



# **ALTERATION OF BNSF RAILROAD COMPANY BRIDGE OVER THE UPPER MISSISSIPPI RIVER, BURLINGTON, IA**

**UNDER THE PROVISIONS OF  
TRUMAN-HOBBS ACT**

**Kamal Elnahal, Ph.D., P.E.  
U.S. Coast Guard**



*Western Bridge Engineers' Seminar  
September, 2009*

# OVERVIEW



- **Alteration of Bridges Program of Coast Guard**
- **Completed projects under Coast Guard program**
- **BNSF Railroad Bridge project**



# **ALTERATION OF BRIDGES PROGRAM OF U.S. COAST GUARD**



**Coast Guard policy is to ensure that bridges crossing the navigable waters do not obstruct the reasonable needs of navigation**



# UNREASONABLY OBSTRUCTIVE BRIDGES

- **Bridges which mariners face difficulty to cross them**
- **Bridges involved in many ship collisions**
- **Bridges which do not meet today's navigation needs**

# **CITY OF BOSTON BRIDGE OVER CHELSEA RIVER BOSTON, MASSACHUSETTS**



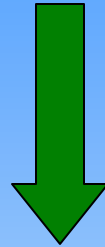
# **GALVESTON COUNTY BRIDGE OVER INTRACOASTAL CANAL, GALVESTON, TEXAS**



# COAST GUARD INVESTIGATION

- **Investigate the obstructive characteristics of the bridge**
- **Calculate the navigation benefits**
- **Calculate cost of bridge alteration**
- **Determine if benefit/cost ratio  $\geq 1.0$  , the bridge is qualified to receive federal funding**

**"ORDER TO ALTER"**



**SERIOUS** Matter For Bridge Owner

Unreasonably Obstructive Bridge

By Law, Bridge Must Be Altered



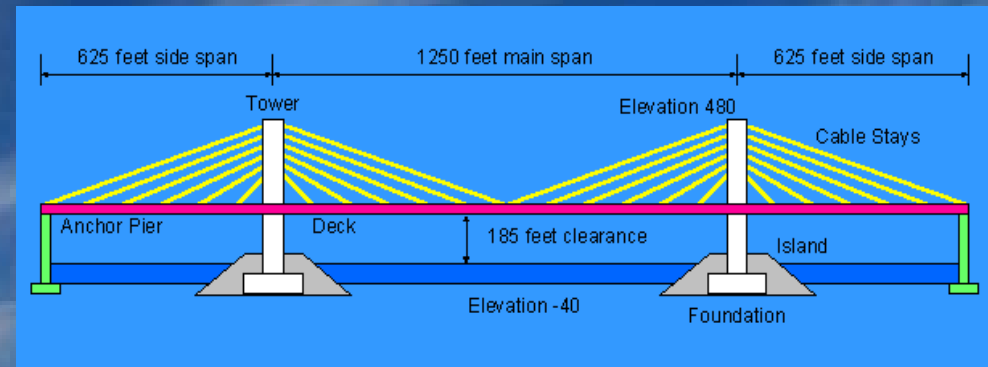
# TRUMAN-HOBBS ACT

- **Alteration of Bridges is covered under the provisions of Truman-Hobbs Act (33, U.S.C. 511-523)**
- **Unreasonably obstructive bridges receive federal funding to cover their alteration cost**
- **The bridge owner pays for betterment items**

