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Lightweight Noise Barrier on Bridge Structure on IH-30 in Dallas

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Research • Education • Public Service

Noise Barrier On IH-30 in Dallas

- Background
 - IH-30, near downtown Dallas, was expanded in early 2000s
 - Noise has been a problem ever since for adjacent neighborhood
 - Quieter pavements placed in 2006 and 2010
 - TxDOT pilot project for a light-weight noise barrier

Tined CRCP



PFC



Summary of Work Performed

- Conduct a feasibility study for a light-weight traffic noise wall
- Selection of material types and vendors
- Design
- Inspection
- Sound measurements

Noise Barrier On IH-30 in Dallas

- 2,500-ft. section, between Edgefield Ave. and Sylvan Ave., west of downtown
- Elevated section (bridges) above a creek
- Next to a residential neighborhood (Kessler Park)
- Heavy commuter traffic and high number of trucks
- Existing 8-ft. concrete wall





Kessler Park Neighborhood



IH-30 in Dallas



IH-30 South Side Wall



IH-30 South Side Wall



IH-30 Truck Traffic



Kessler Park Neighborhood



Noise Barrier Considerations

- Barrier material needed to be light to avoid having to retrofit bridge structures
- Noise barriers are normally not effective for receivers on a hillside overlooking the highway or for receivers at heights above the top of a noise barrier

Highway View from Residence



- FHWA Traffic Noise Model (TNM)
- Noise impacts evaluated for existing and future traffic conditions
- Twenty-six receivers included in the model, located between Fort Worth Ave. and Beckley Ave.
- Three receivers had noise impact





Impacted Receivers (Current and 2035 Traffic)

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- Barrier analysis: existing 8-ft. wall, with additional height increments of 2-ft. up to 12 ft., on top of the existing wall.
- Future traffic: 2035
- A minimum of 8-ft. tall height was recommended to provide benefits to some receivers, and a 10-ft. wall was recommended to provide benefits for locations along the park

Noise Barrier Design & Costs

- Transparent acrylic material
- Manufacturer: Evonik Acrylite
- 10-ft. panels above the existing 8-ft. barrier
- 15-mm thick
- 23,950 sq. ft.
- Material cost \$32/sq. ft.
- Project cost \$860,000

Transparent Walls

- Aesthetically pleasing
- Preserve views and sunlight
- Could relieve the feeling of enclosure
- Could attract graffiti
- Graffiti is easier to clean
- STC =32 dB
- Lightweight







Photos from September 11-12, 2013



Photos from September 23-24, 2013





Noise Barrier Finished



Noise Barrier


















- SPL measurements taken before and after barrier construction
- Four residential locations and a park location
- Morning, afternoon and evening
- Measurements taken approximately every two weeks
- In conjunction with a portable weather station





Portable Weather Station



Portable Weather Station



















Noise Wall Inspection - Graffiti



Noise Wall Inspection - Graffiti





Photos from November 11, 2013

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Noise Wall Inspection - Graffiti



Graffiti Removal Costs

- Traffic Control: \$3,893.27
- Steam Cleaner: \$200.00
- Graffiti Removal: \$73.50
- Total: \$4,166.77

• Cost information from Mr. Frank Jett, TxDOT Dallas District, Heavy Equipment Maintenance

Graffiti Removed



- 130 measurements before the wall was installed
- 125 measurements after wall was installed
- Average level before wall: 58.2 dBA
- Average level after wall: 56.6 dBA

Noise Measurements: Before vs. After

Until June 2014



Noise Measurements: Before vs. After

Actual vs. TNM Prediction





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Noise vs. Wind Speed



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Noise vs. Wind Speed



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Conclusions

- Noise reduction varies from 0.7 to 2.5 dBA (on average)
- Location with more benefit is close to highway and at a lower elevation
- Sound wall provided significant noise reduction in the few months following its completion
- Noise levels appeared to get higher in the colder months
- Cold temperatures are correlated to higher tirepavement noise generation (1 dBA per 10°C)

Conclusions

- Other weather variables appear to have no significant influence
- Foliage might have some influence (no foliagehigher noise). Foliage diffracts and absorb sound.
- Neighbors are very satisfied with the wall
- TNM over predicts current noise levels

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