1999
Employment Density Study
and
ZELDA
(**Z**onal **E**mployment **L**and **D**emand **A**nalysis model)
Frequently Asked Questions

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ZELDA and the Employment Density Study

ZONAL EMPLOYMENT LAND DEMAND ANALYSIS MODEL (ZELDA)

What is ZELDA?

ZELDA is an acronym for **Z**onal **E**mployment **L**and **D**emand **A**nalysis model. ZELDA is a new model for estimating the demand for land for future employment related purposes. The ZELDA approach is a refinement of the methodology used in calculating the land need in the Urban Growth Report. ZELDA calculates *how much land* and *where land* is needed to accommodate the amount of employment growth projected in the future. ZELDA distinguishes the "jobs land" need by industrial, retail, office and other commercial categories.

What's the impact of the ZELDA approach versus the "one job capacity" method?

There aren't any "need numbers" presented in this first half of the Employment Density Study. Final numbers will be presented to the Council in the UGR due in June 1999.

Background.
Before, the land supply data was converted into an estimate of job capacity which was then compared against total employment demand to determine if a surplus (or deficit) exists.

The ZELDA approach avoids the confusing steps of converting land supply into job capacity. Instead, ZELDA uses disaggregate information to produce a finer estimate of land demand by industry/land use type and location. In turn this estimate of land need is compared against a tabulation of buildable vacant land computed straight from the RLIS database. The result becomes a matter of balancing the projected land DEMAND and the tabulated land SUPPLY to determine if surpluses (or deficits) exist in any category of use and/or by location.

What's the purpose of ZELDA?

ZELDA is intended to give policy makers a computational framework for analyzing where future land demand for employment related uses could occur and what type of land

by land use categories could be in demand. The current baseline inputs to ZELDA are based on observed findings of FARs and building densities.

ZELDA allows policy makers an opportunity to analyze the impact of various scenario alternatives. These alternatives include the following land demand forecast parameters:
1. Floor-to-Area Ratios by county subareas
2. Building Densities by Industry Sector
3. Vacancy Rate Assumptions
4. Percent workforce in each sector by type of land use

If policy officials choose, they can "over-ride" the current assumptions which are based on current findings with their own assumptions. Assumptions could then be based on aspirational target densities, regulatory maximums (i.e., a build-out scenario adapted from zoning regulations), or recently observed density trends (e.g., based on industry/market practices, anecdotal information, etc.). ZELDA provides a rational modeling framework to incorporate explicit assumptions about future density expectations.

What are FARs and why are they of any interest to urban land need?

FAR is short for **F**loor-to-**A**rea **R**atio. It is important to our understanding of future nonresidential land need because it is a standard statistic for measuring density. It is a common term used by planning officials, builders, commercial brokers and developers to measure the efficiency at which land is being used. The higher the FAR value, the more efficient land is being used in comparison with the total building plate area of a structure (or building footprint for a one-story building). (For example, an FAR = 0.5 implies that half the parcel is being used for the building itself.)

FARs are predominantly impacted by the size of the building footprint, landscaping setbacks, physical and environmental constraints, and parking ratios. In other words, FARs represent a summary statistic that encompasses the range of zoning regulations required by local communities.

FARs tend to vary around the Metro region by the type of use that is intended or zoned for a particular location or subarea of the region. They tend to reflect a certain character or type of business desired by the local community. Therefore, by small areas, FARs tend to be the same. ZELDA divides the Metro region into 20 smaller subareas.

What does building density measure?

Building density is our term for measuring the amount of area each employee is given to perform his/her duties. Building density as we have calculated it is the *gross* square-footage of a building divided by the number of total employees (for all full- and part-time workers). Building densities are computed for each 20 subareas by industry sector. The

industry sectors are basically two-digit SICs (Standard Industrial Classification) in manufacturing and one-digit in nonmanufacturing.

What does building density and FARs tell us about land need?