# OLD GADOT SIDNEY LANIER BRIDGE OVER BRUNSWICK RIVER, BRUSWICK, GA



# NEW GADOT SIDNEY LANIER BRIDGE OVER BRUNSWICK RIVER, BRUNSWICK, GA



# **OLD SCDOT LIMEHOUSE MEMORIAL BRIDGE, OVER STONO RIVER, CHARLESTON, SC**





# **NEW SCDOT LIMEHOUSE MEMORIAL BRIDGE, OVER STONO RIVER, CHARLESTON, SC**



02/20/2004

# **SCDOT LIMEHOUSE MEMORIAL BRIDGE, OVER STONO RIVER, CHARLESTON, SC**



# **EXISTING CSX RAILROAD BRIDGE OVER THE MOBILE RIVER, HURRICANE, AL**



# **NEW CSX RAILROAD BRIDGE OVER THE MOBILE RIVER, HURRICANE, AL**



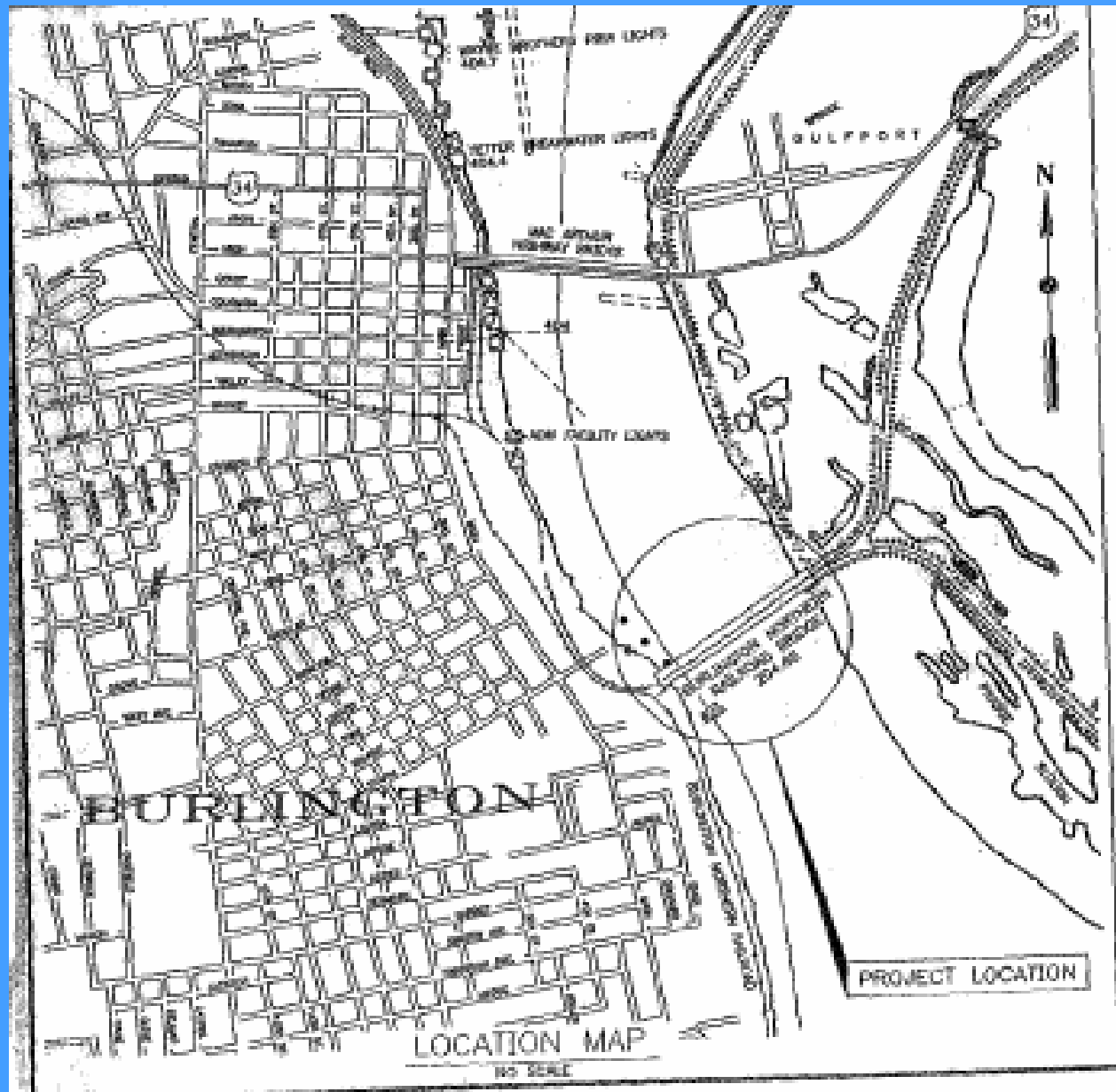


# PORT OF NEW ORLEANS BRIDGE OVER INNER HARBOR NAVIGATION CANAL, NEW ORLEANS, LA





# BNSF BRIDGE LOCATION



# **BNSF BRIDGE OVER UPPER MISSISSIPPI RIVER BURLINGTON, IOWA**



# **EXISTING BNSF BRIDGE OVER UPPER MISSISSIPPI RIVER, BURLINGTON, IOWA**





## **NAVIGATION PROBLEMS**

- **The bridge is located within a bend**
- **The bridge is skewed to the direction of approaching tows**
- **Restricted channel width**
- **Severe cross current and winds**
- **Safe transit of the bridge requires extensive tow maneuvering**
- **An avg. Of 10 vessels/yr struck the bridge**

# CONCLUSION OF COAST GUARD INVESTIGATION

- **Bridge was declared by Coast Guard to be an unreasonable obstruction to navigation.**
- **Order to Alter issued on Aug 6, 1991.**
- **Existing bridge will be altered to provide at least 300' horizontal clearance & 60' vertical clearance, above normal pool elevation in the open position.**

## **GOALS OF THE DESIGN**

- **Find the least costly construction scheme**
- **Ensure navigation safety and mobility during the construction**
- **Develop a construction sequence, a method to remove the existing swing span and a method to install the new lift span while minimizing the impacts on rail and marine traffic**

# SEARCH FOR THE LEAST COSTLY CONSTRUCTION SCHEME

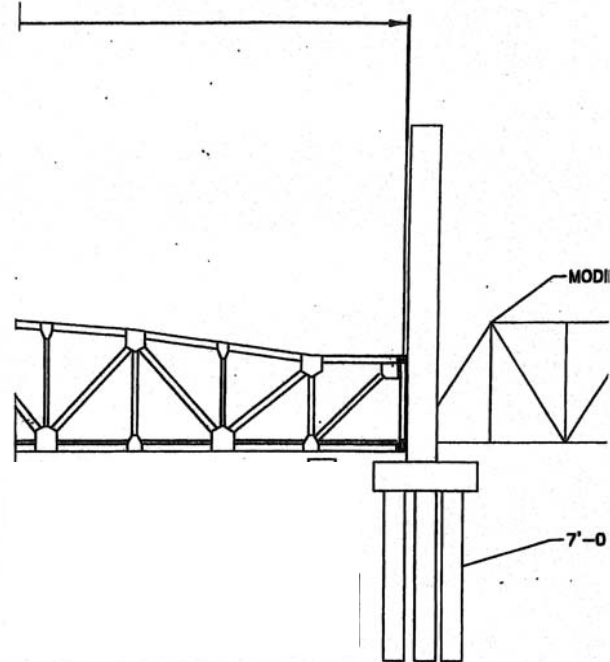
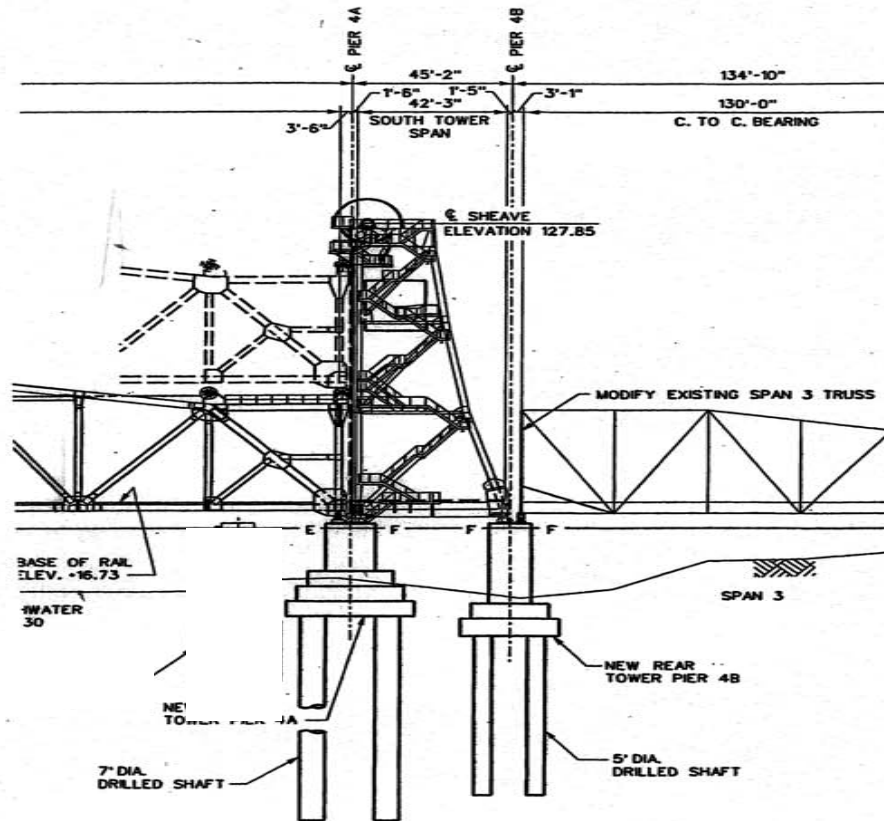
- **Constructing most of the bridge superstructure and substructure outside the limits of the existing bridge**
- **Optimizing the design for a better use of the construction material**



