

Socioeconomic Projections 2016

Data, Methods, Models, and Assumptions Update

MAG Population Technical Advisory Committee, January 26, 2016

3 major areas to address

- Documentation in attachment #1:
 1. AZ-SMART Base Year Database (2014)
 2. AZ-SMART Models and Urban Simulation System
 3. AZ-SMART Model Assumptions and Additional Methods
- Also, by the end of July 2015 documentation will be expanded to include more information and published to the web:
 - Any additional clarifications needed
 - Information about public involvement: member agency review process and committee actions
 - Technical appendix with model diagnostics: functional form, independent variable definitions, statistical significance

Data, Methods, Models, and Assumptions Update

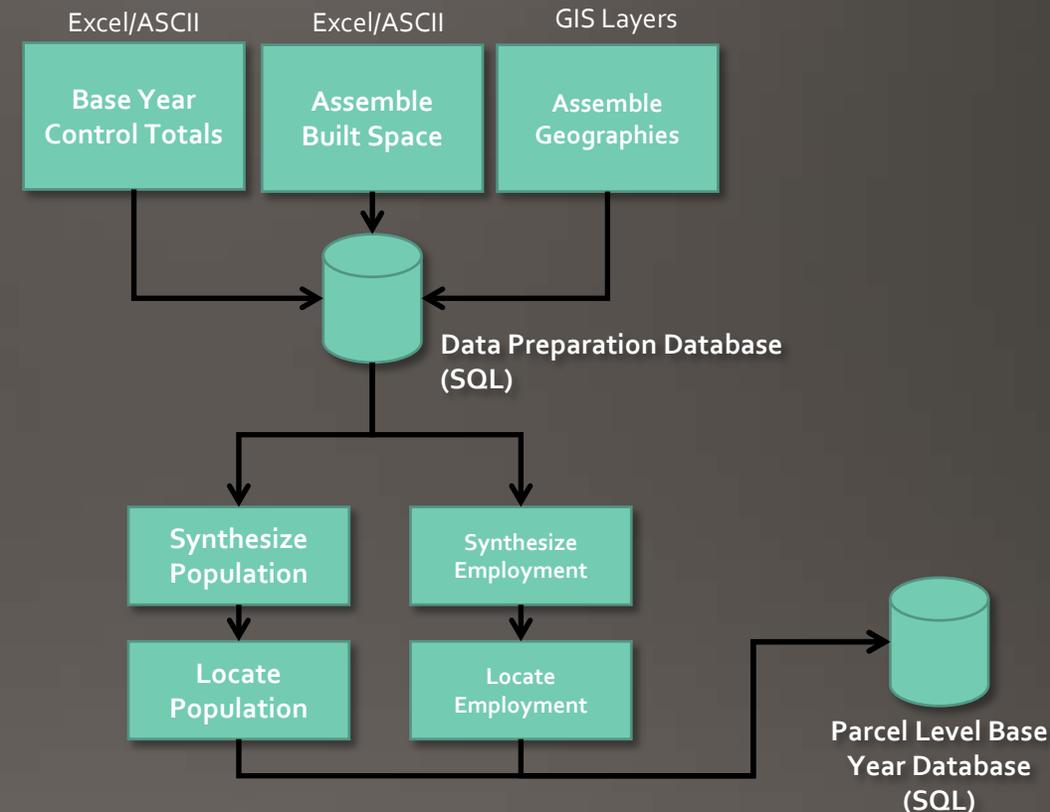
- AZ-SMART: Arizona's Socioeconomic Modeling and Reporting Toolbox
- AZ-SMART was last used to produce the 2013 Socioeconomic Projections
 - UrbanSim source code was completely overhauled in late 2014 to be more compact, efficient, and transparent
 - MAG Staff have had extensive involvement in customizing the codebase and configuration to suit the needs of our region
 - Theoretical bases and core functionality of UrbanSim and AZ-SMART remain the same

1. AZ-SMART Base Data

#	Method/Dataset/Assumption	Information and Discussion or Approval
1A	Census Data Sources	Information and Discussion
1B	MAG Employment Database	Information and Discussion
1C	MAG Residential Completions Database	Information and Discussion
1D	MAG Existing Land Use Database	Information and Discussion
1E	MAG Future Land Use Database	Information and Discussion
1F	MAG Development Projects Database	Information and Discussion
1G	MAG Sub-Regional Geographies	Information and Discussion
1H	Base Population and Housing Variables	Information and Discussion
1I	Base Employment and Land Use and Industrial Sectors	Information and Discussion
1J	Other Data Collection Efforts	Information and Discussion

