

Product 0-6691-P2



Managing the Travel Model Process: Small and Medium-Sized MPOs

Participant Handbook

Project 0-6691

Managing the TDM Process:
Developing MPO Institutional Capacity

September 2013



Managing the Travel Model Process: Small and Medium-Sized MPOs

ABBREVIATIONS

EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
MPO	Metropolitan Planning Organization
MTP	Metropolitan Transportation Plan
TCEQ	Texas Commission on Environmental Quality
TDM	Travel Demand Model (or Travel Model or Travel Forecasting Model)
TIP	Transportation Improvement Program
TMA	Transportation Management Area
TPP	TxDOT Transportation Planning and Programming Division
TxDOT	Texas Department of Transportation
UPWP	Unified Planning Work Program

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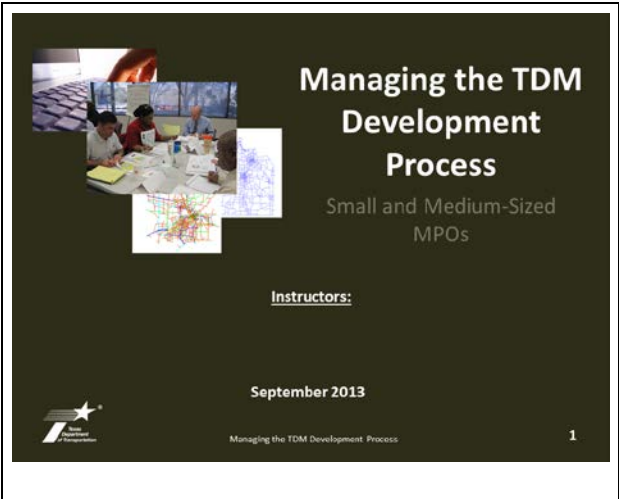
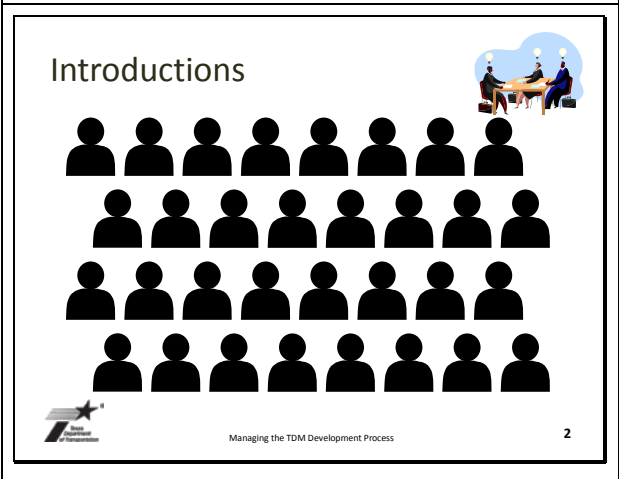
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Course Introduction

Overview

Lesson Materials

Welcome and Introductions

What Is an MPO? TMA?

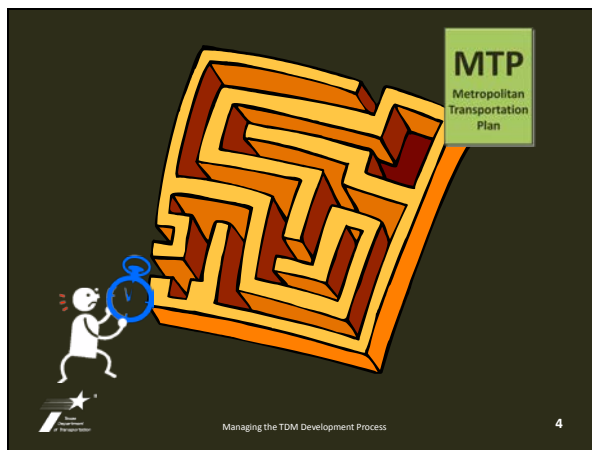
- A Metropolitan Planning Organization (MPO) is designated for urbanized areas with population over 50,000.
- A Transportation Management Area (TMA) is an MPO with population over 200,000.



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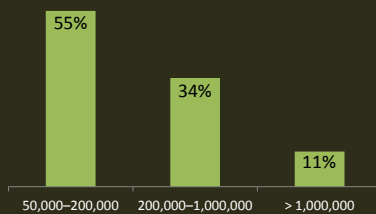
Study Background



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Texas Is Not Alone: Types of MPOs

**MPOs by Population**

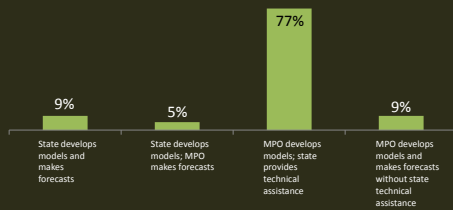
Source: SR 288 Metropolitan Travel Forecasting: Current Practice and Future Direction, 2007



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Modeling Approach: Large MPOs



MPOs with Population over 1 Million Modeling Approach

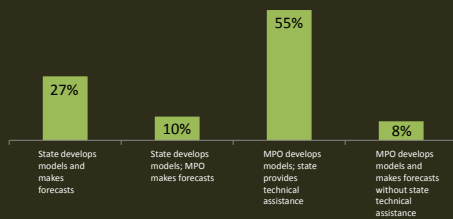
Source: SR 288 Metropolitan Travel Forecasting: Current Practice and Future Direction, 2007



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Modeling Approach: Medium MPOs



MPOs with Population 200,000 to 1 Million Modeling Approach

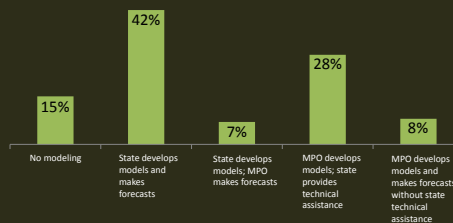
Source: SR 288 Metropolitan Travel Forecasting: Current Practice and Future Direction, 2007



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Modeling Approach: Small MPOs



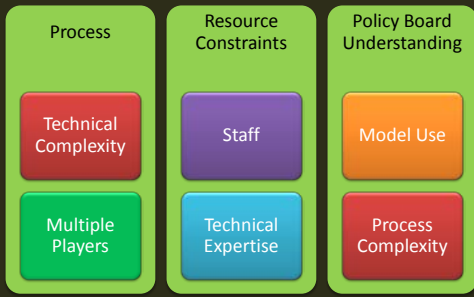
MPOs with Population 50,000 to 200,000, Modeling Approach

Source: SR 288 Metropolitan Travel Forecasting: Current Practice and Future Direction, 2007


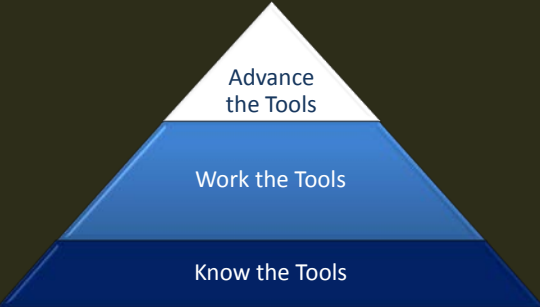


Managing the TDM Development Process

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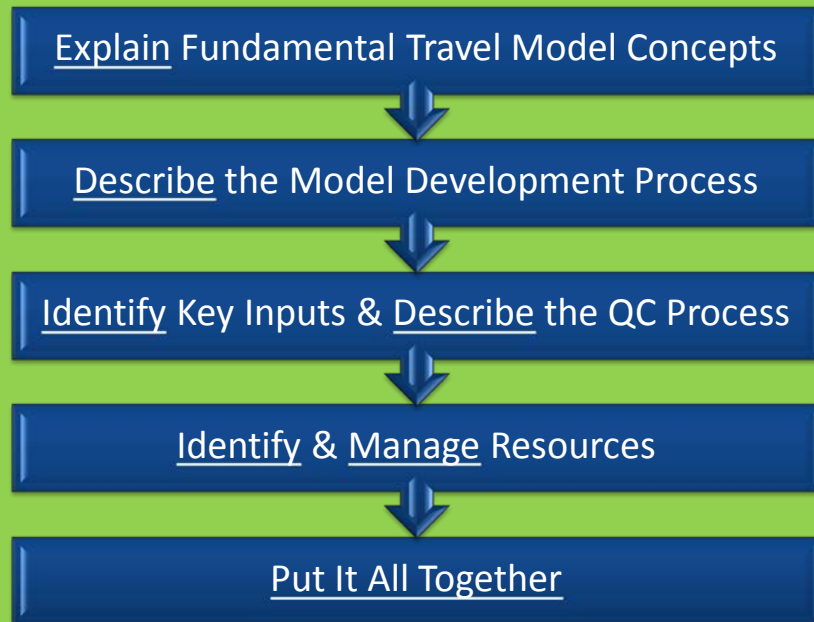
<p>MPOs' General Issues with Models</p>  <p>Managing the TDM Development Process 9</p>	
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Course Focus and Premise

<p>Not All Texas MPOs Have a Modeler, but All Texas MPOs Have a Director</p>  <p>Managing the TDM Development Process 10</p>	
<p>Course Premise</p>  <p>Managing the TDM Development Process 11</p>	

Course Learning Objectives and Approach

Learning Objectives



Managing the TDM Development Process

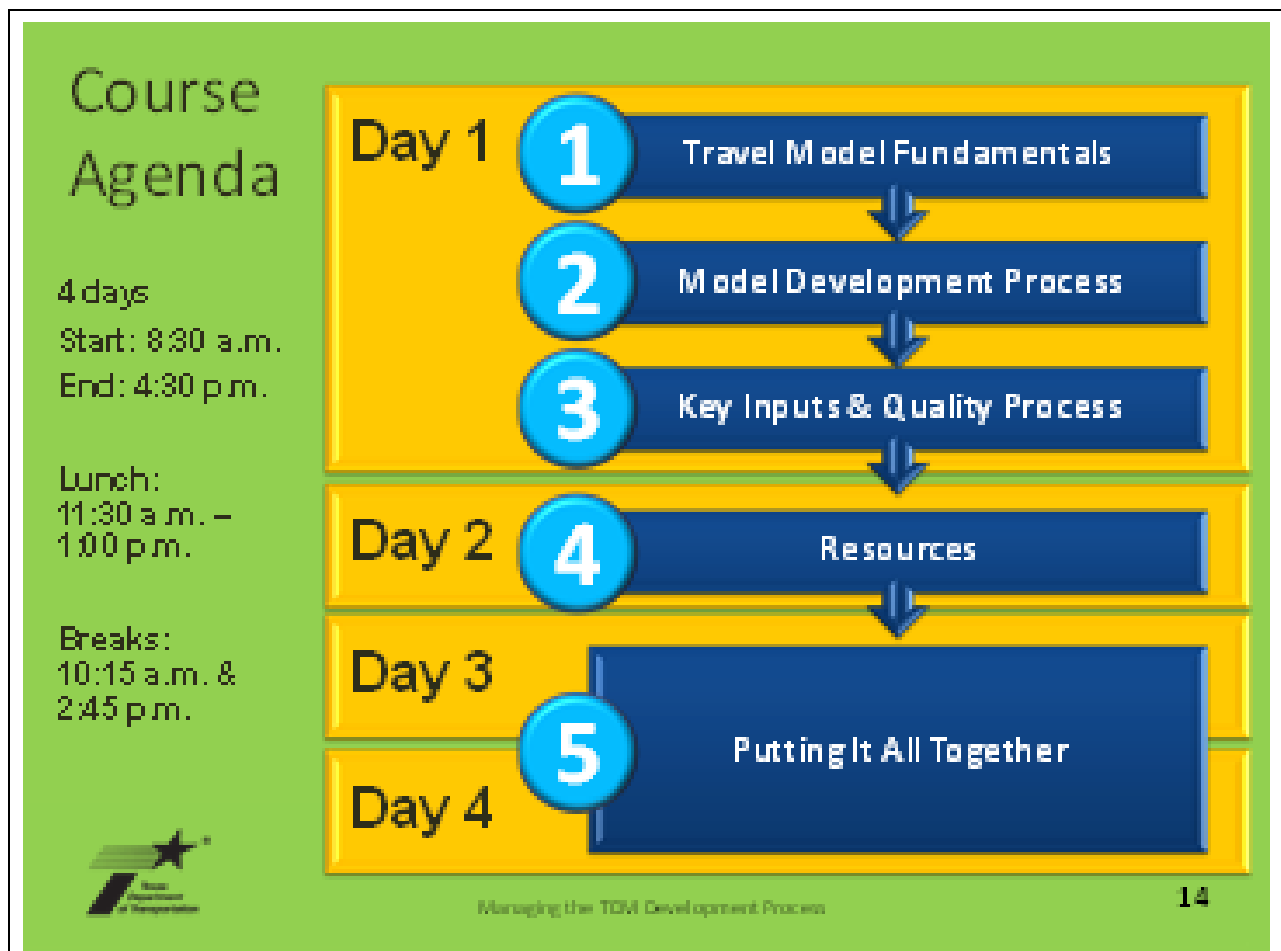
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Lessons & Course Materials



Managing the TDM Development Process

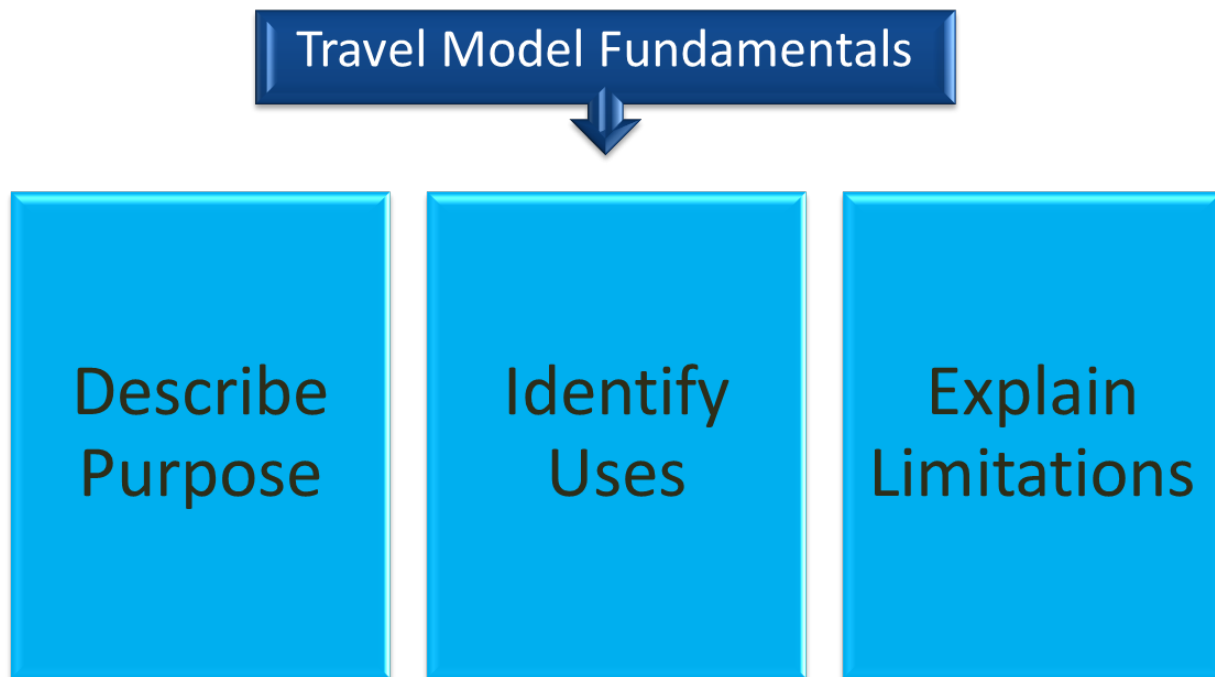
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<p>Questions?</p>  <p> Managing the TDM Development Process</p> <p>15</p>	
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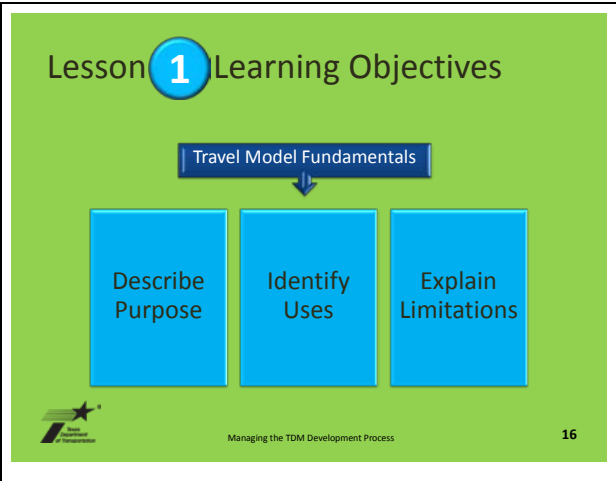
Lesson 1: Travel Model Fundamentals

Learning Objectives

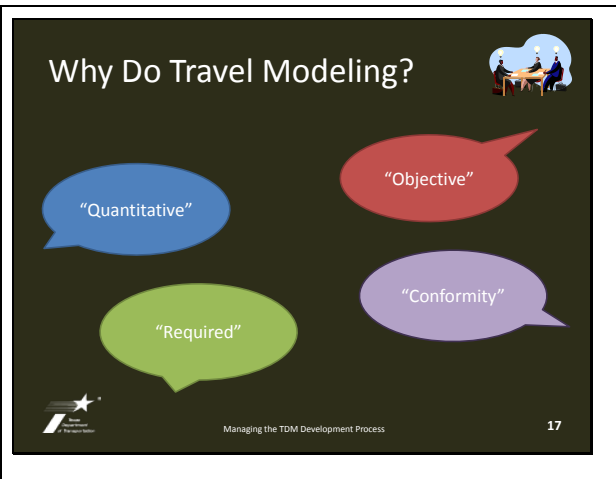


Lesson Materials Follow

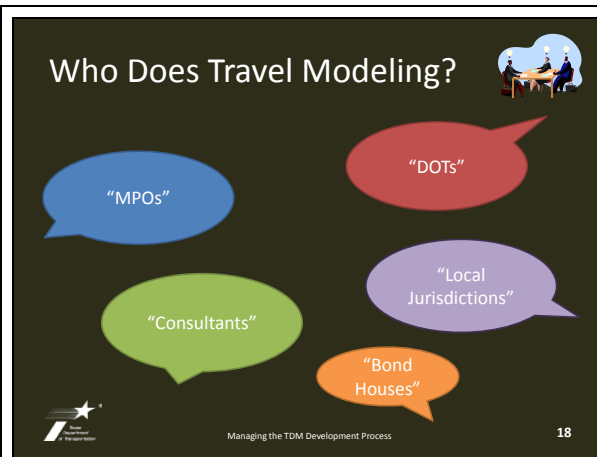
Topic 1.1 Lesson Learning Objectives

	
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Topic 1.2 Purpose of Travel Models

	
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Who Does Travel Modeling?



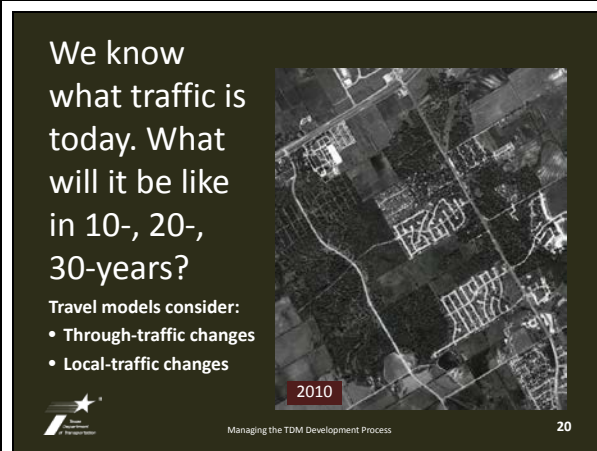
A diagram with a dark background. At the top right is a small icon of three people sitting around a table. Below it are five speech bubbles of different colors: blue, red, green, purple, and orange. Each bubble contains a text label. In the bottom left corner is a logo with a star and the text 'Texas Department of Transportation'. In the bottom center is the text 'Managing the TDM Development Process'. In the bottom right corner is the number '18'.

- "MPOs"
- "DOTs"
- "Consultants"
- "Local Jurisdictions"
- "Bond Houses"

Managing the TDM Development Process 18



We know what traffic is today. What will it be like in 10-, 20-, 30-years?



Aerial view of a city grid with a red box labeled "2010" in the bottom left corner. The text "We know what traffic is today. What will it be like in 10-, 20-, 30-years?" is overlaid on the left side. Below the text is a list of bullet points. In the bottom left corner is a logo with a star and the text 'Texas Department of Transportation'. In the bottom center is the text 'Managing the TDM Development Process'. In the bottom right corner is the number '20'.

Travel models consider:

- Through-traffic changes
- Local-traffic changes

Managing the TDM Development Process 20

What if Local Area Develops?

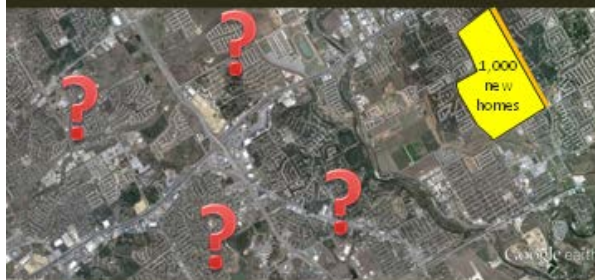
- If yellow areas are likely to become residential and the red commercial...
- Travel models forecast traffic considering both local and through traffic changes.



Managing the TDM Development Process

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How Will Traffic Change across Network with a Demographic Change?



Travel models are used to forecast traffic changes in a complex world.

Managing the TDM Development Process

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Or, What Happens in Response to a Capacity Addition or Improvement?

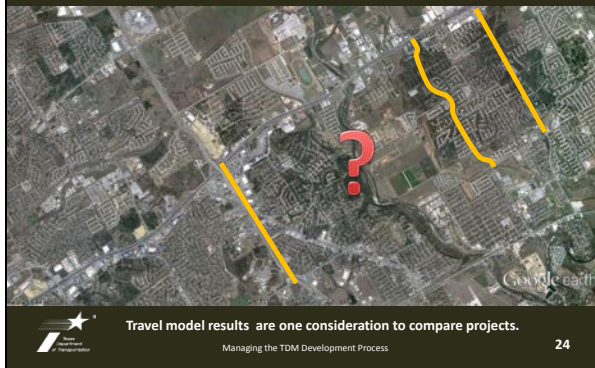


Travel models are used to test the impact of different projects.

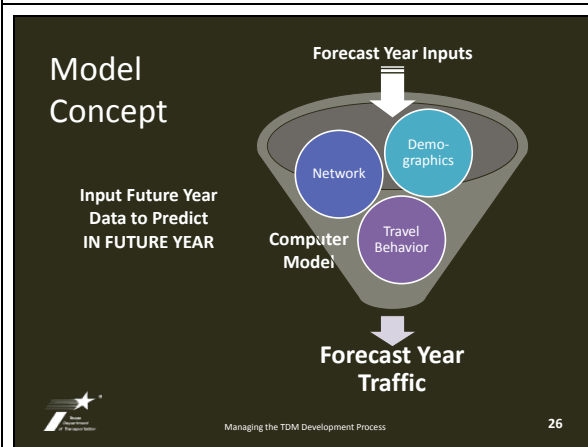
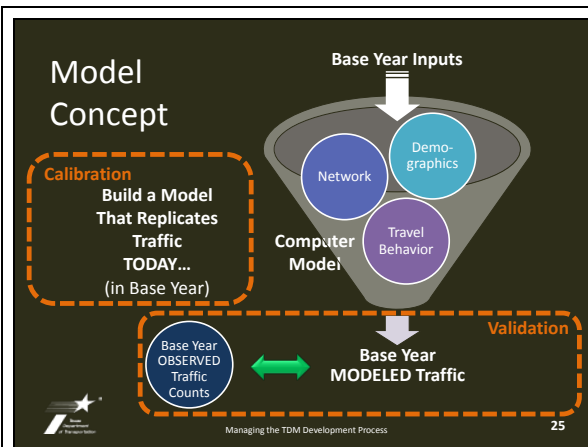
Managing the TDM Development Process

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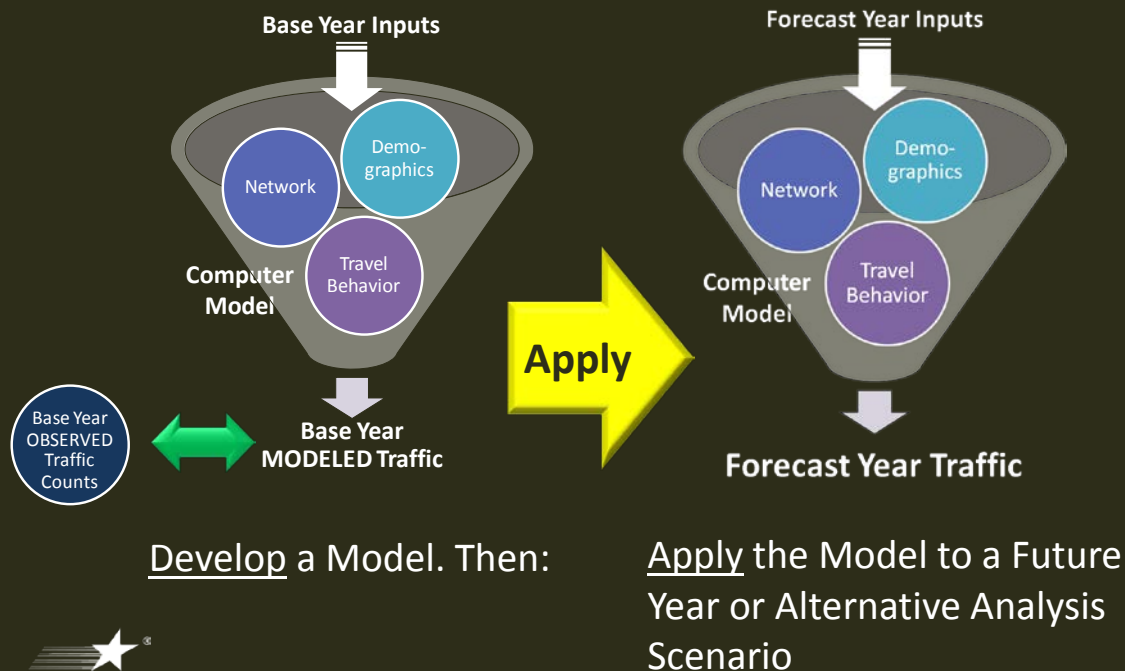
Or, How Do We Compare Projects?



Topic 1.3 “Model” Concept



“Develop” versus “Apply”



Managing the TDM Development Process

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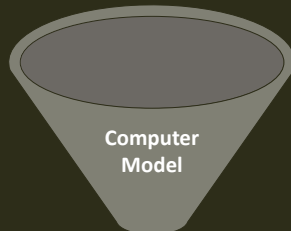


KEY CONCEPTS: “**Develop**” a model = create the model
 “**Apply**” refers to using the model for analysis
 Use the **forecast year** to refer to a travel model when talking to the MPO Policy Board or the public.

Topic 1.4 The “Texas Package”

Travel Demand Model (TDM) = Texas Package

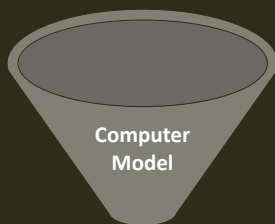
- Developed by TxDOT for small and medium-sized MPOs
- Standardized approach
- Supported by TxDOT TPP



Managing the TDM Development Process

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The Texas Package Is a Trip-Based Model, Generally 3 Steps



**Trip Generation
(TRIPCAL5)**



**Trip Distribution
(ATOM2)**



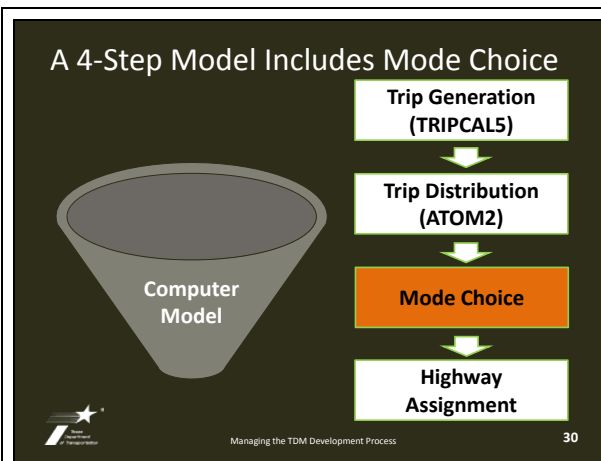
**Highway
Assignment**



Managing the TDM Development Process

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(same slide, continued)



KEY CONCEPT: The Texas Package is a **traditional, trip-based model**, typically with **3 steps**, sometimes 4 steps.


Typical Performance Measures from Texas Package

STRUCTURE/ANALYSIS		Lesson 7: Travel/Market/Performance
<p>EXERCISE 1: A Typical Month Outputs from The Texas Package</p>		
<p>Level of Analysis</p>	<p>Measure</p>	
<p>System wide*</p>	<p>Vehicle miles traveled (VMT) Measure of regional travel – all vehicle kilometers traveled (or miles traveled) in the study region. Includes travel for all modes (except rail) and all vehicle types (except taxicab). Includes travel by the system's own fleet (e.g., transit, police, fire, etc.) Excludes travel by the system's own fleet (e.g., transit, police, fire, etc.)</p>	
	<p>Vehicle Length (VLE) Measure of vehicle length traveled per km – vehicle length of vehicles (in km) traveled per km. Vehicle length is measured in km (or miles) traveled per km. Vehicle length is measured in km (or miles) traveled per km.</p>	
	<p>Vehicle Miles Traveled per Hour (VMT/H) Measure of vehicle miles traveled per hour – vehicle miles traveled per hour (VMT/H) measured by vehicle and divided by the number of hours in the day.</p>	
	<p>Stops per Person per Hour (SPPH) Measure of stops per person per hour – stops per person per hour (SPPH) measured by vehicle and divided by the number of hours in the day.</p>	
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	<p>Stops per Person per Hour (SPPH) Measure of stops per person per hour – stops per person per hour (SPPH) measured by vehicle and divided by the number of hours in the day.</p>	
<p>Link-level*</p>	<p>Volume (vehicle trips) Only vehicle trips (not bus trips) traveling the link. Volume is the number of vehicle trips traveling the link.</p>	
	<p>Volume by Category (VLE) Measure of the amount of vehicle trips traveling the link.</p>	
	<p>Volume by Category (VLE) Measure of the amount of vehicle trips traveling the link.</p>	
	<p>Volume by Category (VLE) Measure of the amount of vehicle trips traveling the link.</p>	
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	<p>Volume by Category (VLE) Measure of the amount of vehicle trips traveling the link.</p>	
<p>Other**</p>	<p>Number of trips entering the TAZ Measure of the number of trips entering the TAZ. Measure of the number of trips entering the TAZ.</p>	
	<p>Number of trips leaving the TAZ Measure of the number of trips leaving the TAZ. Measure of the number of trips leaving the TAZ.</p>	
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Other Performance Measures from Texas Package

[illegible]

Other Texas Package Approaches for Specific Analysis Needs



Managing the TDM Development Process


INSTRUMENTATION

Lesson 7: Travel Model Fundamentals

Exhibit 1-6 Other Texas Package Approaches for Specific Analysis Needs

Analysis Need	Texas Package Approaches/Notes
Mode Choice	<ul style="list-style-type: none"> • Junior Mode Choice Model
Toll	<ul style="list-style-type: none"> • Methodology available to be implemented as necessary
Freight	<ul style="list-style-type: none"> • Utilize Shortwork Analysis Model for truck flow • Methodology available to be implemented as necessary
Peak Hour/Period	<ul style="list-style-type: none"> • Using demand factors by trip purpose, either specific to look area from survey, state or general sources
Feedback	<ul style="list-style-type: none"> • Has been tested as a case study only

integrating the Travel Model Process
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TDMT 0410



KEY CONCEPT:

The **Texas Package** is a suite of tools capable of providing a variety of performance measures for traditional roadway projects.

Exhibit 1.a Typical Model Outputs from the Texas Package

Level of Analysis	Measure
System-wide*	<ul style="list-style-type: none"> • Vehicle-miles traveled (VMT) Measure of regional travel – link volume (vehicles) multiplied by link length (miles) and summed for all links • Vehicle-hours traveled (VHT) Measure of regional hours spent traveling – link volume (vehicle) multiplied by link travel time (converted to hours) and summed for all links • Average Trip Length (miles) Average distance traveled per trip – vehicle miles of travel (VMT) divided by total trips Average Trip Length (minutes) Average time traveled per trip – vehicle hours of travel (VHT) converted to minutes and divided by total trips • Trips per Person/per household Average of number of trips made in day person or by members of a household – total trips divided by population or total trips divided by number of households
Link-level*	<ul style="list-style-type: none"> • Volumes (vehicle traffic) Daily vehicles (autos and trucks) traveling the link. • Volume-to-capacity Ratio (v/c) Measure of the amount of capacity in use – volume divided by capacity • Congested speed (mph) Link travel time from assignment based on volume-to-capacity ratio and converted to a speed – link distance (miles) divided by link time (minutes) times 60
Other*	<ul style="list-style-type: none"> • Point-to-point congested travel time (minutes) Measure of travel time from one location in the network to another based on link travel time from assignment. The sum of travel time of links connecting two nodes in the network. • Number of trips exiting and entering a TAZ Measure of travel activity produced by and attracted to a TAZ. Sum of volume on centroid connectors of a TAZ.

* All are 24-Hour (daily) values

Exhibit 1.b Other Model Outputs the Texas Package Can Yield with Minimal Effort

Level of Analysis	Measure
System-wide*	<ul style="list-style-type: none"> • Auto-versus-truck travel measures (VMT, VHT) Regional measures of travel miles and hours by autos and trucks reported separately and obtained from separate assignment of auto and truck trips. Auto/truck link volume multiplied by link length and summed for all links. • External-versus-internal travel (VMT) Regional measure of travel demand by residents of region and visitors reported separately and obtained from separate assignment of internal and external trip demand. External/internal link volume multiplied by link length and summed for all links. • Total System Delay Regional measure of additional time spent traveling as a result of recurring congestion. Regional VHT as described in Exhibit. 1a minus regional VHT from a single iteration assignment.
Link-level*	<ul style="list-style-type: none"> • Select- (also called Critical-) Link Analysis Identification of the TAZ trip demand passing through a specified set of links and component of flows on all links that pass through a specified set of links. • Auto-versus-truck volumes Comparison of auto and truck demand link volumes. Produced from separate assignment of auto and truck demand • Volumes by trip purpose Link volumes separated by the purpose of the trip travelling on the link. Produced from separate assignment of purpose demand. • External-versus-internal volumes Comparison of external and internal demand volumes. Produced from separate assignment of external and internal demand.
Other*	<ul style="list-style-type: none"> • Turning movements at specific intersections Turns from regional traffic assignment at pre-defined reporting network nodes. Provides macroscopic overview of direction of flows at intersections. (NOT FOR OPERATIONAL ANALYSIS!)

* All are 24-Hour (daily) values

Exhibit 1.c Other Texas Package Approaches for Specific Analysis Needs

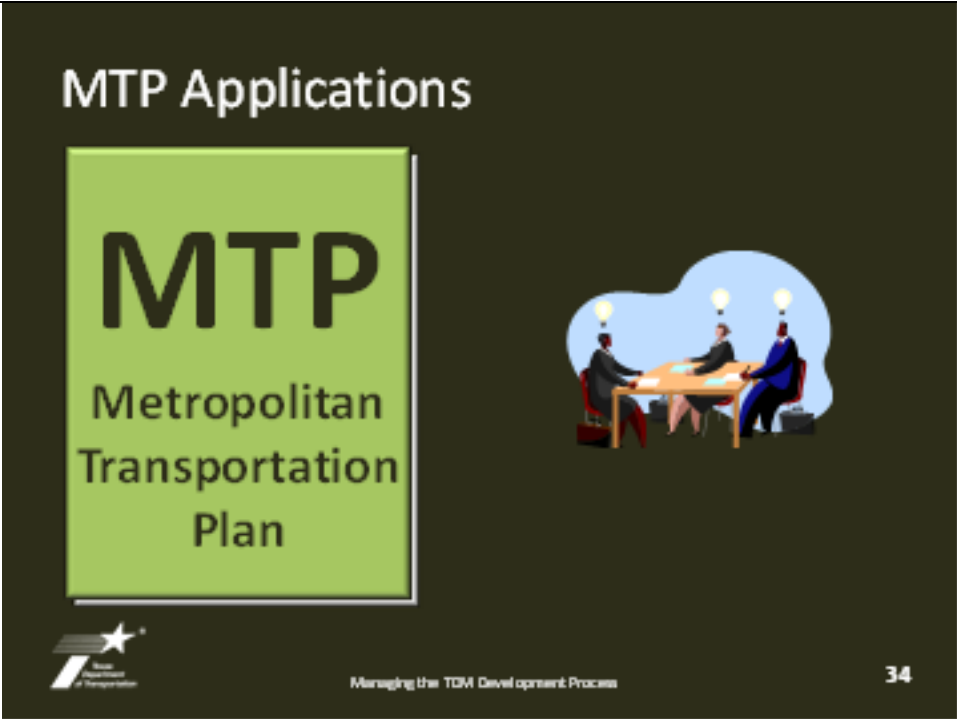
Analysis Need	Texas Package Approach/Notes
Mode Choice	<ul style="list-style-type: none">• Junior Mode Choice Model
Toll	<ul style="list-style-type: none">• Methodology available to be implemented as necessary
Freight	<ul style="list-style-type: none">• Utilize Statewide Analysis Model for truck flows• Methodology available to be implemented as necessary
Peak Hour/Period	<ul style="list-style-type: none">• Using diurnal factors by trip purpose, either specific to local area from survey data or general values
Feedback	<ul style="list-style-type: none">• Has been tested as a case study only

Topic 1.5 Travel Model Uses for MTP Process

Activity 1.1 Potential Uses for Travel Models in MTP Development Process

Given the performance measures just presented in the handbook, and the information you have about what travel models can do, let's work as small groups at each table to brainstorm potential uses for travel models as part of the development process for a long-range metropolitan transportation plan process. You can take notes on this page.

Take 5 minutes at your table; then we will share with the larger group.



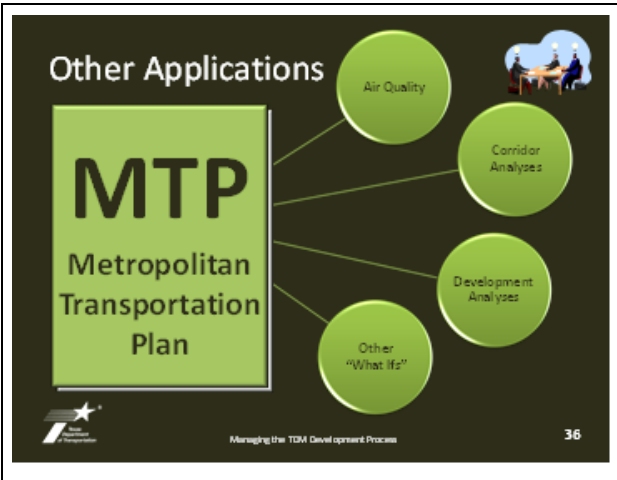

The slide is titled "MTP Applications" in white text on a dark background. On the left, there is a green rectangular box with the text "MTP" in large, bold, black letters, followed by "Metropolitan Transportation Plan" in smaller black letters. To the right of this box is an illustration of three people sitting around a table, each with a glowing lightbulb above their head, symbolizing brainstorming or ideas. At the bottom left is the Texas Department of Transportation logo, which includes a star and the text "Texas Department of Transportation". At the bottom center, it says "Managing the TDM Development Process". At the bottom right, the number "34" is displayed.

Topic 1.6 Travel Model Uses Other Than the MTP

Activity 1.2 Other Potential Uses for Travel Models

As a group (and without peeking at the next slide), let's discuss this question: What other uses might the travel model be good for besides the MTP?

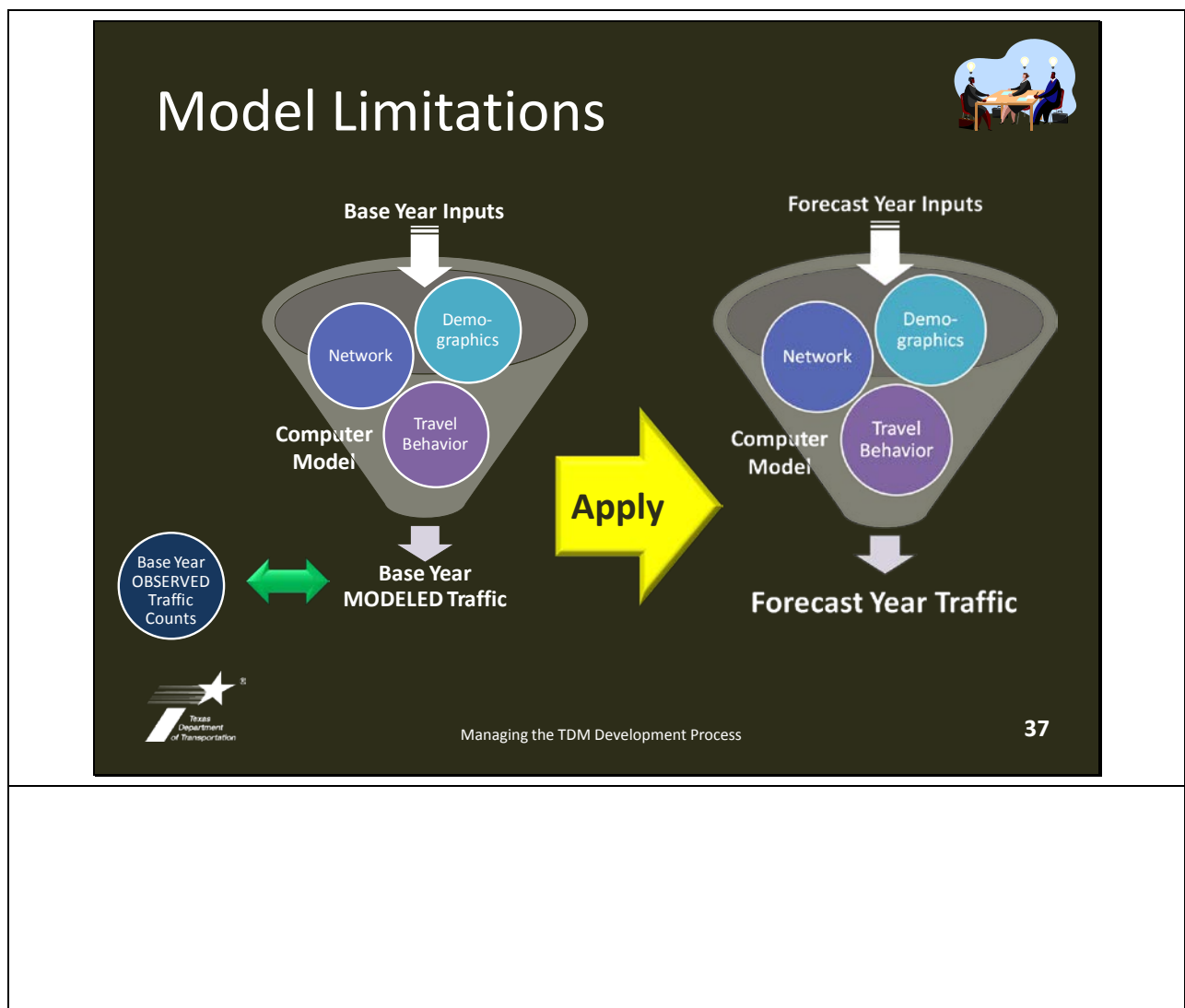
The slide is titled "Other Applications" in white text on a dark background. In the center, there is a green rectangular box with the text "MTP" in large, bold, black letters, followed by "Metropolitan Transportation Plan" in smaller black letters. Four green lines radiate from the right side of this box, pointing towards the right edge of the slide. In the top right corner, there is a small, colorful illustration of three people sitting around a table, possibly in a meeting. In the bottom left corner, there is a small logo for "Texas Department of Transportation" featuring a star and the text "Texas Department of Transportation". In the bottom center, the text "Managing the TDM Development Process" is written in small white letters. In the bottom right corner, the number "35" is displayed in white.

	
<div data-bbox="203 724 259 808"></div> <div data-bbox="292 714 1451 833"><p>KEY CONCEPT: Travel models are important for a wide variety of project analysis needs; the version that the MPO bases the adopted plan on is the official model for the area.</p></div>	

Topic 1.7 Model Limitations

Activity 1.3 Model Limitations Brainstorming

Of course, like any tool, travel models have limitations. With what you know now about these models generally, their inputs, and the Texas Package approach, let's work as small groups at each table to brainstorm potential limitations with the model approach we just discussed. Take 5 minutes at your table, then we will share with the larger group.



Micro-level Analysis? NO

How Long Should Signal Time Be?

Are Direct Connects Needed?

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Texas Package Applications

INSTRUCTOR HANDBOOK Lesson 1: Travel Model Fundamentals

Activity 1.4 "Would You Use the Texas Package for TDM?"

Analysis Question	Yes	No
What future traffic will be on road based on changes in demographics?		
What might be the projected bicycle/pedestrian usage along a future trail?		
Will flex-time incentives reduce future traffic?		
Which roadway should we build first of two potential projects?		
Will lengthening a certain bus route help congestion along that roadway?		
Will the projects in the MTP maintain metropolitan air quality status?		
Will additional lanes in a corridor attract more traffic?		
How many left turn lanes are needed at a particular intersection?		
How long should a merge length be between particular on- and off-ramps?		
How much traffic will a bypass remove from other facilities?		

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KEY CONCEPT:

Limitations of a travel model include technical limitations, as well as the potential for errors. By far the most certain limitation is that the future is unknown. Travel models remain a solid analytical tool for making planning decisions for the future.

Activity 1.4 “Would You Use the Texas Package for This?”

Analysis Question	Yes	No
What future traffic will be on road based on changes in demographics?		
What might be the projected bicycle/pedestrian usage along a future trail?		
Will flex-time incentives reduce future traffic?		
Which roadway should we build first of two potential projects?		
Will lengthening a certain bus route help congestion along that roadway?		
Will the projects in the MTP maintain metropolitan air quality status?		
Will additional lanes in a corridor attract more traffic?		
How many left turn lanes are needed at a particular intersection?		
How long should a merge length be between particular on- and off-ramps?		
How much traffic will a bypass remove from other facilities?		

Topic 1.8 Other Helpful Resources

Metropolitan Transportation Planning: Executive Seminar

Tailored for MPO Board members

<http://www.planning.dot.gov/Documents/MetroPlanning/metroTrans.htm>

U.S. DOT Capacity Building Programs Home Page

General capacity building for transportation professionals (see TPCB below)

<http://www.pcbprograms.dot.gov/>

FHWA/FTA Joint Transportation Planning Capacity Building Program (TPCB)

Focused on transportation planning-related capacity-building

<http://planning.dot.gov/>



Transportation Planning Process: Key Issues

A Briefing Book for Transportation Decisionmakers, Officials, and Staff

AKA The “Briefing Book” – a fundamental resource and starting point.

<http://planning.dot.gov/documents/briefingbook/bbook.htm>

or PDF at:

http://planning.dot.gov/documents/briefingbook/bbook_07.pdf



Introduction to Travel Demand Forecasting

Self-instructional CD-ROM (downloadable) covering basic concepts and high-level overview.

http://tmiponline.org/Clearinghouse/Items/Introduction_to_Travel_Demand_Forecasting_Self_Instructional_CD-ROM.aspx

Metropolitan Travel Forecasting: Current Practice and Future Direction, TRB (SR 288), 2007

An extensive review of MPOs nationwide, needs, challenges, and opportunities.

<http://onlinepubs.trb.org/onlinepubs/sr/sr288.pdf>

Travel Model Improvement Program

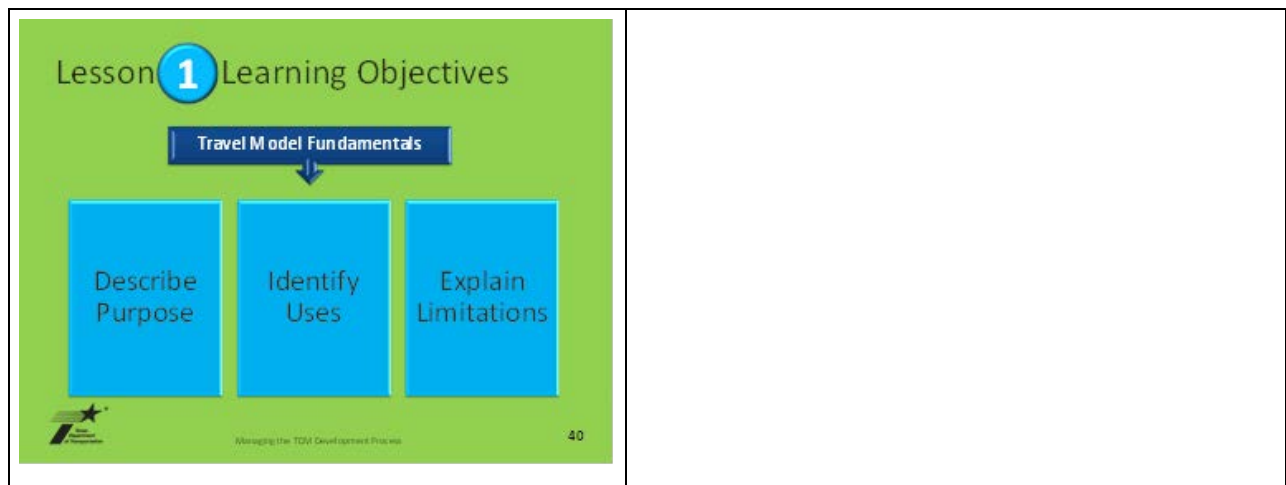
Overall general resource for the travel modeling community, from nuts to bolts, including discussion forum and email list.

<http://tmiponline.org/>



Topic 1.9 Lesson Wrap-Up

On the previous page is a list of Other Helpful Resources that cover the topics in this lesson. The Briefing Book, with the three yellow stars, is recommended as a fundamental resource and starting point for MPO Policy Board members, staff, and the public, to understand the role of the MPO in the larger context and the planning process that travel models support.

