Research Digest

FORWARD ALL REQUESTS TO:

The University of Texas at Austin
Center for Transportation Research Library
1616 Guadalupe St. | Suite 4.202 | Austin, Texas 78701
Phone: (512) 232-3126
Email: ctrlib@austin.utexas.edu

In this Issue:

Southwest Region University Transportation Center (SWUTC)

Table of Contents

Research Digest

Item 1

2014 Urban Mobility Report: Powered by INRIX Traffic Data

SOUTHWEST REGION UNIVERSITY TRANSPORTATION CENTER (SWUTC)

TTI SWUTC/15/161302-1 • 2015

"The 2014 Urban Mobility Report is the 4th prepared in partnership with INRIX. The data behind the 2014 Urban Mobility Report are hundreds of speed data points on almost every mile of major road in urban America for almost every 15-minute period of the average day of the week. For the congestion analyst, this means more than 700 million speeds on 1.1 million miles of U.S. streets and highways -- an awesome amount of information. For the policy analyst and transportation planner, this means congestion problems can be described in detail, and solutions can be targeted with much greater specificity and accuracy."

CONTENTS

This report is available for free download (1 MB):
http://swutc.tamu.edu/publications/technicalreports/161302-1.pdf

Item 2

Achieving Regional Fare Integration in New Orleans: Innovative Cost Sharing Arrangements and Technologies

SOUTHWEST REGION UNIVERSITY TRANSPORTATION CENTER (SWUTC)

U-NOLA SWUTC/15/600451-00117-1 • 2015

Many regions across the country have more than one transit agency providing vital public transportation services. While a transit agency may see their role limited by a jurisdictional boundary, transit riders' commutes know no such political boundaries. For those riders whose commutes are reliant on one or more transit agencies, a fractured fare system among the various transit agencies they ride means higher user costs. This study will examine the history of regional fare integration in the New Orleans metropolitan region, and the challenges and successes of varying approaches taken by transit agencies in various metropolitan regions, to reveal options for achieving regional fare integration in New Orleans today.

This report is available for free download (814 KB):
http://swutc.tamu.edu/publications/technicalreports/600451-00117-1.pdf

Item 3

Arterial Signal Coordination with Uneven Double Cycling

SOUTHWEST REGION UNIVERSITY TRANSPORTATION CENTER (SWUTC)

TTI SWUTC/15/600451-00024-1 • 2015

In arterial coordination, high traffic volume at large intersections often requires a long cycle length to achieve good two-way progression. This long cycle length, however, often causes excessive delay at some minor intersections where the traffic volume is low on cross streets. This research proposes a mathematical optimization model to enable uneven double cycling (UDC) in arterial signal coordination to address this issue. The model presents an equation for delay estimation when using double cycling and formulated a bi-objective optimization problem that maximizes bandwidth efficiency and minimize total average delay. The model introduces the concept of nominal red to describe the bandwidth geometry that is compatible with conventional arterial coordination. Through disjunctive programming techniques, the resultant model is a mixed integer quadratic programming problem with linear constraints. Based on numerical experiments evaluating the model performance, the research suggests several criteria for preliminary UDC application guidance. The UDC control scheme generally performs better at intersections with permitted left turn operation. When the arterial green time ratio between the minor intersection and the critical intersection under single cycling is greater than 2.06, the UDC control scheme is recommended for it can reduce delay without reducing bandwidth efficiency when compared with conventional single cycling. Following the preliminary guidelines, the case study using an actual field dataset showed promising results.

