Summary of Data Collection, Travel Demand Forecasting Model Development, and Traffic Results for the U.S. 287 at Lamar Project

PREPARED FOR: U.S. 287 at Lamar - CDOT Region 2

PREPARED BY: CH2MHILL

COPIES: Kirkham Michael
CH2M HILL Project File

DATE: May 8, 2003

Introduction

The purpose of this memorandum is to summarize and document the technical tasks that were performed for the U.S. 287 at Lamar travel demand forecasting model development in support of the project's environmental assessment. The proposed project is a new road that would serve as an alternate route to Main Street for regional truck and automobile traffic. The route would connect to the existing U.S. 287 north and south of the city with an access to U.S. 50 east of the city.

In cities with population greater than 50,000, federal regulations require the use of a travel demand forecasting model or similar tools to assess transportation facility needs. For cities like Lamar, there are no formal requirements for a travel model or forecasting process. However, the applicability of such travel demand models is the same for smaller cities, particularly on this project where substantial expenditure of public funds is anticipated.

Reliable and defensible traffic forecasts are important to the success of this project for several reasons:

- Traffic analysis is required as part of the Environmental Assessment (EA)
- To provide a means to evaluate different alternatives and the purpose and need criteria
- Other disciplines require traffic forecasts as input into their technical analyses, such as noise, air quality, and economic impact analysis
- To assist in establishing a level of trust between the consultant team and the public

A summary of the data collection effort, travel demand forecasting model development, and traffic results are presented in subsequent sections.

Data Collection

License Plate Origin Destination Survey

Purpose

The purpose of the license plate origin destination data collection effort was to determine potential traffic diversion to the alternate route and to better understand travel patterns in and around the City of Lamar.

Methodology

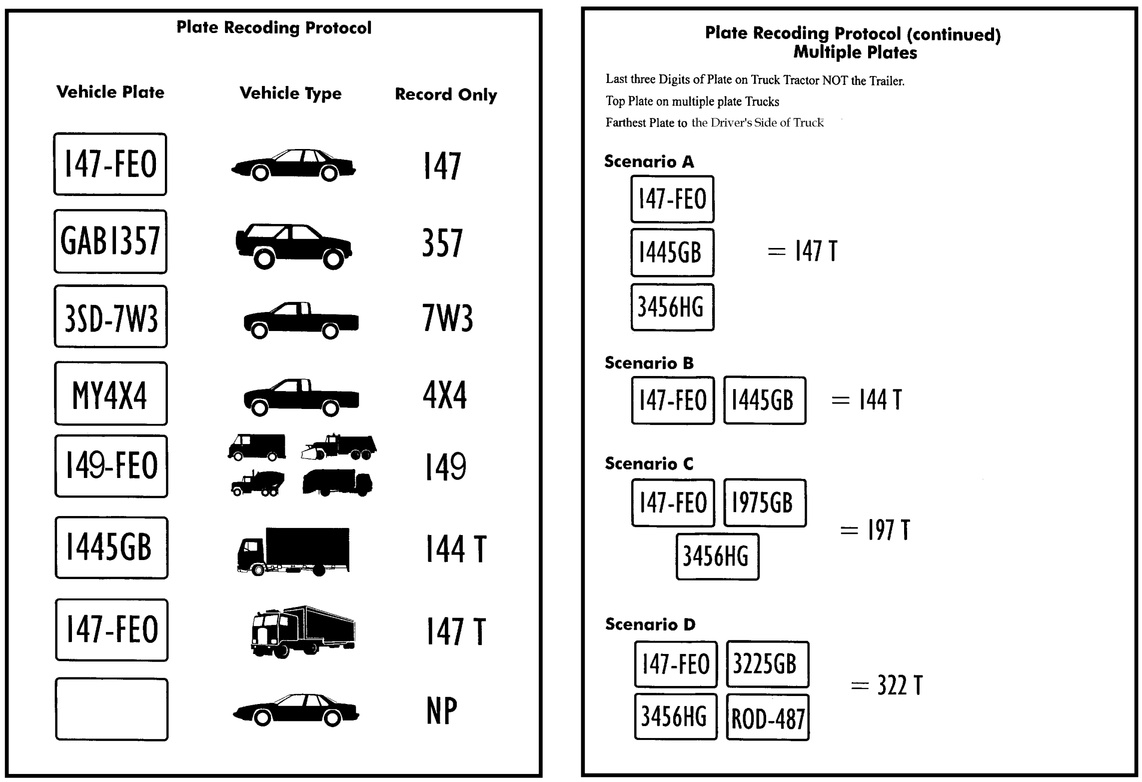
Origin destination surveys are an important data source for the development of travel demand forecasting models. OD surveys provide insight into when and where people travel. The survey performed for the U.S. 287 at Lamar project focused on vehicles entering and exiting the city. The data collected enabled the project team to determine the number of potential alternate route users and served as the external- external (trips with an origin and destination from outside of the region), external-internal (trips with origins outside of the region and destinations inside the region), and internal-external (trips with origins in the region and destinations outside of the region) trip matrix in the travel demand forecasting model.

This was accomplished by "matching" the license plates at each of the stations based on the travel time between stations. The data was further refined by adding an additional qualifier to the data (vehicle type either truck or car) in order to reduce the potential of duplicate plate matching. Existing available traffic count data was analyzed to determine the best periods for data collection. Two data collection periods were selected that would capture the traffic peaking characteristics as well as general traffic conditions. The data collection effort was completed for two time periods, 6:30 A.M. to 9:30 A.M. and 3:30 P.M. to 6:30 P.M., on Thursday July 25th, 2002. Two individuals were stationed at each of the following five study locations:

- Count Location #1 – Northbound and southbound traffic on U.S. Highway 287 north of U.S. Highway 50 and south of County Road LL.
- Count Location #2 – Eastbound and westbound traffic on U.S. Highway 50 west of U.S. Highway 287 at County Road 35.
- Count Location #3 – Northbound and southbound traffic on U.S. Highway 287/50 south of Colorado Highway 196 and north of Crystal Street.
- Count Location #4 – Eastbound and westbound traffic on U.S. Highway 50 at milepost 437.
- Count Location #5 – Northbound and southbound traffic on U.S. Highway 287 south of U.S. Highway 50 at County Road DD.

Each surveyor was responsible for recording a predetermined vehicle descriptor (license plate number) as it passed through his or her survey location. Three digits of each license plate were recorded and time stamped in five-minute increments. Since there are many different types of license plates, a uniform procedure was established so each data recorder would use the same descriptors for each vehicle. Each vehicle was classified as a tractor trailer truck or as an automobile according to the procedures outlined in Figure 1. In addition to each individual recording this data, each study location was videotaped as a backup data source. Two cameras were positioned at each location for each direction of traffic. The time stamped video was focused on the vehicles' license plates.

Figure 1 – License Plate Recording Protocol



Results

The raw data collected was recorded in a Microsoft Excel spreadsheet format and was analyzed using database queries built in Microsoft Access. An example of the raw data is presented in Table 1.

Table 1- Example data from OD Study

Location	Direction	Time Period	Plate Number	Type
1	E/B	16:00	392	Car
1	E/B	16:05	256	Truck
1	E/B	16:05	245	Car

This data was analyzed using a series of database queries to determine:

- External to External Trips
- External to Internal Trips

- Internal to External Trips
- The percent of through trips in the following time categories:
  - Through Nonstop - (0 – 15 minute time category)
  - Through - 0 to 15 minute stop (15 - 30 minute time category)
  - Through - 15 to 105 minute stop (30 - 120 minute time category)
  - Through - 105 to 165 minute stop (120 - 180 minute time category)
- An estimation of potential alternate route users based on the time categories above and through travel time runs
- The distribution of through trips from all stations to all other stations
- Traffic composition of the through traffic (trucks vs. cars)
- Peak period traffic volumes in order to validate 1998 traffic counts and vehicle composition from the Design Concept Study

A summary of the license plate origin destination data is presented in Tables 2 - 4. A comprehensive discussion of these data and the results are presented in the Model Application / Results section.

