

City Administrator Report to Mayor & City Council

2017-04-14, Edition No. 261

WEEKLY UPDATE:

- Miss Drive: According to the City Engineer, starting this past Tuesday, a company called Kleinfelder will be in town setting vibration monitors at selected locations along the Mississippi Drive Corridor. This equipment will gather background or existing condition vibrations these structures are experiencing. This is in preparation for the start of the Mississippi Drive project and required by the State. By the way, the Pre-Construction meeting with the contractor has been set for later this month to keep things moving forward.
- Public Works: DPW has been working with IDNR's Air Quality Bureau and we will be able to burn the storm debris in lieu of having to haul it away at a significant cost.
- Fire & ISO: Chief Ewers was just contact by ISO and the City will have an on-site inspection in June. It's been a few years since our last one. I've already sent survey requests out to MUSCOM and Muscatine Power and Water since those are the three areas for the review (communications, water supply, and fire department operations). We will be working on this between now and June so we are prepared for the on site. Currently we are a PPC 3 and we may have a chance to go to a rating of a PPC 2. The additional personnel will help. The lower the number, the better the insurance discounts, especially for businesses and industry.
- Quiet Zone: We are hoping to have the contracts with CP for construction of the two quad gates to Council at next week's meeting. Community Development Director Gobin found the attached article on property values and train horn noise. Just an FYI.
- OpenGov: We are reviewing the draft agreement, but hope to bring forward the OpenGov contract to council next week so that we are prepared to go come July 1st.
- Rep. Loebsack: Rep. Loebsack will be stopping by City Hall on Tuesday at 4pm to discuss the Federal budget and any potential affects it may have related to the City. A couple issues come to mind - HUD funding and Federal Grants such as TIGER that could be potential funding sources the Port should it proceed.

Projects

The following are my notes from the Team Meeting on Wednesday, April 12th:

1. Art Center HVAC Project
 - a. Punch List update
 - b. Open House - April 27, 2017
 - c. Close out at Council Meeting on May 4, 2017

2. Mulberry Ave Reconstruction Project
 - a. Rain delaying final punch list items
 - b. Close out at Council Meeting on May 18, 2017
3. Mississippi Dr. Corridor Project
 - a. Tentative: Pre-Con Meeting on April 21, 2017
 - b. Tentative: Public Meeting on May 2, 2017
(need to reserve Riverview Center for this)
4. Musser-Wiggins Trail
 - a. Tentative: Pre-Con Meeting on May 1, 2017
 - b. Tentative: Public Meeting on May 9, 2017
(need a location - Transfer Station???)
5. Library Relocation Project
 - a. Final cost estimates are needed
 - b. May include in the CAT Grant Application for July 15, 2017
6. Airport runway 6/24
 - a. Adam will have reports to FAA by April 21, 2017
 - b. Close out at Council Meeting on May 4, 2017
7. Airport: T-Hangers/Apron Expansion
 - a. Contractor: Fox Construction
 - b. Pre-Con - April 21, 2017
 - c. Completion date: October 2017
8. Riverfront Master Plan
 - a. May 10, 2017 Public Meeting on the Riverfront Master Plan Update
9. Property Acquisition/Demolition
 - a. City owns T-Strake
 - b. One Beach Lumber building eliminated
 - c. Asbestos Abatement Specs needed
 - d. Demolition Specs needed for T-Strake
 - e. Are all EA requirements met (i.e. photos & documentation)
10. Landfill Cell Construction
 - a. April 13, 2017: Presentation
 - b. April 20, 2017: Resolution Setting a Public Hearing
11. Cleveland Ave. Reconstruction
 - a. Resolution Setting Public Hearing: June 1, 2017
 - b. Public Hearing/Approving Plans & Specs: June 15, 2017

12. Next Projects:

- a. RFP for Grandview Ave. Design (In)
- b. Design for 2nd/Mulberry (and bluff)

13. Other:

- a. Signage for Projects

Notes and comments

The economic valuation of train horn noise: A US case study

William K. Bellinger *

Dickinson College, Department of Economics, P.O. Box 1773, Carlisle, PA 17013-2896, United States

Abstract

This paper provides a property value-based estimate of the dollar cost of train horn noise in a residential neighborhood in a small town, Wormleysburg, Pennsylvania, US. Residential property values are found to decrease by about \$4800, or 4.1%, per 10 db of added noise exposure, for an aggregate total of \$4,088,799 in 2004 dollars. The primary study was supplemented with information from a neighborhood survey. Dollar value estimates of train horn costs could prove useful in facilitating balanced benefit-cost analyses of horn noise abatement policies such as quiet zones, wayside horns, underpasses, or street closures.