This report is available for free download (997 KB):
http://swutc.tamu.edu/publications/technicalreports/600451-00024-1.pdf

Item 4

Calibration of the Louisiana Highway Safety Manual

SOUTHWEST REGION UNIVERSITY TRANSPORTATION CENTER (SWUTC)

U-NOLA SWUTC/15/600451-00102-1 • 2015

The application of the American Association of State Highway and Transportation Officials' (AASHTO) Highway Safety Manual (HSM) to Louisiana roads is a key component to the Louisiana Department of Transportation and Development's (DOTD) plan to improve safety on state highways and reach the goal of Destination Zero Deaths. The goal of this project was to develop Louisiana state-specific HSM calibration factors for eight facility types. During the completion of the project, the data-intensive computational process undertaken to compute the calibration factors revealed numerous issues associated with the input data required by the HSM. These included, most notably, coding errors and missing required data elements in the Louisiana roadway and crash databases. Some of the resulting factors were unexpected, in particular, those for urban three lane and urban five lane highways which were lower than anticipated. These factors may warrant further analysis beyond which was required for this project, including detailed assessments of each crash report to ensure data accuracy. The remaining calibration factors for rural two lane, rural multilane undivided and divided, urban/suburban two lane, and urban/suburban four lane divided and undivided highways, ranged from a low of 0.62 for rural multilane undivided highways to a high of 2.54 for urban/suburban four lane divided highways. It is expected that with an understanding of the conditions under which these factors were developed, that they will be acceptable for use by analysts seeking to conduct highway safety analyses for roads in Louisiana.

This report is available for free download (541 KB):
http://swutc.tamu.edu/publications/technicalreports/600451-00102-1.pdf

Item 5

Changing Perceptions of Cycling in the African American Community to Encourage Participation in a Sport that Promotes Health in Adults

SOUTHWEST REGION UNIVERSITY TRANSPORTATION CENTER (SWUTC)

CTR SWUTC/15/600451-00084-1 • 2015

This study introduces two interventions designed to influence perceptions of cycling among African Americans. Results from the 2001 National Household Transportation Survey reveal that African Americans cycle at two-thirds the rate of White and Hispanic Americans. Moreover, African Americans are less likely to possess alternative transportation modes like a bicycle. Researchers suggest that cycling disparities are linked to negative perceptions among inexperienced cyclists and non-cyclists including African Americans. An important consideration in analyzing why African Americans generally do not cycle is that of perception. The purpose of this study is to address negative perceptions of cycling that inhibit bicycle use, including a lack of experience, knowledge, and safety. Few studies exist that explore race or ethnic-specific reasons for low levels of physical activity and this information is needed to increase physical activity among minority groups. By examining perceptions of cycling among African Americans, this study builds on existing literature and fills a significant void in addressing the lack of bicycle ridership in the African-American community.

This report is available for free download (744 KB):
http://swutc.tamu.edu/publications/technicalreports/600451-00084-1.pdf

Item 6

Evaluation of Complete Streets Policy Implementation by Metropolitan Planning Organizations

SOUTHWEST REGION UNIVERSITY TRANSPORTATION CENTER (SWUTC)

U-NOLA SWUTC/15/600451-00119-1 • 2015

Over the last ten years, communities around the country have begun to implement comprehensive reforms designed to ensure that roadway users of all ages and abilities can safely utilize the transportation system. This complete streets policy framework has emerged as an important tool for communities to improve opportunities for active living with over 500 policies adopted nationwide. Complete streets policy diffusion has been rapid, but uneven, and the extent to which policy adoption is making a difference in the implementation of projects at the local and regional level is unclear. This research project seeks to address this need through a national survey of the 385 metropolitan planning organizations (MPOs) around the country, evaluating the extent to which complete streets policies are being adopted and implemented at the MPO level, what opportunities and barriers to complete streets exist, and implications for future policy diffusion and innovation efforts.

This report is available for free download (882 KB):
http://swutc.tamu.edu/publications/technicalreports/600451-00119-1.pdf

Item 7

Forecasting the Impacts of Shale Gas Developments on Public Health and Transportation Systems on Both Sides of the Mexico-U.S. Border

SOUTHWEST REGION UNIVERSITY TRANSPORTATION CENTER (SWUTC)