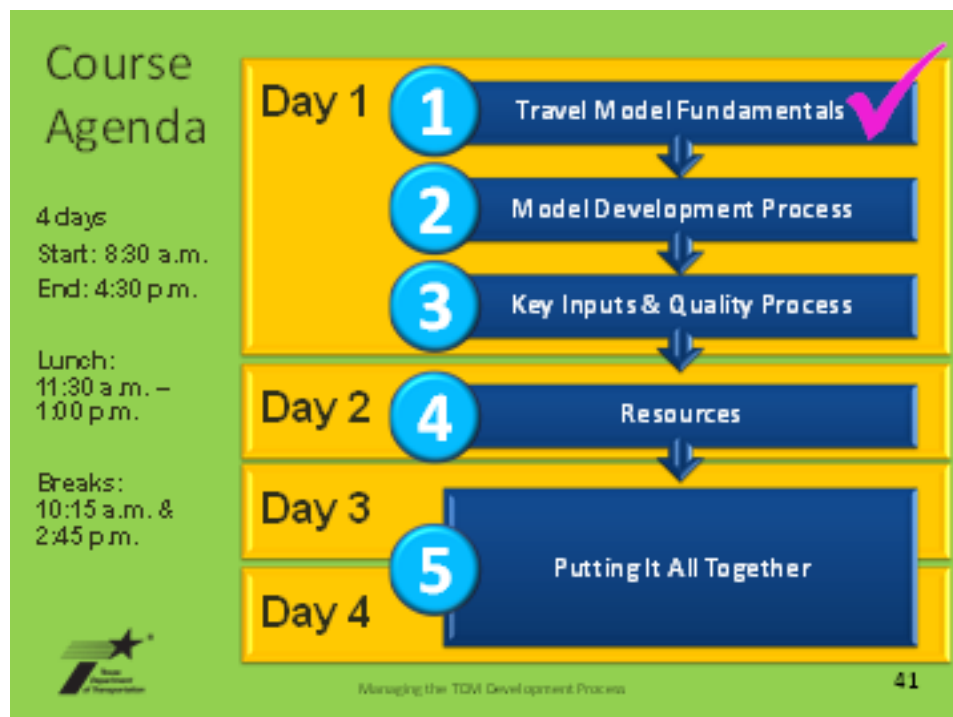


Lesson 1 Reinforcement Questions

After break, before starting the next lesson, review these questions (and answers) as a group:

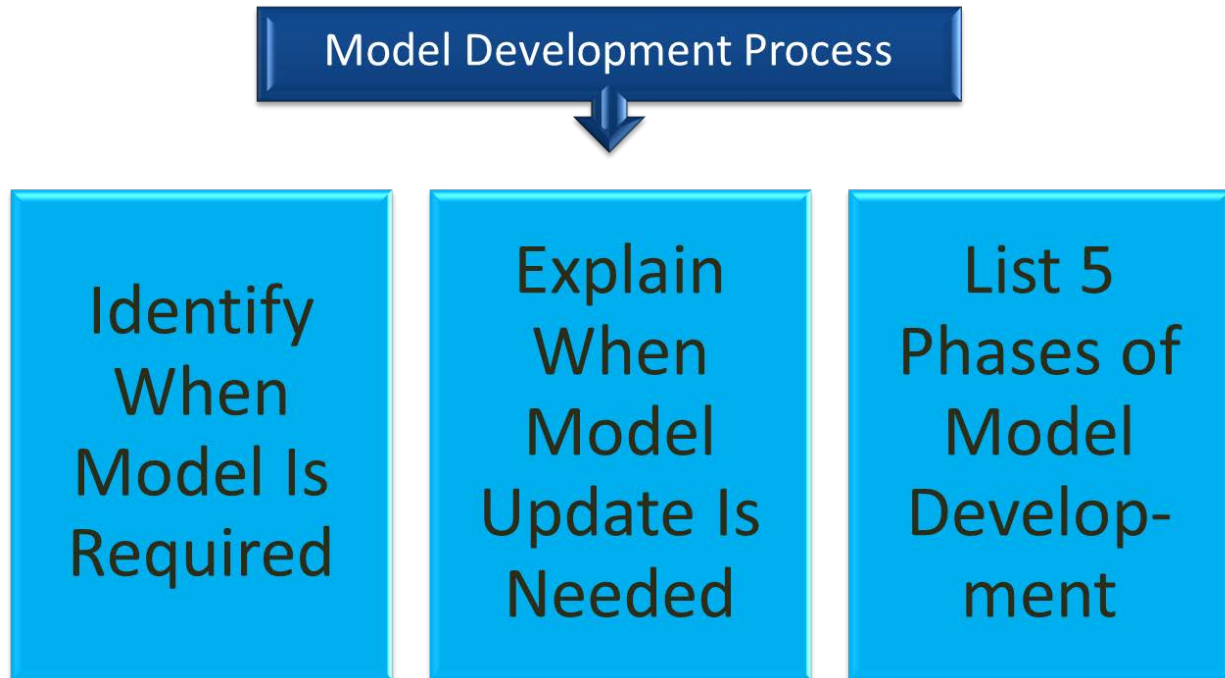
1. Describe the purpose of a travel model?
2. What are some uses of a travel model?
3. What are some limitations of a travel model?

Where Are We?



Lesson 2: Model Development Process

Learning Objectives



Lesson Materials Follow

 <p>Lesson 2 Learning Objectives</p> <p>Model Development Process</p> <ul style="list-style-type: none">Identify When Model Is RequiredExplain When Model Update Is NeededList 5 Phases of Model Development <p>Managing the TDM Development Process 42</p>	
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Topic 2.1 MPO Responsibilities Related to Models

MPO Responsibilities Relevant to Travel Modeling

 <p>MPO Responsibilities Related to Models</p> <p>Managing the TDM Development Process 43</p>	
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What Is an MPO? TMA?

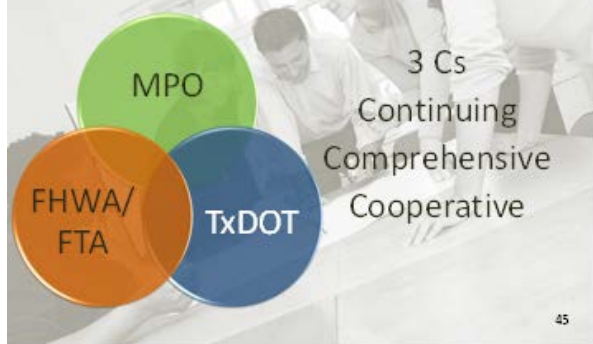
- A Metropolitan Planning Organization (MPO) is designated for urbanized areas with population over 50,000.
- A Transportation Management Area (TMA) is an MPO with population over 200,000.



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Planning Process



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Five Core MPO Functions*

1. Provide a setting for regional decision making
2. Identify and evaluate alternative transportation improvement options
3. Prepare and maintain a Metropolitan Transportation Plan (MTP)
4. Develop a Transportation Improvement Program (TIP)
5. Involve the public

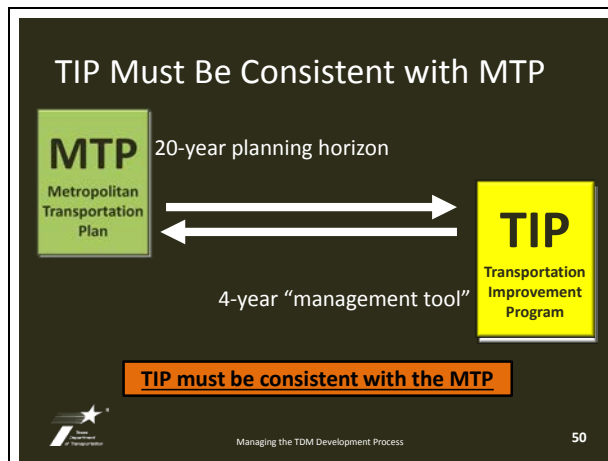


*Transportation Planning Process: Key Issues
A Briefing Book for Transportation Decisionmakers, Officials, and Staff, USDOT

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<h3>MTPs in Statewide Planning Context</h3> <p>MPO TIPs are needed to</p> <p>Managing the TDM Development Process 47</p>	
<h3>Metropolitan Transportation Plan</h3> <div style="display: flex; align-items: flex-start;"> <div style="border: 1px solid black; padding: 10px; margin-right: 20px; text-align: center;"> MTP Metropolitan Transportation Plan </div> <ul style="list-style-type: none"> ▪ Long-range: 20-year planning horizon ▪ Federal requirement of the metropolitan transportation planning process ▪ Cooperatively developed with consultative partners (TxDOT, FHWA, TCEQ, etc.) and local ▪ Financially-constrained component is required, illustrative purposes component is optional </div> <p>Managing the TDM Development Process 48</p>	
<h3>Transportation Improvement Program</h3> <div style="display: flex; align-items: flex-start;"> <ul style="list-style-type: none"> ▪ Short-range: list of projects programmed for implementation within 4 years ▪ A “management tool for monitoring progress in implementation” of the MTP ▪ Fiscally constrained ▪ Must be updated and approved every 2 years <div style="border: 1px solid black; padding: 10px; margin-left: 20px; text-align: center; flex: 0.5;"> TIP Transportation Improvement Program </div> </div> <p>Managing the TDM Development Process 49</p>	



TIP Amendment Triggers (Exhibit)

INSTRUCTION HANDBOOK Lesson 2 Model Development Process

EXHIBIT 2.6 TIP Amendment Triggers

Note: Because of various complexities of air quality and conformity issues, the need to revise a TIP should be discussed with TDECOT (see the TDECOT Transportation Planning Manual, 2001, p. 5-23).

Non-Attachment Area Project Change to:	Attachment Area Project Change to:
1. Add or delete any project.	1. Same, but only for <u>federally funded</u> projects.
2. Project's design concept or scope of work.	2. Same, but only for <u>federally funded</u> projects.
3. Project phase of work such as the addition of preliminary engineering, construction, or right-of-way.	3. Same, but only for <u>federally funded</u> projects.
4. In the TIP year if the MPO's project certification statement does not provide for <u>federally funded</u> projects from the amount, that, or funds pool.	4. Same.
5. Will Congestion Mitigation and Air Quality funding to a potentially impacted project or	5. Not applicable.
6. Funding from non-federal to federal funding or when the change in funding affects the addition or deletion of <u>federally funded</u> projects or <u>federally funded</u> state-funded projects.	6. Funding that forces the addition or deletion of <u>federally funded</u> projects.

Source: U.S. Code of Federal Regulations (24 CFR 400.104(g)). "Each project or project phase included in the TIP shall be consistent with the approved metropolitan transportation plan."

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KEY CONCEPT: The MTP, the TIP, and a travel model used to develop the MTP must all be consistent.

Exhibit 2.a TIP Amendment Triggers

Note: Because of various complexities of air quality and conformity issues, the need to revise a TIP should be discussed with TxDOT (see the TxDOT Transportation Planning Manual, 2001, p. 5-25).


Non-Attainment Area Project Change to:	Attainment Area Project Change to:
<ol style="list-style-type: none"> 1. add or delete any project; 2. project's design concept or scope of work; 3. project phase of work (such as the addition of preliminary engineering, construction, or right of way); 4. in the TIP year if the MPO's project selection procedure does not provide for selecting projects from the second, third, or fourth year; 5. add Congestion Mitigation and Air Quality funding to a previously approved project; or 6. funding from non-federal to federal funding or where the change in funding forces the addition or deletion of federally funded projects or regionally significant state funded projects. 	<ol style="list-style-type: none"> 1. Same, but only for <u>federally funded</u> projects 2. Same, but only for <u>federally funded</u> projects 3. Same, but only for <u>federally funded</u> projects 4. Same 5. Not applicable 6. Funding that forces the addition or deletion of <u>federally funded</u> projects

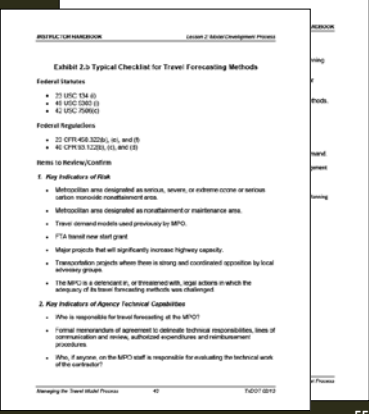
Source: U.S. Code of Federal Regulations [23 CFR 450.324(g)]: "Each project or project phase included in the TIP shall be consistent with the approved metropolitan transportation plan."

Additional MPO Responsibilities Related to Models

<p>Additional MPO Responsibilities Related to Models</p>  <p>Managing the TDM Development Process 52</p>	
<p>Air Quality Conformity</p>  <p>Managing the TDM Development Process 53</p>	
<p>Unified Planning Work Program (UPWP)</p> <ul style="list-style-type: none">▪ Describes planning work tasks, including those in support of the MTP▪ Basis for identifying state and federal sources of funding▪ Typically developed every 1-2 years  <p>Managing the TDM Development Process 54</p>	

Certification Review (Activity & Exhibit)





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Activity 2.1 Certification Review

MPO Certification Review is required for TMAs, and occurs at least every 4 years. Certification review covers many different aspects of the MPO responsibilities, only one part is the travel forecasting model. When FHWA and TxDOT meet with the MPO for certification review, there is typically a checklist of items to review or confirm regarding the travel forecasting model. A current version of this checklist is included here for discussion.

- What do you think “Key Indicators of Risk” means?
- Why might non-TMA MPO’s want to be aware of this Checklist?

Exhibit 2.b Typical Checklist for Travel Forecasting Methods

Federal Statutes

- 23 USC 134 (i)
- 49 USC 5303 (i)
- 42 USC 7506(c)

Federal Regulations

- 23 CFR 450.322(b), (e), and (f)
- 40 CFR 93.122(b), (c), and (d)

Items to Review/Confirm

1. Key Indicators of Risk

- Metropolitan area designated as serious, severe, or extreme ozone or serious carbon monoxide nonattainment area.
- Metropolitan area designated as nonattainment or maintenance area.
- Travel demand models used previously by MPO.
- FTA transit new start grant.
- Major projects that will significantly increase highway capacity.
- Transportation projects where there is strong and coordinated opposition by local advocacy groups.
- The MPO is a defendant in, or threatened with, legal actions in which the adequacy of its travel forecasting methods was challenged.

2. Key Indicators of Agency Technical Capabilities

- Who is responsible for travel forecasting at the MPO?
- Formal memorandum of agreement to delineate technical responsibilities, lines of communication and review, authorized expenditures and reimbursement procedures.
- Who, if anyone, on the MPO staff is responsible for evaluating the technical work of the contractor?

- Formal training or experience in the use of travel forecasting methods.
- MPO organization structure includes a technical committee to review planning assumptions and forecasting methods.
- Strategic plan and a guaranteed minimum level of funding in its UPWP for maintenance and improvements to its travel forecasting methods.
- Peer review or other independent assessment of its travel forecasting methods.

3. Documentation

- Inventory of current state of transportation.
- Key planning assumptions used in developing the forecasts.
- Descriptions of the methods used to develop forecasts of future travel demand.

Source: Federal Highway Administration/Federal Transit Administration, Transportation Management Area Planning Certification Review Primer,

http://www.planning.dot.gov/documents/primer/intro_primer.asp#3.2.

For more information, contact TxDOT or the Texas field office of FHWA, or reference FHWA's Planning Capacity Building Program (included in the References section at the end of this chapter).

MAP-21 and How It May (or May Not) Change Things


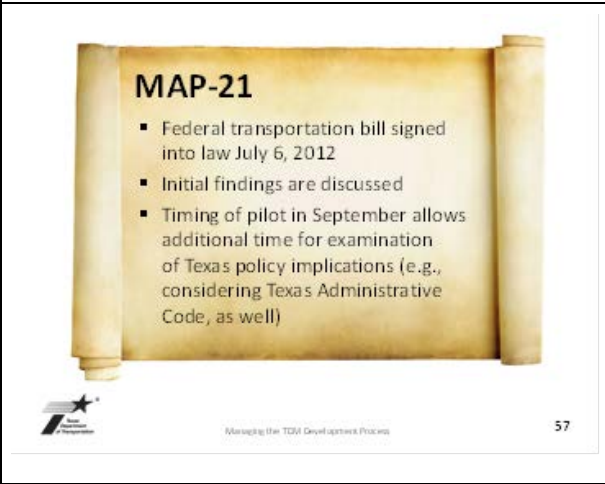

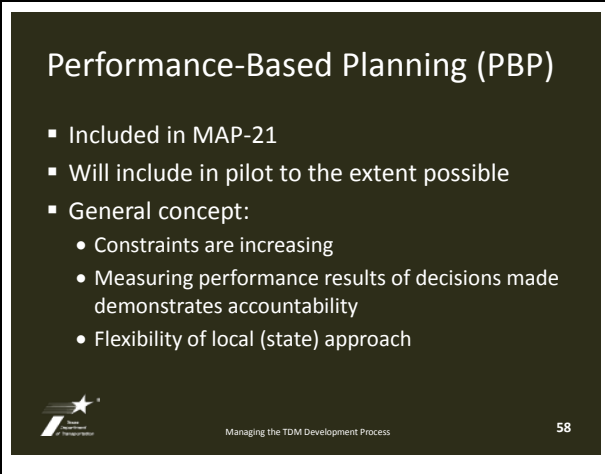

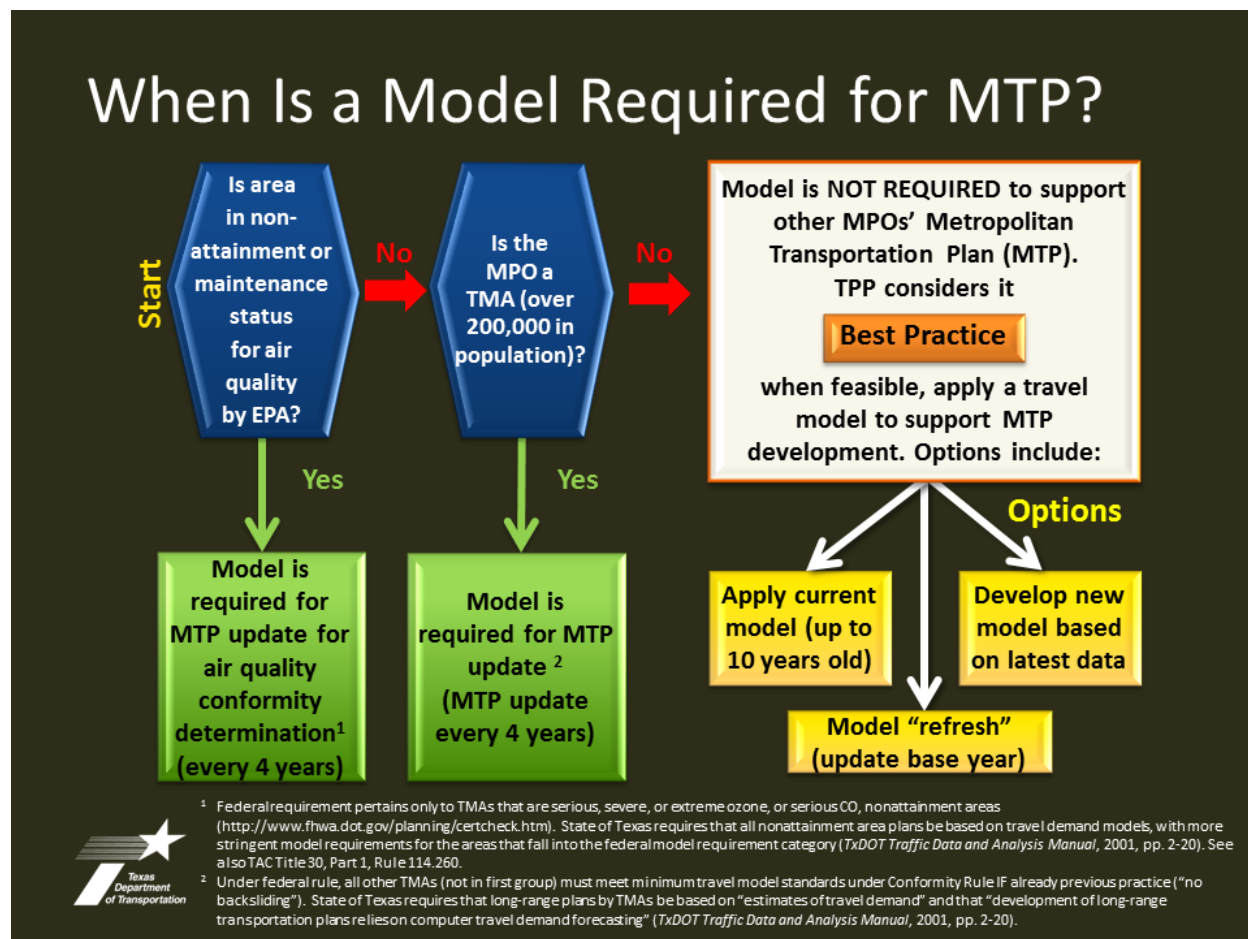
 <p>How Does MAP-21 Change Things?</p> <p> Managing the TDM Development Process 56</p>	
 <p>MAP-21</p> <ul style="list-style-type: none"> ▪ Federal transportation bill signed into law July 6, 2012 ▪ Initial findings are discussed ▪ Timing of pilot in September allows additional time for examination of Texas policy implications (e.g., considering Texas Administrative Code, as well) <p> Managing the TDM Development Process 57</p>	
 <p>Performance-Based Planning (PBP)</p> <ul style="list-style-type: none"> ▪ Included in MAP-21 ▪ Will include in pilot to the extent possible ▪ General concept: <ul style="list-style-type: none"> • Constraints are increasing • Measuring performance results of decisions made demonstrates accountability • Flexibility of local (state) approach <p> Managing the TDM Development Process 58</p>	

Exhibit 2.c When Is a Travel Model Required for an MTP?



The fine print:

- ¹ Federal requirement pertains only to TMAs that are serious, severe, or extreme ozone, or serious CO, nonattainment areas (<http://www.fhwa.dot.gov/planning/certcheck.htm>). State of Texas requires that all nonattainment area plans be based on travel demand models, with more stringent model requirements for the areas that fall into the federal model requirement category (TxDOT Traffic Data and Analysis Manual, 2001, pp. 2-20). See also TAC Title 30, Part 1, Rule 114.260.
- ² Under federal rule, all other TMAs (not in first group) must meet minimum travel model standards under Conformity Rule IF already previous practice ("no backsliding"). State of Texas requires that long-range plans by TMAs be based on "estimates of travel demand" and that "development of long-range transportation plans relies on computer travel demand forecasting" (TxDOT Traffic Data and Analysis Manual, 2001, pp. 2-20).

When Is a Model Update Required for an Application Scenario?

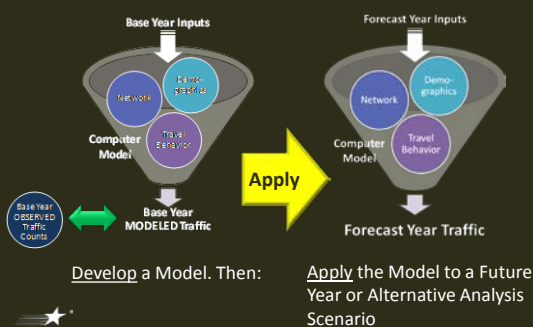
When Is a Model Update Required for an Application Scenario?



Managing the TDM Development Process

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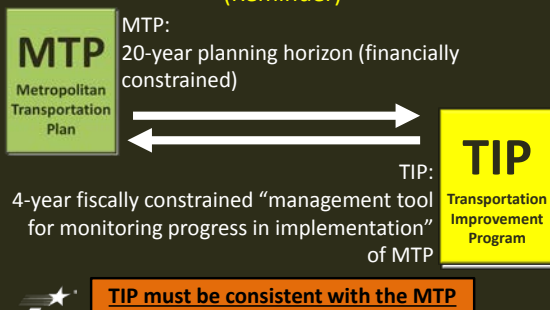
What Kind of Update?



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When Is a Model Update Necessary? (Reminder)



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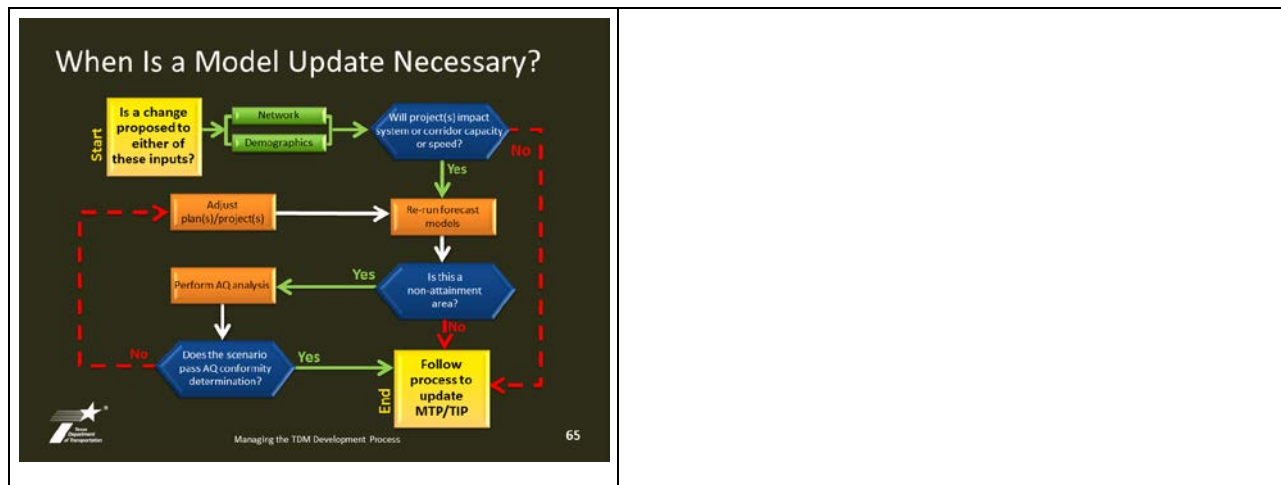
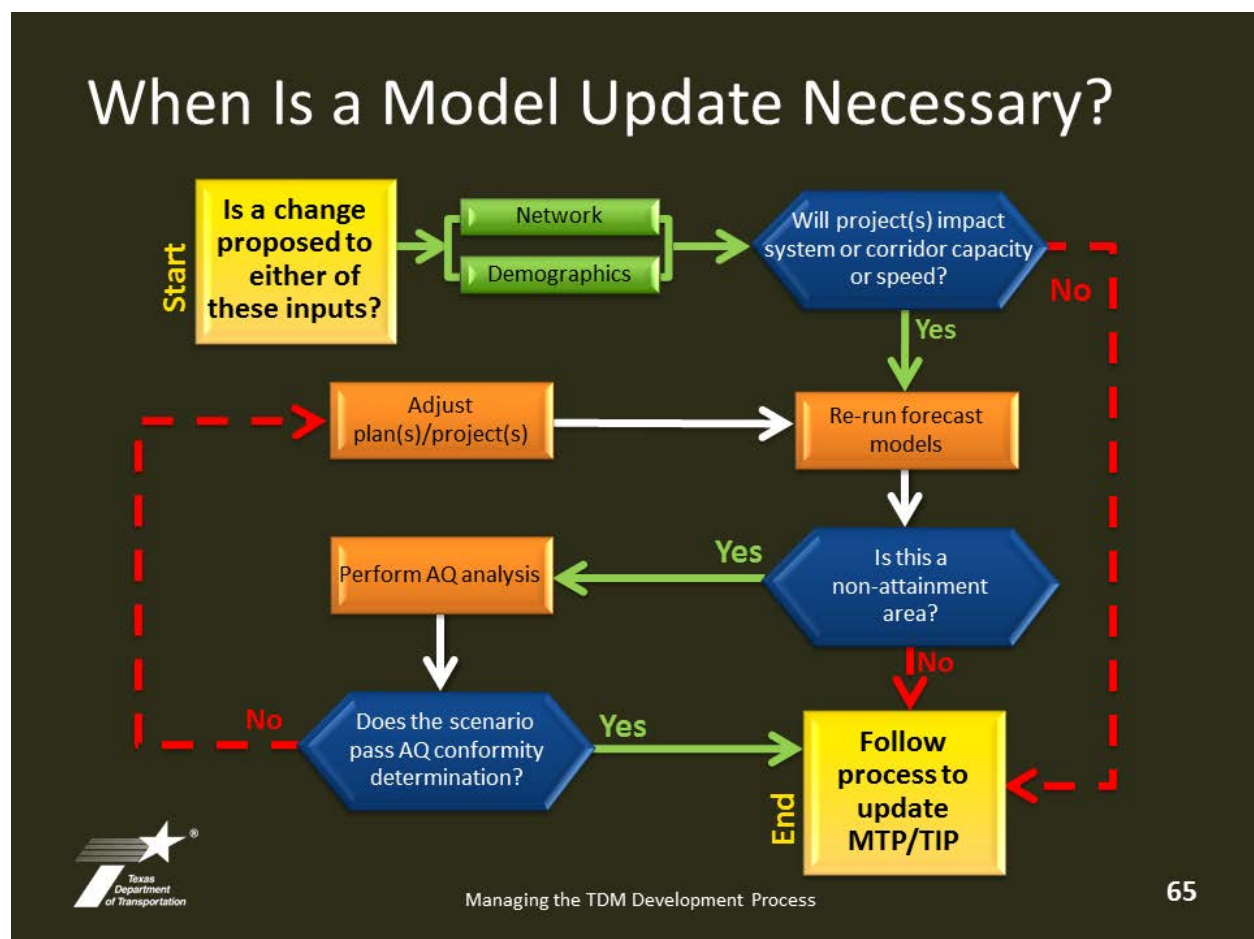
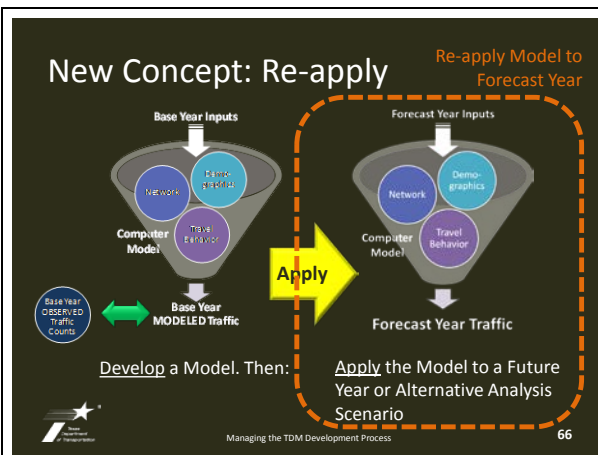


Exhibit 2.d When Is a Model Update Required for an Application Scenario?





When Is a Model Required Otherwise?

Examples include:

- Major investments/NEPA analyses
- Environmental justice examination of tolling projects (current and future)
- Mobile source air toxics analysis

MPOs should confer with TxDOT in these cases

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Activity: Is a Model Update Required?

INSTRUCTION HANDBOOK LESSON 2: Model Development Process

Activity 2.2 Is a Model Forecast Update Application Required?

As a small group, work through these five questions, and as well share answers in a full group. Write in the small space to mention one additional question.

Clues:

- Your MPO has an adopted MTP less than three years old.
- Your MPO is a TGA and you are in maintenance status for air quality.

For each of these scenarios, and referring to Exhibit 2 (see page 45), is a model forecast your update and model application required?

Scenario	Yes	No
1. Through technical oversight when the TIP was adopted, a new location/segment roadway was included in the TIP that was not in the MTP.		
2. The TxDOT District office is proposing to add a 0.1 mile auxiliary lane to a freeway segment between existing ramps and this project was not included previously in the MTP or TIP.		
3. Your MPO model does not include transit mode choices in the travel model. The base travel provider has decided to add a new mode to their system.		
4. The City Council has approved a parking charge and appropriate discounts to allow a regional mall in a location previously designated commercial.		
5. The City and TxDOT District are jointly funding a project to build a multi-use, and will appear in order to improve management and storage of operations in front of an existing commercial, high traffic area.		

These responses are for discussion purposes only. MPOs should check with TxDOT and TGA before making a final decision.

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KEY CONCEPT: The requirement that the TIP be consistent with the MTP drives need to “re-apply” the forecast year model

Activity 2.2 Is a Model Forecast Update/Application Required?

As a small group first, work through these five questions, and we will share answers as a full group. While in the small group, brainstorm one additional question.

Givens:

- Your MPO has an adopted MTP less than three years old.
- Your MPO is a TMA and you are in maintenance status for air quality.

For each of these scenarios, and referring to Exhibit 2.d on page 49, is a model forecast year update and model application required?

Scenario	Yes	No
1. Through a technical oversight when the TIP was adopted, a new-location arterial roadway was included in the TIP that was not in the MTP.		
2. The TxDOT District office is proposing to add a 0.1 mile auxiliary lane to a freeway segment between existing ramps, and this project was not included previously in the MTP or TIP.		
3. Your MPO model does not include transit (mode choice) in the travel model. The local transit provider has decided to add a new route to their system.		
4. The City Council has approved a zoning change and appropriate documents to allow a regional mall in a location previously designated parkland.		
5. The City and TxDOT District are jointly funding a project to braid existing on- and off-ramps in order to improve mainlane and frontage road operations in front of an existing commercial, high traffic area.		

These examples are for discussion purposes only. MPOs should check with TxDOT and FHWA before making a final decision.

Topic 2.3 Best Practice Model Uses to Support the MTP Development Process

<p>So, If a Model Is Not Required...</p> <p>When Is a Model Best Practice?</p>  <p>Managing the TDM Development Process 69</p>	
<p>When Is a Model Required for MTP?</p>   <p>Managing the TDM Development Process</p>	
<p>Why Do Travel Modeling?</p>   <p>Managing the TDM Development Process 71</p>	

Best Practice Model Uses for MTP

- Scenario testing
- Project prioritization
- To support performance measure examination under MAP-21 (specifics still being explored)



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Scenarios for Testing

- Fiscally-constrained forecast year (as required)
- No build (really: existing plus committed)
- Other test scenarios to define plan
 - To prioritize projects
 - To determine project implementation year
 - Etc.
- Needs plan/illustrative purposes



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Project Prioritization

How Does an MPO Decide Which Projects to Include in the Financially Constrained Plan?

- Run existing plus committed scenario to identify needs
- Test projects to address needs
 - Projects with existing funding/schedule
 - New projects not previously identified
- Examine measures of effectiveness



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Performance Measures

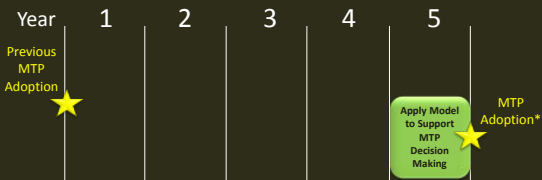
- More to come as MAP-21 is interpreted
- One possible approach:
 - MPO, with public, identifies goals to meet
 - Performance measures are used to evaluate how well the MTP meets those goals
 - Total regional delay reduction
 - Hot spots addressed
 - More people using sustainable modes
 - Other goals/measures not from a travel model



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MTP Development Model Need (5-Year MTP Adoption Cycle)



*(a) ...In attainment areas, the effective date of the transportation plan shall be its date of adoption by the MPO...

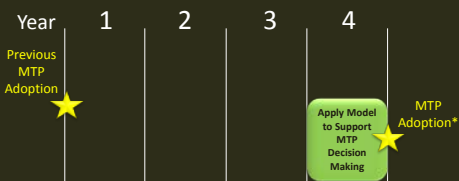
(c) The MPO shall review and update the transportation plan at least every four years in air quality nonattainment and maintenance areas and at least every five years in attainment areas..." (23 CFR 450.322)



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MTP Development Model Need (4-Year MTP Adoption Cycle)



* "In nonattainment and maintenance areas, the effective date of the transportation plan shall be the date of a conformity determination issued by the FHWA and the FTA." (23 CFR 450.322)



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<p>When is a Model Required for MTP?</p> <pre> graph TD Start([Start]) --> Q1{Is area in non-attainment or maintenance status for air quality by EPA?} Q1 -- Yes --> A1[Model is required for MTP update for air quality conformity determination¹ (every 4 years)] Q1 -- No --> Q2{Is the MPO a TMA (over 200,000 in population)?} Q2 -- Yes --> A2[Model is required for MTP update¹ (every 4 years)] Q2 -- No --> Q3{If Best Practice is Not an Option, What Next?} Q3 --> A3[Discuss options with TPR, may include, depending on circumstances, using a stale model or not using a model at all.] </pre> <p><small>¹ Federal requirements pertain only to TMA that are not local, state, or non-attainment, or serious CO, non-attainment areas. Major Criteria Pollutants and criteria for such areas. Federal requirements for air maintenance areas are for local and state demand models, with more stringent model requirements for the areas that fall inside of Federal model requirement category (TMDL Traffic Data and Analysis Manual, 2003, pp. 2-10). See also TMDL Code 10, Part 1, Rule 114.100.</small></p> <p><small>² Under Federal rule, all other TMA (not in Federal model requirement category) must meet model standards under Conformity Rule if already previously approved "no new building". Federal requirements for the long-range planning TMA are under "Federal model requirement" and are "development of long-range transportation plan and model computer to meet demand for building". TMDL Traffic Data and Analysis Manual, 2003, pp. 2-10.</small></p>	
<p>BREAK</p> <p>Managing the TDM Development Process 79</p>	

Post-Break Reinforcement Questions

1. What are some MPO functions where the model is particularly relevant?

2. What are the two primary triggers that require a model for an MTP?

3. What does reapply when in the context we just discussed?

Topic 2.4 Key Dates for Modeling and the MTP

Key Dates for Modeling and the MTP



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3-Model Concept

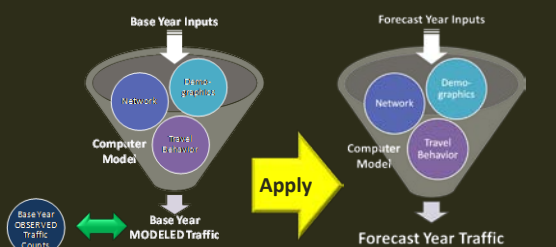
- Current model available
- Model under development
- Data collection for next model after that



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Reminder: Base Year and Forecast Year



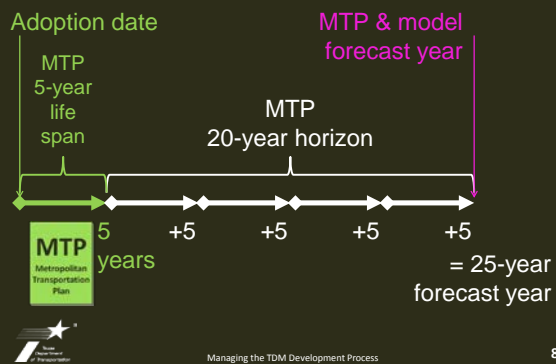
Develop a Model. Then: Apply the Model to a Future Year or Alternative Analysis Scenario



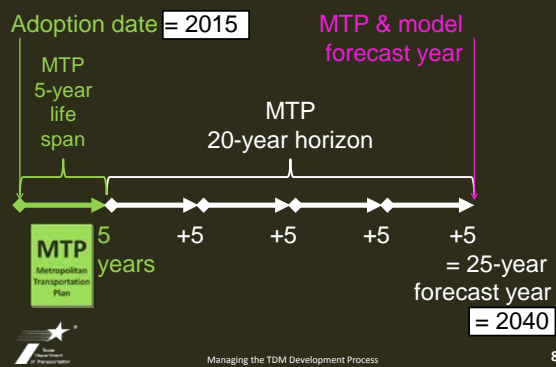
Managing the TDM Development Process

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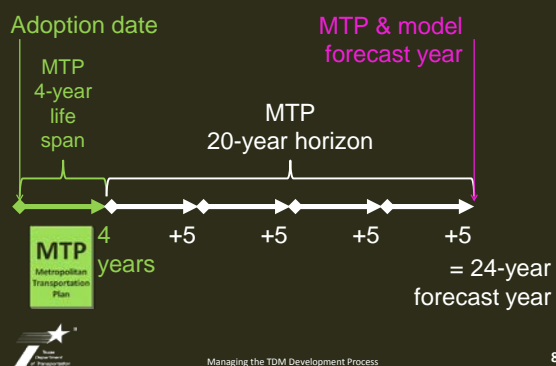
Adoption, Forecast Years: 5-Year Cycle



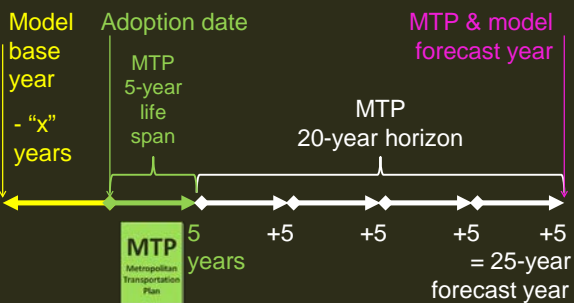
Example



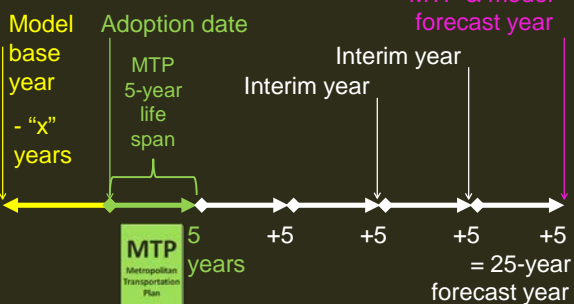
Adoption, Forecast Years: 4-Year Cycle



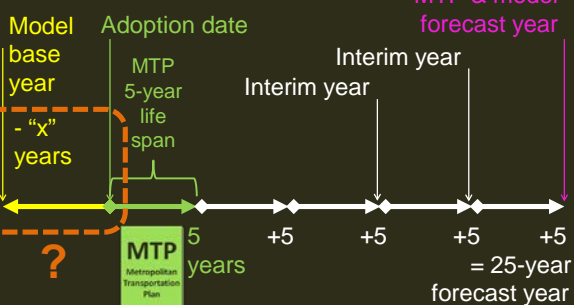
Model Base Year Precedes MTP



Interim Model Years



What Is a Stale Model?



Models: 5 Years Old versus New



2007 4 Runner



2012 4 Runner



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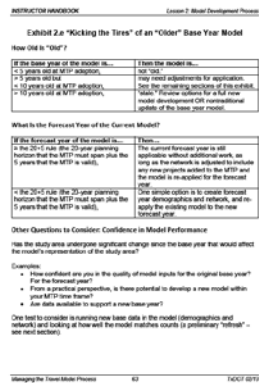
89

“Kicking the Tires” Exhibit



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KEY CONCEPT: A model with base year less than 5 years old at MTP adoption is not stale.

Exhibit 2.e “Kicking the Tires” of an “Older” Base Year Model

How Old Is “Old”?

If the base year of the model is...	Then the model is...
< 5 years old at MTP adoption,	not “old.”
> 5 years old but < 10 years old at MTP adoption,	may need adjustments for application. See the remaining sections of this exhibit.
> 10 years old at MTP adoption,	“stale.” Review options for a full new model development OR nontraditional update of the base year model.

What Is the Forecast Year of the Current Model?

If the forecast year of the model is...	Then...
≥ the 20+5 rule (the 20-year planning horizon that the MTP must span plus the 5 years that the MTP is valid),	The current forecast year is still applicable without additional work, as long as the network is adjusted to include any new projects added to the MTP and the model is re-applied for the forecast year.
< the 20+5 rule (the 20-year planning horizon that the MTP must span plus the 5 years that the MTP is valid),	One simple option is to create forecast year demographics and network, and re-apply the existing model to the new forecast year.

Other Questions to Consider: Confidence in Model Performance

Has the study area undergone significant change since the base year that would affect the model's representation of the study area?

Examples:


- How confident are you in the quality of model inputs for the original base year? For the forecast year?
- From a practical perspective, is there potential to develop a new model within your MTP time frame?
- Are data available to support a new base year?

One test to consider is running new base data in the model (demographics and network) and looking at how well the model matches counts (a preliminary “refresh” – see next section).

What Is a “Nontraditional” Base Year Model “Refresh”?

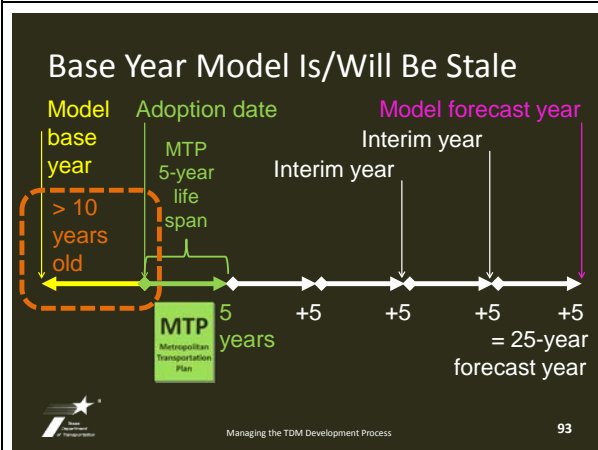
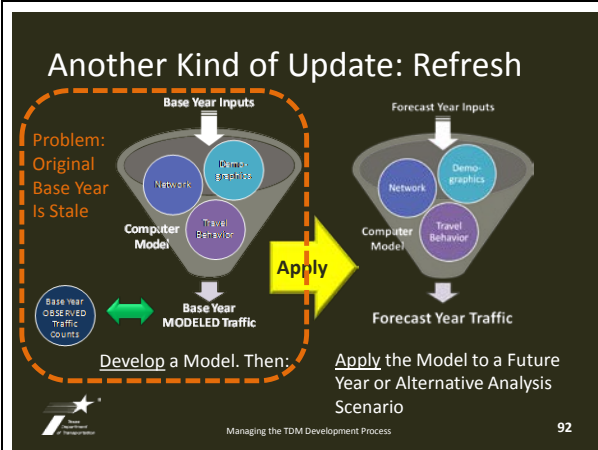
Models: Older than 10 Years

2002 Camry

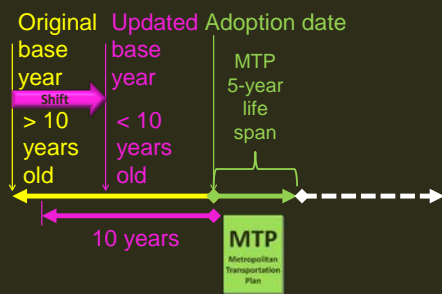


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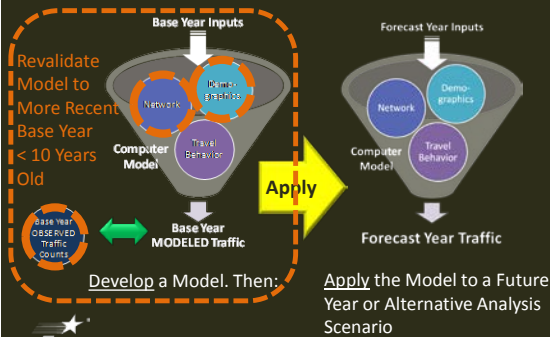
Nontraditional Refresh of Base Year



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Nontraditional Refresh



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Topic 2.5 Calibrating a New Base Year Model

3-Model Concept

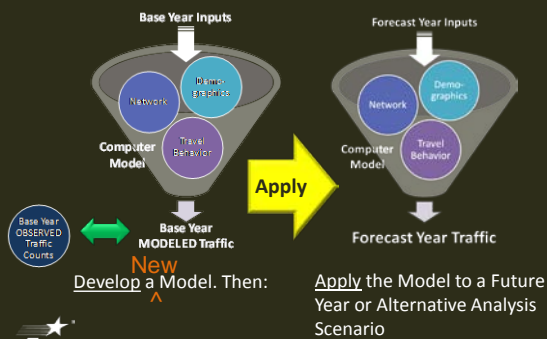
- Current model available
- Model under development
- Data collection for next model after that



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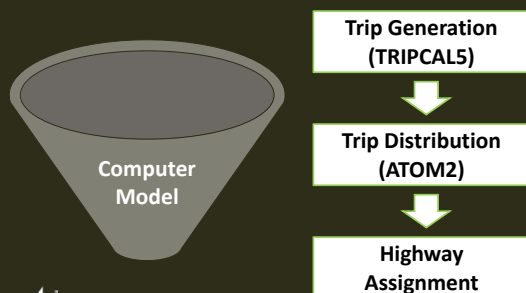
Calibration of New Model



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From Lesson 1: The Texas Package Is a Trip-Based Model, Generally 3 Steps



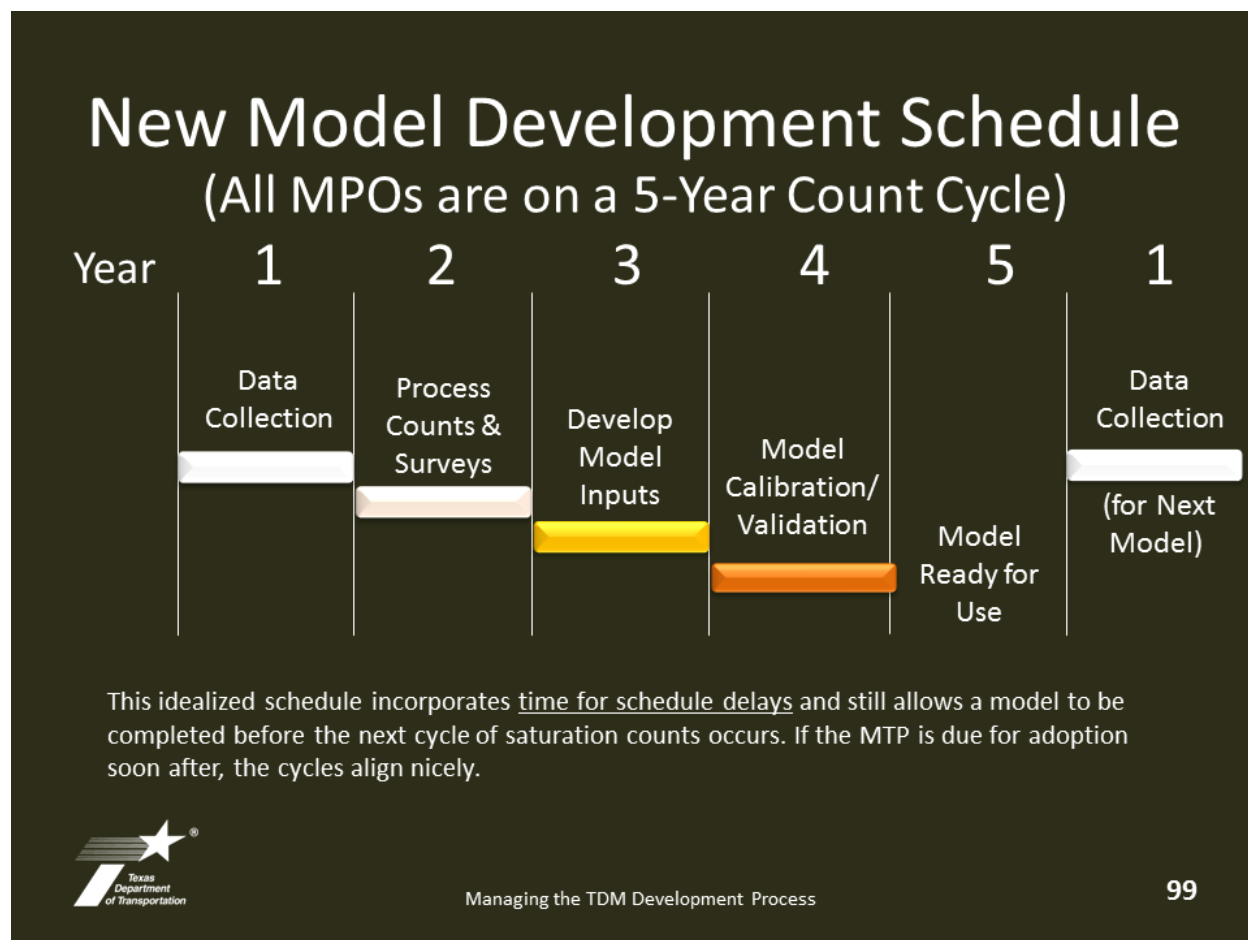
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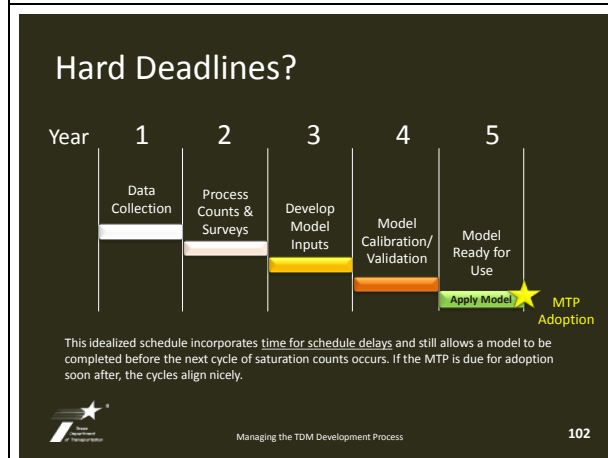
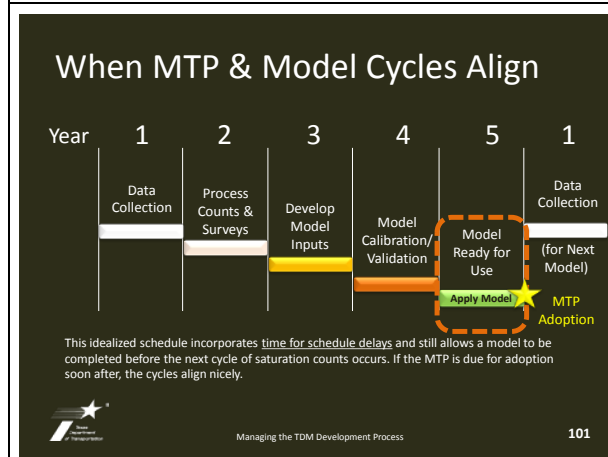
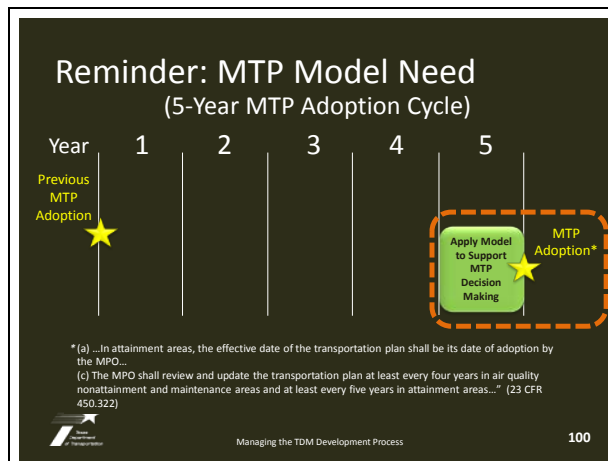
98

Exhibit 2.f Travel Model Development and Application Timeline to Support an MTP on a 5-Year Count Cycle

Four phases of model development are shown in the schedule shown in this exhibit. The fifth phase is actual model application for the purpose of planning and analysis.

