



NTSB National Transportation Safety Board

Office of Highway Safety

Construction Activity & Traffic Conditions on I-35W Bridge

Robert Accetta



Presentations

1. Bridge description and collapse
2. Construction activities on bridge at time of collapse
3. Gusset plate inadequacy
4. Finite Element Analysis
5. Design and review process
6. Bridge load rating and bridge load analysis
7. Bridge inspections
8. Gusset plate inspections

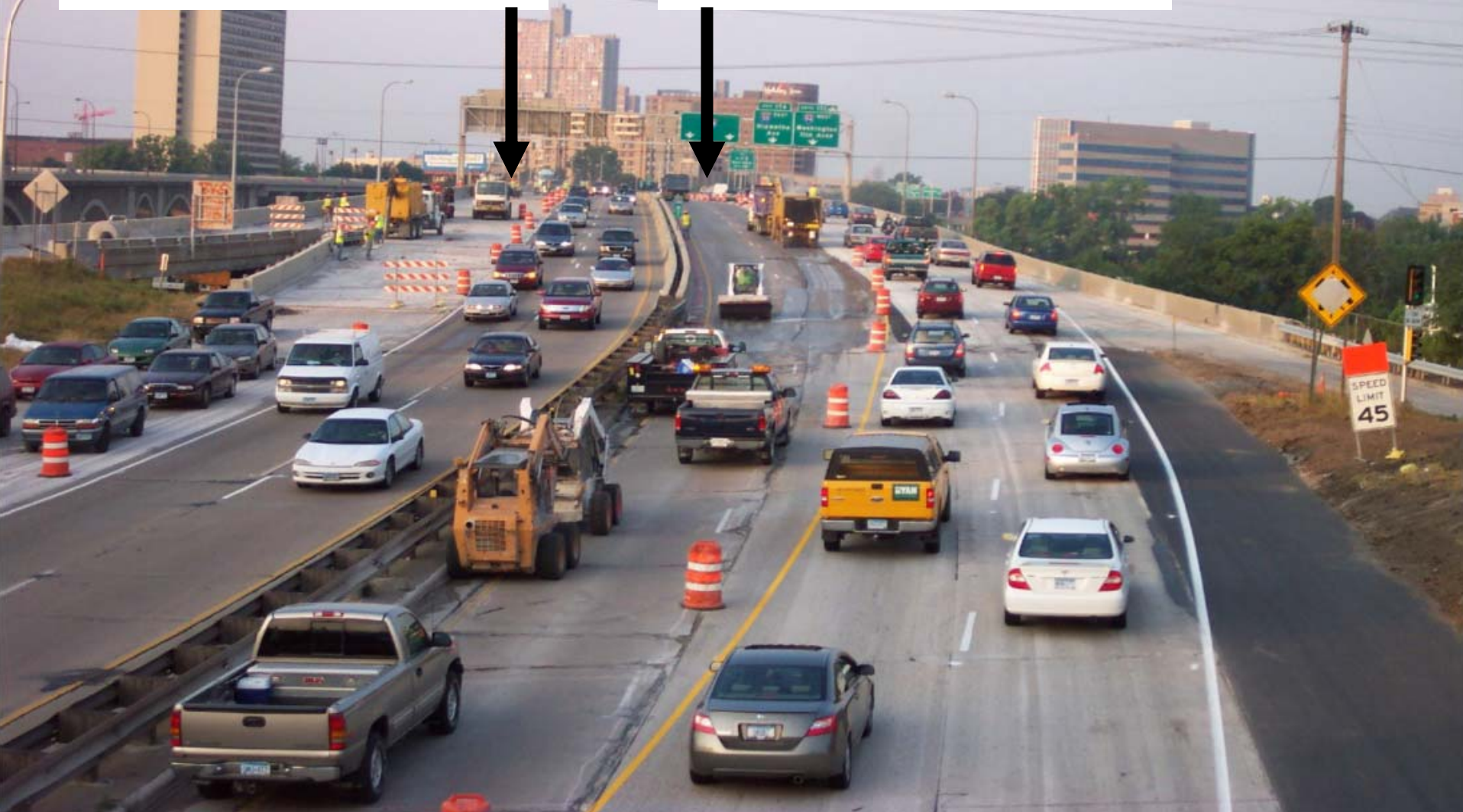
2007 Construction Project

- Maintenance repair and renovation
- Conducted by Progressive Contractors, Inc. (PCI)
- June – October 2007
- Project included
 - Removal of concrete deck surface and replacement with new concrete overlay
 - Other repairs: curbing, expansion joints, and deicing system