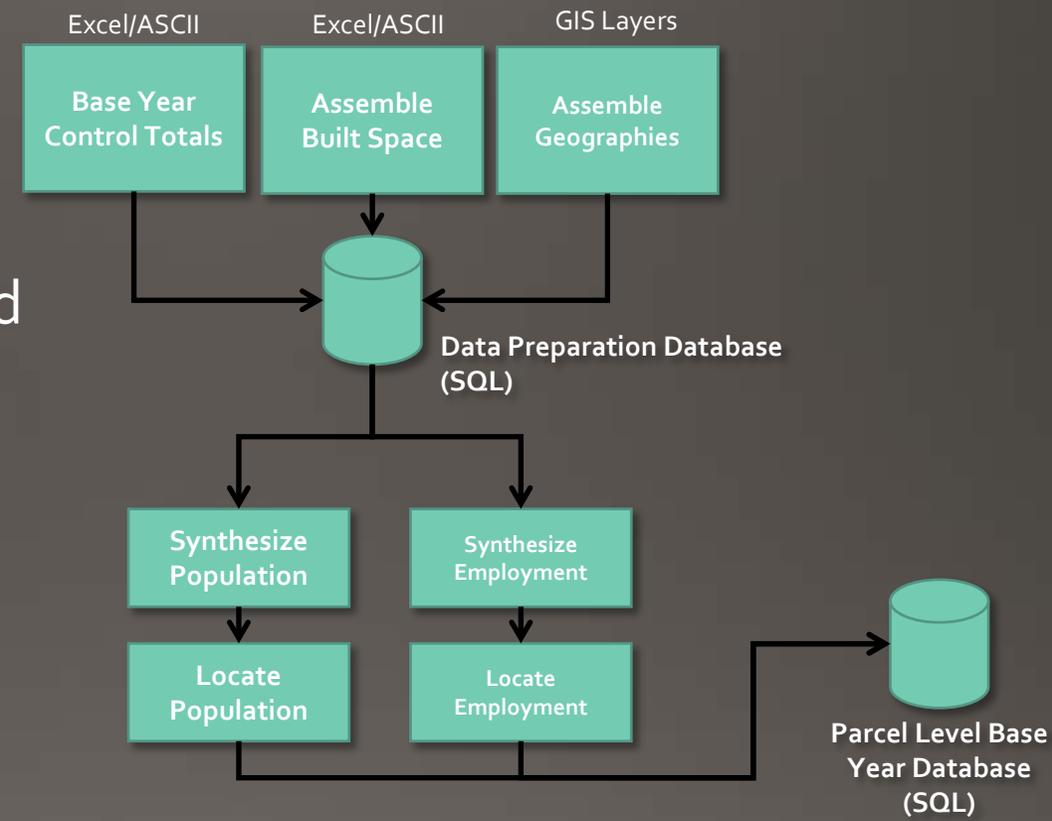
Base Data, Assumptions, and Factors

- Database of observed data representing the region
- Database serves as the basis for forecasting, build-out
- Base year is 2014
 - Note: 2015 will be a forecast year due to data availability, will be controlled to 2015 population estimate. All available 2015 data will be used.
- Population control totals
 - 2014 population estimates by jurisdiction
- Employment control totals
 - 2014 totals based on 2014 Q1 and Q2 QCEW
 - New 2014 totals will be used for projections based on full 2014 QCEW data



