

Estimated Impact of Widening U.S. Highway 80 (Marshall Avenue) in Longview, Texas

JESSE L. BUFFINGTON AND MARIE T. WILDENTHAL

The effects during and after construction of a highway widened to install a continuous two-way left-turn lane with curbs and gutters are documented. A 10.89-km (6.7-mi) section of U.S. Highway 80, known as Marshall Avenue, in Longview, Texas, was widened in this manner between 1989 and 1991. Before the addition of the continuous left-turn lane, five intersections were widened. A study of the effects of the latter construction was completed in 1987, and the data collected at that time serve as the "before construction" data for the present study. Data were also collected during and after construction of the two-way continuous left-turn lane. The data collected included information on abutting businesses' assessments of the impact of construction on their businesses, estimates of parking availability and use, and the impacts of the construction expenditures on the local area or city. Most businesses' number of usable parking spaces, customers per day, full-time and part-time employees as well as gross sales and net profits were unaffected, either during or after construction. Over half of the 1987 abutting businesses experienced no change in their number of parking spaces. Longview land and property values peaked in 1986 and fell until Marshall Avenue construction started. Subsequent increases in values were not necessarily related to the construction. Construction expenditures in Texas totaled \$8.1 million. The Texas input-output model estimates the impacts of these expenditures to be \$29.9 million in additional output and 514 jobs for the statewide economy.

Departments of transportation (DOTs) continually are faced with the responsibility of providing safe and congestion-free highways. One of the ways that the DOTs are accomplishing this task is by widening and adding travel lanes to existing highways. In many cases, these highways are widened enough to install a continuous two-way left-turn lane in the median and curbs and gutters at the margins. Additional right-of-way has to be acquired from owners of abutting property to make these improvements on some highways.

Many business and property owners who potentially may be affected by the construction ask questions about the negative economic impacts. Some are concerned about losing shoulder and private parking space for their customers, the ability of their customers to safely turn into their parking lots if curbing restricts continuous access to their parking lots, and the economic impact, specifically on land value, land use, and their businesses, of such an improvement. Unfortunately, the only studies found in the literature dealing with any of the impacts of highway widening projects that add a two-way continuous left-turn lane discuss the benefit-cost and land use impacts.

This paper provides a complete economic impact study, encompassing land use, land value, business, and parking impacts. Texas Transportation Institute (TTI) has another highway widening study

under way that will provide additional findings for use in estimating the positive and negative impacts of the same type of improvement on other highways. Even so, there is a need for several more case studies of different types of widening projects to establish a minimal data base for estimating all related economic impacts of such improvements on those directly affected as well as the city as a whole. Also, the results could be used as supporting data for the environmental assessment (EA) required for proposed projects before approval can be obtained from FHWA. Need for supporting data for EAs was dramatized in the case of the proposed widening of U.S. Highway 80 in Longview, Texas. As a result, the Texas Department of Transportation (TxDOT) asked TTI to estimate the expected economic impact of the proposed improvement. The initial study was completed in September 1987. The findings were based on traffic counts, instrumented vehicle runs, parking surveys, and the opinions of businesses, especially those located along five short sections widened to install protected left-turn lanes at major intersections. These findings were submitted as part of the EA to FHWA for approval, which was granted.

Before construction, parking space availability and use, business volumes, and employment levels were fully documented. The proposed improvement was approved and went to contract in fall 1989; it was completed in fall 1991. Then, a follow-up study was authorized by TxDOT, and similar data were collected during and after construction. Construction activity and expenditures were monitored. In short, a complete impact analysis, covering before, during, and after construction, was performed.

METHODS

Four aspects of the construction are evaluated: Mail and interview surveys of businesses abutting the construction were conducted to determine impacts on sales, employment, number of customers, and number of parking places. Additional parking surveys were conducted for businesses that were expected to have a parking availability problem. Land and property values were studied to determine construction impacts. Input-output analysis was used to determine the employment and output impacts of the construction expenditures on Texas.