Table 2 –Potential Users of the Alternate Route from the North Station

	2002 24-Hour Through Trips[2]					
	North Station to South Station			North Station to East Station		
	Trucks	**Autos**	**Total**	**Trucks**	**Autos**	**Total**
Percent of Total Through Trips[1]						
Through Nonstop	81%	35%	51%	82%	30%	35%
Through - 0 to 15 Min stop	10%	24%	19%	5%	20%	19%
Through - 15 to 105 Min stop	9%	40%	29%	13%	43%	40%
Through - 105 to 165 Min stop	0%	1%	1%	0%	7%	6%
Total External Trips	100%	100%	100%	100%	100%	100%
Assumed Percent Use of New Route[3]						
Through Nonstop	100%	100%	100%	100%	100%	100%
Through - 0 to 15 Min stop	0%	0%	0%	0%	0%	0%
Through - 15 to 105 Min stop	0%	0%	0%	0%	0%	0%
Through - 105 to 165 Min stop	0%	0%	0%	0%	0%	0%
Estimated Traffic Split (Percent of Total Through Trips)						
Existing Routes	19%	65%	**49%**	18%	70%	**65%**
Alternate Route	81%	35%	**51%**	82%	30%	**35%**
Total	100%	100%	100%	100%	100%	100%

Notes:
[1]External-external trips only
[2] The 6-hour origin destination survey results were factored to 24-hour totals based on all day traffic counts at the external stations
[3] Assumed percent use of alternate route based on the assumption that only the true through trips (nonstop) would use the alternate route. The 0 to 15 minute stop category through trips are also potential alternate route users.

Table 3 – Potential Use of the Alternate Route from the East Station

	2002 24-Hour Through Trips[2]					
	East Station to North Station			East Station to South Station		
	Trucks	**Autos**	**Total**	**Trucks**	**Autos**	**Total**
Percent of Total Through Trips[1]						
Through Nonstop	67%	33%	35%	67%	19%	24%
Through - 0 to 15 Min stop	11%	21%	20%	17%	15%	15%
Through - 15 to 105 Min stop	16%	40%	39%	16%	60%	55%
Through - 105 to 165 Min stop	6%	6%	6%	0%	6%	6%
Total External Trips	100%	100%	100%	100%	100%	100%
Assumed Percent Use of New Route[3]						
Through Nonstop	100%	100%	100%	100%	100%	100%
Through - 0 to 15 Min stop	0%	0%	0%	0%	0%	0%
Through - 15 to 105 Min stop	0%	0%	0%	0%	0%	0%
Through - 105 to 165 Min stop	0%	0%	0%	0%	0%	0%
Estimated Traffic Split (Percent of Total Through Trips)						
Existing Routes	33%	67%	**65%**	33%	81%	**76%**
Alternate Route	67%	33%	**35%**	67%	19%	**24%**
Total	100%	100%	100%	100%	100%	100%

Notes:
[1]External-external trips only
[2] The 6-hour origin destination survey results were factored to 24-hour totals based on all day traffic counts at the external stations
[3] Assumed percent use of alternate route based on the assumption that only the true through trips (nonstop) would use the alternate route. The 0 to 15 minute stop category through trips are also potential alternate route users.

Table 4 – Potential Use of the Alternate Route from the South Station

	2002 24-Hour Through Trips[2]					
	South Station to North Station			**South Station to East Station**		
	Trucks	**Autos**	**Total**	**Trucks**	**Autos**	**Total**
Percent of Total Through Trips[1]						
Through Nonstop	92%	29%	50%	0%	15%	15%
Through - 0 to 15 Min stop	3%	28%	19%	0%	26%	26%
Through - 15 to 105 Min stop	4%	38%	27%	100%[4]	51%	52%
Through - 105 to 165 Min stop	1%	5%	4%	0%	8%	7%
Total External Trips	100%	100%	100%	100%[4]	100%	100%
Assumed Percent Use of New Route[3]						
Through Nonstop	100%	100%	100%	100%[4]	100%	100%
Through - 0 to 15 Min stop	0%	0%	0%	0%	0%	0%
Through - 15 to 105 Min stop	0%	0%	0%	0%	0%	0%
Through - 105 to 165 Min stop	0%	0%	0%	0%	0%	0%
Estimated Traffic Split (Percent of Total Through Trips)						
Existing Routes	8%	71%	**50%**	100%[4]	85%	**85%**
Alternate Route	92%	29%	**50%**	0%	15%	**15%**
Total	100%	100%	100%	100%[4]	100%	100%

Notes:
[1]External-external trips only
[2] The 6-hour origin destination survey results were factored to 24-hour totals based on all day traffic counts at the external stations
[3] Assumed percent use of alternate route based on the most conservative assumption that only the true through trips (nonstop) would use the alternate route. The 0 to 15 minute stop category through trips are also potential alternate route users.
[4] Represents a total of 3 vehicles and confirms that relatively few vehicles make through trips from the south station to the east station. Improvements to the existing unpaved section would likely encourage through trip usage.

Available Existing Traffic Data

As part of the U.S. 287 Lamar Alternative Truck Route Design Concept Study, traffic counts were conducted at several locations in and around the City including peak hour intersection turning movement counts and 24 hour vehicle classification counts. The existing travel patterns and assumptions about future alternate route use were made to determine the distribution of traffic. Intersection level of service was analyzed and travel time studies were conducted. Available data from this study was used to supplement data collected during the license plate origin destination survey. In addition to available CDOT historical traffic counts, Table 5 presents the daily traffic counts and vehicle composition collected in 1998:

Table 5: Existing Daily Traffic Volumes & Vehicle Composition

Location	Existing 1998 Counts	% Cars	% Trucks
U.S. 287 s/o CO 196 (North Station)	9,000	83%	17%
U.S. 287 s/o Arkansas River	10,200	79%	21%
U.S. 287 n/o U.S. 50	13,400	83%	17%
U.S. 287 s/o U.S. 50	12,900	87%	13%
U.S. 287 s/o Alt Route(South Station)	2,650	52%	48%
U.S. 50 e/o U.S. 287	6,100	89%	11%
U.S. 50 e/o Alt Route (East Station)	3,000	85%	15%

The travel times presented in the Design Concept Study were validated by driving the corridors on July 25th, 2002. This ensured that travel times reflected the level of traffic growth and delay within the city for 2002.

