Wisconsin Department of Transportation
Division of Transportation System Development
Southeast Regional Office
P.O. Box 798
Waukesha, WI 53187-0798

Scott Walker, Governor
Mark Gottlieb, P.E., Secretary
Internet: www.dot.wisconsin.gov

Telephone: (262) 548-590
Fascimile (FAX): (262) 548-5662

E-mail: serdtsd@dot.wi.gov

TRAVEL FORECASTING METHODOLOGY FOR I-94 EAST-WEST CORRIDOR STUDY

To: Bethaney Bacher-Gresock/FHWA

From: WisDOT I-94 East-West Study Team

Date: January 26, 2016

Updated August 23, 2016

The purpose of this memo is to summarize the process of developing forecasts of future traffic volumes on the I-94 East-West corridor (between 70th to 16th Streets) in Milwaukee, Wisconsin. WisDOT utilized forecasts developed by the Southeastern Wisconsin Regional Planning Commission (SEWRPC) for a variety of purposes on this project. This memo was prepared to address FHWA Wisconsin Division comments on the preliminary Final Environmental Impact Statement (EIS) for this project. This memo was updated in the summer of 2016 to provide further information and clarifications. The updates and clarifications stem from new information provided by SEWRPC and additional explanations on traffic forecasting procedures that arose as part of WisDOT/FHWA meetings.

BACKGROUND

The I-94 East-West Corridor study is within the Southeastern Wisconsin Regional Planning Commission, or SEWRPC, planning area. SEWRPC serves as the area's regional planning commission and metropolitan planning organization. Part of SEWRPC's regional planning activities includes the development of land use and transportation plans.

To develop its long range plans, SEWRPC begins with the land use planning effort. The transportation plan and long range travel demand forecasting is completed after the land use plan is complete. All future needs for transit, street and highway, and other transportation improvements considered in the regional transportation planning process are derived from the future growth proposed in the regional land use plan. SEWRPC first develops regional population, household, and employment forecasts which identify reasonable and desirable expectations for total growth in the region[1]. In developing the year 2035 land use plan, SEWRPC considered community and county land use plans during the allocation of the forecast population and employment throughout the Region. The 2035 regional transportation plan (Planning Report 49, page 365) states that "The final recommended year 2035 regional transportation system plan was designed to serve, and to be consistent with, the year 2035 regional land use plan. Future needs for public transit, street and highway, and other

[1] The population, household, and employment forecasts used to develop the year 2035 land use and transportation plans are documented in the 4th editions of SEWRPC Technical Reports 10 and 11.

transportation improvements considered in the regional transportation planning process were derived from the projected travel based upon the regional land use plan."

However, SEWRPC's development of the land use plan and transportation plan is an iterative process. SEWRPC advised WisDOT in July 2016 that the 2035 regional land use plan assumed the I-94 East-West project would be implemented. This raises the possibility that the design year 2040 no-build forecast WisDOT received from SEWRPC could reflect some induced demand from the I-94 East-West project.

To assess whether it is reasonable to proceed with the design-year 2040 no-build forecast from SEWRPC used to support the no-build analysis in the EIS, WisDOT looked at several factors:

1) The I-94 East-West project lies in a very well developed transportation corridor. The freeway has been in place for 50 years, and an inter-urban streetcar was located in this corridor before the freeway was built.

2) The project will be built on its existing alignment, rather than in "greenfield" area where new development could reasonably be expected to spring up adjacent to the freeway

3) The indirect and cumulative effects analysis for this study, which included input from land use planners and developers, concluded that the land use impact of additional lanes on this segment of I-94 is not expected to be substantial. This is documented in Section 2.2.2 of the January 2016 Indirect and Cumulative Effects report update.