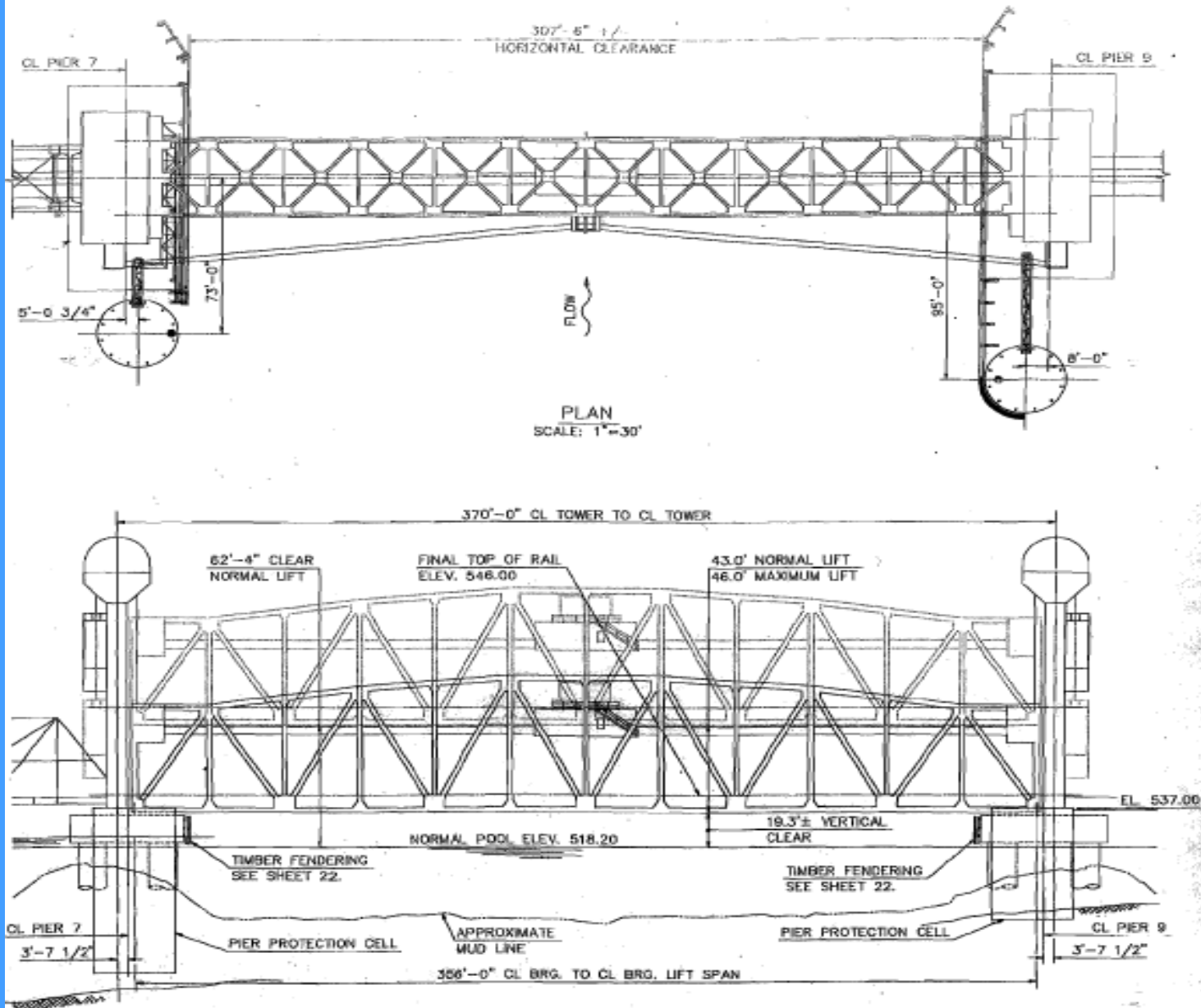
# DESIGN OF THE NEW BRIDGE



# COMPARISON BETWEEN THE TWO ALTERNATIVES



# PLAN & ELEVATION OF BNSF BRIDGE





# **BNSF BRIDGE SEQUENCE OF CONSTRUCTION**





# BNSF BRIDGE SEQUENCE OF CONSTRUCTION



# BNSF BRIDGE SEQUENCE OF CONSTRUCTION

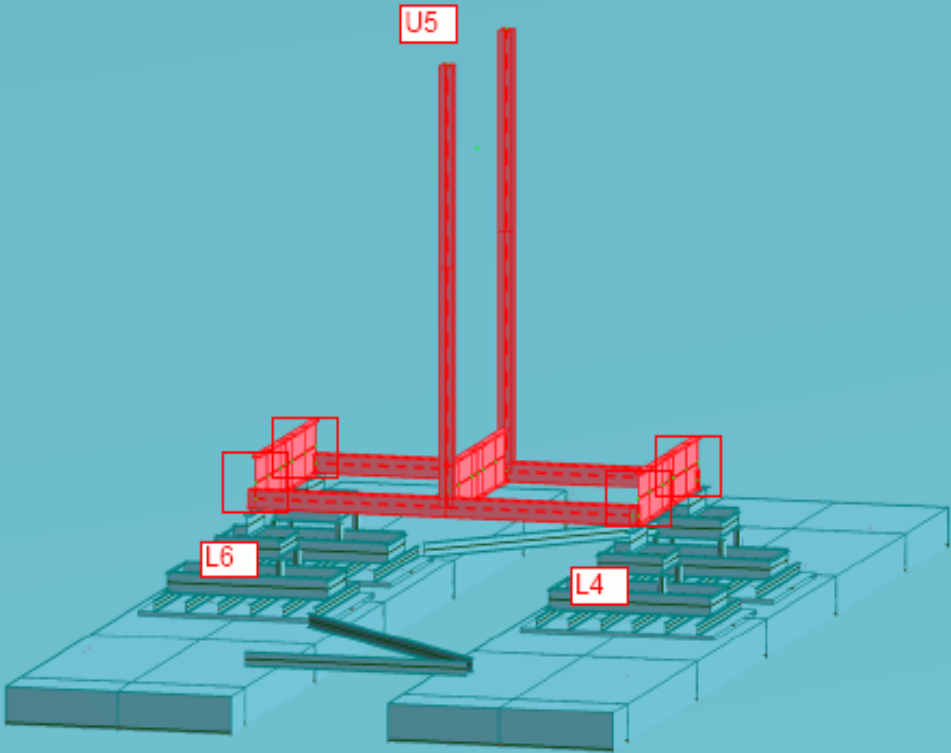
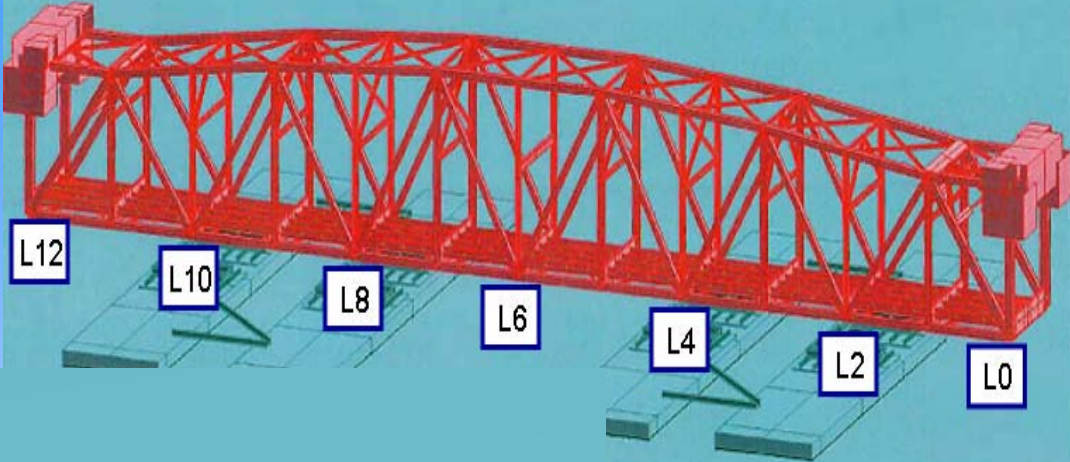