ESTIMATED IMPACT ON BUSINESSES

By 1987 five intersections had already been widened to include a left-turn lane. Three intersections were widened in 1974, and the

other two were widened in 1986. The impacts of these widenings were discussed in an unpublished report in 1987 (Buffington et al., unpublished data). The five widened intersections included 45 businesses, 39 of which were willing to respond to a 1987 in-person survey on the impacts of widening the intersection (87 percent response rate). In the following discussion, the 1987 actual impacts during and after construction for these five intersections (hereafter referred to as previously widened sections of the highway) are compared with those impacts of widening construction for a continuous left-turn lane for the unwidened sections.

The previously widened sections were minimally affected by the widening of the remaining portions of Marshall Avenue. Realignment of the curbs, new surface treatment, and new pavement markings were the principal improvements made in these sections during the latter construction. Also, widening of the remaining section was anticipated, as portions most distant from the intersection were already being used to some extent to make left turns into parking spaces of businesses on the opposite side of Marshall Avenue.

In 1992 each business abutting the previously and newly widened section of U.S. Highway 80 (Marshall Avenue) was surveyed by mail to determine the impacts of the construction on the businesses. The completely widened section extends between Eastman and Fisher roads. Three hundred seventy-one operating businesses were located on this section when the survey was administered in August, 1992, compared with 331 in 1987, a 10.08 percent increase during the period. Most 1992 businesses were involved in retail sales and service. Forty-six businesses (12 percent) completed all or part of the 1992 survey. The 1992 results are reported only for those who answered the question, not for those who left the question blank. There were no respondents from gas stations, convenience stores, motels, food and liquor stores, or house-trailer businesses. Between 6 and 29 percent of other types of businesses responded to the survey. Seven (16 percent) of these respondents were located along sections at the five major intersections that were widened before 1991, representing 10.5 percent of all businesses operating along the 10.89-km (6.7-mi) previously and newly widened sections.

Note that because of the low response rate of the 1992 survey, the survey results may contain nonresponse errors. This means that the final sample may not fully represent what happened to the whole population of businesses. However, 100 percent of the whole population of operating businesses had an opportunity to respond. Also, because the number of 1992 respondents is greater than 30, the chance of nonresponse errors or nonrepresentativeness of the findings is low (1). Further, the sampling error can be estimated adequately by the size of the sample (2,3). Finally, the findings of the 1992 survey are logical. Similar surveys are now conducted in person with almost a 100 percent response rate for the new widening study.

The business owners were surveyed about changes in their number of usable parking spaces, gross sales, net income, the number of full-time and part-time employees, and the number of customers per day. Respondents were asked to indicate impacts both during and after construction.

There was little difference between survey responses about the impacts during construction versus after construction for a single year. However, the answers differed between the years. A possible explanation for this is that 1987 data combined responses of "don't know" with responses of "no answer," whereas 1992 data

eliminated answers from nonrespondents. The responses to individual questions are summarized below.

Usable Parking Spaces

Longview's businesses generally did not experience increases in usable parking spaces either before or during construction in either 1987 or 1992. Only 3 percent of the 1992 respondents, during or after construction, responded with "don't know," whereas 44 percent gave this response in 1987. Approximately one-third of the 1987 respondents experienced no change in number of parking places, whereas approximately three-fourths of the 1992 respondents experienced no change. Roughly 20 percent of the businesses experienced a decrease in parking spaces for both years. Therefore, most respondents did not experience a change in number of parking spaces during or after construction. However, if they did experience a change, it was for the worse.

Customers per Day

Generally businesses did not experience an increase in the number of customers per day either before or during construction for either of the two survey years. In 1992 the number of customers for most businesses did not change, whereas the number of customers for approximately 20 percent of 1987 businesses did not change. More businesses had fewer customers during the construction than afterwards, although the percentage of responding businesses experiencing a decrease in 1987 (41 percent) was twice the percentage of those with similar experiences in 1992 (27 percent). After construction, only 16 percent of the 1987 businesses and 9 percent of the 1992 businesses experienced a decline. Approximately 47 percent of the 1987 respondents did not know or did not answer, compared with roughly 8 percent of the 1992 businesses.