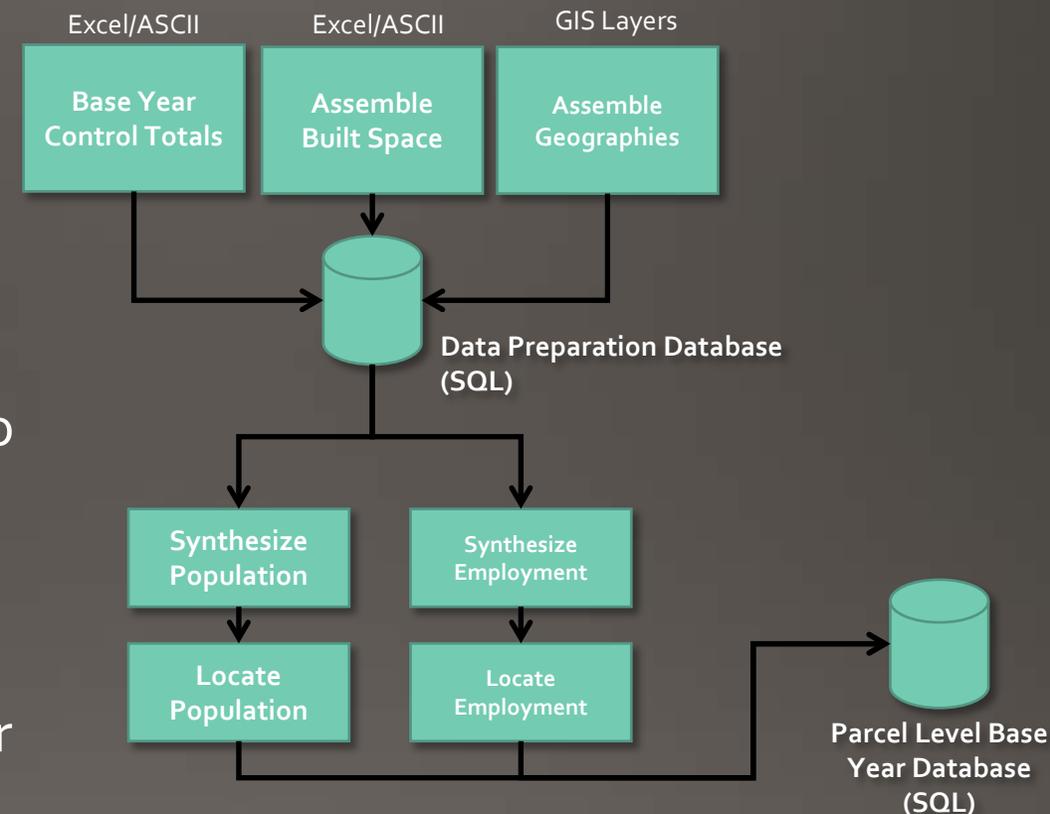
Base Data, Assumptions, and Factors (cont'd.)

- Land: Assessor parcels, filled in w/land use dataset
- Built space: Assessor improvements, city and other public data
 - Building types: 22 types of built space, aggregated from Assessor "model types" in improvements data
 - Residential Completions current to 2014Q2
- Building Occupants:
 - Households
 - Employment
 - Building SQFT / Job, by building type
 - Employment by industrial sectors: NAICS 2 Digit
 - Work at home employment



Base Database Methodologies

- Household and population synthesis:
 - Based on latest Census ACS 5 year sample and ACS PUMS (2009-2013) released in Dec. 2014
 - Synthesized to “pseudo-block groups,” controlled population to 2014 Population Estimates from ADOA
 - Located households to dwelling units
- Employment synthesis:
 - 2014 MAG employer database, parcel level
 - Allocated employees to building records proportional to the built space
 - Scaled employment up to match 2014 county control total (by NAICS)
- Special populations:
 - Seasonal households, allocated to vacant units “held for seasonal use” by Census
 - Non-site based (NSB) employment, allocated to buildings proportionally by NSB type and building occupants
 - Construction employment, allocated to developing land use codes