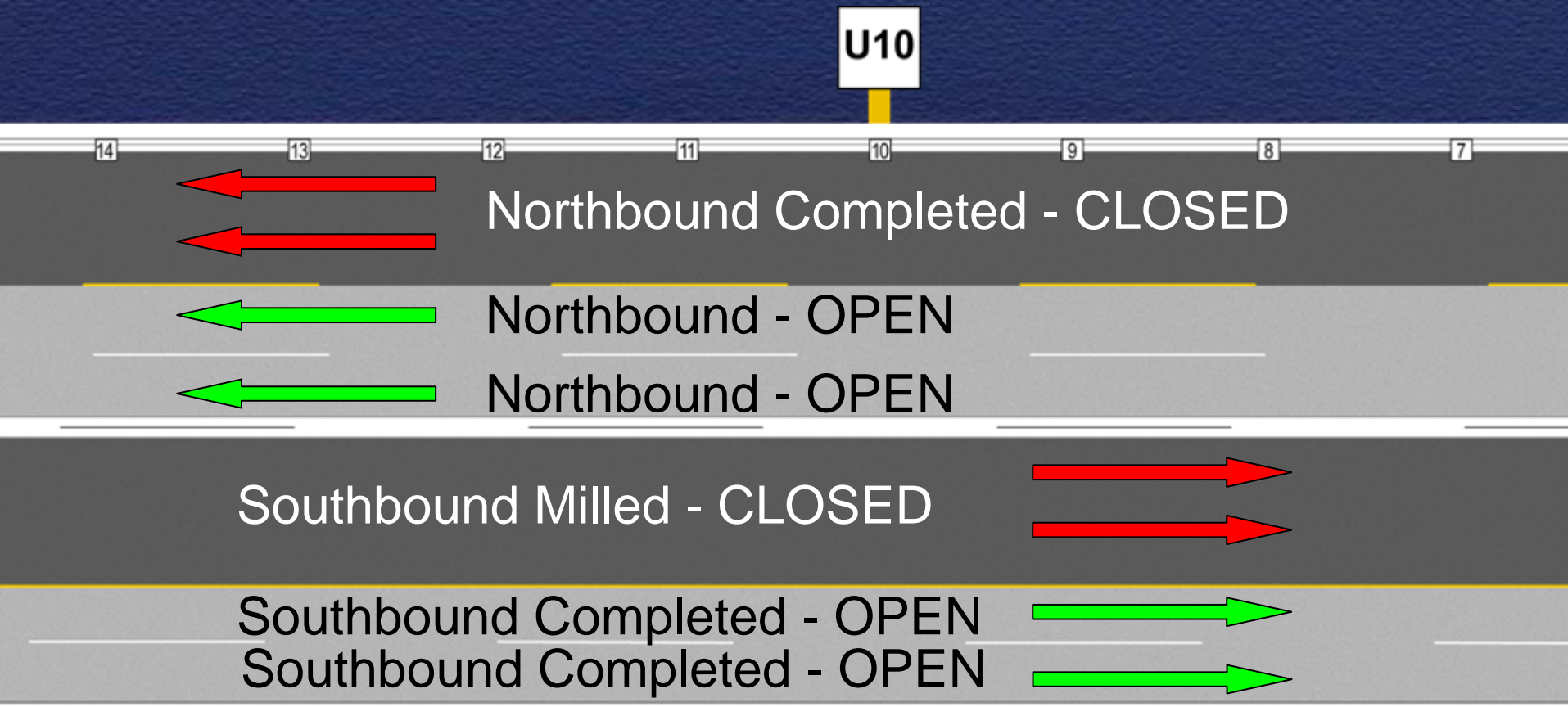
Roadway Construction Work

2 closed outside
northbound traffic lanes

2 closed inside
southbound traffic lanes



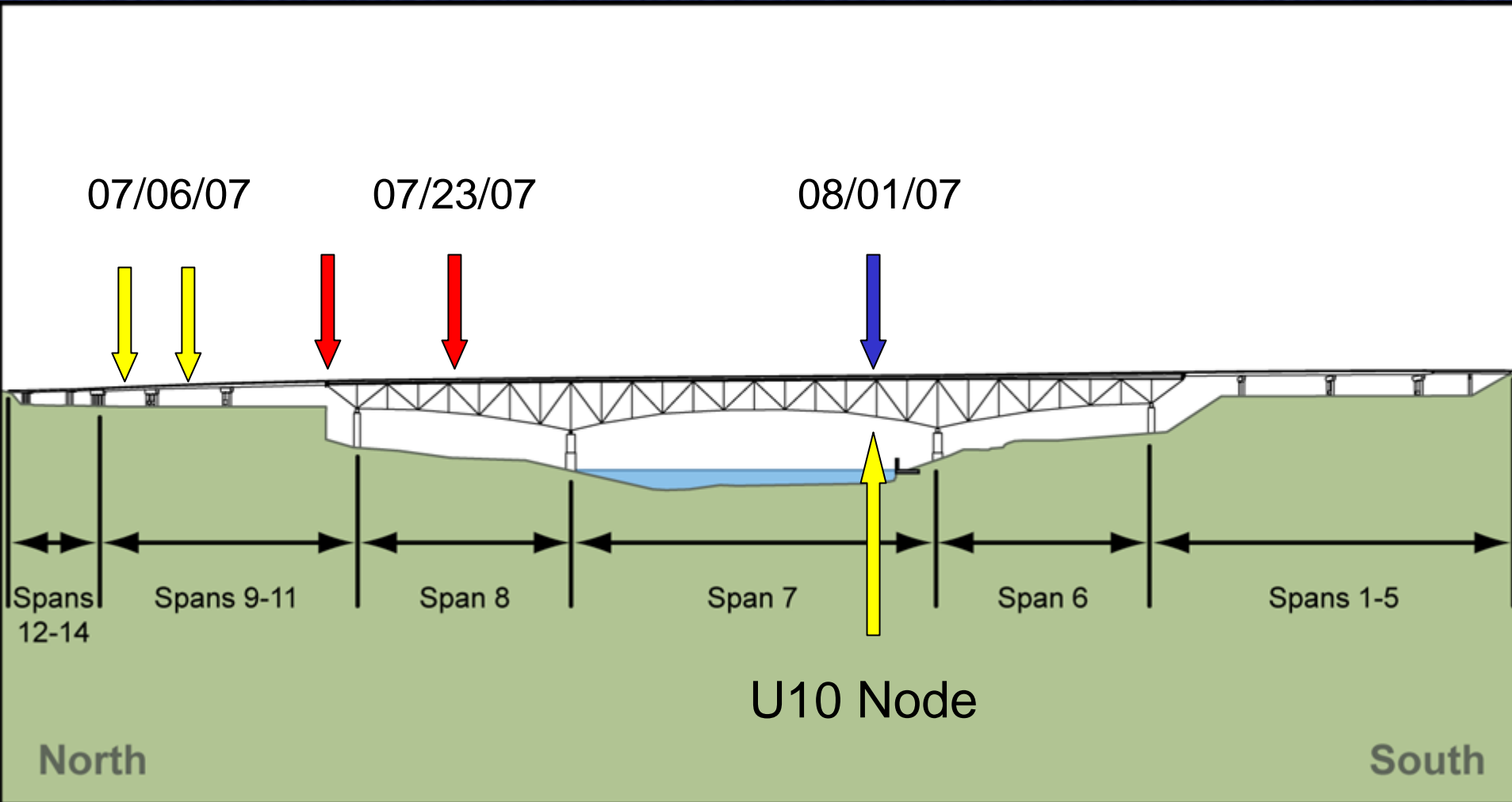
Lane Designations



Staging of Construction Materials

- Mn/Dot project requirements
 - Low slump concrete: dense concrete mix, low water/cement ratio, sets up quickly, higher strength
 - Mix concrete close to pour site
 - Lane closure restrictions
 - Materials mixed near worksite (sand, gravel, cement, and water)
- Materials and machinery staged on two inside southbound lanes

