

FRONTAGE ROADS IN TEXAS: LEGAL ISSUES, OPERATIONAL ISSUES, AND LAND USE DISTINCTIONS

What We Did...

AASHTO’s Green Book bills frontage roads as “the ultimate in access control” and, until recently, frontage roads have been Texas’ primary design solution to the issue of access along freeways (1995, p. 528). A policy of building frontage roads avoids the purchase of access rights when upgrading existing highways to freeway standards and generally supplements local street networks. Such a policy may also impact corridor operations, land values, and development patterns. This research investigated frontage roads as an element of limited-access highway

design, with an objective of providing a comprehensive evaluation of frontage road design policies and the legal, financial, land-development, and operational issues associated with such policies. This abbreviated report summarizes the results contained in Research Report O-1873-2, a paper which reviews legal statutes affecting public access to roadways, summarizes access policies and practices across states, compares land development and operations of corridors with and without frontage roads, summarizes studies on access-right valuation, and evaluates construction cost distinctions.

What We Found...

TxDOT has recently affirmed its desire to limit frontage road construction on new projects. (See Texas Transportation Commission Minute Orders #108544 and #108545.) This decision represents a significant shift in state policy towards freeway corridor design. However, it is consistent with reasonable practice, based on operational, cost, and other considerations examined here.

This work’s review of literature related to frontage roads considered a variety of issues, including access-right valuation, access policies, and operations. It also



Corridor with Frontage Roads



Corridor without Frontage Roads

highlighted issues of reasonable access, alternatives to frontage roads, corridor preservation, ramp location and spacing, merge lengths, and access-point densities. Overall, it suggests that with or without frontage roads, a wide variety of options are available to TxDOT for limiting access to and improving flow and safety along freeway corridors.

The survey of state DOTs indicates that a state's tendency to build frontage roads depends both on past access policies within the state, which generally depend heavily on legislation, and formal policy guidelines that specify the provisions under which a frontage road will be provided. Moreover, the roadway geometry associated with frontage roads in other states was in many cases quite different from typical Texas designs. Several states allowed development to occur on both sides of their "frontage" roadways. However, since generous ramp-to-signal distances were required by several policy guidelines, development adjacent to the ramp-frontage road interface to prevent dangerous weaving maneuvers was generally much more restricted than in Texas. While not every strategy given by a state DOT will apply to Texas, new and rehabilitated roadways within Texas may achieve significant operational and safety advantages by utilizing some of the techniques proven successful in other areas of the United States.

Thirteen U.S. corridor pairs were selected for a corridor pair analysis based on their proximity

to one another within an urbanized area. In each of these pairs, one corridor provides frontage roads along its entire length and the other does not. One of the project objectives was to determine whether there are any fundamental differences in land uses or resident demographics along corridors with frontage roads versus freeway corridors without frontage roads. The results suggested that census tracts near frontage roads are associated with lower household incomes, lower population densities, lower percentages of bike trips to work, lower vehicle occupancies for work trips, and higher unemployment rates — relative to an equivalent corridor constructed without frontage roads. Though not statistically significant, the results also suggested somewhat lower per-capita incomes, larger household sizes, more SOV commuting, lower educational levels, and more poverty in corridors utilizing frontage roads. An examination of two Dallas-Ft. Worth corridor pairs with employment data across 17 industry types at the Census block-group level suggested that job densities are not necessarily higher along frontage road corridors; zoning is very important, and may lead to higher levels of commercial and industrial activity along non-frontage road corridors.

The case studies of Austin-area frontage roads should provide TxDOT with useful information regarding frontage road design should TxDOT choose to amend the design of existing (or future)

frontage roads. Both increased access density and increased speed variation were estimated to exhibit strong positive effects on frontage road crash and injury incidence. This conclusion was reached through the development of multivariate regression models on data collected at twelve case study sites in the Austin metropolitan region. These findings suggest that reducing the density of access and speed variation along frontage road corridors is a judicious goal for TxDOT to pursue when developing access control policies for existing frontage roads.

The operational analysis of freeway and parallel arterial corridors with and without frontage roads under heavy/peak use demonstrated that frontage roads may improve the operation of the mainlanes in intensely developed areas, depending on interchange design, spacing, and traffic loads. However, the speed impacts are rarely dramatic. Table 1 gives the speed results of the simulations run here for mainlanes.