# BNSF BRIDGE

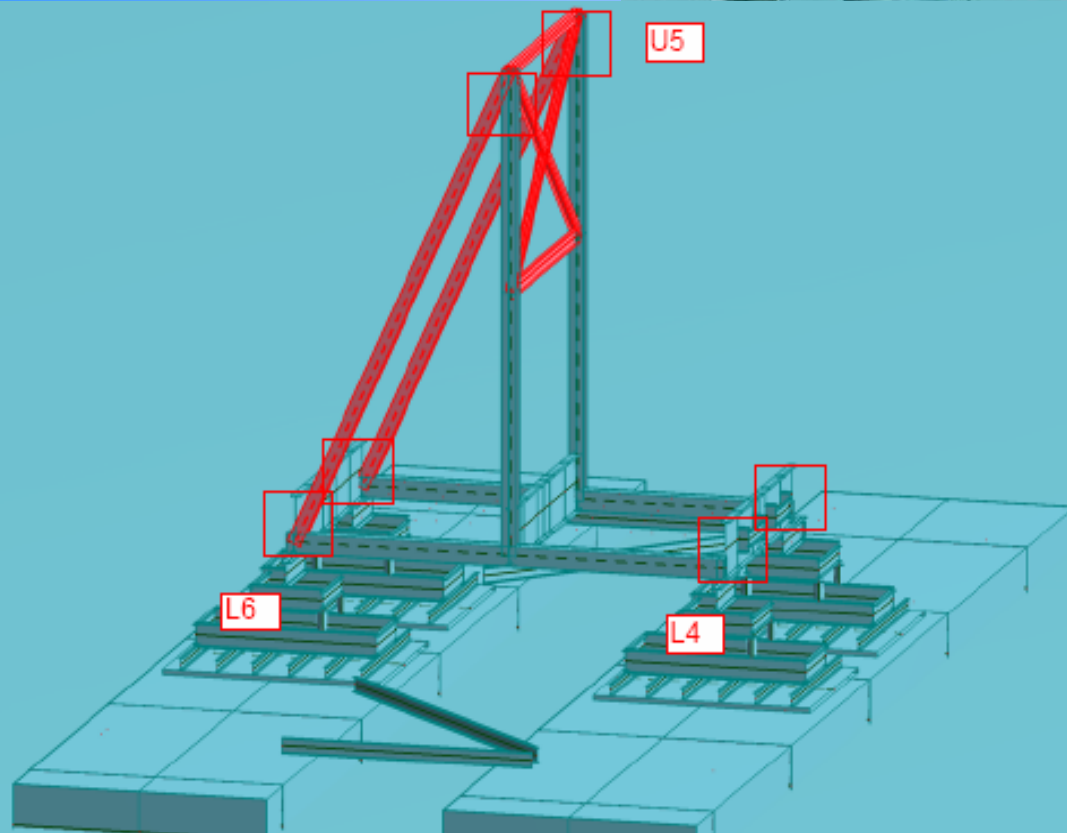
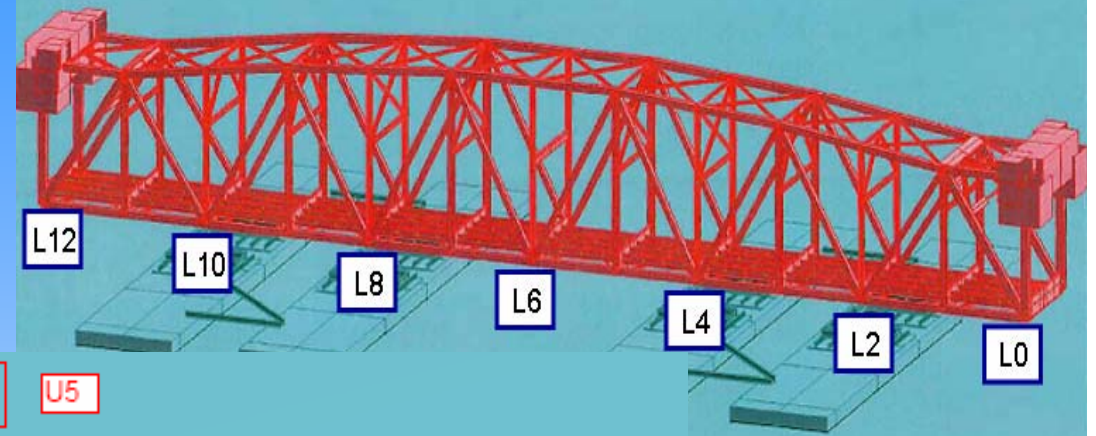
## ASSEMBLY OF THE LIFT SPAN





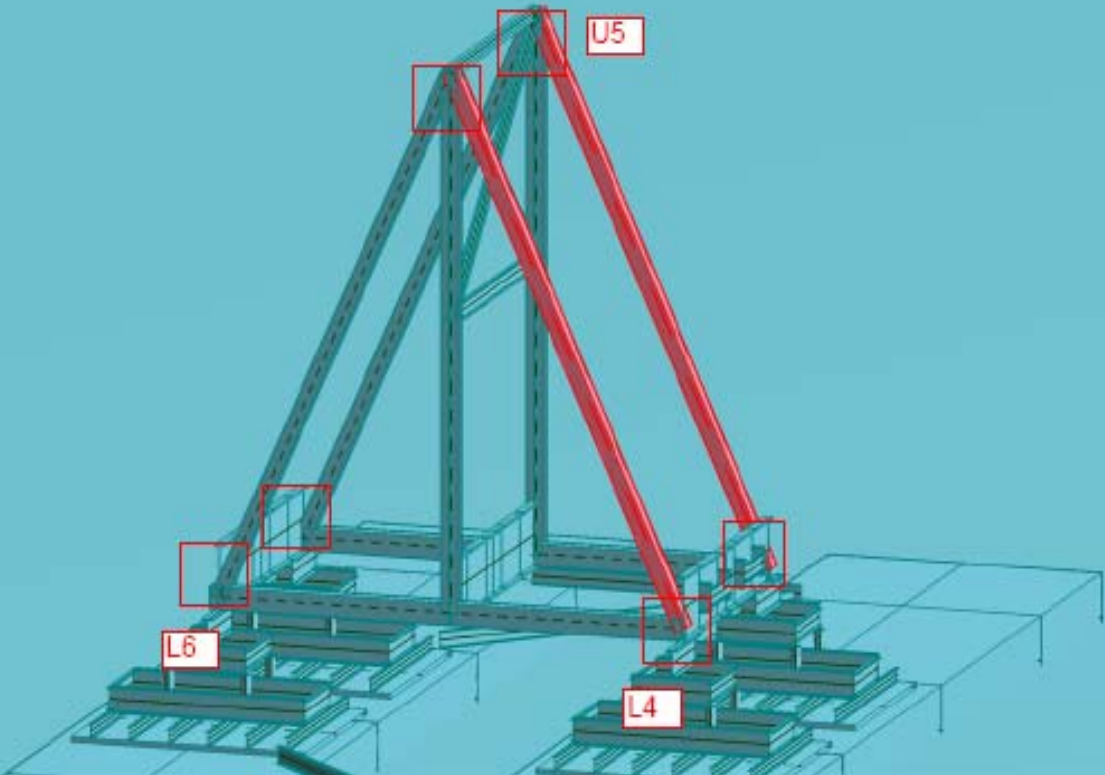
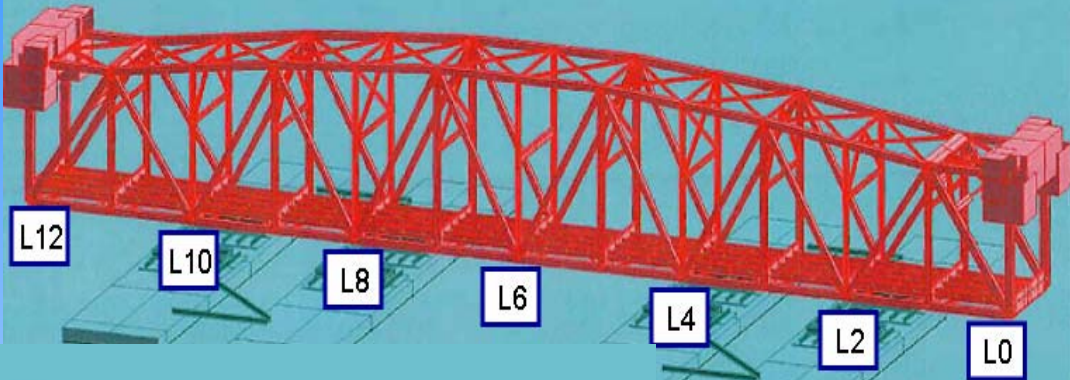
# BNSF BRIDGE