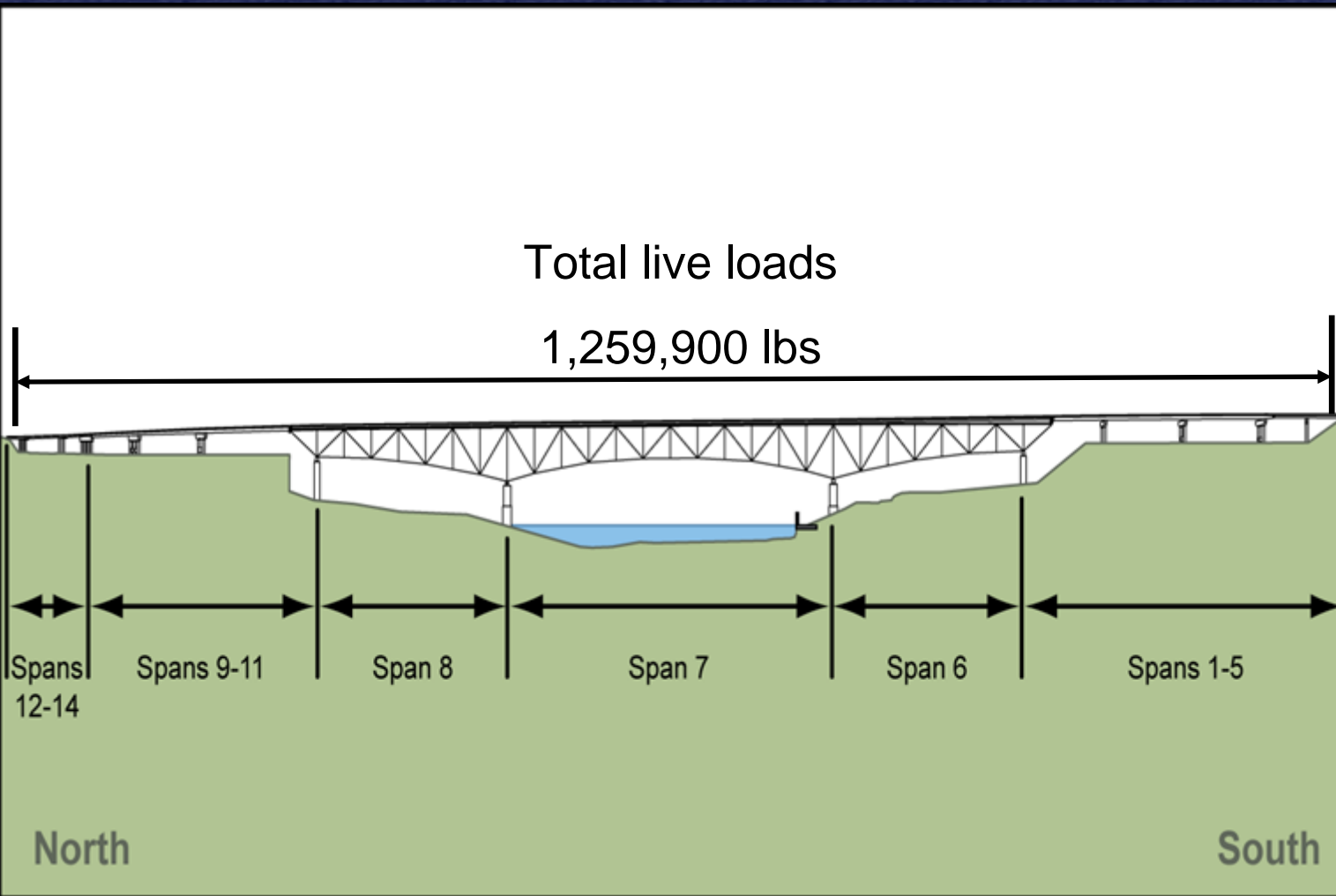
Staging of Construction Material



Material Staging – Previous Overlay Pour

- PCI foreman discussed staging of materials with Mn/DOT construction inspector
- Mn/DOT
 - Written request should have been made to Mn/DOT project engineer
 - No specific policy or guidance on material staging
 - Analysis of loads should have been completed before approving request

