Forecast and Capacity Planning for Nogales' Ports of Entry

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Agenda

- Welcome and Introductions
- Objectives of the Study
- Review and Refine Project Work Plan
- Review and Approve Project Schedule
- Working Session
- Schedule Next Meeting
- Adjourn

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Objectives of the Study

- Forecast the number of border crossings by mode at the Nogales-Mariposa and DeConcini Ports of Entry

- Make an assessment of the interaction between the Mariposa and DeConcini Ports of Entry

- Make an assessment of the port's current capacity and the impact of the forecasted demand on it

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Methodology

1. Identification, assessment and classification of previous studies dealing with traffic forecasts of the targeted POEs
2. Documentation of current conditions
3. Development of preliminary assessment of forecast models and refinement of scope of work
4. Development of accepted forecast models
5. Data collection and Validation of forecast models
6. Determination of infrastructure capacity

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Previous Studies

- ADOT's library of corridor profile studies, rail studies and other transportation plans, such as I-19 corridor study, Cyber Port project and Arizona Rail Plan.

- Guaymas' Master Development Plan

- I-10 National Freight Corridor Study

- Canamex Corridor Study

- Statistics from the *Secretaría de Comunicaciones y Transportes* (SCT)

- Arizona's Global Gateway: Addressing the Priorities of Our Border Communities

- Impacts of Transportation and Education on Trade and Development in the Arizona-Sonora Region

- Arizona Trade Corridor Study

- Other regional, state and local studies and developments plans

Other Sources of Information

- FHWA (Federal Highway Administration)
- The Chicago Area Transportation Study (now part of CMAP)
- BTS (Bureau of Transportation Statistics)
- The Ontario project
- The El Paso project

...ANY OTHER STUDIES?

Conventional Four Phase Approach

- **Trip generation** determines the frequency of origins or destinations of trips in each zone by trip purpose, as a function of land uses and household demographics, and other socio-economic factors.

- **Trip distribution** matches origins with destinations, often using a gravity model function, equivalent to an entropy maximizing model.

- **Mode choice** computes the proportion of trips between each origin and destination that use a particular transportation mode.

- **Route assignment** allocates trips between an origin and destination by a particular mode to a route.

Source: http://tmip.fhwa.dot.gov/clearinghouse/docs/utp/

The Ontario-Michigan (OM) Project

- Conducted by the Canadian, U.S., Ontario and Michigan governments
- Assessed the existing transportation network and long-term transportation needs, alternatives and potential new crossings in the region
- Multiple ports involved
- Two methods used:
  - Time series analysis
  - Macro economy factors incorporated models, used multivariate regression

The El Paso Project

- Conducted by Fullerton et al.
- Studied the El Paso, Texas and Ciudad Juárez, Mexico border area
- A series of studies
- Incorporate macro economy factors
- Stated a series of equations derived from multivariate regression

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Documentation of Current Conditions

- Conduct a field review of the study area
- Identify and provide a general description of all studies and existing data relevant to the ports of entry and study area
- Prepare an inventory and evaluation of current land use patterns, travel data, functional classification of roads, access management policies, as well as demographic and socioeconomic characteristics
- Evaluate data, estimates, and projections from relevant existing sources.
- Multi-modal transportation currently utilized
- Characteristics of the physical, natural, and cultural environments

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Preliminary Models & Scope of Work

- A baseline forecast for each mode of transportation
- The determination of statistically significant external factors influencing traffic demand generation for each mode of transportation
- The determination of those factors that determine the traffic split among the different ports of entry
- Incorporation of relevant factors into appropriate forecast models
- The development of alternative scenarios based on existing infrastructure
- An adaptive system that considers newly acquired data

Current Data

- Truck flow crossing through Mariposa Port of Entry from BTS (Bureau of Transportation Statistics)

- Monthly data starts from January 1994 to July 2007

- In our preliminary assessment, we used data from January 1994 to December 2004 to build the model (132 data points)

- Then, we used data from January 2005 to July 2007 (31 data points) for validation

Regression Model

1. Build regression model on yearly data
2. Build model of the portion of each month
3. Use the yearly model to estimate the yearly truck flow and then use the portion to estimate the monthly truck flow

- Pros:
  - Easy to build
  - Straightforward for understanding
- Cons:
  - Not Accurate enough for forecasting

Time Series Analysis

- Single model
- Consider the overall trend
- Consider the seasonality in the model
- More accurate than the regression model
- More complicated than the regression model

