REHABILITATION OF A SCHERZER BASCULE BRIDGE

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A 70 year old railroad bridge with a movable span posed an unusual and difficult engineering problem:

How to upgrade it economically without major disruption to the commuter trains using the line and the navigational traffic using the waterway.

The engineering activities employed to arrive at the solution to this dilemma, a description of the final solution and the actual construction-implementation are the subject of this presentation.

The Manasquan River Bridge between Point Pleasant and Brielle, New Jersey, is approximately 1,200 feet long. It has 25 fixed spans, each 41 to 45 feet long with a 60'± Scherzer Bascule Span located in between these spans over the navigable channel. The waterway is used mostly by pleasure boats and fishing vessels. The Railroad was owned and operated by the N.Y. and Long Branch Railroad but was taken over by NJDOT to be operated by N.J. Transit Corp. when ConRail commuter operations will sease.

An in-depth inspection of the superstructure, substructure, movable span and its mechanical and electrical components was made. A partial subaqueous investigation was also conducted by AGLAS engineers-divers. The results of the inspection were summarized in a Report and submitted to the NJDOT. The main points are listed below:

1. The structural condition of the Scherzer Segmental and Track Griders was very bad. The flanges were stressed way beyond the yield point and were cracked and completely corroded. Portions of the Segmental Girder would need replacement. The Track Girders could not be repaired economically and would need total replacement.

2. The tracks supporting stringers in the approach spans were found to have lost 30% to 50% of their section. The bottom flanges and the lower portions of the webs were rusted through and exhibited many holes from the salt water.

The rehabilitation of the Bascule Span could be accomplished through various methods:

a. Complete replacement.

b. Temporary support of the Segmental Girder via auxiliary piers.

c. The temporary support of the Segmental Girder by utilization of the existing pier.

An economic study indicated that method c. would be the most economical. It involved the construction of a specially designed seat on the existing pier which will permit the support of the Segmental Girder in its open position. That means it will permit navigational vessels to get through the crossing, but no train service is possible. A 30 day maximum limit was set for the disruption of the commuter trains, during which time the passengers were bussed across the channel. Since this is a seasonally affected line, the month of April was selected as the most convenient.

As to the Track Girder which supports the Segmental Girder, that could not be salvaged or repaired and had to be completely replaced. By the introduction of a notch at the pier support, the entire Track Girder was removed when the Segmental Girder was sitting on its new support at the pier. Simultaneously a new Track Girder properly designed and detailed, including a corresponding notch, was quickly erected in the exact place where the old, deteriorated Track Girder had been located. At the same time the Segmental Girder was repaired and strengthened to comply with the latest AREA requirements. It was then moved to the middle of the new Track Girder, and the notch was repaired via a properly designed splice.

The rehabilitated Segmental Girder and the new Track Girder permitted the main trunnion to be moved by the rack in a horizontal direction without causing damage to the gears.

The main difficulty with this method of construction was the temporary support of the two Segmental Girders on the pier in the open position. Specially designed frame and tie-backs were indicated on the plans and constructed by the contractor.

A study was made for the approach spans and six alternates were considered:

Alternate 1 -	Do nothing.	
Alternate 2 -	Repair existing girders by addition of steel plates, shapes and high strength bolts	$911,000
Altenrate 3 -	Create reinforced concrete and steel girder composite beam	$656,000

Alternate 4 - Post tension existing girders	$835,000
Alternate 5 - New prestressed concrete bridge	$664,000
Alternate 6 - New steel girder bridge	$1,170,000

Alternate 5, specially designed P.C. Beams (Pi shaped) was selected for its construction economy and low maintenance qualities, and speed of erection.

In addition, the concrete counter-weight was sound at the core, but was hazardous due to the recurring formation of large surface spalls falling on the tracks. The solution was to enclose it in a wire mesh anchored to the core with studs. Houekeeping of the mechanical and electrical components was also included, but the owner decided to keep the extant machinery without major modification at that time.

The project was advertised, and a low bid of $1,882,000 was submitted by the Karl Koch Erecting Company of Carteret, New Jersey. The time of construction was one year with a maximum shut-down of railroad traffic for 30 days in April. No Coast Guard Permit was needed, but a few hours closing of the Leaf was allowed by arrangement with local users. The contractor managed to complete the work in less than ten (10) months and did not exceed the bid price.

Supervision of construction was furnished by NJDOT. AGLAS checked shop and working drawings and made occasional visits to the field when important activities took place. The temporary support of the Leaf was the most difficult construction operation and required the combined talents of the contractor, State and AGLAS engineers.

Implementation of this project drew praise from the Commuter Groups and Coast Guard, in particular, since no complaints were registered during construction. The NJDOT was pleased that the project was finished on time, at a cost of 2 million dollars less than a rehabilitation scheme prepared by others several years prior.

The Manasquan River Bridge is in good shape and will provide service for many years to come.