**DTI 2040 Population and Employment Forecast**

**Introduction, Methodology, and Discussion**

**Introduction**

The City of Austin’s “**DTI 2040 Population and Employment Forecast**” is a long-range, small-polygon-based population and employment forecast produced by the City Demographer in conjunction with other City departments, most notably Austin Water. The close collaboration between the City’s Planning Department and the City’s Water Utility spans many decades and is responsible for the production of several accurate population and employment forecasts over the years.

DTI is an acronym, standing for **D**elphi, **T**rends and **I**magine Austin, and 2040 refers to the final year of the forecast, also known as the forecast horizon. The specific influences exerted on the overall forecast by the components of Delphi, Trends, and Imagine Austin are discussed in detail in the methodology sections of this document. DTI 2040 is the first long-range, small-polygon-based forecast to be collectively and collaboratively created by City departments for Austin following the release of Census 2010 data. The fundamental purpose of the forecast is to predict the future total population and employment within each polygon in the study area, for the year 2020 and the horizon year 2040.

**Population Forecast Methodology**

**STEP ONE: Establish the Baseline**

To establish a 2010 population baseline, Census 2010 block-level population data were aggregated into 227 proprietary polygons within the DTI 2040 study area ([please see map](http://austintexas.gov/sites/default/files/files/Planning/Demographics/MSA_2013.pdf)) which is basically the City of Austin’s Full and Limited Purpose jurisdictions plus the City’s Extra-Territorial jurisdiction. In most cases, census blocks fit neatly within the study area’s polygons, thereby creating a solid baseline.

**STEP TWO: Determine future population totals for the study area as a whole**

A population control total for the DTI 2040 study area for 2020 and 2040 was generated from the long-range population projection for the City of Austin, using an assumed ratio relationship between the study area and the City as a whole. The ratio relationship between the study area and the City has proven to be extremely stable over time. It is considered a viable method of determining what the total population within the study area will be in the future, assuming that the City’s forecasted future total populations are closely aligned to the actual trajectory of growth that is realized over the forecast period.

**STEP THREE: Disaggregating the 2040 population control total into polygons**

Each polygon within the study area was assigned a portion of the projected increment of overall population growth for the entire study area. Estimating each polygon’s portion of overall population growth was accomplished by initially assigning a “growth factor” to each polygon. Growth factors determine each polygon’s potential population growth from 2010 to 2040. Essentially, the growth factor for each polygon is the result of accuracy calibrations originating from the City’s Smart Growth forecast, a previously produced regional forecast. The calibrated growth factors were used only as initial starting points from which corrections and modifications were made.

**STEP FOUR:** **Adjustments from the “Delphi Team”**

The preliminary future populations for 2040 for each polygon—determined by applying the growth factor for each polygon-- within the study area were reviewed by the “Delphi Team.” This refers to the “Delphi Method,” which is an interactive forecasting method that relies on a panel of experts. [[1]](#footnote-1),[[2]](#footnote-2) Each person on the Delphi Team requires a deep knowledge of the study area, knowledge of emerging developments, and the potential for future development within the study area.

The Delphi Team included demographers, engineers, geographers, and planners and represented decades of experience within the greater Austin area.

**STEP FIVE:** **Input data influencing Delphi Team decisions**

* Emerging residential and mixed-use developments;
* Position of the polygon within the overall study area, a factor which takes into account roadway accessibility and proximity to other developments;
* Momentum of population growth within the polygon from 2000 to 2010;
* Approved and applied for Water Utility Service Extension Agreements;
* Adjacency to Imagine Austin Activity Centers and Corridors, assessing the viability of growth ranges assigned to these centers and corridors;
* Construction activity and delivered product from 2010 to 2013; and
* Aerial photography and numerous Geographic Information Systems (GIS) land use and environmental constraint layers to determine future potential for development and redevelopment.

It is important not to underestimate the level of analysis and methodological rigor applied to each individual DTI 2040 polygon in terms of the intensity of examination delivered from the Delphi Team. This collaborative, comprehensive and in-depth analysis of each individual polygon on the part of the Delphi Team is what makes the Delphi Method so valuable, basically bringing the complexities and nuances of population and employment forecasting out from within an opaque black box and into the transparent open. Experts debating, persuading and compromising with an end result being superior to a result generated by the blind heavy-hand of an algorithm.

**STEP SIX:** **Create “market timers” for each polygon to determine year 2020 population totals**

A default value of 33% was set as a market timer for each polygon, meaning that each polygon will gain roughly 1/3 of the total population increment expected between 2010 and 2040 by 2020. The Delphi Team then reviewed each individual polygon’s 2020 predicted total population and made adjustments based on the overall consensus of the team.

