# Non Residential Hedonic Study Preliminary Technical Memo

To: Non Residential Study Team

From: Sonny Conder, Maribeth Todd

**Introduction and Background**

The Non Residential Hedonic Study seeks to establish the value of various design, planning, neighborhood and other location attribute variables in determining the market value of real estate in areas zoned for uses other than single family residential.

This technical memo documents the work to date and adds a few comments as to our impressions of the implications of the statistical results we have available.

Roughly 3 months ago we began data collection for the nonresidential hedonic study. Unlike hedonic residential studies of single family homes that number in the thousands, nonresidential studies are exceedingly rate (see Bill Reid's literature search). Two reasons underlie this rarity. One, nonresidential building attribute data are almost non-existent and hard to interpret when available. Two, nonresidential data are exceedingly heterogeneous in usage and attribute range; thereby rendering interpretation of coefficient values exceedingly difficult.[1]

On the other hand, the 2040 Plan is pretty much limited to the nonresidential zoned land stock for implementing the compact and higher density, reduced VMT goals of the 2040 Plan. Necessarily, we need to have as much information as we are able to reliably generate to guide us in selecting investment strategies for our very limited resources and regulatory leverage.

Accordingly, the Economic and Land Use Forecasting Unit set about sampling at least 1000 properties distributed over a representative range of regional nonresidential types. We

[1] For example, location on the corner of two busy 5 lane arterials is an excellent place for a gas station or a car lot; but it is a terrible place for a fashionable outdoor restaurant.

selected individual properties if they had recorded a sale over the period 1/2001 through 12/2006. Besides sales amount, present assessed value and lot size little additional information was consistently available from the assessor’s records.

From our original sample of roughly 2500 records we collected information in the following areas:

- Building description including sale price, assessed value, size of building, size of lot, building age, building use by floor, number of floors, building construction and building condition.
- Site area design conditions including presence of sidewalks, street trees, design type, street parking, off-street parking, etc.
- Street description including number of lanes of closest street, 2 way or 1 way street,  presence of left turn refuge lane, and traffic speed and volume
- Surrounding market area including neighborhood score, households within ½ miles and households with ½ mile, sidewalk and tree coverage and overall neighborhood design such as traditional grid pattern versus cul-de-sac.

Besides the assessor data base, we used that RLIS air photos and Google Maps to measure such variables as building square footage, number of floors, building construction, condition, etc. and a host of design variables associated with the streetscape and surrounding neighborhood condition.

Suffice to say that since this was a first time effort, we experienced substantial frustration attempting to consistently measure a large number of variables that are essentially qualitative judgment, design variables. Besides the bias, measurement error and distortion due to self-selection in the sample, we must emphasize our data collection effort added its own independent level of measurement error.

All of the above leads to our emphasizing one important caveat in interpreting results. This caveat is that while we have taken all appropriate steps to remove bias, some bias necessarily must remain in the coefficients. Secondly, we make no assertion that any particular design variable or group of design variables can be interpreted as causative. The variables at best can be described as “associated with”.

Before moving to a discussion of what we found and how we intend to apply the results to our regional nonresidential data base, we need frame our data discussion in the broader terms of public welfare economics and preference measurement.

We have chosen to interpret our results to the degree plausible in terms of preference for varying amounts of private and public consumption. Private consumption amounts to the goods and services that households purchase and use for their exclusive benefit. An example of private consumption is a home and the lot on which it is located. An example of public consumption would be parks, urban design and the overall quality of the neighborhood in which the house is located. Typically, private goods and services are produced in the market which determines a market price that rations the amounts produced and consumed. Public goods on the other hand are more abstract and diffuse, are generally produced by public bodies and do not have a market price attached. Lack of a market price requires the goods and services be produced through collective (government) action and that the desired level of public goods and services will always be difficult to determine.

Typically, we determine the appropriate level of public consumption, by observing how much more private households are willing to pay to be in areas where public goods are plentiful versus areas where they are scarce.[2] The present study by focusing on the value of various urban design and location attributes follows this tradition.