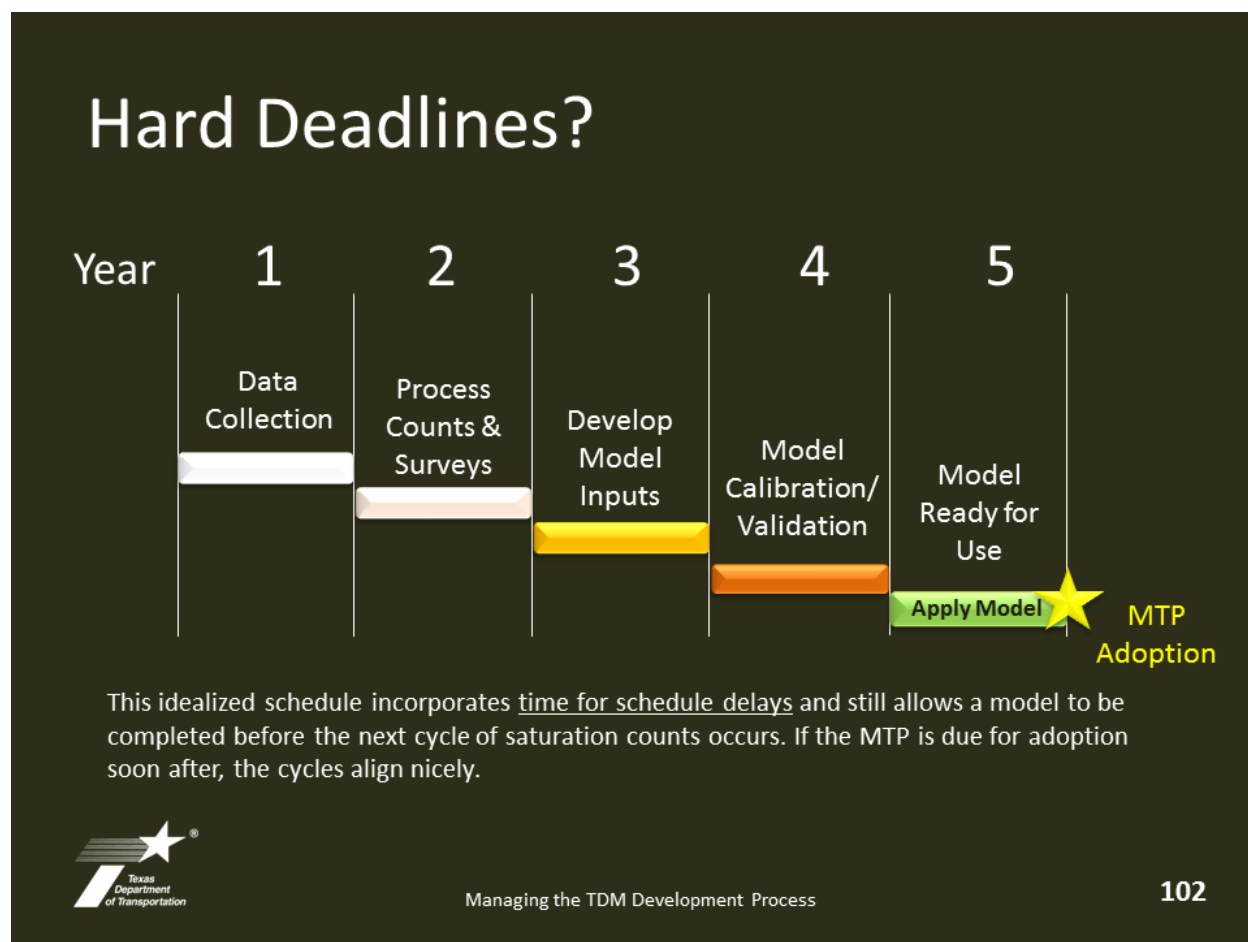
IMPORTANT: This is an idealized schedule in order to explore the basic concept of model develop schedule.





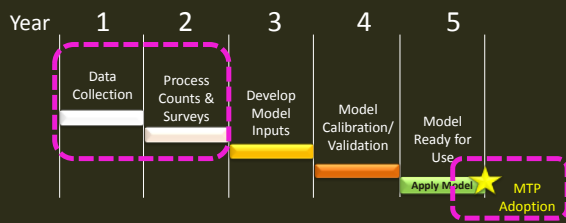
Activity 2.3 What Critical Path Items Can We Identify from This Idealized Schedule?

As a small group, looking at this graphic, identify the critical path activities. Critical path items are those that are not very flexible with regard to timing. Discuss for 5 minutes and then come back to the full group.



After discussing the critical path activities, what opportunities are there to compress the schedule if you needed the model sooner than this schedule shows?

Hard Deadlines?



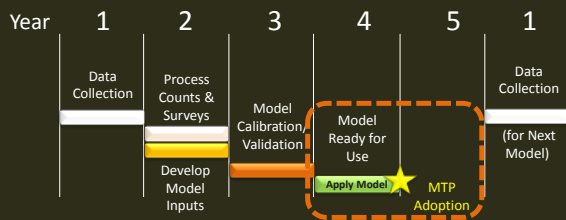
This idealized schedule incorporates time for schedule delays and still allows a model to be completed before the next cycle of saturation counts occurs. If the MTP is due for adoption soon after, the cycles align nicely.



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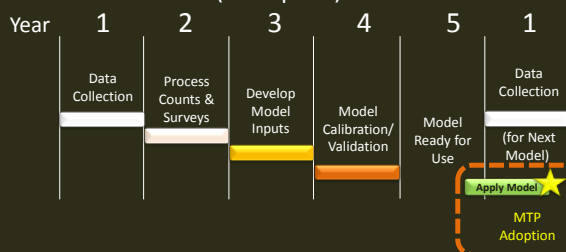
Room for Some Flexibility



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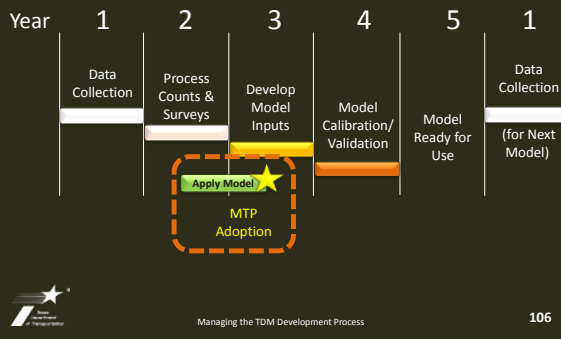
What If the Schedules Don't Align? (Example 1)



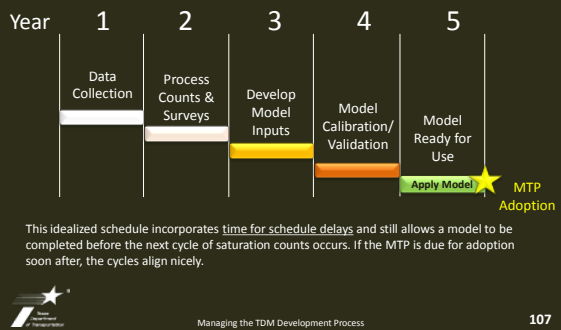
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What If the Schedules Don't Align? (Example 2)

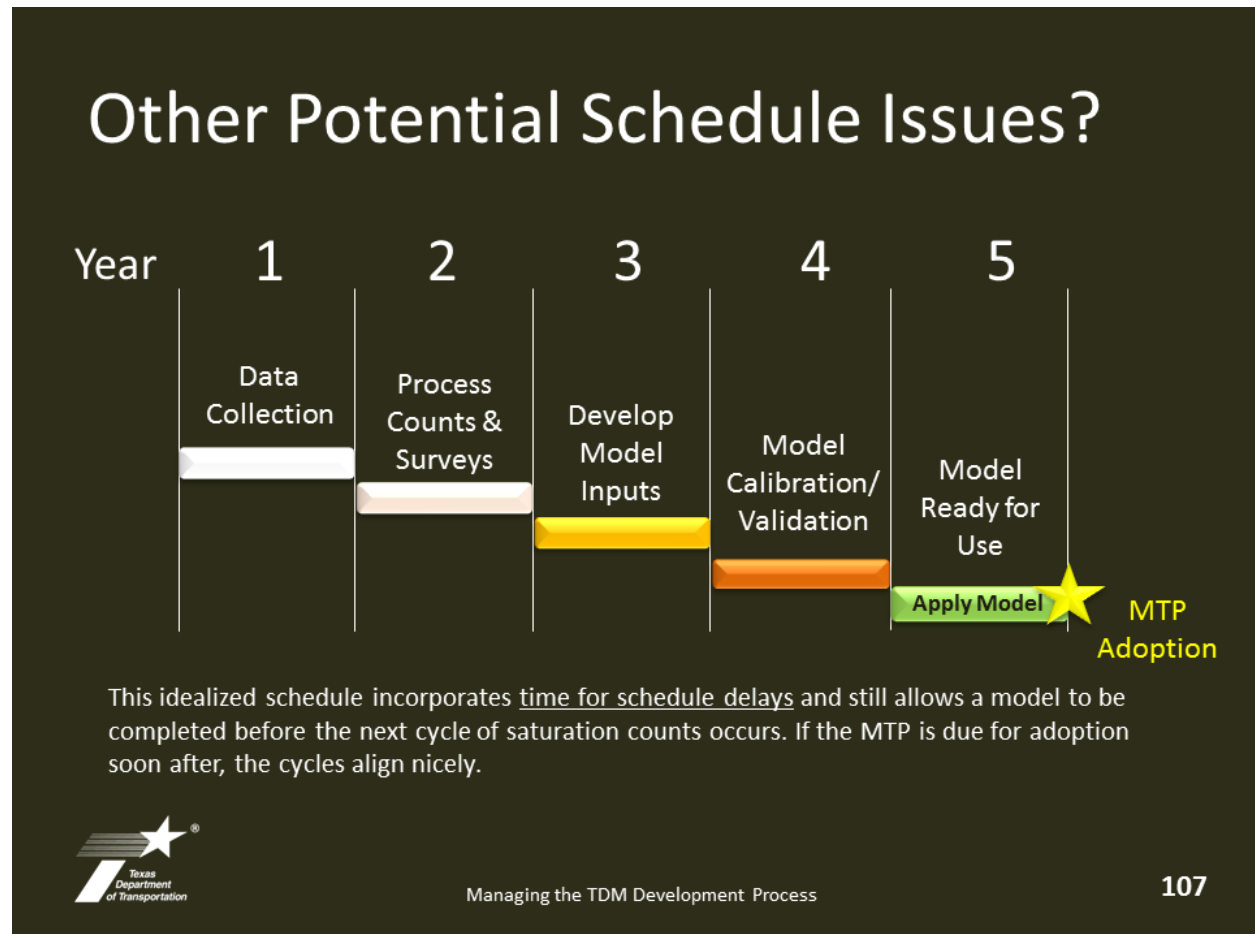


Other Potential Schedule Issues?



Activity 2.4 What Other Potential Schedule Issues Might Arise?

As a large group, looking at this graphic, brainstorm some potential issues that might delay the schedule.



Topic 2.6 Other Helpful Resources

MAP-21 – Federal Highway Administration (FHWA) Website

Federal transportation funding authorization, signed into July 6, 2012.

<http://www.fhwa.dot.gov/map21/>

MAP-21 – Federal Transit Administration (FTA) Website

Federal transportation funding authorization, signed into July 6, 2012.

<http://www.fta.dot.gov/map21/>

Texas Administrative Code regarding Non-attainment Areas

[TAC Title 30, Part 1, Rule 114.260] Texas rule regarding conformity for transportation: “Applicability. **This section applies to transportation-related criteria pollutants for which an area is designated nonattainment or is subject to a maintenance plan.**

The transportation-related criteria pollutants are ozone, carbon monoxide, nitrogen dioxide, particles with an aerodynamic diameter of ten micrometers (PM_{10}) and smaller, and particles with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers ($PM_{2.5}$). This section also applies to the precursors of ozone, nitrogen dioxide, PM_{10} , and $PM_{2.5}$ as required in 40 CFR §93.102.”

[http://info.sos.state.tx.us/pls/pub/readtac\\$ext.TacPage?sl=R&app=2&p_dir=&p_rloc=131077&p_tloc=&p_ploc=&pg=1&p_tac=131077&ti=30&pt=1&ch=114&rl=260&dt=&z_chk=2542442&z_contains=Metropolitan%20Planning](http://info.sos.state.tx.us/pls/pub/readtac$ext.TacPage?sl=R&app=2&p_dir=&p_rloc=131077&p_tloc=&p_ploc=&pg=1&p_tac=131077&ti=30&pt=1&ch=114&rl=260&dt=&z_chk=2542442&z_contains=Metropolitan%20Planning)

Transportation Planning Process: Key Issues

A Briefing Book for Transportation Decisionmakers, Officials, and Staff

AKA The “Briefing Book” – a fundamental resource and starting point.

<http://planning.dot.gov/documents/briefingbook/bbook.htm>

or PDF at:

http://planning.dot.gov/documents/briefingbook/bbook_07.pdf

Transportation Planning Capacity Building

FHWA/FTA joint Web site – resources for MPOs.

<http://www.planning.dot.gov/default.asp>



TxDOT Data and Analysis Manual, 2001

Explanation of the Traffic Estimation and Count Programs (Section 1), Urban Travel Demand Forecasting (Section 2, including Air Quality in Subsection 5), and Project Level Traffic Data Development (Section 3). NOTE THIS MANUAL IS CURRENTLY UNDER UPDATE AND SOME MATERIAL MAY BE OUT OF DATE.

<http://onlinemanuals.txdot.gov/txdotmanuals/tda/tda.pdf>

TxDOT Transportation Planning Manual, 2001

Guidelines for the planning process, see especially Chapter 5.

<http://onlinemanuals.txdot.gov/txdotmanuals/pln/pln.pdf>

**MPO Certification Review: Checklist for Travel Model Forecasting Methods – FHWA Overview**

This Web page provides readable but comprehensive discussion of the role that travel models play in certification review and air quality conformity analysis. May continue to evolve following MAP-21 legislation.

<http://www.fhwa.dot.gov/planning/certcheck.htm>

**Transportation Management Area Planning Certification Review Primer**

The TMA Certification Review Primer Itself and the checklist included in this Lesson. May continue to evolve following MAP-21 legislation.

http://www.planning.dot.gov/documents/primer/intro_primer.asp#3.2

U.S. Code of Federal Regulations

The federal Transportation Conformity Rule [40 CFR 93.122 (b) and (c)] at

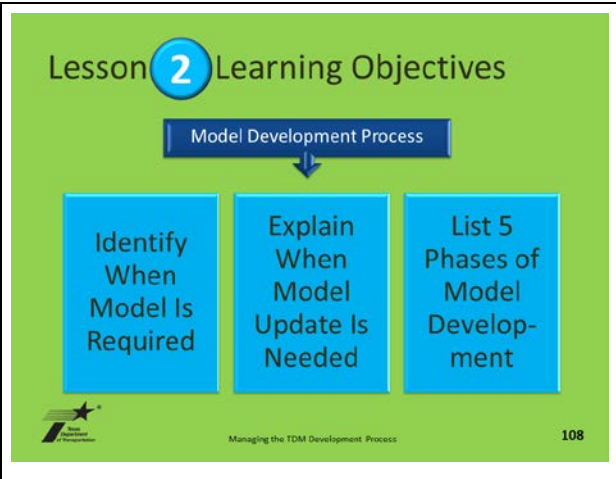
<http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&rgn=div5&view=text&node=40%3A21.0.1.1.7&idno=40#40:21.0.1.1.7.1.1.23>

The import of this section of the code is best described as:

“The Transportation Conformity Rule established a regulatory requirement that includes minimum specifications for travel models used to forecast vehicle activity for regional emission analyses in conformity determinations in certain non-attainment and maintenance areas [40 CFR 93.122 (b) and (c)]. However, these minimum specifications apply only to metropolitan planning areas with an urbanized area population over 200,000 that are also serious, severe or extreme ozone or serious carbon monoxide non-attainment areas. All other non-attainment or maintenance areas must continue to meet the minimum specifications for travel models established in the Conformity Rule to the extent that those procedures have been the previous practice of the MPO.” From: <http://www.fhwa.dot.gov/planning/certcheck.htm>

Topic 2.7 Lesson Wrap-Up

On the previous page is a list of Other Helpful Resources that cover the topics in this lesson.

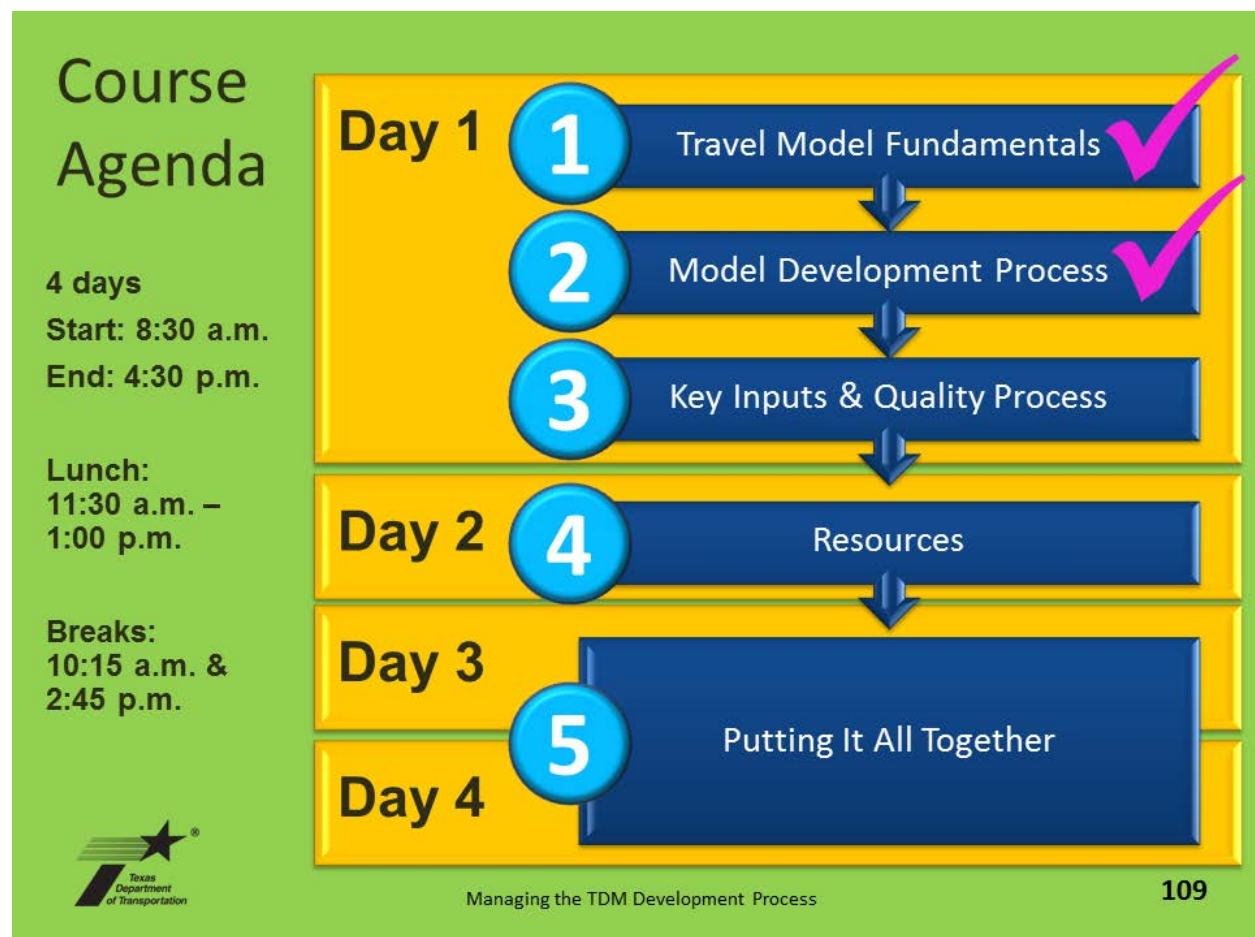
 <p>The diagram is titled "Lesson 2 Learning Objectives" in a green box. Below the title is a blue box labeled "Model Development Process" with a downward arrow pointing to three blue boxes arranged horizontally. The first box says "Identify When Model Is Required", the second says "Explain When Model Update Is Needed", and the third says "List 5 Phases of Model Development". At the bottom left is the Texas Department of Transportation logo, and at the bottom right is the page number "108".</p>	<p>At the beginning of this lesson, we set the following learning objectives. At this point, you would be able to: (read the objectives).</p> <p>Does anyone have any questions about this material?</p>
--	--

Lesson 2 Reinforcement Questions

After break, before starting the next lesson, review these questions (and answers) as a group:

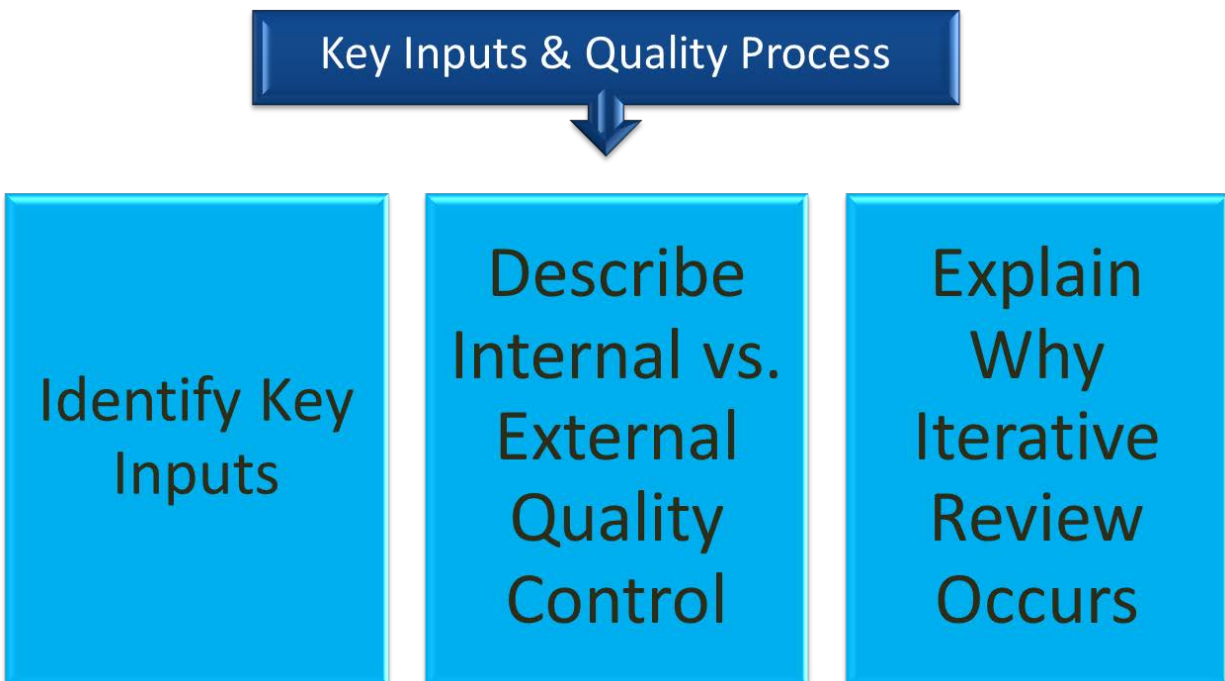
1. What are the three models?
2. What is a stale model
3. What is a model refresh?
4. What are the five phases to develop a new base year model?

Where Are We?



Lesson 3: Key Inputs and the Quality Process

Learning Objectives



Lesson Materials Follow

Lesson 3 Learning Objectives

Key Inputs & Quality Process

↓

Identify Key Inputs

Describe Internal vs. External Quality Control

Explain Why Iterative Review Occurs

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Topic 3.1 Overview

Ideal MTP/Model Schedule

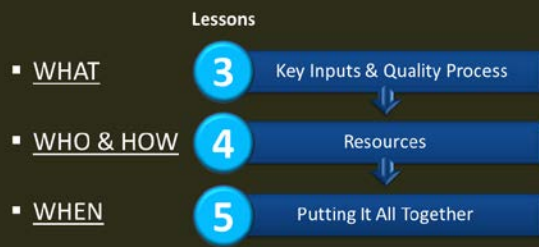
Year	1	2	3	4	5
	Data Collection	Process Counts & Surveys	Develop Model Inputs	Model Calibration/Validation	Model Ready for Use
					Apply Model ★ MTP Adoption

This idealized schedule incorporates time for schedule delays and still allows a model to be completed before the next cycle of saturation counts occurs. If the MTP is due for adoption soon after, the cycles align nicely.

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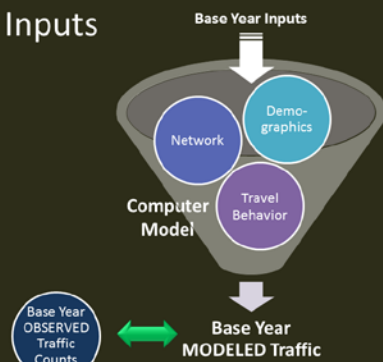
Plan for Lessons 3, 4, and 5



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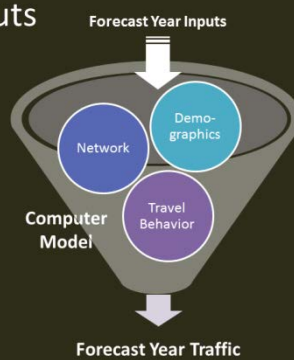
Base Year Inputs



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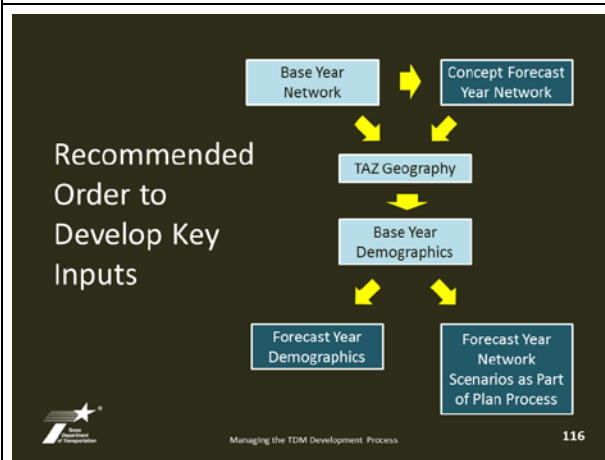
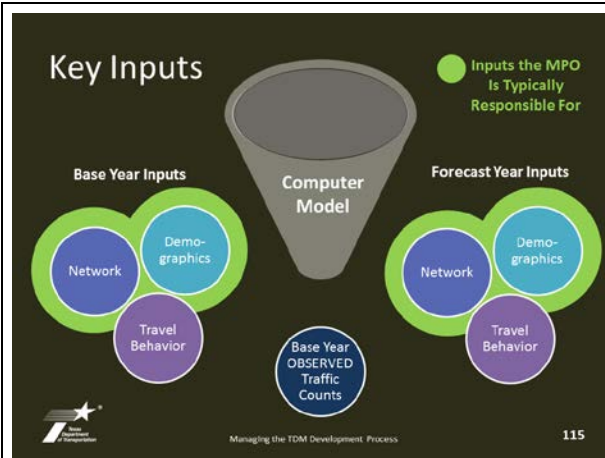
113

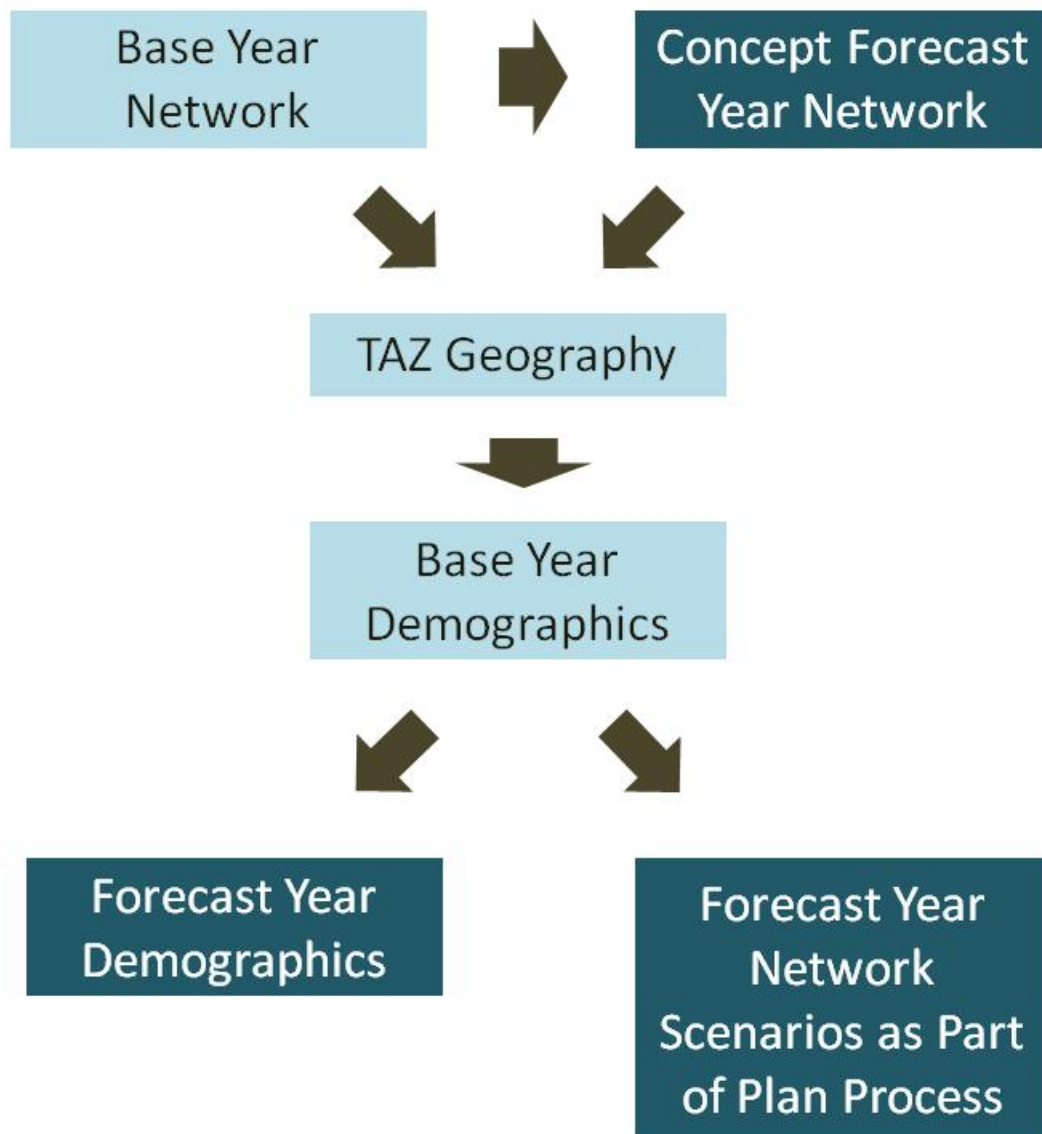
Future Year Inputs



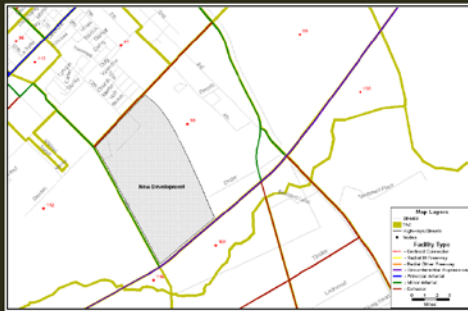
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**Exhibit 3.a Travel Model Network and Demographics Inputs
Development: Recommended Order**

Start: Base Year Network



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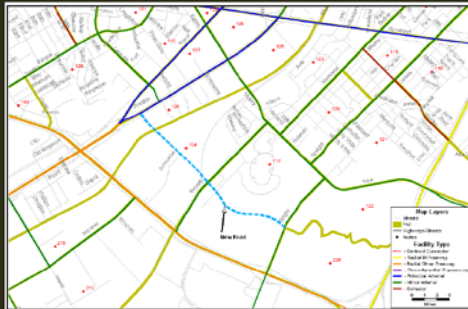
Code: Concept Forecast Year Network



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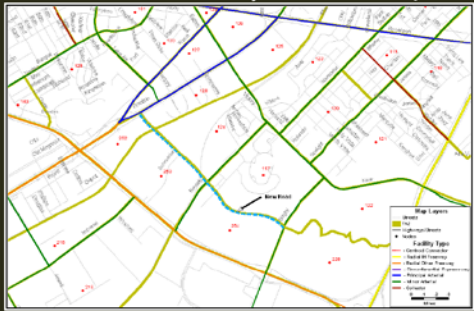
Code: Concept Forecast Year Network



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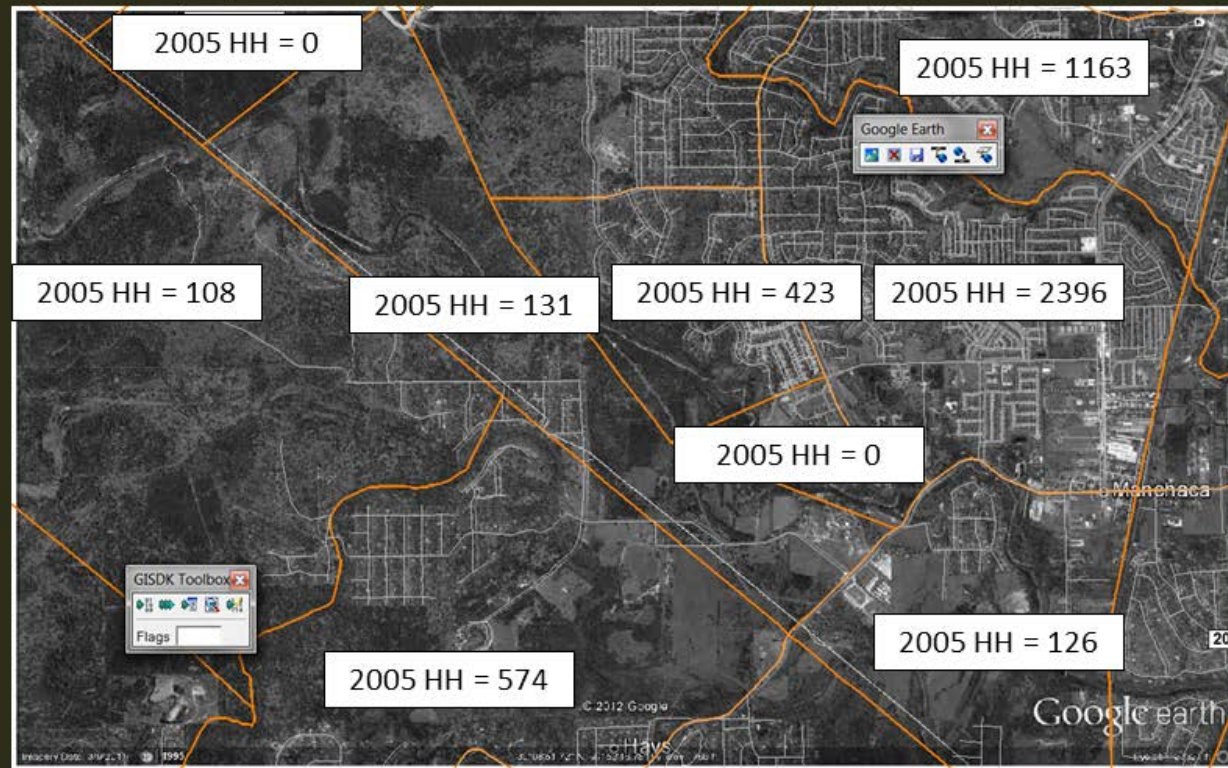
Define Traffic Analysis Zones (TAZs)



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Develop Base Year Demographics

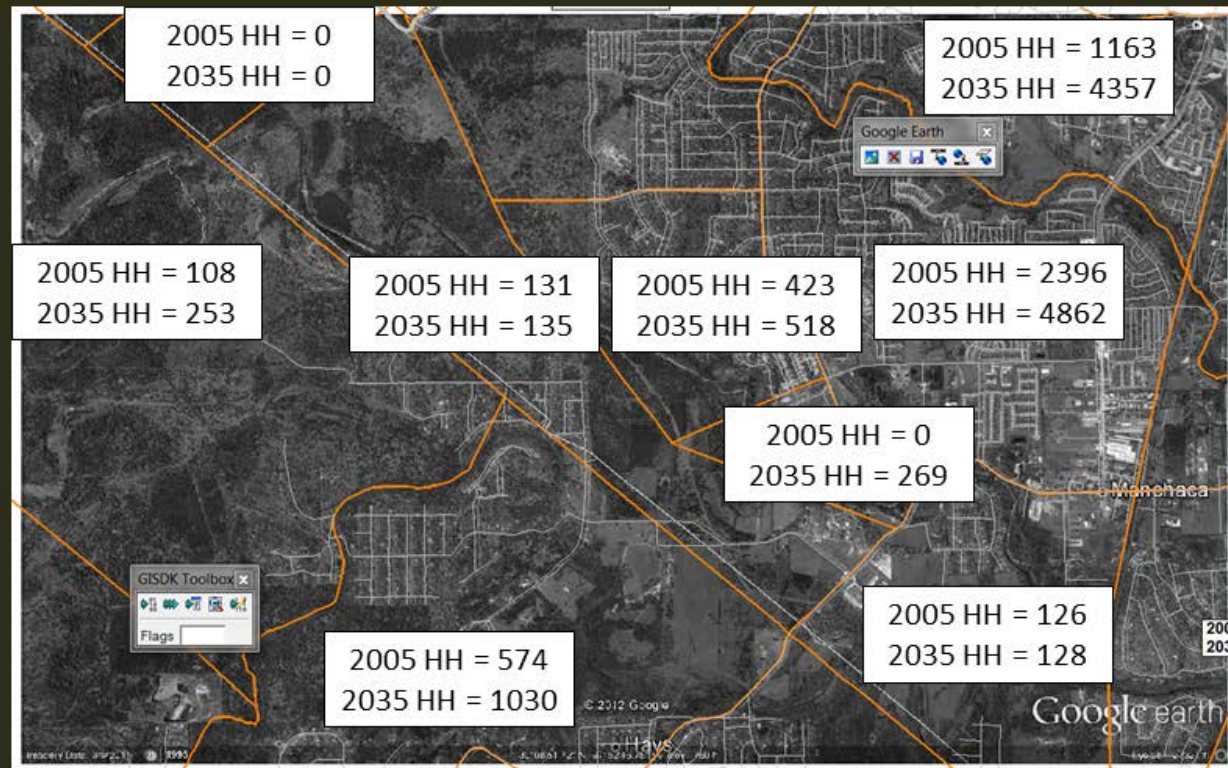


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Base year demographics are developed for the TAZ geography.

Develop Forecast Year Demographics



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Forecast year demographics use the same TAZ geography and build upon the base year data.

Topic 3.2 Base Year – Need to Know

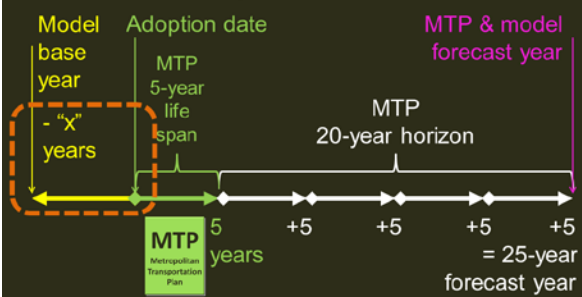
Base Year —Need to Know



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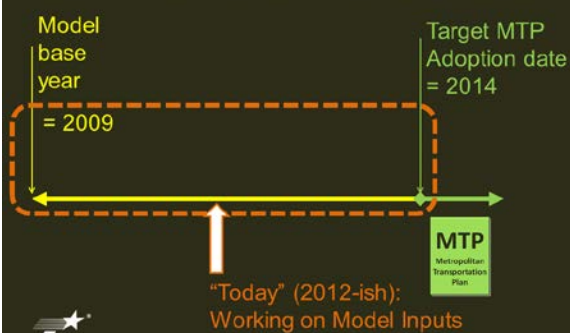
Reminder: Key Dates



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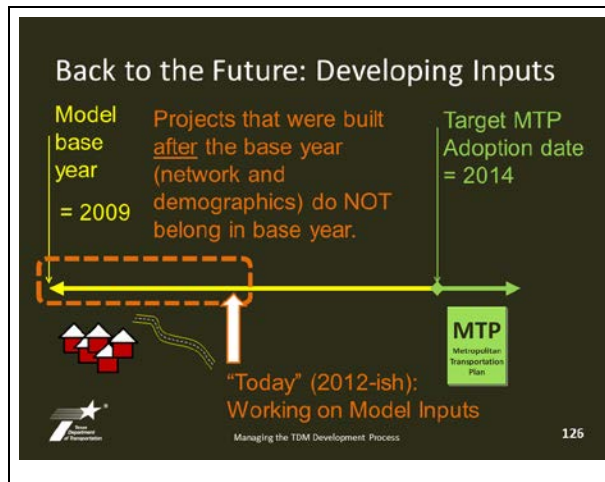
124

Back to the Future: Developing Inputs

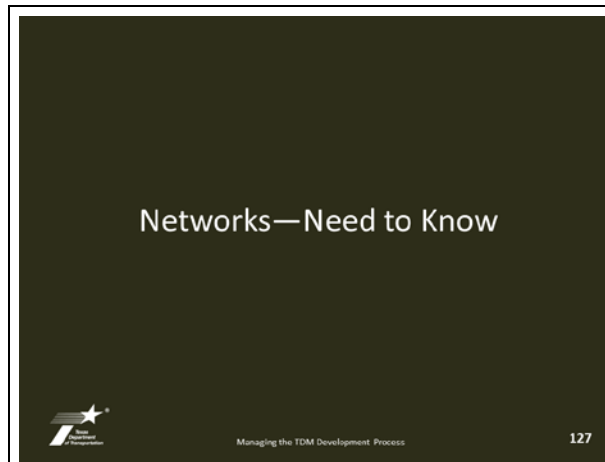


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Topic 3.3 Key Concepts for MPO Model Inputs



Network Key Concepts Exhibit

INSTRUCTOR HANDBOOK Lesson 3: Key Inputs and the Quality Process

Exhibit 3.b Base Year and Forecast Year Network Approaches

	Base Year	Forecast Year
Description of Base	Forecast year reflects all required attribute data representing the base year roadway transportation system.	Same, but for forecast year.
Key Input Data	<ul style="list-style-type: none"> Geography (where is the road? Where will it be?) Access and connectivity to other facilities (intersections, signals) Facility type (see next exhibit) Link network of links 	<ul style="list-style-type: none"> Includes all facilities in base year network. Plus regionally significant future facilities. And any other facilities for which forecast and volumes are needed. Maintain link node consistency as much as possible with Base Year network to facilitate comparison of link-level model results.
Possible Input Data Options	<ul style="list-style-type: none"> Previous Base Year Network Recently Constructed Projects Get with other local agencies Drive-out the Network Two-person approach is best Accurate hard-copy maps is typical approach Review aerial imagery 	<ul style="list-style-type: none"> Same, plus to derive planned projects from local planning documents.
Suggested Skill Set of Technical Staff Doing the Work	<ul style="list-style-type: none"> Local knowledge (attention to detail) Basic knowledge of differences between facility types 	<ul style="list-style-type: none"> Same, plus knowledge of planned projects
Suggested Skill Set of Reviewer	<ul style="list-style-type: none"> Local knowledge of how data is used to model Local streets should not be included unless providing access or otherwise provided Check streets that were recently constructed (not in the base year network) to determine whether they were open in base year. Check directionality. 	<ul style="list-style-type: none"> Avoid including additional detail and facilities not assigned by TAC. Ensure streets that were recently constructed are included in the forecast year. Check directionality.
Common Issues to Avoid		

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Exhibit 3.b Base Year and Forecast Year Network Approaches

	Base Year	Forecast Year
Description of Item	TransCAD network with required attribute data representing the base year roadway transportation system	Same, but for forecast year
Key Input Data	<ul style="list-style-type: none"> • Geography (where is the road? Where will it be?) • Access and connectivity to other facilities (intersections, ramps) • Facility type (see next exhibit) • Total number of lanes 	
Possible Input Data Options	<ul style="list-style-type: none"> • Previous Base Year Network • Recently Constructed Projects • Get with other local agencies • Drive-out the Network • Two-person approach is best • Annotate hard-copy maps is typical approach • Review Aerial Imagery 	<ul style="list-style-type: none"> • Includes all facilities in Base Year network • Plus regionally significant future facilities • And any other facilities for which forecast year volumes are needed • Maintain link-node consistency as much as possible with Base Year network to facilitate comparison of link-level model results
Suggested Skill Set of Technical Staff Doing the Work	<ul style="list-style-type: none"> • Local knowledge • Attention to detail • Basic knowledge of differences between facility types 	<ul style="list-style-type: none"> • Same, plus to derive planned projects from local planning documents
Suggested Skill Set of Reviewer	<ul style="list-style-type: none"> • Local knowledge • Basic knowledge of how data are used in model 	<ul style="list-style-type: none"> • Same, plus knowledge of planned projects
Common Issues to Avoid	<ul style="list-style-type: none"> • Local streets should not be included unless providing access not otherwise provided • Check streets that were recently constructed (not in the base year network) to determine whether they were open in base year • Check directionality 	<ul style="list-style-type: none"> • Avoid including additional detail and facilities not supported by TAZ structure • Ensure streets that were recently constructed are included in the forecast year • Check directionality

Network Facility Types Exhibit

INSTRUCTOR HANDBOOK Lesson 3: Key Inputs and the Quality Process

Exhibit 3.6 Network Facility Types

NOTE: These functional classes and facility types are specific to the travel mode process. They may be informed by the functional class definition used by TxDOT and the MPOs for the purpose of funding categories and by those used in partner agency Thoroughfare Plans, but should not be constrained by those documents.

Functional Class	Facility Type	Facility Type Code	Source	Facility Type Code
1	INTERSTATE HIGHWAYS			
1.1	Interstate Highway	1.1	Interstate Highway	1.1
1.2	Interstate Highway	1.2	Interstate Highway	1.2
2	MAJOR HIGHWAYS			
2.1	Major Highway	2.1	Major Highway	2.1
2.2	Major Highway	2.2	Major Highway	2.2
3	MINOR HIGHWAYS			
3.1	Minor Highway	3.1	Minor Highway	3.1
3.2	Minor Highway	3.2	Minor Highway	3.2
4	LOCAL ROADS			
4.1	Local Road	4.1	Local Road	4.1
4.2	Local Road	4.2	Local Road	4.2
5	TRAILWAYS			
5.1	Trailway	5.1	Trailway	5.1
5.2	Trailway	5.2	Trailway	5.2
6	RAILROADS			
6.1	Railroad	6.1	Railroad	6.1
6.2	Railroad	6.2	Railroad	6.2
7	WATERWAYS			
7.1	Waterway	7.1	Waterway	7.1
7.2	Waterway	7.2	Waterway	7.2
8	OTHER			
8.1	Other	8.1	Other	8.1
8.2	Other	8.2	Other	8.2

Source: TxDOT, 2006.