Model Development

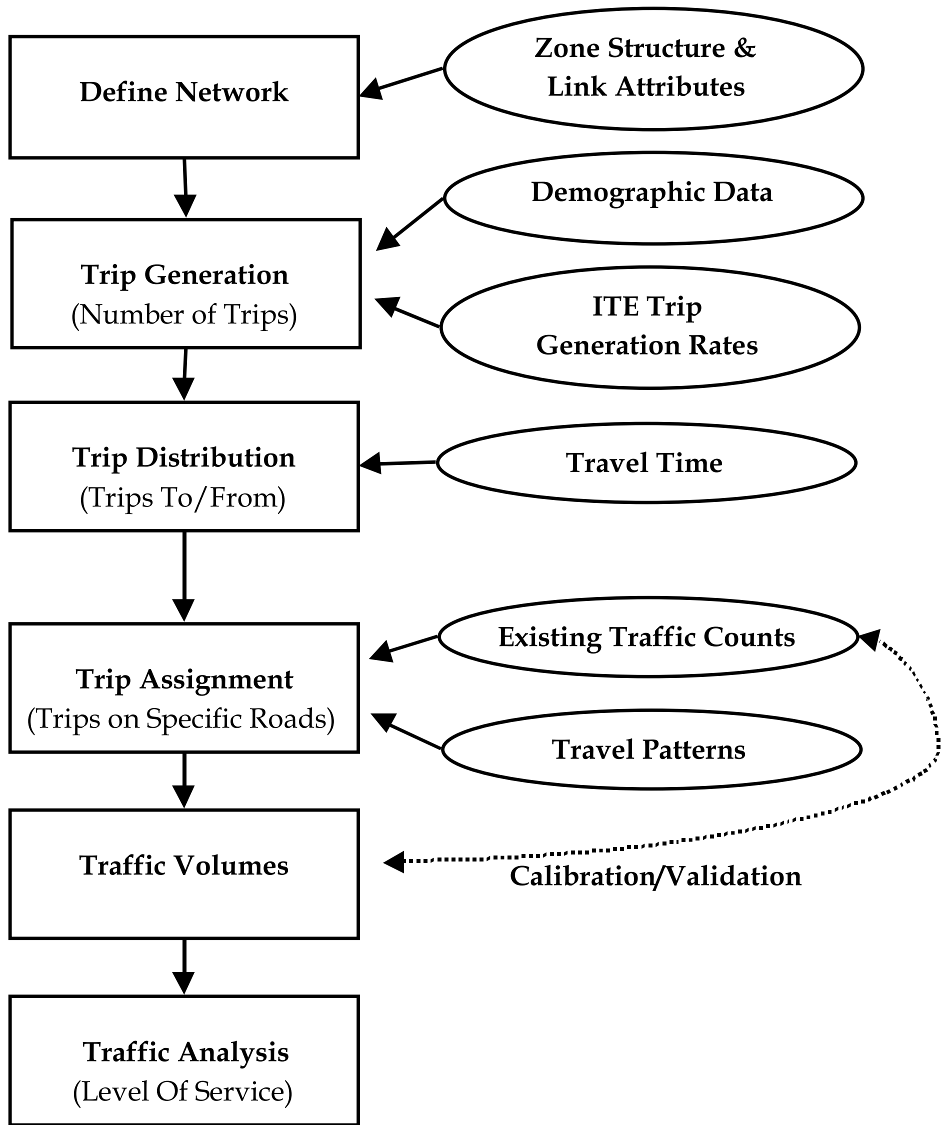
Introduction

Without an existing travel demand forecasting model in place for the City of Lamar, a series of procedures were developed to estimate travel demand. Numerous National publications from the Transportation Research Board were used to assist in developing these procedures. The National Cooperative Highway Research Program Report 365 entitled *Travel Estimation Techniques for Urban Planning* was extensively used as a resource during the travel demand forecasting model development. A traditional travel model consists of a "four-step" process:

- Trip Generation
- Trip Distribution
- Mode Choice
- Trip Assignment

Due to the limited alternative modes in the Lamar study area, the limited service by the Prowers Area Transit (PAT), and the nature of the study, the mode choice component of a traditional travel model was not included in the model development. The elements, data sources used, and methodology for developing the model roadway network, trip generation, trip distribution, and trip assignment model components are described below.

Figure 2 – Travel Demand Forecasting Process



Model Elements

Roadway Network & Zone Structure

The Lamar Travel Demand Model roadway network was built from Tiger line files (2000) to ensure compatibility with GIS (ArcView). This allows for ease in editing, as well as, providing a geo-referenced network. All network links are bi-directional.

In addition to the attributes already contained in the Tiger line files, attributes that were coded into the network include:

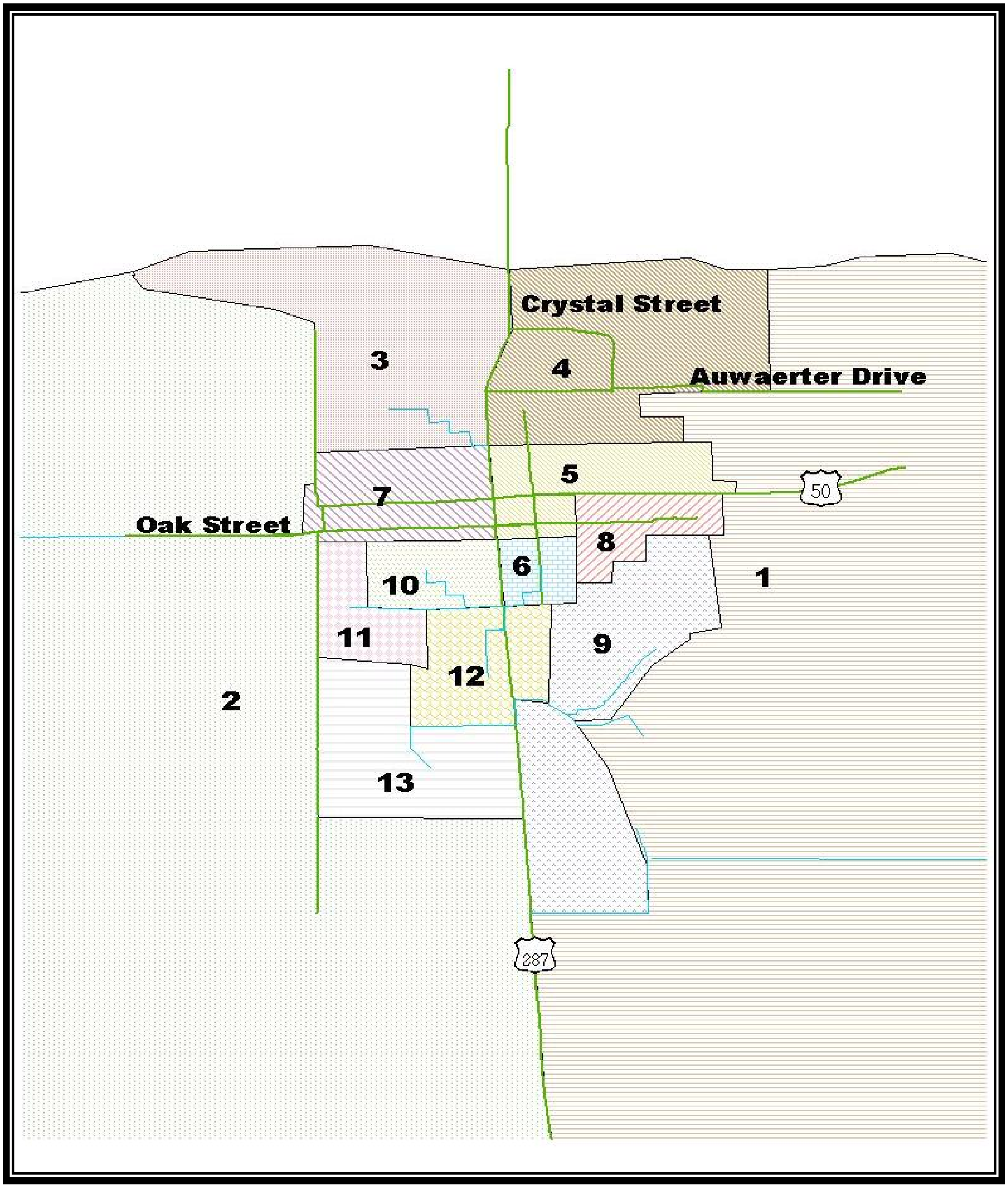
- Directionality (EB/WB or NB/SB)
- Speed

- Distance (miles and feet)
- Travel Time (calculated and then estimated through actual travel time runs—see below)
- Link ID

A link ID was coded in order to facilitate integrating modeled output with the roadway network. These ID's allow the user to link attribute tables and display output volumes, v/c ratios and similar measures on the roadway network itself.

A Transportation Analysis Zone system (TAZ) was developed which incorporated Census 2000 block groups. Three block groups were split to ensure that substantial portions of TAZs did not cross the boundary of US 287. The Lamar model contains 13 TAZs, 3 external stations, 58 links, and 22 centroid connectors. Figure 3 shows the resulting Lamar TAZ structure and roadway network.

Figure 3 – Traffic Analysis Zones & Roadway Network (2002)



Travel Time Runs for Speed Estimation

The speeds on the network links were calibrated with actual travel time runs. This allowed the development of link speeds that represented real travel times and that include delay as a result of stop signs, congestion, and roadway conditions. This was accomplished in the model by adjusting the speeds until the calculated travel time represented the actual travel time.

Trip Generation

Trip generation is the first step in the four-step modeling process. Trip generation provides a methodology for determining the numbers of trips that have their beginning in a particular TAZ or their end in a particular TAZ (the number of trip ends).

A cross-classification model (trip rates multiplied by household) was developed for trip generation, based on available Census demographic data, and adjusted by ITE trip rates later in the modeling process. This adjustment allowed for the conversion from person trips to vehicle trips in the absence of accurate auto occupancy factors.

As presented in Figure 4, Census 2000 socioeconomic data was used to obtain the numbers of households. Household type (single or multi-family) was later allocated by reviewing the existing aerial photography and Lamar zoning, and allocating household types by a percentage of the zoning of the entire TAZ. Trip productions were achieved by using assumed production rates by household from NCHRP 365 (9.2 trips per household) for the smallest city size available.