Therefore, because the number of parking spaces generally was not affected, construction might have hurt business accessibility. Finished construction may not improve or may hinder accessibility as compared with accessibility before construction. Also, people get out of the habit of going to a place if it is difficult to gain access. When a business is accessible again, former customers may not think about coming back.

Full-Time and Part-Time Employees

Although the businesses were asked about full-time and part-time employees in different questions, their answers for each were basically the same. None of the businesses increased its number of employees either during or after construction for either study year. Approximately 40 percent of the 1987 businesses and 90 percent of the 1992 businesses had the same number of employees during and after construction. Approximately 13 percent of the 1987 businesses hired fewer employees during or after construction, whereas roughly 5 percent of the 1992 businesses did so. Although approximately 47 percent of the 1987 businesses said that they did not know, or simply did not respond to the question about employees, only 3 percent of the 1992 businesses responded that they did not know. In sum, few businesses laid off any employees, and most tried to retain them.

Gross Sales and Net Profit

Businesses also were asked about gross sales and net profit separately, as they were for full-time and part-time employees, but their responses for both were very similar. Less than 3 percent of the 1987 businesses experienced increased sales or profit, whereas approximately 5 percent of the 1992 businesses had such an experience. The sales and profit of roughly 22 percent of the 1987 businesses did not change, although approximately 72 percent of the 1992 businesses experienced such changes. More businesses experienced decreased sales and profit during the construction than afterwards, although the percentage of responding businesses experiencing a decrease in 1987 (41 percent) was twice as much as the percentage with similar experiences in 1992 (19 percent). This fact could be related to the decrease in the number of customers experienced by many businesses during the construction. After construction, only 18 percent of the 1987 businesses and 3 percent of the 1992 businesses experienced a decline. This situation could be related to customers getting out of the habit of shopping at a certain store during construction and not going back once the construction was completed. Whereas approximately 47 percent of the 1987 respondents did not know or did not respond to the question, only 12 percent of the 1992 respondents did not know how their sales and profit were affected.

ESTIMATED IMPACT ON PARKING

In 1987 Buffington et al. indicated that many of the businesses along Marshall Avenue in the 10.79-km (6.7-mi) study area were concerned that widening the sections of the highway that had not been widened previously at intersections would have a negative impact on available customer parking (unpublished data). Exacerbating the problem was the fact that many of the businesses were housed in older buildings located too close to the right-of-way. Many did not have the minimum number of parking spaces required by the city's zoning ordinance at that time. Some businesses depended on Marshall Avenue's sloped paved shoulders for much of their parking.

In the last section, the parking problem was addressed through the eyes of the businesses. To further determine the magnitude of the parking problem, surveys on parking space availability and use were conducted. A parking-space availability survey was done with the use of a 1986 aerial photograph, a detailed design schematic, and an on-the-ground inspection of the premises of each business. An estimate of the number of available parking spaces before and after construction was established. Annual parking space use surveys of selected businesses were done by on-the-ground inspection.

Before the highway widening construction, both parking space availability and use included space on the paved shoulder in front of the premises of each business. All of the paved shoulder is on the highway right-of-way, and parking on the shoulder is illegal. However, the standard dimension of 2.75 by 6.10 m (9 by 20 ft) for each parking space was used to estimate the number of passenger vehicles that could park on the paved shoulder in front of each business.

