



State Road 408 Widening

Category A – Studies, Research, and Consulting Engineering Services

Exploding growth and increased tourism have taken their toll on State Road (SR) 408, the 16-mile limited-access toll road that allows travelers to bypass downtown surface streets in Orlando. A design approach that incorporated context-sensitive design principles to not only relieve congestion, but highlight the best aesthetic features of the community, resulted in a much better expressway for the traveling public and a better quality of life for surrounding neighborhoods.

A. Role of Entrant's Firm

As the General Engineering Consultant for the Orlando-Orange County Expressway Authority (Expressway Authority), PBS&J was responsible for the development of roadway and aesthetic concepts for the widening of State Road 408 ([SR 408] East-West Expressway). PBS&J worked closely with the Expressway Authority and coordinated with other consultants throughout every phase of the project from concepts through construction plan development.

B. Role of Other Consultants

Turning the conceptual package into a final set of construction plans was a collaborative effort between planners, designers, and construction personnel. Canin Associates began the process by canvassing the local communities to identify their concerns, using the input to determine preliminary treatments. Quest Communication provided a full-time public information officer who assisted the Expressway Authority and PBS&J in presenting the final engineering designs that were prepared by Parsons



Description of the Project



Transportation Group. PB Construction Services, URS, and Lane Construction Corporation then created the real-scale model mock-up.

Originality/Innovation

SR 408 is a 16-mile toll road providing travelers an east-west route through Orlando. With traffic volumes approaching 140,000 vehicles during a typical weekday, and a projected growth to 175,000 vehicles within the next ten years, PBS&J was tasked with developing concepts incorporating context-sensitive design principles to not only relieve congestion, but highlight the best aesthetic features of the community.

When originally constructed in the 1970s, SR 408 bisected the heart of downtown Orlando and divided communities. With this expansion project, the Expressway Authority saw the opportunity to enhance the existing neighborhoods by using a context-sensitive design approach that involved disciplines not typically associated with roadway projects. Throughout the project, public meetings and workshops were held to solicit input from the local community in an effort to develop the most effective design concepts while keeping the public informed.

Preliminary engineering concepts used Interstate 4 (I-4) as the divide and included progressive and innovative engineering components such as Open Road Tolling to eliminate traditional barrier mainline toll plazas and

integrated Intelligent Transportation Systems (ITS), a fiber-optic system to collect and present real time traffic information on dynamic message boards. Retaining walls were designed throughout the downtown neighborhoods to minimize the need for additional rights-of-way (ROW), mitigate impacts to surrounding neighborhoods, and enhance aesthetics. To reduce the scale of the required retaining walls, a series of 5' tall decorative planter walls were used that not only softened the appearance of the walls but also provided a great venue for restoration of native plants and canopy trees along the SR 408 frontage.

In parts of downtown Orlando, SR 408 cuts through residential areas as an elevated roadway, less than 100' from some homes. In addition to the required retaining walls, the preliminary concepts identified areas that needed sound walls. Adding 8' high sound walls to new 15' to 20' high retaining walls presented another challenge to the designers to creatively address the wall height. Textures and earth tone colors were selected for “visual reduction” of the walls. Coping bands and score lines provided vertical relief while decorative precast columns were added along the corridor to provide a lateral break.

The bridges were designed with a facade (a precast cladding system) to conceal slope pavement and the piers. This innovative approach is not only attractive, but also functional by prohibiting trespassing under the bridges.



These decorative architectural precast panels, typically reserved for buildings, were designed using native Florida stone in two shades of earth tones to complement the rich green tone selected for the bridge arches.

A signature design component is “stately” precast pylons stationed on each corner of the bridges. These pylons were designed to reflect a batten column matching many of the Craftsman-style homes along the frontage. These pylons are further accented by decorative logo plaques to add interest and identify the Expressway Authority and SR 408 to the travelers.

A new black davit arm style light pole was introduced to minimize the visual impact of the lighting and establish a distinctive new style theme. The black poles complement the earth tones and were designed to be less obtrusive than standard aluminum poles. The black also matches the new style of ground mounted sign structures.

Extensive landscaping is planned throughout the project utilizing xeriscape design principles, which use a range of native trees, shrubs, and grasses that can survive without irrigation. To provide safe distances between opposing lanes of traffic, a landscaped center median was designed at some locations. A concrete barrier will be constructed in stretches where the median will have to be eliminated. The overall landscape design calls for plantings that are consistent with the SR 408 design features which

also provides a distinctive look to downtown.