As presented in Figure 5, trip attractions were obtained indirectly by allocating employment (from 2000 Census and the Colorado Department of Local Affairs) based on the geocoding of existing businesses.

Three trip types were included in the model: home-based work trips, home-based other trips, and non-home based trips. The trip types were derived according to a percentage of all trips as outlined in NCHRP 365. Four TAZs were defined as Central Business District (CBD) TAZs due to the requirement in the formulas for calculating trip type from NCHRP guidance. The TAZs described as encompassing the CBD of Lamar included TAZs 5,6,7, and 10. Trip attractions were adjusted to trip productions due to the superior reliability of production data as is standard modeling practice.

Once an initial trip table was produced which included internal-internal trips (I-I), internal-external and external-internal trips (I-E and E-I); then I-E and E-I trips were extracted from the table. External-external (E-E) trips were derived from the O-D survey described earlier.

Figure 4 – 2000 Households

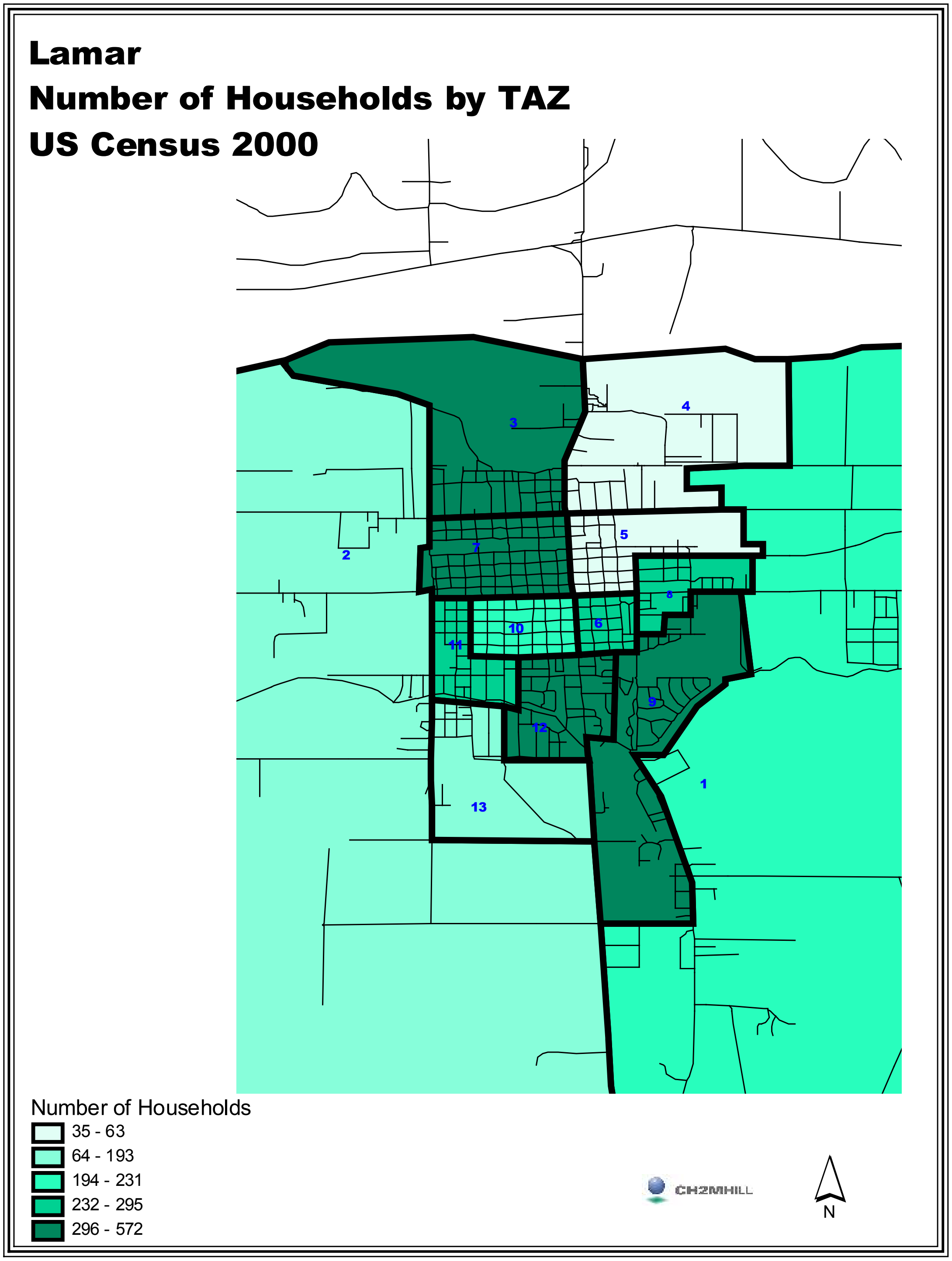
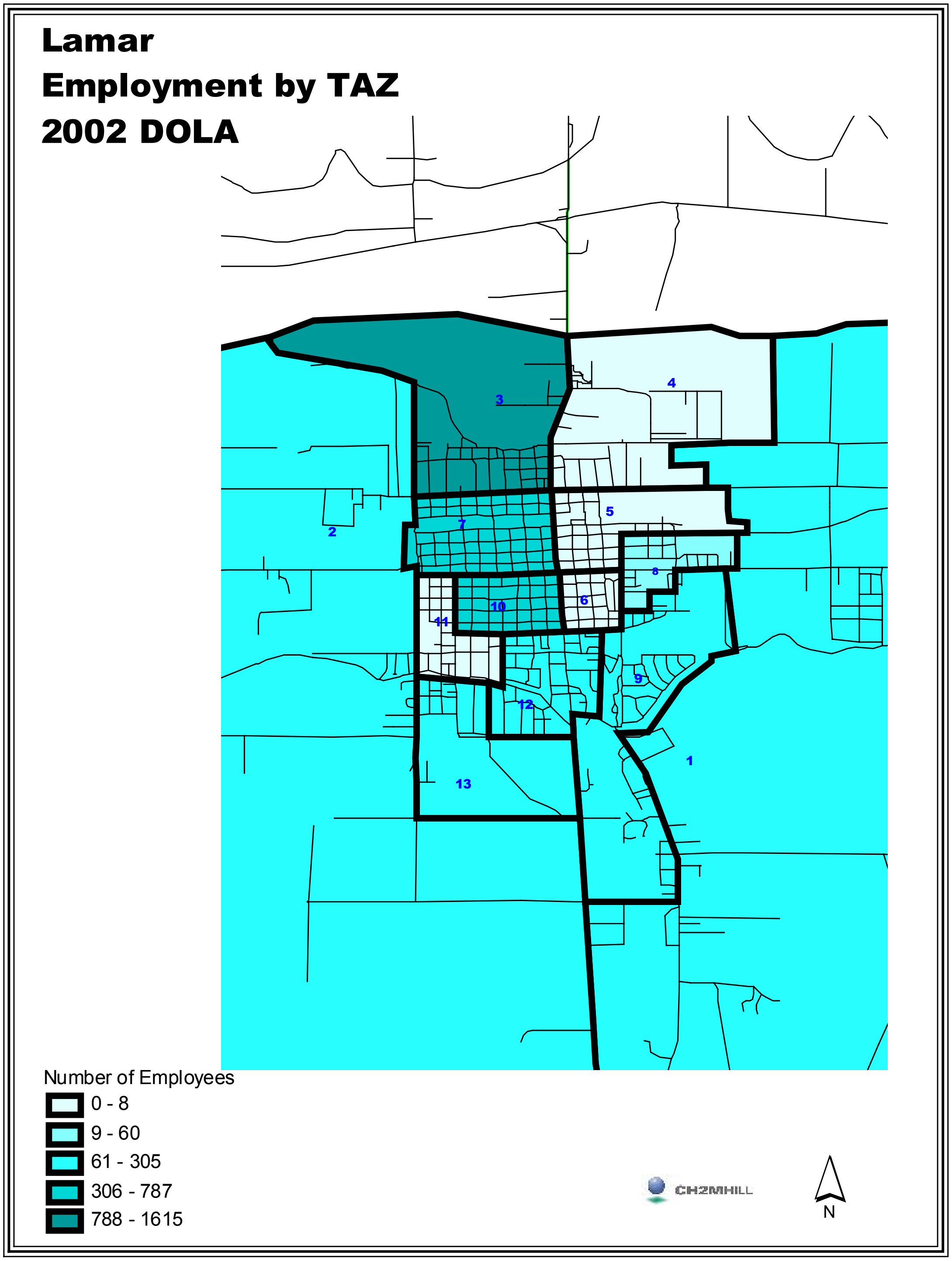


Figure 5 – 2002 Employment



Institute of Transportation Engineers Data

The *Trip Generation Manuals* (6th Edition, 1997) published by the Institute of Transportation Engineers, were used to collaborate trip productions and attractions from socioeconomic data, to convert person trips to vehicle trips (since all ITE data is in vehicle trips), and to calibrate the model.