4) Per the ICE analysis (see Section 3.28 and 3.29 of the Final EIS) the travel time savings that would result from adding new travel lanes to an existing freeway are not expected to be great enough to substantially change current land use pattern trends. This was confirmed by SEWRPC's July 2016 estimation of travel time savings of this project as well as past and future freeway reconstruction and widening projects in the I-94 corridor from downtown Milwaukee to Highway 16 in Waukesha County.[2]

5) WisDOT reviewed the low, intermediate and high projections of population, employment and households from SEWRPC's 2035 land use plan (Tables 51, 54 and 55)[3]. SEWRPC ultimately used the intermediate growth projection for these variables. The low growth projections of population, employment and households are 7 to 8 percent lower than the intermediate projections for Milwaukee and Waukesha Counties (the secondary study area). WisDOT then applied an 8 percent reduction to the 2040 design year no-build forecast to assess whether the level of service on this segment of I-94 would meet level of service D (the agreed upon operational design goal). This analysis used Highway Capacity Software, consistent with how level of service was determined throughout the study. This is a very conservative approach, because this one project would not account for the entire 8 percent difference between the low and intermediate projections for the seven-county area. The results of this analysis indicate that 18 of 36 segments of the mainline freeway in the I-94 East-West corridor would still operate at level of service E or F in 2040 under the No-build alternative (Table 1).

[2] The purpose and need for the project does not rely on travel time savings. See Section 1 of the Final EIS for a complete description of the project's purpose and need, also summarized on page 1 of the Record of Decision.

[3] The high projections are not relevant for this analysis.

Table 1

Level of Service	No Build Forecast			
	AM Peak		PM Peak	
	Intermediate Projection (Aug 2012 forecast)	Low Growth Projection (8% Reduction)	Intermediate Projection (Aug 2012 forecast)	Low Growth Projection (8% Reduction)
A	0	0	0	0
B	0	0	0	0
C	2	2	2	3
D	8	16	6	15
E	18	13	20	13
F	8	5	8	5

The results of this analysis, as well as the other reasons cited above, give WisDOT reasonable assurance that it is appropriate to rely on the design year 2040 no-build forecast received from SEWRPC in August 2012 in assessing the purpose and need for the project. WisDOT did not take this analysis any further because there is no need to further document the traffic congestion element of the project's purpose and need statement. Existing traffic volumes (2009) already result in level of service E and F on several segments of I-94 in the study area as documented in the Final EIS Exhibits 1-15 and 1-16.

TRAVEL DEMAND FORECASTING

To estimate transportation use on the region's facilities, SEWRPC utilizes a regional travel demand model. Like all major travel demand models, the greater Southeast Wisconsin region is subdivided into transportation analysis zones, or TAZs. The SEWRPC model consists of several thousand TAZs. The population, household, and employment data developed in the land use plan are applied to TAZs throughout the region in the initial trip generation step to develop the number of trips to and from a particular zone. Travel demand models used by SEWRPC follow a sequence of four main steps (SEWRPC Planning Report No. 49, p 176):

1. **Trip generation**, in which the total number of trips generated in each TAZ of the planning area for the time period under analysis is determined by using relationships established to exist between land use and travel by analyses of the land use and travel inventory data. The output from this step is the total number of trips entering and leaving each TAZ within the model limits.
2. **Trip distribution**, in which the trips generated in each TAZ are linked with trip ends in other TAZs, thereby defining the universe of trips by point of origin and point of destination. The output from this step is the number of trips made between each TAZ.
3. **Modal choice**, in which the number of trips between each TAZ is divided among the travel modes, primarily public transit and automobile. The output of this step is the number of trips made between each TAZ by each mode, also known as trip tables.
4. **Traffic assignment**, in which the TAZ transit trip tables are assigned to existing or proposed alternative future transit system networks and the TAZ vehicle trip tables are assigned to existing or proposed alternative arterial street and highway facility networks. The output of this step is the number of people utilizing the routes and facilities of the existing or proposed public transit system and the number of vehicles utilizing each segment of the existing or proposed public transit and arterial street and highway systems.

Upon completing the four steps, the model describes the use of the entire regional transportation system, including arterial streets, highways and transit lines. To establish forecast future year traffic volumes, SEWRPC first compares model estimated traffic volumes to current and historic traffic count data. Differences between

model's estimated traffic volumes and ground count data are taken into account as SEWRPC develops the future year forecasts based on model estimated future year traffic assignments.