Total Live Loads – I-35W Bridge



Construction documents

Wreckage locations

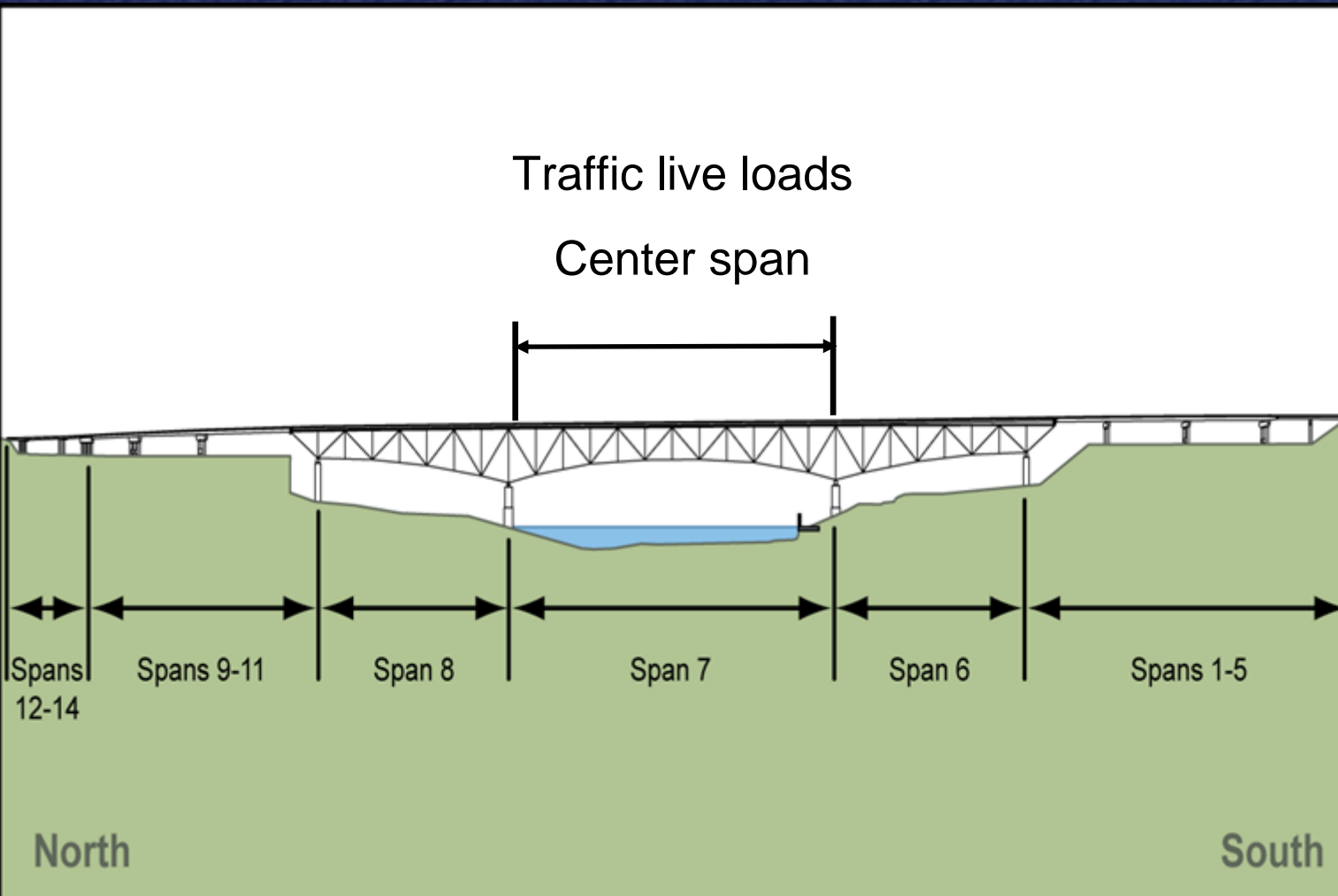
Witness statements