Base and Buildout Review

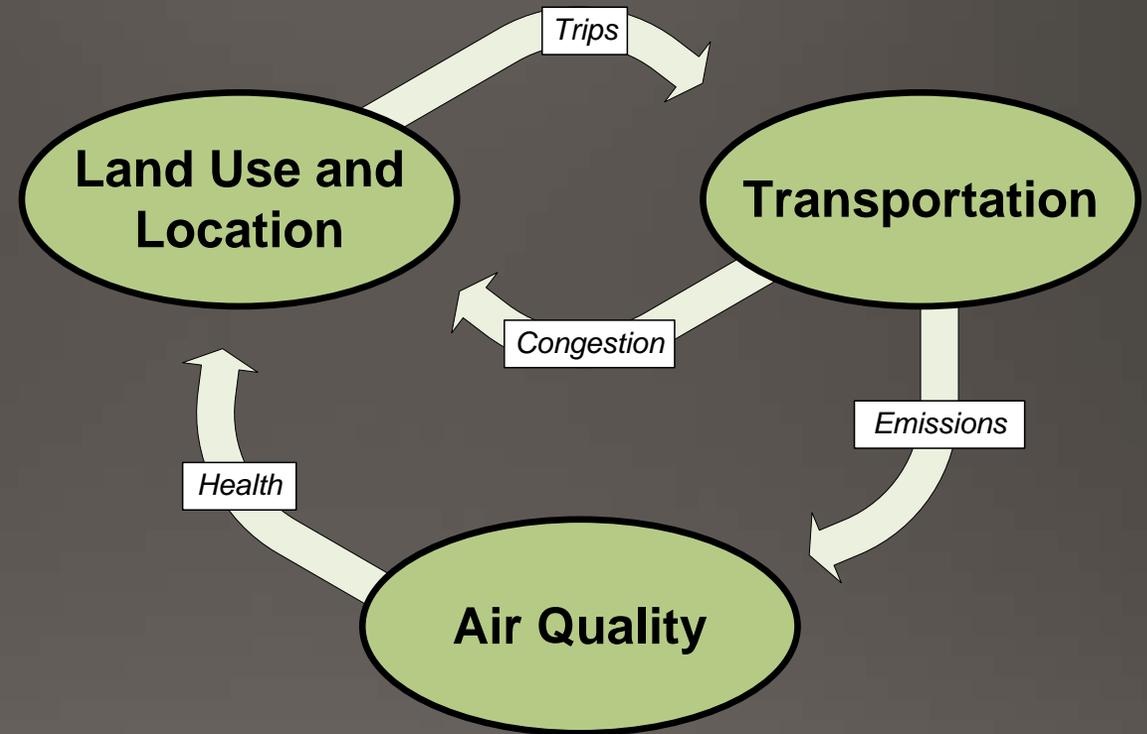
- 20 individual meetings with Member Agency staff held at MAG offices
 - Beginning September through November 2015
- Reviewed
 - Base year database
 - Build-out for population and employment
 - Developments and recent development trends (draft o)

2. AZ-SMART Models and Urban Simulation System

#	Method/Dataset/Assumption	Information and Discussion or Approval
2A	Overall Model Process and Objectives	Information and Discussion
2B	AZ-SMART and UrbanSim	Information and Discussion
2C	Overall Methodology for Preparing County and Sub-County Projections	Approval
2D	County-Level Projections Models	Information and Discussion
2E	Parcel-Level Simulation Models	Approval
2F	Metropolitan Area Tabulation and Review	Information and Discussion
2G	Transportation Demand Model Feedback	Approval

2A. Overall Model Process and Objectives

- Establish links between models
- Leverage current software and methods
- Create a process to integrate local knowledge