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1. Introduction

The elimination of train horn noise is the primary benefit to be derived from the establishment of quiet zones for railroads. While the long period of experimentation with quiet zones led to a great deal of information about their effects on safety (Federal Railroad Administration, 1995, 2000; Zador, 2003), the benefits of the elimination of train horn noise have received very little attention beyond studies of residents' annoyance levels (Gent et al., 1998). Therefore this paper may begin to fill a need in the analysis of train horn noise and quiet zone policy decisions.

This paper is derived from a more general benefit-cost analysis of a proposed highway-rail underpass in a residential neighborhood in Wormleysburg, Pennsylvania, a small town directly across the Susquehanna River from Harrisburg. Wormleysburg is divided into a narrow 100 year flood plain near the river and a more elevated section to the west, and into northern and southern sections by a local limited access highway. The rail tracks are somewhat elevated relative to the riverfront neighborhood but are well below the crest of the bluff that leads to the western side of the town. Based on a survey of Wormleysburg residents, the riverfront area is highly impacted by train horn and other noise, while most of the higher elevation area is not.

* Tel.: +1 717 245 1358; fax: +1 717 245 1854.
E-mail address: bellinge@dickinson.edu

2. Resident survey

While the primary estimate of the dollar cost of train horns is based on an analysis of property values presented later, the study also benefits from the findings of a survey distributed to Wormleysburg residents in the summer of 2005. This survey asked about perceived loudness and annoyance levels from train horns and train movement, the impact of horn noise on daily activities such as sleep and outdoor activity, and a hypothetical question regarding residents' willingness to pay to eliminate train horn noise. Identifying variables included location, household size, and tenure. Just over 100 questionnaires were returned, the majority of which were from the northern riverfront and uphill neighborhoods in Wormleysburg closest to the rail crossing. The results are consistent with expectations. Annoyance is closely related to perceived train horn volume. Annoyance levels are far higher in the riverfront north area nearest to the rail crossing, higher for train horns than for train movement, higher for those with fewer years of residence, and higher at night than during the day.

The Wormleysburg resident survey also included the following:

“This question is not about a real person or a real situation and does not mean you will actually have to pay to stop horn noise. Your best guess will be perfectly acceptable. If you could pay some person or group to stop all train horns, what is the most you would be willing to pay per month?”

While the question seems to invite high responses, response biases existed in both directions. At least half a dozen respondents with high or extremely high levels of annoyance offered a zero payment response. The majority of these few respondents added notes saying that while they were annoyed by horns, someone else should pay for their elimination. On the other hand, two respondents offered dubiously high valuations of \$500 and \$1000 per month, possibly in an attempt to influence the results. Eliminating both groups reduced the average monthly willingness to pay from \$30.18 to \$13.06 per household, a more reliable figure. Because statistical tests found no correlation between family size and respondents' willingness to pay, these responses were interpreted as individual valuations. Therefore, household values were calculated by multiplying the willingness to pay by the number of adults in the household.

Selected annoyance values and monthly willingness to pay by location are presented in Table 1. The positive relationship between respondents' willingness to pay and train horn annoyance levels, measured on a 5 point scale, is clear. The correlations between willingness to pay and annoyance were 0.612 for daytime annoyance levels, 0.637 for evening and nighttime annoyance levels, and 0.671 for frequency of sleep loss. Correlations between willingness to pay and loudness were 0.590 for daytime and 0.600 for night time. All were highly significant. Average monthly household willingness to pay varied from \$66.75 for those with at least one annoyance level of 5 (extremely annoying) to \$0 for those households with a highest annoyance level of 1 (not annoying).

Because of the possible upward bias in the survey results, no aggregate dollar value is reported here. The important finding from the survey is the strong correlation between perceived noise volume, annoyance, willingness to pay, and proximity to the Wormleysburg railroad crossing. This information helps to support the indirect sound figures used in the following property value estimate of horn noise costs.