TTI SWUTC/15/600451-00027-1 • 2015

The activities completed for this project include the literature research on the Eagle Ford formation, the review of public-health and transportation related variables to shale gas developments, and the definition of the project collaborative site at Prof. Medina-Cetina's Stochastic Geomechanics Laboratory SGL server. Also, a collection of spatial data from the Eagle Ford Shale, including transportation infrastructure, geology, hydrology, demography, and well production was gathered. In this project, researchers developed an improvement of the proposed Bayesian Network for the regional assessment of environmental and social risk (i.e., transportation infrastructure and public health) by enhancing the BN+GIS Model for Environmental Sensibility assessment including a Surface Water variable. This required the improvement and optimization of the code producing BN+GIS results to reduce computational time. Afterward, researchers attained results on the implementation of enhanced BN+GIS model in the Barnett Shale Play. Consequently, researchers completed a paper to be submitted in the ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems named "Bayesian Networks and Geographical Information Systems for Environmental Risk Assessment for Oil and gas Site Developments." Following up this activity, researchers defined the objectives, hypothesis, and methodology for a parametric sensitivity analysis on the BN+GIS Model used for Risk Assessment on the Barnett Shale. Additionally, researchers developed an investigation about commercially available simulators (software) used for estimating production in unconventional reservoirs.

This report is available for free download (2.3 MB):
http://swutc.tamu.edu/publications/technicalreports/600451-00027-1.pdf

Item 8

Identifying the Local and Regional Travel Effects of Activity Centers in the Austin, Texas Area

SOUTHWEST REGION UNIVERSITY TRANSPORTATION CENTER (SWUTC)

CTR SWUTC/15/600451-00088-1 • 2015

Metropolitan planning organizations (MPOs) have become increasingly interested in incorporating innovated land use planning and design into transportation plan-making. Many design ideas are recommended under the umbrella of the New Urbanism; yet in practice they hardly get fully implemented in the standard transportation planning procedures. The project includes two parts. Part one refines the analysis of trip generation as it relates to mixed use development (MXD), with a focus on trip-chaining behavior, an approach taken by CAMPO. Part two looks into the potential of and challenges facing land use intervention as an emission reduction tool. Through the Austin case study, it investigates the regional and local distributional effects of vehicle miles traveled (VMT) and Green House Gas (GHG) emission changes pertaining to recommended land use and design innovations.

CONTENTS

This report is available for free download (1.4 MB):
http://swutc.tamu.edu/publications/technicalreports/600451-00088-1.pdf

Item 9

The Impact of the Conversion of Incandescent Bulbs to the LED Light Source in Traffic Signals in Houston: A Step toward Sustainable Control Devices

SOUTHWEST REGION UNIVERSITY TRANSPORTATION CENTER (SWUTC)

TSU SWUTC/15/600451-00041-1 • 2015

With the slowing of the American economy since 2008, it has become imperative that municipalities identify areas in which costs can be reduced while still providing needed services to its constituents. The use of traffic signals equipped with light emitting diodes (LED) provides opportunities for urban municipalities to conserve both tax dollars and energy. With other advantages, such as the reduced maintenance, a longer life span, and more illumination than the standard incandescent light bulb, LED's have become a viable option in cities around the globe as a first step in reducing municipal costs. Furthermore, LED traffic signals could be retrofitted to solar energy in the future thereby enhancing the move towards "green" technologies. The City of Houston is the focus of this case study evaluating the use of LED traffic signals at selected intersections in and near the urban core.

This report is available for free download (315 KB):
http://swutc.tamu.edu/publications/technicalreports/600451-00041-1.pdf

Item 10

Impact of the Gulf Intracoastal Waterway (GIWW) on Freight Flows in the Texas-Louisiana Megaregion

SOUTHWEST REGION UNIVERSITY TRANSPORTATION CENTER (SWUTC)

CTR SWUTC/15/600451-00080-1 • 2015

This report addresses the benefits of maintaining the GIWW both in totality (5 States) and specifically between Texas and Louisiana since their coastal regions have been identified as a potential U.S megaregion. The chapters include a historical background and current conditions, the opportunities for raising barge productivity and safety, the challenges of increasing GIWW funding, the introduction of articulated tug barges (ATBs) which may have diverted some GIWW traffic, and finally summaries both findings and recommendations. It argues for sharply focused improvements and protecting system integrity for future technologies and barge designs.

CONTENTS

This report is available for free download (1.5 MB):
http://swutc.tamu.edu/publications/technicalreports/600451-00080-1.pdf