This lack of dramatic distinction was also apparent when examining just the arterials' performance, under both development scenarios, even though corridors with frontage roads clearly provide more arterial "capacity" (in terms of number of paved lane-miles). Evidently, while frontage roads serving intensely developed areas may improve the operation of the mainlanes, the resulting weaving movements associated with frequent driveway spacings might create additional opera-



tional and safety considerations that need to be addressed.

The financial costs associated with frontage road facilities were found to be considerably higher than those associated with non-frontage road facilities. Such comparisons almost exclusively favored non-frontage road facilities both when frontage roads were considered to only provide access and when it was assumed that their purpose was also to provide additional capacity. In some scenarios, where land values were assumed to be extremely high, the cost of purchasing access may result in construction cost savings (associated with narrower rights-of-way and lower total construction costs). However, such savings would likely be evident only

on very short projects bisecting very high land value areas.

The analyses presented in the project’s final research report (0-1873-2) represent avenues of study not previously attempted. The momentum of frontage road construction in the state of Texas dates back to before construction of the Interstate highway system, and many may argue that it gave rise to undesirable roadway operations and land development within the state. It is hoped that these results, in addition to efforts by other researchers, will assist in constructing a solid, formal policy for Texas to follow in providing access along its new and existing freeways in the decades to come.

The Researchers Recommend...

An implementation project for formal application of this project’s results is being pursued. If permitted, this work will synthesize the results for public use and provide a decision tree for corridor design evaluation based on the cost, safety, and operational results obtained here. The coming work likely will offer application of such approaches to several Texas corridors slated for upgrades to limited-access standards. Methods of local government involvement may be documented, and educational/training materials for TxDOT personnel may be generated.

Table 1: Freeway Performance (Speed)

Interchange Spacing (miles)	Land Use Type					
	Mainly Residential			Mainly Commercial		
	No FR	FR D.	FR X.	No FR	FR D.	FR X.
	Average Speed (miles per hour)					
0.5	58.4	57.4	58.2	26.6	52.4	54.0
1	56.1	55.8	57.8	20.8	27.9	46.0
2	58.0	47.7	57.7	11.0	17.9	7.1

Notes: _No FR = 6-lane freeway with parallel arterials on either side with diamond interchanges and no frontage roads. FR D = Same as No FR but with 3 frontage road lanes on either side. FR X = Same as FR D but with X-type interchanges.
_Shaded cells identify significant congestion, conceptual level of Service F.



For More Details...

Research Supervisor: Kara M.Kockelman, Ph.D., (512) 471-0210
email: kockelm@mail.utexas.edu
TxDOT Project Director: Ed Collins, (512) 832-7041
email: ecolli0@dot.state.tx.us

The research is documented in the following reports:

1873-1 *Frontage Roads in Texas: Legal issues, Operational Issues, and Land Use Distinctions* August 2001
1873-2 *Frontage Roads in Texas: A Comprehensive Assessment* October 2001

To obtain copies of a report: CTR Library, Center for Transportation Research,
(512) 232-3138, email: ctrlib@uts.cc.utexas.edu

TxDOT Implementation Status February 2004

As a result of this research, a follow-on implementation project , 5-1873 "Freeway Design Decisions for Revised Frontage Road Policy, " was conducted. The implementation project finishes in February 2004. There are four deliverables associated with the implementation project:

1. Decision tree for determining when frontage roads are appropriate
2. Results of actual corridor applications using the decision tree
3. Methods for increasing local government involvement in decisions about frontage roads
4. Educational materials based on the research findings about frontage roads

When finalized and approved, these products will be provided to the TxDOT Design Division for possible use.

For more information, contact: Andrew Griffith, P.E., Research and Technology Implementation Office,
(512) 465-7908, or e-mail agriffi@dot.state.tx.us.

Your Involvement Is Welcome!

Disclaimer

This research was performed in cooperation with the Texas Department of Transportation and the U. S. Department of Transportation, Federal Highway Administration. The contents of this report reflect the views of the authors, who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official view or policies of the FHWA or TxDOT. This report does not constitute a standard, specification, or regulation, nor is it intended for construction, bidding, or permit purposes. Trade names were used solely for information and not for product endorsement. The engineer in charge was Kara M. Kockelman, P.E. (California No. C57380).



The University of Texas at Austin
Center for Transportation Research
3208 Red River, Suite #200
Austin, TX 78705-2650