Equation 1: **Floor-to-Area Ratio**

FAR = (Square footage of Building) / (Parcel Area)

Equation 2: **Building Density** (Square-foot per employee)

Building Density = (Square footage of Building) / (No. of Employees)

Equation 3: **Land Demand**

Land Demand = (Employment Growth) * (SF/Employee) * (1/FAR)

EQ. 3 is the formula to calculate the nonresidential land demand. Land demand is computed by 20 subarea and by industry sectors. Whereas before, the ZELDA paradigm provides more detailed land demand information by location and by land use type.

What about parcel size?

ZELDA in its current configuration is unable to forecast the demand for land by parcel size.

Instead, the debate so far with regard to parcel size has focused on the inventory or supply-side of the UGB land debate. Using GIS and the RLIS database, we can provide a preliminary accounting of the available supply of vacant buildable land inside today's UGB arrayed by individual parcel sizes or as ranges of parcel sizes.

The Metro land supply estimate is based on an assumption of long-range availability. Sometimes, this definition contradicts with definitions of supply used by developers and industrial/retail/office/commercial brokers because their time horizon to churn over the inventory for development purposes is within the 6 months to 1 year outlook. Land not available within a year may be available and counted in supply in a 20 year land supply analysis. Differences in the quality or attributes of the land supply exist which may impair its so-called short term or current availability, such as: "land banking", ownership vs. leasing arrangements, use limitations (e.g., marine related businesses only for Port owned land), farm tax deferral, environmental constraints, and economic constraints.

The Vacant Land Study combined with the RLIS database can provide a tabulation of vacant buildable parcels by size, location and zoning (or land use type).

How does mixed-use development get calculated by ZELDA?

Mixed-use development is a supply-side response to non-residential land demand. Mixed use represents a regulatory allowance to build office, retail or other commercial space in otherwise predominantly residentially zoned locations. Businesses do not per se demand mixed use development sites; what firms demand is space or real estate to produce the goods (or services) demanded by its customers. Firms go out in search of industrial, retail or office locations to conduct their business. In so far as a mixed use satisfies a firms locational requirements, mixed use development becomes a viable choice.

Mixed use is not something that firms demand, but if it satisfies the overall business needs of the going concern, then mixed use can be as successful or more successful than a standalone or segregated one-use development pattern. Therefore, regulators (i.e., policy makers and planning officials) through local zoning rules may allow mixed use as a means to satisfy the underlying demand for land by type which exists in each subarea. Mixed use becomes another choice in the array of land supply types along with industrial, retail, office and other commercial uses.

How does re-development and infill (i.e., re-fill) get calculated with ZELDA?

ZELDA, by itself, only computes the amount of land demand generated by the employment growth in the regional forecast that is to be accommodated by "greenfield" development.

Re-fill is a separate study to be presented to the Metro Council in a forthcoming report. The imputed re-fill rate for jobs (or employment non-residential lands) in the December 1997 UGR was approximately 43%. This rate of redevelopment and infill was added to the supply-side or job capacity figure to accommodate future job demand.

Although not shown in the ZELDA flow-diagram, the re-fill rate is input assumption prior to ZELDA. Employment demand on buildable vacant non-residential land is reduced by the re-fill rate prior to execution of the ZELDA computation of land demand. Refill is the amount of employment absorbed into existing development.

How does the capture rate get calculated with ZELDA?

The capture rate is a policy goal. It is not, per se, a policy lever nor is it a growth factor that the Metro Council can directly influence. Only indirectly through transportation infrastructure spending and in other limited ways through regulatory zoning changes which might affect people's locational choices can the capture rate be made to change over time. In the current configuration of the Urban Growth Report, past Metro Council's have based their policy statement of future demand to be pegged at 70% for dwelling units (households) and 82% for jobs.

The capture rate is an outcome of market factors (such as: housing prices, non-residential land prices, comparative economic growth between subareas of the region, employment demand, location choice factors of firms, household location choice, etc.) and indirectly by regulatory choices. In the ZELDA flow-diagram, the capture rate is imbedded as part of the allocation model. Currently, the capture rate is a determined as an informed policy goal in the UGR computation.

