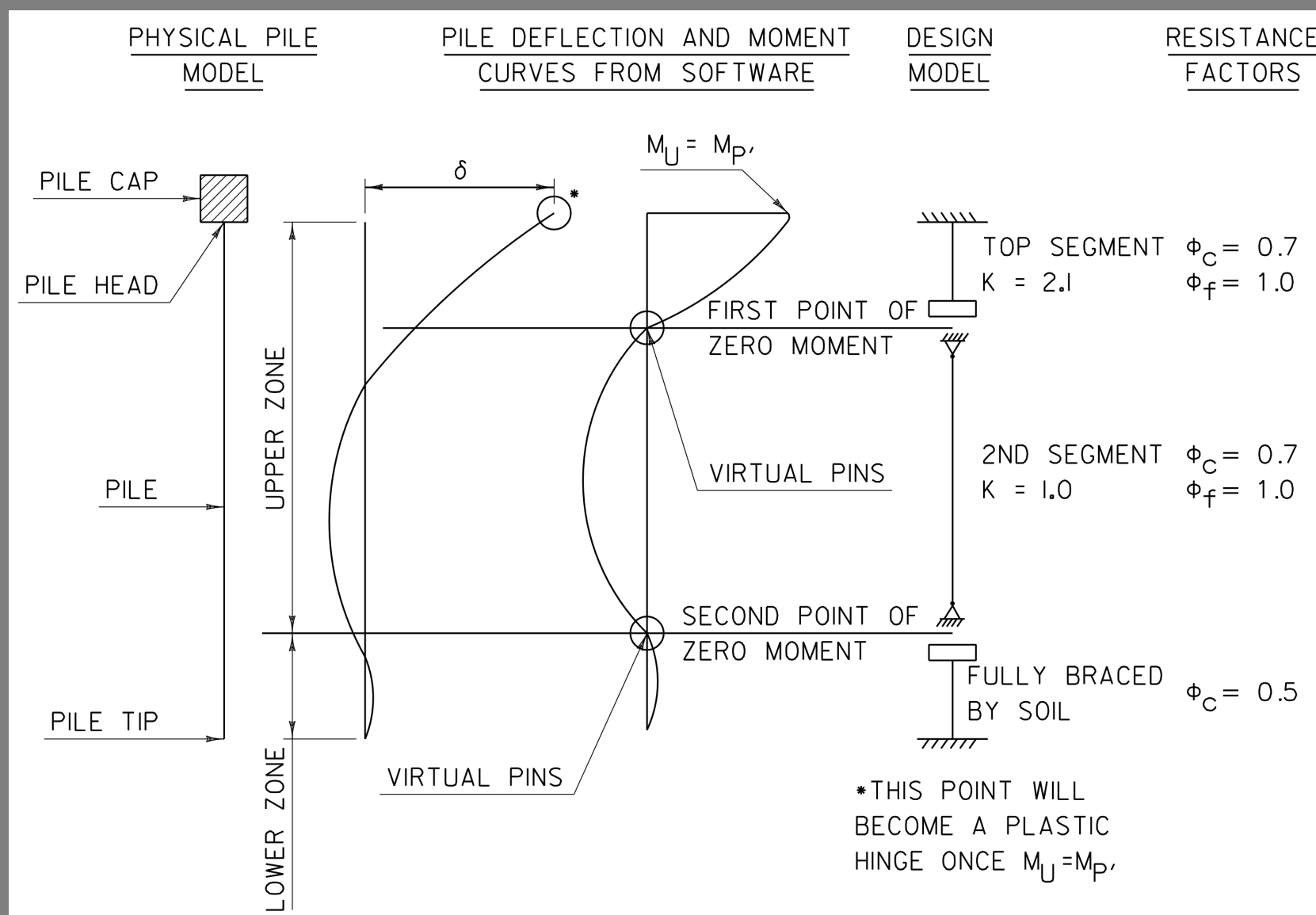


# PUSHING THE LIMITS OF