Deep Dive Annotated Outline

1 Introduction

<Name of the project> is a <type of project [capacity addition, reconstruction, etc.]> located in <city, state>.

This report, written in month-year, assesses the utility, reliability and accuracy of traffic forecasts for the <project name>. Traffic forecasts for the project were prepared in <YYYY> for the <YYYY>, <YYYY>, and <YYYY> forecast year(s). The project opened in <YYYY>. Traffic counts are available for the year(s) <YYYY–YYYY>, all post-opening.

Section 2 describes the project. Section 3 compares the predicted and actual traffic volumes for all roadways in the study area where post-opening traffic counts are available. Section 4 enumerates the exogenous forecasts and sources of forecast error for the project. It also includes an assessment of the accuracy of the exogenous forecasts. Section 5 attempts to identify items discussed in Section 4 that are important sources of forecast error and, if so, attempt to quantify how much it would change the forecast if the forecasters had accurate information about the item. Section 6 summarizes the findings from the previous two sections. Section 7 discusses suggested improvements to the forecasting methods, forecasting practices, and/or validation practices to be used for future projects. Section 8 provides a list of data sources and references used in the development of this report.

2 Project Description

The study area boundaries are <here>, <here>, <here>, and <here>. A summary of the project scope goes <here>.

<Describe any unique characteristics of the project. Some examples include: first project of its type in the region, first project of its type in decades, and exceptional project length, construction period and/or cost.>

<Include a map.>

3 Predicted-Actual Comparison of Traffic Forecasts

There are <NN> links/roadways in the study area. Traffic forecasts were made for <NN> links, or <PP> percent. Describe generally how the traffic forecasts were produced (e.g., model outputs only, post-processed model outputs, traffic counts with growth rate [define growth rate], etc.).

There are <NN> links, or <PP> percent, with an annual average daily traffic (AADT) traffic count. The following table lists each link with its forecast and observed AADT. Slight differences between the forecast year and the year traffic forecasts were collected should be noted here.

Here is an overall assessment of the accuracy of these forecasts.

Table III-C-1. Traffic volume accuracy assessment (columns in yellow require numerical input).



Note: Interactive versions of Tables III-C-1 through III-C-4 can be accessed in the Excel file titled “Deep Dive Assessment Tables.xlsx,” which is available for download from the *NCHRP Research Report 934* webpage at [www.trb.org](http://www.trb.org).

4 Potential Sources of Forecast Error

This section identifies the exogenous forecasts and project assumptions used in the development of the traffic forecasts. Exogenous forecasts are made outside of the immediate traffic forecasting process. Project assumptions are established during project development and serve as the basis for the traffic forecast. Exogenous forecasts and project assumptions are leading sources of forecast error.

An example are population and employment forecasts, which are commonly identified as a major source of traffic forecasting error. These forecasts are usually made by outside planning agencies on a regular basis; that is, they are not prepared for any individual project. During project development, these forecasts are revised to match assumptions documented by the project team. In this example, population and employment forecasts are both an exogenous forecast and a project assumption.

Past forecasting research has identified several exogenous forecasts and project assumptions as common sources of forecast error, including:

* Macro-economic conditions (of the region or study area),
* Population and employment forecasts,
* Significant changes in land use,
* Auto fuel prices,
* Tolling pricing, sensitivity and price levels,
* Auto ownership,
* Changes in technology,
* Travel times within the study area, and
* Duration between the year the forecast was produced and the project’s opening year.

The following table lists all exogenous forecasts and project assumptions for which observed data is available. It also includes an assessment of the accuracy of each item.

<See Table III-C-2; note where actual data is not available.>

<Assess overall accuracy of the sources of forecast error.>

<Identify any model deficiencies/issues, data deficiency/issues and unexpected non-transportation changes that might have contributed to forecast error. If none, state accordingly.>

Table III-C-2. Input accuracy assessment table (columns in yellow require input).



Note: Interactive versions of Tables III-C-1 through III-C-4 can be accessed in the Excel file titled “Deep Dive Assessment Tables.xlsx,” which is available for download from the *NCHRP Research Report 934* webpage at [www.trb.org](http://www.trb.org).

5 Contributing Sources to Forecast Error

Building upon the items discussed in Section 4, this section attempts to identify items that are important sources of forecast error and, if so, attempt to quantify how much it would change the forecast if the forecasters had accurate information about the item.

Adjusted forecasts for the critical roadways are computed by applying an elasticity to the relative change between the actual and predicted values for each item in Section 4. Only those items which could be quantified and deemed important for this project were adjusted. The effect on the forecast can be quantified in this way. First, the change in forecast value, a delta between the opening-year forecast and the actual observed traffic count in the opening year is calculated.

$$Change in Forecast Value =^{(Actual Value-Forecast Value )}/\_{(Forecast Value)}$$

Second, a factor of the effect on forecast by exponentiating an elasticity of the common source errors and natural-log of the change rate in forecast value is calculated. This factor is applied to the actual forecast volume to generate an adjusted forecast.

$$Effect on Forecast =exp^{(Elasticity \* ln(1+Change in Value)) }-1$$

$$Adjusted Forecast =(1+Effect on Forecast)\*Actual Forecast Volume$$

The results of this process are shown in the following table. Discuss insights and findings.

<See Table III-C-3, which is sorted largest-to-smallest by the “remaining percent difference from forecast” column.>

Table III-C-3. Forecast adjustment table (elasticity adjustments).



Note: Interactive versions of Tables III-C-1 through III-C-4 can be accessed in the Excel file titled “Deep Dive Assessment Tables.xlsx,” which is available for download from the *NCHRP Research Report 934* webpage at [www.trb.org](http://www.trb.org).

<Repeat for all segments, and provide summary adjustments at the final rows of the table.>

If the travel model or other method used to produce the traffic forecasts is available, then rerun the model or method, following the original method to the extent possible but using corrected exogenous forecasts and project assumptions. Report the results here. If the results are dramatically different from the elasticity-based approach, note this and rerun the model or method, altering the biggest contributors of forecast error individually. Note the “elasticities” and “cross-elasticities” from this process.

<See Table III-C-4.>

Table III-C-4. Forecast adjustment table (travel model adjustments).



Note: Interactive versions of Tables III-C-1 through III-C-4 can be accessed in the Excel file titled “Deep Dive Assessment Tables.xlsx,” which is available for download from the *NCHRP Research Report 934* webpage at [www.trb.org](http://www.trb.org).

<Repeat for all segments, provide summary adjustments at the final rows of the table.>

6 Discussion

This section discusses how the findings in Section 5 relate to Section 3 and Section 4.

This section should then address the following questions:

* Would the project decision have changed if the forecast accuracy or reliability were improved?
* How useful were the forecasts (what was their utility) in terms of providing the necessary information to the planning process?
* Was risk and uncertainty considered in the forecast? How was it be considered? How was it communicated?

7 Suggested Changes

This section suggests improvements to the:

* Forecasting method,
* Forecasting practices, and/or
* Validation practices to be used for future projects.

Supporting evidence from Sections 3–6 should be explicitly referenced.

8 Data Sources and References

List and number in alphabetical order the data sources and references used to develop this report.