

ABC on LBJ Express Project – Innovative bent cap design and beam placement

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Abstract

The LBJ Express project rebuilt one of the most congested highways in Texas. Precasting most of the straddle bents that supported the 9-mile depressed section allowed for a fast construction and erection of the bents. In order to maintain the existing traffic at all times, some bent caps were constructed in several phases, and post-tensioning was used to connect different bent segments. For the IH-35E section, composite straddle bents were placed overnight in a single operation that allowed for a reduction of the original schedule. Existing cross bridges along I-635 created constructability issues because of low vertical clearance and crane placement constraints. An 82 meter long custom-built truss system enabled each beam to be carried transversely, moving across the bent cap to its final location, accelerating the bridge construction. This paper describes in detail some of these innovative designs and how they were implemented during construction.

Keywords: Bridges, Roads, Construction equipment for Bridges, Post-tensioning, Precast, Prestressing, Bent caps, Accelerated Bridge Construction, Innovative Structural Systems

1 Introduction

The IH-635 Managed Lanes Project (LBJ Freeway) rebuilt one of the busiest and most congested highways in North Texas by 2016. This project is one of the largest private-public partnerships undertaken in the United States in terms of complexity and investment value.

The most significant parts of the project are the full reconstruction of the IH-635 general purpose lanes from IH-35E to US-75 and the addition of six managed lanes in a depressed section for a total length of nine miles. The depressed managed lanes were excavated beneath the existing lanes such that approximately half of the existing lanes in each direction cantilevered over the new managed lanes (see Figure 1). The existing lanes were supported by retaining walls on either side of the new depressed lanes that extended the length of the highway as well as intermediately

placed straddle bents that spanned across all six of the depressed managed lanes. The project requires that new managed lanes be built within the existing facility while maintaining the existing traffic. With more than 250,000 vehicles driving through the corridor every day, this poses significant traffic maintenance, construction phasing, and scheduling challenges. To overcome these challenges an extraordinary amount of effort must be put into the planning and design. It is vital to incorporate innovative ideas to the design of the structures in order to improve schedule, adapt the structures to the traffic control plan, reduce traffic detours and improve safety during construction.

2 Background and main objective

Most of the design solutions for the structures were chosen to minimize disruption to traffic and construction time. Due to the fact that a large