SEWRPC's forecast at the start of the I-94 East-West Corridor study represented 2035 as the horizon year. WisDOT's Facilities Development Manual recommends using a horizon year 20 years after construction as the "design year." At the beginning of the I-94 East-West Study, WisDOT estimated that construction year would be 2020 and the design year would be 2040. To develop a 2040 forecast, which was five years beyond the horizon year of the year 2035 plan, SEWRPC ran the full travel demand model for the year 2030 using the population, household, and employment levels envisioned in the 4th edition of SEWRPC Technical Reports 10 and 11. The vehicle trip tables developed based on the year 2030 socioeconomic conditions were then compared to year 2035 vehicle trip tables to determine a 5 year increment of growth in vehicle trips. This five year increment was then added to the year 2035 vehicle trip table to estimate 2040 vehicle trips and travel patterns. SEWRPC assigned (step 4) the 2040 vehicle trip tables to the highway networks taking into account each alternative being considered. The 2040 vehicle assignments then served as the basis of the year 2040 forecast traffic volumes developed by SEWRPC.

Based on requests from WisDOT and the project team, several alternative model scenarios were developed by SEWRPC to represent proposed alternatives. They included:

- No changes to current design and capacity , commonly known as the No-build[4] alternative
- Eight lanes at-grade with no I-94 access to/from Hawley Road,
- Eight lanes at-grade with partial I-94 access to/from Hawley Road (to/from I-94 west) (preferred alternative), and
- Eight lanes grade separated with full I-94 access to/from I-94, commonly known as the "double deck" alternative.

SEWRPC's 4th generation travel demand models were estimated and calibrated using new data provided by a major origin and destination travel survey completed within the region in 2001. The models were validated for years 2000–2001 by using U.S. Census data and 2001 transportation network data, and comparing model estimates of trip generation, trip distribution, highway traffic, and transit ridership to estimates derived from travel surveys and actual traffic and transit ridership counts. The validation indicated that the models were able to accurately replicate not only observed trip generation, travel patterns, modal choice, and VMT data, but also model-estimated individual arterial street traffic volumes within 10 percent of the observed average weekday vehicular traffic. The models were validated again in 2011 for the year 2008 using year 2008 estimates of households, population, employment, and transportation network data, and comparing estimates of arterial VMT and transit ridership to model estimates derived from actual traffic and transit ridership and found to be within 10 percent. (http://www.sewrpc.org/SEWRPCFiles/Publications/mr/mr-205-assessment-of-conformity-air-quality-standards.pdf; pages 37-38 and Appendix E).

For more detail on the development and use of the travel demand models, refer to Chapter VI of SEWRPC Planning Report No. 49: A Regional Transportation System Plan for Southeastern Wisconsin: 2035.

In July 2016 SEWRPC approved the VISION 2050 regional transportation and land use plan. SEWRPC's regional travel demand model was updated as part of its transportation plan development and now represents the 5th

[4] Other projects included in the 2035 regional transportation plan are assumed to be implemented and land use assumptions/recommendations in the 2035 land use plan are also assumed to be implemented. The no-build scenario is just for this segment of I-94.

generation of the model. WisDOT asked SEWRPC to develop a 2040 build forecast[5] for the I-94 East-West corridor using the 5th generation model (also referred to as the 2050 model, as opposed to the 4th generation model used to develop the 2035 regional transportation plan). The purpose of this request was so WisDOT could assess whether the 5th generation model provided a similar forecast. The 5th generation model's forecast of average weekday daily traffic volumes for 2040 are 1.6 percent to 4 percent lower than the 4th generation model's build forecast (received from SEWRPC in 2014). WisDOT accepts the 4th generation build forecast as valid after considering the 5th generation build forecast and the minimal differences in data between the two forecasts.

