridgeSight
Software™

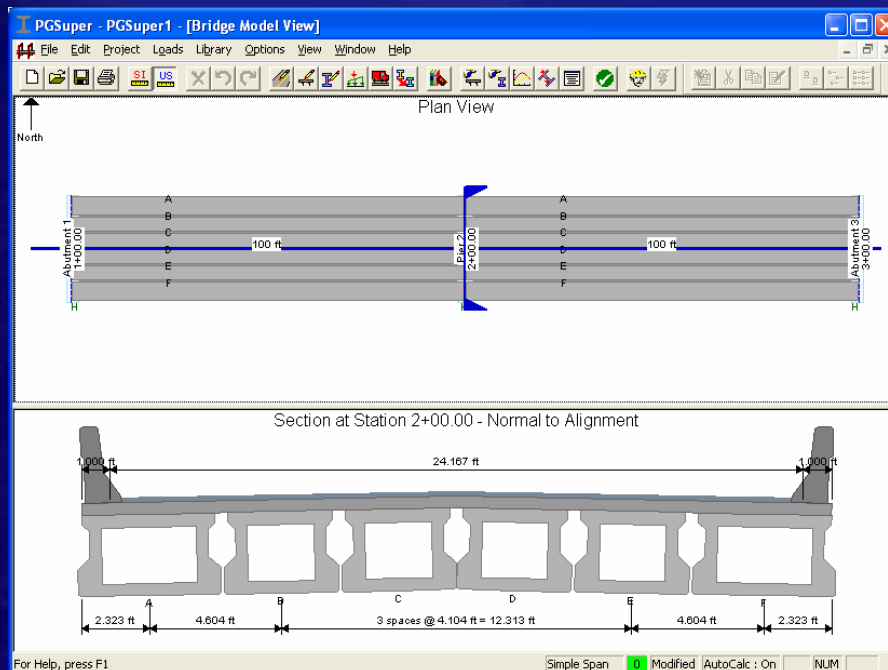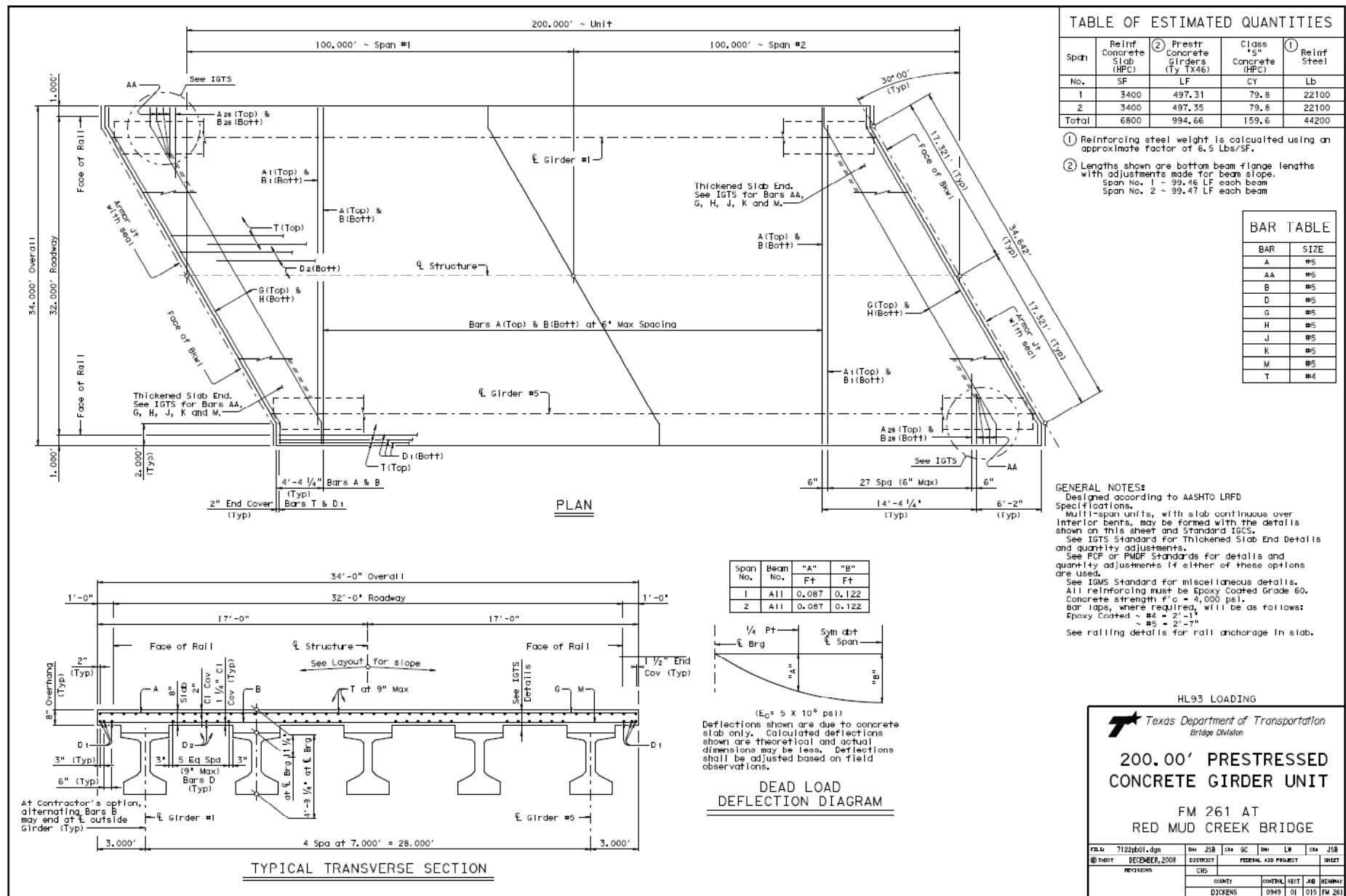# More Complex Structures