## ASSEMBLY OF THE LIFT SPAN



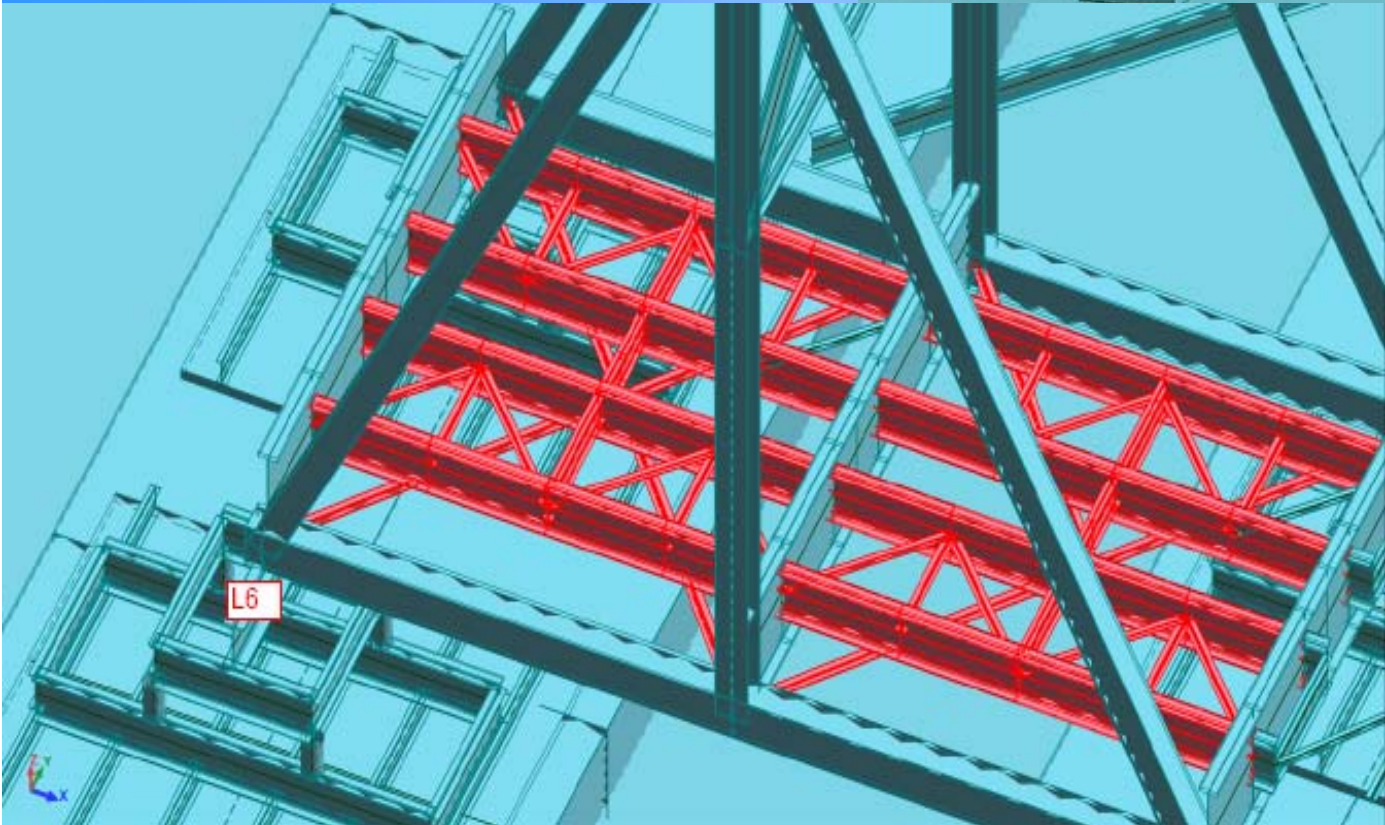
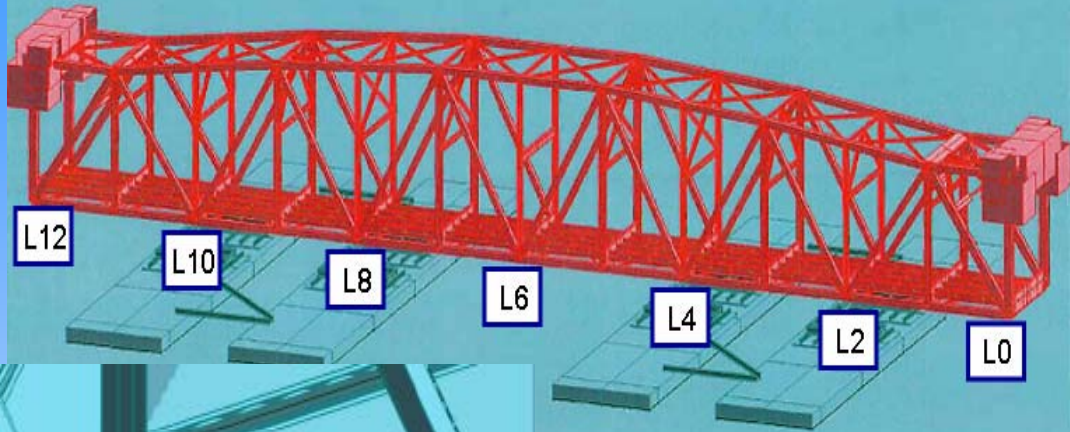
# BNSF BRIDGE