Effects on Parking Space Availability

The results of the 1987 parking space availability survey are summarized. The survey did not include the side and back spaces of

businesses that had adequate front, side, or back parking. None of the shoulder spaces available to the businesses before construction were available after the construction started on a particular section of the project. Projections in 1987 forecast a 2 percent loss of the front parking spaces of all businesses and a maximum loss of 9.7 percent of all available shoulder and front parking spaces. More than half were expected to experience no change in their number of parking spaces, and only four (1 percent) would lose more than eight parking spaces. A higher percentage of the open businesses would experience no more change in available parking spaces than would be the case for closed businesses.

The study focused on the parking spaces available before and after construction for 118 of the 1987 businesses (open and closed) that were expected to experience a parking space availability problem. A total of 300, or 22 percent of the parking spaces, would be lost because of the construction. The average number of available parking spaces per business would drop from about 11.5 spaces to 9 spaces, a reduction of 2.5 spaces per business.

Effects on Parking Space Use

Since 1987, parking demand for a selected group of businesses that were expected to have a parking availability problem has been studied on an annual basis. By 1992, the number of businesses or parking lots monitored for parking demand had been reduced, partially because a small shopping center, structurally damaged by the explosion of a nearby railcar, had been demolished and some businesses closed. (Parking capacity data were unavailable for one business.) About 24 of the 114 businesses surveyed in 1987 already were experiencing a shortage of available parking spaces. Following construction, the number has not changed, but some businesses now have a smaller parking surplus, and other businesses have closed.

To analyze further the severity of the parking space availability versus use problem, all businesses having 10 or fewer spaces after construction were identified and classified according to levels of parking space use. Eleven parking loss levels were used for comparison. In 1992, the same percentage of businesses were under capacity as in 1987, a higher percentage were over capacity, and a lower percentage either were closed or did not know their status. Overall, a higher percentage of the businesses lost all of their available spaces in 1992 than did so in 1987. However, a lower percentage of the businesses with overcapacity lost all of their available parking spaces in 1992 than did so in 1987. Even so, more of these businesses experienced a deterioration in parking use and availability during and after construction.

ESTIMATED IMPACT ON PROPERTY VALUES AND USES

A limited amount of data were collected to provide some indication of the extent of property value and use impacts. Data were collected from the Gregg County Appraisal District, local real estate appraisers, and the city of Longview to estimate abutting property value and land use impacts of the widening project. Property values, building permits, and property uses were the three types of data collected.

Property Values

During the years before the widening of U.S. Highway 80, specifically between 1985 and 1989, property values fell in Longview. The decline, which was observed in both land and building values, was partly caused by the oil recession. One appraiser also noted that Longview property values peaked in 1985 because of overbuilding. Land and building values on Marshall Avenue fell similarly to the decline in Longview property values overall. The overall decline was exacerbated by the continuation of the late 1960s to early 1970s trend of building north of U.S. Highway 80.

By the time that the widening construction of U.S. Highway 80 began, Longview land and building values had leveled off and were beginning to rise. Land values on U.S. Highway 80 were behaving similarly. One appraiser noted that the construction slowed down the traffic on U.S. Highway 80, thus making it a more desirable location. He indicated that property values were related to the condition of the property but were generally falling because of the earlier neglect of buildings.

Only one year of after-construction property value is available. Trends evident during construction are still present. The increase in value between 1991 and 1992 is not as great as the increase between 1990 and 1991, however. Obviously, more time is needed to assess even the short-run after-construction impacts.

Building Permit Data

Demolition Permits

Earlier neglect of buildings can be traced through building demolition data available from the city of Longview. Between 1984 and 1989, there were only a few building demolitions each year. During the construction period, there were more demolitions. However, there were more commercial demolition permits issued the first year after construction than in any previous year. This increase supports the contention that Marshall Avenue property had been neglected, requiring demolition of existing buildings to take advantage of the renewed interest in building in this location. It is important to note that many kinds of work, including petroleum tank removal, are classified as building demolition.