Data analyzed in the *Trip Generation Manuals* was contributed on a voluntary basis by various state and local governmental agencies, consulting firms, transportation professionals, professional organizations, and universities and colleges. Variations in trip generation characteristics are reflected in ranges of rates, standard deviations, and in coefficient of determination values. Variations may be the result of small sample sizes, differing lengths of traffic count duration, and/or seasonal variations.

For the Lamar model, the lower range of trip generation was consistently used with the exception of the following categories for which average rates were used:

- Specialty Retail
- Free Standing Discount
- Shopping Center
- New Car Sales

In some cases, actual numbers of employees were used, in others square feet of the intended land use were used, depending on the dependent variable from the Trip Generation manuals. In general, the following units were required for analysis:

Land Use	Unit
Industrial Uses	Employee
Hotel/Motel Uses	Number of Rooms
Office Uses	Employee
Retail Uses	Employee
Service Uses	1000 S.F. of GFA
Restaurant Use Weighted Average	1000 S.F. of GFA
Single and Multi-Family	Dwelling Units
Schools	Students

Employee numbers were obtained from Census 2000 and Colorado Department of Local Affairs (DOLA) data. The number of hotel/motel rooms was obtained through phone interviews and estimation. Single and multi-family units were derived from existing zoning (as mentioned above). Square feet of a land use was assumed based on the number of employees. And finally, school enrollment was obtained from the 2001 pupil membership by district and grade from the Colorado Department of Education.

Trip Distribution

Trip distribution is the second step in the four-step modeling process and is the step that links trip productions and trip attractions to a specific origin-destination pair. Considerations used in determining trip patterns include trip length, trip type, and the resulting vehicle trip volumes. The results of trip distribution are tables that indicate the number of trips between each zone pair.

The gravity model is a well accepted approach to trip distribution and was used for this project. The gravity model is based on the gravitational theory of Newtonian physics and states that the force/attraction between bodies is directly proportional to the mass of those bodies and inversely proportional to the square of the distance between bodies. Translated into transportation planning, this theory posits that the relative number of trips between TAZs will be directly proportional to the number of trips produced or attracted by each TAZ and inversely proportional to a measure of separation between the TAZs. Specifically, the mathematical formulation of the gravity model is:

$$T_{ij} = P_i \left(\frac{A_j F_{ij} K_{ij}}{\sum_{k=1}^{zones} A_k F_{ik} K_{ik}} \right)$$

where

T_{ij} = the number of trips from zone *i* to zone *j*,

P_I = the number of trip productions in zone *i*,

A_I = the number of trip attractions in zone *j,*

F_{ij} = the friction factor relating to the spatial separation between zone *i* and zone *j* and

K_{ij} = an optional trip distribution adjustment factor for interchanges between zone *i* and zone *j*.

Friction factors (F_{ij}) measure the perceived accessibility of each zone from any other zone This accounts for the way travelers regard length of trips made for different purposes. Typically, friction factors are derived from travel surveys taken in the local area and used to "calibrate" the gravity model's results. For the Lamar model, friction factors were "borrowed" from standard tables in NCHRP 365 for cities of similar type and size.

Shortest travel time paths are built and then zone to zone travel impedance can be calculated. Shortest travel time paths for intrazonal trips are calculated using the following equation:

$$Intrazonal\ Time = \frac{0.5 \cdot \sqrt{(ZonalArea)} \cdot 60}{IntrazonalSpeed(AreaType)}$$

Zone to zone travel time and associated friction factors enable the origin-destination trips to be allocated to each OD zone pair. Trips made between external stations are based on a function of expected growth of total traffic volumes on both ends of the trip. External-external trip matrix balancing was accomplished using the Fratar method where matrix cells were factored so that the matrix total, row totals, and column totals are set equal to specified values determined from the OD survey. This method also allowed the conversion of the 6-hour OD matrix to a 24-hour OD matrix and enabled the average growth of regional traffic at the external stations to be incorporated. The trips from the gravity model and the external trips are summed together and directionally balanced to represent two way daily movements. These trips are then allocated to specific network paths in Traffic Assignment.

Traffic Assignment

The final step in the four-step modeling process is traffic assignment where trips are assigned to a specific route or path. Assignment was completed using the all or nothing method based on the shortest travel time. This method assigns all trips to the shortest path without adjusting travel times to reflect road capacity constraints. However, since speeds on the network were calibrated to account for actual delay; this model considers capacity as a factor in route choice.

Model Validation

Results of the model assignment were compared to existing count data . Final assignment results were within 10% of existing counts (consistent with FHWA guidelines). Separate reasonableness checks were performed that indicated that the initial computation of productions and attractions and the numbers of trip types were within reasonable limits.

Future Forecast Assumptions

Traffic projections were prepared for 2000, adjusted to 2002 for model calibration and validation purposes, and for 2025. Figure 6 and 7 present 2025 households and employment assumptions that were based on the state demographer's future annual projections. Based on the State Department of Education projections, school enrollment is expected to experience nominal growth and therefore existing school enrollment was used in both the 2002 and 2025 models. The anticipated land use growth was allocated proportionally to the TAZs. No known policies or projections indicated a new large employer or other major disruption of historical growth patterns, so growth was assumed to follow current trends. This means that particular types of land uses grew/became more dense in the same locations as they exist today. Historical CDOT traffic counts were analyzed at each of the external stations. Each station experienced approximately the same annual average increase in traffic so external trips were increased at 0.7% average annual rate per year for the future forecast.