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Exhibit 3.c Network Facility Types

NOTE: These functional classes and facility types are specific to the travel model process. They may be informed by the functional class definition used by TxDOT and the MPOs for the purpose of funding categories and by those used in partner agency Thoroughfare Plans, but should not be constrained by those documents.

Functional Class Code		Facility Type Code	Facility Type Descriptions	General Color Description	Detailed Color Description
1			INTERSTATE FREEWAYS	Yellow	
	1		Radial IH Freeways - Mainlanes Only		
	2		Radial IH Freeways - Mainlanes & Frontage Roads		
	3		Circumferential IH Freeways (Loops) - Mainlanes Only		
	4		Circumferential IH Freeways (Loops) - Mainlanes & Frontage Roads		
2			OTHER FREEWAYS	Orange	
	5		Radial Other Freeways - Mainlanes Only		
	6		Radial Other Freeways - Mainlanes & Frontage Roads		
	7		Circumferential Other Freeways (Loops) - Mainlanes Only		
	8		Circumferential Other Freeways (Loops) - Mainlanes & Frontage Roads		
3			EXPRESSWAYS	Purple	
	9		Radial Expressways		Dark
	10		Circumferential Expressways (Loops)		Light
4			PRINCIPAL ARTERIALS	Blue	
	11		Principal Arterial - Divided		Dark
	12		Principal Arterial - Continuous Left Turn Lane		Medium
	13		Principal Arterial - Undivided		Light
5			MINOR ARTERIALS	Dark Green	
	14		Minor Arterial - Divided		Dark
	15		Minor Arterial - Continuous Left Turn Lane		Medium
	16		Minor Arterial - Undivided		Light
6			COLLECTORS	Brown	
	17		Collector - Divided		Dark
	18		Collector - Continuous Left Turn Lane		Medium
	19		Collector - Undivided		Light
7			FRONTAGE ROADS	Mustard	
	20		Frontage Road		
8			RAMPS	Gray	
	21		Ramp (Between Frontage Road and Mainlanes)		Dark
	22		Interchange Ramp (Freeway-to-freeway Interchange Ramps)		Light

Source: TxDOT, 2006.

Networks Activity





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Lesson 3: Key Inputs and the Quality Process

Activity 3.1 Networks*

As a large group, discuss these and different types of facilities that an MPO might consider whether or not to include in a model network. The scenarios are citations only; the facilities are shown to provide discussion only.

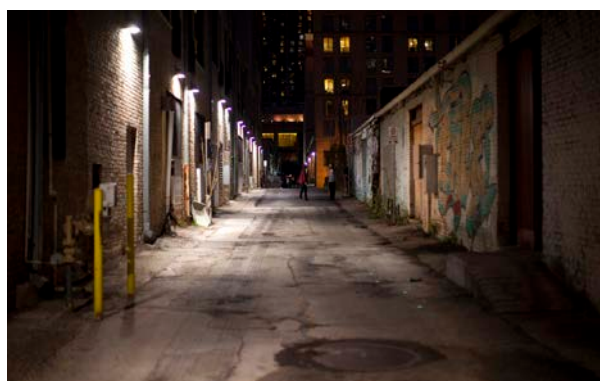
	<p>Should this alley be included in the MPO base year network?</p> <p>Why or why not?</p> <p>What facility type might this be?</p> <p><small>(Source: Alley near 6th Street Downtown Austin. www.austintexas.gov)</small></p>
	<p>Should this dirt road be included in the MPO base year network?</p> <p>Why or why not?</p> <p>What facility type might this be?</p> <p><small>(Source: TxDOT, dirt roads off Park road 20, North Parks Island)</small></p>

*General concepts only. This is not definitive of any particular area and judgment will need to be applied to particular situations.

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Activity 3.1 Networks*

As a large group, discuss these and different types of facilities that an MPO might question whether or not to include in a model network. The sources are citations only; the facilities are shown to provoke discussion only.



Should this alley be included in the MPO base year network?

Why or why not?

What facility type might this be?

(Source: Alley near 6th Street Downtown Austin; www.deanterry.com)



Should this dirt road be included in the MPO base year network?

Why or why not?

What facility type might this be?

Source: TxDOT; Dirt roads off Park road 22, North Padre Island

What other types of roadways have you had trouble deciding whether or not to include in a roadway network?

**General concepts only. This is not definitive of any particular area and judgment will need to be applied to particular situations.*

TAZs—Need to Know



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TAZ
Development
Approaches
Exhibit

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Lesson 3: Key Inputs and the Quality Process

Activity 3.1 Networks*

As a large group, discuss these and different types of facilities that an MPO might consider whether or not to include in a model network. The sources are citations only, the facilities are shown to provide discussion only.



Should this alley be included in the MPO base year network?
Why or why not?
What facility type might this be?

(Source: Alley near 6th Street Downtown Austin, www.austintexas.gov)



Should this dirt road be included in the MPO base year network?
Why or why not?
What facility type might this be?

(Source: TxDOT, dirt roads off Park road 22, North Plano, Texas)

What other types of roadways have you had trouble deciding whether or not to include in a roadway network?

*General concepts only. This is not definitive of any particular area and judgment will need to be applied to particular situations.

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TAZ Development Example

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Exhibit 3.d TAZ Development Approaches

	Base & Forecast Year
Description of Item	TransCAD shape geography with required attribute data (typically provided by TxDOT) <ul style="list-style-type: none"> • Supports desired network detail • Not so detailed that some areas are isolated from network
Possible Input Data Options	<ul style="list-style-type: none"> • Prior model traffic analysis zones • Base year model network • Forecast year model network • Most recent Census data block group geography • Other helpful boundaries <ul style="list-style-type: none"> ○ Major water features ○ Rail ○ Evacuation routes
Suggested Skill Set of Technical Staff Doing the Work	<ul style="list-style-type: none"> • Local knowledge • Attention to detail • Basic knowledge of differences between facility types
Suggested Skill Set of Reviewer	<ul style="list-style-type: none"> • Local knowledge • Basic knowledge of how data are used in model
Common Issues to Avoid	<ul style="list-style-type: none"> • Avoid narrow, elongated zones where possible

Demographics—Need to Know



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What Do Demographics Include?

- Population in households
- Households
- Population in group quarters (institutionalized and not)
- Median income
- Employment by basic, retail, and service categories
- Special generators data (covered separately)



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Example Demographics Submittal

							REGULAR EMPLOYMENT					SG EMPLOYMENT				
TAX	Pop/HH	GQ_NST	GQ_NCN	HH	Pop/HH	Income31	Subtotal	BAS	RET	SERV	EDUC	Subtotal	BAS	RET	SERV	EDUC
							49540	11426	14632	21022	2068	20893	5136	2232	11937	1588
1	8	3	0	0	0.00	0	49	2	2	45	0	75	0	0	76	0
2	8	0	0	0	0.00	0	15	6	2	7	0	3	0	0	0	0
3	19	0	0	3	3.80	13234	15	2	1	4	0	3	0	0	0	0
4	31	0	0	14	2.21	13234	66	8	6	52	0	3	0	0	0	0
5	8	12	0	0	0.00	0	8	2	2	4	0	3	0	0	0	0
6	8	0	0	0	0.00	0	8	2	2	4	0	11	0	0	11	0
7	8	0	0	0	0.00	0	90	6	76	8	0	3	0	0	0	0
8	8	0	0	0	0.00	0	21	7	2	12	0	3	0	0	0	0
9	8	0	0	0	0.00	0	42	33	4	5	0	3	0	0	0	0
10	8	0	0	0	0.00	0	13	2	7	4	0	108	0	0	108	0
11	14	0	0	13	1.08	20614	293	59	3	231	0	3	0	0	0	0
12	8	202	0	0	0.00	0	8	2	2	4	0	580	0	0	580	0
13	8	0	0	0	0.00	0	64	2	58	4	0	3	0	0	0	0
14	8	0	0	0	0.00	0	48	2	42	4	0	3	0	0	0	0
15	8	0	0	0	0.00	0	64	3	2	49	0	3	0	0	0	0
16	8	0	0	0	0.00	0	4	2	2	0	0	178	0	0	178	0
17	27	0	0	12	2.25	20614	8	2	2	4	0	3	0	0	0	0
18	41	0	0	19	2.16	20614	31	24	2	5	0	3	0	0	0	0
19	8	0	0	0	0.00	0	48	9	2	37	0	3	0	0	0	0
20	8	0	0	0	0.00	0	32	26	2	4	0	3	0	0	0	0
21	8	0	0	0	0.00	0	221	123	20	73	0	50	0	0	50	0



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Demographics Key Concepts Exhibit



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Lesson 3: Key Inputs and the Quality Process

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Exhibit 3.4 Base Year and Forecast Year Demographic Approaches

	Base Year	Forecast Year
Description of Item	TransCAD shapefile with required attribute data representing the base year traffic analysis zones (TAZs) typically provided by TxDOT.	Same geography, but data for forecast year.
Possible Input Data Options	<ul style="list-style-type: none"> TAZ geography Population data estimates/total jobs (Texas Data Data Center) One-Stop Demographic Data Analysis Tool Most recent Census data by block group Other ways to account building permits or septic system permits Employment data (Texas Workforce Commission) Local knowledge 311 calls, etc. 	<ul style="list-style-type: none"> SDC forecast year control totals MPO needs to choose recommendation Local plans/knowledge Check with other agencies who have to do forecast planning
Suggested Skill Set of Technical Staff Doing the Work	<ul style="list-style-type: none"> Attention to detail Awareness of local data sources General level of understanding of typical development patterns of region 	<ul style="list-style-type: none"> Understanding of expected economic growth and/or changes to diversify of population and employment change
Suggested Skill Set of Reviewer	<ul style="list-style-type: none"> Same as technical staff or further understanding 	<ul style="list-style-type: none"> Understanding of relationship of population growth to employment growth
Common Issues to Avoid	<ul style="list-style-type: none"> Employment by employment type not consistent with population or housing Failure to match diverse characteristics 	<ul style="list-style-type: none"> Changes in employment total and mix from base year inconsistent with changes in population Failure to match diverse control total for region (or to explain discrepancies)

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Exhibit 3.e Base Year and Forecast Year Demographic Approaches

	Base Year	Forecast Year
Description of Item	TransCAD shapefile with required attribute data representing the base year traffic analysis zones (TAZs) (typically provided by TxDOT)	Same geography, but data for forecast year
Possible Input Data Options	<ul style="list-style-type: none"> • TAZ geography • Population data estimates/control totals (Texas State Data Center) • One-Stop Demographic Data Analysis Tool • Most recent Census data by block group • Other ways to account (building permits or septic system permits) • Employment data (Texas Workforce Commission) • Local knowledge • 911 datasets 	<ul style="list-style-type: none"> • SDC forecast year control totals • MPO needs to choose • Recommendation • Local plans/knowledge • Check with other agencies that have to do forecast planning
Suggested Skill Set of Technical Staff Doing the Work	<ul style="list-style-type: none"> • Attention to detail • Awareness of local data sources • General level of understanding of typical development patterns of region 	<ul style="list-style-type: none"> • Understanding of expected economic growth and/or changes to drivers of population and employment change
Suggested Skill Set of Reviewer	<ul style="list-style-type: none"> • Same as technical staff or better understanding 	<ul style="list-style-type: none"> • Understanding of relationship of population growth to employment growth
Common Issues to Avoid	<ul style="list-style-type: none"> • Employment by employment type not consistent with population or household characteristics 	<ul style="list-style-type: none"> • Changes in employment total and mix from base year inconsistent w/ changes in population • Failure to match chosen control total (or neglecting to explain discrepancy)

<p>Demographics Development: Base Year Estimate</p> <p> Past Known Demographics Point <ul style="list-style-type: none"> • U.S. Census Data for Local Area </p> <p> What Happened Up until Base Year? <ul style="list-style-type: none"> • Local Knowledge • Aerial Photography • Other Resource (See Local Agencies, e.g., Water, Permitting, ISDs) </p> <p> Managing the TDM Development Process </p> <p>138</p>	
<p>Demographics Development: Forecast Year</p> <p> Establish Control Totals <ul style="list-style-type: none"> • Base Year Estimate is "Base" • Examine State Data Center Scenarios • Make Local Decision Which to Use </p> <p> Allocation to TAZs <ul style="list-style-type: none"> • Enter known development that occurred since base year • Developable Areas (Consider Physical, Political, and Typical Densities) • Land Use Modeling • Other Agency Input (see Local Agencies, e.g., Water, Permitting, ISDs) </p> <p> Managing the TDM Development Process </p> <p>139</p>	
<p>Median Income</p> <p> Base Year <ul style="list-style-type: none"> • U.S. Census Data • Aerial Imagery (Size of Homes, Swimming Pools, Gates, Etc.) • Local Knowledge </p> <p> Forecast Year <ul style="list-style-type: none"> • In Base Year \$ • Real Income Change ONLY (Not Inflation Change) • Regional Economic Change (Examine Trends) • TAZ Level <ul style="list-style-type: none"> • New Development • Adjacent TAZ Incomes </p> <p> Managing the TDM Development Process </p> <p>140</p>	

Special Generators (SGs)

- Travel behavior is not adequately described by general travel rates (too low, too high)
- Suggested approach
 - Identify potential SGs during demographics development
 - Model developer has the discretion to treat as SG
- As for other demographics, base year and future year characteristics must be identified



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Special Generators Section in Guidebook

SECTION SEVEN – SPECIAL GENERATORS

UNDERSTANDING SPECIAL GENERATORS

Special generators are land use activities that are unique to the area and are modeled individually in the modeling process. They are identified as special generators do not exhibit "typical" trip-making characteristics that can be replicated using trip generation rates based on the results of the travel survey. As a result, data specific to the special generator needs to be collected to account for the special activities that occur.

Typically, special generators include, but are not limited to, activities such as colleges and universities, military bases, major hospitals, airports, and major regional shopping centers. Special generators include only those activities that present unusual trip characteristics relative to other activities. This means that the majority of office, retail, educational, and educational facilities (i.e., public housing) through high school will not be considered as a special generator.

SPECIAL GENERATOR DATA REQUIREMENTS

Specific data are required for each special generator according to the type of activity. Table 7-1 lists the data required for special generators according to the type of facility.

Table 7-1. Data Requirements for Special Generators

Type of Special Generator	Additional Data Required
Educational	<ul style="list-style-type: none"> # of employees # of students # of students who live on campus (if college)
Hospitals	<ul style="list-style-type: none"> # of employees # of beds
Airports	<ul style="list-style-type: none"> # of employees # of departing passengers
Military Bases	<ul style="list-style-type: none"> # of military personnel # of civilian employment # of military personnel living on base
Industrial Sites	<ul style="list-style-type: none"> # of employees
Regional Malls	<ul style="list-style-type: none"> # of employees

The specific data items listed in Table 7-1 will need to be collected for the base year and for each forecast year.



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Special Generators Activity

Activity 3.2 Discussion: Special Generators



Should this airport be annotated as a potential Special Generator?
Why or why not?

Source: Texas Transportation Institute, 2011

Should this large employer be annotated as a potential Special Generator?
Why or why not?

Should this military base be annotated as a potential Special Generator?
Why or why not?

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KEY CONCEPT: Use the TxDOT-developed *Demographics Guidebook* for developing model inputs.

Activity 3.2 Discussion: Special Generators*

Should this airport be annotated as a potential Special Generator?

Why or why not?

Source: Texas Transportation Institute, 2011.



Should this large employer be annotated as a potential Special Generator?

Why or why not?



Should this military base be annotated as a potential Special Generator?

Why or why not?

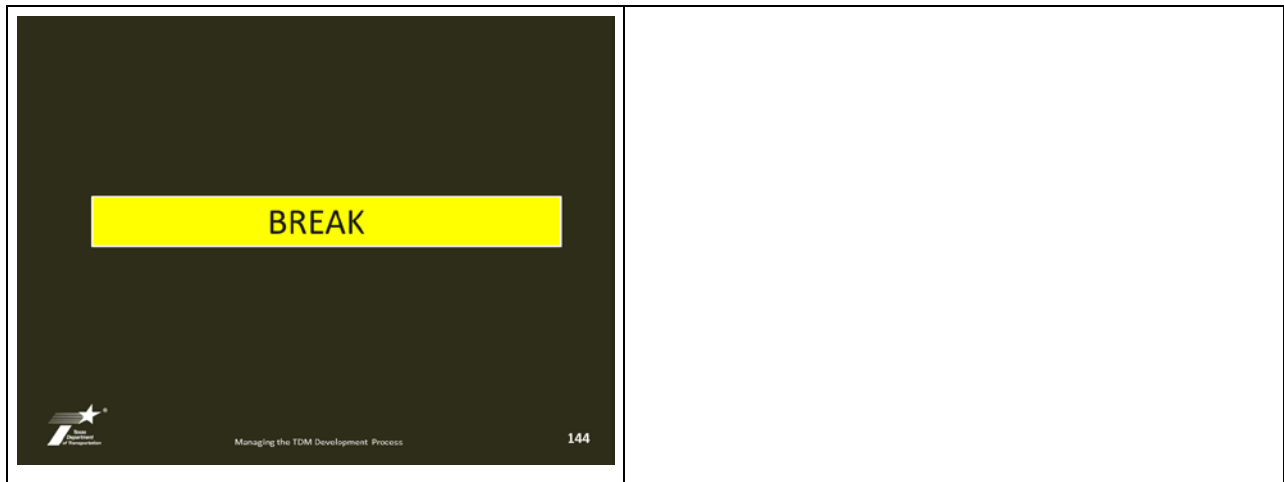


Should this golf course be annotated as a potential Special Generator?

Why or why not?

What other types of special generators have you had trouble deciding whether or not to identify as such?

**General concepts only. This is not definitive of any particular area and judgment will need to be applied to particular situations.*



Post-Break Reinforcement Questions

1. What are the model inputs that MPOs are typically responsible for, as a partner in travel model development?
2. What are some examples of Special Generators and what makes them special?
3. What is the most common error made with forecasting median income?

Topic 3.4 Best Practice Strategies Model Inputs

Minimum and Ideal Data to Support Development of Model Inputs



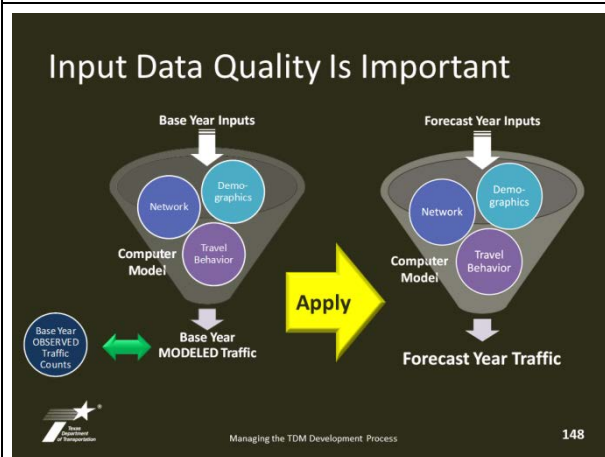
 <p>Best Practice Strategies for Developing Model Inputs</p> <p>Managing the TDM Development Process</p> <p>145</p>																						
 <p>Minimum and Desirable Model Input Data Exhibit</p> <p>Managing the TDM Development Process</p> <p>146</p>	<p>Lesson 3: Key Inputs and the Quality Process</p> <p>PLC 07—INSTRUCTOR HANDBOOK</p> <p>Exhibit 3.1 Minimum and Desirable Model Input Data*</p> <table border="1"> <thead> <tr> <th>Model Aspect</th> <th>Minimum</th> <th>Desirable</th> </tr> </thead> <tbody> <tr> <td>Count Data</td> <td> <ul style="list-style-type: none"> • Intersection stratification of count data across facility and area types </td> <td> <ul style="list-style-type: none"> • 40% link coverage with automated count data (not optional) </td> </tr> <tr> <td>Travel Surveys</td> <td> <ul style="list-style-type: none"> • Small-area rates </td> <td> <ul style="list-style-type: none"> • Link survey data • Workplace • Household • Commercial vehicle • Cellphone </td> </tr> <tr> <td>TAZ Layer</td> <td> <ul style="list-style-type: none"> • Should cover geographic area that represents 50% of residents who travel in region </td> <td> <ul style="list-style-type: none"> • Should cover geographic area that represents 80% of residents who travel in region </td> </tr> <tr> <td>Networks</td> <td> <ul style="list-style-type: none"> • Arterial and higher facilities </td> <td> <ul style="list-style-type: none"> • Collector and higher facilities </td> </tr> <tr> <td>Demographics</td> <td> <ul style="list-style-type: none"> • TAZ data updated for each model base year • Number of households • Population by household • Group Quarters (residential) • Employment by type • Other Special Generation • Median income </td> <td> <ul style="list-style-type: none"> • Tracked and updated annually </td> </tr> <tr> <td>Census Journey-to-Work Data</td> <td> <ul style="list-style-type: none"> • County-county flows </td> <td> <ul style="list-style-type: none"> • Sector sector flows (in percentages) </td> </tr> </tbody> </table> <p>*Possible dependent upon challenges of particular model. Discuss with TxDOT as part of model development scheduling and planning process ahead of time.</p> <p>TxDOT 0213 106 Managing the Travel Model Process</p>	Model Aspect	Minimum	Desirable	Count Data	<ul style="list-style-type: none"> • Intersection stratification of count data across facility and area types 	<ul style="list-style-type: none"> • 40% link coverage with automated count data (not optional) 	Travel Surveys	<ul style="list-style-type: none"> • Small-area rates 	<ul style="list-style-type: none"> • Link survey data • Workplace • Household • Commercial vehicle • Cellphone 	TAZ Layer	<ul style="list-style-type: none"> • Should cover geographic area that represents 50% of residents who travel in region 	<ul style="list-style-type: none"> • Should cover geographic area that represents 80% of residents who travel in region 	Networks	<ul style="list-style-type: none"> • Arterial and higher facilities 	<ul style="list-style-type: none"> • Collector and higher facilities 	Demographics	<ul style="list-style-type: none"> • TAZ data updated for each model base year • Number of households • Population by household • Group Quarters (residential) • Employment by type • Other Special Generation • Median income 	<ul style="list-style-type: none"> • Tracked and updated annually 	Census Journey-to-Work Data	<ul style="list-style-type: none"> • County-county flows 	<ul style="list-style-type: none"> • Sector sector flows (in percentages)
Model Aspect	Minimum	Desirable																				
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Travel Surveys	<ul style="list-style-type: none"> • Small-area rates 	<ul style="list-style-type: none"> • Link survey data • Workplace • Household • Commercial vehicle • Cellphone 																				
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Demographics	<ul style="list-style-type: none"> • TAZ data updated for each model base year • Number of households • Population by household • Group Quarters (residential) • Employment by type • Other Special Generation • Median income 	<ul style="list-style-type: none"> • Tracked and updated annually 																				
Census Journey-to-Work Data	<ul style="list-style-type: none"> • County-county flows 	<ul style="list-style-type: none"> • Sector sector flows (in percentages) 																				

Exhibit 3.f Minimum and Desirable Model Input Data*

Model Aspect	Minimum	Desirable
Count Data	<ul style="list-style-type: none"> Reasonable stratification of count data across facility and area types 	<ul style="list-style-type: none"> 40% link coverage with observed count data (not estimated)
Travel Surveys	<ul style="list-style-type: none"> Small-area rates 	Local survey data: <ul style="list-style-type: none"> Workplace Household Commercial Vehicle External
TAZ Layer	<ul style="list-style-type: none"> Should cover geographic area that represents 50% of residents who travel in region 	<ul style="list-style-type: none"> Should cover geographic area that represents 80% of residents who travel in region
Networks	<ul style="list-style-type: none"> Arterial and higher facilities 	<ul style="list-style-type: none"> Collector and higher facilities
Demographics	<ul style="list-style-type: none"> TAZ data updated for each model base year: <ul style="list-style-type: none"> Number of households Population in households Group Quarters Population (Institutional versus not) Employment by type Other Special Generators Median income 	<ul style="list-style-type: none"> Tracked and updated annually
Census Journey-to-Work Data	<ul style="list-style-type: none"> County-county flows 	<ul style="list-style-type: none"> Sector-sector flows (or percentages)

** Flexible dependent upon challenges of particular model, discuss with TxDOT as part of model development scheduling and planning process ahead of time.*

Quality Assurance



Quality Discussion

Lesson 3: Key Inputs and the Quality Process PLCT-BESTPRACTICE HANDBOOK

Activity 3.3 Discussion: Effective and Efficient Quality Procedures

Who does quality start with?

Can an individual ensure quality on a complex, technical product alone?

Is a reviewer always correct?

Does reviewing a product always find all mistakes made?

Based on the above discussion, given a model input deliverable (a network or demographics), describe an effective and efficient quality procedure that you would feel confident in.

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Activity 3.3 Discussion: Effective and Efficient Quality Procedures


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Based on the above discussion, given a model input deliverable (a network or demographics), describe an effective and efficient quality procedure that you would feel confident in.



Internal MPO Quality Assurance Protocol Example



Managing the TDM Development Process

Lesson 3: Key Inputs and the Quality Process INSTRUCTOR HANDBOOK

Exhibit 3.g Example INTERNAL MPO Quality Assurance Protocol
Suggestion: tailor, reproduce this Protocol for each technical deliverable.

MPO Quality Assurance Commitment

The MPO follows this procedure for all technical products. This procedure, or comparable variation with permission, is required for MPO staff and persons working under contract to the MPO.

QA/QC Tracking Log for Current Deliverable*

Role/Description	Print Name	Date	Initial
QAP Assigns Task			
RP Complete Task			
IR Reviews Task			
IRP Address Comments			
IR Reviews Changes			
QAP Signs Off			

*This document to be submitted with deliverable.

Rules and Responsibilities

Quality Assurance Professional (QAP): This person assumes that the RP and IR assigned have the appropriate skills to do the task, assures the QC procedure is scheduled and followed, and maintains the QC records. The QAP can also be either the RP or IR.


Responsible Professional (RP): The person who is completing the task to be reviewed.

Internal Reviewer (IR): A person (not the RP) with skills equal to or more advanced than the RP.

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QA/QC Roles Exercise



Managing the TDM Development Process

INSTRUCTOR HANDBOOK Lesson 3: Key Inputs and the Quality Process

Activity 3.4 Example INTERNAL MPO QA/QC Roles Activity

NOTE: Assumes that non-MPO parties below have agreed to be a partner to the MPO in the development of their deliverable.

Consider a travel model Network or Demographics deliverable that the MPO is responsible for. QAP role is set. Who can serve in the RP role? In the IR role?

(a) Review and discuss (large group).
(b) Who else could be RP or IR? (MPO is always QAP)

Role	MPO	Consultant	Travel Model Developer	Demographics Developer	IRP	IRP (MPO?)	?
Quality Assurance Professional (QAP)	✓						
Responsible Professional (RP)*	✓						
Internal Reviewer (IR)*	✓						

*Remember that the RP and IR cannot be the same person.

NOTE: As will be discussed later, ideally, the Policy Board adoption occurs after the model development and initial application is complete.

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Exhibit 3.g Example INTERNAL MPO Quality Assurance Protocol

Suggestion: tailor, reproduce this Protocol for each technical deliverable.

_____ MPO Quality Assurance Commitment
<p>The _____ MPO follows this procedure for all technical products. This procedure, or comparable variation with permission, is required for MPO staff and persons working under contract to the MPO.</p>

QA/QC Tracking Log for Current Deliverable*

Role Description	Print Name	Date	Initial
QAP Assigns Task			
RP Complete Task			
IR Reviews Task			
RP Address Comments			
IR Reviews Changes			
QAP Signs Off			

**This document to be submitted with deliverable.*

Roles and Responsibilities

Quality Assurance Professional (QAP): This person assures that the RP and IR assigned have the appropriate skills to do the task, assures the QC procedure is scheduled and followed, and maintains the QC records. The QAP can also be either the RP or IR.

Responsible Professional (RP): The person who is completing the task to be reviewed.

Internal Reviewer (IR): A person (not the RP) with skills equal to or more advanced than the RP.

Activity 3.4 Example INTERNAL MPO QA/QC Roles Activity

NOTE: Assumes that non-MPO parties below have agreed to be a partner to the MPO in the development of their deliverable.

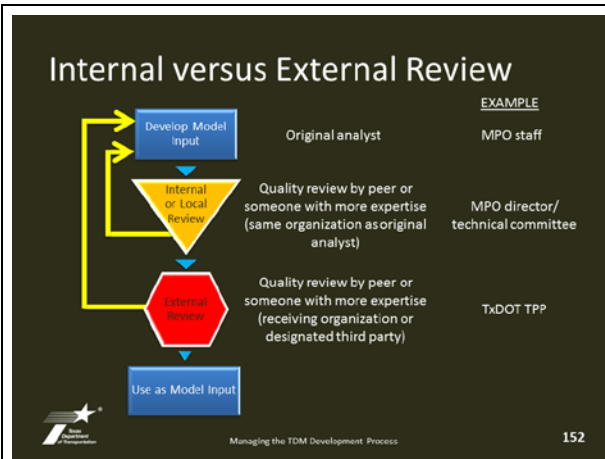
Consider a travel model **Network** or **Demographics** deliverable that the MPO is responsible for. QAP role is set. Who can serve in the RP role? In the IR role?

- (a) Review and discuss (large group).
- (b) Who else could be RP or IR? (MPO is always QAP)

Role	MPO	Consultant	TxDOT District/ Region	City/ County	TPP	Peer MPO?	?
Quality Assurance Professional (QAP)	✓						
Responsible Professional (RP)*	✓						
Internal Reviewer (IR)*	✓						

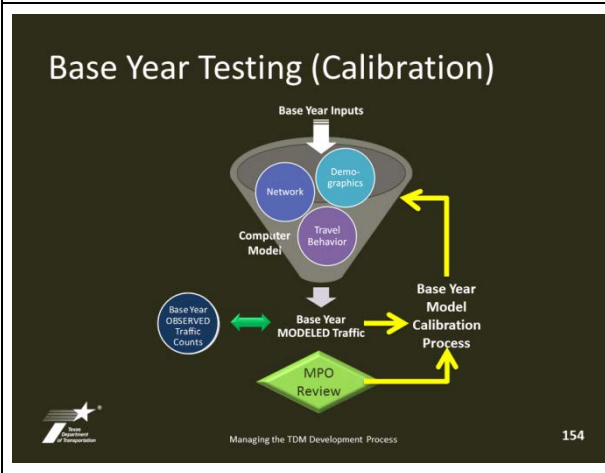
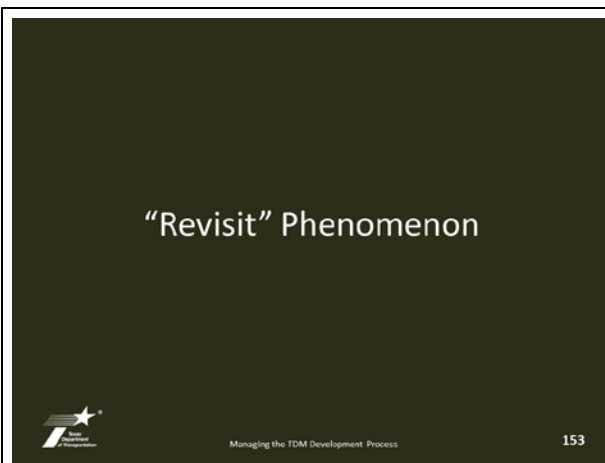
* Remember that the RP and IR cannot be the same person.

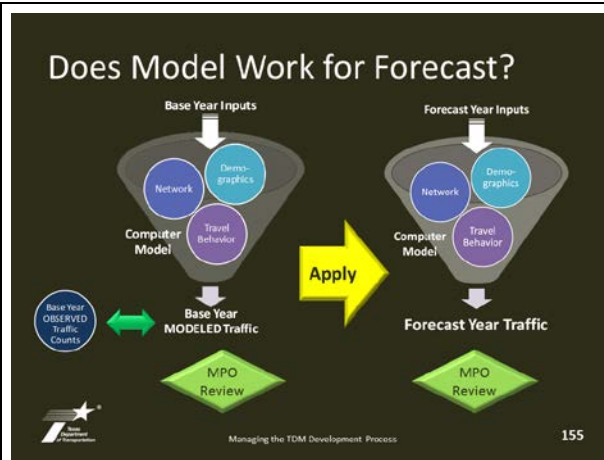
NOTE: As will be discussed later, ideally, the Policy Board adoption occurs after the model development and initial application is complete.



KEY CONCEPTS: **Schedule** INTERNAL and EXTERNAL review (if required) as part of model development process.
Identify expected roles when scheduling.
Get concurrence of TPP on these roles.

“Revisit” Phenomenon for Model Inputs





Minimum & Desirable Checks for Base Year Model (Exhibit)

Lesson 3: Key Inputs and the Quality Process

PILOT-INSTRUCTOR HANDBOOK

Exhibit 3.1a Minimum and Desirable Model Performance Checks (Base Year Model)

Model Aspect	Minimum	Desirable
Count Data	Reasonable classification of count data across facility and area types	40% link coverage with observed count data (not preferred)
Trip Generation	Attraction scale factors no more than 150%	Attraction scale factors no more than 150%
Trip Distribution	<ul style="list-style-type: none"> Trip lengths by trip purpose are reasonable and extend appropriately for local area Distribution of trips by trip purpose is reasonably intuitive HVMT trip length longest of internal purposes 	<ul style="list-style-type: none"> Trip lengths by trip purpose are comparable to model-based travel survey data 4000+ internal % no more than 15% Non-work internal percentages no more than 150% Distribution of model-based work trip purpose trip destinations extend pattern to most recent Census Bureau journey-to-work data
Base-Year Traffic Assignment Overall	Model converges to 2001 relative gap within 24 assignment iterations	Model converges to 2001 relative gap in less than 15 assignment iterations
Volume-to-Count Performance		
System-wide RMSE ¹⁰	30%	same
System-wide %	-10% to 5%	5% to 1%
% by Area Type	-10% to 5%	-10% to 5%
% by Functional Class	-10% to 10%	-10% to 10%
% by Facility Type	-10% to 10%	-10% to 10%

¹⁰Assumes that checks of the network and demographics have already occurred, and Florida dependent upon challenges of particular model, discuss with TDMOT.

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Minimum & Desirable Checks for Forecast Year Model (Exhibit)

INSTRUCTOR HANDBOOK

Lesson 3: Key Inputs and the Quality Process

Exhibit 3.1b Minimum and Desirable Model Performance Checks for the Forecast Year Model

Model Aspect	Minimum	Desirable
Trip Generation	Ratio of productions/attractions by area consistent with inventory ratio	Ratio of productions/attractions by area consistent with inventory ratio
Trip Distribution	Trip lengths by trip purpose should be reasonable for the study area	Changes from base year trip attractions consistent with changes in employment and land use; changes from base year productions consistent with changes in the size and location of the study area
Forecast Year Traffic Assignment	Region-wide system implied speed (vehicle-miles-traveled, VMT/1000) & volume/capacity ratio are reasonable for study area given forecast	Model converges to 2001 relative gap within 24 assignment iterations

¹⁰Assumes that checks of the network and demographics have already occurred.

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Exhibit 3.h Minimum and Desirable Model Performance Checks (Base Year Model)*

Model Aspect	Minimum	Desirable
Count Data	<ul style="list-style-type: none"> Reasonable stratification of count data across facility and area types 	<ul style="list-style-type: none"> 40% link coverage with observed count data (not estimated)
Trip Generation	<ul style="list-style-type: none"> Attraction scale factors no more than 15%? 	<ul style="list-style-type: none"> Attraction scale factors no more than 10%?
Trip Distribution	<ul style="list-style-type: none"> Trip lengths by trip purpose are reasonable and scaled appropriately for local area Distribution of trips by trip purposes is reasonably intuitive HBW trip length longest of internal purposes 	<ul style="list-style-type: none"> Trip lengths by trip purpose are comparable to most recent local survey data HBW intrazonal % no more than 10% Non-work intrazonal percentages no more than 15%? Distribution of Home-based Work trip purpose trips demonstrates similar pattern to most recent Census Bureau Journey-to-Work data
Base-Year Traffic Assignment Overall	<ul style="list-style-type: none"> Model converges to .001 relative gap within 24 assignment iterations 	<ul style="list-style-type: none"> Model converges to .001 relative gap in less than 15 assignment iterations
Volume-to-Count Performance		
System-wide RMSE**	<ul style="list-style-type: none"> 30% 	<ul style="list-style-type: none"> same
System-wide %	<ul style="list-style-type: none"> -5% to 5% 	<ul style="list-style-type: none"> 0% to 1%
% by Area Type	<ul style="list-style-type: none"> -5% to 5% 	<ul style="list-style-type: none"> -3% to 3%
% by Functional Class	<ul style="list-style-type: none"> -20% to 20%** 	<ul style="list-style-type: none"> -10% to 10%
% by Facility Type	<ul style="list-style-type: none"> -30% to 30%** 	<ul style="list-style-type: none"> -10% to 10%

*Assumes that checks of the networks and demographics have already occurred, and Flexible dependent upon challenges of particular model, discuss with TxDOT.

**Root Mean Square Error.

Exhibit 3.i Minimum and Desirable Model Performance Checks for the Forecast Year Model

Model Aspect	Minimum	Desirable
Trip Generation	<ul style="list-style-type: none"> Ratio of productions/attractions by are consistent with hh/emp ratio 	<ul style="list-style-type: none"> Ratio of productions/attractions by are consistent with hh/emp ratio Change from base work trip attractions consistent with changes in employment total and employment by type Changes from base total productions consistent with changes in hh size and income
Trip Distribution	<ul style="list-style-type: none"> Trip lengths by trip purpose should be reasonable for the study area 	<ul style="list-style-type: none"> Changes in trip length reflect demographic changes
Forecast-Year Traffic Assignment	<ul style="list-style-type: none"> Region-wide system implied speed (vehicle-miles-traveled/vehicle-hours-traveled, VMT/VHT) & volume/capacity ratio are reasonable for study area given forecast 	<ul style="list-style-type: none"> Model converges to .001 relative gap within 24 assignment iterations

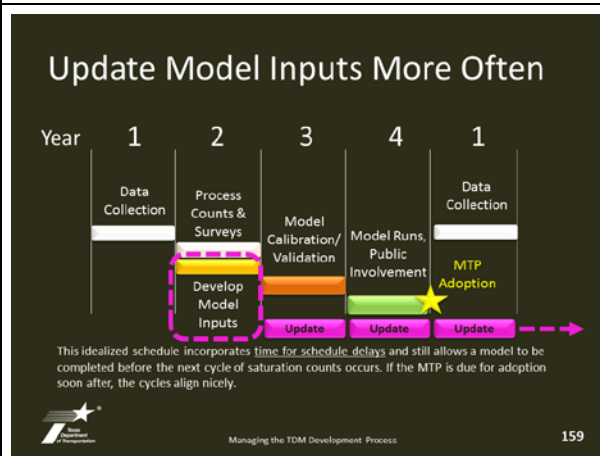
**Assumes that checks of the networks and demographics have already occurred.*

Helpful Strategies for Model Data Inputs



Other Best Practice Strategies

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Update Model Inputs More Often

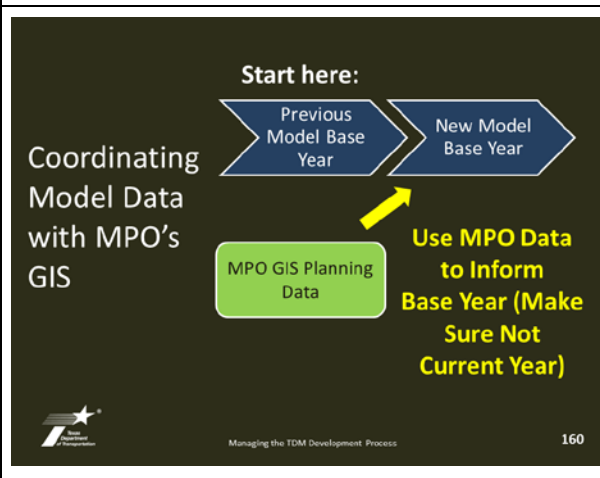
Year 1 2 3 4 1

Data Collection Process Counts & Surveys Model Calibration/Validation Model Runs, Public Involvement MTP Adoption

Develop Model Inputs Update Update Update

This idealized schedule incorporates time for schedule delays and still allows a model to be completed before the next cycle of saturation counts occurs. If the MTP is due for adoption soon after, the cycles align nicely.

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Coordinating Model Data with MPO's GIS

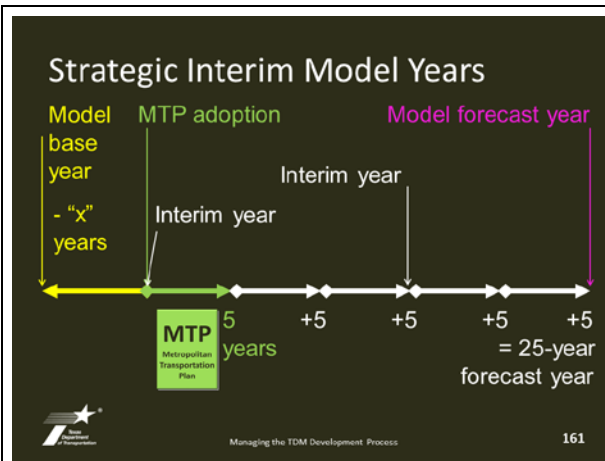
Start here:

Previous Model Base Year New Model Base Year

MPO GIS Planning Data

Use MPO Data to Inform Base Year (Make Sure Not Current Year)

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Other Strategies for Data Inputs

- Avoid getting demographics or networks adopted by MPO board until the model is complete
- Specific to MPOs hiring consultants
 - Product is not final until TPP has reviewed it with respect to demographic reasonableness *and* model format
 - Adjustments may still be necessary as issues are uncovered during model calibration and application

The diagram is part of a presentation titled 'Managing the TDM Development Process' on slide 162.



KEY CONCEPT:

Treating model inputs development, at least regarding population, households, and employers, as a regular maintenance activity may improve quality and decrease schedule problems.

Topic 3.5 Other Helpful Resources

TxDOT Transportation Planning Manual

Guidelines for the planning process.

<http://onlinemanuals.txdot.gov/txdotmanuals/pln/pln.pdf>

TxDOT One-Stop Demographic Data Analysis Tool (beta)

Tool designed to give TxDOT and MPOs a “one-stop” location to derive general demographic information.

<http://www.txdot.gov/business/demographic.htm>

Transportation Planning Process: Key Issues

A Briefing Book for Transportation Decisionmakers, Officials, and Staff

AKA The “Briefing Book” – a fundamental resource and starting point.

<http://planning.dot.gov/documents/briefingbook/bbook.htm>

or PDF at:

http://planning.dot.gov/documents/briefingbook/bbook_07.pdf

Transportation Planning Capacity Building

FHWA/FTA joint Web site – resources for MPOs

<http://www.planning.dot.gov/default.asp>



TxDOT-TPP *Developing Network and Demographic Inputs for Travel Demand Modeling*



Guidebook, TxDOT and TTI, February 2007.

Current version included in Appendix of this manual (check for updates with TPP)

TxDOT-TPP Tutorial on Aggregating Census Data

Current version included in Appendix of this manual (check for updates with TPP)

TxDOT-TPP Tutorial on Geocoding Texas Workforce Commission Data

Current version included in Appendix of this manual (check for updates with TPP)

TxDOT-TPP Tutorial on Using Factfinder 2 (Census Bureau data)

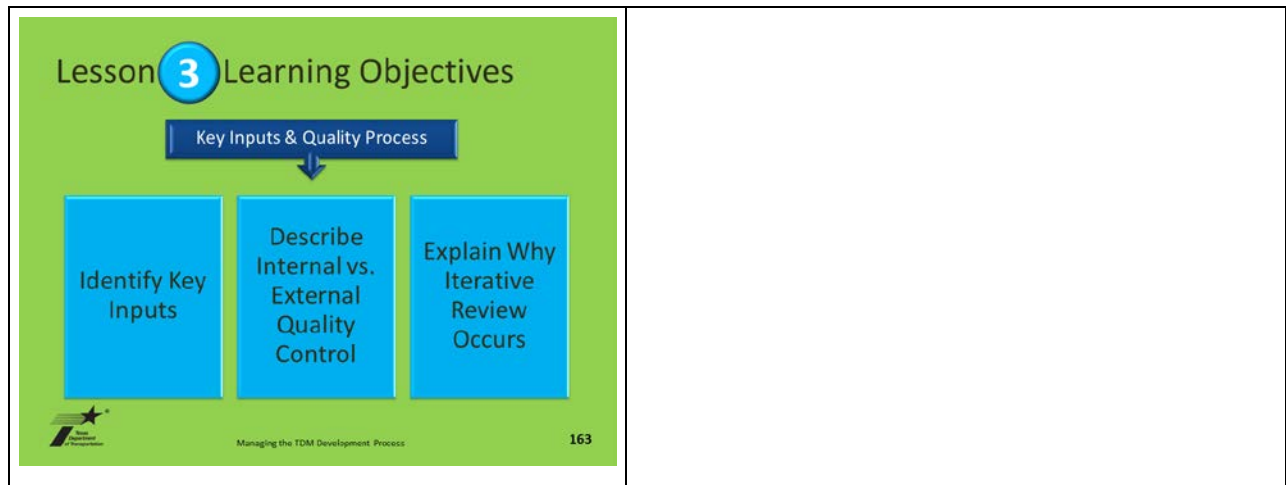
Current version included in Appendix of this manual (check for updates with TPP)

TxDOT-TPP Tutorial on Using DataFerret

Current version included in Appendix of this manual (check for updates with TPP)

Topic 3.6 Lesson Wrap-Up

On the previous page is a list of Other Helpful Resources that cover the topics in this lesson.



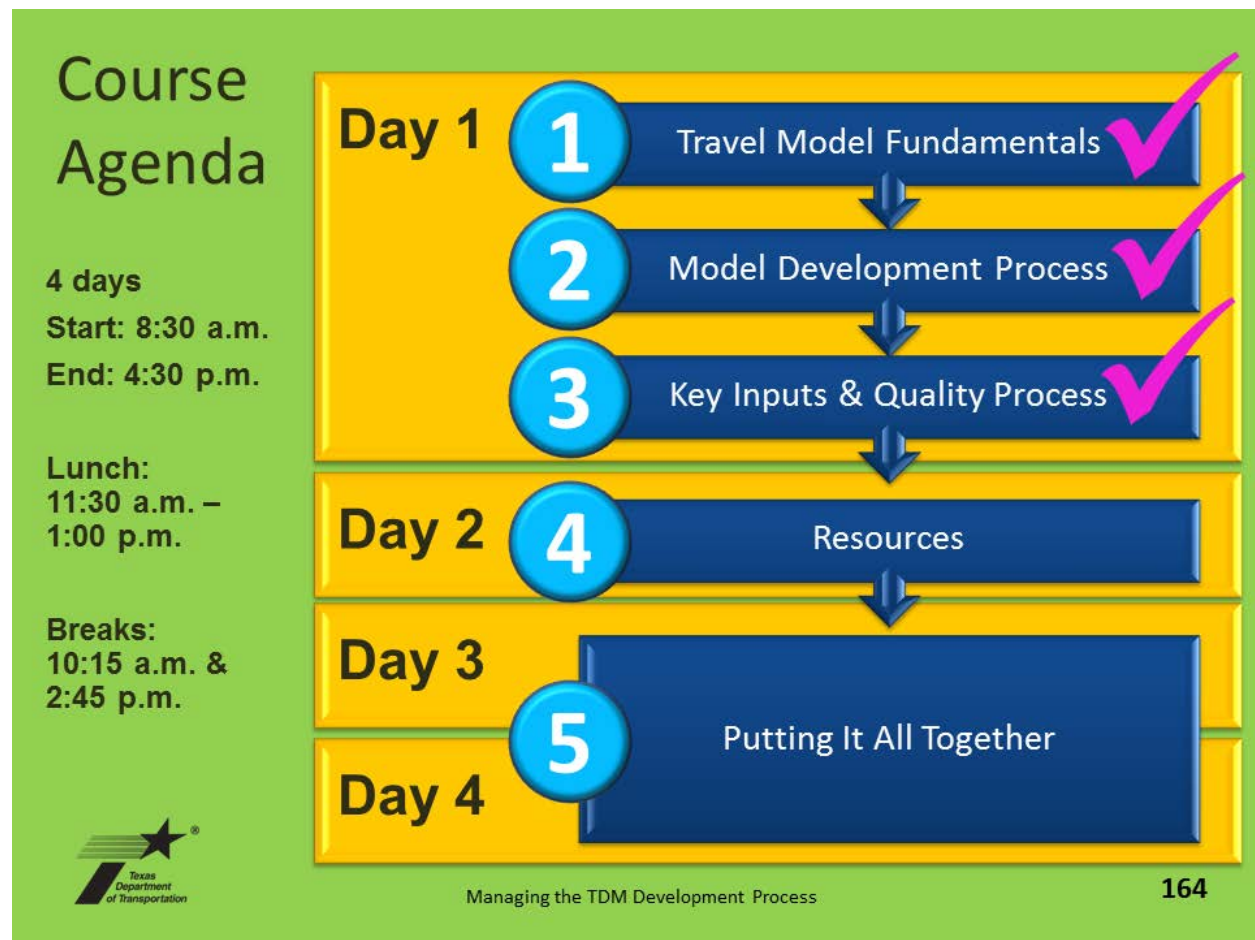
Lesson 3 Reinforcement Questions

After break, before starting the next lesson, review these questions (and answers) as a group:

(from the second half of Lesson 3)

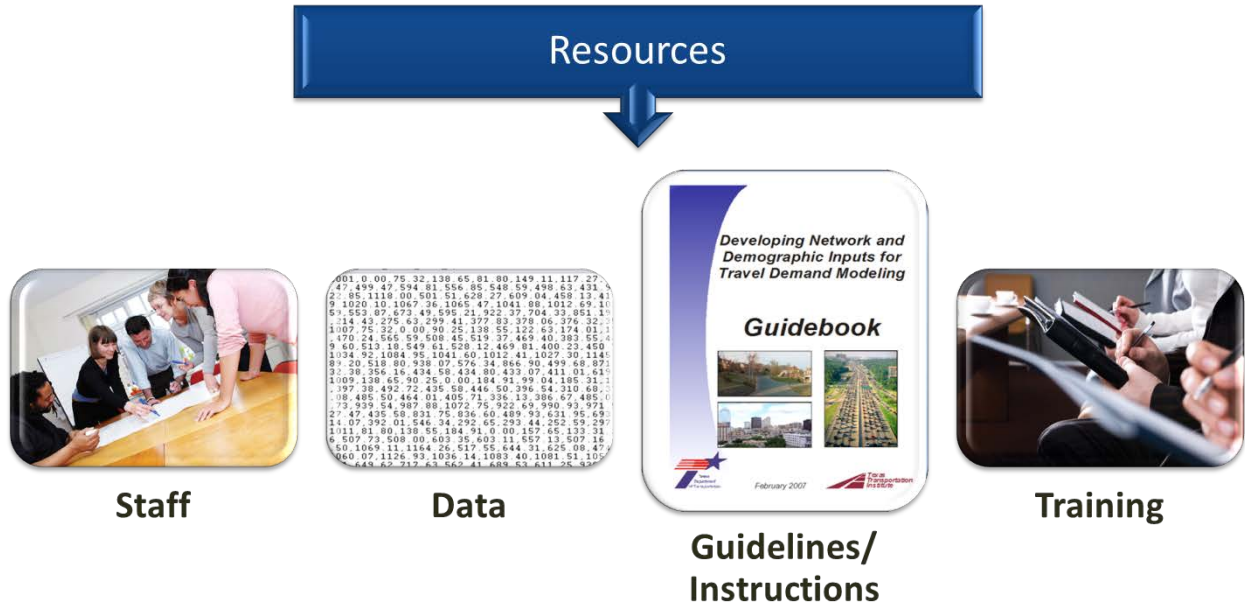
1. Please describe the difference between internal quality control and external quality control?
2. What are some key features of a good internal quality control process?
3. What are some other best practice strategies to facilitate development of the network and demographic inputs for a travel model?

