

Use of PGSuper by TxDOT

Taya Retterer

February 25, 2011

Introduction

- What is PGSuper?
 - Prestressed Girder Superstructure design and analysis software
 - According to AASHTO LRFD Bridge Design Specifications and TxDOT design guidelines
 - Jointly developed and maintained by TxDOT and WSDOT

Introduction

- Where can I find it?
 - For TxDOT users, request from your IR staff
 - For others,
http://www.dot.state.tx.us/business/contractors_consultants/engineering_software.htm

Introduction

- PGSuper Design Guide –
 - Find it - ftp://ftp.dot.state.tx.us/pub/txdot-info/library/pubs/bus/bridge/pgsuper_design_guide.pdf
 - Read it
 - Keep it handy.

Why PGSuper?

- PGSuper is a windows bases application to design beams to the current LRFD specifications. The program
 - Calculates Loads (Rail and Overlay)
 - Calculates Live Load Distribution Factors (No more spreadsheets)
 - Designs ANY Beam in a cross section.
 - Checks all LRFD provisions relating to design of prestressed concrete

Which one should I use?

- Use PGSuper as your primary design tool.
- Run companion PSTRS14 to verify results. They should match!
- Do we still need PSTRS14?
 - Standard Spec
 - Railroad loading

Just how easy is PGSuper?

- Open a Template
- Input Span Length
- Input Beam Spacing and Number of Beams
- Input Deck Width
- Click on the Design Algorithm
- You're done!

TxDOTisms

- Library
- LLDF for Shear
- Vertical Curves (page 4)
- Slab Offsets (page 5)
- Non-Standard Strand Patterns (page 6 and Appendix B)
- Camber
- Inverted T's (page 10)
- TOGA (page 11)

Library

Set to meet AASHTO LRFD criteria and TxDOT LRFD Bridge Design Guide. You will not need to modify the default settings, EVER!

- Project Criteria – TxDOT 2010
 - Release Factor 0.65
 - Warns when you exceed 6 ksi release strength and 8.5 ksi final strength.

① Based on the following allowable stresses (ksi):

Compression = $0.65 f'_{ci}$

Tension = $0.24 \sqrt{f'_{ci}}$

Optional designs must likewise conform.

Shear

- Recently added LLDFs for Shear

STRUCTURE	DESIGNED GIRDERS (DEPRESSED STRANDS)											OPTIONAL DESIGN						
	SPAN NO.	GIRDER NO.	GIRDER TYPE	NON-STD STRAND PATTERN	PRESTRESSING STRANDS					DEPRESSED		CONCRETE		DESIGN LOAD COMP STRESS (TOP Ⓢ) (SERVICE I) f_{ct} (ksi)	DESIGN LOAD TENSILE STRESS (BOTT Ⓢ) (SERVICE II) f_{cb} (ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (ft-kips)	LIVE LOAD DISTRIBUTION FACTOR	
					TOTAL NO.	SIZE (in)	STRGTH f_{pu} (ksi)	"e" Ⓢ (in)	"e" END (in)	NO.	TO (in)	RELEASE STRGTH Ⓢ f'_{ci} (ksi)	MINIMUM 28 DAY COMP STRGTH f'_{c} (ksi)				Ⓢ	
																	Moment	Shear

- DO NOT use the Shear Design Algorithm
- Check for shear.

Vertical Curves & Slab Offsets

- DO NOT Model
- Slab Offset = Slab Thickness + Haunch
- The way PGSuper models the additional concrete due to the vertical curve and haunch is not inline with TxDOT guidelines.

Non-Standard Strand Patterns

- Seeing more of these due to the Release Factor of 0.65 and a maximum release strength of 6 ksi release strength
- If you have a design with a release greater than 6 ksi, consider using a non-standard strand pattern. .
- See pages 6 and 7 and Appendix B in the PGSuper User Guide.