## ASSEMBLY OF THE LIFT SPAN



# BNSF BRIDGE

## ASSEMBLY OF THE LIFT SPAN



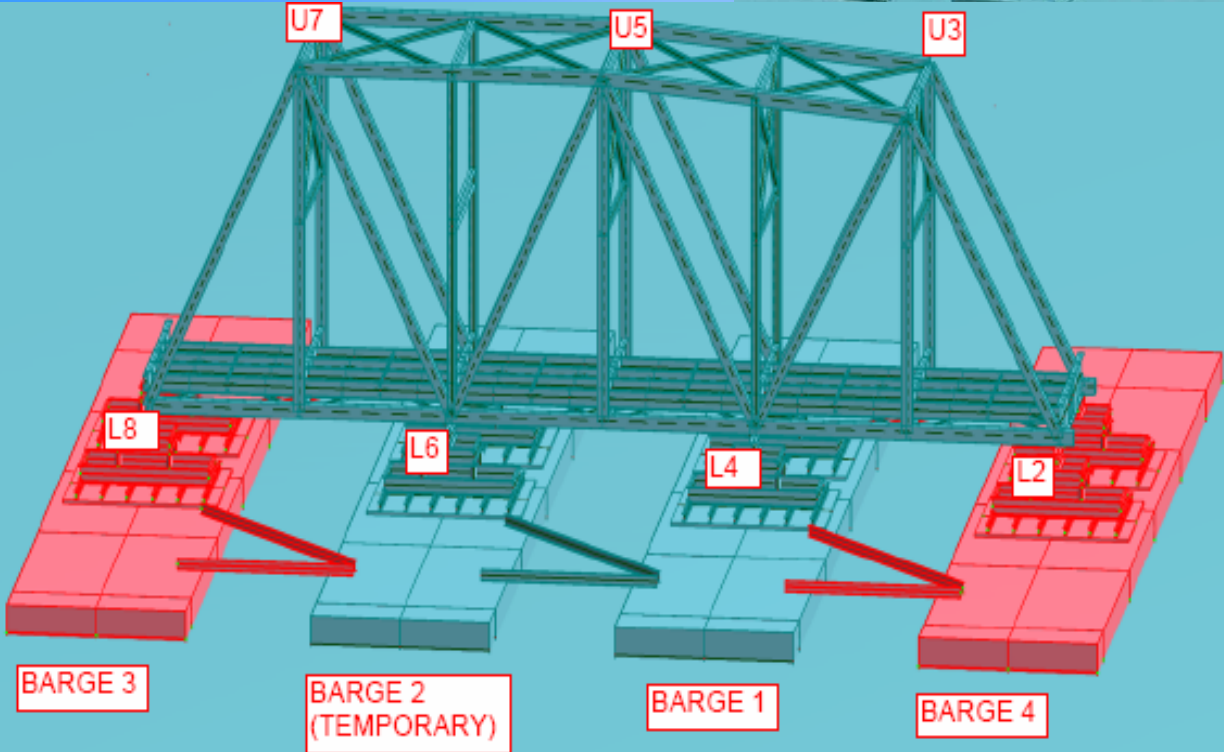
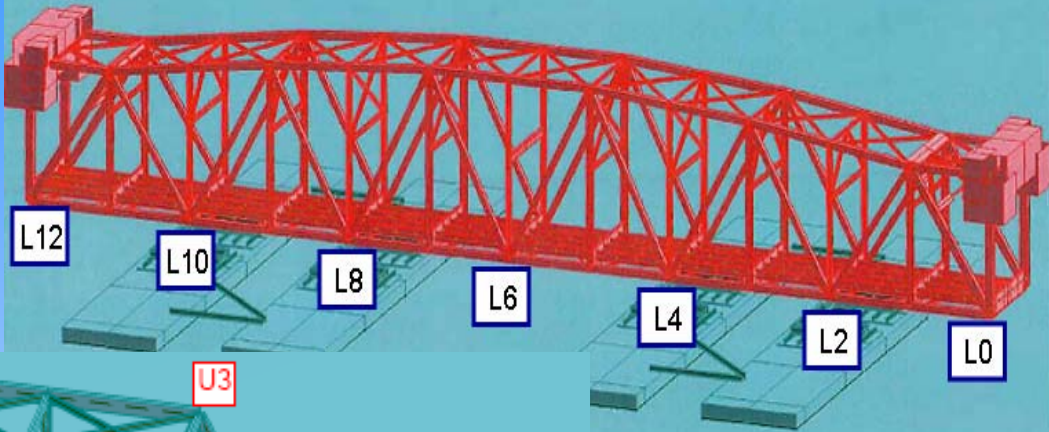






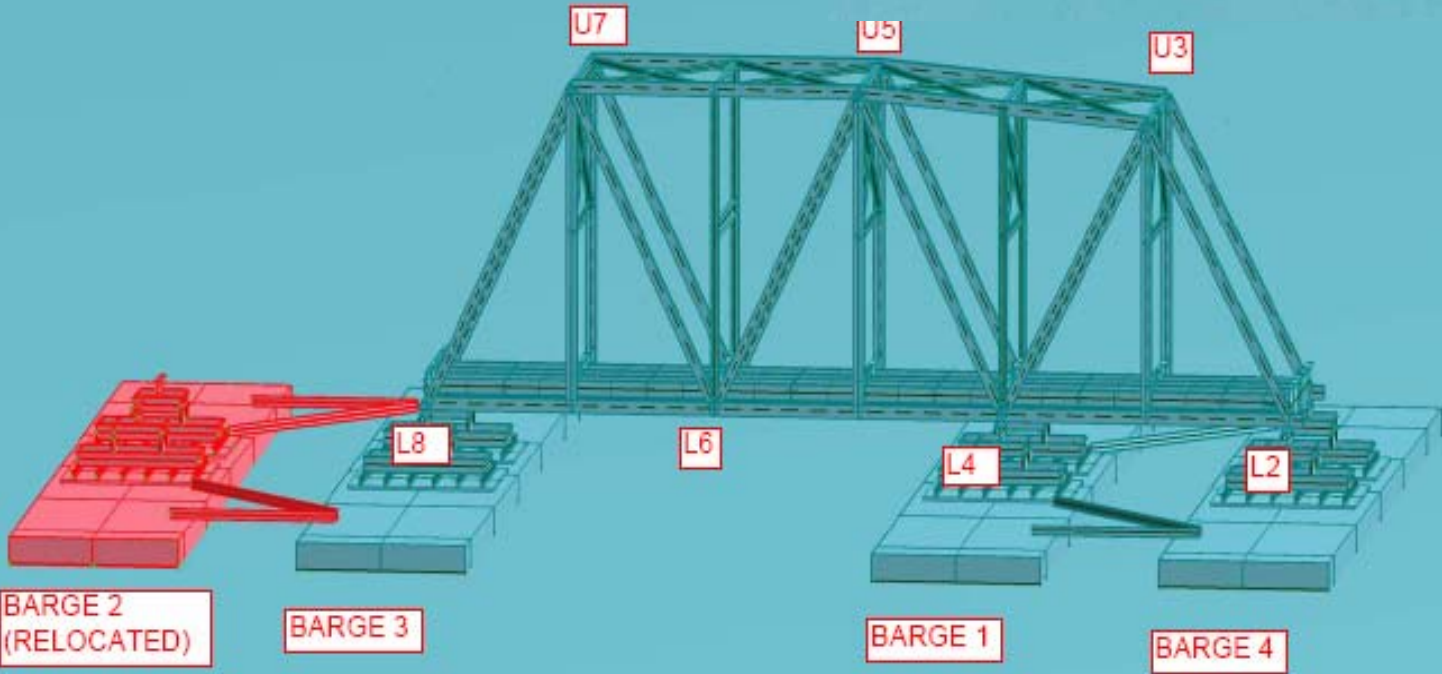
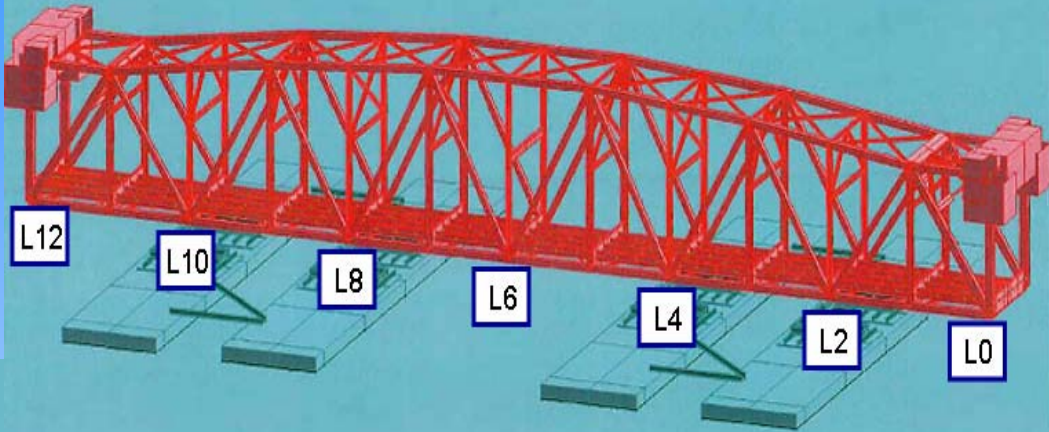
# BNSF BRIDGE