Where Are We?



Lesson 4: Resources

Learning Objectives



Lesson Materials Follow

Lesson 4 Learning Objectives

The diagram illustrates the flow of resources for Lesson 4. A central blue box labeled 'Resources' has a downward arrow pointing to a row of four items: 'Staff' (with a photo of people in a meeting), 'Data' (with a photo of a data center), 'Guidelines/Instructions' (with a 'Guidebook' icon titled 'Developing Network and Demographic Inputs for Travel Demand Modeling'), and 'Training' (with a photo of people in a classroom). The background is green.

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Topic 4.1 Overview of Lesson Purpose

Plan for Lessons 3, 4, and 5

Lessons

- WHAT 3 Key Inputs & Quality Process
- WHO & HOW 4 Resources
- WHEN 5 Putting It All Together

The diagram shows a vertical flow of three blue boxes. The first box is labeled '3 Key Inputs & Quality Process' with a blue circle containing the number 3. A downward arrow points to the second box, labeled '4 Resources' with a blue circle containing the number 4. Another downward arrow points to the third box, labeled '5 Putting It All Together' with a blue circle containing the number 5. The background is dark green.

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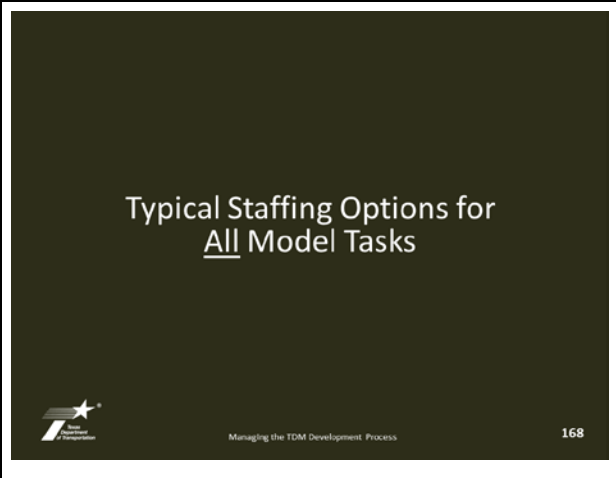
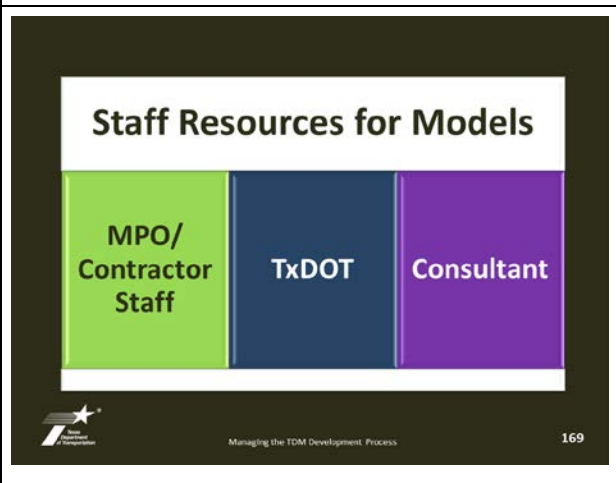
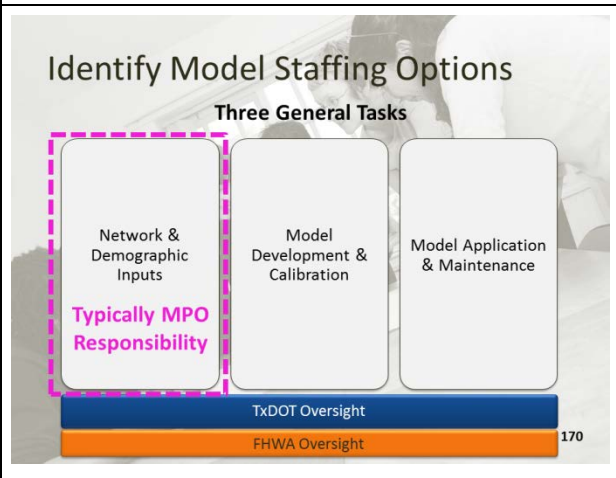
Overview of Resources

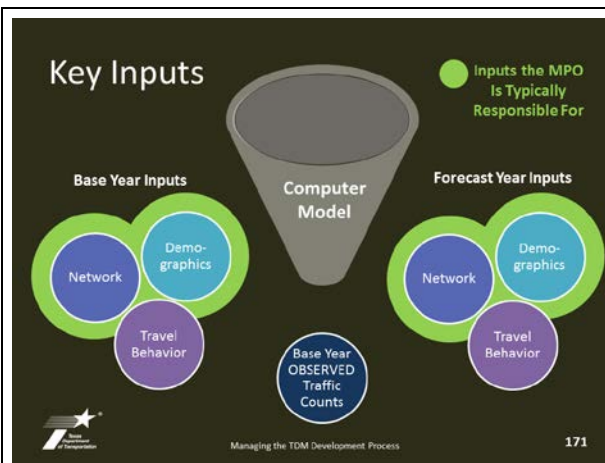
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Topic 4.2 Staff Resources

Typical Staffing Options for Model Tasks

 <p>Typical Staffing Options for <u>All</u> Model Tasks</p> <p>Managing the TDM Development Process 168</p>	
 <p>Staff Resources for Models</p> <p>MPO/ Contractor Staff TxDOT Consultant</p> <p>Managing the TDM Development Process 169</p>	
 <p>Identify Model Staffing Options</p> <p>Three General Tasks</p> <p>Network & Demographic Inputs Typically MPO Responsibility</p> <p>Model Development & Calibration</p> <p>Model Application & Maintenance</p> <p>TxDOT Oversight</p> <p>FHWA Oversight</p> <p>170</p>	



Identify Model Staffing Options

Network & Demographic Inputs

- MPO Staff**
 - Traditionally the MPO staff at small and medium-sized MPOs prepare these inputs
- MPO Contractor Staff**
 - Occasionally temporary contractor staff or a consultant
- Consultant**
 - TxDOT staff role is to provide data, guidance, assistance, review, and oversight
- TxDOT Staff**

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Identify Model Staffing Options

Model Development & Calibration

- TxDOT Staff**
 - Traditionally the TPP staff for small and medium-sized MPOs
- MPO Staff**
 - Options under prior agreement with consultative partners (FHWA and TxDOT):
 - Some large MPOs have modeling staff
 - Some MPOs hire a consultant
- Consultant**
 - TxDOT staff role of review and oversight still pertains

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Identify Model Staffing Options

Model Application & Maintenance

MPO Staff

TxDOT Staff

Consultant

- Traditionally intended to be MPO staff; often TPP staff under deadline
- Options under prior agreement with consultative partners (FHWA and TxDOT):
 - Some large MPOs have modeling staff
 - Some MPOs hire a consultant
- TxDOT staff role of review and oversight still pertains

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Identify Model Staffing Options

Network &
Demographic
Inputs

MPO Staff

MPO Contractor
Staff

Consultant

Model
Development &
Calibration

TxDOT Staff

MPO Staff

Consultant

Model Application
& Maintenance

MPO Staff

TxDOT Staff

Consultant

TxDOT Oversight

FHWA Oversight

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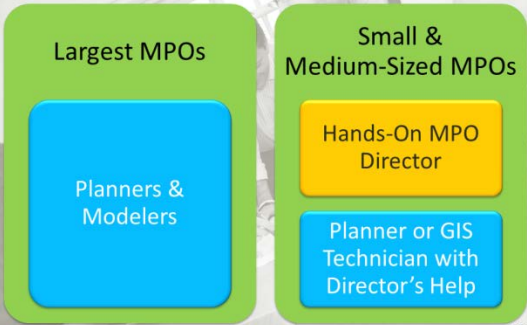


MPO Staffing for Model Tasks

Focus on Internal MPO Staffing



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<p>MPO Staff Doing Modeling</p>  <p>177</p>	
<p>Talent Management Framework</p>  <p>Managing the TDM Development Process</p> <p>178</p>	
<p>Competency and Workforce Planning</p> <ul style="list-style-type: none"> ▪ Develop an inventory of required competences and available competences ▪ Prepare a workforce plan ▪ MPOs will benefit by: <ul style="list-style-type: none"> • Identifying competency inadequacy • Recognize existing talent • Seek appropriate training • Hire the right people (local more likely to stay)  <p>Managing the TDM Development Process</p> <p>179</p>	

Recruitment

- Augment the talent pipeline
 - Fellowship and internship programs
- MPO positioning and branding
 - Attract talent
 - Inspire current employees
- Screening system
 - Collaboration with TxDOT TPP and academia



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Learning Management

- Two types of innate talents—actualized talent and potential talent
- Potential talent—development required to fully realize the MPOs investment in hiring someone



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Training Options



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<h3>Outsourcing vs. In-House Training</h3> <table border="1"> <thead> <tr> <th>Outsourcing</th> <th>In-House Training</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> Develops a broad and deep understanding of the issues. Offers stronger diagnosis ability. Provides a fresh and out-of-the-box perspective. </td> <td> <ul style="list-style-type: none"> Integrity of information is maintained. In line with the organization's core values and vision. </td> </tr> </tbody> </table> <p> Managing the TDM Development Process 183</p>	Outsourcing	In-House Training	<ul style="list-style-type: none"> Develops a broad and deep understanding of the issues. Offers stronger diagnosis ability. Provides a fresh and out-of-the-box perspective. 	<ul style="list-style-type: none"> Integrity of information is maintained. In line with the organization's core values and vision. 	
Outsourcing	In-House Training				
<ul style="list-style-type: none"> Develops a broad and deep understanding of the issues. Offers stronger diagnosis ability. Provides a fresh and out-of-the-box perspective. 	<ul style="list-style-type: none"> Integrity of information is maintained. In line with the organization's core values and vision. 				
<p> KEY CONCEPT: MPOs, like any other small, funding-constrained organization, have to be flexible and creative to find and retain quality staff.</p>					

Partner Agency Staff

<h3>TxDOT Staff</h3> <ul style="list-style-type: none"> TPP model management TPP staff assigned to model TransCAD Help Desk <ul style="list-style-type: none"> TPP-TRANSCAD-HELPPDESK@txdot.gov 512/486-5177 TxDOT TPP planning staff TxDOT field planning staff <p>184</p>	
<h3>Other Staff Resources</h3> <ul style="list-style-type: none"> Local agency partners Temporary contractor staff Consultant contracts Universities doing research <p>185</p>	

What Is FHWA's Role?

- Federal Planning Team, including the Travel Model Improvement Program (TMIP)
- Travel Model Resource Center
- Texas division
 - Oversee MPO planning through certification review
 - In Texas, division staff tend to limit direct modeling input to non-attainment areas
 - Division staff have gotten involved in project studies in other areas upon request



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General Model Staffing Options by Model Stage

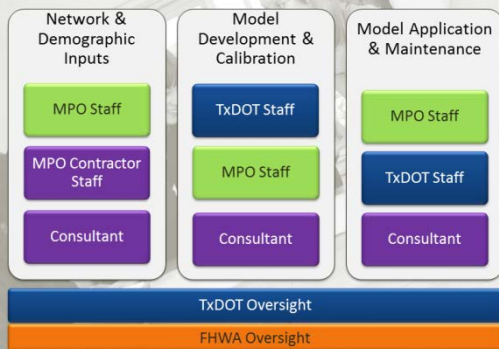
General Model Staffing Options by Model Stage



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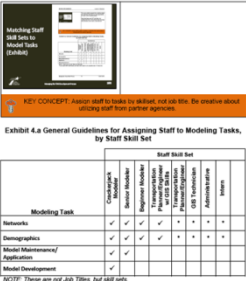
Identify Model Staffing Options



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Matching Staff Skill Sets to Model Tasks (Exhibit)

PARTICIPANT HANDBOOK Lesson 4: Resources



KEY CONCEPT: Assign staff to tasks by skillset, not job title. Be creative about utilizing staff from partner agencies.

Exhibit 4.a General Guidelines for Assigning Staff to Modeling Tasks, by Staff Skill Set

Modeling Task	Crackjack Modeler	Senior Modeler	Beginner Modeler	Transportation Planner/Engineer w/ GIS Skills	Transportation Planner/Engineer	GIS Technician	Administrative	Intern
Networks	✓	✓	✓	✓	*	*	*	*
Demographics	✓	✓	✓	✓	*	*	*	*
Model Maintenance/ Application	✓	✓						
Model Development	✓							

NOTE: These are not Job Titles, but skill sets.
* Can assist with model tasks, but may not be able to do complete task in TransCAD.

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KEY CONCEPT: Assign staff to tasks by skillset, not job title. Be creative about utilizing staff from partner agencies.

Exhibit 4.a General Guidelines for Assigning Staff to Modeling Tasks, by Staff Skill Set

Modeling Task	Staff Skill Set							
	Crackjack Modeler	Senior Modeler	Beginner Modeler	Transportation Planner/Engineer w/ GIS Skills	Transportation Planner/Engineer	GIS Technician	Administrative	Intern
Networks	✓	✓	✓	✓	*	*	*	*
Demographics	✓	✓	✓	✓	*	*	*	*
Model Maintenance/ Application	✓	✓						
Model Development	✓							



NOTE: These are not Job Titles, but skill sets.




** Can assist with model tasks, but may not be able to do complete task in TransCAD.*

Topic 4.3 Data Resources

<p>Data Resources Overview</p> <ul style="list-style-type: none"> ▪ Data needs <ul style="list-style-type: none"> • Network, TAZs, demographics • Other data for models ▪ Data resources <ul style="list-style-type: none"> • Public • Private <p>Typically MPO Responsibility</p>  <p>Managing the TDM Development Process 190</p>	
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Data to Support Model Inputs Typically Expected of MPOs

<p>Data Base Year Network</p> <ul style="list-style-type: none"> ▪ Previous base year network ▪ Recently constructed projects <ul style="list-style-type: none"> • Get with other local agencies ▪ Drive out the network <ul style="list-style-type: none"> • Two-person approach is best • Annotating hard-copy maps is typical approach ▪ Review aerial imagery  <p>Managing the TDM Development Process 191</p>	
<p>Data TAZ Geography</p> <ul style="list-style-type: none"> ▪ Prior model traffic analysis zones ▪ Base year model network ▪ Forecast year model network ▪ Most recent census data block group geography ▪ Other helpful boundaries <ul style="list-style-type: none"> • Major water features • Rail  <p>Managing the TDM Development Process 193</p>	

<div><div>Data</div><div>TAZ Geography</div><ul style="list-style-type: none">▪ Prior model traffic analysis zones▪ Base year model network▪ Forecast year model network▪ Most recent census data block group geography▪ Other helpful boundaries<ul style="list-style-type: none">• Major water features• Rail<div><small>Managing the TDM Development Process</small><div>193</div></div></div>	
<div><div>Data</div><div>Base Year Demographics</div><ul style="list-style-type: none">▪ TAZ geography▪ Population data estimates/control totals (Texas State Data Center)▪ One-Stop Demographic Data Analysis Tool▪ Most recent Census data by block group▪ Other ways to account (building permits or septic system permits)▪ Employment data (Texas Workforce Commission)▪ Local knowledge<div><small>Managing the TDM Development Process</small><div>194</div></div></div>	
<div><div>Data</div><div>Forecast Year Demographics</div><ul style="list-style-type: none">▪ SDC forecast year control totals<ul style="list-style-type: none">• MPO needs to choose• Recommendation▪ Local plans/knowledge<div><small>Managing the TDM Development Process</small><div>195</div></div></div>	

Data Package Typically Provided to MPOs by TxDOT

**Data Package
Typically
Provided to
MPOs for
Inputs
Development
(Exhibit)**



Managing the TDM Development Process

INSTRUCTOR HANDBOOK Lesson 4: Resources

Exhibit 4.b Data Package Typically Provided to MPO for Model Inputs Development

Prior Model Network and TAZ Files in TransCAD Format

Prior Model Network Hard-copy Plot, by Facility Type and Lanes for Mark-up
2 copies: mark up both the same, then keep 1 at MPO, send other to TSP

Texas Workforce Commission (TWC) Data

Other GIS Data Sets

- County(ies) Boundary
- MPO Boundary
- Streets Layer
- Bridges
- Railroads
- Rivers
- Other Water Features

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Exhibit 4.b Data Package Typically Provided to MPO for Model Inputs Development

Prior Model Network and TAZ Files in TransCAD Format

Prior Model Network Hard-copy Plot, by Facility Type and Lanes for Mark-up

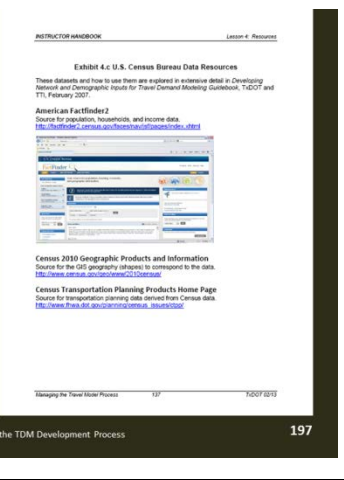
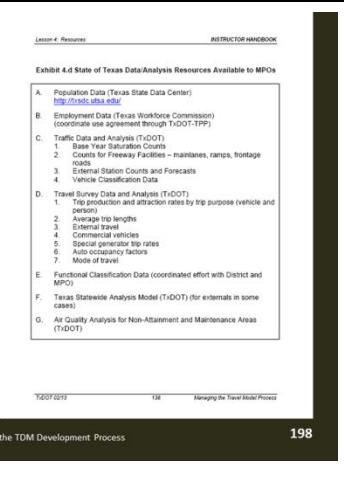
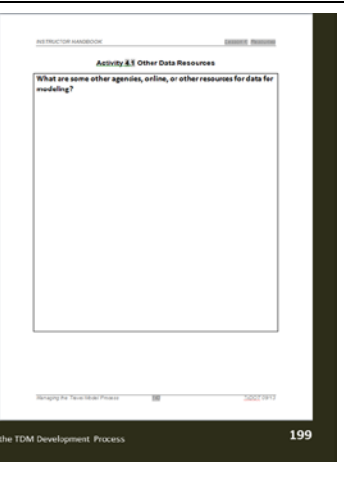
2 copies: mark up both the same, then keep 1 at MPO, send other to TPP

Texas Workforce Commission (TWC) Data

Other GIS Data Sets

- County(ies) Boundary
- MPO Boundary
- Streets Layer
- Bridges
- Railroads
- Rivers
- Other Water Features

Other Data Resources to Develop a Travel Forecasting Model

<p>Census Data Resources</p>  <p>Managing the TDM Development Process 197</p>	
<p>State of Texas Data Resources</p>  <p>Managing the TDM Development Process 198</p>	
<p>Activity: Other Potential Data Sources</p>  <p>Managing the TDM Development Process 199</p>	



KEY CONCEPT: The information above is not exhaustive – be creative in thinking about data resources, especially as technology and communications facilitate data exchange.

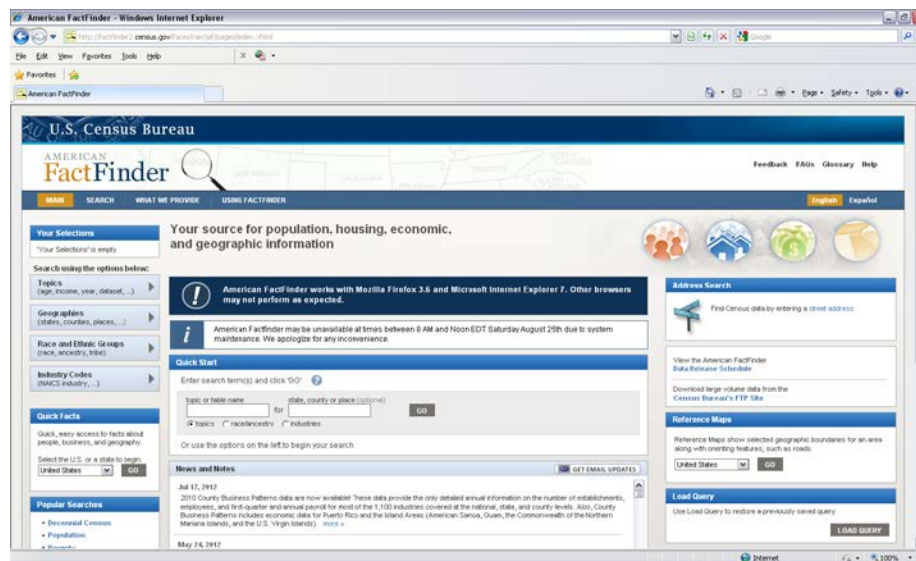
Exhibit 4.c U.S. Census Bureau Data Resources

These datasets and how to use them are explored in extensive detail in *Developing Network and Demographic Inputs for Travel Demand Modeling Guidebook*, TxDOT and TTI, February 2007.

American Factfinder2

Source for population, households, and income data.

<http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>



Census 2010 Geographic Products and Information

Source for the GIS geography (shapes) to correspond to the data.

<http://www.census.gov/geo/www/2010census/>

Census Transportation Planning Products Home Page

Source for transportation planning data derived from Census data.

http://www.fhwa.dot.gov/planning/census_issues/ctpp/

Exhibit 4.d State of Texas Data/Analysis Resources Available to MPOs

- A. Population Data (Texas State Data Center)
<http://txsdc.utsa.edu/>
- B. Employment Data (Texas Workforce Commission)
(coordinate use agreement through TxDOT-TPP)
- C. Traffic Data and Analysis (TxDOT)
 - 1. Base Year Saturation Counts
 - 2. Counts for Freeway Facilities – mainlanes, ramps, frontage roads
 - 3. External Station Counts and Forecasts
 - 4. Vehicle Classification Data
- D. Travel Survey Data and Analysis (TxDOT)
 - 1. Trip production and attraction rates by trip purpose (vehicle and person)
 - 2. Average trip lengths
 - 3. External travel
 - 4. Commercial vehicles
 - 5. Special generator trip rates
 - 6. Auto occupancy factors
 - 7. Mode of travel
- E. Functional Classification Data (coordinated effort with District and MPO)
- F. Texas Statewide Analysis Model (TxDOT) (for externals in some cases)
- G. Air Quality Analysis for Non-Attainment and Maintenance Areas (TxDOT)

Activity 4.1 Other Data Resources

What are some other agencies, online, or other resources for data for modeling?

Topic 4.4 References and Guidelines


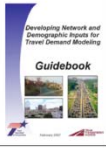


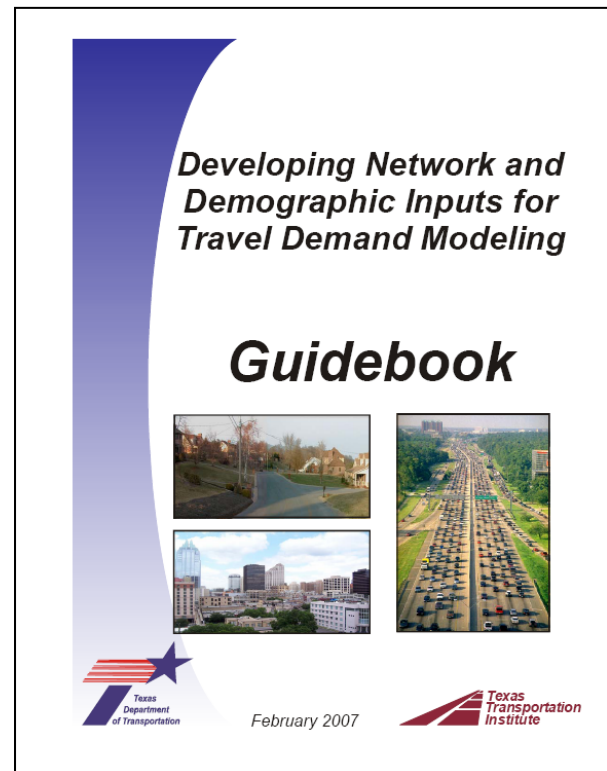
<p>Texas-Specific References & Guidelines (Exhibit)</p>  <p>Managing the TDM Development Process</p> <p>200</p>	<p>INSTRUCTOR HANDBOOK Lesson 4: Resources</p> <p>Exhibit 4.e Texas-Specific Guidelines and References Available to MPOs</p> <p>Developing Network and Demographic Inputs for Travel Demand Modeling Guidebook, TxDOT and TTI, February 2007.</p>  <p>Memo: Aggregating Census Data (January 2012)</p> <p>Memo: Geo-coding TDM Data (January 2012)</p> <p>Memo: Using Datacenter</p> <p>Memo: Aggregating Census Data</p> <p>AT0M2 User Manual, Texas Department of Transportation, February 2001.</p> <p>Texas Travel Demand Model Applications Guidebook, Texas Department of Transportation, 2007.</p> <p>TriCal Inputs Manual, Texas Transportation Institute, 1999.</p> <p>TriCal5 User's Manual, Texas Department of Transportation, 1990.</p> <p>Managing the Travel Model Process 141 TxDOT 2013</p>	
<p>General References & Guidelines (Exhibit)</p>  <p>Managing the TDM Development Process</p> <p>201</p>	<p>INSTRUCTOR HANDBOOK Lesson 4: Resources</p> <p>Exhibit 4.f General Guidelines and References Available to MPOs</p> <p>Library List</p> <p>NCHRP 716 (Update to NCHRP 365 released in May 2012): Travel Demand Forecasting: Parameters and Techniques General guide to travel forecasting. http://trb.nchrp.org/onlinepubs/nchrp/nchrp_716.pdf</p> <p>Other online information such as the Travel Forecasting Resource currently under development by TMAP/FGU/UTPA.</p> <p>Online Community</p> <p>TMAP Website Network resources for transportation modeling http://trb.nchrp.org/onlinepubs/nchrp/nchrp_716.pdf</p> <p>Ask an Expert Q&A</p>  <p>TMAP Listserve: Discussion list for transportation planning To subscribe, send mail to LISTSERV-201.101.20.100@trb.org with the command (paste it) in the email message body: SUBSCRIBE TMAP-L</p> <p>TxDOT 2013 142 Managing the Travel Model Process</p>	

Exhibit 4.e Texas-Specific Guidelines and References Available to MPOs

Developing Network and Demographic Inputs for Travel Demand Modeling Guidebook, TxDOT and TTI, February 2007.



Memo: Aggregating Census Data (January 2012)

Memo: Geo-coding TWC Data (January 2012)

Memo: Using Dataferret

Memo: Aggregating Census Data

ATOM2 User Manual, Texas Department of Transportation, February 2001.

Texas Travel Demand Model Applications Guidebook, Texas Department of Transportation, 2007.

TripCal5 Inputs Manual, Texas Transportation Institute, 1999.

TripCal5 User's Manual, Texas Department of Transportation, 1990.

Exhibit 4.f General Guidelines and References Available to MPOs

Library List

NCHRP 716 (Update to NCHRP 365 released in May 2012): Travel Demand Forecasting: Parameters and Techniques

General guide to travel forecasting

http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_716.pdf

Other online references such as the Travel Forecasting Resource currently under development by TMIP/FHWA/FTA.

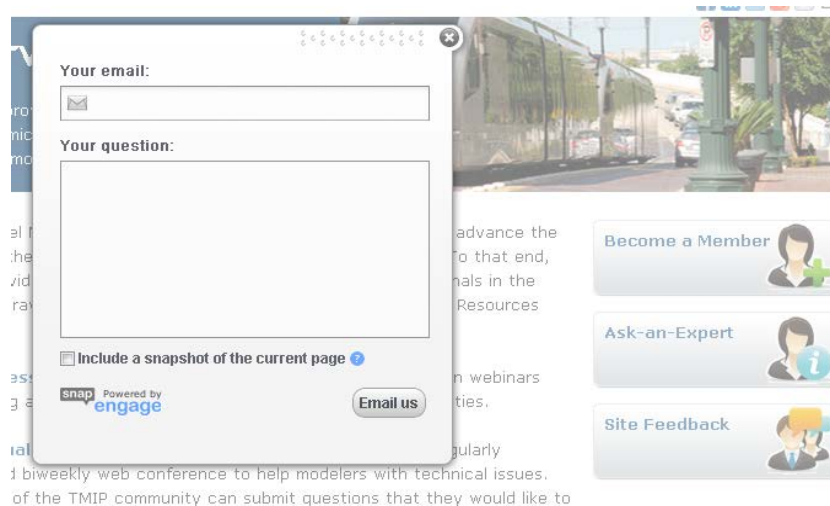
Online Community

TMIP Website

Various resources for transportation modeling

<http://tmiponline.org/Services.aspx>

Ask an Expert option



The screenshot shows a web form titled 'Ask an Expert' overlaid on a website background. The form has the following elements:

- Your email:** A text input field with an email icon.
- Your question:** A large text area for typing the question.
- ☐ **Include a snapshot of the current page** (with a small blue icon).
- Powered by snap engage** logo.
- Email us** button.

The background website shows a city street scene and a sidebar with the following links:


- Become a Member** (with a person icon and a green plus sign).
- Ask-an-Expert** (with a person icon and a blue 'i' icon).
- Site Feedback** (with a person icon and a speech bubble icon).

TMIP Listserv: Discussion list for transportation planning

To subscribe, send mail to LISTSERV@LISTSERV.TMIPONLINE.ORG with the command (paste it!) in the e-mail message body: SUBSCRIBE TMIP-L

Topic 4.5 Training

Training Available to MPOs on Modeling (Exhibit)



Lesson 4: Resources INSTRUCTOR HANDBOOK

Exhibit 4.g Model Training Available to MPOs

<p>TxDOT (or under contract through Texas A&M Transportation Institute)</p> <p>A. General TransCAD Training (TTI)</p> <p>B. Introduction to Travel Demand Modeling (TTI)</p> <p>C. Model Inputs Development Training (TTI)</p> <p>D. Model Application/Alternatives Analysis Training (TTI)</p> <p>Contact TxDOT TFP staff or the TransCAD Help Desk: TFP_TRANSCAD_HELP@dot.texas.gov or 512/486-5177</p>
<p>NHI Introduction to Urban Travel Demand Forecasting Course http://www.nhi.fhwa.dot.gov/training/course_detail.asp?num=PH03A-NHI-15-054&topicnum=151</p> <p>Free version of materials available, but for course to be offered in Texas, contact TxDOT TFP staff or the TransCAD Help Desk: TFP_TRANSCAD_HELP@dot.texas.gov or 512/486-5177</p>
<p>TMAP Webinars http://transportmap2services.com</p> <p>Caliper Corporation (TransCAD software developer) Travel Demand Modeling with TransCAD and On-site Training Options http://www.caliper.com/</p>

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Exhibit 4.g Model Training Available to MPOs

TxDOT (or under contract through Texas A&M Transportation Institute)

- A. General TransCAD Training (TTI)
- B. Introduction to Travel Demand Modeling (TTI)
- C. Model Inputs Development Training (TTI)
- D. Model Application/Alternatives Analysis Training (TTI)

Contact TxDOT-TPP staff or the TransCAD Help Desk:

TPP-TRANSCAD-HELPDESK@txdot.gov or 512/486-5177

NHI Introduction to Urban Travel Demand Forecasting Course

http://www.nhi.fhwa.dot.gov/training/course_detail.aspx?num=FHWA-NHI-152054&topicnum=151

Free version of materials available, but for course to be offered in Texas, contact TxDOT-TPP staff or the TransCAD Help Desk:

TPP-TRANSCAD-HELPDESK@txdot.gov or 512/486-5177

TMIP Webinars

See <http://tmiponline.org/Services.aspx>

Caliper Corporation (TransCAD software developer)

Travel Demand Modeling with TransCAD and On-site Training Options

<http://www.caliper.com/>

Topic 4.6 Model Software Licensing and Support

Texas Package & TransCAD Licensing Explained (Exhibit)



Lesson 4: Resources INSTRUCTOR HANDBOOK

Exhibit 4h The Texas Package and TransCAD Software

Minimum Software Needs to Run the Texas Package

- TransCAD: The software should be loaded on one computer only, for the user most likely to do the modeling work.
 - Typically the person who does GIS work, if applicable
 - When the software is loaded, write down here: TransCAD license serial number off the installation disk: _____
- TransCAD USB Key serial number here: _____
- TransCAD Version: _____ and Build Number: _____ (these are on the installation disc or from the Help menu)
- TransCAD USB Key
 - The TransCAD USB Key is VALUABLE and EASILY LOST
 - Find a large, highly visible key chain to attach to it
 - During times when TransCAD is not being used consistently, identify a location where it should be kept
- Texas Package Program Suite (Add-on Menu) (see next page for more info)

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Other Texas Package Software Requests (Exhibit)



Lesson 4: Resources INSTRUCTOR HANDBOOK

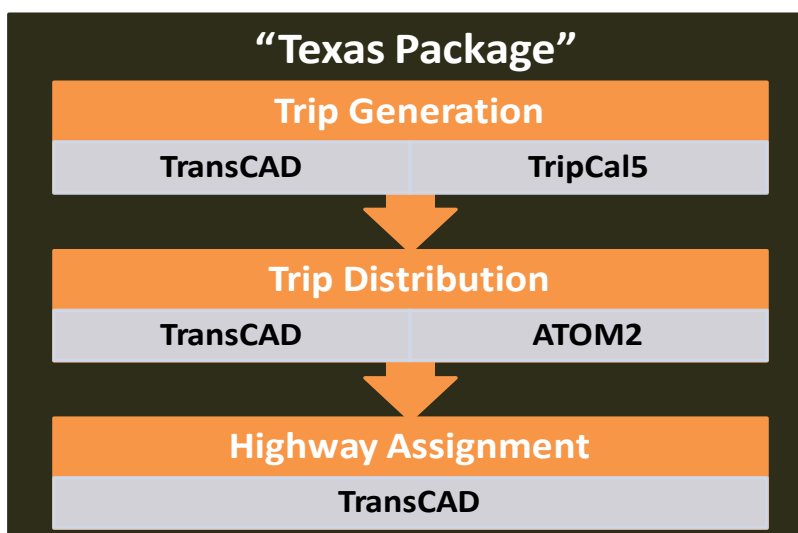
Exhibit 4i The Texas Package Software Request Forms (TripCal and ATOM2)

TripCal and ATOM2 software packages are proprietary to TxDOT. Their distribution is controlled through individual contract by user. Request contract forms from TxDOT TFP. These forms need to be completed and submitted in hardcopy format with signature of the MPO Director.

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Exhibit 4.h The Texas Package and TransCAD Software



Minimum Software Needs to Run the Texas Package

- ☐ TransCAD: The software should be loaded on one computer only, for the user most likely to do the modeling work.

- Typically the person who does GIS work, if applicable
- When the software is loaded, write down here:
TransCAD license serial number off the installation disk:

TransCAD USB Key serial number here: _____

TransCAD Version: _____ and Build Number: _____ (these are on the installation disc or from the Help menu)

- ☐ TransCAD USB Key
 - The TransCAD USB Key is VALUABLE and EASILY LOST
 - Find a large, highly visible key chain to attach to it
 - During times when TransCAD is not being used consistently, identify a location where it should be kept



- ☐ Texas Package Program Suite (Add-on Menu)
(see next page for more info)

(exhibit continued)

If the user will be running ALL steps of the Texas Package (including Trip Generation and Trip Distribution), they will also need:

- ☐ TripCal5 Software (proprietary to TxDOT)
 - ☐ ATOM2 Software (proprietary to TxDOT)
-

Where to Get TransCAD and Other Texas Package Software

1. Typically, TxDOT allocates two (2) TransCAD licenses per District. District staff then work with the MPO to allocate the licenses to the appropriate local staff (District, MPO, local partner agency).
2. Check if it is already loaded. If so, find the USB key. Open up the Help menu and determine which version and build number you have. Contact the Help Desk with this information to determine if you are using the current version and build.
3. Contact TxDOT-TPP or the TransCAD Help Desk to verify or install the software. Installation is not immediate, as of 2012, installation involves someone traveling to your MPO to install the software. Please keep this potential delay in mind.

Help Desk: TPP-TRANSCAD-HELPDESK@txdot.gov

How to Get Help with TransCAD Software

Contact the Help Desk: TPP-TRANSCAD-HELPDESK@txdot.gov

Exhibit 4.i The Texas Package Software Request Forms (TripCal and ATOM2)

TripCal and ATOM software packages are proprietary to TxDOT. Their distribution is controlled through individual contract by user. Request contract forms from TxDOT-TPP. These forms need to be completed and submitted in hardcopy format with signature of the MPO Director.

Contract No.

STATE OF TEXAS §
COUNTY OF TRAVIS §

**COPYRIGHT LICENSE AGREEMENT FOR THE USE OF
THE TEXAS DEPARTMENT OF TRANSPORTATION'S
TripCal5 and ATOM2**

THIS AGREEMENT is made by and between the State of Texas, acting by and through the Texas Department of Transportation, hereinafter called "State," and _____

WITNESSETH

WHEREAS, the State, in accordance with Transportation Code, §201.205, may:

1. apply for, register, secure, hold, and protect patents, copyrights, trademarks, or other evidence of protection or exclusivity;
2. enter into nonexclusive license agreements with any third party for the receipt of fees, royalties, or other things of monetary or nonmonetary value;
3. waive or reduce the amount of fees if it determines that such waiver will further the goals and missions of the department and result in a net benefit to the State; and

WHEREAS, the State has authored, produced, or participated in the production of a work, the Trip Calculation-version 5 software, known generally as "TripCal5" and the Texas Spatially Disaggregate Trip Distribution Model-version 2 software, known generally as "ATOM2" and is the owner of certain rights including copyrights, and

WHEREAS, the Licensee desires to obtain a non-exclusive license from the State to use TripCal5 and ATOM2; and

WHEREAS, the State is agreeable to provide a non-exclusive, non-transferable license to the Licensee to use TripCal5 and ATOM2 as stated herein; and

NOW, THEREFORE, in consideration of the premises and of the mutual covenants and agreements of the parties hereto, to be by them respectively kept and performed as hereinafter set forth, it is agreed as follows:

AGREEMENT

1. **CONTRACT PERIOD.** This agreement becomes effective upon the date of final execution by the parties and shall be renewed annually, unless terminated or modified as hereinafter provided.
2. **RIGHTS GRANTED.** The State hereby grants to the Licensee a non-exclusive right, license, and privilege worldwide to use TripCal5 and ATOM2 for MTP Update.

The Licensee agrees that this License does not transfer or convey any ownership or any other rights other than those rights expressly granted by this agreement. Title to and all rights of ownership in the portions of TripCal5 and/or ATOM2 developed by the State are and shall remain the property of the State.

Copyright_Agreement Page 1 of 4

3. **RESPONSIBILITY FOR MAINTENANCE OF THE SOFTWARE.** The Licensee does not have, nor shall it have, any responsibility for the maintenance, repair, or replacement of the State's confidential information. (The Licensee shall not disclose or otherwise make available to any third party who is not a party to this agreement any confidential information of the State.)
4. **LICENSE FEE.** The State agrees to waive the license fee.
5. **TAXES AND FEES.** Licensee agrees to pay all federal, state, and local taxes or fees for the use of TripCal5 and/or ATOM2.
6. **ASSIGNMENT PROHIBITION.** The Licensee shall not assign, transfer, or otherwise dispose of its rights to TripCal5 and/or ATOM2 to any third party.
7. **COPYRIGHT INFRINGEMENT.** The Licensee shall not be liable for any third-party or potential infringement by a third party relating to TripCal5 and/or ATOM2.
8. **CONFIDENTIALITY.** Licensee shall not disclose, publish, or disseminate to any third party any confidential information or intellectual property and related information of the State.
9. **TERMINATION.** This agreement shall be terminated by mutual agreement of the parties. If the Licensee fails to provide written notice to the State of its intent to terminate this agreement, the Licensee shall be deemed to have terminated this agreement. Termination of this agreement shall not constitute an admission of liability of the parties under this agreement. Termination of this agreement shall not constitute an admission of liability of the parties under this agreement.
10. **INDEMNIFICATION.** The Licensee shall indemnify and save harmless the State from any and all claims, damages, and attorneys' fees arising out of or in any way connected with the use of TripCal5 and/or ATOM2.

Copyright_Agreement Page 2 of 4

11. **REMEDIES.** Violation or breach of contract by the Licensee shall constitute a breach of contract or violation of contract terms shall be a breach of contract.
12. **SUPPLEMENTAL AGREEMENTS.** Any changes in the agreement terms shall be enacted by a written supplement. Supplemental agreements must be executed during the term of the agreement.
13. **LEGAL CONSTRUCTION.** In case one or more of the provisions of this agreement shall for any reason be held invalid, illegal or unenforceable, the validity, legality or unenforceability shall not affect any other provisions of this agreement. Supplemental agreements must be executed during the term of the agreement.
14. **PRIOR AGREEMENTS SUPERSEDED.** This agreement constitutes the entire agreement between the parties and supersedes any prior understandings and oral agreements between the State and the Licensee respecting the within subject matter.
15. **AUTHORITY OF STATE AUDITOR.** The state auditor may conduct an audit or investigation of any entity receiving funds from the state directly under the contract or indirectly through a subcontract under this contract. Acceptance of funds directly under the contract or indirectly through a subcontract under this contract acts as acceptance of the audit or investigation in connection with those funds. An entity that is the subject of an audit or investigation must provide the state auditor with access to any information the state auditor considers relevant to the investigation or audit.
16. **VENUE.** This agreement is governed by the laws of the State of Texas.
17. **SIGNATORY AUTHORITY.** The undersigned for the Licensee represents and warrants that he/she is an officer of the organization for which he/she has executed this agreement and that he/she has the full and complete authority to enter into this agreement on behalf of the Licensee.
18. **NOTICES.** All notices to either party by the other party required under this agreement shall be delivered personally or sent by certified or U.S. Mail, postage prepaid, addressed to such party at the following respective address:

Copyright_Agreement Page 3 of 4

Topic 4.7 Other Resources/Assistance

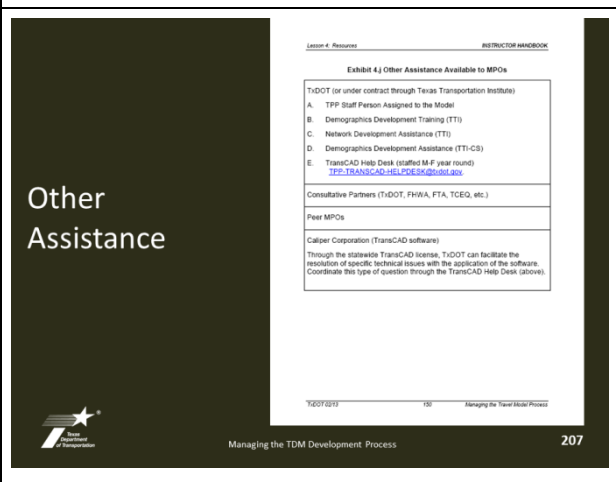
	
	
	

Exhibit 4.j Other Assistance Available to MPOs

<p>TxDOT (or under contract through Texas Transportation Institute)</p> <ul style="list-style-type: none">A. TPP Staff Person Assigned to the ModelB. Demographics Development Training (TTI)C. Network Development Assistance (TTI)D. Demographics Development Assistance (TTI-CS)E. TransCAD Help Desk (staffed M-F year round) TPP-TRANSCAD-HELPDESK@txdot.gov.
<p>Consultative Partners (TxDOT, FHWA, FTA, TCEQ, etc.)</p>
<p>Peer MPOs</p>
<p>Caliper Corporation (TransCAD software)</p> <p>Through the statewide TransCAD license, TxDOT can facilitate the resolution of specific technical issues with the application of the software. Coordinate this type of question through the TransCAD Help Desk (above).</p>

Topic 4.8 Other Helpful Resources

TransCAD Help Desk

Provided by TxDOT, staffed M-F year round

TPP-TRANSCAD-HELPDESK@txdot.gov or 512/486-5177

TxDOT One-Stop Demographic Data Analysis Tool (beta)

Tool designed to give TxDOT and MPOs a one-stop location to derive general demographic information.

<http://www.txdot.gov/business/demographic.htm>

TxDOT Transportation Planning Manual

Guidelines for the planning process.


<http://onlinemanuals.txdot.gov/txdotmanuals/pln/pln.pdf>

***TxDOT-TPP Developing Network
and Demographic Inputs for
Travel Demand Modeling
Guidebook, TxDOT and TTI, February 2007.***



Topic 4.9 Lesson Wrap-Up

On the previous page is a list of Other Helpful Resources that cover the topics in this lesson.

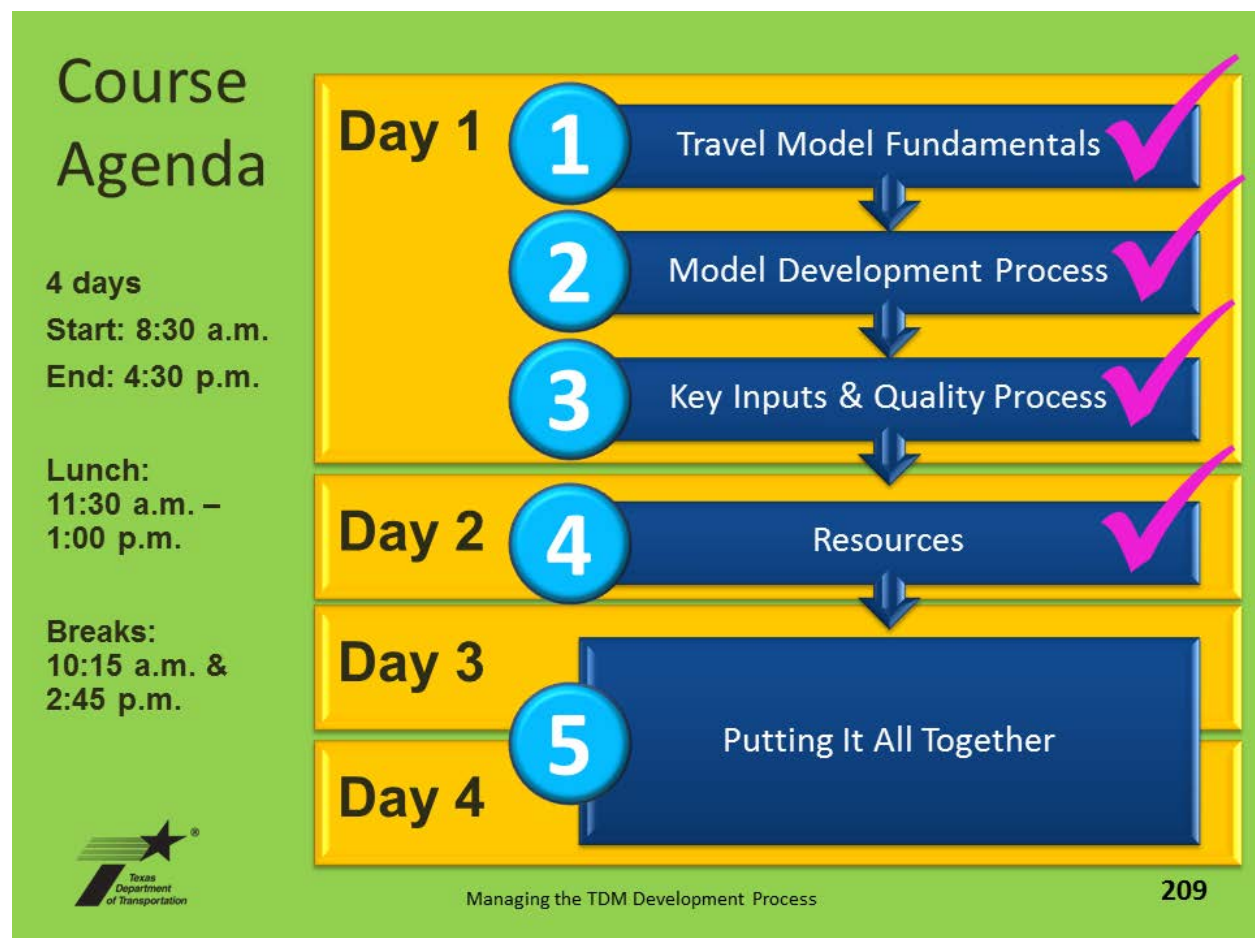
 <p>The diagram is titled "Lesson 4 Learning Objectives" in a blue circle. Below the title is a blue box labeled "Resources" with a downward arrow pointing to a central "Guidebook" icon. The "Guidebook" icon is titled "Developing Network and Demographic Inputs for Travel Demand Modeling" and "Guidebook". Below the "Guidebook" icon are four smaller icons labeled "Staff", "Data", "Guidelines/Instructions", and "Training". The "Staff" icon shows a group of people in a meeting. The "Data" icon shows a grid of data points. The "Guidelines/Instructions" icon shows a document. The "Training" icon shows a person at a computer. At the bottom left is the "Texas Department of Transportation" logo. At the bottom center is the text "Managing the TDM Development Process". At the bottom right is the page number "208".</p>	<p>At the beginning of this lesson, we set the following learning objectives. At this point, you would be able to: (read the objectives).</p> <p>Does anyone have any questions about this material?</p>
---	--

Lesson 4 Reinforcement Questions

After break, before starting the next lesson, review these questions (and answers) as a group:

1. What types of staffing options do MPOs have available to them for completing model tasks?
2. What types of datasets are available for MPOs and what agencies are the primary sources?

Where Are We?



