

# Tendon force vs. frame response

## Test Problem

|              |                                                                                                    |
|--------------|----------------------------------------------------------------------------------------------------|
| Name:        | Tendon force vs. frame response                                                                    |
| Description: | Tendon application is validated by comparing tendon forces to those in an equivalent frame system. |
| Program:     | SAP2000                                                                                            |
| Version:     | 12.0.2                                                                                             |
| Model ID:    | na                                                                                                 |
|              |                                                                                                    |
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|              |                                                                                                    |

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## Overview

The model attached contains four separate structures, shown below in Figures 1 and 2, and listed as follows:

- Two-span bridge created using the [bridge modeler](#)
- Two-span bridge created manually
- One-span bridge created using the bridge modeler
- One-span bridge created manually

All four structures have the following properties:

- Each span length is 10m.
- Concrete deck sections are 0.5m deep and 3m wide.
- Simply-supported conditions are at each abutment and [bent](#).
- A straight [tendon](#), 25mm in diameter, runs along each length. Tendons are prestressed to 10kN (without losses) and located 0.05m from the bottom of each section.

The purpose of this model is to:

- Determine and review internal forces resulting from prestressing.
- Verify the prestressing forces used for flexural design check.
- Compare [frame-element](#) forces to the prestressing forces, found through the Display > Show Bridge Forces/Stresses menu.
- Define a section cut through the frame and tendon, review forces, and compare with frame and tendon response at section cut locations.

## Model screenshots

Flexural response is depicted in Figures 1 and 2:

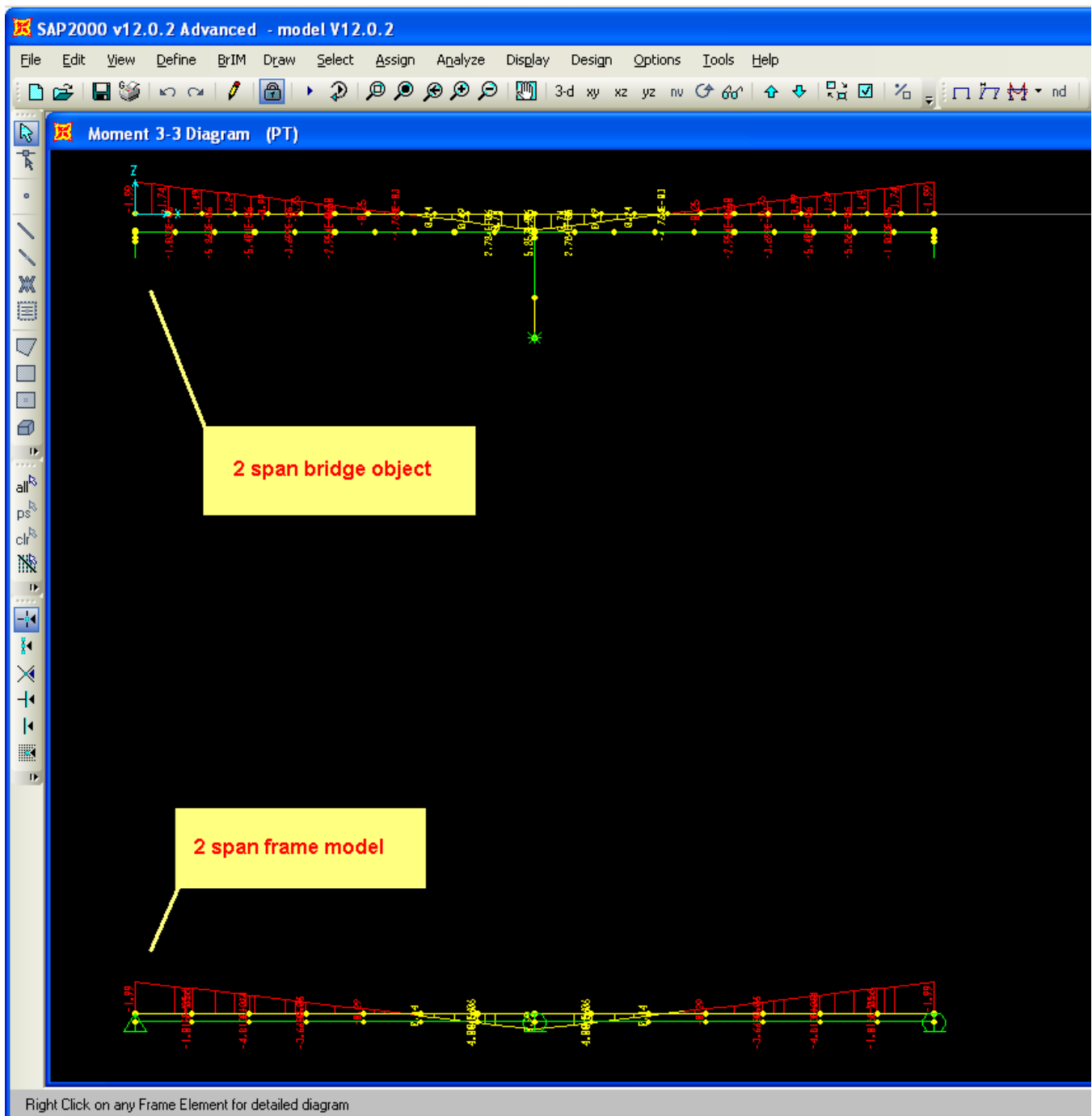


Figure 1 - Moment diagram, two-span bridge with tendon

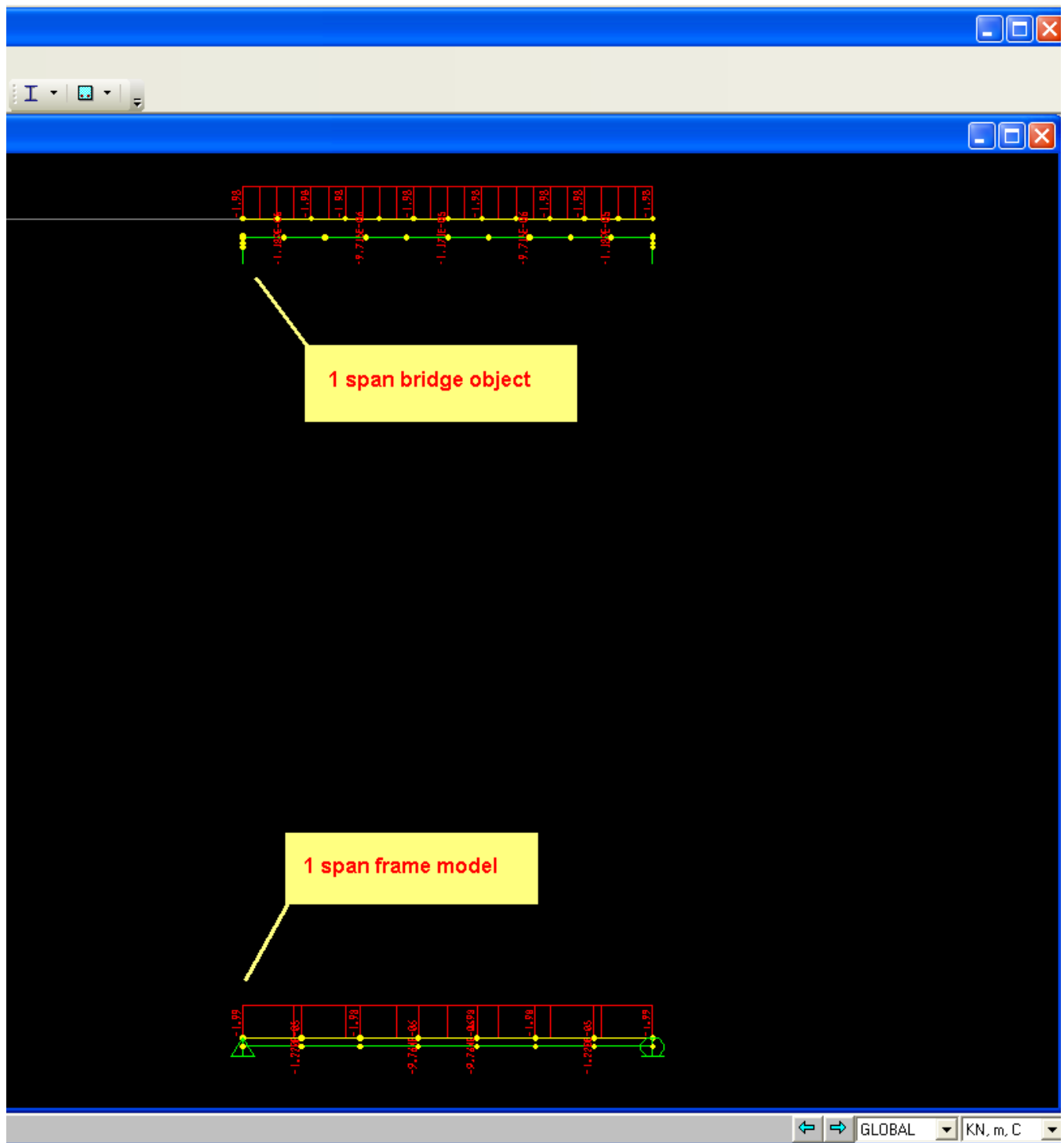


Figure 2 - Moment diagram, one-span bridge with tendon

[Section cuts](#) reveal that individual element forces closely correlate with those induced by prestressing.

## See Also

- [Hyperstatic forces for bridge-object superstructures](#) test problem

## Attachments

- [SAP2000 V12.0.2 model](#) (zipped .SDB file)