Figure 6 – 2025 Households

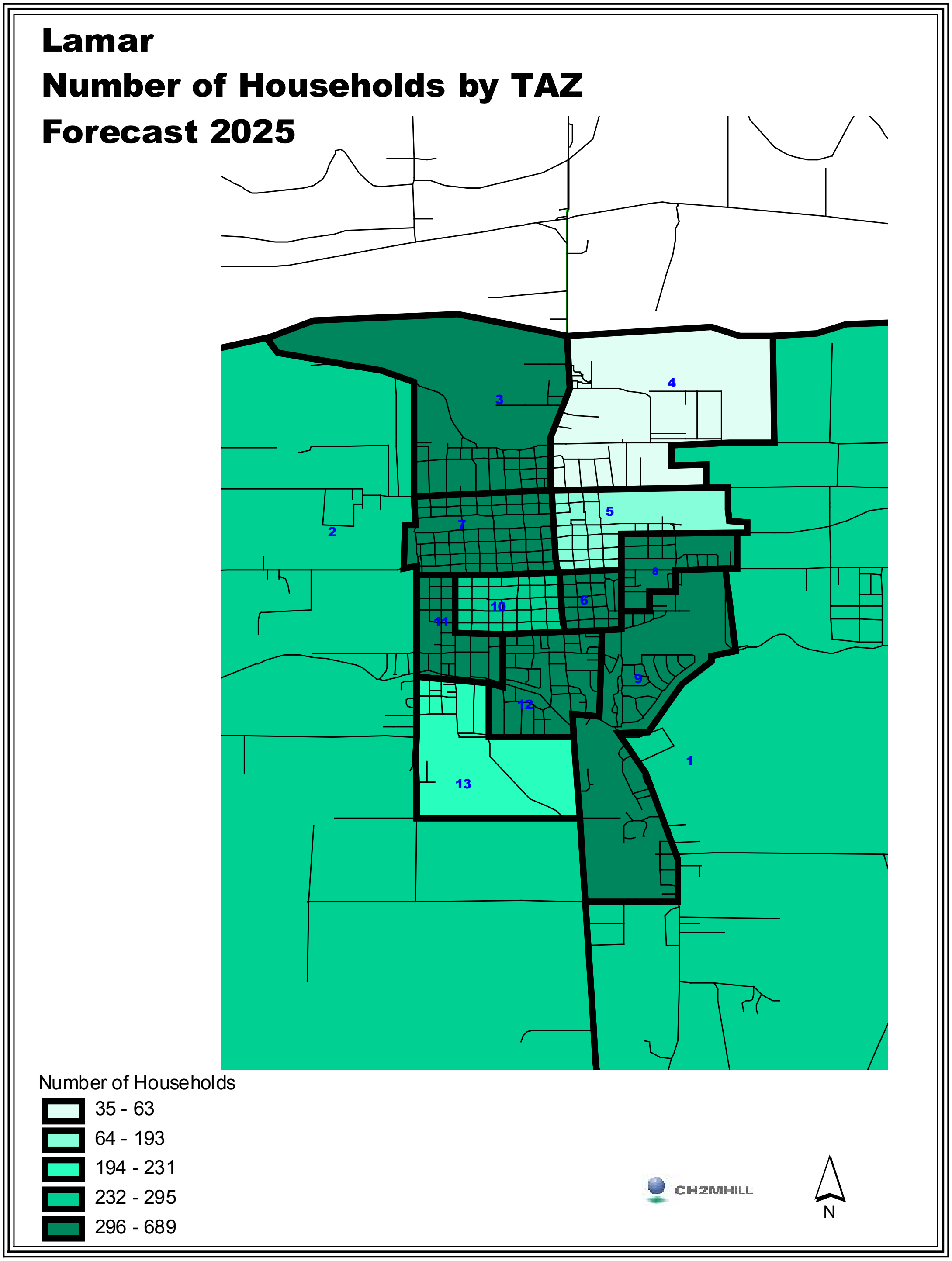
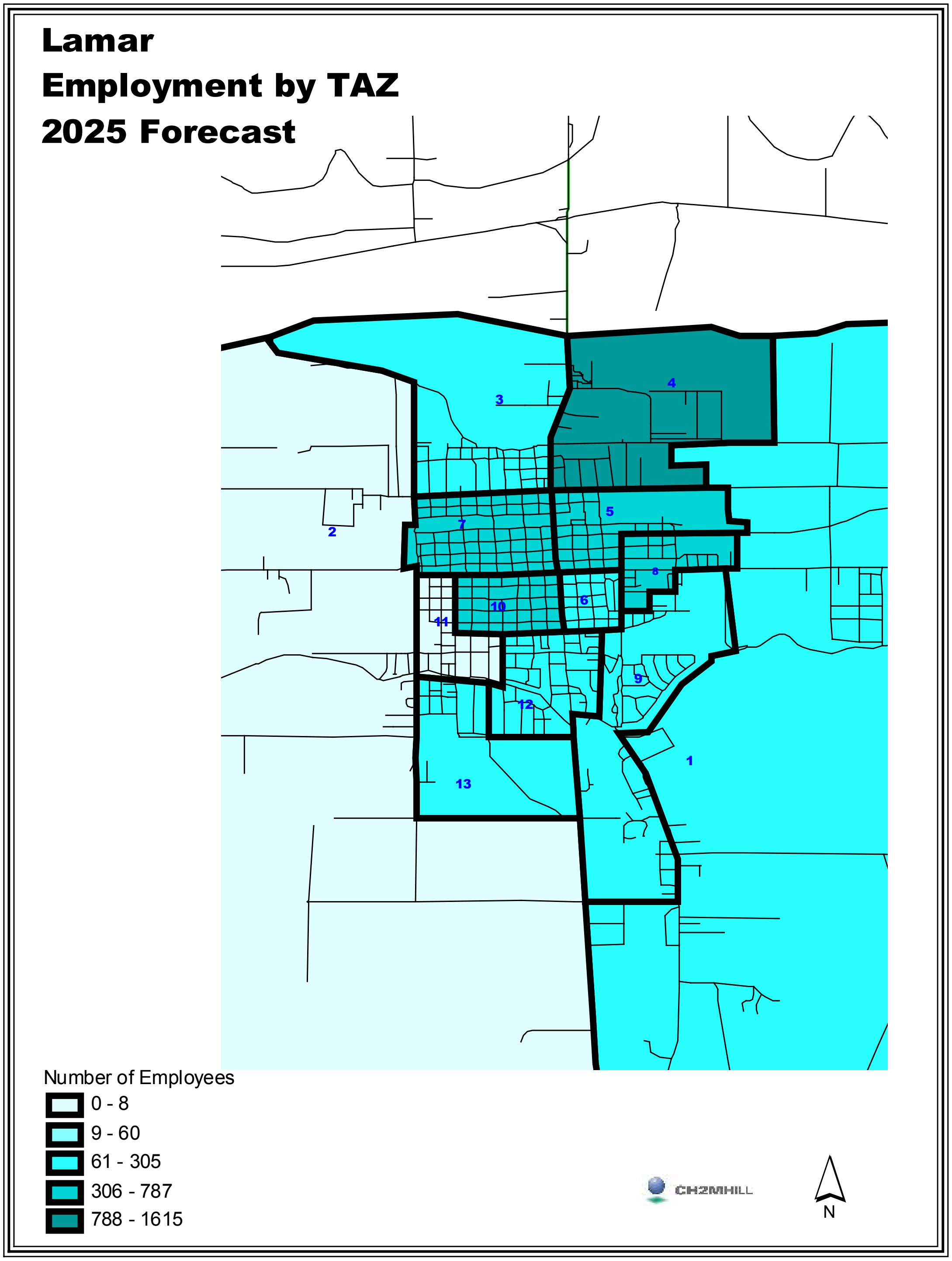


Figure 7 – 2025 Employment



Model Application / Results

Existing Conditions (2002)/ Forecast Traffic Volumes

The 2002 model replicated existing counts within reasonable limits. Table 6 presents the existing traffic counts and forecast traffic volumes for seven locations:

Table 6 – Model Calibration/Validation

Two-way Daily Traffic Volume				
Location	Existing 1998 Counts	Existing 2002 Counts [1]	Modeled Existing (2002)	% Difference
U.S. 287 s/o CO 196 (North Station)	9,000	9,250	9,250	0.0
U.S. 287 s/o Arkansas River	10,200	10,500	11,150	6.2
U.S. 287 n/o U.S. 50	13,400	13,750	12,600	-8.4
U.S. 287 s/o U.S. 50	12,900	13,300	12,200	-8.3
U.S. 287 s/o Alt Route(South Station)	2,650	2,750	2,750	0.0
U.S. 50 e/o U.S. 287	6,100	6,300	5,800	-7.9
U.S. 50 e/o Alt Route (East Station)	3,000	3,050	3,050	0.0
Notes:[1] 2002 counts were calculated based on an average growth rate of 0.7%/year over 4 years				

Potential Alternate Route Usage

The license plate origin destination survey described above revealed that on average approximately 84% of trucks and 30% of cars traveling through the City of Lamar, do not stop within the city. Therefore, these trips were assumed to use the alternate route because of the travel time savings. From a traffic perspective this is the most conservative assumption, (that only these true through trips, trips within the "non-stop" category from the survey, would use the alternate route). The 0 to 15 minute stop category through trips are also potential alternate route users and if they were included, would result in higher traffic volumes on the alternate route.

As presented in Table 7, approximately 50% of the vehicles traveling through the study area north and south would use the alternate route and vehicles traveling through to the east are less likely to use the alternate route.