Table 1
Monthly willingness to pay to eliminate train horns

Area	Number of responses	Average night noise rating (5 point scale)	Average night time annoyance rating (5 point scale)	Household willingness to pay
Riverfront north	17	4.00	4.06	\$55.29
Riverfront south	8	2.94	3.00	21.25
Uphill north	29	2.56	2.23	5.21
Uphill south	9	3.50	3.58	30.00
Total	63	3.21	3.12	\$24.30

3. Train horn noise and property values

One approach to providing a dollar estimate for the cost of noise uses regression analysis to estimate the one time increase in property value due to the elimination of a noise source. This study utilizes a set of 192 residential properties in Wormleysburg sold between 1980 and 2004. Sales prices were adjusted for housing price inflation using the housing price index for the Harrisburg metropolitan area. In addition to the property's estimated exposure to horn noise, other variables such as lot size, living space, the age of the dwelling, and access to a river view were included as control variables.

Because no sound equipment was available to test train noise directly, a noise distribution map from an Iowa study (Gent et al., 1998) was adjusted to scale and overlaid onto a map of Wormleysburg for northbound and southbound trains. These overlays are shown in Figs. 1 and 2. Gent et al's maps give a visual representation of the resulting sound pattern, and may not be entirely accurate.

Because the Norfolk Southern tracks in Wormleysburg lie partway up a relatively steep hill, sound exposure seems to be pervasive across the riverfront section but relatively negligible for the uphill neighborhood to the west. To test the significance of this topographical issue, the sound distribution overlays from the Gent study were interpreted in three ways. The first interpretation was to make no topographical adjustment in the estimated noise exposure. The second interpretation limits assumed noise exposure to those streets at the river level or above but directly contiguous to the Norfolk Southern tracks. This exposure area is referred to as riverfront plus. The third interpretation limits assumed noise exposure to riverfront blocks only. The (literally) narrower interpretations of sound exposure provide far more significant results than the unadjusted data.

3.1. Property value results

The effect of horn noise on property values was analyzed through multiple regression analysis. Results are shown in Table 2. Results in the uppermost rows indicate that the riverfront and riverfront plus contiguous

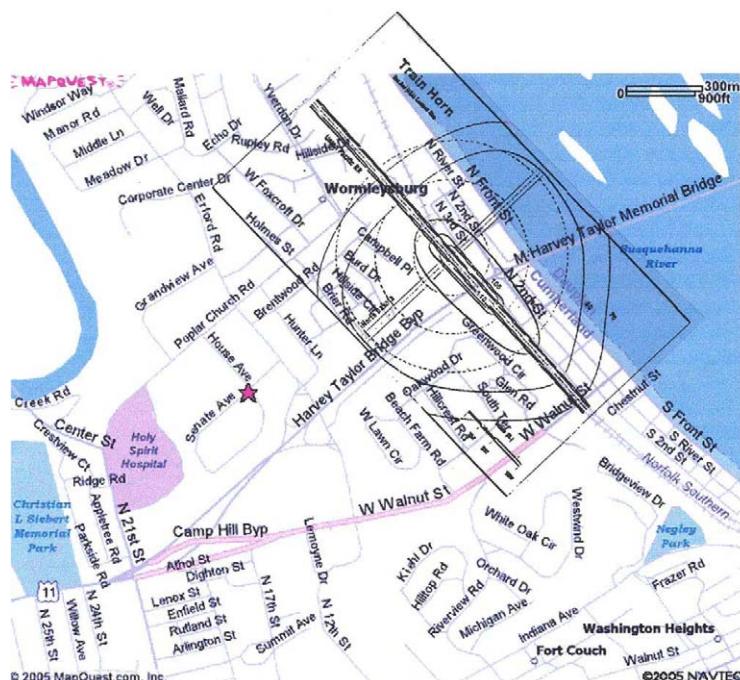


Fig. 1. Northbound Trains.