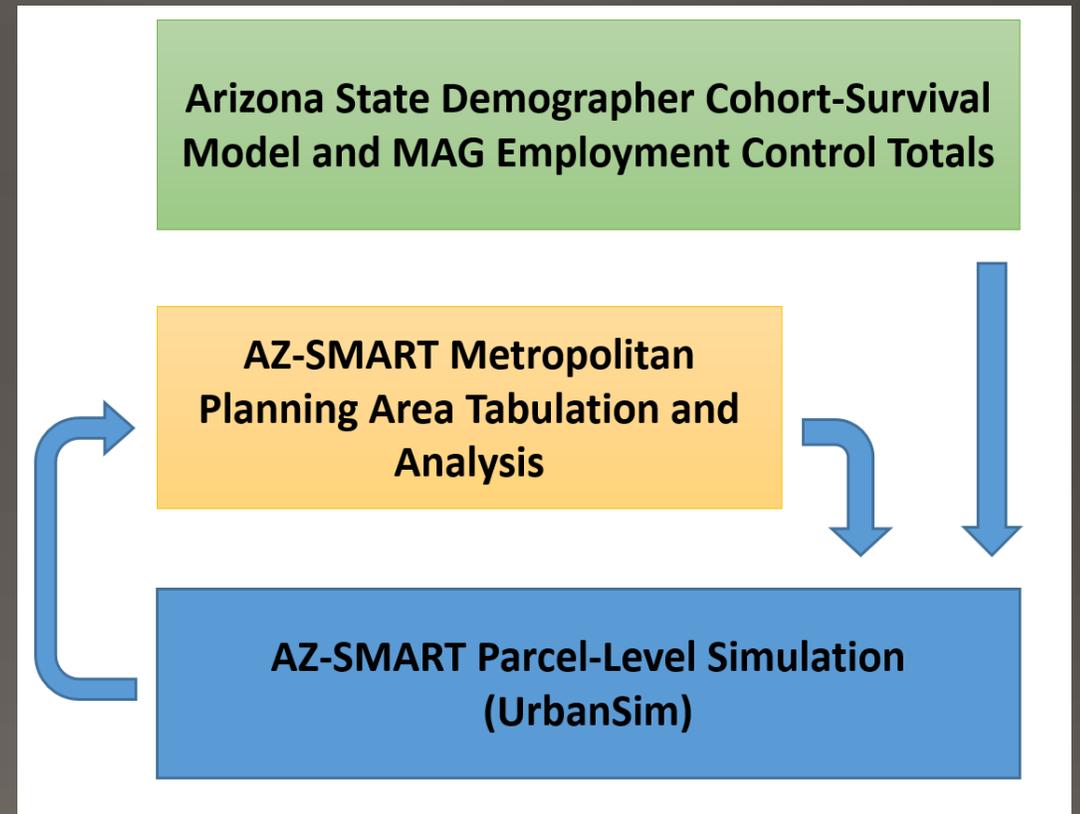


2B. AZ-SMART and UrbanSim

- Arizona's Socioeconomic Modeling and Reporting Toolbox
- A platform to build, calibrate, run, and analyze projections
- Consists of many varied software tools for collecting, inspecting, correcting, and merging data
- Integrates 3rd party modeling tools: UrbanSim
- UrbanSim: widely used Urban Simulation suite
 - Originally developed in the late 1990s at the University of Washington
 - Now at University of California Berkeley

2C. Overall Methodology for Preparing County and Sub-County Projections

- 3 step model system:
 1. County level models simulate overall economic and demographic conditions
 2. Allocates development and occupants down to the parcel level of detail while respecting plans and developments
 3. Aggregate up to any geography that parcels reasonably aggregate to

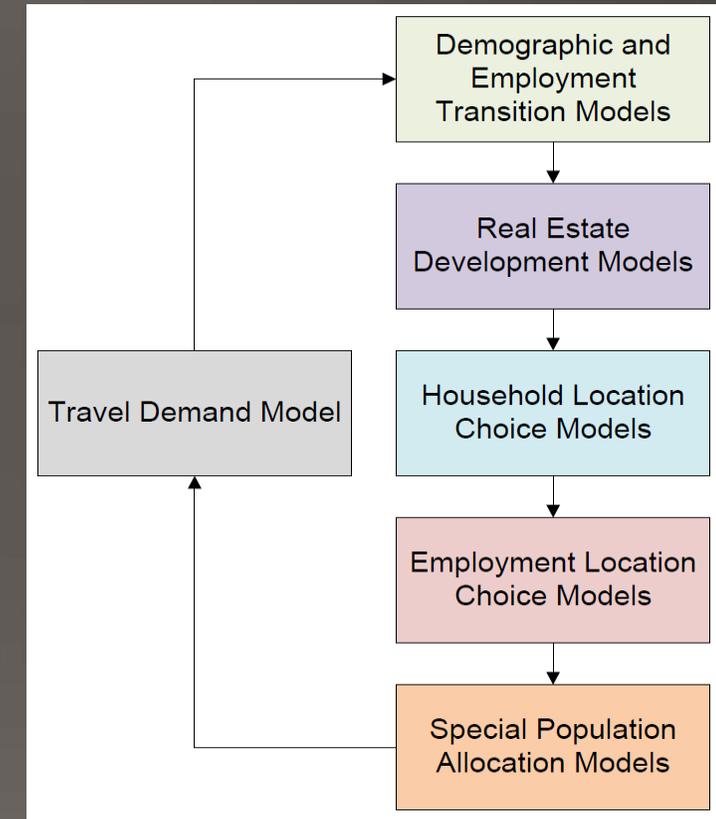


2D. County-Level Projections Models

- Population
 - AZ Executive Order 2011-04
 - AZ State Demographer developed and maintains a cohort-survival model for every county
 - Developed with the input of the Council for Technical Solutions
 - Produces population by sex, single year of age, 6 race/ethnic categories, plus net domestic and international migration, special population out to 2050
- Employment
 - MAG Regional Economist developed projections of employment at the county level using the MAG EmpDB as a base, and the State's population projections
 - Employment by 2 digit NAICS industrial categories is projected annually to 2050
 - Growth rates were developed by analyzing a combination of purchased projections (Moody's Economy.com, Woods and Poole, and U. of Arizona) and professional judgement