Table 7 – Summary of Potential Alternate Route Users – All Vehicle Types

Estimated Traffic Split (Percent of Total Through Trips)	North to		East to		South to	
	South	East	North	South	North	East
Existing Routes	49%	65%	65%	76%	50%	85%
Alternate Route	51%	35%	35%	24%	50%	15%

Future Conditions (2025)/ No Build Alternative

As described above, population and employment was increased based on the state demographer's projections for the 2025 No Build Alternative. External station traffic was estimated from historical CDOT traffic counts and the existing model network was used in the analysis. No attempt was made to account for increased travel speeds on Main Street due to potential travel demand management and transportation system management (TDM/TSM) improvements such as coordinated signals or reduced delay from the addition of exclusive turning lanes. Model results are presented in the Travel Demand Model Results section.

Future Conditions (2025)/Alternate Route Alternative

The 2025 Alternate Route Alternative model used the same population, employment, and external station assumptions as the No Build Alternative with the exception of the addition of the alternate route that parallels Main Street on the east. The alternate route was assumed to have a free-flow speed of 65 miles per hour and access to this facility was assumed north and south of the city on U.S. 287 and east of the city on U.S. 50. The primary purpose of this facility is to redirect heavy vehicle traffic from Main Street to the alternate route by serving as a faster and safer alternative for regional truck and automobile traffic. Model results are presented in the Travel Demand Model Results section.

Travel Demand Model Results

Tables 8-10 present travel demand model results for the three scenarios, 2002 Existing, 2025 No-Build, and 2025 Alternate Route. Network daily link volume plots for the three scenarios are presented in Figure 8, 9, and 10 at the end of the document. Comprehensive analysis tables and supplemental data can be made available upon request.

Table 8: Two-way Daily Traffic Volume

Location	Existing 1998 Counts	Modeled Existing (2002)	Modeled Future (2025) No-Build	Modeled Future (2025) with Alternate Route
U.S. 287 s/o CO 196 (North Stn)	9,000	9,250	10,900	10,900
U.S. 287 s/o Arkansas River	10,200	11,150	13,200	11,050
U.S. 287 n/o U.S. 50	13,400	12,600	14,900	12,850
U.S. 287 s/o U.S. 50	12,900	12,200	14,400	13,200
U.S. 287 s/o Alt Route(South Stn)	2,650	2,700	3,200	3,200
U.S. 50 e/o U.S. 287	6,100	5,800	6,900	5,900
U.S. 50 e/o Alt Route (East Stn)	3,000	3,050	3,600	3,600

With the implementation of the alternate route, the expected percent reduction of traffic on local roads is approximately 8% to 16% depending on the location.

As presented in Table 9, the expected alternate route traffic volume is approximately 1,250 to 2,100 vehicles per day. The use of the alternate route could vary considerable over the 23 year planning horizon. For example, land use decisions and subsequent development around the alternate route could encourage more through trips that currently stop for services on Main Street to use the alternate route. These developments may also attract local traffic that would access these developments via the alternate route. Also, the effect of the proposed Ports to Plains Corridor is still unknown and could result in increased truck traffic on the alternate route.

Table 9: Two-way Daily Traffic Volume on Alternate Route

Two-way Daily Traffic Volume on Alternate Route	
Section	Modeled Future (2025)
Northern	2,100
Southern	1,250

Table 10: Daily System Wide Summary

System Performance	Vehicle Miles Traveled			Vehicle Hours Traveled		
	Local Roads	Alternate Route	System Wide	Local Roads	Alternate Route	System Wide
Modeled Existing (2002)	69,939	N/A	69,939	2,147	N/A	2,147
Modeled Future (2025) No-Build	82,568	N/A	82,568	2,534	N/A	2,534
Modeled Future (2025) with Alternate Route	70,651	13,094	83,745	2,241	201	2,442

The peak hour design factors presented in Table 11, are based on 1998 traffic data collected during the Design Concept Study and traffic volumes collected during the license plate origin destination survey. The design factors were implemented to determine peak hour traffic volumes from the modeled daily volumes in order to complete the traffic operations analysis.

Table 11: Peak Hour Design Factors

Data Source	Location	AM Peak	Noon Peak	PM Peak
Design Concept Study Traffic Data (1998)	US 287 W/O CR 5	6.4%	7.6%	7.8%
	US 287 S/O Arkansas River	6.5%	7.5%	8.5%
	US 287 S/O CO 196	6.9%	7.3%	8.8%
	US 287 N/O US 50	5.0%	7.8%	8.0%
	US 287 S/O US 50	6.2%	8.5%	8.1%
	US 287 S/O Alt Route	4.9%	6.5%	6.2%
	US 50 E/O US 287	4.9%	7.6%	8.7%
	US 50E/O Alt Route	6.2%	6.5%	8.8%
Origin - Destination Traffic Data (2002)	US 287 S/O CO 196	7.2%	N/A	8.8%
	US 287 S/O Alt Route	5.2%	N/A	7.6%
	US 50E/O Alt Route	6.5%	N/A	8.1%
	AVERAGE	**6.0%**	**7.4%**	**8.1%**