Pre & post collapse photographs

Weights of wreckage

Replicated stockpiles of aggregate

Traffic Live Loads – Center Span

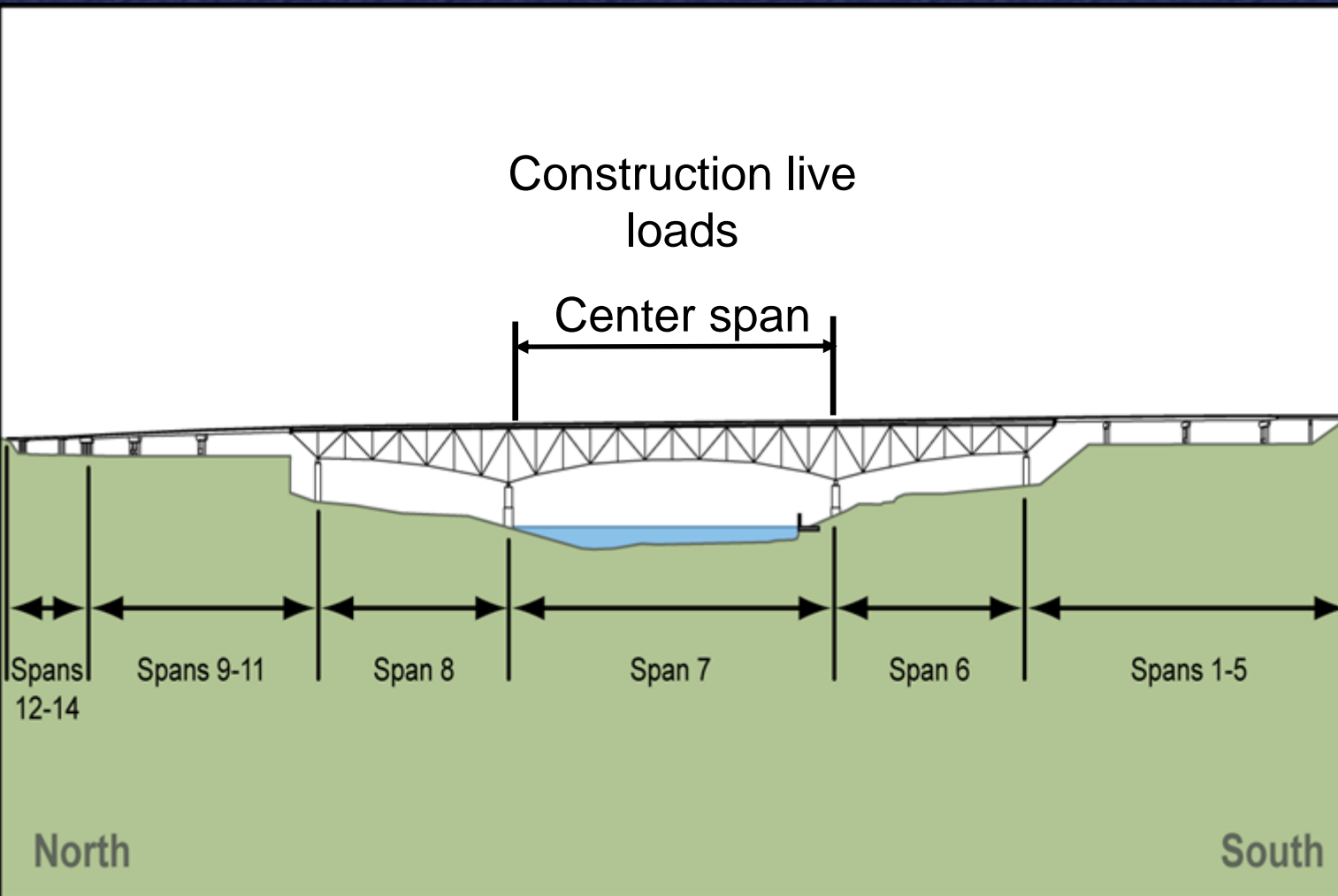