The SR 408 crossing of Lake Underhill from the east into downtown Orlando provided an opportunity to create a unique gateway feature that would be a memorable structure for travelers and serve as a hallmark for Orlando. Conceptual designs for the existing Lake Underhill bridge structure involved modifying it to look like a cable-stayed bridge with a treatment featuring decorative tubes and panels, additional thematic lighting, and two five-story towers from which steel cables drape down 50' to the roadway. A 10-foot-wide pedestrian bridge was attached to the new ramp to close in a loop in an existing city fitness trail along the south side of the lake. This loop afforded designers another opportunity to improve the community by enhancing recreational value.

Future Value to the Engineering Profession

This highly visible project will likely change the design process for future roads and serve as an example for the Federal Highway Administration (FHWA) in their 2004 plan to go beyond traditional roadway engineering by incorporating innovative ways to improve the overall quality of projects. Elements used within the SR 408 project are already being implemented on other projects in Central Florida including I-4 and the Maitland Boulevard Extension (SR 414).



Streamlining bid packages, providing real-size mock-ups for construction contractors, and creating façades that soften the appearance of standard roadway structures through the use of extensive landscaping, eye-pleasing colors, and energy-efficient decorative lighting, enhanced the process and project while benefiting both the client and the community.

This project demonstrates that planning and designing a project that functions within the standard of the community and blends with its surroundings, may reduce the typical “not-in-my-backyard” (NIMBY) attitude of the public. Although growth will continue to dictate the need for expanded or new roadways, placing a value on aesthetics can determine their acceptance.

Social, Economic and Sustainable Design Considerations

This SR 408 project was designed to be functional while benefiting the community. Changing the expressway surface from concrete to asphalt will improve the attractiveness and ride, and combined with the sound walls, will result in less noise—a benefit that will add to the quality of life and enjoyment of the surrounding neighborhoods. The faux cable-stayed bridge and a pedestrian walkway designed for Lake Underhill will become a visual “Gateway to Orlando.” This new pedestrian bridge, unique to the City of Orlando and Central Florida, will link the community by creating a continuous pathway around Lake

Underhill. In addition, it will provide more opportunities for recreational use of the lake.

When originally constructed in 1972, SR 408 split neighborhoods in the downtown area. Over 1,000 homes were removed and 58 streets closed. The concepts developed for this project will enhance the aesthetics in the area and provide the City of Orlando with impetus for urban renewal.

Complexity

Limited Right-of-Way

The majority of the SR 408 widening project occurs within a highly developed corridor and the existing ROW could not accommodate the necessary expansion without extensive condemnation of businesses and residential homes. The wall system met the roadway ROW needs, but stormwater regulations were not in place when SR 408 was originally built. PBS&J met the stormwater ROW challenges by developing concepts that involved compensatory treatment, use of the hardship rule, and modifications to stormwater models and facilities developed and built by the City of Orlando. PBS&J, working side by side with the City of Orlando, developed concepts to modify and expand an existing urban wetland. The reshaped and regraded wetland provided the City with better flood protection and additional native wetland plants while meeting state water quality requirements.



Disciplines Meet

Because the original construction of SR 408 spanned numerous, diverse neighborhoods, PBS&J landscape architects drove the streets of the existing corridor to better understand the history and style of the older neighborhoods with varied architectural styles and conditions. The resulting context-sensitive design included a precast cladding component for bridges that met Florida's building code rather than FDOT's specifications. This non-traditional approach by PBS&J architects, using standards normally reserved for buildings, maintained the aesthetic blending of the expressway with the surrounding neighborhoods.

Another non-traditional approach involved collaboration with an arborist to assess the health and value of every tree that could reasonably be saved within the corridor. With the typical cross-section between I-4 and Crystal Lake Drive around 210' and the need to save trees, PBS&J used planter walls to allow a flatter grade to be established and for landscaping to reduce the visual impact of the retaining walls all while remaining within the existing ROW.

Exceeding Clients Needs

PBS&J streamlined the bid packages by making the aesthetic package general for all seven segments. This not only ensured a consistent theme throughout the project, but also saved the Expressway Authority the cost of having to pay twice

for design. Most of the precast components were designated design-build, including the cladding and pylons, and it became the contractor's responsibility to coordinate with their structural engineer and precaster to make sure the intent of the aesthetic package was transferred into the actual construction product.



A unique approach was used to help highway contractors construct the architectural details outlined in the concepts: a mock-up of a typical corner including the pylon, logo plaque, accent panels, sound walls, and bridge rail barrier was developed. This mock-up was a real-scale model, constructed off-site, that provided a visual image from which to make design alterations. Because it is not common for precast manufacturers and roadway contractors to work side by side, the mock-up served as a learning tool for everyone involved and has set the standard for future projects.