Lesson 5: Putting It All Together

Learning Objectives

Putting It All Together

Identify
Unique
MPO
Challenges

Map the
Critical
Path

Make It
Work

Lesson Materials Follow

 <p>Lesson 5 Learning Objectives</p> <p>Putting It All Together</p> <ul style="list-style-type: none"> Identify Unique MPO Challenges Map the Critical Path Make It Work <p>Managing the TDM Development Process 210</p>	
--	--

Topic 5.1 Lesson Overview

 <p>Plan for Lessons 3, 4, and 5</p> <p>Lessons</p> <ul style="list-style-type: none"> WHAT 3 Key Inputs & Quality Process WHO & HOW 4 Resources WHEN 5 Putting It All Together <p>Managing the TDM Development Process 211</p>	
--	--

Lesson 5 Components

- One size does not fit all
- The model as a project
 - Choosing a project manager
 - Plan the work and work the plan (then check it)
- Best practice strategies
- Key talking points by audience



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Topic 5.2 “One Size Does Not Fit All”

MPOs' General Issues with Models



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One Size Does Not Fit All

- Largest MPOs
 - Independent with respect to model development
 - Work with TxDOT to gather travel surveys and count data
- Other large MPOs are developing models with TxDOT data resources and limited TxDOT help
- Some MPOs have staff resources/interest
- Some MPOs have little staff resources/interest



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One Size Does Not Fit All, cont.

- Even among small and medium-sized MPOs, there is variation:
 - One MPO has a separate IAC with TTI to provide guidance on model inputs
 - Several MPOs use consultants to develop model inputs
 - Many of the MPOs develop their model inputs in-house with current staff



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Specific Issue

For small and medium-sized MPOs across the United States, there is a ***well-documented resource constraint***, hence the necessity for other strategies—developing innovative methodologies, scaling efforts to the resources available, and prioritizing.



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What Are Your MPO's Unique Challenges? (Activity)

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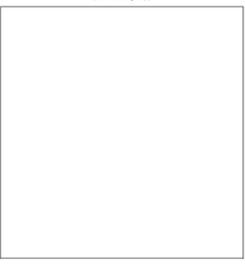

Activity 5.1 Identifying Your MPO's Unique Challenges



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<p>What Does Success Mean for You? (Activity)</p>  <p>Managing the TDM Development Process</p> <p>219</p>	<p>Lesson 5: Putting It All Together</p> <p>PARTICIPANT HANDBOOK</p> <p>Activity 5.2 What Does a Travel Model Success Mean for YOU? (Discuss as group)</p>  <p>TxDOT 09/13 164 Managing the Travel Model Process</p>
<p> KEY CONCEPT: YOUR MPO's unique challenges today will change over time, but hopefully for the better.</p>	

Activity 5.1 Identifying Your MPO's Unique Challenges

Process	Resource Constraints	Policy Board Understanding
<div>Technical Complexity</div> <div>Multiple Players</div>	<div>Staff</div> <div>Technical Expertise</div>	<div>Model Use</div> <div>Process Complexity</div>
<div></div> <div></div>	<div></div> <div></div>	<div></div> <div></div>

Activity 5.2 What Does a Travel Model Success Mean for YOU?

(discuss as group)

Topic 5.3 Challenge: Travel Model Scheduling

Timelines for a Single Model under Development

In the two exhibits below, the count cycle (which drives the model development cycle) and the MTP cycle line up nicely. Note the compression in the second exhibit that allows the MPO to achieve the schedule.

Exhibit 5.a Ideal Timeline: 5-Year Count Cycle = 5-Year MTP Cycle

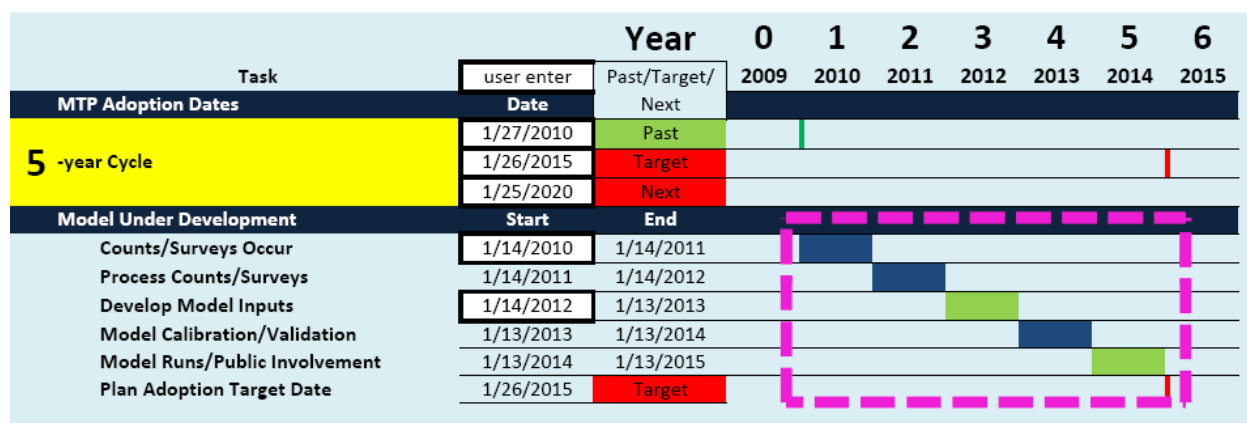
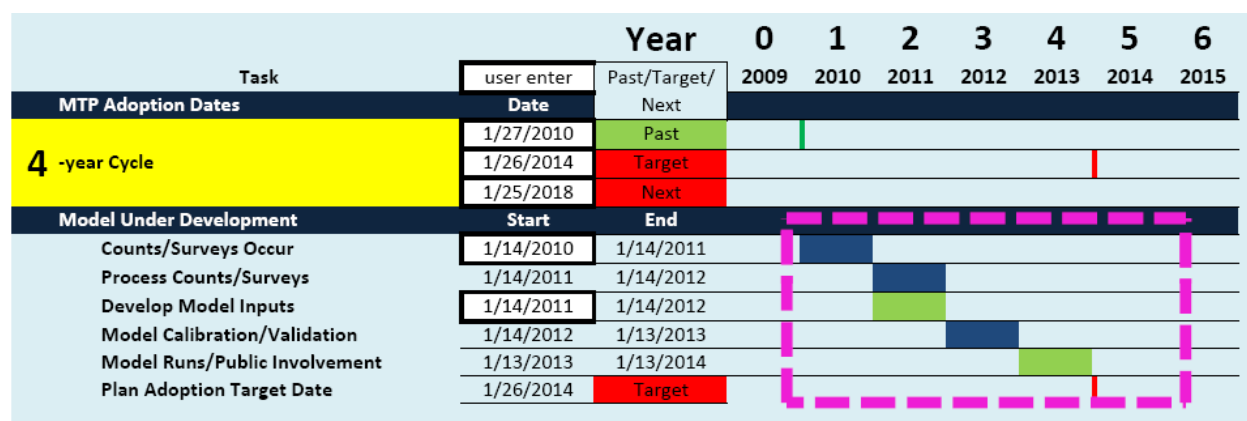
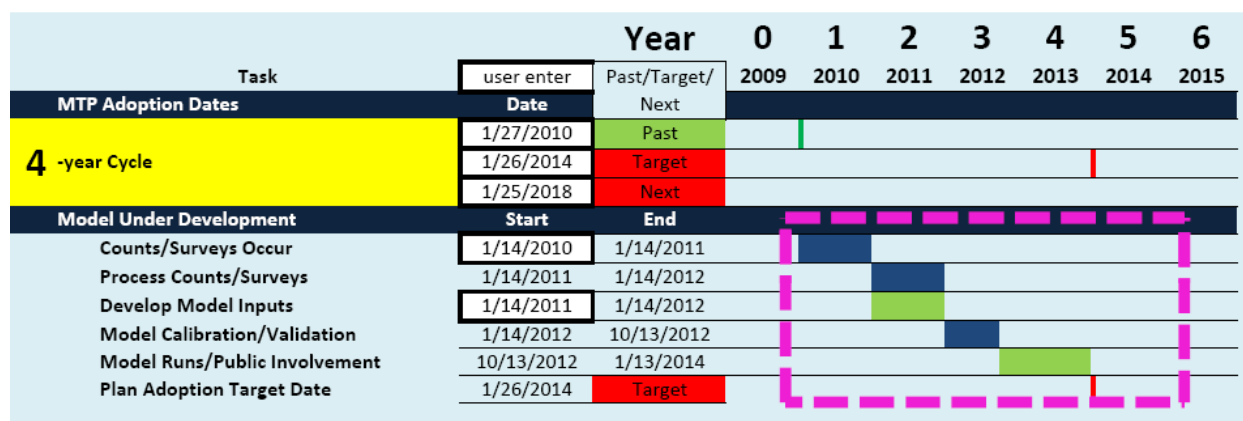


Exhibit 5.b Example Timeline: 5-Year Count Cycle, 4-Year MTP Cycle



The next exhibit even demonstrates areas of flexibility in the schedule, if some tasks are performed more aggressively.

Exhibit 5.c Example Timeline: 5-Year Count Cycle, 4-Year MTP Cycle, More PI Time Needed



Timelines Considering the “3 Models” Concept

The following exhibits demonstrate how quickly the timelines can get off-track, even when everyone is doing the model tasks according to the original 5-year schedule.

Exhibit 5.d Ideal Timeline: 5-Year MTP Cycle, 3 Models: In this example, the count cycle (which drives the model development cycle) and the MTP cycle line up nicely for all three models, current, under development, and next model.

Exhibit 5.e Example Timeline: 4-Year MTP Cycle, 3 Models: This example demonstrates how the 4-year MTP cycle quickly gets off track with the 5-year count/model cycle. The model under development is a candidate for accelerating tasks to still meet the MTP need.

Exhibit 5.f Example Timeline: 4-Year MTP Cycle, 3 Models, After: This example demonstrates that the next model, however, represents a seriously challenging schedule.

Exhibit 5.d Ideal Timeline: 5-Year MTP Cycle, 3 Models

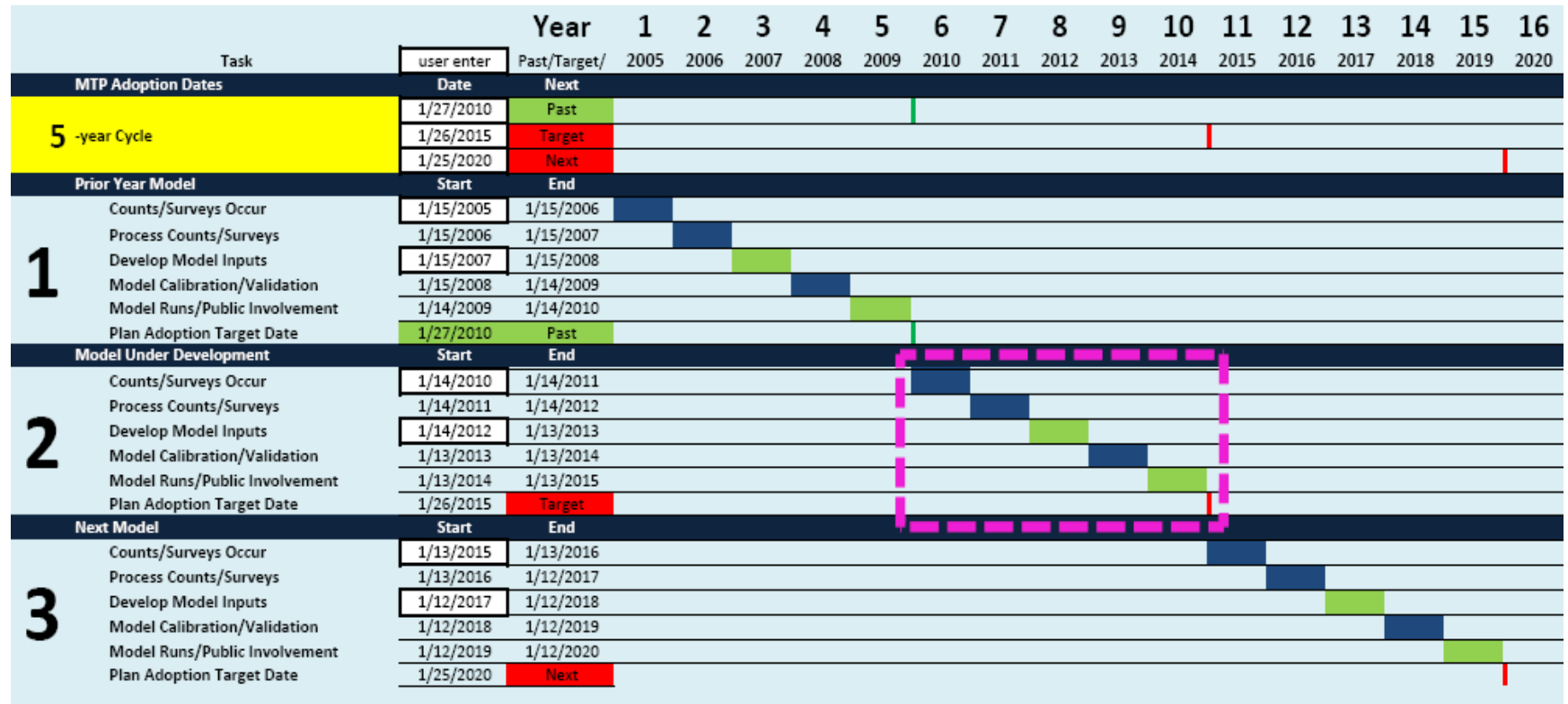


Exhibit 5.e Example Timeline: 4-Year MTP Cycle, 3 Models

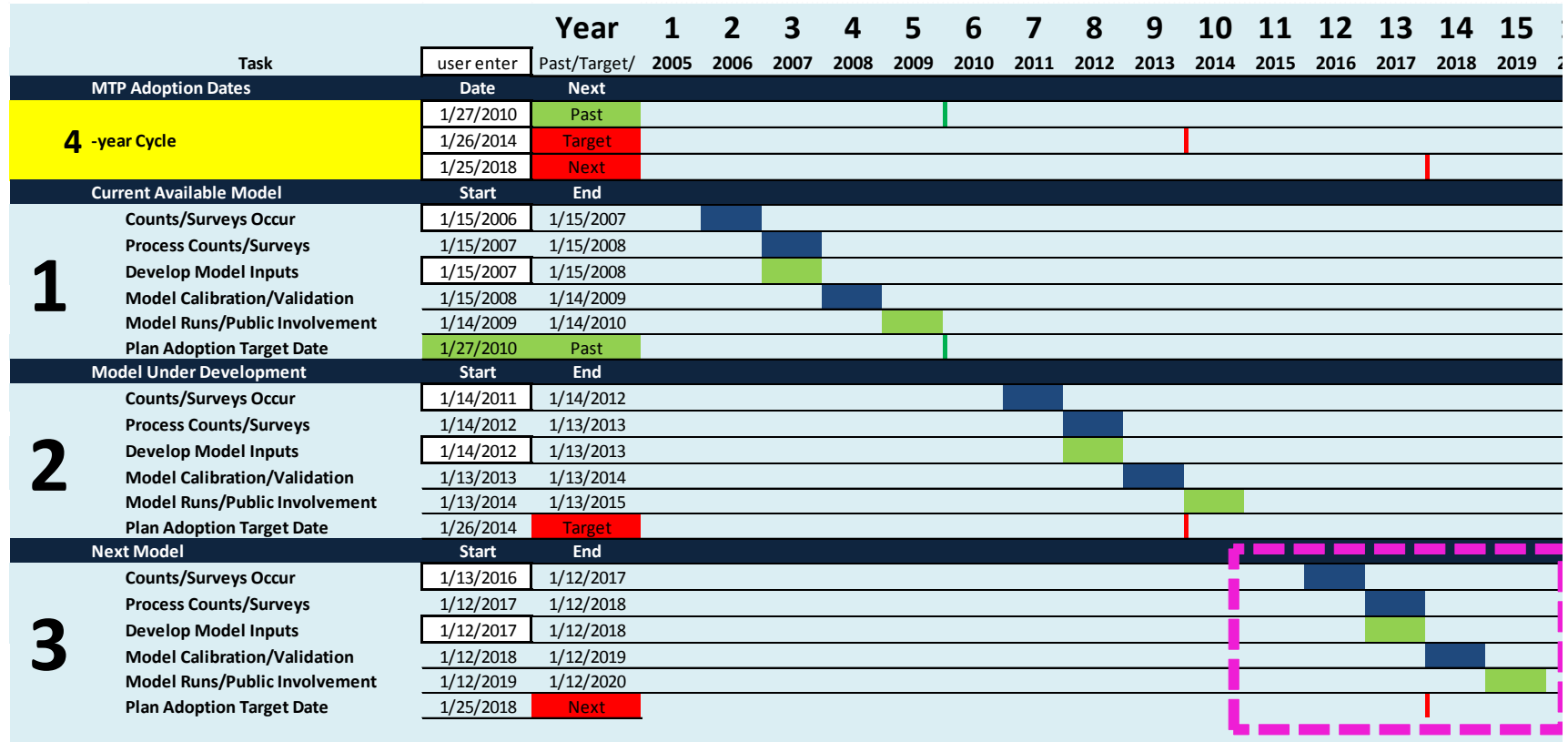
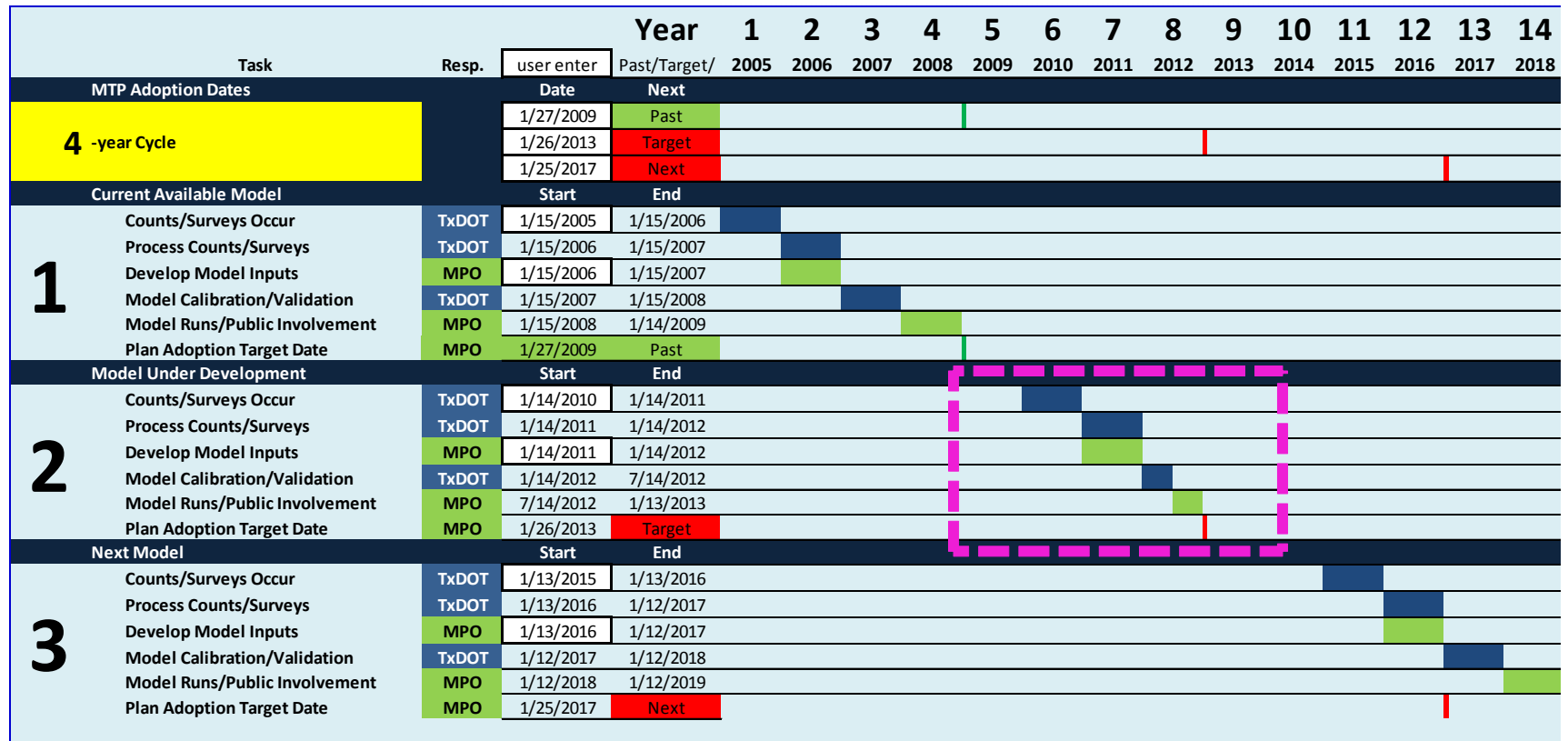


Exhibit 5.f Example Timeline: 4-Year MTP Cycle, 3 Models, After “Fix”



Topic 5.4 The Model as a Project

What Is a Project?

A project is a one-time or cyclic endeavor involving:

- An established objective
- A defined life span with a beginning and an end
- Usually, the involvement of several departments and professionals
- Specific time, cost, and performance requirements



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The Model as a Project

MPO model development is cyclic, involving:

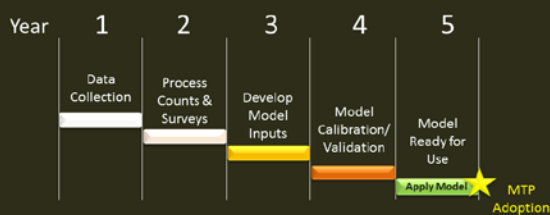
- An established objective—to apply for MTP
- A defined life span with a beginning and an end
- Usually, the involvement of several departments and professionals—and agencies
- Specific time, cost, and performance requirements



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Ideal MTP/Model Schedule

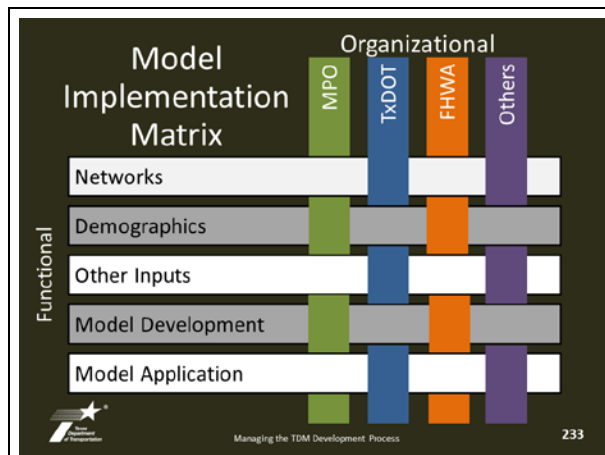


This idealized schedule incorporates time for schedule delays and still allows a model to be completed before the next cycle of saturation counts occurs. If the MTP is due for adoption soon after, the cycles align nicely.



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Who Is the Project Manager for Your MPO's Model? (Activity)

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Activity 5.3 Identifying a Project Manager for the Model

Let's brainstorm the answers to the following questions as a group, but write down notes for your own MPO. Remember to not restrict yourself to MPO staff.

Who has the knowledge of how the model will be used as part of the MTP process?

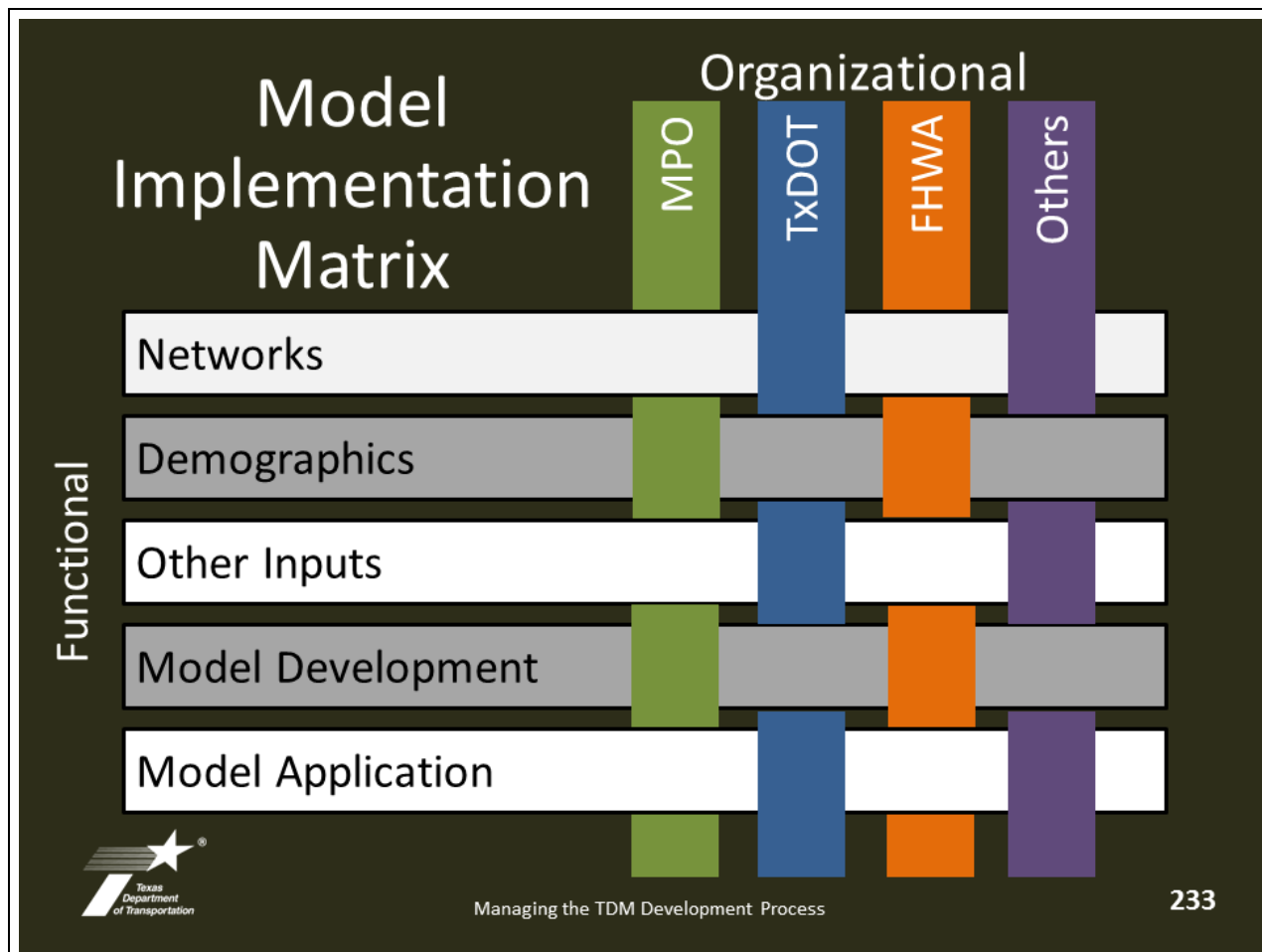
Who has been knowledge of a model purpose, use, and application, as well as basic knowledge of inputs?

What other relevant questions should we ask?

Who is most interested in a quality model being delivered on time for use to develop the MTP?

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Activity 5.3 Identifying a Project Manager for the Model



Let's brainstorm the answers to the following questions as a group, but write-down names for your own MPO. Remember to not restrict yourself to MPO staff.

Who has the knowledge of how the model will be used as part of the MTP process?

Who has basic knowledge of a model purpose, use, and application, as well as basic knowledge of inputs?

What other relevant questions should we ask?

Who is most invested in a quality model being delivered on time for use to develop the MTP?

PLAN THE WORK

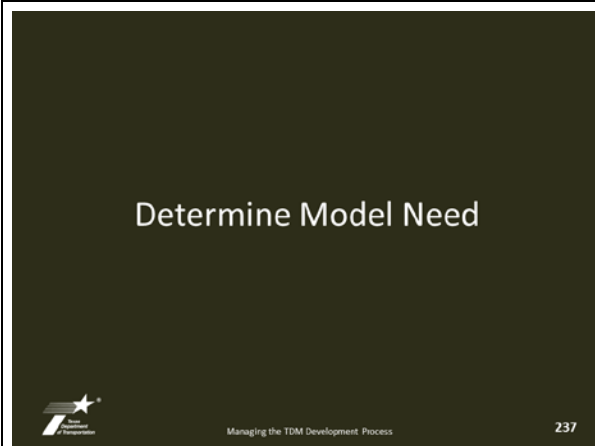
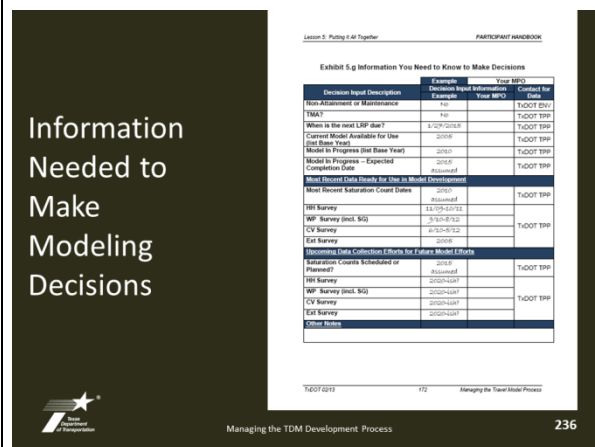
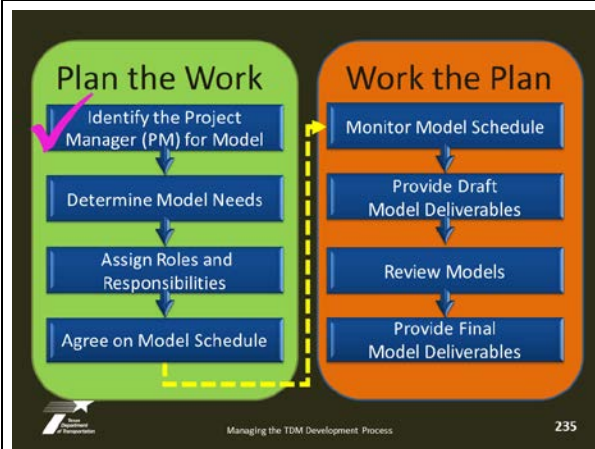


Exhibit 5.g Information You Need to Know to Make Decisions

	Example	Your MPO	
Decision Input Description	Decision Input Information		Contact for Data
	Example	Your MPO	
Non-Attainment or Maintenance	No		TxDOT ENV
TMA?	No		TxDOT-TPP
When is the next LRP due?	1/27/2015		TxDOT-TPP
Current Model Available for Use (list Base Year)	2005		TxDOT-TPP
Model In Progress (list Base Year)	2010		TxDOT-TPP
Model In Progress -- Expected Completion Date	2015 assumed		TxDOT-TPP
<u>Most Recent Data Ready for Use in Model Development</u>			
Most Recent Saturation Count Dates	2010 assumed		TxDOT-TPP
HH Survey	11/09-10/11		TxDOT-TPP
WP Survey (incl. SG)	9/10-8/12		
CV Survey	6/10-5/12		
Ext Survey	2005		
<u>Upcoming Data Collection Efforts for Future Model Efforts</u>			
Saturation Counts Scheduled or Planned?	2015 assumed		TxDOT-TPP
HH Survey	2020-ish?		TxDOT-TPP
WP Survey (incl. SG)	2020-ish?		
CV Survey	2020-ish?		
Ext Survey	2020-ish?		
<u>Other Notes</u>			

Topic 5.5 Determine Model Need, Models Available

Defining Your MPO's Specific Modeling Objective

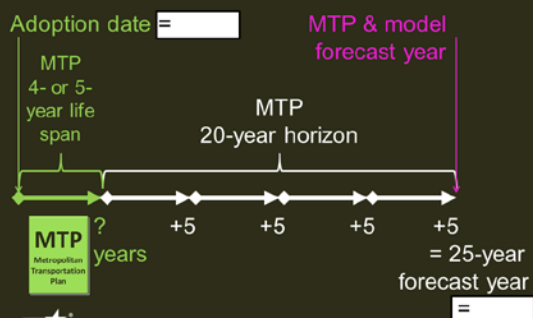
- Do you need a model?
- Determine the model you need
- Identify and describe the model you have available right now
- Describe the model under development and when it will be available



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Determine MTP Forecast Year



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Determine the Model Needed (Exhibit & Activity)

Lesson 5: Putting It All Together PARTICIPANT HANDBOOK

Exhibit 5.4 Example: Determine the Model You Need

Is a Model Required for Your MTP Process? (Yes or No)

Is Your MPO in Non-Attachment? No

Is Your MPO a TMA? No

If the answer to either question is yes, then a model is required for your MTP process. Otherwise, a model is still recommended as "Best Practice".

Model Need:

(check one)

☒ Upcoming MTP Adoption☐ MTP/TP Update☐ Project-level Analysis (not MTP)☐ Other:

Required Forecast Year (see Lesson 2)

Adoption or Update DATE:

1/26/2014

= 2014 + 25 = 2039

(2040)

Model Timing (MPO side):

How Much Time Does Your MPO Need to Have to Conduct Analysis with the TDM?

12 months

Date the Model is Needed to Start Analysis:

1/26/2013

(Subtracting the time needed for analysis from the date the product is needed (adoption, update, etc.), what date do you need a model in hand to start analysis?)

Remember to confer with consultative partners! (start with TxDOT-TPP)

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Exhibit 5.h Example: Determine the Model You Need**Is a Model Required for Your MTP Process?**

	(Yes or No)
Is Your MPO in Non-Attainment?	No
Is Your MPO a TMA?	No

If the answer to either question is yes, then a model is required for your MTP process. Otherwise, a model is still recommended as “Best Practice.”

Model Need:

(check one)

- ☒ Upcoming MTP Adoption
- ☐ MTP/TIP Update
- ☐ Project-level Analysis (not MTP)
- ☐ Other: _____

Adoption or Update DATE:

1/26/2014
$= 2014 + 25 = 2039$ (2040)

Required Forecast Year (see Lesson 2):

Model Timing (MPO side):

How Much Time Does Your MPO Need to Have to Conduct Analysis with the TDM?

12 months
1/26/2013

Date the Model is Needed to Start Analysis:

(Subtracting the time needed for analysis from the date the product is needed (adoption, update, etc.), what date do you need a model in hand to start analysis?)

Remember to confer with consultative partners! (start with TxDOT-TPP)

Activity 5.4 Determine the Model You Need

Is a Model Required for Your MTP Process?

(Yes or No)

Is Your MPO in Non-Attainment?

Is Your MPO a TMA?

If the answer to either question is yes, then a model is required for your MTP process. Otherwise, a model is still recommended as “Best Practice.”

Model Need:

(check one)

- ☐ Upcoming MTP Adoption
- ☐ MTP/TIP Update
- ☐ Project-level Analysis (not MTP)
- ☐ Other: _____

Adoption or Update DATE:

Required Forecast Year (see Lesson 2):

Model Timing (MPO side):

How Much Time Does Your MPO Need to Have to Conduct Analysis with the TDM?

Date the Model is Needed to Start Analysis:

(Subtracting the time needed for analysis from the date the product is needed (adoption, update, etc.), what date do you need a model in hand to start analysis?)

Remember to confer with consultative partners! (start with TxDOT-TPP)

Determine the Model Currently Available for Use

3-Model Concept

- Current model available
- Model under development
- Data collection for next model after that



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Identify and Describe Model “In Hand”

- What travel model do you have available right now?
- Does it meet above needs?
- What level of effort is necessary to get the model to meet above needs?



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Describe YOUR Current Available Model (Activity)



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PARTICIPANT HANDBOOK Lesson 5: Putting It All Together
Activity 5.3 Describe the Current Model Available for Use and “Rock Its”

	Y1888
Base Year of Model	
Forecast “Out” Year	
Interim Years, if any?	
Other:	

Refer to the information you filled out for the previous Activity (the model you need **FOR THE TIME**). (Exhibit in Lesson 2, DESCRIBE FINDINGS)

Will the Current Model Base Year be Stable by the Time of MTP Adoption? If so, is it a Possibility?

What is the Current Model Forecast Year and How Does that Compare to the Forecast Year You Need?

What is Your Confidence in the Current Model Output?

Generally, What is the Current Model’s Potential for Using for the MTP?

Remember to confer with consultative partners! (start with FADOI)

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Activity 5.5 Describe the Current Model Available for Use and “Kick Its Tires”

	Years
Base Year of Model	
Forecast “Out” Year	
Interim Years, if any?	
<input type="checkbox"/> Other: _____	


*Refer to the information you filled out for the previous Activity (the model you need) **and** the “Kick the Tires” Exhibit in Lesson 2. Describe findings:*

Will the Current Model Base Year be Stale by the Time of MTP Adoption? If So, Is a Refresh a Possibility?
What Is the Current Model Forecast Year and How Does that Compare to the Forecast Year You Need?
What Is Your Confidence in the Current Model Overall?
Generally, What Is the Current Model’s Potential for Using for the MTP?

Remember to confer with consultative partners! (start with TxDOT)

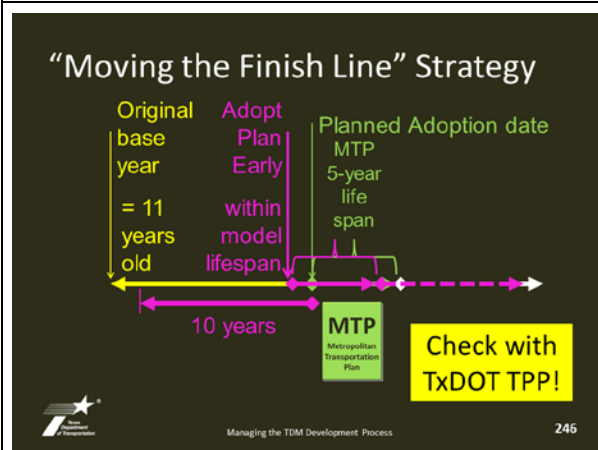
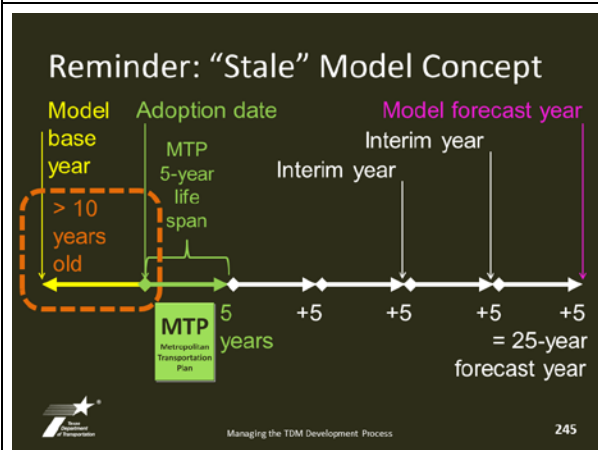
What about Moving the Finish Line?

“Moving the Finish Line”



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Next: Describe the Model under Development

3-Model Concept

- Current model available
- Model under development
- Data collection for next model after that



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Describe the Model Currently under Development

- When it will be available for application?
- What is the risk that the model development schedule will not be achieved?
- Is the model under purview of TxDOT for model development?
- Model advantages compared to model currently available



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Describe YOUR Model under Development (Activity)

Lesson 5: Putting It All Together PARTICIPANT HANDBOOK

Activity 5.6 Describe the Model Under Development

Base Year of Model: _____ Year

Forecast "Out" Year: _____

Interim Years, if any? _____

☐ Other: _____

When is it scheduled for completion? _____

Also consider:

What is your relative confidence in new model input data (demographics, networks, count data, survey data) versus the data used for the Currently Available Model? (e.g., is there new survey data at all?) _____

What level of confidence do you have that the model development schedule will result in a model early enough to use for the MTP planning process? _____

Generally, What is the Current Model's Potential for Using for the MTP? _____

Remember to confer with consultative partners! (start with TxDOT)

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Activity 5.6 Describe the Model under Development

	Years
Base Year of Model	
Forecast “Out” Year	
Interim Years, if any?	
<input type="checkbox"/> Other: _____	
When is it scheduled for completion?*	

Also consider:

What is your relative confidence in new model input data (demographics, networks, count data, survey data) versus the data used for the Currently Available Model? (e.g., is there new survey data at all?)

What level of confidence do you have that the model development schedule will result in a model early enough to use for the MTP planning process?

Generally, What Is the Current Model’s Potential for Using for the MTP?

Remember to confer with consultative partners! (start with TxDOT)

**If needed, use one of these Rough Schedules for Determining Likely Model Completion:*

	Year	1	2	3	4	5	6	7	8	9	10
Task											
Model Under Development											
Counts Occur											
Surveys Occur											
Process Counts											
Process Surveys											
Develop Model Inputs											
Model Calibration/Validation											
Model Runs/Public Involvement											
Plan Adoption Target Date											

	Year	1	2	3	4	5	6	7	8	9	10
Task											
Model Under Development											
Counts Occur											
Surveys Occur											
Process Counts											
Process Surveys											
Develop Model Inputs											
Model Calibration/Validation											
Model Runs/Public Involvement											
Plan Adoption Target Date											

	Year	1	2	3	4	5	6	7	8	9	10
Task											
Model Under Development											
Counts Occur											
Surveys Occur											
Process Counts											
Process Surveys											
Develop Model Inputs											
Model Calibration/Validation											
Model Runs/Public Involvement											
Plan Adoption Target Date											

Consider Options (Activity)



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Activity 5.7 Consider Potential Model Options

Options (see Lesson 2)

is a model required for updating your MPC's MTP? If no, then you need to find at least one option below. If not, one of the options below may still be chosen for Base Practice.

Yes (check one)	No	Options
<input type="checkbox"/>	<input type="checkbox"/>	Current Model Options (MPC model "to hand")
<input type="checkbox"/>	<input type="checkbox"/>	Base Year is Not State & Model is OK
<input type="checkbox"/>	<input type="checkbox"/>	Forecast Year Demographics are OK
<input type="checkbox"/>	<input type="checkbox"/>	Might need to add projects to network and re-apply model for forecast year
<input type="checkbox"/>	<input type="checkbox"/>	Base Year is Not State & Model is OK
<input type="checkbox"/>	<input type="checkbox"/>	Need New Forecast Year Scenario Demographics plus Network
<input type="checkbox"/>	<input type="checkbox"/>	Base Year is (is going to be) State, Model is OK
<input type="checkbox"/>	<input type="checkbox"/>	Consider:
<input type="checkbox"/>	<input type="checkbox"/>	• Non-traditional Base Year Model Refresh
<input type="checkbox"/>	<input type="checkbox"/>	• Or Moving the Finish Line
<input type="checkbox"/>	<input type="checkbox"/>	Need New Forecast Year Scenario Demographics plus Network
<input type="checkbox"/>	<input type="checkbox"/>	Base Year is State, Model is OK
<input type="checkbox"/>	<input type="checkbox"/>	Consider: Non-traditional Base Year Model Refresh
<input type="checkbox"/>	<input type="checkbox"/>	Need New Forecast Year Scenario Demographics plus Network
<input type="checkbox"/>	<input type="checkbox"/>	New Base Year Model & Forecast Year
<input type="checkbox"/>	<input type="checkbox"/>	Full Base Year Model Development & Application

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Identify Plans A and B (Activity)



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Activity 5.6 Identify Plans A and B

Here you will decide which are your desired (Plan A) and back-up model (Plan B) to use for your upcoming MTP planning process. Remember to consider what you filed out for these activities.

Activity 5.4 Determine the Model You Need

Activity 5.5 Describe the Current Model Available for Use and "Kick its Tires"

Activity 5.6 Describe the Model Under Development

Activity 5.7 Consider Potential Model Options

In the checklist in Activity 5.7:

- Write "Plan A" to the left of your desired model option.
- Write "Plan B" to the left of your fallback model option.

In the next few pages, you will schedule both Plan A and Plan B activities. This way, you will be able to identify when you need to go to Plan B.

RECOMMENDATION

Consider each scenario in the MTP planning process as a "what-if" scenario. Do not make a final decision until you have reviewed all options.

KEY CONCEPT (highlight content necessary "Plan B" and desirable "Plan A")

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Activity 5.7 Consider Potential Model Options

Yes (check one)	No	Options (see Lesson 2)
<input type="checkbox"/>	<input type="checkbox"/>	Is a model required for updating your MPO's MTP? If so, then you need to find at least one option below. If not, one of the options below may still be desired for Best Practice.
Current Model Options (MPO model "in hand")		
<input type="checkbox"/>	<input type="checkbox"/>	Base Year Is Not Stale & Model Is OK Forecast Year Demographics Are OK <i>Might need to add projects to network and re-apply model for forecast year.</i>
<input type="checkbox"/>	<input type="checkbox"/>	Base Year Is Not Stale & Model Is OK Need New Forecast Year Scenario Demographics plus Network
<input type="checkbox"/>	<input type="checkbox"/>	Base Year is (is going to be) Stale, Model is OK Consider: <ul style="list-style-type: none"> • Non-traditional Base Year Model Refresh • Or Moving the Finish Line Need New Forecast Year Scenario Demographics plus Network
<input type="checkbox"/>	<input type="checkbox"/>	Base Year Is Stale, Model Is OK Consider: Non-traditional Base Year Model Refresh Need New Forecast Year Scenario Demographics plus Network
New Base Year Model & Forecast Year		
<input type="checkbox"/>	<input type="checkbox"/>	Full Base Year Model Development & Application

Activity 5.8 Identify Plans A and B

Here you will decide which are your desired (Plan A) and back-up model (Plan B) to use for your upcoming MTP planning process. Remember to consider what you filled out for these activities:

Activity 5.4 Determine the Model You Need

Activity 5.5 Describe the Current Model Available for Use and “Kick Its Tires”

Activity 5.6 Describe the Model Under Development

Activity 5.7 Consider Potential Model Options

In the checklist in Activity 5.7:

- Write “Plan A” to the left of your desired model option.
- Write “Plan B” to the left of your fallback model option.

In the next few pages, you will schedule both Plan A and Plan B activities. This way, you will be able to identify when you need to go to Plan B.

IMPORTANT!

Confer with TPP early in the MTP planning process to ensure the assumptions and information used for these decisions are correct.



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KEY CONCEPT: Distinguish between **necessary** (“Plan B”) and **desirable** (“Plan A”).

Topic 5.6 Schedule Model Activities

Identify Specific Plan A and Plan B Model Tasks

First, Identify Specific Model Tasks (Exhibit, Simple)

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Lesson 5: Putting It All Together PARTICIPANT HANDBOOK

Exhibit 5.1 Technical Model Tasks by Model Option (Simple)

Description of Model Option	Process 87: Complete Model Tasks by Model Option									
	Process 87: Complete Model Tasks by Model Option	Process 87: Complete Model Tasks by Model Option	Process 87: Complete Model Tasks by Model Option	Process 87: Complete Model Tasks by Model Option	Process 87: Complete Model Tasks by Model Option	Process 87: Complete Model Tasks by Model Option	Process 87: Complete Model Tasks by Model Option	Process 87: Complete Model Tasks by Model Option	Process 87: Complete Model Tasks by Model Option	Process 87: Complete Model Tasks by Model Option
Current Model Options (MPO model "in hand")										
Base Year is Not State & Model OK										
Forecast Year Demographics are OK										
Base Year is Not State & Model OK										
Need New Forecast Year Scenario										
Demographics plus Network										
Moving the Forecast Year										
Need New Forecast Year Scenario										
Demographics plus Network										
New-Traditional Network, Auto										
New Base Year Model & Forecast Year										
Full New Model Development										

* In most cases, application of the model represents multiple model runs to test various scenarios. Identify year or alternative demographics or network scenarios involve the development of different demographics or network inputs. Typically these alternate scenarios are based upon the base case and do not represent the same amount of effort to develop as the base case. See next exhibit for expanded list of scenarios.

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Identify Specific Model Tasks (Tabloid)

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Exhibit 5.1 Technical Model Tasks by Model Option (Long)

Directions: The checkmarks are the minimum necessary for each model option.

Model Option	Base Year		Forecast Year		Scenario Tasks				Full Year
	2010	2040	2015	2020	2025	2040			
Current Model Options (MPO model "in hand")									
Base Year is Not State & Model OK									
Forecast Year Demographics are OK									
Base Year is Not State & Model OK									
Need New Forecast Year Scenario									
Demographics plus Network									
Moving the Forecast Year									
Need New Forecast Year Scenario									
Demographics plus Network									
New-Traditional Network, Auto									
New Base Year Model & Forecast Year									
Full New Model Development									

* In most cases, application of the model represents multiple model runs to test various scenarios. Identify year or alternative demographics or network scenarios involve the development of different demographics or network inputs. Typically these alternate scenarios are based upon the base case and do not represent the same amount of effort to develop as the base case. See next exhibit for expanded list of scenarios.

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Activity 5.9 Identify Plans A and B

(15 minutes)

From the checklist in Activity 5.7, you should have already identified your Plan A and Plan B.

Simple Puck

In Exhibit 5.1 above:

- Write "Plan A" to the left of your desired model option.
- Write "Plan B" to the left of your fallback model option.

What do you notice about the tasks you need to complete that are the same or different?

Does this information make any difference to you in making you think one option is better or worse?

Longer Look

Next, for Exhibit 5.1 on the next page:

- Write "Plan A" to the left of your desired model option.
- Write "Plan B" to the left of your fallback model option.

What do you notice about Exhibit 5.1? Are there additional model activities that you may consider doing above the minimum shown?

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Identify Plans A and B (Activity)

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Exhibit 5.i Technical Model Tasks by Model Option (Simple)

Description of Model Option	Process BY Counts/Surveys	Create Base Year Network	Create Forecast Year Network	Create TAZ Geography	Estimate BY Demographics	Forecast FY Demographics	Calibrate Base Year Model	Validate Base Year Model	Apply Forecast Year Model*
Current Model Options (MPO model “in hand”)									
Base Year Is Not Stale & Model OK Forecast Year Demographics Are OK			✓						✓*
Base Year Is Not Stale & Model OK Need New Forecast Year Scenario Demographics plus Network			✓			✓			✓*
Moving the Finish Line: Need New Forecast Year Scenario Demographics plus Network			✓			✓			✓*
Non-Traditional Refresh, Apply	✓	✓	✓		✓	✓	✓	✓	✓*
New Base Year Model & Forecast Year									
Full New Model Development	✓	✓	✓	✓	✓	✓	✓	✓	✓*

* In most cases, application of the model represents multiple model runs to test various scenarios. Interim year or alternative demographics or network scenarios involve the development of different demographics or network inputs; typically these alternate scenarios are based upon the base case and do not represent the same amount of effort to develop as the base case. See next exhibit for expanded list of scenarios.

Exhibit 5.j Technical Model Tasks by Model Option (Long)

Directions: The checkmarks are the minimum necessary for each model option.