## ASSEMBLY OF THE LIFT SPAN



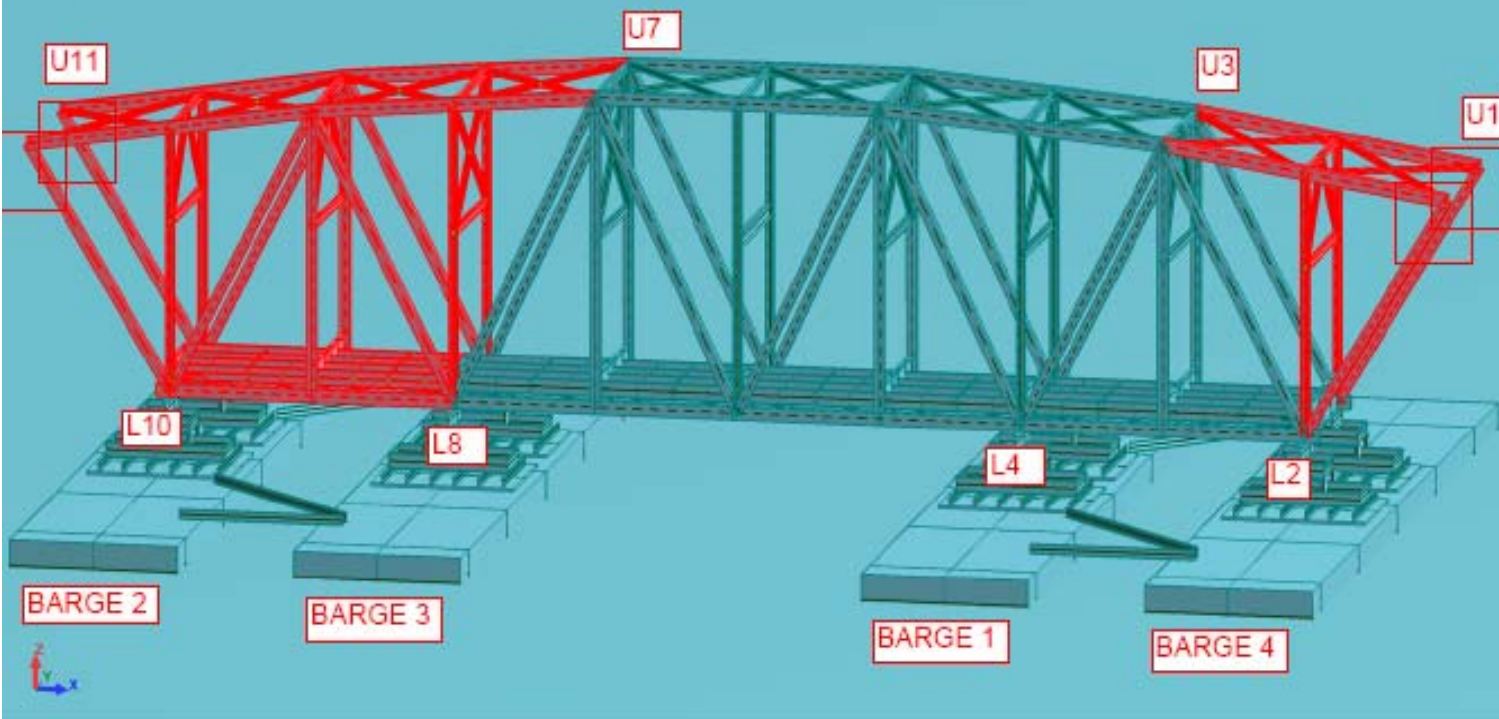
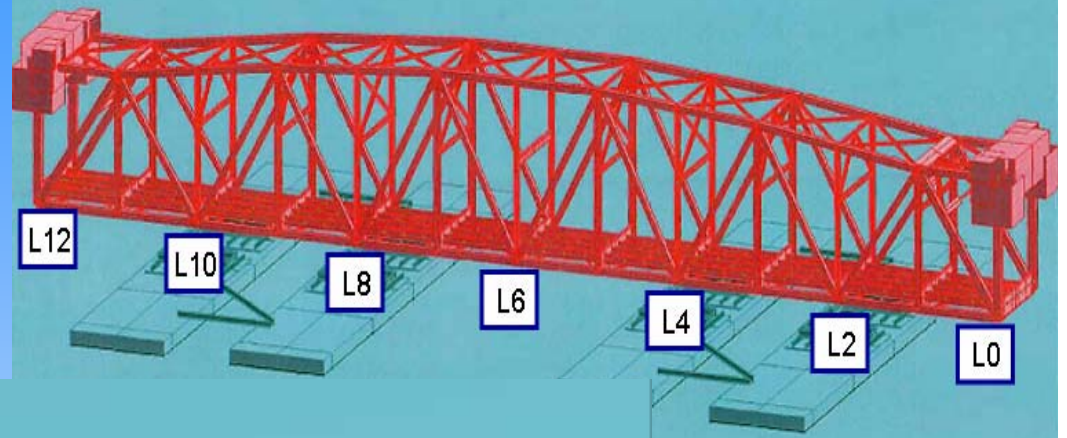
# BNSF BRIDGE