Building Permits

The highest value of construction occurred between September 1984 and August 1985. Sixteen permits were issued between 1984 and the start of construction, and three permits were issued during the construction period. This decline supports the appraisers' view that Longview is overbuilt or that businesses are building north of Highway 80. Whereas \$1.64 million in new construction permits was issued in the last year of construction, only \$12,300 worth of permits was issued after the construction was completed. The building permits for new construction neither support nor refute the contention that there is renewed interest in building on Marshall Avenue. Note that the permits filed are for installation of signs, offices, and electrical plugs and are not necessarily related to the highway construction.

Remodeling Permits

City residents faced with the possibility of highway widening feared they would lose part of their property for highway right-

of-way. For this reason, permits for remodeling purposes were investigated. The permits applied for after the construction was completed were related mainly to routine improvements such as installing electrical outlets, signs, lavatories, air conditioning, heating furnaces, roofing, or sprinkler systems. It appears that Longview residents did not have to do extensive remodeling in the aftermath of U.S. Highway 80 widening.

Property Uses

Most properties had the same use throughout the study period. Property use changes that did occur included the addition of new retail outlets built on previously vacant land toward the end of the construction period. The new highway improvement may have influenced these use changes.

In 1991 more than 40 percent of the properties abutting Marshall Avenue were used as sites for retail businesses. Another 14 percent were being used for other commercial, office, and industrial purposes. About 25 percent of the properties were still vacant land. The remainder of the properties were used to house public activities, religious activities, or single- and multiple-family dwellings.

ESTIMATED ECONOMIC IMPACT ON THE LONGVIEW AREA

The general economic impact on Longview and the surrounding area of the proposed change in Marshall Avenue is estimated on the basis of the impact on businesses along the facility and multiplier effects of the project expenditure on the Longview area.

Impact on Business

In 1987 a few small businesses were expected to go out of business because of the loss of parking and the negative effects of construction. Less than one-third of the responding businesses thought that the long-term business effects would be negative, and businesses along previously widened sections expected that fewer jobs would be lost than did businesses abutting newly widened sections. Temporary effects on the businesses' number of employees, gross sales, and net profits were expected to be negative.

Fewer businesses had negative expectations in 1992 than in 1987. Most businesses experienced no change in the number of usable parking spaces, the number of customers per day, or the number of full-time and part-time employees. Gross sales and net profit received a less negative response, with 3 percent of the respondents noting a decline and 79 percent indicating no change. Some smaller businesses closed, but that is normal on Marshall Avenue and cannot be directly attributed to the widening construction.

Impact of Project Expenditure

U.S. Highway 80 construction costs totaled \$9,544,420.01, more than half of which was spent in the Longview area; \$2,616,400.48

was spent on Longview area construction materials, \$1,448,503.77 went to Longview area laborers, and \$1,526,559.31 in overhead expenses was paid to Longview area businesses. Longview area businesses appeared to receive the most patronage for each type of expenditure because less—\$2,331,028.84 worth of materials, \$783,837.65 worth of labor, and overhead expenditures of \$838,089.96—was purchased from businesses not located in Longview.

Employment and output multipliers were developed from the 1986 Texas input-output model to produce statewide estimates of the impacts of widening expenditures for U.S. Highway 80. Note that there are many limitations to using input-output models; these models are only mechanisms for gauging impacts. Impact estimates are made using the most applicable expenditure category in the input-output model, which is Category 20, new road/highway construction. The estimated employment multiplier for new road/highway construction is 53.7601 people per \$1 million of expenditures. This includes the direct impact of the construction expenditures, the indirect impacts on the suppliers, and the induced effect of increased consumer spending. Because costs have risen since 1986, the multiplier can be adjusted using the TxDOT construction cost index, which gives an adjustment factor of 1.1191 for 1991. An adjusted employment multiplier of 63.5 is generated by dividing the 1986 employment multiplier by the 1991 construction cost index. Applying this multiplier to the \$8.1 million construction costs spent in Texas indicates that widening Highway 80 generated about 514 jobs for the statewide economy. It is unknown how much employment was generated in the Longview area.