We also recognize the complication that private households have a wide range of preferences for the mix of private and public consumption. One household may value a well kept, well developed and serviced neighborhood with high levels of retail opportunity, diversity and safety but a minimum of lot and house size. Another household may value highly a large house on a 20 acre lot with no neighbors or services and sufficient private transportation to reach whatever public services they require. Most importantly, these preferences sort themselves out into different locations over time. This means a design approach in one area that is successful will not necessarily be transferable to another area. Certainly, the spatial pattern of precinct level voting for the regional green spaces program provides an excellent example of spatial self-sorting.

[2] The literature on hedonic measurements is rich with examples of the value of parks, school quality and public safety .

Consequently, our results always must be tempered with the realization that we have to account for the area where a particular design approach is being implemented.

**Data Results**

Having made the appropriate caveats concerning the data, we feel that the data are quite adequate to support the level of conclusions that we make about the price levels specific areas and groups of design attributes are associated with.

Table One below presents a summary for each of the target design areas that we chose as representing the spectrum of nonresidential land use types within the region.

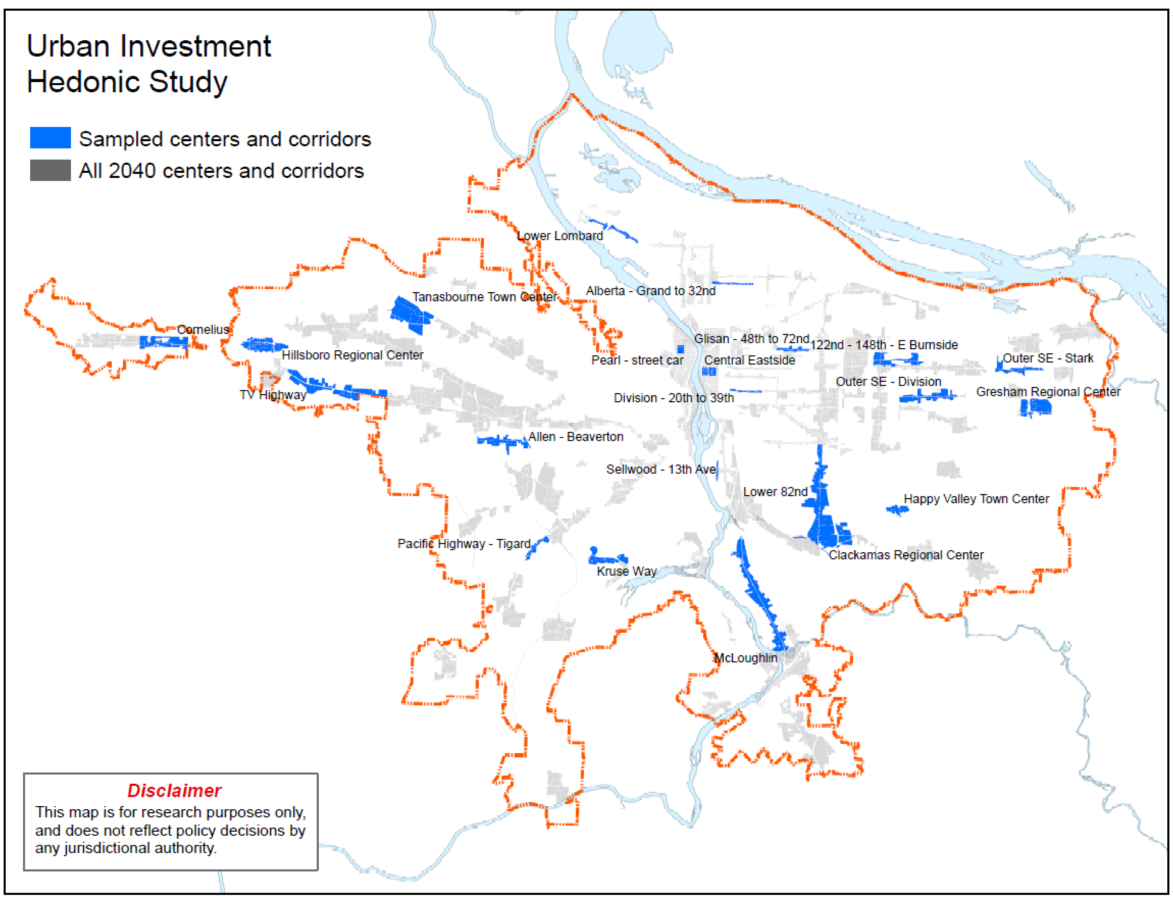