Camber

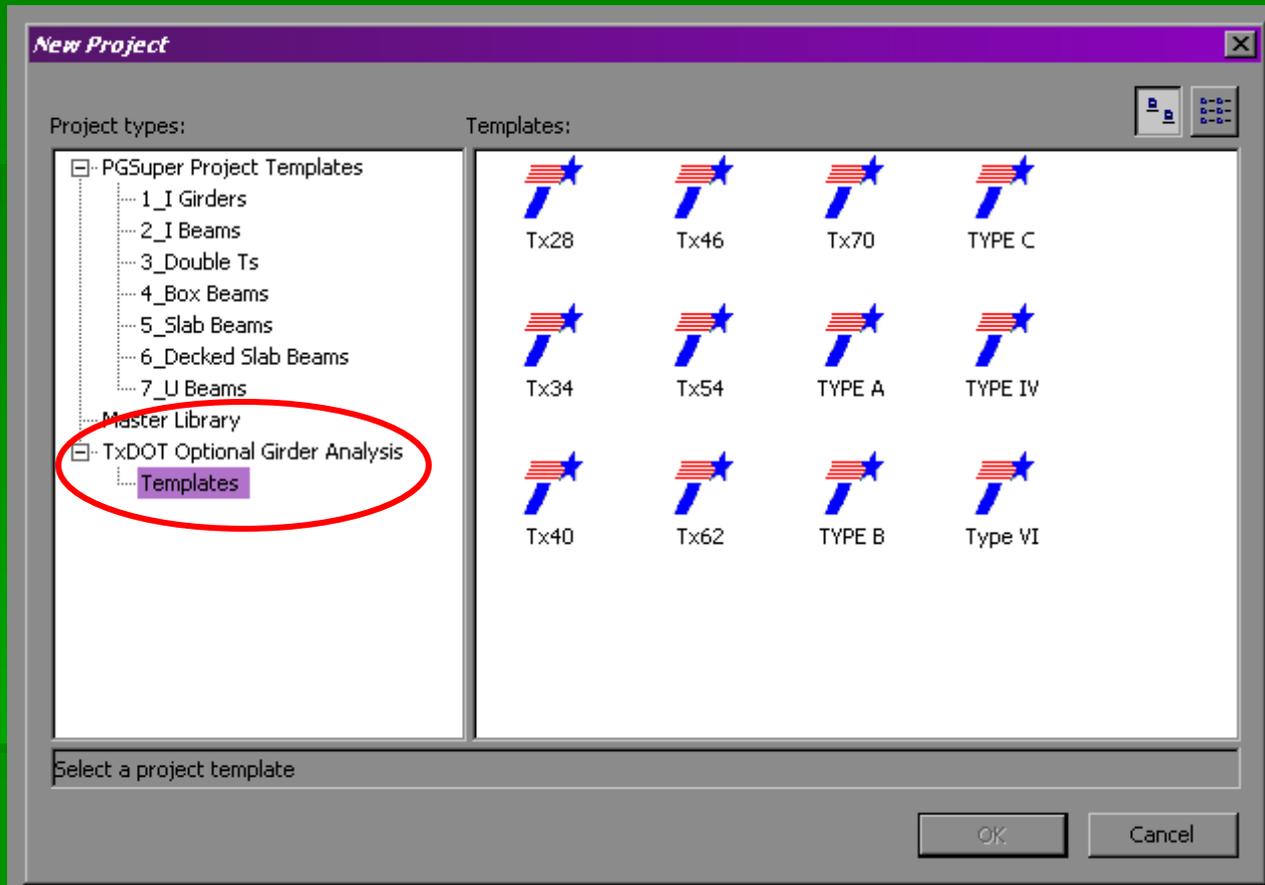
- Dependent on weather, location, materials ... everything.
- Different method than PSTRS14, which results in higher values for camber.
- Which lead to higher haunch values. This is conservative.
- TxDOT is good with the higher values.

Inverted T's

- The boundary conditions for the ends of beams at Inverted T's can be modeled in PGSuper.
- A “How to” was added to the PGSuper User Guide in December, pages 10-11.

TOGA

- TxDOT Option Girder Analysis
- Graphical User Interface
- Uses the same assumptions PSTRS14 does when analyzing a Fabricator's Optional Girder Design.
- For more information, see the Help menu for TOGA.
- To access TOGA,



CAD Export

- File : Export : TxDOT CAD Data
- Is not always there. A glitch in TxDOT packaging of the software.
- THE FIX

- Open a command prompt
 - Windows Start : Run
 - Type in cmd
- A DOS-style command window should appear
 - Change the command directory to the folder location where PGSuper is installed, likely either
 - cd C:\Program Files\WSDOT\PGSuper
 - or
 - cd D:\Program Files\WSDOT\PGSuper
 - Hit Enter
 - Type the following command
 - regsvr32 txdotagent.dll
 - Hit Enter
 - You should see a “DllRegisterServer in txdotagent.dll succeeded.” box. Click ok.
 - Open the PGSuper program. Do not open a document
 - Click File : Manage : PGSuper Plugins and Extensions
 - Data Exporters Tab – Make sure TxDOT CAD Data Exported is Checked
 - Extensions Tab – Make sure TxDOT Extensions is Checked.

Coming Soon

- Faster
- Multiple Girder Design and Export
- Shear Design Algorithm

Questions

- Out of time (maybe), so email me
 - taya.retterer@txdot.gov