WISDOT REVIEW OF TRAVEL DEMAND FORECAST

WisDOT reviews and accepts forecasts developed by the Metropolitan Planning Organization (MPO), in this case SEWRPC, consistent with Chapter 9 of the WisDOT *Transportation Planning Manual* (http://wisconsindot.gov/Pages/projects/data-plan/plan-res/tpm.aspx). Southeast Wisconsin (SEWRPC specifically) is identified (Chapter 9, Section 10, subject 7) as an area where WisDOT does not need to operate the travel demand model application because of SEWRPC's demonstrated expertise in this area. Because of SEWRPC's expertise, the WisDOT Southeast Region Planning unit reviewed the forecasts to confirm they were reasonable. Additional information that documents how WisDOT's process was consistent with Chapter 9 was provided to FHWA in August 2016. The review performed by WisDOT's Southeast Region Planning Unit consisted of 3 checks for reasonableness. The first checked consistency between SEWRPC forecasts, the second checked SEWRPC with TAFIS[6], the third checks growth rates.

1. **WisDOT compared older SEWRPC TDM forecasts to newer SEWRPC TDM forecasts.**
   WisDOT compared the SEWRPC September 2014 Preferred Alternative Build forecast to the SEWRPC July 2012 Build forecast**.**

2. **WisDOT compared recent SEWRPC TDM forecasts to TAFIS**
   WisDOT compared the SEWRPC forecast to WisDOT TAFIS volumes through 2 different tests. The first test compared the SEWPRC's 2012 TDM no build forecast to 2012 TAFIS base counts. The second test compared SEWRPC's 2014 TDM build forecast to the 2012 TAFIC and 2015 TAFIS forecast**.**

3. **WisDOT checked growth rates.**
   WisDOT calculated growth rates between July 2012 TAFIS existing count data points and the corresponding 2014 SEWRPC Build forecast volumes.

A full description of the reasonableness checks performed by WisDOT is documented in project memo titled "Procedural Approach for Comparing TAFIS to TDM" sent to FHWA WI Division in August, 2016.

In addition to the Southeast Region Planning Unit review, the WisDOT project team reviewed the forecast and findings. Based on these reviews, WisDOT and the project team asked SEWRPC to remove its assumption that

[5] This forecast used the preferred alternative as its basis, including the half interchange at Hawley Road. Other design refinements that occurred after the Final EIS publication noted in the Record of Decision are not included in this forecast. These design refinements are largely related to surface streets and would not affect the forecast.

[6] The Traffic Analysis Forecasting and Information System (TAFIS) is a computerized tool that compiles historical traffic volumes at a specific state trunk highway traffic count site and then performs a statistical regression in order to predict future traffic at that site. TAFIS produces forecasts for 40 years into the future. WisDOT has programmed TAFIS as a series of equations where the best fit equation is selected based on available historical traffic volumes at or surrounding each site. TAFIS does not account for roadway classification data or land use development data. TAFIS does not account for the number of lanes on a roadway.

capacity expansion will occur on National Avenue and Greenfield Avenue in West Allis. Through coordination with West Allis, the project team ascertained that capacity additions are unlikely to occur on these roadways through elimination of on-street parking. SEWRPC revised their forecasts accordingly.

The forecast was accepted after the WisDOT project team's request was resolved by SEWRPC.

As noted on page 4, WisDOT asked SEWRPC to use its recently developed 2050 travel demand model to assess whether the forecast is comparable to the forecast received in 2012 from the 2035 travel dement model.

PROJECT TEAM'S USE OF SEWRPC TRAVEL DEMAND FORECAST

After review and approval, WisDOT's project team utilizes the design year daily no-build forecast volumes for the Purpose and Need statement. In addition to the daily volume forecasts, WisDOT's project team utilized and applied SEWRPC peak hour forecasts to be used in the various parts of the study for summarization within the EIS. A summary of the process follows.

As noted, the peak hour data from SEWRPC were provided in the form of a trip table that was specific to the study area. The study-specific trip tables are a summary of trips on the network in to and out of the study area. There are trip tables for the morning and evening peak hours for the base year and each alternative in the design year.

For each of the alternatives noted on page 4, WisDOT and the project team assessed the rate of change in traffic volumes between the base year and design year from the respective SEWRPC forecasts. The assessment included both the percent change and relative change in traffic volumes. The design year peak hour, study-specific trip tables were then assigned to the study area roadway using a microsimulation model. Results from the model are used to establish alternative-specific design year peak hour traffic volumes for the study area. These traffic volume forecasts were then used in various analyses for the EIS.