2E. Parcel-Level Projections Models

- Parcel level model allocates development, employment, and population down to the parcel level of detail using a custom version of UrbanSim
- Microsimulation of jobs, households, and persons as decision making agents
- Real estate development model custom built in house by MAG staff to take advantage of MAG datasets and Member Agency expertise
- Location Choice models make heavy use of accessibility based variables
- Provides a system of feedback to and from the travel demand model to link land use with transportation



2F. Metropolitan Area Tabulation and Review

- AZ-SMART modules allow MAG staff to aggregate parcel results up to larger geographies that are easier to map, analyze, and review
- Commonly TAZ and MPA are geographies used for analysis, but most any geography can be used on a case by case basis
- Member Agency review happens at a TAZ level and provides a way to compare model results to local conditions
- Model can take Member Agency input and feed it back into the model to refine output

2G. Travel Demand Model Feedback

- Socioeconomic results are fed to the travel demand model which produces “skims” of travel time by mode and time of day
- Skims are fed back into AZ-SMART so travel times can affect location decisions of firms and households and real estate prices
- Accessibility based independent variables on location choice models and real estate price models, for example:
 - “# of jobs within 20 minutes travel time during AM peak” may influence household location decisions in the simulation
- Accessibility variables update dynamically with every model loop out to the travel demand model and back

3. AZ-SMART Model Assumptions and Methods

#	Method/Dataset/Assumption	Information and Discussion or Approval
3A	MAG Socioeconomic Projections Geographies	Information and Discussion
3B	Population and Employment Projections Control Totals Methods	Approval
3C	Methods and Factors for Developing Housing, Households, and Population Projections	Information and Discussion
3D	Methods and Factors for Developing Non-Residential Built Space and Employment Projections	Information and Discussion
3E	Special Population Projections	Information and Discussion
3F	AZ-SMART Classifications and Typologies	Information and Discussion

3A. MAG Socioeconomic Projection Geographies

- Projections are reviewed with Member Agencies at the MPA and TAZ level
- Variables to be reviewed: DUs, population, employment by type
- Projections are adopted at Management Committee and Regional Council at the RAZ level (aggregations of TAZs)
- Variables adopted DUs, population, and total employment

3B. Population and Employment Projections Control Totals Methods

- Population
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3C & D. Methods and Factors for Developing Projections of Housing & Non-Residential built space

- Density and type are controlled via the Future Land Use database, which is a combination of existing land use, general plans, and known developments
- Known developments take priority over general plan densities
- If development document states density (FAR) or # of units, that will be used directly, otherwise density is inferred from the land use code of the development or general plan polygon
- Some parcel density is reduced to account for gross-net issues (e.g. parks, roads, parking within a development)
- Vacancy rates are tracked in the simulation to trigger demand for new development
- Persons Per Household is simply calculated from the micro households and persons data, but PPH assumptions need to be used for build-out calculations

3E. Special Populations Projections

- Special populations include:
 - Group Quarters: military, prison, dorms, nursing homes, and other
 - Seasonal population: population present in the area for more than 2 weeks but less than 6 months per year
 - Transient Population: population present in the area for less than 2 weeks per year (primarily tourism and business travel)
 - School enrollment
 - Airport enplanements
- Special population categories are allocated to parcels via weighted allocation or “pro-rating” methods

3F. AZ-SMART Classifications and Typologies

- A variety of typologies are used in AZ-SMART to project different types of employment or population in sector or cohort specific ways
 - e.g. We expect the factors (independent variables) that affect the location decisions of industrial firms to be different than those of retail or office based firms
 - Employment sectors are based on 2 digit NAICS codes
- Different types of built space are projected and tracked separately
 - Building types include: SFR, MFR, Retail, Office, Medical, Hotel, Education, etc.

Requested POPTAC Action

Approval of items overall methodology for preparing county and sub-county projections, parcel-level simulation models, transportation demand model feedback, and population and employment projections control totals methods as documented in Attachment One.

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2C	Overall Methodology for Preparing County and Sub-County Projections	Approval
2E	Parcel-Level Simulation Models	Approval
2G	Transportation Demand Model Feedback	Approval
3B	Population and Employment Projections Control Totals Methods	Approval

Questions?

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