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# Main Avenue User Costs Analysis

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Prepared for:  
**North Dakota Department of Transportation**  
**Bismarck, North Dakota**

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## TECHNICAL MEMORANDUM (revised)

TO: Kevin Gorder, NDDOT

FROM: Kate Miner

SUBJECT: Main Ave Construction User-Cost Estimates

This Technical Memorandum summarizes the results of analysis conducted by the Advanced Traffic Analysis Center (ATAC) to estimate user costs for the Main Avenue construction project. The North Dakota Department of Transportation (NDDOT) will be undertaking a major reconstruction project in the Fargo metropolitan area during the summer of 2004. The project consists of widening Main Avenue through Fargo from 25<sup>th</sup> Street to 45<sup>th</sup> Street and reconstructing the interchange with I-29. Main Avenue is classified as a major arterial in the metropolitan area and construction is expected to have significant impacts on traffic. Therefore, the NDDOT requested ATAC's assistance in estimating the traffic delay and associated user costs due to the construction.

### METHODOLOGY

The analysis utilizes the Fargo-Moorhead Council of Government's (FM-COG) travel demand model. Using the existing roadway network, the model estimates the total vehicle hours of travel within the Fargo-Moorhead Area (FM-Area). This value represents the baseline for pre-construction conditions. The roadway network was then modified to reflect the speed and lane configurations that will be in place during the construction, as specified by the NDDOT. The model was run and the difference in the number of vehicle hours of travel between the baseline and the construction scenario represents the total delay to the users due to the construction activities.

The FM-COG travel demand model currently includes all functionally classified roadways within a 16 township area surrounding the greater Fargo-Moorhead metropolitan area. Therefore, the estimates of delay take into account not only the routes directly affected by the construction activities, but also all the traffic indirectly affected by increased congestion on alternative routes.

Although the model does take into account intersection delays, it is important to point out that the delays are estimates and will be much lower than actual delays in over-saturated conditions. Additionally, the model may overestimate traffic diversion to other routes since some drivers prefer to stay on their usual routes. Therefore, the estimates of delay given by the model are conservative and actual delay values could be higher.

### Scenarios

The planned 2004 construction activity on Main Avenue will take place in many stages. However it is not feasible to analyze each stage of construction, therefore two separate and distinct scenarios were identified by the NDDOT for analysis. These two scenarios were chosen to be indicative of the rest of the construction stages. The scenarios are described below:

Scenario 1:        I-29 One lane both directions through Main Avenue  
Main Avenue one lane both directions from 25<sup>th</sup> Street to 45<sup>th</sup> Street  
25<sup>th</sup> Street one lane through intersection of Main Avenue  
45<sup>th</sup> Street one lane through intersection of Main Avenue  
36<sup>th</sup> Street closed 4<sup>th</sup> Avenue to Main Avenue  
SW ramp closed – EB to SB traffic takes left onto NW loop ramp

Scenario 2: I-29 One lane both directions through Main Avenue  
 Main Avenue one lane both directions from 25<sup>th</sup> Street to 45<sup>th</sup> Street  
 25<sup>th</sup> Street one lane through intersection of Main Avenue  
 45<sup>th</sup> Street one lane through intersection of Main Avenue  
 36<sup>th</sup> Street closed – Main Avenue to 1<sup>st</sup> Street  
 NW loop closed to all traffic

These scenarios take into account the fact that during this time the Main Avenue Bridge over the Red River is also closed. However, the bridge closure is reflected in the calculation of the baseline travel delay as well as in each of the scenarios.

## RESULTS

The following table summarizes the results of the travel time analysis . The second row in the table lists total vehicle-hours for baseline conditions, as well as the three construction scenarios. The third (and last) row lists the difference in travel time between the construction scenarios and the baseline. These differences represent additional traffic delay attributed to construction each day and will be converted to user costs .

	Base Case	Scenario 1	Scenario 2
Total Travel Time (veh-hr)	97,013	98,325	98,402
Total Delay (Hours)	0.00	1312.02	1389.70

Using these estimates of the delay incurred by the users it is possible to estimate extra user-costs associated with the construction. The 2000 Highway Economic Requirements System (HERS) was used to assign values for user time (dollars per hour) by vehicle type. The latest HERS (2002) reports auto costs to be approximately \$15.75/hour and truck costs to range from \$17.84/hour to \$25.49/hour.

Historical traffic counts along Main Avenue and I-29 show significant numbers of trucks due to the heavy commercial and industrial nature of the area as well as the through traffic generated outside of the F-M Area. Because of this , we can estimate truck traffic to be 5% of the total affected traffic. Taking into account the amount of truck traffic, the estimated user-costs are shown below.

	Scenario 1	Scenario 2
Total Delay (Hours)	1312.02	1389.70
Auto User-Cost (\$15.75/hour)	\$ 19,631.05	\$ 20,793.39
Truck User-Cost (\$25.00/hour)	\$ 1,640.02	\$ 1,737.13
<b>Total User-Cost</b>	<b>\$ 21,271.07/day</b>	<b>\$ 22,530.51/day</b>