The total output multiplier is \$3.69 of output per dollar of expenditures. Applying this multiplier to the \$8.1 million of construction expenditure in Texas indicates that widening Highway 80 generated about \$29.9 million in additional output. Again it is unknown how much of this increase benefited the Longview area.

Local impacts of construction expenditures are difficult to determine because the Texas input-output model is designed to average the economic relationships for all communities in Texas. Therefore, it is not representative of any specific city. Estimates of the economic benefits from the Longview area expenditures can be made, but extreme caution should be exercised in the use of the estimates provided in this report. The total amount of expenditures made to Longview area vendors was \$5.59 million. Applying the Texas input-output multipliers to this value yields an estimated impact on Longview employment of 355 new jobs and \$20.6 million of additional output.

A benefit-cost model was also used to analyze the benefits and costs to motorists of the highway widening construction. The model and its implementation are presented in the paper by Wildenthal et al. in this Record. The benefit-cost ratio was 7.82, which means that the motorists are receiving \$7.82 in benefits for every dollar spent on the project.

SUMMARY

Estimated Business Effects

Abutting businesses were asked about the impacts of widening Marshall Avenue on various aspects of their businesses, including the number of parking spaces, customers, and employees as well as sales and profits. For the most part, the 1987 survey respon-

dents' experiences were much more negative than those of the 1992 respondents. A lower percentage of the 1992 respondents experienced a negative impact during and after construction on all aspects of their businesses except for usable parking spaces. A much lower percentage of the 1992 respondents experienced a negative impact on their business after construction than during construction. Had the construction period been a year longer and had there been less cooperation between all concerned—the businesses, the contractor, and TxDOT—the negative impacts, at least during construction, could have been greater.

Parking Impacts

In 1987, more than half of the businesses abutting the widened section of Marshall Avenue were expected to experience no change in their number of parking spaces. Firms that were expected to have inadequate front, side, or shoulder parking were selected for a follow-up study through 1992. The number of businesses expected to have a serious parking problem increased during and after construction. However, a higher percentage of these businesses than anticipated had adequate parking after the construction.

Property Value and Use Impacts

Longview's land values peaked in 1986 and fell until Marshall Avenue construction began. Land values began to rise at that time but still have not reached their 1985 and 1986 levels. Property along Marshall Avenue was affected by the land value trend as well as the trend toward building north of Marshall Avenue. Property was neglected, and building demolitions increased during and after the construction period. Building permits for new construction were issued more frequently in the last year of construction and after construction but not as frequently as before construction began. Property owners did not have to do extensive remodeling after the construction was completed, and few property use changes occurred during the study period.

Economic Impact

Longview, and motorists using the widened section of Highway 80, have benefitted from the construction. Business sales and property values along the highway are increasing. Construction expenditures of \$5.59 million are still felt in the local economy. The construction period's negative impacts were kept to a minimum by early completion of the project.

ACKNOWLEDGMENTS

The authors would like to thank the following officials of District 10 of TxDOT for the data they furnished and their valuable assistance with this study: James R. Evans, Harold C. Waggoner, Robert W. Ward, and J. Walter Lehmann.

The authors also are indebted to Edlyn Vathauer and John H. Russell of the City of Longview for data and valuable assistance. The authors express sincere thanks to the Netherton Company, Inc., the general contractor for the widening project, in particular

to L. C. Woods. The company's assistance in determining construction expenditure data for the Longview area and logging lane closure data was greatly appreciated.

Their thanks also go to the following Transportation Economics Program personnel for their valuable assistance: W.F. McFarland, J. L. Memmott, and Katie N. Womack, who conducted the parking survey, and Darrell Borchardt, Gerald Ullman, and their staff. Craig Smith and George Rose helped to reduce the study's data base. Finally, Linda Buzzingham helped to compile and sort the data and to prepare the report.

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Publication of this paper sponsored by Committee on Social and Economic Factors of Transportation.