INTEGRAL ABUTMENTS

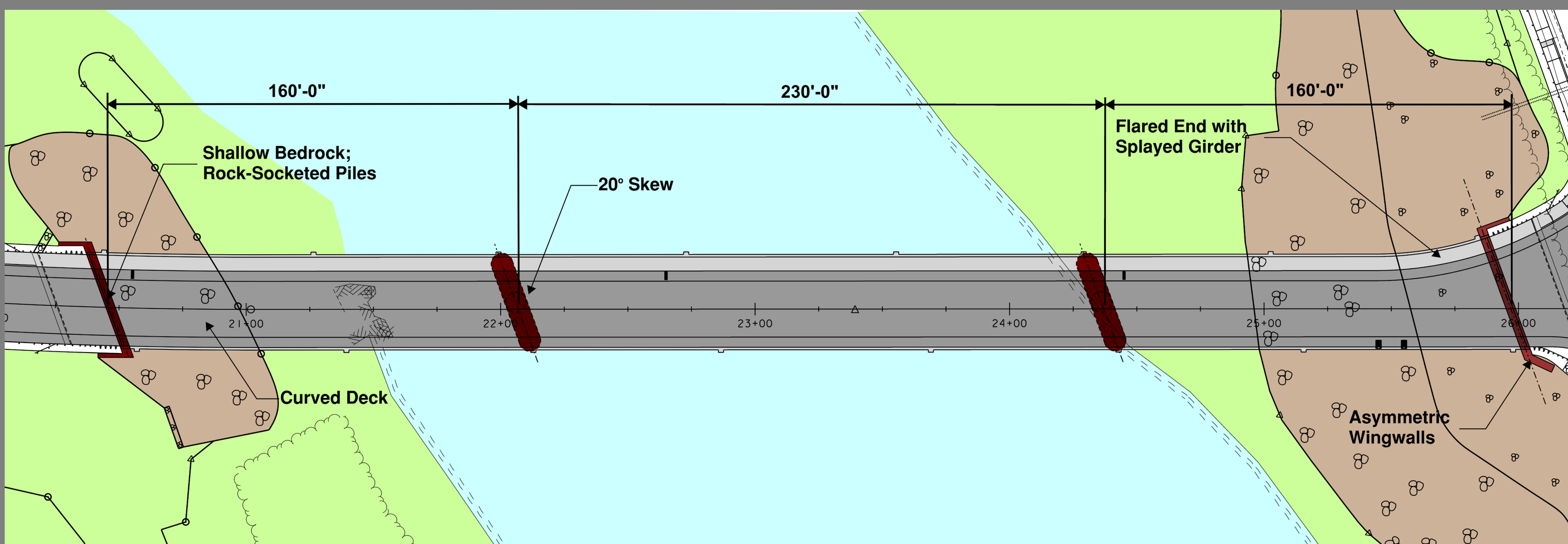