## Table One: Sample Areas Description

| Area | N | Weight of Each Observation (N) | Traditional Central City | Old Suburban Strip Corridor | New Suburban Center | Average Value per Sq. Ft. |
|---|---|---|---|---|---|---|
| 122nd - 148th - E Burnside | 70 | 5.81 | 0 | 1 | 0 | $ 113.67 |
| Alberta - Grand to 32nd | 47 | 1.91 | 1 | 0 | 0 | $ 132.59 |
| Allen - Beaverton | 49 | 5.36 | 0 | 1 | 0 | $ 77.01 |
| Central Eastside | 34 | 32.00 | 1 | 0 | 0 | $ 83.72 |
| Clackamas Regional Center | 75 | 13.59 | 0 | 0 | 1 | $ 126.19 |
| Cornelius | 28 | 17.75 | 0 | 1 | 0 | $ 126.70 |
| Division - 20th to 39th | 23 | 15.60 | 1 | 0 | 0 | $ 123.83 |
| Glisan - 48th to 72nd | 18 | 36.54 | 1 | 0 | 0 | $ 110.57 |
| Gresham Regional Center | 91 | 6.30 | 0 | 1 | 0 | $ 100.94 |
| Hillsboro Regional Center | 47 | 6.90 | 0 | 1 | 0 | $ 92.67 |
| Kruse Way | 60 | 9.51 | 0 | 0 | 1 | $ 232.29 |
| Lower 82nd | 72 | 26.00 | 0 | 1 | 0 | $ 158.07 |
| Lower Lombard | 35 | 2.06 | 1 | 0 | 0 | $ 141.18 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| McLoughlin | 15 | 24.21 | 0 | 1 | 0 | $ | 68.65 |
| Outer SE - Division | 151 | 1.74 | 0 | 1 | 0 | $ | 107.66 |
| Outer SE - Stark | 18 | 5.21 | 0 | 1 | 0 | $ | 111.16 |
| Pacific Highway - Tigard | 8 | 11.55 | 0 | 1 | 0 | $ | 108.70 |
| Pearl - street car | 485 | 6.71 | 1 | 0 | 0 | $ | 344.71 |
| Sellwood - 13th Ave | 24 | 2.86 | 1 | 0 | 0 | $ | 194.71 |
| Tanasbourne Town Center | 117 | 6.90 | 0 | 0 | 1 | $ | 148.63 |
| TV Highway | 105 | 9.74 | 0 | 1 | 0 | $ | 105.74 |

The Map below highlights the areas selected and shows the total amount of nonresidential land in corridor and center designations with the Metro Region. Map 2 shows the sample area broken into center and corridor classifications.