Splayed Girders with Tapered Deck
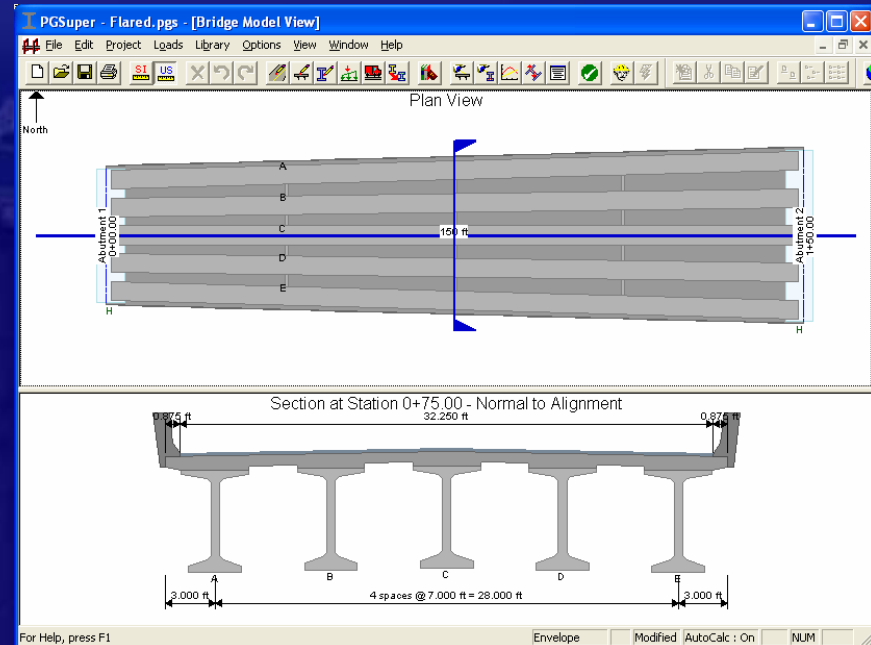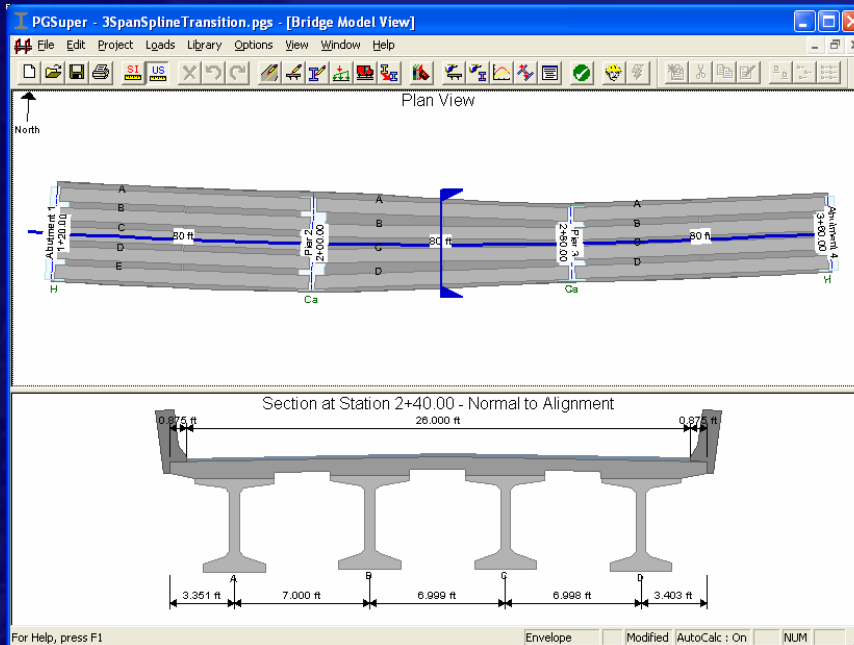
Complex Structures