	Base Year						Forecast Year												Interim Years						+5 Year						
User Entry:																															
Examples:	2010						2040												2015			2020			2025			2045			
Description of Model Option	Process BY Counts/Surveys	Create Base Year Network	Create TAZ Geography	Estimate BY Demographics	Calibrate Base Year Model	Validate Base Year Model	Develop FY Demographics	Develop E+C Network	Test E+C Scenario*	Test Scenario: FY Network	Test Scenario: FY Apply Model	Test Scenario: FY Network	Test Scenario: FY Apply Model	Test Scenario: FY Network	Test Scenario: FY Apply Model	Test Scenario: FY Network	Test Scenario: FY Apply Model	Final to Adopt: FY Network	Final to Adopt: FY Apply Model	Interim Year____ Demographics	Create Interim Year Network	Apply Interim Year Model	Interim Year____ Demographics	Create Interim Year Network	Apply Interim Year Model	Interim Year____ Demographics	Create Interim Year Network	Apply Interim Year Model	+5 Forecast FY Demographics**	Create +5 FY Network	Apply +5 Forecast Year Model**
Current Model Options (MPO model “in hand”)																															
Base Year Is Not Stale & Model OK Forecast Year Demographics Are OK								✓*	✓*									✓	✓												
Base Year is Not Stale & Model OK Need New Forecast Year Scenario Demographics plus Network							✓	✓*	✓*									✓	✓												
Moving the Finish Line: Need New Forecast Year Scenario Demographics plus Network							✓	✓*	✓*									✓	✓												
Moving the Finish Line: Need New Forecast Year Scenario Demographics plus Network	✓	✓		✓	✓	✓	✓											✓	✓												
New Base Year Model & Forecast Year																															
Full New Model Development	✓	✓	✓	✓	✓	✓	✓											✓	✓												

* In most cases, application of the model represents multiple model runs to test various scenarios. A Best Practice first step is to apply future year demographics to an “Existing plus Committed” (E+C) network, which includes all projects in the base year plus any projects in the TIP as a committed project. Interim year or alternative demographics or network scenarios involve the development of different demographics or network inputs; typically these alternate scenarios are based upon the base case and do not represent the same amount of effort to develop as the base case.

**The “+5” scenario is a recommended best practice to develop forecast year demographics for a future model application. The choice to develop the +5 demographics and network for an additional model run is left to the discretion of the MPO Director if that model output might be useful for a future plan.

Activity 5.9 Looking Closer at Plans A and B

(15 minutes)

From the checklist in Activity 5.7, you should have already identified your Plan A and Plan B.

Simple Peek

In Exhibit 5.i above:

- Write “Plan A” to the left of your desired model option.
- Write “Plan B” to the left of your fallback model option.

What do you notice about the tasks you need to complete that are the same or different?

Does this information make any difference to you in making you think one option is better or worse?

Longer Look

Next, for Exhibit 5.j:

- Write “Plan A” to the left of your desired model option.
- Write “Plan B” to the left of your fallback model option.

What do you notice about Exhibit 5.j? Are there additional model activities that you may consider doing above the minimum shown?

Tools to Schedule Model Tasks (Both Plan A and Plan B)

[illegible]

Activity 5.10 Draft Schedule Overview for Plan A and Plan B

EXAMPLE		Year											
		1	2	3	4	5	6	7	8	9	10		
Task	user enter	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019		
Model Under Development	Start	End											
Counts Occur	2/1/2010	11/28/2010											
Process Counts	11/28/2010	11/28/2011											
Surveys Occur	2/1/2010	11/28/2010											
Process Surveys	11/28/2010	11/28/2011											
Develop Model Inputs	11/28/2011	11/27/2012											
Model Calibration/Validation	11/27/2012	11/27/2013											
Model Runs/Public Involvement	11/27/2013	11/27/2014											
Plan Adoption Target Date	Target:	1/27/2015											

OPTION: _____

		Year												
Task	user enter	1	2	3	4	5	6	7	8	9	10			
Model Under Development	Start	End												
Counts Occur														
Process Counts														
Surveys Occur														
Process Surveys														
Develop Model Inputs														
Model Calibration/Validation														
Model Runs/Public Involvement														
Plan Adoption Target Date	Target:													

OPTION: _____

		Year	1	2	3	4	5	6	7	8	9	10
Task	user enter											
Model Under Development	Start	End										
Counts Occur												
Process Counts												
Surveys Occur												
Process Surveys												
Develop Model Inputs												
Model Calibration/Validation												
Model Runs/Public Involvement												
Plan Adoption Target Date	Target:											

Activity 5.11 Draft Schedule Overview Extras

OPTION: _____

		Year	1	2	3	4	5	6	7	8	9	10
Task	user enter											
Model Under Development	Start	End										
Counts Occur												
Process Counts												
Surveys Occur												
Process Surveys												
Develop Model Inputs												
Model Calibration/Validation												
Model Runs/Public Involvement												
Plan Adoption Target Date	Target:											

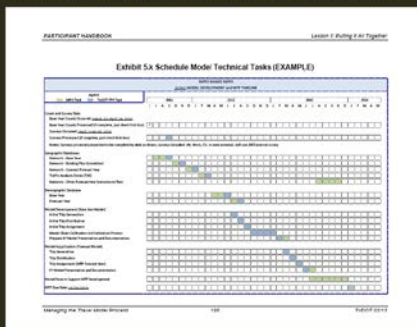
OPTION: _____

		Year	1	2	3	4	5	6	7	8	9	10
Task	user enter											
Model Under Development	Start	End										
Counts Occur												
Process Counts												
Surveys Occur												
Process Surveys												
Develop Model Inputs												
Model Calibration/Validation												
Model Runs/Public Involvement												
Plan Adoption Target Date	Target:											

OPTION: _____

		Year	1	2	3	4	5	6	7	8	9	10
Task	user enter											
Model Under Development	Start	End										
Counts Occur												
Process Counts												
Surveys Occur												
Process Surveys												
Develop Model Inputs												
Model Calibration/Validation												
Model Runs/Public Involvement												
Plan Adoption Target Date	Target:											

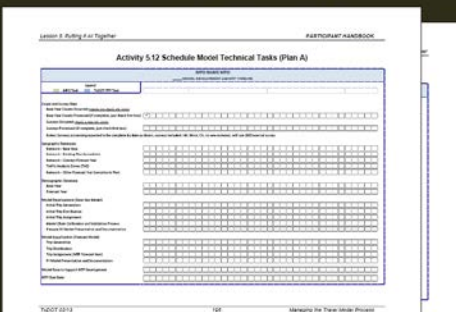
Recommended Level of Detail



Managing the TDM Development Process

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Activities: Plan A and Plan B



Managing the TDM Development Process

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Exhibit 5.k Schedule Model Technical Tasks (EXAMPLE)

MPO NAME MPO																																																											
2040 MODEL DEVELOPMENT and MTP TIMELINE																																																											
Legend												2011												2012												2013												2014											
MPO Task																																																											
TxDOT-TPP Task																																																											
Count and Survey Data																																																											
Base Year Counts Occurred: <u>March 22-April 13, 2010</u>																																																											
Base Year Counts Processed (if complete, just check first box) <input checked="" type="checkbox"/>																																																											
Surveys Occurred: <u>April 1-Nov 15, 2010</u>																																																											
Surveys Processed (if complete, just check first box)																																																											
Notes: Surveys processing expected to be complete by date as shown, surveys included: HH, Work, CV, no new external, will use 2005 external survey																																																											
Geographic Databases																																																											
Network - Base Year																																																											
Network - Existing Plus Committed																																																											
Network - Concept Forecast Year																																																											
Traffic Analysis Zones (TAZ)																																																											
Network - Other Forecast Year Scenarios to Test																																																											
Demographic Database																																																											
Base Year																																																											
Forecast Year																																																											
Model Development (Base Year Model)																																																											
Initial Trip Generation																																																											
Initial Trip Distribution																																																											
Initial Trip Assignment																																																											
Model Chain Calibration and Validation Process																																																											
Prepare BY Model Presentation and Documentation																																																											
Model Application (Forecast Model)																																																											
Trip Generation																																																											
Trip Distribution																																																											
Trip Assignment (MTP Forecast Year)																																																											
FY Model Presentation and Documentation																																																											
Model Runs to Support MTP Development																																																											
MTP Due Date: <u>01/26/2014</u>																																																											

Activity 5.12 Schedule Model Technical Tasks (Plan A)

MPO NAME MPO	
MODEL DEVELOPMENT and MTP TIMELINE	
<p style="text-align: center; margin: 0;"><i>Legend</i></p> <div style="display: flex; justify-content: space-around; margin: 5px 0;"> <div style="display: flex; align-items: center;"> <div style="width: 15px; height: 10px; background-color: #92d050; border: 1px solid black; margin-right: 5px;"></div> MPO Task </div> <div style="display: flex; align-items: center;"> <div style="width: 15px; height: 10px; background-color: #4f81bd; border: 1px solid black; margin-right: 5px;"></div> TxDOT-TPP Task </div> </div>	
<p>Count and Survey Data</p> <p>Base Year Counts Occurred: <u>March 22-April 13, 2010</u></p> <p>Base Year Counts Processed (if complete, just check first box) <input checked="" type="checkbox"/></p> <p>Surveys Occurred: <u>April 1-Nov 15, 2010</u></p> <p>Surveys Processed (if complete, just check first box) <input type="checkbox"/></p> <p>Notes: Surveys processing expected to be complete by date as shown, surveys included: HH, Work, CV, no new external, will use 2005 external survey</p>	
<p>Geographic Databases</p> <p>Network - Base Year</p> <p>Network - Existing Plus Committed</p> <p>Network - Concept Forecast Year</p> <p>Traffic Analysis Zones (TAZ)</p> <p>Network - Other Forecast Year Scenarios to Test</p>	
<p>Demographic Database</p> <p>Base Year</p> <p>Forecast Year</p>	
<p>Model Development (Base Year Model)</p> <p>Initial Trip Generation</p> <p>Initial Trip Distribution</p> <p>Initial Trip Assignment</p> <p>Model Chain Calibration and Validation Process</p> <p>Prepare BY Model Presentation and Documentation</p>	
<p>Model Application (Forecast Model)</p> <p>Trip Generation</p> <p>Trip Distribution</p> <p>Trip Assignment (MTP Forecast Year)</p> <p>FY Model Presentation and Documentation</p>	
<p>Model Runs to Support MTP Development</p> <p>MTP Due Date:</p>	

Activity 5.13 Schedule Model Technical Tasks (Plan B)

MPO NAME MPO	
MODEL DEVELOPMENT and MTP TIMELINE	
<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;"> <p style="text-align: center; margin: 0;"><i>Legend</i></p> <div style="display: flex; justify-content: space-between; margin: 0;"> <div style="width: 15px; height: 10px; background-color: #92d050; border: 1px solid black; margin-right: 5px;"></div> MPO Task <div style="width: 15px; height: 10px; background-color: #4f81bd; border: 1px solid black; margin-right: 5px;"></div> TxDOT-TPP Task </div> </div>	
Count and Survey Data	
Base Year Counts Occurred: <u>March 22-April 13, 2010</u>	
Base Year Counts Processed (if complete, just check first box) <input checked="" type="checkbox"/>	
Surveys Occurred: <u>April 1-Nov 15, 2010</u>	
Surveys Processed (if complete, just check first box)	
Notes: Surveys processing expected to be complete by date as shown, surveys included: HH, Work, CV, no new external, will use 2005 external survey	
Geographic Databases	
Network - Base Year	
Network - Existing Plus Committed	
Network - Concept Forecast Year	
Traffic Analysis Zones (TAZ)	
Network - Other Forecast Year Scenarios to Test	
Demographic Database	
Base Year	
Forecast Year	
Model Development (Base Year Model)	
Initial Trip Generation	
Initial Trip Distribution	
Initial Trip Assignment	
Model Chain Calibration and Validation Process	
Prepare BY Model Presentation and Documentation	
Model Application (Forecast Model)	
Trip Generation	
Trip Distribution	
Trip Assignment (MTP Forecast Year)	
FY Model Presentation and Documentation	
Model Runs to Support MTP Development	
MTP Due Date:	

Activity 5.14 Schedule Model Technical Tasks (Extra Blank)

MPO NAME MPO	
MODEL DEVELOPMENT and MTP TIMELINE	
<p style="text-align: center; margin: 0;"><i>Legend</i></p> <div style="display: flex; justify-content: space-around; margin: 5px 0;"> <div style="display: flex; align-items: center;"> <div style="width: 15px; height: 10px; background-color: #92d050; border: 1px solid black; margin-right: 5px;"></div> MPO Task </div> <div style="display: flex; align-items: center;"> <div style="width: 15px; height: 10px; background-color: #4f81bd; border: 1px solid black; margin-right: 5px;"></div> TxDOT-TPP Task </div> </div>	
<p>Count and Survey Data</p> <p>Base Year Counts Occurred: <u>March 22-April 13, 2010</u></p> <p>Base Year Counts Processed (if complete, just check first box) <input checked="" type="checkbox"/></p> <p>Surveys Occurred: <u>April 1-Nov 15, 2010</u></p> <p>Surveys Processed (if complete, just check first box) <input type="checkbox"/></p> <p>Notes: Surveys processing expected to be complete by date as shown, surveys included: HH, Work, CV, no new external, will use 2005 external survey</p>	
<p>Geographic Databases</p> <p>Network - Base Year</p> <p>Network - Existing Plus Committed</p> <p>Network - Concept Forecast Year</p> <p>Traffic Analysis Zones (TAZ)</p> <p>Network - Other Forecast Year Scenarios to Test</p>	
<p>Demographic Database</p> <p>Base Year</p> <p>Forecast Year</p>	
<p>Model Development (Base Year Model)</p> <p>Initial Trip Generation</p> <p>Initial Trip Distribution</p> <p>Initial Trip Assignment</p> <p>Model Chain Calibration and Validation Process</p> <p>Prepare BY Model Presentation and Documentation</p>	
<p>Model Application (Forecast Model)</p> <p>Trip Generation</p> <p>Trip Distribution</p> <p>Trip Assignment (MTP Forecast Year)</p> <p>FY Model Presentation and Documentation</p>	
<p>Model Runs to Support MTP Development</p> <p>MTP Due Date:</p>	

Deciding the Trigger Point

Deciding a Trigger Point

- Desirable (Plan A)
- Fall-back (Plan B)
- What triggers the fall-back?
 - Make decision now what/when trigger occurs
 - Decide whom you tell



Managing the TDM Development Process

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Related Activities That Should Be Scheduled

Activities That Should Be Scheduled

- Communication milestones/regular check-ins
- QA/QC activities
- Incorporating model tasks into UPWP
- Staff training prior to anticipated tasks
- Tasks related to engaging consultants
- Post-MTP retrospective (lessons learned)



Managing the TDM Development Process

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Schedule Related Activities (Example)



Managing the TDM Development Process

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Exhibit 5.I Schedule Related Activities (EXAMPLE)

MPO NAME MPO																																																																	
<u>2040</u> MODEL DEVELOPMENT and MTP TIMELINE																																																																	
																		2011												2012												2013												2014											
																		J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M												
Count and Survey Data																																																																	
Base Year Counts Occurred: <u>March 22-April 13, 2010</u>																																																																	
Base Year Counts Processed (if complete, just check first box) ✓																																																																	
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FY Model Presentation and Documentation																																																																	
Model Runs to Support MTP Development																																																																	
MTP Due Date: <u>01/26/2014</u>																																																																	
Other Activities Necessary to Support Model Tasks																																																																	
<u>2040</u> MODEL DEVELOPMENT and MTP TIMELINE																																																																	
Other Activities Necessary to Support Model Tasks																																																																	
Model Project Management																																																																	
Kick-off Meeting (Held on 0) + Milestone Mtgs																																																																	
Quarterly Progress Meetings																																																																	
MPO Quality Review Checks of Model Items																																																																	
Model Developer TM: Model Metadata, Reccs for Next																																																																	
Retrospective Review by Agency Partners of Process																																																																	
Policy Board Updates (✓ for prior year)																																																																	
UPWP Updates for Next Year's Model Activities (✓ for prior year)																																																																	
Training (Optional)																																																																	
Network & TAZ Training																																																																	
Demographics Training																																																																	
Model Application Technical Assistance																																																																	
Overview of Travel Demand Modeling																																																																	
Annual Update of Model Inputs (Networks, Demographics)																																																																	
Engage Consultants to Assist with Model Tasks (✓ for prior year) (optional)																																																																	
(networks, TAZs)																																																																	
(demographics and/or model development)																																																																	
(model application, scenario testing)																																																																	

Activity 5.15 Schedule Related Activities (blank)

Other Activities Necessary to Support Model Tasks	
_____ MODEL DEVELOPMENT and MTP TIMELINE	
Model Project Management	<div></div>
Kick-off Meeting (Held on _____) + Milestone Mtgs	<div></div>
Quarterly Progress Meetings	<div></div>
MPO Quality Review Checks of Model Items	<div></div>
Model Developer TM: Model Metadata, Reccs for Next	<div></div>
Retrospective Review by Agency Partners of Process	<div></div>
Policy Board Updates (✓ for prior year)	<div></div>
UPWP Updates for Next Year's Model Activities (✓ for prior year)	<div></div>
Training (Optional)	
Network & TAZ Training	<div></div>
Demographics Training	<div></div>
Model Application Technical Assistance	<div></div>
Overview of Travel Demand Modeling	<div></div>
Annual Update of Model Inputs (Networks, Demographics)	<div></div>
Engage Consultants to Assist with Model Tasks (✓ for prior year)	<div></div>
(optional)	<div>(networks, TAZs)</div> <div>(demographics and/or model development)</div> <div>(model application, scenario testing)</div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div>

Post-Break Reinforcement

Discuss previous material, any questions?

Topic 5.7 Roles & Responsibilities

Typical Roles & Responsibilities for Texas Travel Model Development

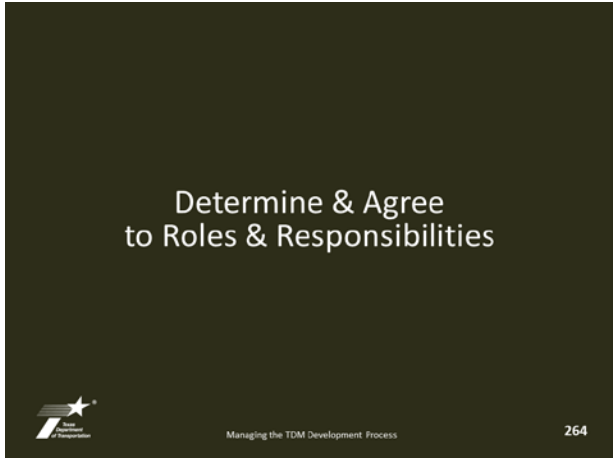
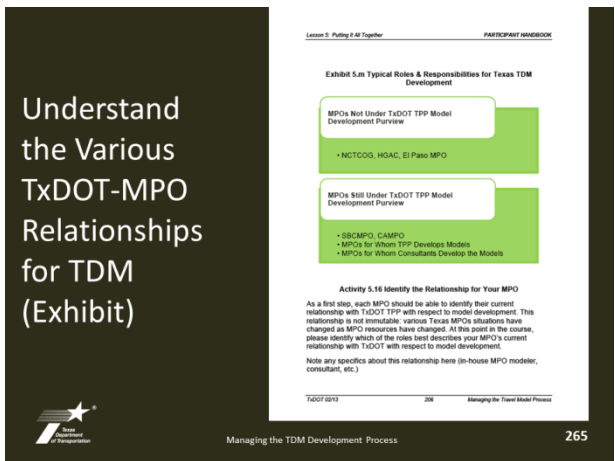
 <p>Determine & Agree to Roles & Responsibilities</p> <p>Managing the TDM Development Process 264</p>	
 <p>Understand the Various TxDOT-MPO Relationships for TDM (Exhibit)</p> <p>Managing the TDM Development Process 265</p>	

Exhibit 5.m Typical Roles and Responsibilities for Texas TDM Development

MPOs Not Under TxDOT-TPP Model Development Purview

- NCTCOG, HGAC, El Paso MPO

MPOs Still Under TxDOT-TPP Model Development Purview

- SBCMPO, CAMPO
- MPOs for Whom TPP Develops Models
- MPOs for Whom Consultants Develop the Models


Activity 5.16 Identify the Relationship for Your MPO

As a first step, each MPO should be able to identify their current relationship with TxDOT-TPP with respect to model development. This relationship is not immutable: various Texas MPOs situations have changed as MPO resources have changed. At this point in the course, please identify which of the roles best describes your MPO's current relationship with TxDOT with respect to model development.

Note any specifics about this relationship here (in-house MPO modeler, consultant, etc.)

Assess Internal MPO Resources to Meet Model Tasks

Matching Staff Skill Sets to Model Tasks (Exhibit from Lesson 4)



Managing the TDM Development Process

PARTICIPANT HANDBOOK Lesson 5: Putting It All Together

Assess Internal MPO Resources to Meet Model Tasks

Exhibit 5.n has been copied below from Lesson 4.

In previous activities, you identified which model activities need to occur for Plan A, and Plan B. For your MPO, if TxDOT TDM takes care of model development and application, don't worry about them. But do look at the various staff sets which can be applied to develop networks and demographics, which are an MPO input.

Exhibit 5.n General Guidelines for Assigning Staff to Modeling Tasks by Staff Skill Set

Modeling Task	Crackerjack Modeler	Senior Modeler	Beginner Modeler	Transportation Planner/Engineer w/ GIS Skills	Transportation Planner/Engineer	GIS Technician	Administrative	Intern
Networks	✓	✓	✓	✓	*	*	*	*
Demographics	✓	✓	✓	✓	*	*	*	*
Model Maintenance/ Application	✓	✓						
Model Development	✓							

NOTE: These are not Job Titles, but skill sets.
* Can assist with model tasks, but may not be able to do complete task in TransCAD.

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Exhibit 5.n General Guidelines for Assigning Staff to Modeling Tasks by Staff Skill Set

Modeling Task	Staff Skill Set							
	Crackerjack Modeler	Senior Modeler	Beginner Modeler	Transportation Planner/Engineer w/ GIS Skills	Transportation Planner/Engineer	GIS Technician	Administrative	Intern
Networks	✓	✓	✓	✓	*	*	*	*
Demographics	✓	✓	✓	✓	*	*	*	*
Model Maintenance/ Application	✓	✓						
Model Development	✓							

NOTE: These are not Job Titles, but skill sets.

* Can assist with model tasks, but may not be able to do complete task in TransCAD.

Staff Skill Sets “Crib Notes” (Exhibit)




Exhibit 5.a “Crib Notes” for Identifying Staff Skill Levels with Regard to Modeling Tasks

These descriptions are provided as a cursory perspective only, for the purpose of understanding the following Exhibit and other information provided in this handbook. Also, please consult the activities in your CDOT for a more in-depth discussion with project senior individuals. Individual results may vary.

Modeling Program Manager	<p>Typical Salary Range: \$140,000+</p> <p>This individual typically has a minimum of 20 years of experience with travel demand modeling, at least 10 years of which is hands-on, managing the work of others and managing generally translate into this hands-on experience at this level. They utilized leading a modeling team of less experienced staff and ensuring a quality deliverable on time and within budget. Expertise in communicating model results to non-modelers, the public, and decision-makers to bring a message home.</p>
“Checksheet” Modeler	<p>Typical Salary Range: \$100,000 – \$150,000</p> <p>This individual typically has a minimum of 15 years of hands-on experience with travel demand modeling, at least five years of which is with traditional, 4-step, trip-based models; some experience with activity-based or other advanced modeling practice is increasingly expected. Experience with developing each model component from original data sources, ideally in a TransCAD environment, GIS/CAD, expertise preferred. Capable of leading modeling projects with minimal guidance from manager and TxDOT, attending meetings with partner agency staff, and coordinating modeling tasks, keeping the manager informed of progress and/or technical results as they arise. Expertise in communicating model results to non-modelers, the public, and decision-makers is plus.</p>

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Exhibit 5.o “Crib Notes” for Identifying Staff Skill Levels with Regard to Modeling Tasks

These descriptions are provided as a cursory perspective only, for the purpose of understanding the following Exhibit and other information provided in this handbook. All dollar values are estimates in year 2012\$ for a Texas metropolitan area, private sector individual. Individual results may vary.

Modeling Program Manager	<p>Typical Salary Range: \$140,000+</p> <p>This individual typically has a minimum of 20 years of experience with travel demand modeling, at least 15 years of which is hands-on; managing the work of others and marketing generally translate into less hands-on experience at this level. Best utilized leading a modeling team of less expensive staffers and ensuring a quality deliverable on time and within budget. Expertise in communicating model results to non-modelers, the public, and decision-makers is likely a strength area.</p>
“Crackerjack” Modeler	<p>Typical Salary Range: \$100,000–150,000</p> <p>This individual typically has a minimum of 15 years of hands-on experience with travel demand modeling, at least five years of which is with traditional, 4-step, trip-based models; some experience with activity-based or other advanced modeling practice in increasingly expected. Experience with developing each model component from original data sources, ideally in a TransCAD environment. GISDK expertise preferred. Capable of leading modeling projects with minimal guidance from manager and TxDOT, attending meetings with partner agency staff, and coordinating modeling tasks, keeping the manager informed of progress and/or technical issues as they arise. Expertise in communicating model results to non-modelers, the public, and decision-makers a plus.</p>

Senior Modeler	<p>Typical Salary Range: \$75,000–110,000</p> <p>This individual has a minimum of 5 years of hands-on experience with travel demand modeling, most likely with traditional, 4-step, trip-based models. Experience with developing each model component from original data sources, ideally in a TransCAD environment. GISDK expertise preferred. Capable of leading modeling tasks with minimal guidance from project or program manager. Attending meetings with partner agency staff, and keeping the manager informed of progress and/or technical issues as they arise. Increasing opportunities for communicating model results to non-modelers, the public, and decision-makers.</p>
Transportation Planner/Engineer in Training (EIT) w/ GIS Skills	<p>Typical Salary Range: \$50,000–80,000</p> <p>This individual has a minimum of 5 years of hands-on experience with geographic information systems, most likely with ESRI Arc products, TransCAD or Maptitude (Caliper's version of GIS) proficiency a plus. Capable of leading GIS tasks with minimal guidance. Creativity in solving technical issues an advantage; expertise in documentation, data management including complex query tools a plus.</p>
Entry Level Modeler/ Transportation Planner/EIT	<p>Typical Salary Range: \$45,000–77,000</p> <p>This individual may be newly graduated from a Master's program with a concentration in transportation planning and technical traffic analysis tasks, travel demand modeling preferred. Capable of completing modeling tasks with appropriate guidance and feedback from manager. Strong technical skill set an advantage, including geographic information systems experience, statistics, and programming. Increasing technical opportunities.</p>
Administrative/Support Staff	<p>Typical Salary Range: \$20,000-45,000</p> <p>This individual may have priority tasks related to administrative support, but have the interest and detail-oriented enough to be very helpful in developing model inputs, in particular those related to the demographics, if using Excel. Capable of completing modeling tasks with appropriate guidance and feedback from manager.</p>

Staff Resource “Upgrade” (Training)

Exhibit 5.p Suggested Model Training for MPO Staff by Expected Modeling Duties

Training	Modeling Task							
	Networks Development	Networks Review	Demographics Development*	Demographics Review	Model Maintenance/ Application	Model Application Review	Model Development	Model Development Review
TxDOT Training								
General TransCAD Training	✓		✓		✓			
Introduction to Travel Demand Modeling	✓	✓	✓	✓		✓		
Model Inputs Development Training	✓	✓	✓	✓				
Model Application/Alternatives Analysis Training					✓	✓		
Other Training								
NHI Introduction to Urban Travel Demand Forecasting Course	✓	✓	✓	✓	✓			
TMIP Webinars							✓	✓
Caliper Travel Demand Modeling	✓		✓		✓		✓	

* Demographics development can be done in alternative GIS and imported to TransCAD.

Staff Resource Assessment (MPO and Other)

[illegible]

Directions for Filling Out Activity 5.15 Available Staff Skills on the next page. This is a brainstorming worksheet Activity. It is meant to encompass all staff resources potentially available to the MPO for modeling tasks.

Each person can have more than one skill set. Blank columns are provided for additional skill sets. Consider this approach:

1. Identify a preliminary “RP” (Responsible Person) and “IR” (Internal Reviewer) for each Model Task.
2. Use “✓” for anyone in the MPO or available to the MPO who can do the technical work or assist.

Ideas for “Other Potential Staff” include: Local Partner Agencies, University Partner Agencies, TxDOT District Staff, TxDOT Regions Staff, etc.

Activity 5.17 Available Staff Skills INVENTORY

		Modeling Task						
Staff Person by Name	Agency	Networks	Create/Update TAZ Boundaries	Demographics	Model Application	Model Maintenance	Model Development	
Director: _____ (QAP)	MPO							
Other Available Staff*								
Consultant Community								
In General		✓	✓	✓	✓	✓	✓	
TxDOT-TPP								
On-staff/Contract		ER	ER	ER	✓	✓	✓	

** Not necessarily with the MPO. Examples include TxDOT District and Regions Staff, partner agencies, local universities, etc.*

QAP = Quality Assurance Professional, IR = Internal Review (or serving MPO), ER = External Review

“Back of the Napkin” Peek

AUTOCRAFT HANDOVER

Lecture 5: Pricing & Cost Together

Exhibit 5.4 "Back of the Napkin" Estimating Consultant Effort

This exercise is offered as a demonstration to illustrate the analysis required to estimate the resources for tasks of effort that are as essential to a construction as performing useful tasks. This represents a simplified financial cost plan *only* and is not used to simplify the quantity of effort attributable among projects, individuals, results using *only*.

Staff/Role	Architect	Hourly	Weekly	Sample Results of Effort for Four Project Examples (Hours)									
	Architect	Rate	Hours	1.000000	2.000000	3.000000	4.000000	5.000000	6.000000	7.000000	8.000000	9.000000	10.000000
	Marketing Project Manager	1.00	10	10	20	30	40	50	60	70	80	90	100
	Construction Manager	1.00	10	10	20	30	40	50	60	70	80	90	100
	Interior Designer	1.00	10	10	20	30	40	50	60	70	80	90	100

Representative Consultant's AC/100 Data

Staff/Role	Architect	Hourly	Weekly	Sample Results of Effort for Four Project Examples (Hours)									
	Architect	Rate	Hours	1.000000	2.000000	3.000000	4.000000	5.000000	6.000000	7.000000	8.000000	9.000000	10.000000
	Marketing Project Manager	1.00	10	10	20	30	40	50	60	70	80	90	100
	Construction Manager	1.00	10	10	20	30	40	50	60	70	80	90	100
	Interior Designer	1.00	10	10	20	30	40	50	60	70	80	90	100

Representative Consultant's AC/100 Data

Staff/Role	Architect	Hourly	Weekly	Sample Results of Effort for Four Project Examples (Hours)									
	Architect	Rate	Hours	1.000000	2.000000	3.000000	4.000000	5.000000	6.000000	7.000000	8.000000	9.000000	10.000000
	Marketing Project Manager	1.00	10	10	20	30	40	50	60	70	80	90	100
	Construction Manager	1.00	10	10	20	30	40	50	60	70	80	90	100
	Interior Designer	1.00	10	10	20	30	40	50	60	70	80	90	100

Representative Consultant's AC/100 Data

Staff/Role	Architect	Hourly	Weekly	Sample Results of Effort for Four Project Examples (Hours)									
	Architect	Rate	Hours	1.000000	2.000000	3.000000	4.000000	5.000000	6.000000	7.000000	8.000000	9.000000	10.000000
	Marketing Project Manager	1.00	10	10	20	30	40	50	60	70	80	90	100
	Construction Manager	1.00	10	10	20	30	40	50	60	70	80	90	100
	Interior Designer	1.00	10	10	20	30	40	50	60	70	80	90	100

Representative Consultant's AC/100 Data

Staff/Role	Architect	Hourly	Weekly	Sample Results of Effort for Four Project Examples (Hours)									
	Architect	Rate	Hours	1.000000	2.000000	3.000000	4.000000	5.000000	6.000000	7.000000	8.000000	9.000000	10.000000
	Marketing Project Manager	1.00	10	10	20	30	40	50	60	70	80	90	100
	Construction Manager	1.00	10	10	20	30	40	50	60	70	80	90	100
	Interior Designer	1.00	10	10	20	30	40	50	60	70	80	90	100

Pros and Cons of Using Consultants (Activity)

Activity 5.18 What Are the Pros and Cons of Using Consultants?

(Discuss as group)

[Empty box for discussion]

Exhibit 5.q “Back of the Napkin” Estimating Consultant Effort

This exercise is offered as a demonstration to illustrate a quick approach for assessing the level of effort that can be expected hiring a consultant to perform model tasks. This represents a simplified financial view point only and in no way implies the quality of effort individuals may provide. Individual results may vary.

Staff Skill Level	Avg. Annual Salary	Hourly Rate	Loaded Rate	Example Levels of Effort for Typical Project Amounts (Dollars)						
				\$1,000,000	\$500,000	\$250,000	\$100,000	\$75,000	\$50,000	\$30,000
Modeling Program Manager	\$ 160,000	\$ 77	\$ 231	\$36,000	\$36,000	\$18,000	\$15,360	\$7,680	\$5,760	\$2,880
"Crackerjack" Modeler	\$ 125,000	\$ 60	\$ 180	\$187,500	\$75,000	\$37,500	\$7,031	\$0	\$0	\$0
Senior Modeler	\$ 85,000	\$ 41	\$ 123	\$306,000	\$114,750	\$38,250	\$25,500	\$25,500	\$12,750	\$6,375
Transportation Planner/EIT w/ GIS Skills	\$ 60,000	\$ 29	\$ 87	\$468,000	\$271,800	\$154,800	\$50,400	\$41,400	\$30,600	\$19,800
TOTAL				\$997,500	\$497,550	\$248,550	\$98,291	\$74,580	\$49,110	\$29,055

Note: Travel/Other Directs not included in simple example!

	Example Levels of Effort for Typical Project Amounts (Weeks)						
	\$1,000,000	\$500,000	\$250,000	\$100,000	\$75,000	\$50,000	\$30,000
Modeling Program Manager	4	4	2	2	1	0.6	0.3
"Crackerjack" Modeler	26	10	5	1	0	0	0
Senior Modeler	62	23	8	5	5	3	1
Transportation Planner/EIT w/ GIS Skills	135	79	45	15	12	9	6
TOTAL	228	116	60	22	18	12	7

Activity 5.18 What Are the Pros and Cons of Using Consultants?

(discuss as group)

<h3>Reminder: Model Staffing Options</h3> <p>272</p>	
<h3>Developing Partnerships</h3> <ul style="list-style-type: none"> ▪ With other local agencies <ul style="list-style-type: none"> • Data • Technical support ▪ Partnership with universities doing research ▪ On-call consultant advisors <p>Managing the TDM Development Process</p> <p>273</p>	
<h3>What Is MPO's Long-Term Strategy? (Activity)</h3> <p>Lesson 5: Putting It All Together PARTICIPANT HANDBOOK</p> <p>Activity 5.19 What are Your MPO's Long-Term Modeling Goals? (as large group, brainstorm 3 relevant questions)</p> <div style="border: 1px solid black; height: 30px; width: 100%;"></div> <p>(as small group, discuss for 5 minutes, then share)</p> <div style="border: 1px solid black; height: 80px; width: 100%;"></div> <p>TxDOT 0913 274 Managing the Travel Model Process</p> <p>274</p>	

Activity 5.19 What are Your MPO's Long-Term Modeling Goals?

(as large group, brainstorm 3 relevant questions)

(as small group, discuss for 5 minutes, then share)

Assigning Roles for the TDM Effort to Support Upcoming MTP

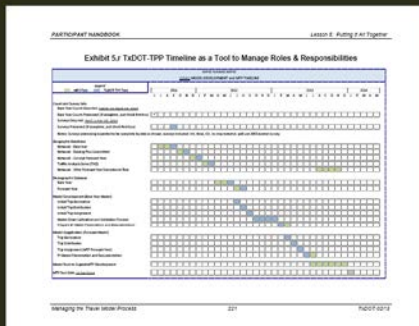


Deciding who to assign to each task involves a careful balance, considering:

- MPO's long-term strategy with regard to modeling
- Each person's skill set to accomplish task (or QC)
- Each person's availability (including commitment)
- Cost
- Risk of any of the above changing

See exhibits on next pages for this effort.

TPP Timeline Tool



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Best Practice: Formalizing the Process

- Formalize agreements with agency partners, e.g.:
 - UPWP task agreement between MPO and TxDOT TPP(T)
 - Formal scope and schedule for TDM development process, including responsibilities for TxDOT and the MPO



Managing the TDM Development Process

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UPWP Staff Planning

Exhibit 5.2: UPWP Staff Planning

TASK	MPO (M Lead)	TxDOT (T Lead)	Staff	Director	Planner	GIS	Technician	Analyst	Total Hours
Project Initiation & Setup									
Administrative Support/Logistics									
Communications/Outreach									
Coordination & Meetings									
Contract Management									
Public Involvement									
Regional Development and Studies									
Database Management									
Reporting									
Document Development									
GIS									
Learning Center/Travel Planning Center & Study									
Travel Education/Travel Information and									
Travel Service/Business									
Information System/Map Data									
Information System/Map Data									
Information System/Map Data									
Information System/Map Data									

Managing the TDM Development Process

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Exhibit 5.r TxDOT-TPP Timeline as a Tool to Manage Roles and Responsibilities

MPO NAME MPO																																					
<u>2040</u> MODEL DEVELOPMENT and MTP TIMELINE																																					
Legend		2011				2012				2013				2014																							
<div style="display: inline-block; width: 10px; height: 10px; background-color: #92d050; border: 1px solid black; margin-right: 5px;"></div> MPO Task <div style="display: inline-block; width: 10px; height: 10px; background-color: #4f81bd; border: 1px solid black; margin-left: 10px; margin-right: 5px;"></div> TxDOT-TPP Task		J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M
Count and Survey Data																																					
Base Year Counts Occurred: <u>March 22-April 13, 2010</u>																																					
Base Year Counts Processed (if complete, just check first box) <input checked="" type="checkbox"/>																																					
Surveys Occurred: <u>April 1-Nov 15, 2010</u>																																					
Surveys Processed (if complete, just check first box) <input type="checkbox"/>																																					
Notes: Surveys processing expected to be complete by date as shown, surveys included: HH, Work, CV, no new external, will use 2005 external survey																																					
Geographic Databases																																					
Network - Base Year																																					
Network - Existing Plus Committed																																					
Network - Concept Forecast Year																																					
Traffic Analysis Zones (TAZ)																																					
Network - Other Forecast Year Scenarios to Test																																					
Demographic Database																																					
Base Year																																					
Forecast Year																																					
Model Development (Base Year Model)																																					
Initial Trip Generation																																					
Initial Trip Distribution																																					
Initial Trip Assignment																																					
Model Chain Calibration and Validation Process																																					
Prepare BY Model Presentation and Documentation																																					
Model Application (Forecast Model)																																					
Trip Generation																																					
Trip Distribution																																					
Trip Assignment (MTP Forecast Year)																																					
FY Model Presentation and Documentation																																					
Model Runs to Support MTP Development																																					
MTP Due Date: <u>01/26/2014</u>																																					

Exhibit 5.s UPWP Staff Planning

TASK	MPO as Lead Entity?	Participation by Non-MPO Staff						Total Hours
			MPO Director	Planner	GIS	Technician	Adm Assistant	
Tasks on a 5-year Cycle								
<u>Metropolitan Transportation Plan</u>								
Demographic development	Y	Y						0
Demographic Updates (weekly)								
Coordination & meetings	Y	Y						0
Contract management	Y	N						0
Public involvement	Y	Y						0
Network development and review	Y	Y						0
Database maintenance	Y	N						0
Mapping	Y	N						0
Document development	Y	Y						0
TAZ								
"Learning Curve" (incl training courses & book)								
Model Evaluation (incl projection yrs)								
Review cordon boundary								
Saturation Count Map Mtg								
Saturation Count Map Review								
Model Kick-Off Meeting								

Post-Break Reinforcement Questions

Discuss previous material, any questions?

WORK THE PLAN

Topic 5.8 Managing the Schedule

<p>Managing the TDM Development Process 279</p>	
<p>Managing the Schedule</p> <p>Managing the TDM Development Process 280</p>	
<p>Best Practice: Communication Protocol (Activity)</p> <p>Lesson 5: Putting It All Together INSTRUCTOR HANDBOOK</p> <p>Exhibit 5.1 Communication Protocol (Example)</p> <p>What is a communication protocol?</p> <p>Discuss elements of communication internal to the MPO:</p> <p>With staff</p> <p>With Policy Board</p> <p>Other?</p> <p>Discuss elements of communication external to the MPO:</p> <p>With TxDOT</p> <p>With other agency partners</p> <p>With consultants</p> <p>With public</p> <p>TxDOT 09/13 228 Managing the Travel Model Process</p> <p>Managing the TDM Development Process 281</p>	

Exhibit 5.t Communication Protocol (Example)

What is a communication protocol?

Discuss elements of communication internal to the MPO:

With staff

With Policy Board

Other?

Discuss elements of communication external to the MPO:

With TxDOT

With other agency partners

With consultants

With public

Monitoring the Schedule – Using the Schedule Itself

Monitoring Schedule

Monitoring the Schedule – Using a Checklist of Deliverables

Monitoring Deliverables

Lesson 5: Putting It All Together INSTITUTE FOR PARTICIPANT HANDBOOK
Exhibit 5.v MTP Model Plan Stage-gate Checklist (Example)

Task	Start Date	Due Date	In Progress/In Review/Complete	Responsible Agency	Monitoring Agency
Base Year Forecast			Complete	MPO	TSP
Forecast Networks			Complete	MPO	TSP
Traffic Analysis Zones			Complete	MPO	TSP
Base Year Demographics			In Review	MPO	TSP
Forecast Year Demographics			In Progress	MPO	TSP
B17 Trip Generation (Initial)			In Progress	TSP	n/a
B17 Trip Generation (Final)			Not Started	TSP	n/a
B17 Traffic Assignment (Initial)			Not Started	TSP	n/a
B17 Calibration/Validation			Not Started	TSP	MPO
B17 Model Presentation to MPO			Not Started	TSP	MPO
F17 Model Setup and Run			Not Started	TSP	MPO

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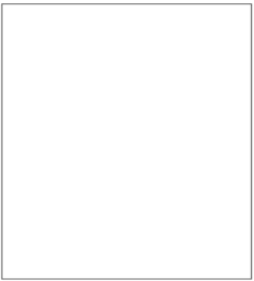
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Exhibit 5.v MTP Model Plan Stage-gate Checklist (Example)



Task	Start Date	Due Date	In Progress/ In Review/ Complete	Responsible Agency	Reviewing Agency
Base Year Network			Complete	MPO	TPP
Forecast Network(s)			Complete	MPO	TPP
Traffic Analysis Zones			Complete	MPO	TPP
Base Year Demographics			In Review	MPO	TPP
Forecast Year Demographics			In Progress	MPO	TPP
BY Trip Generation (Initial)			In Progress	TPP	n/a
BY Trip Distribution (Initial)			Not Started	TPP	n/a
BY Traffic Assignment (Initial)			Not Started	TPP	n/a
BY Calibration/Validation			Not Started	TPP	MPO
BY Model Presentation to MPO			Not Started	TPP	MPO
FY Model Set-Up and Runs			Not Started	TPP	MPO
FY Model Presentation to MPO			Not Started	TPP	MPO


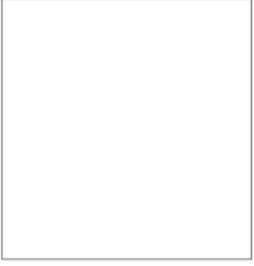

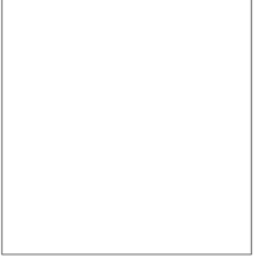

Other Schedule Management Strategies

<p>Strategies for Managing the Process Effectively (Activity)</p> <p><small>Lesson 5: Putting It All Together PARTICIPANT HANDBOOK</small></p> <p>Activity 5.20 What Strategies Might You Employ to Manage the Model Development Schedule? (discuss as group, 5 minutes)</p>  <p><small>TxDOT 09/13 230 Managing the Travel Model Process 284</small></p>	
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Activity 5.20 What Strategies Might You Employ to Manage the Model Development Schedule?

(discuss as group, 5 minutes)

Managing Challenges

<p>Keeping in Touch Strategies</p> <p>MPO Director is the Model Champion</p> <ul style="list-style-type: none">• Advocates for timeline• Manages deadlines <p>MPO Coordinates with TxDOT TPP Regularly</p> <ul style="list-style-type: none">• Identify and resolve issues early• Monthly model update meetings during longer tasks• If TPP staff is involved, copy the help desk on emails <p> Managing the TDM Development Process 285</p>	
<p>What Types of Challenges Do You Anticipate? (Activity)</p> <p>Lesson 5: Putting It All Together PARTICIPANT HANDBOOK</p> <p>Activity 5.21 What Challenges do You Anticipate with Managing the Model Development Schedule? (discuss as group, 5 minutes)</p> <p></p> <p>TxDOT 09/13 234 Managing the Travel Model Process 286</p> <p> Managing the TDM Development Process</p>	
<p>How Do You Plan to Manage Non-performers? (Activity)</p> <p>PARTICIPANT HANDBOOK Lesson 5: Putting It All Together</p> <p>Activity 5.22 How Do You Manage Non-Performers? (within MPO and outside it) (discuss as group)</p> <p></p> <p>Managing the Travel Model Process 235 TxDOT 09/13 287</p> <p> Managing the TDM Development Process</p>	

Activity 5.21 What Challenges do You Anticipate with Managing the Model Development Schedule?

(discuss as group, 5 minutes)

Activity 5.22 How Do You Manage Non-Performers? (within MPO and outside it)

(discuss as group)

Topic 5.9 Draft and Final Model Deliverable Items

Items Typically Provided to an MPO upon Completion of Model Development and Application:

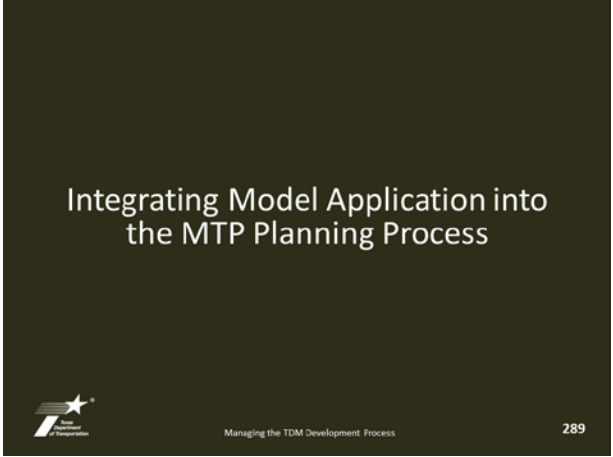

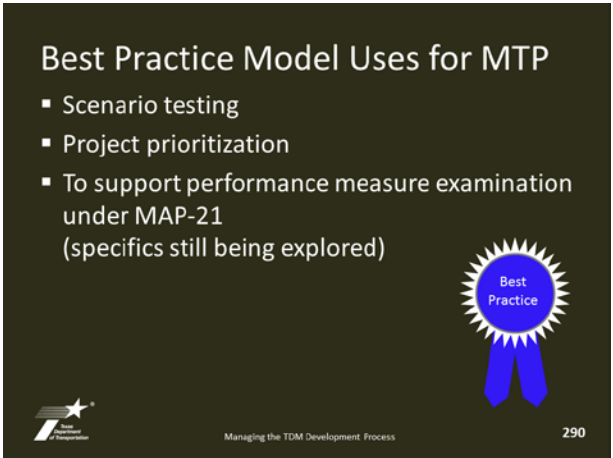


- **All files necessary to run the model** except proprietary software (e.g., TransCAD, TripCal5, ATOM2), these are each available through the means described in Lesson 4.
- A complete base model run, if the model task was calibration and validation of a base model.
- A complete application run or runs, if the model task included this expectation.
- **Documentation** of how to run the model and any additional needs to run it (proprietary software, for example).

If contracting out model tasks to a private consultant, **be sure to specify in the contract language the following:**

- Expectations above for draft and final model deliverables within the timeframe specified.
- Ownership of the model products, including any model code written to implement the MPO's model, belongs to the MPO.
- Specify any protocols wanted with regard to use of the MPO's model for other analysis purposes, e.g., for studies for other parties. The CAMPO MPO, for instance, has developed a protocol requesting return of any model products developed from their regional model, and have additionally specified appropriate citation of the model to differentiate alternate applications of the CAMPO model from the adopted plan run.

Topic 5.10 Best Practice Strategies

Integrating Model Application into the MPO's Planning and Public Involvement Process

 <p>Integrating Model Application into the MTP Planning Process</p> <p> Managing the TDM Development Process 289</p>	
 <p>Best Practice Model Uses for MTP</p> <ul style="list-style-type: none">▪ Scenario testing▪ Project prioritization▪ To support performance measure examination under MAP-21 (specifics still being explored) <p></p> <p> Managing the TDM Development Process 290</p>	

Performance Measures

- More to come as MAP-21 is interpreted
- One possible approach:
 - MPO, with public, identifies goals to meet
 - Performance measures are used to evaluate how well the MTP meets those goals
 - Total regional delay reduction
 - Hot spots addressed
 - More people using sustainable modes
 - Other goals/measures not from a travel model







Managing the TDM Development Process



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EXAMPLE (described)

Looking in the Rearview Mirror: Retrospective Review

 <p>Looking Backward and Forward</p> <p> Managing the TDM Development Process 292</p>	
 <p>Retrospective Review (concept)</p> <ul style="list-style-type: none">▪ Pre-planned, systematic▪ Reassurance to all that focus is on future▪ Format established prior, possibly including:<ul style="list-style-type: none">• Independent facilitator• Simple questionnaire to participants• Discussion format if appropriate• Follow-up by facilitator if necessary▪ Summary of actionable items for future <p> Managing the TDM Development Process 293</p>	

Looking Ahead to the Next Model

Plan for Next MTP (and Model Needs)

Year: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Task: MTP Adoption Dates, Prior Year Model, Model Year 1, Model Year 2, Model Year 3

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KEY CONCEPT: Learn from today's lessons to avoid seeing the same issues for the next model.

Topic 5.11 Key Talking Points by Audience

Key Talking Points by Audience (Activities)

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When Talking with TxDOT Staff

- Agree on expectations at the outset.
- Investigate upcoming and available training opportunities.
- Verify that the resources provided by TxDOT and listed below are the latest versions.
- Inquire about any newly developed initiatives or resources.
- Protocol in contracting with consultants to assist MPO staff with model inputs development.
- Protocol and potential challenges in contracting with consultants to assist MPO staff with model development, application, interpretation, and training.

Activity 5.23 Discuss Best Practices for Communicating with TxDOT Staff

(discuss as group)

When Talking with MPO Staff

- Set clear expectations for tasks clear and provide regular feedback on progress.
- Reiterate mission-critical inputs and deadlines.
- If appropriate, set internal deadlines ahead of critical path deadlines.
- Share quality assurance procedure ahead of time and schedule quality control procedure as part of the delivery schedule.
- Training and travel plans.