## Map 1: Sample Areas and All 2040 Corridors and Centers

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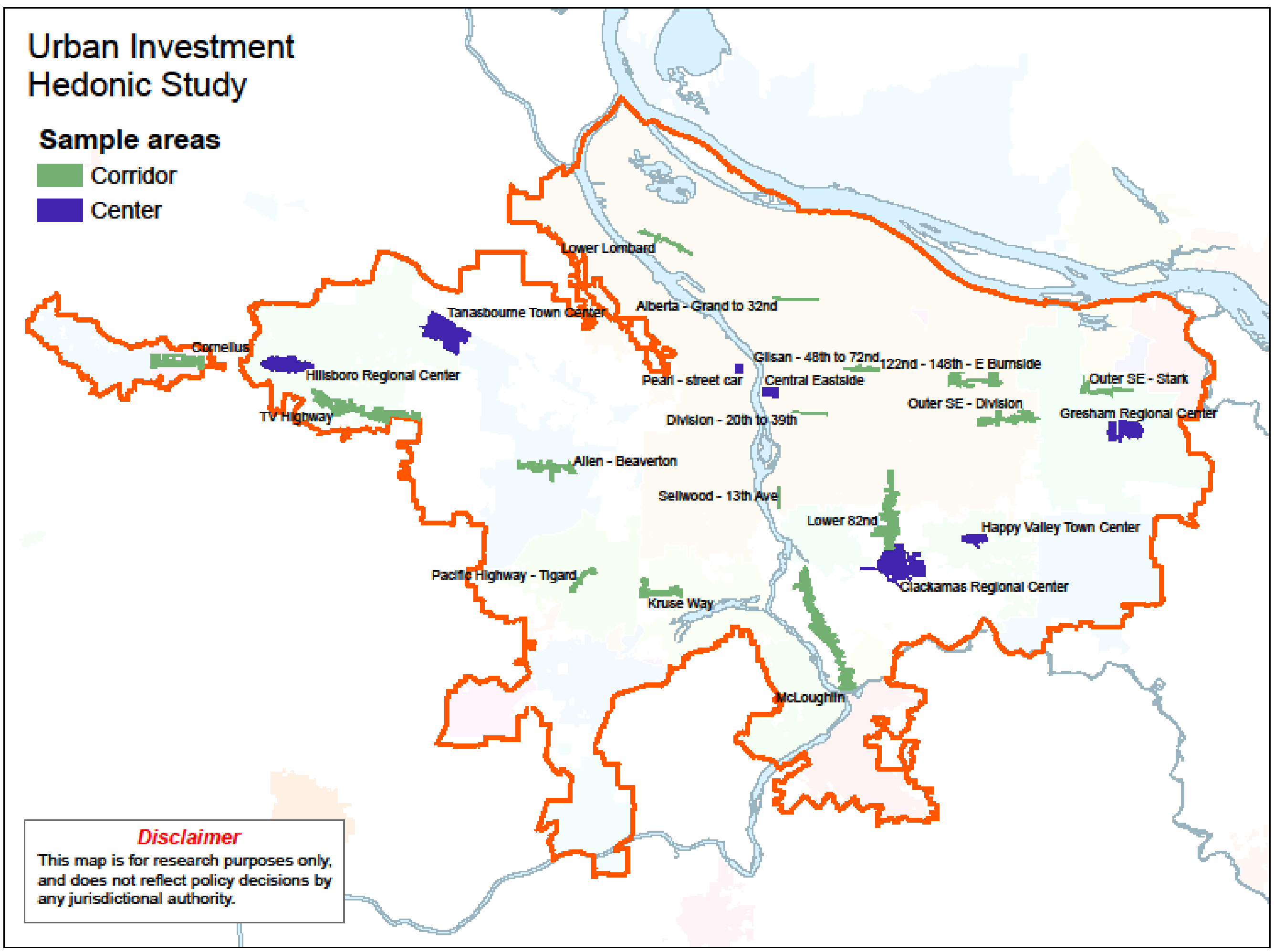
## Map 2: Sample Centers and Corridors

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After several rounds of data cleaning we (ELF) ended up with 1572 useable records. Table One shows the sample area and the number of useable records per sample area. In the third column we have included our suggested weight per sample observation for each area. This is the total amount of real estate value in millions that each sample point in a particular area represents. Notice that though the Pearl constitutes 485 data points of the 1572 total, its weight remains higher than many corridor areas.

The next 3 columns display how each of the sample areas was generally classed: traditional central city, old suburban strip corridor and new suburban center. The final column shows the average 2008 assessed value per square foot of building.

The area with the highest 2008 assessed value per square foot is the Pearl at $345 over 1/3 higher than the next highest, Kruse Way, at $232 per square foot. Of the central city corridor areas the Sellwood-13th Avenue area is the highest at $195 per square foot while the Central Eastside is the lowest of the central city areas at $84. Since Central Eastside and the Pearl for all intents and purposes occupy identical location milieu, the $200 per square foot difference in value provides fodder for future investigations into what regulatory, design and investment options yield a Pearl and what gives us a Central Eastside.

Both Gresham and Hillsboro Regional Centers with traditional design and neo-traditional orientation have low average values in comparison to privately developed suburban centers such as Clackamas Town Center, Tanasbourne Town Center and Kruse Way.

Of note is that Lower 82nd commands a fairly high value of $158 per square foot despite a decidedly nontraditional design orientation. Of course a contributor to this number is the large amount of land required relative to building size. (More on this later)

Table Two introduces us to the design variables and displays their simple correlation with assessed value per square foot of building. We need emphasize these are simple correlations and they do not screen out the effects of conflated variables nor the effects of the large number of very homogeneous Pearl District observations.