Instead, under future iterations of the UGR, we hope to assist Metro Council with a new non-residential allocation model (no acronym for the yet to be constructed model exists) which incorporates data from MARIO, ZELDA and the RLIS vacant land database, RELM, and employment real estate demand parameters to project future capture rates. In this approach, the capture rate becomes an endogenous variable in the determination of future land demand. The capture rate computation becomes a part of the model process and ties together all the exogenous factors that can influence future capture rates in a rational modeling framework. Hence, in order to influence the capture rate, policy makers will be able to test alternative policy scenarios to determine the impact of policy and capture rates.

What's the purpose of the Employment Density Study?

- ❖ Update and determine current job density parameters,
- ❖ Provide current observed findings of FARs and building densities which could be used to populate ZELDA,
- ❖ Offer a basis or foundation from which policy officials can debate the implications of various policy choices and the expectations of future density pattern assumptions.

The current trend in job densities appear to be increasing. Could this be due to purely economic and business cycle impacts or are 2040 practices having an effect too? What could be the regional ramifications and prospects in regard to future densities and economic expectations?

Who asked for this information?

Metro Council determined that reviewing this information at this time would be appropriate. The Executive Officer and the Business Advisory Committee (BAC) agreed that the region needed more refined data to answer the UGB question of enough or not enough land. The BAC and other industry representatives called for more detailed land need estimates to determine if surplus or deficits exist between selected land use categories.

It was determined that a new paradigm for the way Metro estimates land demand and supply was needed; hence, the creation of ZELDA.

Is the method for tabulating land supply any different under the ZELDA approach?

Yes and No.

No, because the Vacant Land Supply Study is unchanged. Vacant land is still tabulated using the same methods employed in prior Urban Growth Reports.

Yes.
1. The Buildable Lands Inventory assessment based on the Vacant Land Study will most likely incorporate a different set of environmental constraints than in previous UGRs.
2. The estimate of land supply (or capacity) is now no longer converted to a jobs capacity figure. Land supply may now be tabulated according to size, location and land type.

EMPLOYMENT DENSITY STUDY

Tell us more about the Employment Density Study?

The employment density study is the basis for creating ZELDA. The ZELDA model relies on the data extracted from the density research for density assumptions. This study began with the idea of gathering current findings of job densities across the Metro region and evolved into ZELDA.

*In regard to ZELDA, what did the research reveal?*

We determined that strong correlations exist between density parameters and geography. This is why ZELDA was formulated along lines of geographical subareas. Common industry and density patterns emerged when the data were disaggregated by locational factors. We employed these geographical correlations in the ZELDA model. (see figure on next page)

How were the data collected?

Sample data were collected for the Metro region on a case study approach using the 2040 Design Type Categories. We collected data from the following places.

2040 Design Type	Sample Location	2040 Design Type	Sample Location
Regional Center:	Oregon City Washington Square	Corridor:	Barbur Blvd. Kruse Way
Town Center:	Hollywood Raleigh Hills	Main Street:	Division Hawthorne
Employment Area:	Hillsboro Tigard Triangle	Industrial Area:	Clackamas County Rivergate