Figure 8 – 2002 Modeled No Build Daily Link Volumes

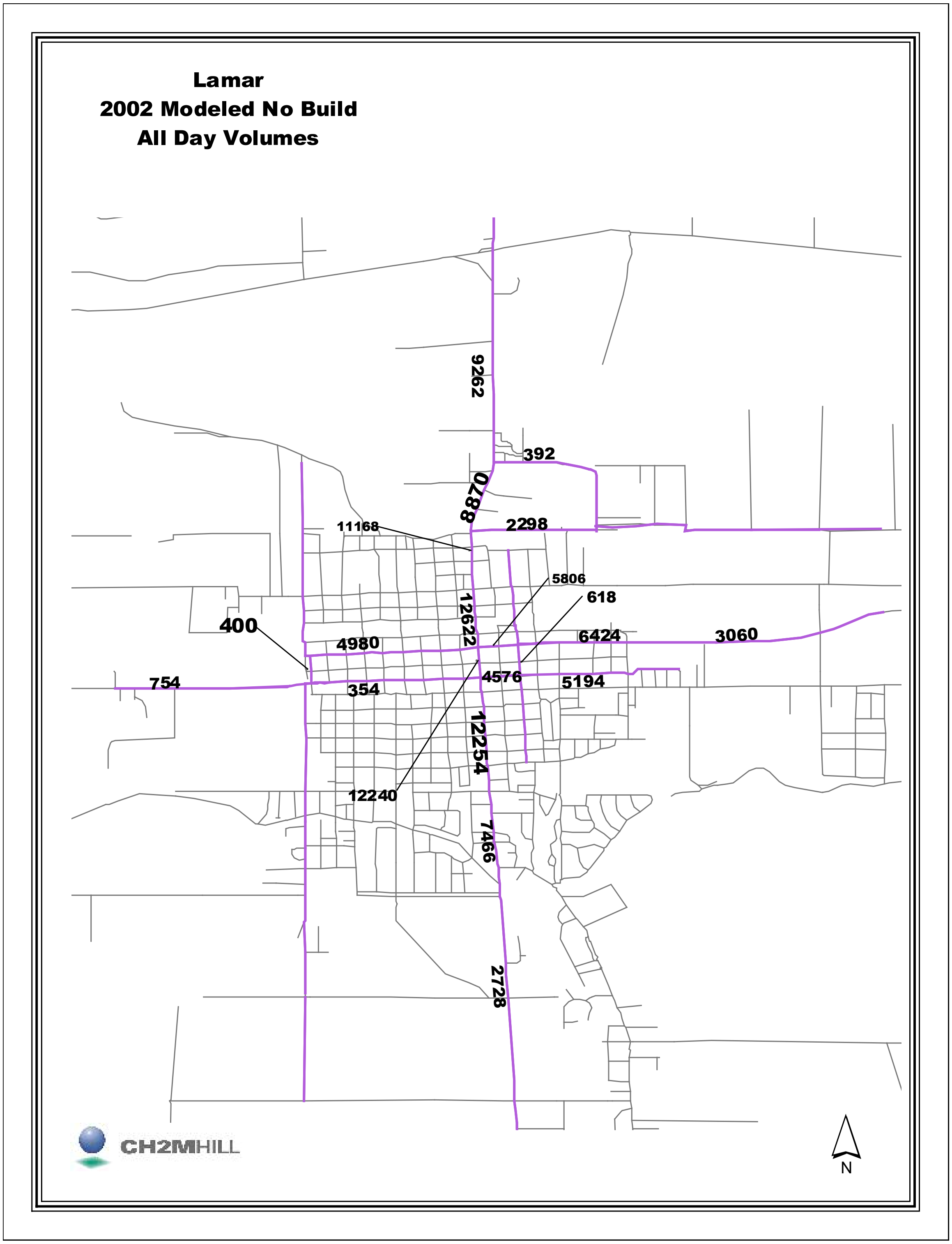


Figure 9 – 2025 Modeled No Build Daily Link Volumes

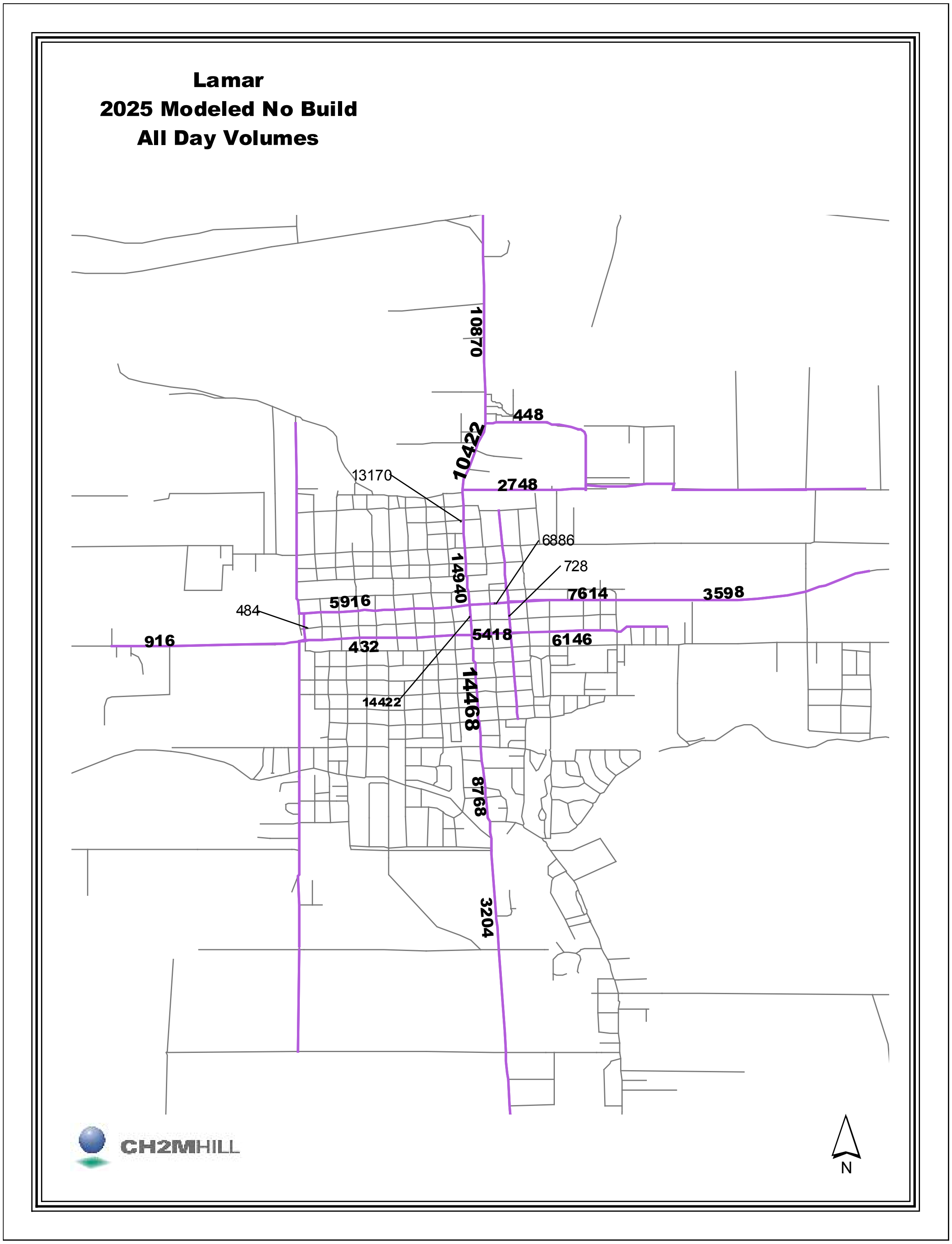
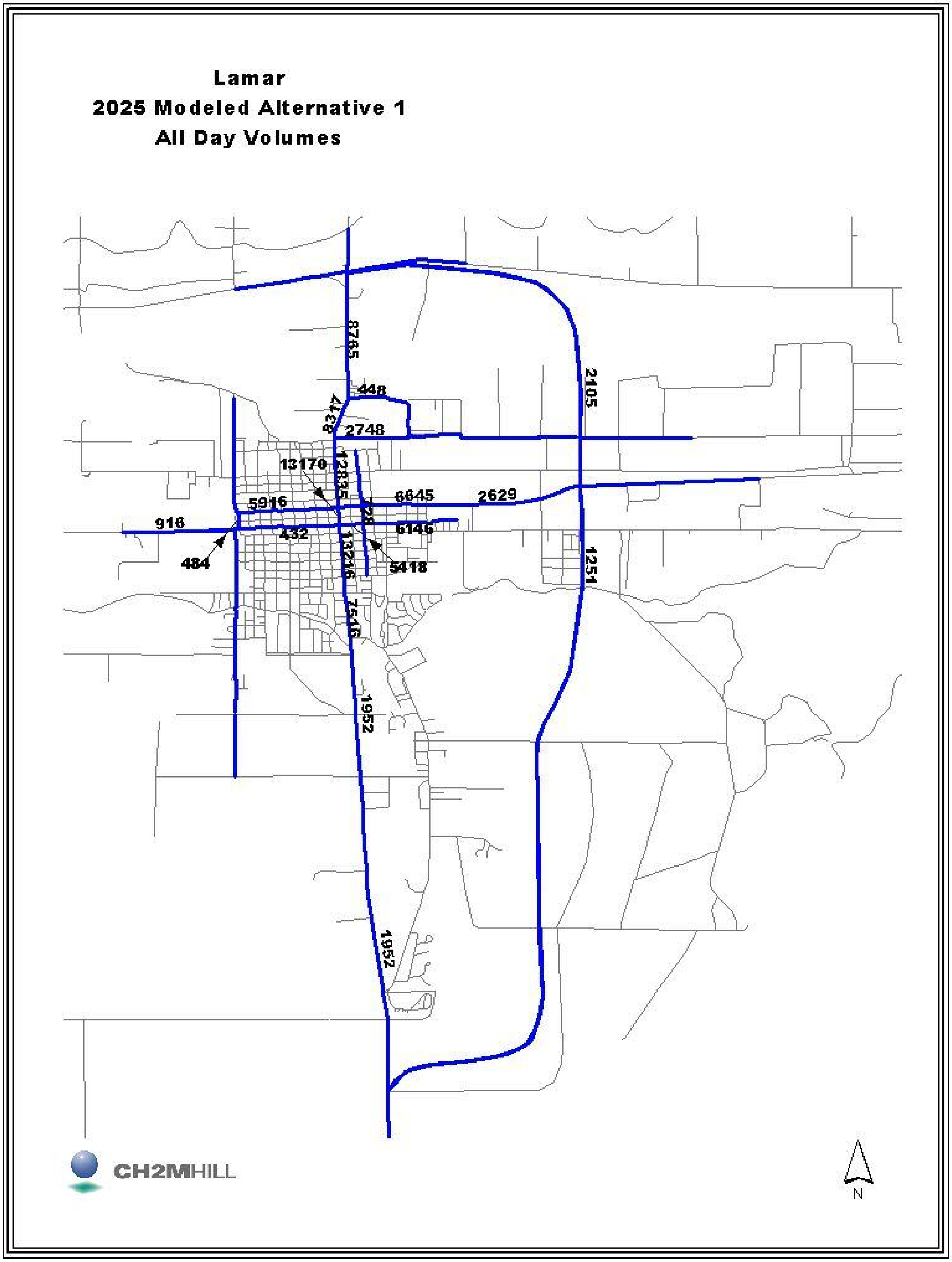


Figure 10 – 2025 Modeled Alternate Route Daily Link Volumes



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