Northbound
57,100 lbs

Southbound
64,600 lbs

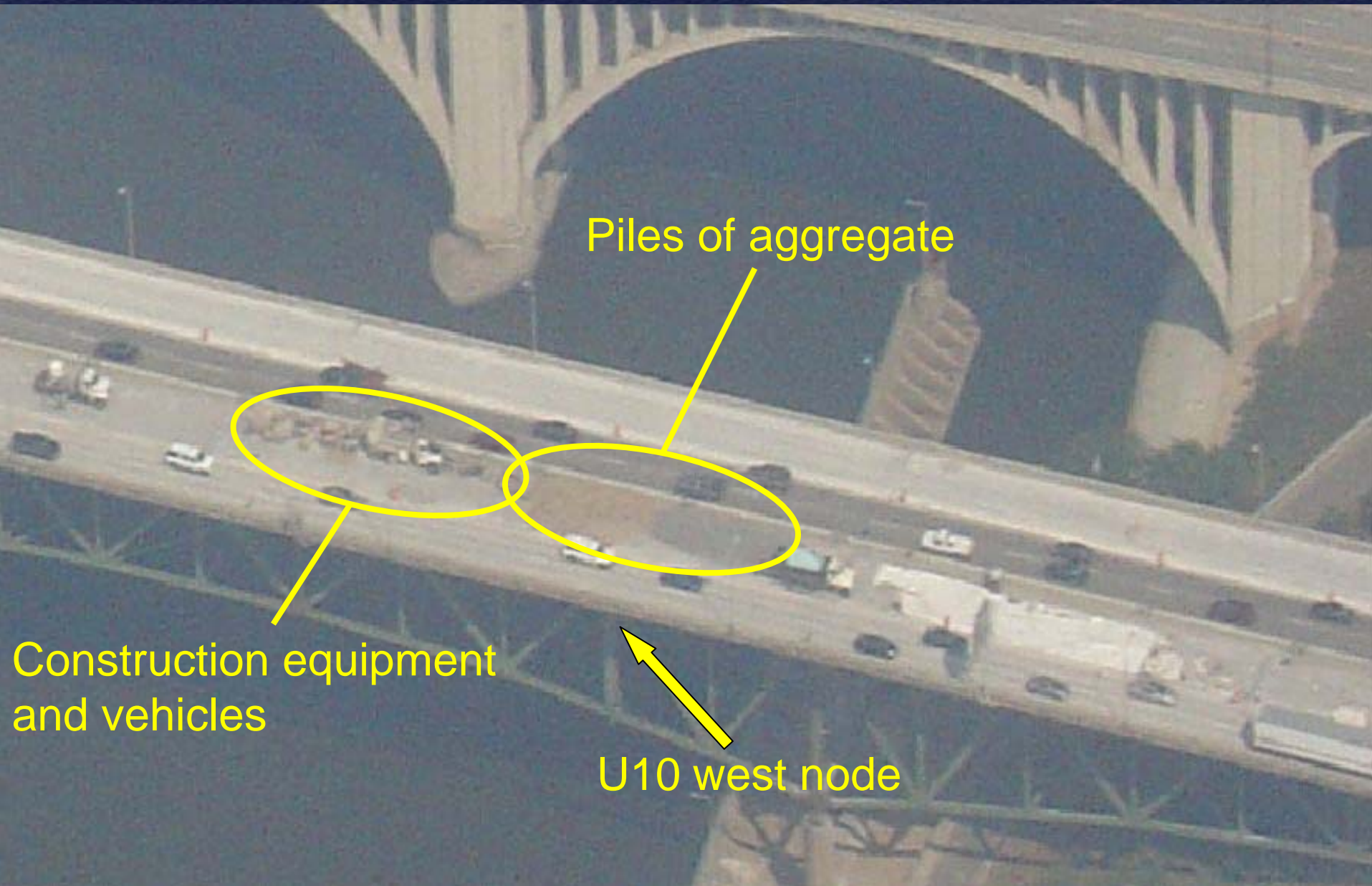
Total live
loads from
traffic
121,700 lbs