The first variable is the 2008 assessed value per square foot. Since it is correlated with itself, it fits perfectly. The next two are total sales and total assessor value that are generally unrelated to value per square foot (this is a good thing). Both building and lot size are modestly negative with value per square foot. This is also a good thing as it means the returns to getting larger and larger are eventually diminishing. Building age is negative which means we were at least partly successful in estimating building age in the many cases when it was not available in the assessor files.

**Table Two : Simple Correlations with Assessed Value per Sq. Ft.**

| Variable Name | Correlation Coefficient | Variable Name2 | Correlation Coefficient3 |
|---|---|---|---|
| ass/sq ft | 1.00 | tradneighbr | 0.47 |
| value_sales | -0.04 | sidewalk75 | 0.51 |
| value_assessor | -0.01 | trees50 | 0.58 |
| bldgsze | -0.11 | trad_grid | 0.51 |
| lotsze | -0.11 | cul_de_sac | -0.51 |
| bldgage | -0.29 | separatedlu | -0.60 |
| brick | 0.34 | murzone | 0.50 |
| concrete | 0.36 | mfrzone | -0.39 |
| glass_steel | -0.01 | comzone | -0.06 |
| wood_frame | -0.57 | Incomp_zon | -0.15 |
| moderate | -0.18 | qtr_SFR | -0.37 |
| good_new | 0.22 | qtr_MFR | 0.82 |
| storefront | 0.68 | half_SFR | -0.51 |
| res_use | -0.50 | half_MFR | -0.05 |
| retail_serv_use | -0.27 | speed | -0.67 |
| mixed_use_res | 0.77 | volume | -0.18 |
| floornbr | 0.82 | Lanes | -0.20 |
| comm_mix | 0.63 | TwoWay | -0.26 |
| res_mix | -0.46 | LeftTurn | -0.28 |
| sub_mall | -0.08 | traditional central city | 0.66 |
| sub_strip | -0.20 | old suburban_strip corridor | -0.56 |
| strtprk | 0.31 | new suburban center | -0.14 |
| offstrtprk | 0.10 | N_score | 0.82 |

The next 4 variables reflect our assessment of the building construction (for statistical purposes we omitted sheet/corrugated metal of industrial buildings). Essentially, brick and concrete construction are associated with high value than glass/steel or particularly wood frame. Moderate building quality (bad/poor left out for statistical reasons) is slightly negative and good is new. (More a test of the measurement team than anything.)

Storefront design has a relatively strong correlation with higher value though keep in mind the Pearl is almost uniformly of storefront design. Areas with exclusive residential use are negative as is exclusive retail-services with mixed use residential areas are positive. Areas with a large number of buildings with multiple floors have higher values than areas with few multi-floor buildings (the Pearl again!).

The next 4 variables describe the general character of the entire corridor or center. Predominately commercial with residential is positive. Predominately residential with other mixed uses is negative while suburban strip development is mildly negative.

On street parking is moderately positive while off street parking appears not to matter. Being located in a “traditional neighborhood”[3] is positively associated with higher values as is having sidewalks and street trees and using a traditional grid pattern for residential and commercial access.[4] Cul-de-sac development per se has a negative correlation as does separated land use.

Being in a mixed use zone seems to be beneficial to values while being in a mfr zone is negative and a commercial zone does not matter. Having a land use that is incompatible with surrounding zoning is only mildly negative.

The next 4 variables measure the number of single family and multi-family residences with ¼ and ½ mile of the observation point. Of the 4 only the number of mfr within ¼ mile is positive and this reflects the density and homogeneity of the Pearl observations.

Traffic speeds as measured in Metro’s travel demand model are negatively associated with high property values while volumes are weakly positive. In other words, streets congested with

[3] Notice we have traditional neighborhood and traditional grid as well. What is traditional versus what is not requires much more precise definition.
[4] We developed this measure in response to large suburban condo and apartment developments that rely exclusively on private, internal circulation instead of fronting on a public right of way.

customers are a good thing. The number of lanes, two way streets and left turn refuge lanes are weakly negative.