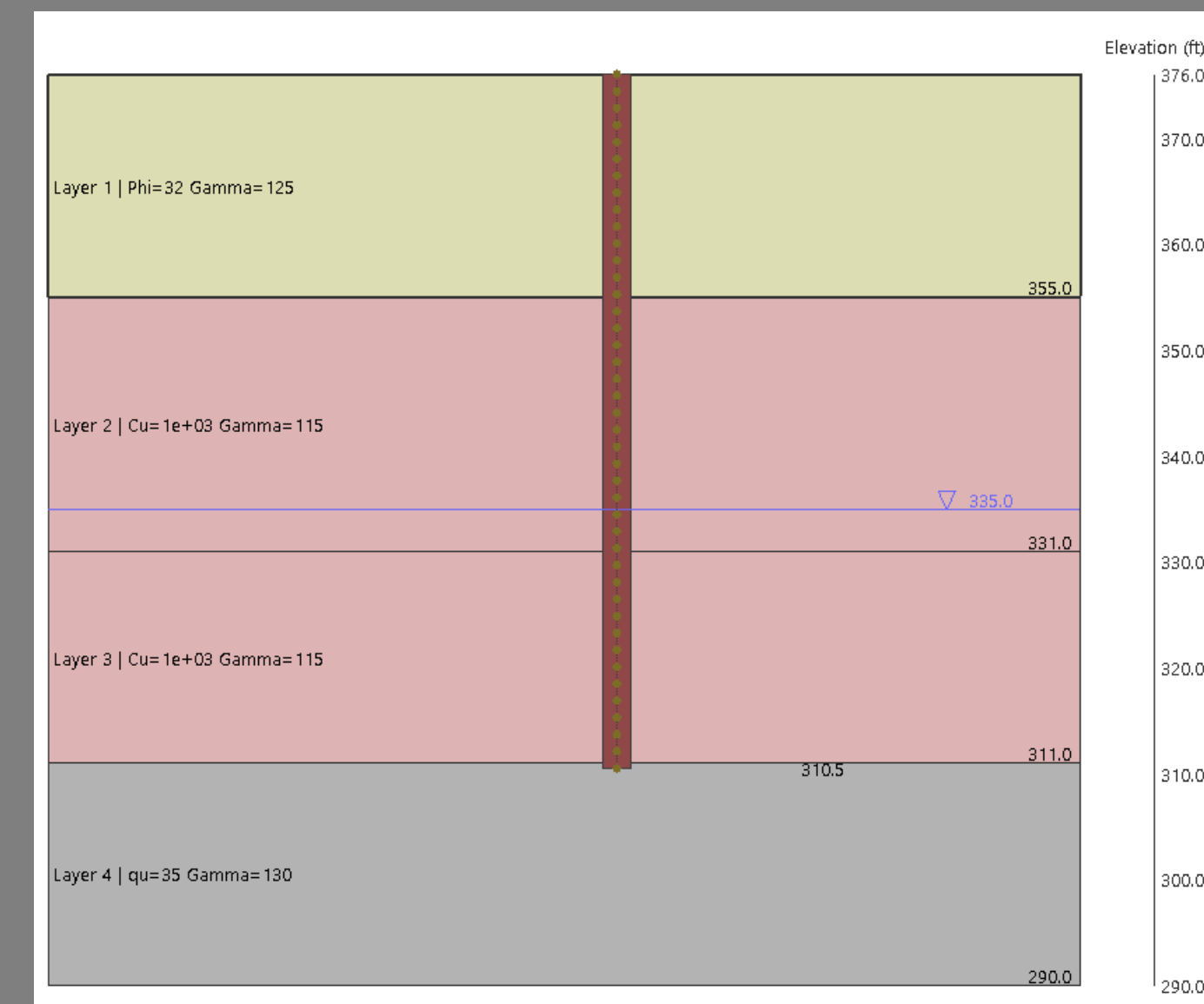
Bridge No. 7, Hartford, VT