Construction Live Loads – Center Span



Construction live loads
578,700 lbs

Construction Work – Day of Accident



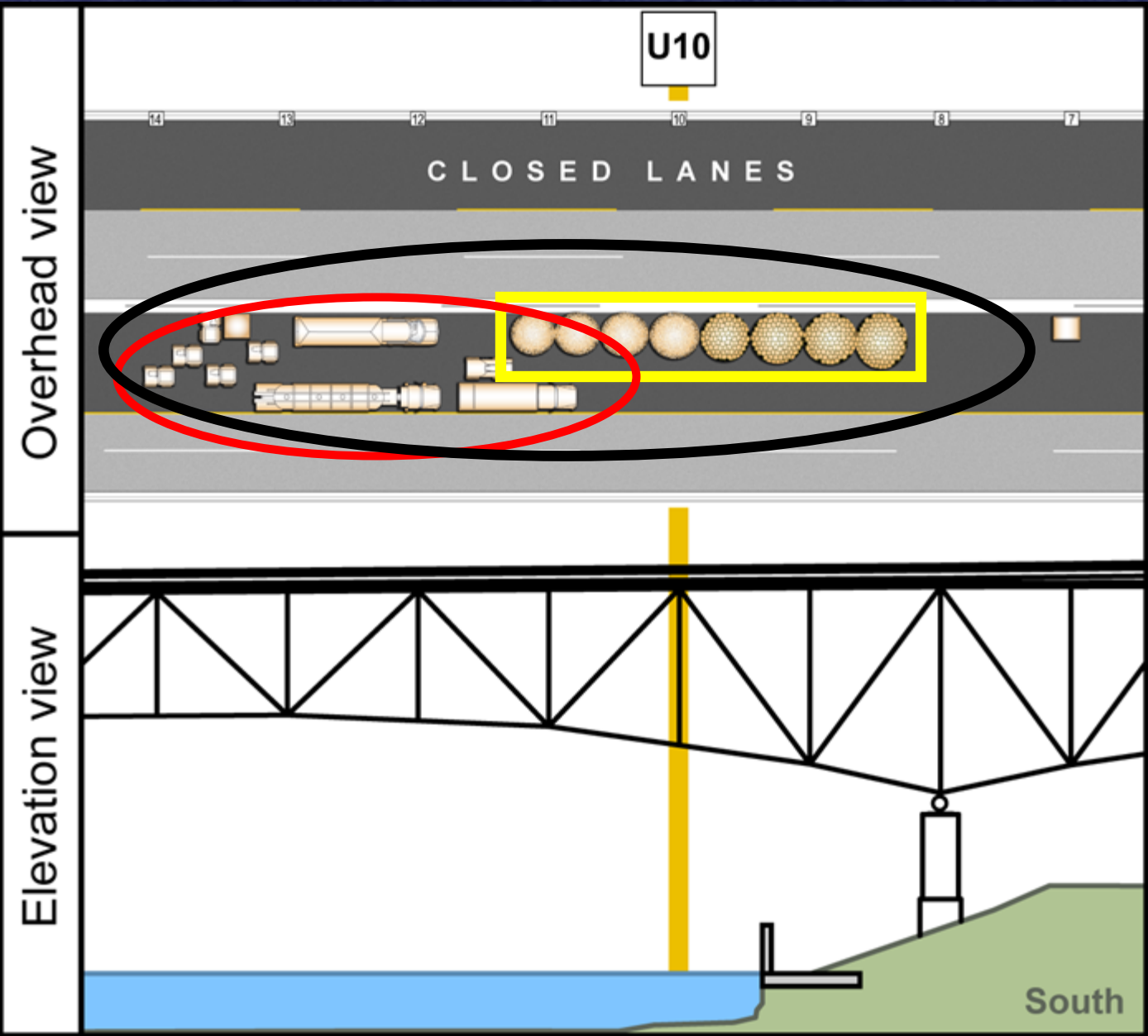
Piles of aggregate



Construction equipment and vehicles

U10 west node

Construction Materials & Vehicles



Construction materials
383,000 lbs

Construction equipment
195,500 lbs

Center span combined
Construction load
578,500 lbs

Post Collapse Load Evaluation

- Mn/DOT
 - No policy or guidance to contractor for written requests regarding stockpiling materials
 - Response to request could have been based on load rating analysis
- Post-collapse Mn/DOT load rating analysis indicated bridge would have supported additional load

Construction Loading Guidance

- AASHTO: guidance was generalized
- FHWA technical advisory issued after the accident was also generalized
- Safety Board Survey
 - 10 State Departments of Transportation
 - Rely on contactor for placement of construction loads
 - Primarily concerned with oversized vehicles
 - Rather than the loading from stockpiling of raw materials

Construction Loading Survey

- AASHTO Survey
 - 39 States responded
 - 22 States had procedures
 - Followed State truck size and weight statutes

Summary

- No formal and specific guidance in place
- Treated as overweight vehicle
- No provision for conducting load-rating analysis that includes gusset plates
- Bridge owners may allow stockpiling before analysis