Activity 5.24 Discuss Best Practices for Communicating with MPO Staff

(discuss as group)

When Talking with Policy Board Members

- Identify your policy board's expectations...some don't want to be involved with the details at all, some want more detail, for example being able to demonstrate accountability for their decisions, concise non-technical explanations of findings, no surprises.
- For policy board members interested in the planning process, an excellent resource is the *Briefing Book* (see Helpful Resources at the end of Lesson 2).
- Key communication milestones before and during the model development process.
- Be clear on which model (referred to by its forecast year, e.g., 2035 or 2040) will be used for the upcoming MTP.
- Set expectations early for how long the model development process takes and what date the MPO needs to have a final model to begin making MTP runs.
- Provide advance communication about training and travel needs.
- Justify MPO staff expertise to manage and review contractor work, if applicable.

Activity 5.25 Discuss Best Practices for Communicating with Policy Board Members

(discuss as group)

How might communicating with Technical Committee members be different?


Talking Model-ese with Non-Modelers Generally (including the Public)

- Define varied expectations of different members of the public—transparency, accountability, clear, concise, more details available for informed audiences.
- Prepare materials that relate modeling key concepts.
- Provide measures from model in support of decisions made.
- Always refer to the model by its forecast year, not its base year.

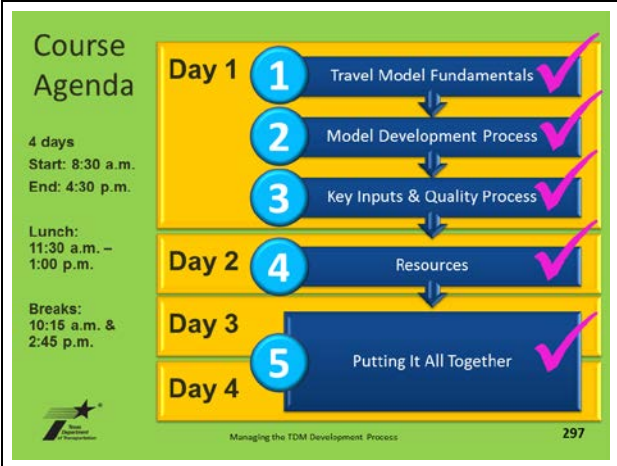
Activity 5.26 Discuss Best Practices for Communicating Model Concepts and Results with the Public

Topic 5.12 Lesson Wrap-Up

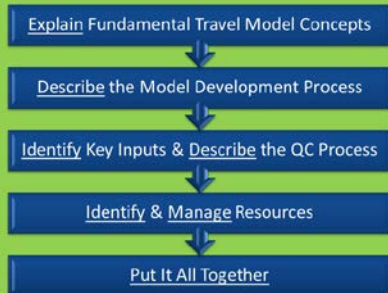
On the previous page is a list of Other Helpful Resources that cover the topics in this lesson.

 <p>Lesson 5 Learning Objectives</p> <p>Putting It All Together</p> <ul style="list-style-type: none"> Identify Unique MPO Challenges Map the Critical Path Make It Work <p>Managing the TDM Development Process 296</p>	
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Course Conclusion

 <p>Course Agenda</p> <p>4 days Start: 8:30 a.m. End: 4:30 p.m.</p> <p>Lunch: 11:30 a.m. – 1:00 p.m.</p> <p>Breaks: 10:15 a.m. & 2:45 p.m.</p> <p>Managing the TDM Development Process 297</p>	
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Learning Objectives



Managing the TDM Development Process

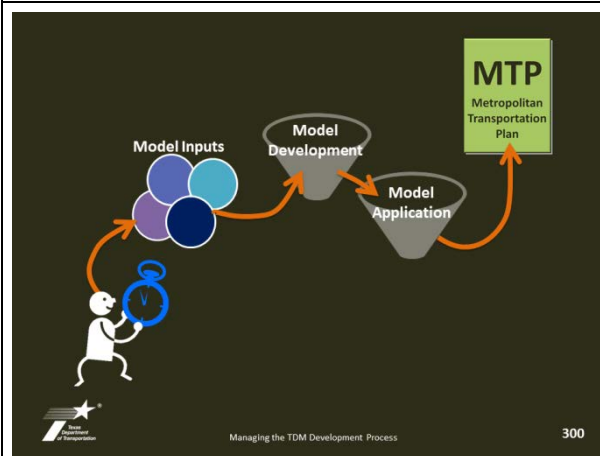
298

Course Premise



Managing the TDM Development Process

299



Managing the TDM Development Process

300

Appendix A: Other Types of Models

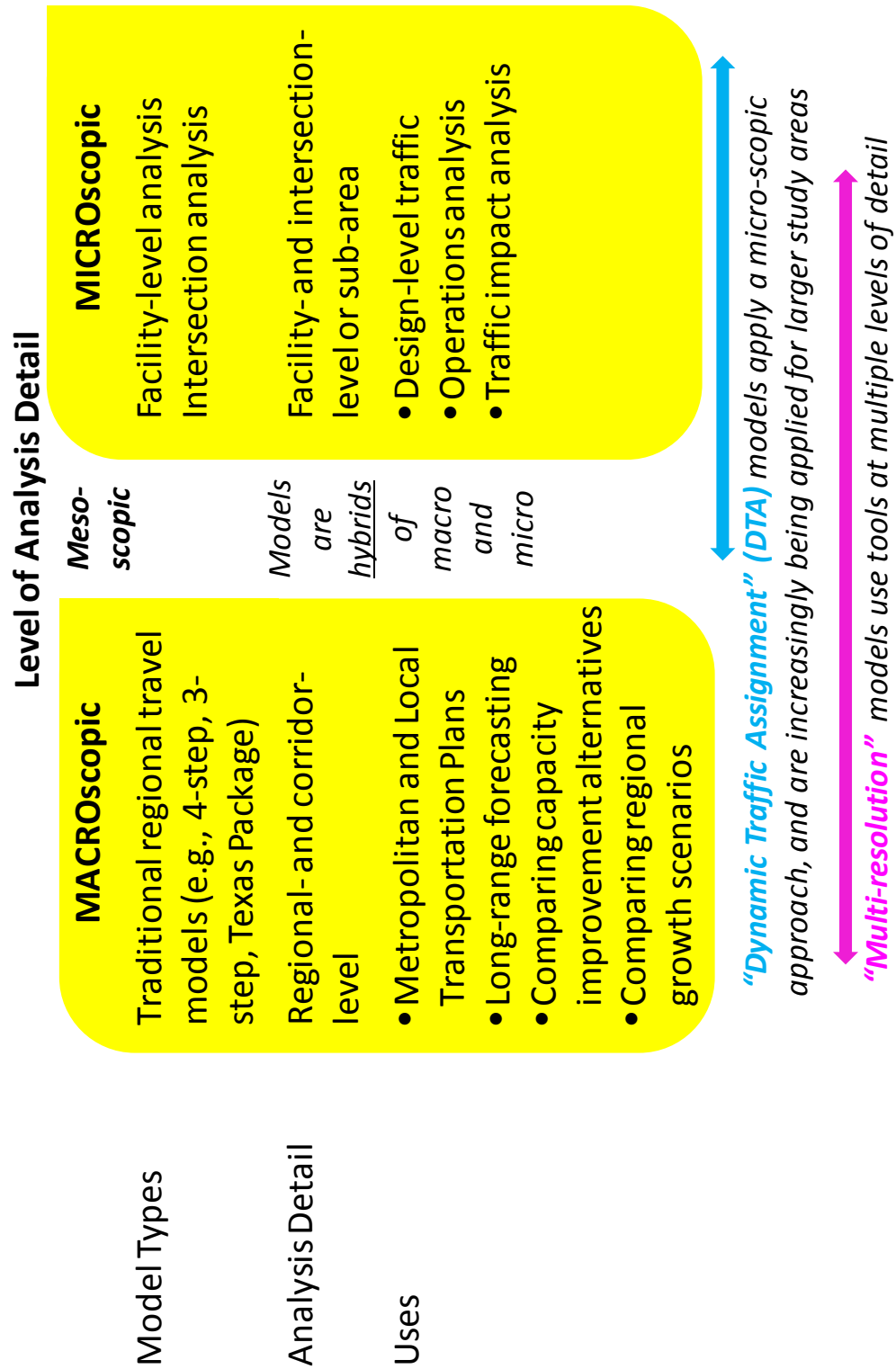
Texas Package in the Context of Other Types of Models

This section is provided to give a general understanding of the different analysis tools available for travel and traffic analysis, not as a comprehensive resource. Please see page 31 in Lesson 1 for other resources on this topic.

Macro-, Meso-, Micro-Models, and Other Forms

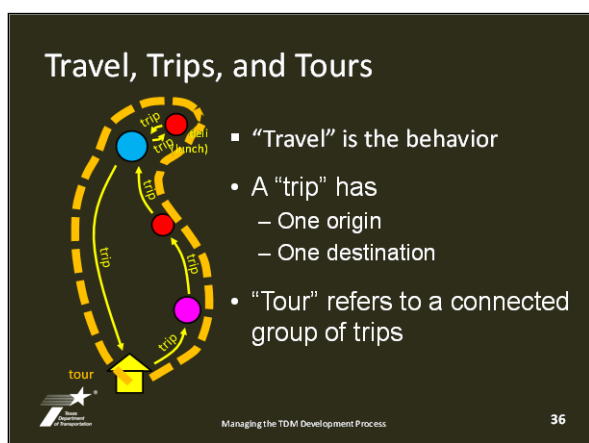
The Lesson 1 section on model limitations provides an example of intersection analysis as something people frequently ask if travel models can do. That type of analysis is best conducted at the “micro” level of analysis. Exhibit A.a shows general differences between the macro (travel demand model) and micro levels of analysis. Note as well: meso-models, multi-resolution models, and hybrids.

Exhibit A.a Macroscopic, Mesoscopic, and Microscopic Model Tools



Trip-Based, Tour-Based, and Activity-Based Models

The Texas Package is a traditional “trip-based” approach. This means that trips are each considered separately: home to dry cleaner, school to coffee shop, coffee shop to work, etc. The entire home-to-home travel is called a “tour.” Many advanced models, in various approaches, link the individual trips, at least for trips starting and ending at the same location (i.e., tours).



The exhibits on the next pages in the handbook provide a very general summary of traditional models (the Texas Package falls in this group) and approaches that industry experts consider advanced practice. As covered in the Course Introduction, of MPOs nationwide, a few don’t use models at all. Of the majority that do, most are using traditional models with enhancements (all 25 MPOs in Texas currently base their MTPs on a traditional model). Many MPOs with the resources to do so are exploring advanced practice models, including the largest MPOs in Texas.

This course is not intended to address advanced model practice. However, the current thinking is to consider models generally “suites” of tools, and therefore advances can often be implemented and integrated as components. At the end of both exhibits is the description of this component approach, called hybridization. Another way to consider this suite of model tools is as a toolbox, as shown in the graphic here.

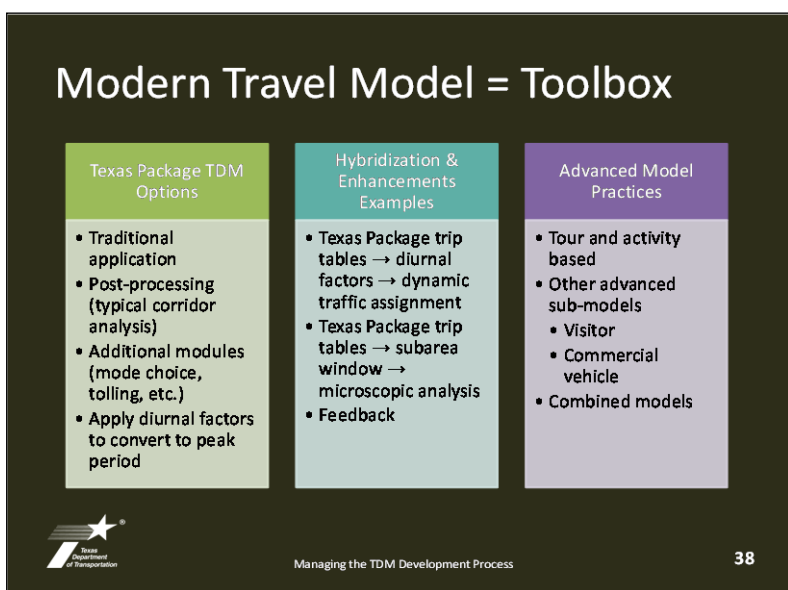


Exhibit A.b Traditional (Trip Based) Model Approach

Typical Components	Demographic allocation of control totals Trip Generation Trip Distribution Mode Choice or Shares Equilibrium Traffic Assignment
Typical Enhancements	Land use models Feedback loops: assignment to distribution Truck models Toll models Special purposes (airport, university, etc.) Post-processing (air quality models, etc.) Time-of-Day models
Model Characteristics	For most trip purposes: <ul style="list-style-type: none"> - Modeling of TAZ groups (aggregate) - Sequential model step application
Distinguishing Features of Approach	Traditional and sufficient for most regional planning needs for autos and trucks <ul style="list-style-type: none"> - Supported by Texas statewide data collection activities - Professional familiarity - Enhancements can supplement the approach for particular analysis needs Daily total volumes along roadways are familiar to Texas transportation professionals.
Example MPOs	All Texas MPOs as of 2012, majority of MPOs nationwide. HGAC and NCTCOG are in different stages of developing an ABM approach.
Hybrid Approaches Combine Some Advanced Elements into Traditional Models	

Exhibit A.c Advanced Practice Approaches

Typical Components	<p>Population synthesis</p> <p>Long term Choice model (work/school location, vehicle availability/ownership)</p> <p>Activity-based or tour-based models: list of all the activities, tours, and stops generated over a day</p> <p>Choice modeling: tour generation (including school escorting & joint travel), tour destination, time-of-day and mode choice, tour stop generation, stop destination and mode choice, etc.</p>
Typical Enhancements	<p>Urban growth simulation models</p> <p>Dynamic Traffic Assignment (DTA) integration</p> <p>Greater interaction between individuals' travel decisions</p> <p>Extensive space-time interactions over the day</p>
Model Characteristics	<p>For most trip purposes:</p> <ul style="list-style-type: none"> - Modeling of individuals' or households' activity/travel (disaggregate) - Greater spatial and temporal detail - Greater person and household attributes and detail - Linkage between trips - Logical trip chains - Feedback to ensure any sequentially applied models are consistent - Upward and downward integration of model components, so that model components at all level of hierarchy can be informed by other model components. <p>Trip purposes such as commercial vehicles and external and visitor demand are often still addressed using a trip-based approach</p>
Distinguishing Features of Each Approach	<p>Enable examination of behavioral changes in response to a variety of system changes</p> <p>More explicitly accounts for and evaluate the effect of transportation system characteristics, improvements, and/or policies on specific sub-groups</p> <p>Disaggregate/detailed form enables tighter integration w/ simulation/operational analysis</p>
Example MPOs	<p>Atlanta (GA), Columbus (OH), Denver (CO), New York (NY), Portland (OR), Sacramento (CA), San Francisco (CA), Tahoe (CA), Houston (under development)</p>
<p>Hybrid Approaches Combine Some Advanced Elements into Traditional Models</p>	

Matching Model to the Context

The Transportation Research Board SR 288 provides an excellent discussion on the topic of matching the model tool to the analysis need, called “Matching the Model to the Context”. The following exhibit was extracted from SR 288 for additional study.

Exhibit A.d Matching the Model Approach to the Context

		Level of detail required for analysis					
		Aggregate					Disaggregate
		Roadway sizing	Transit New Starts	Land use effects on mode choice	Air quality analysis/tolls	High-occupancy travel lanes, variable tolls	Corridor studies, peak spreading, saturated networks
Typical land use issues	Typical transportation issues	Transportation analysis methods					
		Three-step	Four-step	Five-step (automobile availability) with land use variables	Population synthesis	Household activity-based	Traffic microsimulation
Slow to moderate growth	Land use analysis methods						
Fast growth, growth impact analysis	Spreadsheets, geographic information systems						
Growth, housing costs, environmental justice	Lowry-type accessibility-based models ^a						
Economic development	Real estate market models						
Economic development and environmental justice	Markets and input/output models						
	Disaggregate business and residential location models						

■ = Reasonable combination of models

^a The Lowry-type accessibility-based model was first developed by Ira S. Lowry for Pittsburgh. Such models estimate the location and scale of (a) employment for basic industries and services whose clients are outside the region, (b) employment for retail activities serving the region, and (c) the resident population of the region (Chapin and Kaiser 1979).

Source: SR 288, *Metropolitan Travel Forecasting: Current Practice and Future Direction*, TRB, 2007, Figure 4-3.

Appendix B: Draft Contract Language to Contract Out Model Inputs Development

SAMPLE REQUEST FOR PROPOSAL

This document provides a sample request for proposal that may be used by MPOs who wish to have a consultant prepare the demographic data required for use in developing their travel demand forecast. This sample RFP is provided as guidance for MPOs to ensure that the appropriate data and work is outlined in the RFP. It does not include all contracting or other administrative requirements that may need to be included with any RFP.

Following the sample RFP is a sample work plan which outlines the basic tasks that MPOs should look for when reviewing and ranking technical work proposals submitted in response to the Request For Proposal. Additionally, a list of technical or methodological items that MPOs should look for when reviewing the RFPs is included. These items are provided to assist MPOs in the review of proposals. It is **NOT** intended that they be included in the RFP as a consultant that understands the project should be knowledgeable enough to know the basic tasks and methods required to complete the work.

**SAMPLE REQUEST FOR PROPOSAL
FOR
DEVELOPING DEMOGRAPHIC AND EMPLOYMENT INPUTS
FOR TRAVEL DEMAND FORECAST**

Table of Contents

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SAMPLE REQUEST FOR PROPOSAL FOR DEVELOPING DEMOGRAPHIC AND EMPLOYMENT INPUTS FOR TRAVEL DEMAND FORECAST

PART I - SCOPE OF SERVICES

Introduction

Transportation planning in the (*name*) urbanized area is performed by (*MPO name*), the designated MPO for the area, in close cooperation with the Texas Department of Transportation (TxDOT). The travel demand forecast for the (*name*) urbanized area is a traditional four-step model. The trip generation model, TRIPCAL5, requires population, number of households, average household size, median household income, total employment and total employment by type (basic, retail, service, and education) for the base year and the forecast years as inputs. The (*name of agency*) is seeking a qualified consulting firm to assist in conducting the necessary data collection and analysis to develop this data for the 20?? base year and the (*list all forecast years for which data is needed*) travel forecasts.

Background

[*A description of the urban area should be provided here. In general this description should be sufficient to adequately describe the area so that the consultants can more accurately estimate the manhours required to complete the work. Examples of items that should be included are:*

Existing population and historic and current growth patterns

Size of the area in terms of square miles, number of travel analysis zones. A map should be included that illustrates the area that will be defined as the study area for the project.

A description of changes to the urban area since previous forecast and changes to the traffic analysis zone structure

Date of last travel demand forecast

Number and type of special generators in the area

Description of major and minor cities

Any local political concerns that may affect forecasts

Any unusual concerns or developments]

Preliminary Scope of Work

This section describes the basic services and deliverables required to complete the project. Firms submitting proposals should ensure that the work described herein is included in their proposed work program, but other tasks may be included if the consultant feels they are appropriate and they are justified. The consultant should recognize that the work requested here is to prepare the population, household, income and employment estimates and projections required as inputs into

the TRIPCAL5 trip generation program. The motivation for this work is primarily to prepare a new travel demand forecast for use in developing an update to the area's long-range transportation plan. **Specific work to be completed by the consultant is described in the following sections.**

Technical Work Required by Proposal

The work required to complete this study includes the following:

Task 1. Develop Base Year and Forecast Year Control Totals

Develop 20?? base year and (*list all forecast years for which data is needed*) forecast year control totals for population, number of households, average households size, median household income (in base year dollars), total employment, and total employment by type (basic, retail, service, and education) for the county and the Metropolitan Area Boundary (MAB). Additionally, the base year major group quarters populations will be identified by type and population. A brief technical report describing the methodology used to develop the base year and forecast year estimates of population, number of households, average household size, median household income, and basic, retail, service, and total employment will be prepared. This report should include sufficient analysis of historic data and anticipated trends to enable the MPO to assess the reasonableness of the base and forecast year control totals.

Task 1 Deliverables: Control Total Technical Report

Task 2. Develop Base Year TAZ Data

Develop 20?? base year estimates for population, number of households, average household size, median household income (in base year dollars), employment by type (basic, retail, service, and education), total employment, and special generator information for each traffic analysis zone (TAZ). Additionally, in the data set identify the 20?? major group quarters data (type and population) for each traffic analysis zone. The group quarters data will be input into the data file for that zone and identified in the comment section of the data file.

The data for employment will be the 20?? Texas Workforce Commission (TWC) employment for the base year and will be provided to the consultant. The type of employment (basic, service, retail, and education) will be consistent with the North American Industrial Classification System (NAICS) codes as shown in Table 1. The TWC file provided will have the employment type already identified for each establishment.

There are several issues with the TWC data that will need to be considered for this work:

- The majority (but, not all) of the employer records contain a geographic or X/Y coordinate which provides the opportunity to associate business sites to traffic analysis zones using a GIS platform. However, the underlying geography used to create the coordinate information for each employment location address is not always consistent with the underlying geography used by TxDOT to create travel demand model networks. Additionally, some of the X/Y coordinates are not consistent with the actual business site,

SAMPLE

Table 1. Basic, Retail, and Service Employment NAICS Codes

Employment Type	NAICS Code	Employment Description
Basic	11	Agriculture, Forestry, Fishing & Hunting
	21	Mining
	22	Utilities
	23	Construction
	31-33	Manufacturing
	42	Wholesale Trade
	48-49	Transportation & Warehousing (Except 491 – Post Offices)
	5111	Newspaper/Book/Directory Publishers
	5112	Software Publishers
	512	Motion Picture/Sound Recording (Except 51213- Motion Picture Theaters)
	5151	Radio & TV Broadcasting
	5173	Telecommunications Resellers
	5175	Cable and Other Program Distribution
Retail	44-45	Retail
	71	Arts, Entertainment & Recreation
	722	Food Services & Drinking Places
	491	Post Offices
Service	51213	Motion Picture Theaters
	516-5172	Internet Publishing & Telecommunications
	5179	Other Telecommunications
	518-519	Internet Service Providers and News Syndicates
	52	Finance & Insurance
	53	Real Estate, Rental & Leasing
	54	Professional, Scientific & Technical Services
	55-56	Company Management & Administrative Support
	62	Health Care & Social Assistance
	721	Accommodation
	81	Other Service, Repair & Maintenance
	92	Public Administration
	6117	Educational Support Services
	9999	Unknown
Education	6111	Elementary & Secondary Schools
	6112-6113	Junior Colleges, Colleges, Universities & Professional Schools
	6114-6116	Business, Technical, Trade & Other Schools

but, are coded to the zip code centroid. These issues may ultimately result in the erroneous placement of employment sites within traffic analysis zones.

- The TWC data may not include all information for each business (i.e. addresses and/or number of employees may be missing). The contractor will be required to update this data to extent possible in order to place the correct number of employees in the correct zone.
- The TWC data for some establishments represents the location and employment for the parent company. The most common example is where public school employment is provided at the school district administration location rather than the individual school and/or facility location. School employment needs to be at the individual school or facility site. Any other establishment listed at the parent location will need to be located at the local site with local site employment only.

Develop required special generator information for the base year. Special generators in the *(name of MPO area)* include: *(List special generators by name)*. Data required for special generators according to type of generator is given in Table 2. Special generator data is contained in the file with other demographic data (see Table 3 and Table 4) with separate files for the base year and the forecast year.

Table 2. Special Generator Data Requirements

Type of Special Generator	Data Required
Educational (Universities, colleges, junior colleges, high schools, and major technical schools)	Number of employees Number of students Number of students living on campus
Hospitals	Number of employees Number of beds
Airports	Number of employees Number of annual deplaning passengers
Military Bases	Number of military personnel Number of civilian employees Number of military living on base
Major Special Attractions/Event Centers (This should include only those special attractions that are open most of the year. For example Six Flags, Fiesta Texas, Sea World, AstroWorld, etc.)	Number of employees
Industrial sites	Number of employees
Regional Malls	Number of employees

Task 2 Deliverables: A completed Excel file of base year TAZ population, households, group quarters population, median household income, total employment, basic employment, retail employment, service employment, education employment, special generator population, special generator employment, and appropriate comments. This data should be in the format illustrated in Table 3 and Table 4.

Task 3. Develop Forecast Year TAZ Data

Develop *[list all forecast years here]* forecast year estimates for population, number of households, average household size, median household income (in base year dollars), employment by type (basic, retail, service, and education), and total employment for each TAZ. The TAZ data should be consistent with the forecast year control totals previously developed. Additionally, in the data set identify the forecast year major group quarters data (type and population) for each traffic analysis zone. The group quarters data will be input into the data file for that zone and identified in the comment section of the data file.

Develop required special generator information for the same forecast year(s). Special generators are the same as those listed for the base year. Data required for special generators according to type of generator is given in Table 2. Special generator data is contained in the file with other demographic data (see Tables 3 and 4) with separate files for each forecast year.

The MPO, in cooperation with TxDOT TPP, will have one month to review the demographic data. The consultant will be responsible for addressing any comments and/or making needed revisions.

Upon approval of the zonal data, an Excel data file in the format described in Table 3 will be provided. A separate file will be prepared for each forecast year.

Task Deliverables: A completed Excel file for each forecast year containing TAZ population, households, group quarters population, median household income (in base year dollars), total employment, basic employment, retail employment, service employment, education employment, special generator population, special generator employment, and appropriate comments. This data should be in the format illustrated in Table 3 and Table 4 examples.

Table 3. Format of Demographic Submittal

TAZ	POP	HH	Group Quarters Pop.	Median Income	Total Emp.	Basic	Retail	Service	Edu.	Spec. Gen. Pop	Spec. Gen. Emp.	Comment/Type

Table 4. Example of Completed Demographic Data File

TAZ	POP	HH	Group Quarters Pop.	Median Income	Total Emp.	Basic	Retail	Service	Edu.	Spec. Gen. Pop	Spec. Gen. Emp.	Comment/Type
1	100	52	0	26,501	20	0	10	10	0	0	0	
2	0	0	500	0	60	0	0	10	0	0	50	500 Grp. Qtr. Pop. is located in county jail, which has 50 empl.
3	0	0	0	0	21	21	0	0	0	0	0	
4	25	10	0	26,501	35	5	10	20	0	0	0	
5	3	1	0	36,133	45	25	10	10	0	0	0	
6	44	34	0	26,501	50	0	0	0	50	0	0	High school XYZ
7	191	112	0	26,501	77	0	37	10	30	0	0	Middle school XYZ
8	0	0	0	0	312	0	0	0	0	0	312	County hospital
9	0	0	1,000	26,501	210	0	10	0	0	0	200	University Dorm Pop/College Emp (175 full-time, 25 student workers).
10	300	110	0	26,501	0	0	0	0	0	0	0	One of the HH's is a sorority house with 25 people living in house (the 25 are a part of the 300 Pop. total)
11	0	0	10,000	19,910	400	0	0	0	0	0	400	10K Pop. in military barracks; Of the 400 employees, 100 are military personnel and 300 are federal employees
12	0	0	0	19,910	0	0	0	0	0	500	0	500 Pop. for officer quarters not living barracks in 250 HH's

Data and Information To Be Provided By MPO

This section lists the items available to the consultant from the area MPO, TxDOT or other local agencies. *[This list provides examples of data that the consultant might need. The MPO should list what they have and will make available to the consultant, either free or at cost, to better enable the consultant to estimate the manhours required and the cost of the work.]*

- Reproducible base maps for the urbanized area.
- Reproducible base map of the traffic analysis zones for the urbanized area.
- Maps of census tracts and block group maps
- Transportation Network map
- Any recent population estimates developed by local agencies.
- Texas Workforce Commission data for the base year. Businesses will be listed by NAICS codes for basic, service and retail employment. The consultant will be required to sign a letter ensuring the confidentiality of this data prior to receipt.
- The most current land use and zoning maps, including proposed future land use.
- List of special generators with contact name for special generator.
- Available recent aerial photography for the area.
- A table of equals providing the census block/block groups for each traffic analysis zone.
- Available GIS files that may expedite the work at the zonal level.

Required Disciplines

Knowledge and experience in several fields are deemed necessary for completion of this project. Of most importance is demonstrated knowledge and experience in the development of socio-economic data for transportation planning and in the development of demographic, income and employment forecasts. Additionally, knowledge of the development of the transportation network and traffic analysis zone structure is required.

[Depending on the specific MPO, other knowledge may be needed and should be specified].

Required Schedule

This project must be completed no later than *[date]*. Sufficient time must be allowed for agency review and for adoption of the base year and forecast year control totals by the MPO.

Reporting Requirements

On or before the 10th of each month the consultant shall submit a brief progress report describing the work accomplished and technical decisions made during the previous reporting period, and highlighting the work to be completed during the next period. A percentage estimate of the work completed for each task shall be provided and an estimate of the total percentage of

the project completed versus the manhours expended should be made. A total of 10 percent of each billing will be withheld until all work has been completed to the satisfaction of the MPO.

Available Funding (Optional)

This update of the (*area's name*) travel demand model is being prepared with a portion of the federal transportation planning funds made available to the MPO. At the present time \$ has been budgeted for completion of the project.

SAMPLE

PART II - PROPOSAL REQUIREMENTS

Technical Proposal

The required contents and limitations for preparation of the technical proposal are described in this section. Failure to provide the requested information or adhere to any stated limitations may result in disqualification of the submitted proposal. A total of ____ copies of the Technical Proposal should be submitted to the address given in the cover letter.

Contents

The required contents for the Technical Proposal are presented below in the order they should be incorporated into the submitted document.

Understanding of the Proposed Project - This section should demonstrate the consultant's understanding of the project need, the work required, and any local issues or concerns. This description should be concise, candid and not a mere duplication or rephrasing of the RFP's scope of services. Limited to 3 pages in length.

Proposed Work Plan - The consultant should present the proposed work plan necessary to complete the work itemized under the scope of services. The proposed work plan should address each of the specific work elements described in the scope of services, but consultants may propose additional work beneficial to completing the work specified. Where appropriate the methodology to be used to accomplish a specific task should be described. All proposed meetings and/or reviews should be included under each task. Any data or assistance anticipated to be required from the MPO staff should be specified. All final products should be described. There is no page limitation for this section, but consultants are encouraged to be succinct.

Schedule - A proposed schedule for completing each task proposed should be provided. For each review proposed by the consultant, the schedule shall reflect the maximum allowable review time available to maintain the schedule as proposed. The schedule shall also reflect expected dates for deliverables and anticipated timing for review and approval by the MPO and TxDOT.

Firm Qualifications - This section should include a description of the firm's qualifications for performing the proposed work. This description is limited to 2 pages. A brief description of the firm's most recent or applicable demographic forecasting projects shall be provided. For each project a client contact name and phone number should be included for reference purposes. Additionally, the names of the personnel proposed for this project that participated in the projects listed should be provided. This project list is limited to 5 pages.

Personnel and Staffing - The consultant should provide an organization chart for the project; an estimate of the manhours by personnel by task; and, a summary paragraph of the project work to be performed by each proposed staff member. Biographic summaries that highlight

the experience relevant to the specific project responsibilities should be provided for all proposed personnel. There is a 1 page limitation for each biographic summary provided.

Required Certifications and Submittals - [*This section will contain any certifications and assurances as required by TxDOT, the MPO and the FHWA.*] .

Cost Proposal

The required contents and format for preparation of the Cost Proposal are presented in this section. Failure to provide the requested information may result in disqualification of the submitted proposal. A total of ____ copies of the Cost Proposal should be sealed in a package separate from the Technical Proposal and submitted to the address given in the cover letter.

Contents

An Estimate of Personnel Hours by Task - The table provided under the staffing section of the Technical Proposal providing the personnel hours by task should be included in the Cost Proposal.

Cost Estimate - Estimated costs for completing the work described in the proposed work plan shall be provided. Separate detailed cost estimates should be provided for each task. A cost summary sheet for the entire project should be provided. This cost summary sheet should include the total estimated costs for each major phase of the project. Any assumptions used to estimate the costs for the proposed services should be explained in this section, but should be on pages separate from the required tables.

PART III - SELECTION PROCEDURES AND SCHEDULE

Selection Procedures

Technical Proposals shall be the basis for selection of the consultant. Technical Proposals shall be ranked by a committee of individuals representing the MPO and TxDOT using the selection criteria and weights described below. At the same time that the Technical Proposals are being ranked, the Cost Proposals shall be evaluated independent of the Technical Proposal for reasonableness of manhour rates, overhead rates, travel rates and other usual cost items. After the Technical Proposals have been ranked, the result of the Cost Proposal review and evaluation shall be presented to the proposal evaluation committee. If the Cost Proposal for the top-ranked Technical Proposal is considered reasonable and acceptable, contract negotiations shall be initiated with that consultant. If no agreement can be reached with the first consultant, negotiations shall be terminated. Negotiations shall then be opened with the consultant having the next highest ranked Technical Proposal with an acceptable and reasonable Cost Proposal. This process shall continue until a consultant has been selected.

The MPO has the right to reject any and all proposals if they do not meet the needs and/or budget of the MPO.

Selection Criteria and Weights

Demonstrated Experience in Performing Similar Work

Personnel Experience	25%
Firm Experience	20%

Demonstrated Knowledge of the Work Requirements 20%

Quality of the Proposed Work Plan 20 %

Ability to Meet the Required Schedule 10%

Conciseness of Proposal 5%

Consultant Selection Schedule

[This section should outline the schedule for selecting the consultant. Included should be the date by which Technical Proposals shall be ranked, the date by which Cost Proposals shall be reviewed, the date by which the selection shall be made, the date by which it is desired that work begin on the project, etc.]

SAMPLE REQUEST FOR PROPOSAL

This document provides a sample request for proposal that may be used by MPOs who wish to have a consultant prepare the base and forecast year networks and traffic analysis zone (TAZ) geography required for use in developing their travel demand model and travel forecast. This sample RFP is provided as guidance for MPOs to ensure that the appropriate work is outlined in the RFP. It does not include all contracting or other administrative requirements that may need to be included with any RFP.

**SAMPLE REQUEST FOR PROPOSAL
FOR
DEVELOPING THE BASE AND FORECAST YEAR NETWORKS AND TRAFFIC
ANALYSIS ZONE GEOGRAPHY**

Scope of Work

Task 1. Develop the Base Year Network

The current base year network will be developed by the consultant. This work will include the following:

- Review previous base year network maps as provided to determine that:
 - The network contains only collector streets or higher.
 - The network does not include facilities that no longer exist.
 - All network facilities are aligned properly.
 - The functional class of the facility is correct.
 - All facility types on the existing network are correct.
 - The number of lanes on the existing network is correct.
 - Ramp locations and orientation is correct.
 - The posted speed is complete and correct (please annotate a posted speed that represents the majority of the link).
 - The directionality is correct.
- Identify regionally significant facilities that have been built, expanded, or modified since the previous model base year network. Only the changes that were completed by the time of the current base year traffic saturation counts should be included.
- All needed changes to the network (revisions to existing network and addition of new network) will be noted on the network maps using the TxDOT standard facility type and color definitions (see Figure 1), and the following editing conventions:
 - The correct facility type number code will be noted above the mid-point line of the facility and the correct number of lanes noted below the mid-point of the line.
 - One-way facilities will be marked with an arrow and the beginning and ending points of the one-way facility noted on the maps.
 - Roadway links that are to be removed will have an X placed through the line and the word “Remove” added above the link.
 - For links that need to be realigned, place an X through the link, add the word “Move” above the link and draw the link in the proper place.
 - New links will be drawn using the TxDOT functional class/facility type color definitions.
- If network plots are not provided, edits involving physical changes to the network geography (i.e., new links, alignments, removals) will made using the following conventions:

- All new links will be annotated with the current year in the EDITS_YEAR attribute field (i.e., if the network represents a 2008 base year, the new network link will be annotated with a 2008 in the EDITS_YEAR field as a means to identify new links).
- The appropriate attributes will be annotated using the appended fields in the network dataview as noted in the next major bullet (e.g., OK/EDIT, FTYPE_EDIT, LANES_EDIT, etc.). These fields are listed last in the pending network geography. Do not populate the traditional fields that have existing data. The missing values will be one more indicator that the link represents a physical edit.
- Removals will be provided in a list file (e.g. excel) that include the link ID, A-Node, B-Node, facility type, number of lanes, and roadway name.
- “Stub” links or include facilities will not be accepted.
- Network removals will not create “stub” links.
- Additional centroid connectors, unless absolutely necessary to locate potential new zones, will be the responsibility of TPP.
- The COMMENT field should be utilized as much as possible to describe the suggested change.
- Non-freeway level facilities should not be detail coded (e.g. directional links) unless there are supporting directional counts (e.g. divided principal arterials should not have directional links).
- Auxiliary acceleration and deceleration lanes should not be coded as through-lanes.
- Regionally insignificant roads, such as residential loop roads, should not be included in the network inventory. This will eventually lead to an incompatibility between the network and the traffic analysis zone geography.
- As noted earlier, please annotate the posted speed that best represents the length of the link between the a-node and b-node. This is especially true if there are a number of speed link transitions that are occurring over the length of the link. Please select the speed limit most encountered by drivers of that facility.
- Roads that are realigned should be accompanied with a corresponding comment in the COMMENTS field (e.g., link realigned).
- The pending network and pending zone geographies need to be as compatible as possible. The primary means of defining zone boundaries is the network. The pending network must be reviewed and accepted prior to initiating edits to the pending zone geography.
- For external station links, any detail coding should merge to a single non-directional link. The A-Node of this links should be the external station number.

A CD will be provided containing pending network geography (i.e., the previous base year network renamed to pending_year), pending zone geography, and the latest available StratMAP streets geography for *[insert county name]*. The CD will also contain the base year network editing guidelines and socio-economic development guidelines. Contained within the network editing guidelines are the standard editing conventions as well as facility type presentation.

- Changes to existing link attributes (i.e., facility type, number of lanes, speed, direction) will be made in the TransCAD highway/streets dataview layer which will be provided. The highway/streets dataview includes the following fields:

OK/EDIT
 FTYPE_EDIT
 LANES_EDIT
 POSTED_SPEED_EDIT
 DIRECTION_EDIT
 MPO_EDIT_DESCRIPTION

For each link the following editing conventions will be followed:

- For each non-centroid connector link that is correct, type in “OK” in the OK/EDIT field.). For each non-centroid connector link that requires changes, type in “EDIT” in the OK/EDIT column. Each non-centroid connector link will have either an “OK” or “EDIT” in this field. Networks that are not completely populated with either an OK or EDIT for non-centroid connector links will be returned for further review.
- Type in the correct attribute(s) in the appropriate field. (See Figure 2).
- For edits that will occur on the network mark-up plots provided by TxDOT-TPP, information for each new link noted on the base year network maps the following information will be input into the New Link dbase file that will be provided: (See Figure 3)
 - Street name –name of the street the link is part of
 - From street and To street- the beginning and end point of the facility
 - Facility type (FTYPE) – The correct facility type (See Figure 1)
 - Total number of lanes
 - Posted speed
 - Directionality – (0= two-way, 1= one-way, or -1 for a one-way link where the topology is different than the direction of flow)
 - Map sheet number – Map sheet number on which the new facility is drawn
- The MPO and TxDOT Transportation Planning and Programming will have 1 month to review edited maps, edited highway/street TransCAD dataview, and the New Link file.
- Subsequent to the TxDOT review, the consultant will make any required changes to the maps (or network geography), edits to the highway/street TransCAD dataview file, and the New Link file.

Deliverables:

Two sets of existing network maps with changes and edits marked as required (or a pending network geography if plots are not provided)

One edited TransCAD highway/streets dataview

One completed New Link dbase file

One completed list of links removed (as defined above) if edits are made directly to the pending network geography

Task 2. Develop Traffic Analysis Zones

The current base year traffic analysis zone geography will be developed by the consultant. This work will include:

- Upon review and approval of the base year network, the consultant will develop a suggested TAZ geography using TransCAD. The TAZ geography should consider the need for future zone splits based on anticipated area growth and location of planned highway/street facilities.
- The numbering convention is sequential without any gaps (i.e.. 1 to n).
- For zones that are joined, the lower TAZ number should probably be preserved and the merged zone number (or number that is dropped) should be used elsewhere where a new zone is to be created. A comment should be included in the dataview to note that the zone number was moved.
- All zone splits will preserve the historical zone number in at least one of the polygons.
- For new zones, the numbering will begin after the last internal zone number from the previous model to maintain sequential zone numbering (if an existing zone number is not available from a previous zone edit).
- For new zones, an EDIT column should be created and annotated with a “NZ” for new zone.
- The zone numbering convention will be preserved as much as possible to assist with monitoring demographic changes from one base year to the next.
- The MPO and TxDOT TPP will have 1 month to review the proposed TAZ geography.
- Subsequent to MPO and TxDOT TPP review and comment, the consultant will make needed revisions to the TAZ geography. Once the TAZ geography has been accepted, the network will have to be revised to include the zone changes and necessary revisions to centroid connector placement.

Deliverables:

A pending TransCAD TAZ layer geographic file.

Figure 1. Facility Type Codes and Color Description

Functional Class Code	Facility Type Code	Facility Types Descriptions	General Color Description	Detailed Color Description
1		INTERSTATE FREEWAYS	Yellow	
	1	Radial IH Freeways - Mainlanes Only		
	2	Radial IH Freeways - Mainlanes & Frontage Roads		
	3	Circumferential IH Freeways (Loops) - Mainlanes Only		
	4	Circumferential IH Freeways (Loops) - Mainlanes & Frontage Roads		
2		OTHER FREEWAYS	Orange	
	5	Radial Other Freeways - Mainlanes Only		
	6	Radial Other Freeways - Mainlanes & Frontage Roads		
	7	Circumferential Other Freeways (Loops) - Mainlanes Only		
	8	Circumferential Other Freeways (Loops) - Mainlanes & Frontage Roads		
3		EXPRESSWAYS	Purple	
	9	Radial Expressways		Dark
	10	Circumferential Expressways (Loops)		Light
4		PRINCIPAL ARTERIALS	Blue	
	11	Principal Arterial - Divided		Dark
	12	Principal Arterial - Continuous Left Turn Lane		Medium
	13	Principal Arterial - Undivided		Light
5		MINOR ARTERIALS	Dark Green	
	14	Minor Arterial - Divided		Dark
	15	Minor Arterial - Continuous Left Turn Lane		Medium
	16	Minor Arterial - Undivided		Light
6		COLLECTORS	Brown	
	17	Collector - Divided		Dark
	18	Collector - Continuous Left Turn Lane		Medium
	19	Collector - Undivided		Light
7		FRONTAGE ROADS	Mustard	
	20	Frontage Road		
8		RAMPS	Gray	
	21	Ramp (Between Frontage Road and Mainlanes)		Dark
	22	Interchange Ramp (Freeway-to-freeway Interchange Ramps)		Light

Figure 2. Example of Highway/Street Dataview with Edits

ID	Length	Dir	[OK/EDIT]	FTYPE_EDIT	LANES_EDIT	POSTED_SPEED_EDIT	DIRECTION_EDIT	MPO_EDIT_DESCRIPTION
317	0.28	0	OK	--	--	--	--	
6758	0.15	0	OK	--	--	--	--	
327	0.18	0	OK	--	--	--	--	
328	0.16	0	EDIT	--	6	--	--	-- Widened from 4 to 6 lanes in 2009
331	0.17	0	OK	--	--	--	--	
332	0.27	0	EDIT	--	--	--	--	1 Frontage Rd converted from 2-way to 1-way
333	0.17	0	EDIT	11	--	--	--	-- Upgraded from undivided to divided
334	0.32	0	OK	--	--	--	--	
376	0.18	0	OK	--	--	--	--	
377	0.22	0	EDIT	--	--	50	--	
382	0.27	0	OK	--	--	--	--	
383	0.20	0	OK	--	--	--	--	
408	0.19	0	OK	--	--	--	--	
410	0.22	0	OK	--	--	--	--	
5611	0.39	0	EDIT	16	4	--	--	
412	0.37	0	OK	--	--	--	--	
422	0.33	0	EDIT	16	4	--	--	
446	0.32	0	OK	--	--	--	--	
7260	0.29	0	OK	--	--	--	--	
475	0.13	0	OK	--	--	--	--	
499	0.15	0	OK	--	--	--	--	
612	0.23	0	OK	--	--	--	--	

Figure 3. Example of New Link Dbase File

Street	From Street	To Street	FTYPE	Lanes	Posted Speed	Direction (Dir)	Sheet Num
1 st St	Hewitt Dr (FM 1695)	Old Temple Rd	19	2	25	0	3
Airline Rd	Concord Rd	Crest Rd	19	4	35	1	1

*** Please note the "New Link Listing" file will have this format, but will be empty. TxDOT-TPP requests that the database files be updated in TransCAD.

Task 3. Develop Forecast Year Network(s)

The consultant will develop the forecast network. This work will include:

- Subsequent to completion of the base year demographic inventory, the consultant will develop forecast year networks for the year(s) (*list here all forecast years*). A CD will be provided containing the latest available StratMAP streets geography for *[insert county name]*, the pending forecast network geography and a New Link dbase file. Additionally, a set of draft forecast year network maps/plots which represent the final base year network will be provided for markup.
- The consultant will include in the forecast year network(s) the modifications to the network geography consistent with the planned improvements found in the current, financially constrained long-range Metropolitan Transportation Plan (MTP). Interim year forecast networks (if any) should reflect only the planned improvements reasonably expected to be completed by each specific forecast year.
- The pending forecast network plots will be used to identify all changes (MTP planned improvements/revisions to existing network and addition of new network). These changes will be noted on the network maps using the TxDOT standard facility type and color definitions (see Table 1) and the following editing conventions:
 - The correct facility type number code will be noted above the mid-point line of the facility and the correct number of lanes below the mid-point of the line.
 - One-way facilities will be marked with an arrow and the beginning and ending points of the one-way facility noted on the maps.
 - Roadway links that are to be removed will have an X placed through the line and the word “Remove” added above the link.
 - For links that need to be realigned, place an X through the link, add the word “Move” above the link and draw the link in the proper place.
 - New links will be drawn using the TxDOT facility type and color definitions.
- If network plots are not provided, edits involving physical changes to the network geography (i.e., new links, alignments, removals) will be made using the following conventions:
 - All new links will be annotated with the current year in the EDITS_YEAR attribute field (i.e., if the network represents a 2040 forecast year, the new network link will be annotated with a 2040 in the EDITS_YEAR field as a means to identify new links).
 - For non-attainment areas, the project number will be annotated to the ANNOTATION year.
 - A project list file containing a list of the financially constrained long-range projects will be provided for cross-reference purposes.
 - The appropriate attributes will be annotated using the appended fields in the network dataview as noted in the next major bullet (e.g., OK/EDIT,

FTYPE_EDIT, LANES_EDIT, etc.). These fields are listed last in the pending network geography. Do not populate the traditional fields that have existing data. The missing values will be one more indicator that the link represents a physical edit.

- Removals will be provided in a list file (e.g. excel) that include the link ID, A-Node, B-Node, facility type, number of lanes, and roadway name.
- “Stub” links or include facilities will not be accepted.
- Network removals will not create “stub” links.
- Additional centroid connectors, unless absolutely necessary to locate potential new zones, will be the responsibility of TPP.
- The COMMENT field should be utilized as much as possible to describe the suggested change.
- Non-freeway level facilities should not be detail coded (e.g. directional links) unless there are supporting directional counts (e.g. divided principal arterials should not have directional links).
- Auxiliary acceleration and deceleration lanes should not be coded as through-lanes.
- Regionally insignificant roads, such as residential loop roads, should not be included in the network inventory. This will eventually lead to an incompatibility between the network and the traffic analysis zone geography.
- As noted earlier, please annotate the posted speed that best represents the length of the link between the a-node and b-node. This is especially true if there are a number of speed link transitions that are occurring over the length of the link. Please select the speed limit most encountered by drivers of that facility.
- Roads that are realigned should be accompanied with a corresponding comment in the COMMENTS field (e.g., link realigned).
- The pending forecast network and pending zone geographies need to be as compatible as possible. The primary means of defining zone boundaries is the network. The pending network must be reviewed and accepted prior to initiating edits to the pending zone geography.
- For external station links, any detail coding should merge to a single non-directional link. The A-Node of this links should be the external station number.

A CD will be provided containing pending network geography (i.e., the previous base year network renamed to pending_year), pending zone geography, and the latest available StratMAP streets geography for *[insert county name]*.

Two marked sets of plots are required for each forecast year.

- Changes to existing link attributes (facility type, number of lanes, speed, and direction) will be made in the TransCAD highway/streets dataview layer as provided. The highway/streets dataview includes the following fields:

OK/EDIT
FTYPE_EDIT

LANES_EDIT
POSTED_SPEED_EDIT
DIRECTION_EDIT
MPO_EDIT_DESCRIPTION

For each link the following editing conventions will be followed:

- For each non-centroid connector link that is correct, type in OK in the OK/EDIT field. For each non-centroid connector link that requires changes, type in EDIT in the OK/EDIT column. Each non-centroid connector link will have either an “OK” or “EDIT” in this field. Networks that are not completely populated with either an OK or EDIT for non-centroid connector links will be returned for further review.
-
- Type in the correct attribute(s) in the appropriate field. (See Figure 2).

A separate highway/street dataview edit file is required for each forecast year. Additionally, each subsequent forecast year should build on the previous forecast year.

- For edits that will occur on the network mark-up plots provided by TxDOT-TPP, information for each new link noted on the forecast year network maps the following information will be input into the New Link dbase file that will be provided: (See Figure 3)
 - Street name –Name of the street the link is part of
 - From street and To street- the beginning and end point of the facility
 - Facility type (FTYPE) – The correct facility type (See Figure 1)
 - Total number of lanes
 - Posted speed
 - Directionality – (0= two-way, 1= one-way , or -1 for a one-way link where the topology is different than the direction of flow)
 - Map sheet number – Map sheet number on which the new facility is drawn

A separate New Link dbase file will be required for each forecast year.

- The MPO and TxDOT Transportation Planning and Programming will have 1 month to review edited maps, edited highway/street TransCAD dataview, and the New Link file.
- Subsequent to the MPO and TxDOT review and comments, the consultant will make any required changes to the maps (or network geography), edits to the highway/street TransCAD dataview file, and the New Link file.

Deliverables:

Two sets of forecast network maps with changes and edits marked as required. One set of plots for each forecast year. Or, a pending network geography honoring the requested guidelines and formats.

One edited TransCAD highway/streets dataview for each forecast year.

One completed New Link dbase file for each forecast year.

One complete list of removed links.