Integral abutments bridges (IAB's) are cost effective, rapidly constructed supports with reduced long-term maintenance. Lack of standardized design practices has restricted the use of IAB's to more conventional structures. VTrans is making steps to expand the use of IAB's to longer, more complex sites.



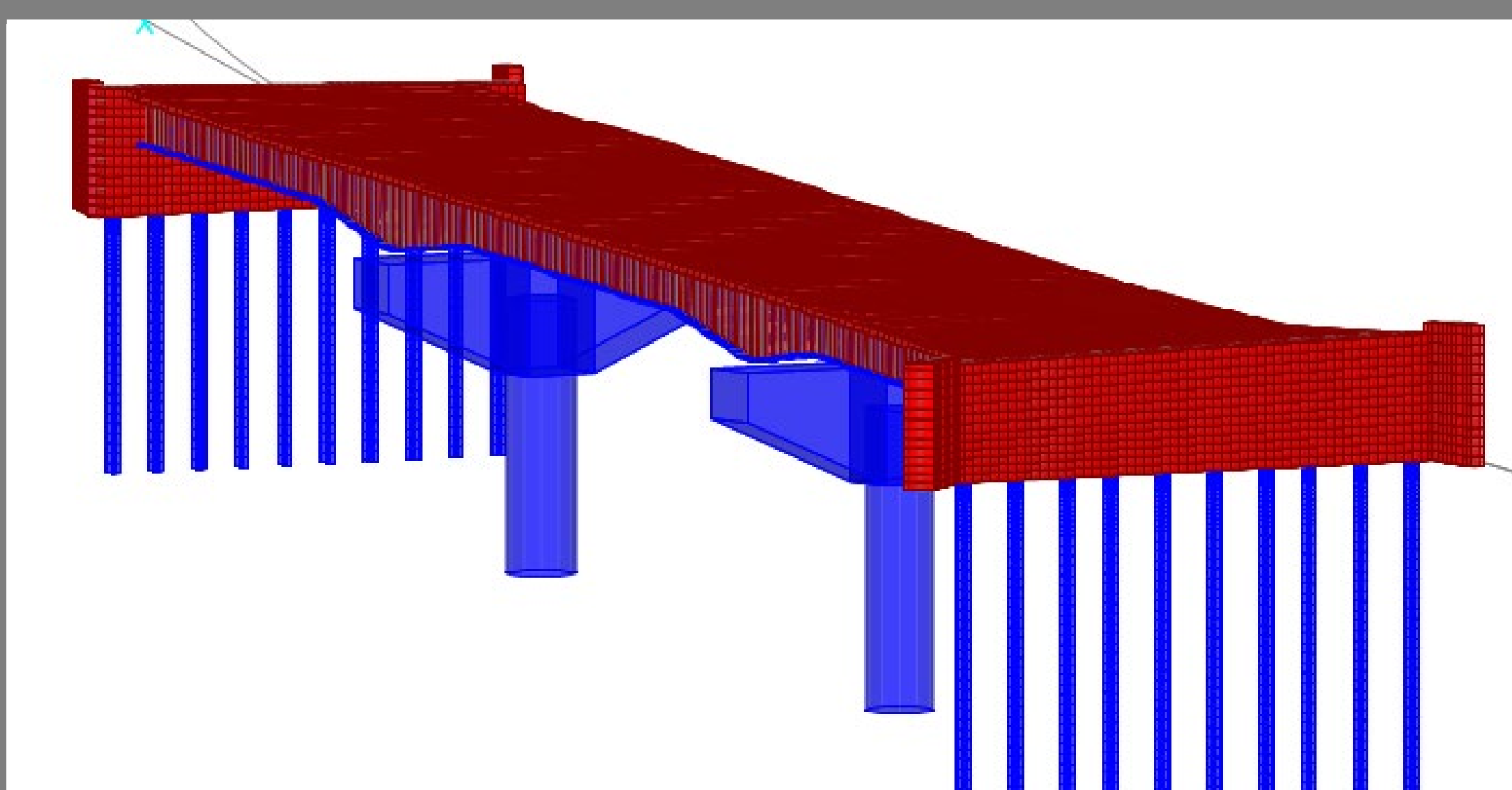
## SIMPLIFIED ANALYSES

- Generally Appropriate for Low Skew, Symmetric Bridges Less than 400-ft
- Single Pile Analysis with Soil Interaction, Weak Axis Only
- Postprocess as Simplified Series of Beam-Columns