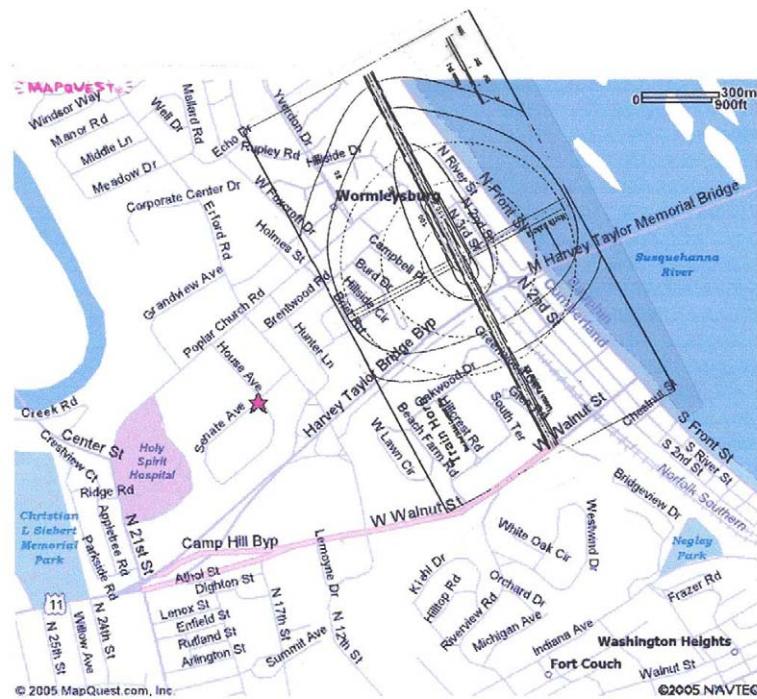


Fig. 2. Southbound Trains.

Table 2
Horn noise effect on real property values^a

Equation	River level	River level	River plus	River plus	Unadjusted
Constant	146,750 (8.56)	162,036 (11.368)	156,030 (8.12)	172,434 (10.29)	141,102 (6.22)
Max. horn noise (River level only)	−4831 (−2.213)	−5103 (−2.34)			
Max. horn noise (River level plus)			−4,741 (−1.96)	−4,837 (−1.99)	
Max. horn noise (unadjusted area)					−797 (−.257)
Living area	12.085 (1.59)		13.06 (1.72)		13.206 (1.71)
Acreage	93,814 (3.62)	117,714 (5.55)	86,867 (3.25)	112,956 (5.12)	100,242 (3.84)
Age of house	−847 (−5.18)	−859 (−5.23)	−951 (−5.66)	−967 (5.74)	−898 (−4.83)
River view	55,411 (5.29)	61,786 (6.36)	53,802 (5.09)	60,714 (6.183)	55,808 (5.25)
<i>R</i> ²	0.558	5.52	0.555	0.548	0.546
Adjusted <i>R</i> ²	0.546	5.42	0.543	0.538	0.534

^a *t*-statistics are in parentheses; all coefficients are in 2004 dollars.

hillside properties experience significant losses in property values. The average residential property in the riverfront or riverfront plus zones lose between \$4700 and \$4800 dollars of sales value for each 10 db of horn noise exposure above an assumed background level of 50. In the noise exposure zone, properties have an average sales price in 2004 dollars of \$115,953. All else equal, the estimated decrease in property value for exposure to each 10 db above background level is 4.1%. Therefore the residents of the 90+ db area will gain an average

16.6% from the elimination of horn noise, with lesser exposure producing correspondingly lower effects. For all 256 waterfront plus residential properties in the affected zones, the aggregate loss of property value from train horns is estimated to be \$4,088,799 in 2004 prices.

Tests of non-linear relationships, including a double log specification and squared noise values, produced less significant results, indicating a linear relationship between added noise exposure and property value. The results for other variables are significant and consistent with expectations in size and sign. A high correlation between living area and acreage did not significantly affect the results, as columns 3 and 5 in Table 2 demonstrate.

There are three possible biases in these estimates. On one hand, horn noise may be more widely dispersed than is indicated by our noise maps. Evidence from the Wormleysburg resident survey indicates that residents to the south of the estimated noise zones also may be annoyed by train horns, although the noise zones do extend somewhat into the southern neighborhoods. Secondly, limited data on factors affecting housing value might mask the possible effect of train horns on property value in the newer and more affluent uphill neighborhoods. However, the resident survey indicated low annoyance levels and low willingness to pay for silencing train horns in this uphill area. The final bias is the lack of any separate measurement for other negative effects of trains, such as movement noise. Efforts to test variables indicating proximity to the tracks well south of the highway intersection produced inconsistent results. If part of the estimated effect of train horns is caused by other rail-related factors, then the estimate is biased upward, all else equal. Given these offsetting biases, the estimated aggregate lost property values seems reasonable.

4. Conclusions

Access to a dollar valuation of the cost of train horn noise will allow a more balanced analysis of the net benefits of quiet zones, stationary horns, underpasses, or other horn noise reduction methods. This paper attempts to provide such an estimate using a property value or revealed preference method, supplemented by a resident survey. According to these estimates, the property value effect of train horns averaged approximately \$4800 per 10 db of added noise exposure, or 4.1% of the sales value. For all of the 256 affected residential properties, this totaled just over \$4 million in 2004 prices. The Wormleysburg resident survey verified a strong connection between horn noise volume, annoyance, willingness to pay, and location, providing support for the indirect sound estimates use in the property value study.

Acknowledgements

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