Geographical Density Relationships

◄───►	Strong Observed Relationship
◄- - -►	Medium Varying Relationship
◄········►	No Observed Relationship
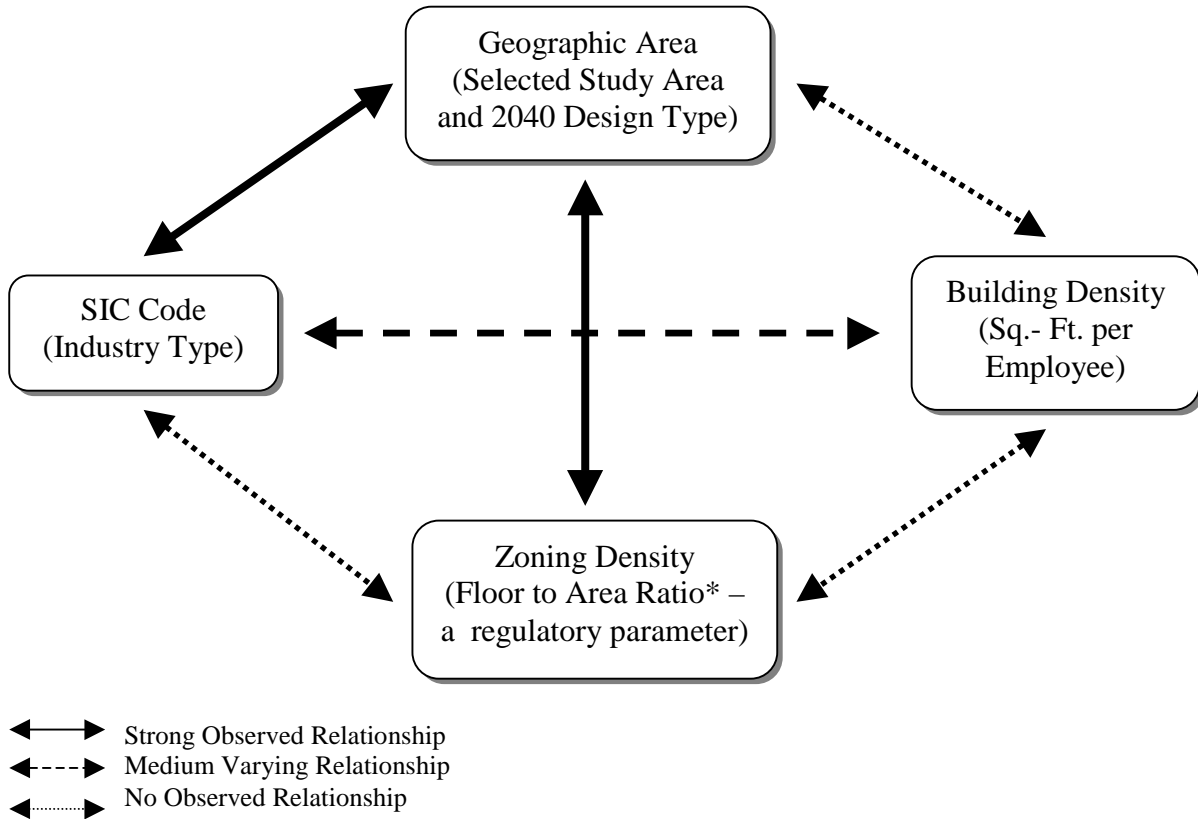
How are the FARs and Building Density parameters calculated for county subareas?

Since the sample was based on a selection of case studies, we are fairly certain that the job density parameters calculated from each sample data set are not likely to be statistically representative of the whole region (i.e., sample universe or frame). We anticipated this going into the study, so in order to make the sample representative of the sample universe, we re-weighted the sample FARs and building densities to correspond to the characteristics of each county subarea. The re-weighting should make the density parameters statistically representative.

What are these county subareas that are being discussed?

A map of the Metro region accompanies this FAQ. The areas are based on a county subarea allocation first developed by Metro's Transportation Department long ago. These county subdivisions are formed along census tract boundaries. Each subarea, for example, approximates city boundaries and represent major sub-markets in the region.

What do the job density parameters in the Study tell us?

They describe to a large extent the built environment of the selected case study areas. We know a great deal about the size of firms, the type of firms, land use and zoning, industry data, etc. This information we then extrapolate across the rest of the Metro area.

However, the densities that we measured in this Study are a profile of what has been built long ago and what businesses now occupy these spaces. Given how building practices and firms change over time, the job density parameters in the sample represent a cross-section or a slice in time of current density practices. Over time, densities presumably change. What these and densities of other places will be in the future could be remarkably different from now. Nevertheless, we can expect or infer a possible direction of future changes.

For the following reasons, under 2040, we anticipate moderate appreciation in land prices, regulatory rezoning, and more efficient use of land and building space. Policy officials can then infer, if not the magnitude, then the direction of expected densities. To this extent, we selected each of the sample sites in hopes of providing policy makers a flavor of what 2040 might yield in terms of densities. Each of the 2040 design types were selected because they exhibit successful attributes that 2040 is designed to foster across the region. Therefore, to some extent, the job density parameters of each sample site represents tinge of 2040 expectations – perhaps not fully.