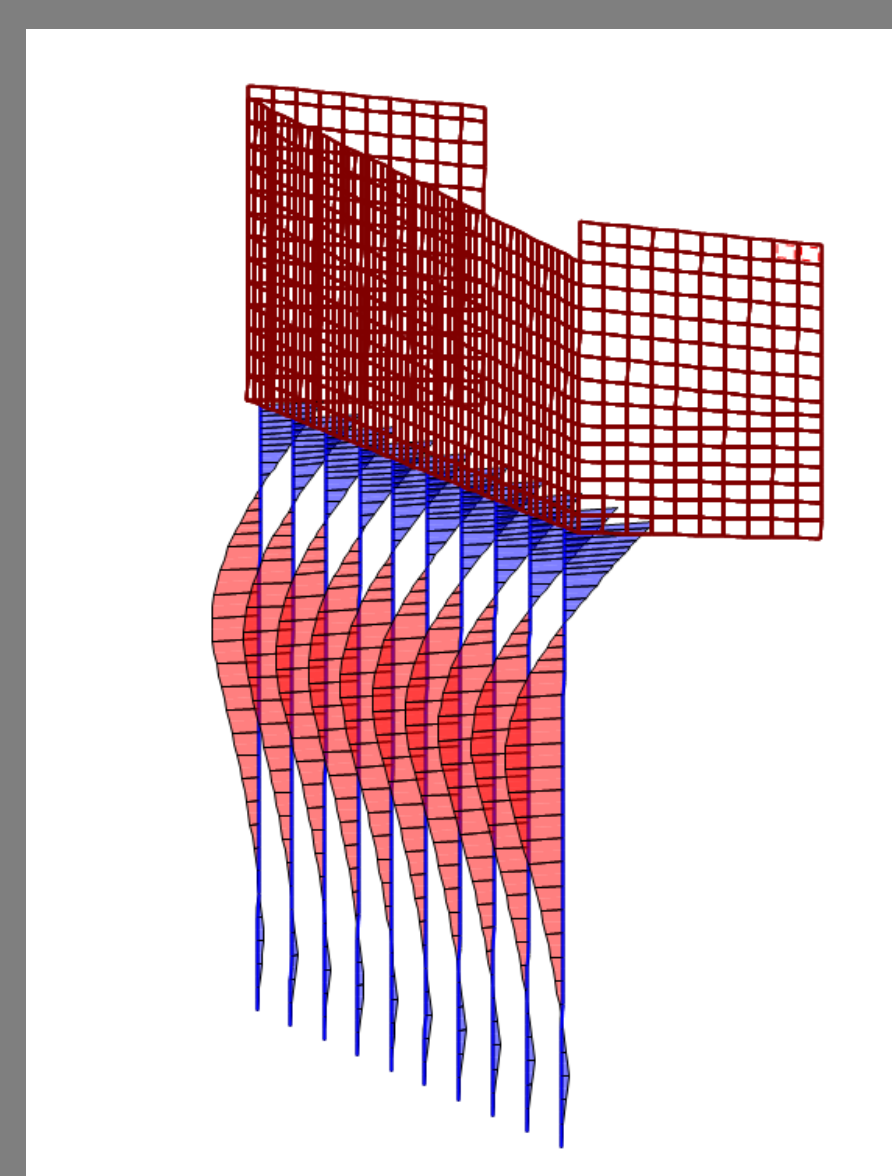
## HARTFORD BRIDGE 7 CHALLENGES

- Excessive Thermal Expansion
- Variable Subsurface Conditions
- Asymmetric Abutments
- Flared and Curved Roadway
- Skewed Substructures
- Relatively Steep Profile