## ASSEMBLY OF THE LIFT SPAN



# BNSF BRIDGE

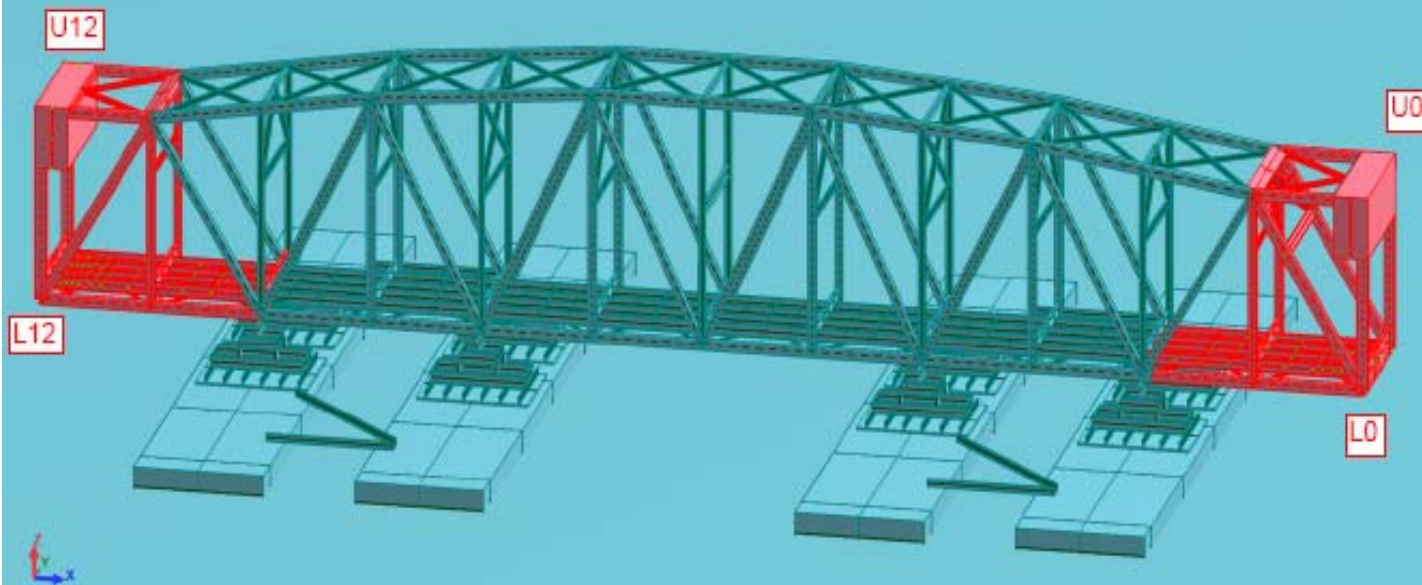
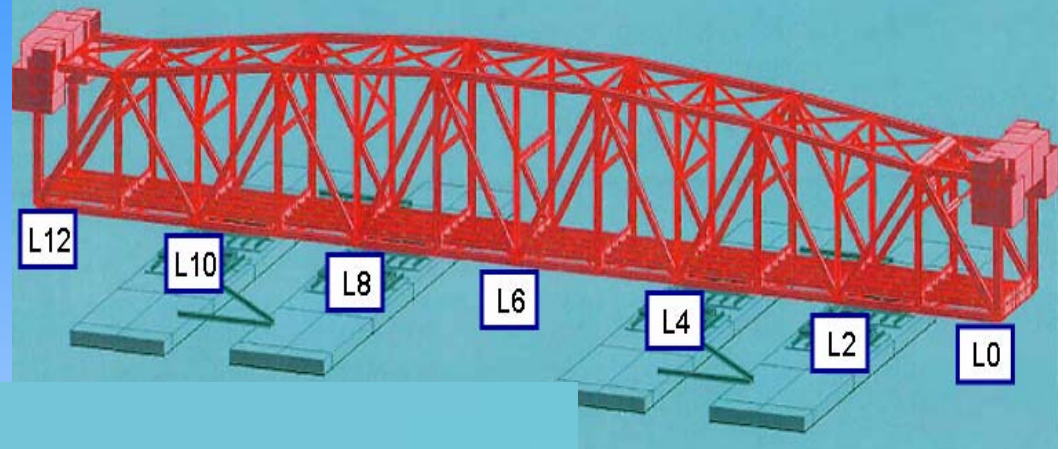
## ASSEMBLY OF THE LIFT SPAN





# BNSF BRIDGE

## ASSEMBLY OF THE LIFT SPAN





# **BNSF BRIDGE ASSEMBLY OF THE LIFT SPAN ON BARGES**



# BNSF BRIDGE SEQUENCE OF CONSTRUCTION



# **BNSF BRIDGE FLOAT IN THE LIFT SPAN**





# BNSF BRIDGE SEQUENCE OF CONSTRUCTION

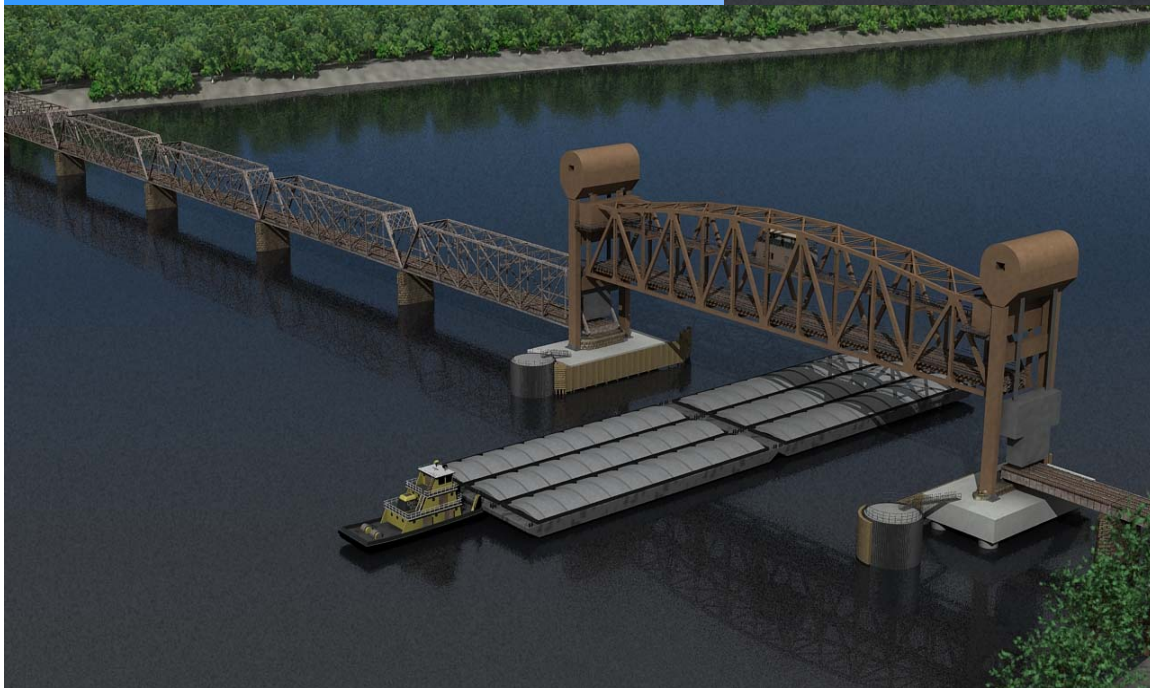




# NEW BNSF BRIDGE OVER UPPER MISSISSIPPI RIVER, BURLINGTON, IOWA



# BNSF BRIDGE OVER UPPER MISSISSIPPI RIVER BURLINGTON, IOWA



# **BNSF BRIDGE OVER UPPER MISSISSIPPI RIVER BURLINGTON, IOWA**

- **HNTB designed the bridge and will provide the engineering services during construction**
- **The construction contract was awarded to Ames Construction Company on July 31, 2009 for \$60.6M**
- **DCCI, a subcontractor to Ames will assemble and erect the lift span.**
- **The Project will be completed in July 2011**



# **BNSF BRIDGE OVER UPPER MISSISSIPPI RIVER BURLINGTON, IOWA**

- 90% of the total project cost funded by the federal government under the provisions of Truman-Hobbs Act**
- 60% of the federal share of the project cost funded through the American Recovery and Reinvestment Act of 2009**



# Q & A