The Build Alternative forecasted volumes were used for several analyses within the study, including:

- Traffic microsimulation and capacity analysis determines the operational characteristics of the traffic interacting with the alternative networks.
- The air quality analysis estimates the impacts on air quality of the alternatives in the design year
- The noise impact analysis estimates noise levels in the design year and determines where noise barriers may be justified for installation.
- The safety analysis estimates the change in crashes for each of the alternatives.
- The construction traffic management plans utilize traffic volumes to estimate any necessary improvements to impacted locations due to construction traffic.

None of the results of these analyses affect the assessment of the project's ability to meet the purpose and need. More detailed steps on the development of peak hour volumes for microsimulation modeling can be found in the attached memo, *I-94 E-W Corridor Studies Traffic Volume Forecasting Methodology* (January 2013).

I-94 E-W

TRAVEL FORECASTING METHODOLOGY

1: TRAVEL DEMAND FORECASTING

Land Use Plan → Transportation Plan

Travel Demand Model

- *How many trips are occuring?* — Trip Generation (TG)
- \+
- *Where are trips going to and coming from?* — Trip Distribution (TD)
- \+
- *What method of travel?* — Modal Choice (MC)

Trip tables generated

What route are trips taking? — Traffic Assignment (TA)

Design Year Forecast Traffic Volumes

What goes into SEWRPC's forecast?

When creating a forecast, WisDOT recommends using a design year 20 years or more after the start of construction.

Base Year	+ ≥20 Years =	Design Year
Construction begins		*At least 20 years after construction begins*
2020	**I-94 E-W Project**	**2040**

For the I-94 E-W project, WisDOT estimated a base year of 2020 and a design year of 2040.

Using trip tables (TT) information from their existing 2035 Plan, SEWRPC was able to create TTs for the I-94 E-W project design year of 2040.

2030 TT
2035 TT
2040 TT

Δ = Difference between 2030 and 2035

2035 + Δ = 2040

SEWRPC assigned the 2040 trip tables to the highway networks, taking into account each alternative being considered.

No-Build Alternative (TA)	Eight lanes at-grade; no I-94 access (TA)	Eight lanes at-grade; partial I-94 access (TA)	Double deck alternative (TA)
No changes to current design and capacity	*No access to/ from Hawley Rd*	*Access to/from Hawley Rd and I-94 west*	*Eight lanes grade separated with full access to/ from I-94*

SEWRPC → WisDOT → SEWRPC → WisDOT

SEWRPC provides forecast to WisDOT

WisDOT reviews and provides comments to SEWRPC

SEWRPC addresses comments and resubmits forecast to WisDOT

WisDOT accepts forecast

2: WisDOT REVIEW of TRAVEL DEMAND FORECAST

WisDOT reviews and accepts forecasts developed by the Metropolitan Planning Organization (MPO). In the case of the I-94 E-W project, the MPO is SEWRPC.

Accepted Travel Demand Forecast

SEWRPC Growth

The growth between the base year and the design year

Peak hour-based

WisDOT Traffic Volumes

Traffic volumes as established by WisDOT

Alternative specific | Peak hour | Design year

3: PROJECT TEAM'S USE of SEWRPC TRAVEL DEMAND FORECAST

After approval, WisDOT and the project team utilize the accepted travel demand forecast volumes for several analyses within the study.

- Traffic microsimulation and capacity *analysis*
- Safety *analysis*
- Air quality *analysis*
- Noise impact *analysis*
- Construction *analysis*

Study Analyses

To: Keegan Dole, I-94 East-West Traffic
Ertan Ornek, Diodos Engineering

From: Rob Beuthling, PE,
Marty Hawley, PE

Subject: I-94 E-W Corridor Studies Traffic Volume Forecasting Methodology

Date: September 28, 2012
Updated January 29, 2013

1. INTRODUCTION

Following the establishment of the existing calibrated Paramics models, the next step is to forecast traffic volumes to represent future year conditions. The main objective of the traffic forecasts is to provide insight into the traffic volumes that can be expected on the network as well as the turning movements and operations at the interchange intersections.