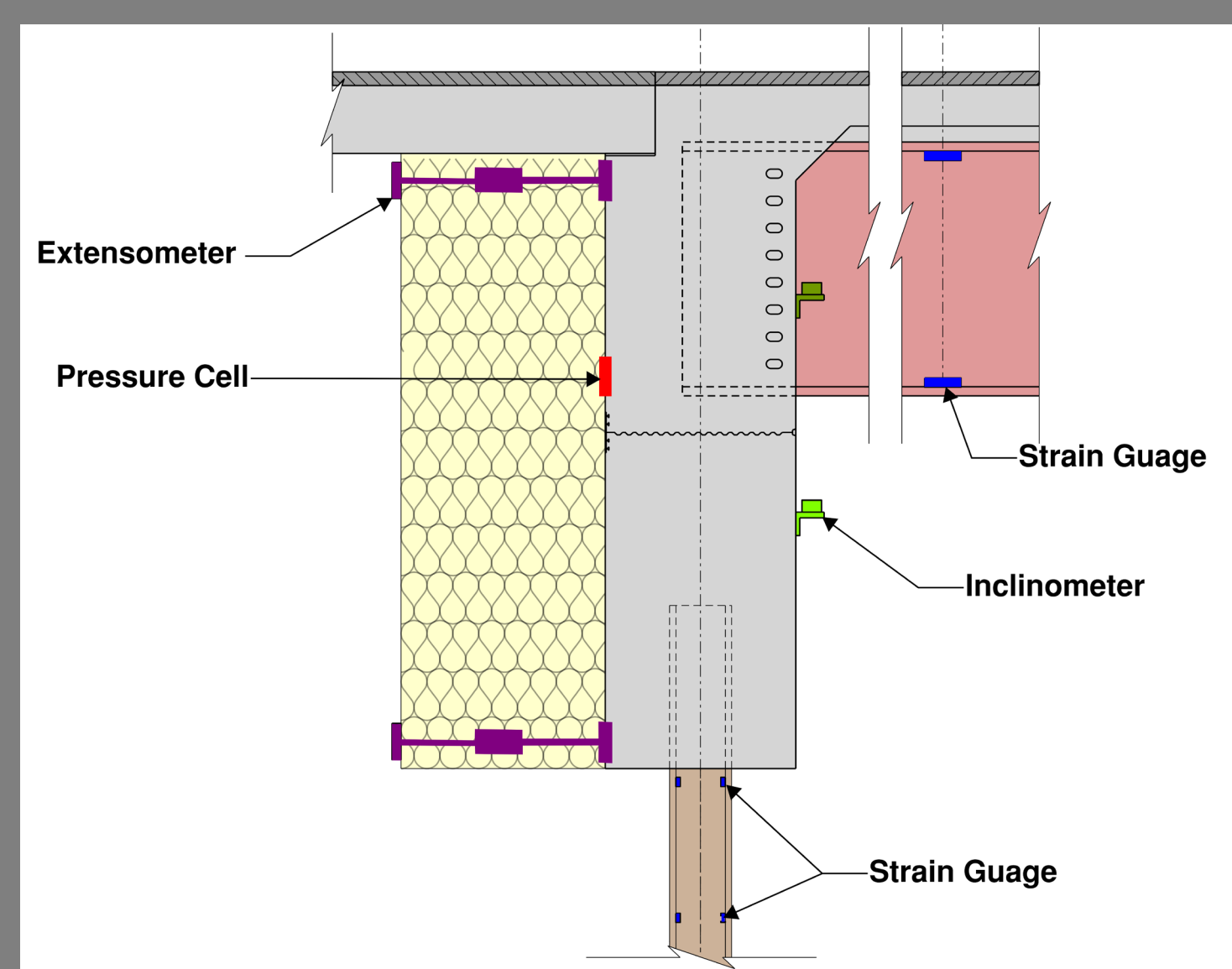
## REFINED ANALYSES

- Global Model Using CSI
- Nonlinear Springs for Soil and Geoinclusion
- Enveloped Solutions
- Construction Phasing
- Live Load Paths, Thermal Expansion and Contraction



## STRUCTURAL MONITORING

- Approximately 300 Sensors
- Monitoring to Commence During Construction (2-year Construction)
- 5-Year Monitoring Plan
- Discrete Live Load Testing Planned
- Partnering with VTrans and UMass Lowell



## DESIRED OUTCOMES

- Understand Accuracy of Modeling
- Confirm Anticipated Movements and Behavior
- Use Information for Future Designs