**Employment Forecast Methodology**

**STEP ONE: Establish the Baseline**

To establish a 2010 employment baseline, address-specific total employment data were aggregated into the DTI 2040 study area’s 227 polygons. The 2010 base employment data were provided by CAMPO (metropolitan Austin’s Municipal Planning Organization). Analysts at CAMPO spent an enormous amount of time and energy scrubbing and perfecting the employment data, working through issues such as all school district employees being assigned to the district central office rather being correctly assigned and distributed to the hundreds of various work sites and schools across the district. Without the valuable efforts from CAMPO staff, the City’s DTI 2040 could not have been produced.

**STEP TWO:** **Generate an employment control total for the study area**

A control total for the number of future jobs expected within the study area was generated by projecting into the future the current ratio between total population and the total number of jobs. This type of projection is standard and in this case assumes an increasing jobs-to-population ratio as the overall commuting shed of metropolitan Austin is assumed to continue to spatially expand. Put another way, in relative terms, the total number of jobs within the study area will begin to slowly approach the total population residing within the study area. In one extreme but illustrative example, the number of jobs within Manhattan greatly outnumbers the number of people living on the island.

**STEP THREE:** **Create study area districts**

To facilitate the disaggregation of the employment control total, polygon districts were created by grouping collections of contiguous study area polygons together yielding 20 larger districts, each containing 9 to 13 individual study area polygons.

**STEP FOUR:** **Generate an initial employment growth increment for each district**

Each district’s share of the total number of study area jobs from the 2010 baseline was used to assume a future potential portion of total study area jobs for each district. For example, using the 2010 data, the study area district covering most of greater downtown Austin has the largest share of total jobs and was assumed to also have the largest share of total study area jobs in 2040. Some districts will experience large gains in overall share (districts in places like North Burnet-Gateway), and some districts will lose overall share (districts that currently include employment centers such as the IRS facility in southeast Austin). The resultant total number of jobs predicted by 2040 for each district was reviewed and adjusted by the Delphi Team.

**STEP FIVE:** **Disaggregate district totals into individual polygons**

The Delphi Team examined each district and disaggregated district employment totals into each individual polygon within that district using the current share and future share (relative to the district total) technique for each individual DTI 2040 polygon.

The Delphi Team used the same set of input data employed during the allocation process of population.

* Emerging commercial and mixed-use developments;
* Position of the polygon within the overall study area, a factor which takes into account roadway accessibility and proximity to other developments;
* Momentum of employment growth within the polygon from 2000 to 2010;
* Approved and applied for Water Utility Service Extension Agreements;
* Adjacency to Imagine Austin Activity Centers and Corridors, assessing the viability of growth ranges assigned to these centers and corridors;
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**Discussion**

All population and employment forecasts occupy a position along a continuum of modeling philosophy, with one end of the continuum representing purely policy-driven forecasts and the other end of the continuum representing purely market trends-driven forecasts. Austin’s DTI 2040 forecast is positioned towards the end where purely market trends-driven forecasts reside. The DTI 2040 forecast is therefore more of a market trends forecast than a policy forecast. Elements of a policy forecast include potential population and employment growth expected to occur within Imagine Austin activity centers and along mixed-use corridors. These growth expectations were adjusted using knowledge of the trends within current development patterns and practices.

The DTI 2040 forecast incorporates an envisioned urban-centric future of growth and development for Austin and yet also accounts for widely distributed, low-density suburban development that will surely continue to occur. The DTI 2040 forecast explicitly assumes a significant amount of redevelopment within the central urban area along with continued greenfield development where possible across the study area. The DTI 2040 forecast also takes into account that Austin’s future employment pattern will be one of increased “multi-nucleation,” meaning that while downtown will continue to be the region’s largest employment center, other significant clusters of employment will emerge regionally.

Worthy of mention is the fact that there are parallel yet inferior parcel-level forecast products currently available for the Austin area. Long-range forecasts based on parcel-level modelling notoriously suffer from what is known as aggregation bias.[[3]](#footnote-3) Aggregation bias can create a forecasting situation in which the predicted land uses of individual parcels cumulatively result in a grossly over-estimated study area total. Whereas the DTI 2040 forecast utilizes a far more reliable technique of beginning with a total increment of growth for the study area, both population and employment, and then distributing these increments into all constituent study area polygons based on attributes that estimate an individual polygon’s attractiveness to future growth.

And finally, the Delphi Team studied a wide variety of thematic, analytic maps generated using the newly created forecast data to show overall trends and the relationships between population growth and employment growth across the study area. Qualitative, visual assessments of mapped forecast results were a critical tool in determining the overall viability of the forecast.

1. Woudenberg, Fred, “An Evaluation of Delphi,” *Technological Forecasting and Social Change*, Sept. 1991. [↑](#footnote-ref-1)
2. Gordon, Theodore J., “The Delphi Method,” *The Millennium Project, Future Research Methodology—V3.0*, 1999. [↑](#footnote-ref-2)
3. Aggregation Bias in Small Area polygon-based Forecasting. Dr. Ronald Mitchelson, Professor of Geography, University of Georgia, paper presented to the Association of American Geographers Annual Conference, 1986. [↑](#footnote-ref-3)