The peak hour microsimulation forecasts are based on the growth in travel volumes established by the demand model for each origin-destination pair in the modeled area. The main advantage of this process is to capture traffic increases in specific areas where a general, model-wide rate may under or over-estimate growth.

To forecast traffic for use in evaluation of alternatives, HNTB utilizes Paramics and travel demand models and the underlying trip tables that load traffic on to the roadway network. The first process is to forecast the trip tables for input in the Paramics models that represent future volume conditions. The second process utilizes the output of the future Paramics models, typically in segment and turning movement counts and develops design traffic volumes. The two processes are explained below.

2. FUTURE YEAR PARAMICS TRIP TABLE FORECASTING PROCESS

In the first process, HNTB utilizes three methodologies to forecast trip tables for input into Paramics. The result of each method is reviewed for each trip pair in the trip table in context of volume and trip ends of the trips being represented. Each method starts with the existing (base), calibrated Paramics trip table.

In Method A, the percent and actual difference between the base and future year travel demand model trips are applied to the calibrated base year Paramics trip table for each individual origin-destination trip pair. The average of the percent difference forecast and the absolute difference forecasts is consider the result of method A.

Method B incorporates any adjustments made during existing Paramics model calibration and applies the adjustments to the future base travel demand model trip tables for the AM and PM peak.

Method C applies the corridor-wide travel demand growth rates to the calibrated base year Paramics trip table. The specific growth rate will be established is established for each peak hour based on the final SEWRPC forecasts.

For each origin-destination trip pair in the entire matrix, the engineer evaluates the result of each method manually and applies a forecast method for each trip pair. The resulting forecasted value for that trip pair (and every other trip pair) is then used as input for the future year Paramics model run.

3. PEAK HOUR DESIGN TRAFFIC FORECASTING PROCESS

After the future input trip tables are complete and accepted, they are input in a "free flow network." A free flow network typically is the no-build network with any intersection control removed and mainline capacity temporarily added. This removal of control and additional capacity allows all traffic to complete their trip within Paramics and therefore be fully assigned to the network. Subsequent analysis of no-build traffic operations with Paramics restores the traffic control and original capacity.

The assigned mainline, ramp and intersection volumes are extracted from the free flow network and used to begin the future design volumes. The volumes are compared with the existing volumes in several checks that incorporate the calibration of the model and associated growth. These include:

- characteristics such as calibrated level (within a GEH[1] 5 of the existing balanced count),
- if the modeled volume is greater than the existing balanced count, and
- if the future volume is greater than the existing Paramics model volume and the balanced count.

Based on the aforementioned parameters, there are essentially four different scenarios used to determine forecast volumes for planning and design purposes for the future horizon year. They are described below. The flowchart shown in **Figure 1** diagrams the process.

Case 1:

In cases where:

- the existing Paramics model assignment matches is within GEH 5 of the existing balanced count, and
- the future modeled volume is greater than the existing modeled volume, and
- both the existing and future modeled volumes are greater than the existing balanced count,

The future Paramics modeled volume is accepted as the future forecast volume.

The future forecast volume is used in this situation because as expected the future Paramics model volume is showing growth over the existing Paramics model volume which was already higher than the balanced count. Thus, a somewhat conservative forecast is attained.

Case 2:

In cases where:

- the existing Paramics model assignment matches is within GEH 5 of the existing balanced count, and

[1] The GEH statistic is calculated using the following equation:

$$\text{GEH} = \sqrt{\frac{(M-C)^2}{(M+C)*0.5}}$$

Where: M = Modeled Flow (vehicles / hour)
C = Target Flow (vehicles / hour)

- the future Paramics modeled volume is greater than the existing Paramics modeled volume,
- but the future Paramics modeled volume and existing Paramics modeled volume are both not greater than the existing balanced count,

The growth rate between the existing and future modeled volumes is applied to the existing balanced count and accepted as the future forecasted volume.

In this case, the Paramics model growth rate is used because even though the future model volume is higher than the existing Paramics model volume, they are not both higher than the balanced count. Therefore, the Paramics model growth rate is applied to the count to attain a more conservative forecast volume.