Mixed Girder Types
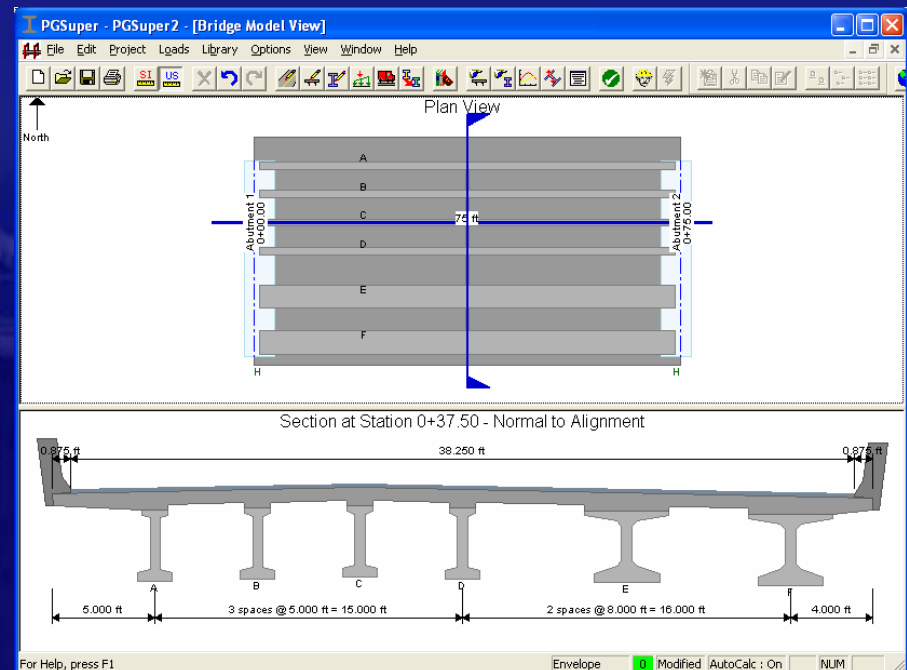
Red Mud Creek Bridge

Texas Department of Transportation, Bridge Division

200.00' PRESTRESSED CONCRETE GIRDER UNIT

FM 261 AT RED MUD CREEK BRIDGE