Data Chart
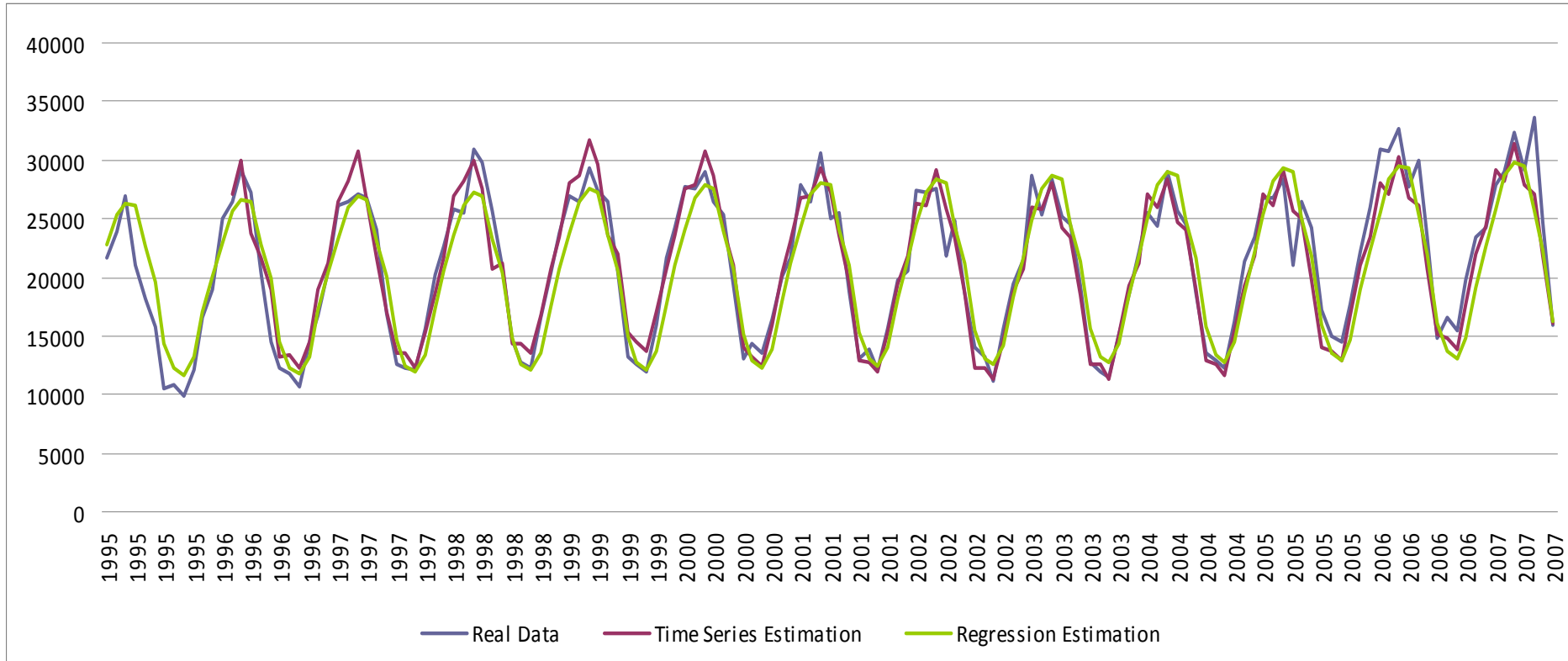
Comments on the Models

- Both are only good for short term (1 to 5 years) forecasting

- For longer time, we need to obtain macro economy data, identify their relationships and incorporate them into the model

- For longer term, we are going to use some other time series models and multivariate regression model.

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Development of Forecast Models

- The resulting models will be calibrated and validated using three methodologies:
  - Using retrospective data
  - Using simulated data
  - Using experts

- The results of the validation phase of the model will be presented to ADOT and the TAC for their feedback

- Adjustments will be made if necessary

Use of Macroeconomic Factors

- Currency Rate Change
- Cross-Border Population and Employment
- Regional GDP
- National GDP
- Price of domestic goods competitive with imports
- Special regulations

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Determination of Infrastructure Capacity

- Once the forecast model is developed it will be used to assess the capacity utilization of both ports of entry

- The capacity utilization will be assessed using at least two scenarios:
  - Current infrastructure improvements
  - Proposed infrastructure improvements

- We will provide preliminary recommendations in terms of capacity needed to face the different traffic forecasts provided by the models

- The recommendations will focus on overall capacity needs rather than on specific infrastructure designs