Case 3:

In cases where:

- the Paramics future modeled volume is not greater than the existing Paramics modeled volume, OR
- the existing Paramics model assignment is not within GEH 5 of the existing balanced count AND the future Paramics modeled volume is not greater than the existing balanced count,

The corridor-wide annual growth rate (specific peak rate) is applied to the existing balanced count.

The Paramics model is verified to ensure no calibration or validation errors are made at these locations. In these cases, the Paramics future model is not showing the volume growth that is expected; therefore the average corridor growth rate is applied instead.

Case 4:

In cases where:

- the existing Paramics model assignment is not within GEH 5 of the existing balanced count, and
- the future Paramics modeled volume is greater than both the existing Paramics modeled volume and the balanced count,

The growth rate between the existing and future Paramics modeled volumes is applied to the existing balanced count and accepted as the future forecasted volume.

The Paramics model growth rate is used and applied in these cases because even though it is not calibrated within GEH 5, the demand model growth is still represented.

Each of the mainline, ramp and turning volumes go through the above process and each are reviewed for consistency. The entire set is then balanced for use in design and analysis purposes. The results are not typically integrated back into the Paramics model.

4. SKYCOMP DATA USE

In the previously approved forecasting methodology for the I-94 East-West project, the processes to calibrate the existing models and forecast future volumes include the use of trip tables from SEWRPC.

For the existing model calibration, the intended use of these trip tables is to provide a “seed” from which to start the volume calibration process. Since the project collected field-based origin-

destination information via Skycomp for the study area, the results of that data collection will replace the SEWRPC trip tables as the seed.

For the forecasting process, the SEWRPC trip tables will still be used to compare the growth for each trip pair within study area. No other changes to the overall calibration and forecasting process are necessary.

It is anticipated that the use of the field based data will provide efficient and accurate delivery of the existing and future conditions in the I-94 East West Corridor Study.

5. CONVERGE TO SEWRPC FORECAST

The approved forecasting methodology created 2040 peak hour ramp, mainline, and turning movement volumes that differed from SEWRPC's approved peak hour forecasts. It is desired that both forecasts complement each other. To converge both forecasts, HNTB enhanced the approved forecasting methodology, to represent SEWRPC's ramp and mainline forecasts, by the following three steps:

- Step 1: SEWRPC's forecasts are based on a design alternative with access options that do not match the current design alternatives. This requires manipulation of SEWRPC's ramp and mainline forecasts to account for access changes in the two design alternatives.
- Step 2: Modify the HNTB forecasted peak hour OD matrices to match the design alternative specific SEWRPC ramp and mainline forecasts developed in step 1.
- Step 3: Forecast peak hour turn movements based on Paramics modeled volume using HNTB's enhanced OD matrices developed in Step 2.

Step 1:

The SEWRPC ramp and mainline forecasts represent a design alternative that does not match the proposed access points of the two design alternatives. SEWRPC's approved forecasts are adjusted to represent each design alternative and considers route changes based on a vehicles ability to travel between study area O-D pairs. The two principals for developing the SEWRPC based design specific forecasts are:

- Trips are created if access increases from SEWRPC's design alternative. The quantity of trips that increase is based on OD pairs from HNTB's original forecast.
- Trips decrease if access decreases. The quantity of trips that decrease for forecasts is based on OD pairs from SEWRPC's balanced OD matrices.

Step 2:

After SEWRPC based forecasts are developed for each design alternative, the O-D matrices forecasted by HNTB's approved methodology were enhanced to represent SEWRPC's adjusted ramp and mainline forecasts (developed in Step 1). The O-D matrices are modified by determining the O-D pairs associated with each mainline access point and iteratively assigning factors to converge the forecasted matrices. Since SEWRPC's forecast volumes are only assigned to the mainline and ramps, any O-D pair that does not enter the freeway system is not adjusted from HNTB's original forecast.

Step 3:

The turning movement forecasts use the Paramics modeled volumes from the enhanced O-D matrices for each design alternative and then are balanced to the ramp forecasts. The process described in section 3 of this document is not used for forecasting turn movements based on the Enhanced OD matrices.

Figure 1: Traffic Forecasting Methodology