Simulation

Interim and Final Report Preparation

- **Interim Report Preparation**
    - Report findings of the study
    - Identify the gaps to be addressed in future studies
    - This report will be delivered to ADOT for comments and approval
- **Final Report Preparation**
    - Once we receive ADOT's approval, a final report documenting the findings of the study will be prepared
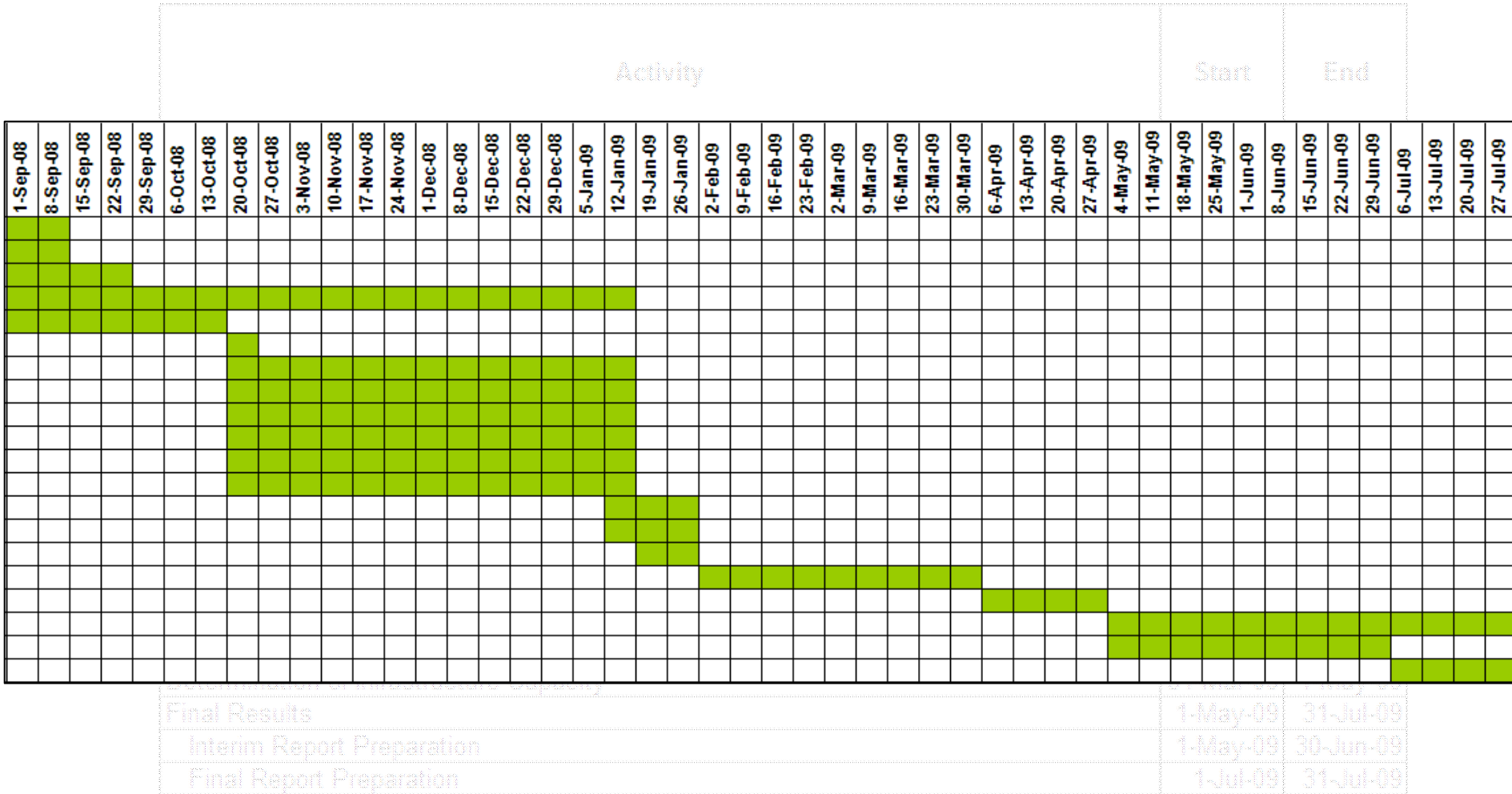
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Review and Approve Project Schedule

Activity	Start	End
Identification, Assessment and Classification of Previous Studies	1-Sep-08	8-Sep-08
Identify all existing documents	1-Sep-08	8-Sep-08
Documentation of Current Conditions	1-Sep-08	22-Sep-08
Preliminary Assessment of Forecast Models Needs and Refinement of Scope of Work	1-Sep-08	15-Jan-09
Preliminary Assessment	1-Sep-08	17-Oct-08
Kick-off Meeting	20-Oct-08	20-Oct-08
The Baseline Forecast	20-Oct-08	12-Jan-09
Determination of External Factors Affecting the Traffic Demand Generation	20-Oct-08	12-Jan-09
Traffic Split among the Different Ports of Entry	20-Oct-08	12-Jan-09
Incorporation of Relevant Factors into Appropriate Forecast Models	20-Oct-08	12-Jan-09
The Development of Alternative Scenarios	20-Oct-08	12-Jan-09
An Adaptive System that Considers Newly Acquired Data	20-Oct-08	12-Jan-09
Preliminary Results	12-Jan-09	26-Jan-09
Refinement of Scope of Work	12-Jan-09	26-Jan-09
Present Preliminary Findings and Proposed Model to ADOT	19-Jan-09	26-Jan-09
Forecast Model Development and Validation	2-Feb-09	31-Mar-09
Determination of Infrastructure Capacity	31-Mar-09	1-May-09
Final Results	1-May-09	31-Jul-09
Interim Report Preparation	1-May-09	30-Jun-09
Final Report Preparation	1-Jul-09	31-Jul-09

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Information Requirement

- U of A study
- Wilbur Smith studies
- GSA information (e.g. Border Wizard)

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