Our general classification of traditional central city is positive; old suburban strip is negative while new suburban center is uncorrelated.

Finally neighborhood score measuring the sales value residual of surrounding single family neighborhoods is quite positive with the sales value per square foot of associated nonresidential real estate.

Tables Three, Four and Five provide 3 different interpretations of the data at hand. Table Three presents the “self selection” bookend interpretation using only dummy variables that describe particular center and corridor areas. Here it is helpful to review what we mean by the term “self selection”. As used in the present context “self selection” implies the polar opposite of random selection. It holds that in any analysis of spatial data, the attributes being measured and the choosers of those attributes are not random but reflect a spatial and historical process whereby people locate in areas with attributes valuable to them. This in turn induces suppliers to provide more of these attributes in those locations over time. Hence, in any given time period the landscape reflects different combinations of self-selected choosers and attributes. The self-selection interpretation is completely at odds with the “random assignment” assumption we make for classical statistical analysis. This renders the conclusion - that any particular design attribute has a fairly constant effect over space – to be a very dubious assumption.

Table Four embodies the classic assumption that attributes and choosers are randomly available over the entirety of our sample space (locations). In Table Four we ignore particular areas and focus exclusively on attribute variables.  Here we are treating the data as if it reflected a statistical experiment wherein a group of people were valuing the various design attributes of neighborhoods and both choosers and attributes were randomly mixed so that one group of choosers would not be concentrated into one group of choices.  Table Four represents the other “bookend” of the set of interpretation approaches we can make.

Table Five contains to the extent that statistical analyses allow both area and attribute variables. The intent here is to be able to simultaneously account for self selection and the attribute effect of design variables. While not a complete solution, this approach in combination with the data in Tables Three and Four provides information useful in establishing the range of effects associated with various area and design attributes.

Table Three contains the statistical results of a model run that contains mostly dummy variables for each of our sample areas (see Map __) . We omit from Table Three the 3 continuous variables (LV4-LV6): building size, building lot size and building age. We display in Table Three 19 dummy variables(V47-V67). V55 (Gresham Regional Center) and V60 (McLoughlin Corridor) are omitted for statistical reasons.[5] Their values in the analysis become zero and all other areas values are the percentage increase of property in a particular area relative to Gresham and McLoughlin.

The variables for building size, lot size and building age control for differences in those variables between our sample areas. LV4 (building size) indicates that on average over all building types and locations and 10 percent increase in building size results in about a 7 percent increase in property value. Similarly, LV5 shows that a 10 percent increase in lot size results in roughly a 1.4 percent increase in property value. The variable LV6 suggests that on average in all locations nonresidential properties lose value at over 12 percent per year. This is a very high number and more complete models suggest something on the order of 6 percent per year.

Building size, lot size and age are used in all three regressions that we report on with little change in their values save that age declines to a more reasonable level of 6 percent decrease per year. (6% implies about a 20 – 25 year life on commercial properties).

Below Table 3 reports the percentage increase in price premium each of the sample areas commands over our base areas. We also include an estimate of “T-Value”. Under classic statistical assumptions we regard T-Values as a measure of the reliability of the estimated coefficient value - the higher the T-value, the greater confidence we have that the coefficient is indeed different than the baseline coefficient of zero. Areas with T-Values lower than 2 may not be different in value than our base line areas. However, given the non-classic nature of our data

[5] To estimate the equations we need omit at least one of the dummy variables. In testing we observed that Gresham and McLoughlin had consistently the lowest coefficients; so we omitted them. This effectively sets their dummy values at 0 and all other areas can be interpreted as the percentage increase over the reference areas.

set, we encourage the maximum use of common sense when judging data results.

**Table Three – Relative Property Values by Area**

| | Variable Number | Coefficient Value | T- Value |
|---|---|---|---|
| 122nd- 148th E. Burnside | V47 | 0.28 | 4.34 |
| Alberta - Grant to 32nd | V48 | 0.59 | 4.89 |
| Allen Rd. Beaverton | V49 | 0.16 | 2.13 |
| Central Eastside | V50 | 0.15 | 2.68 |
| Clackamas Regional Center | V51 | 0.60 | 11.85 |
| Cornelius | V52 | 0.08 | 1.33 |
| Division-20th to 39th | V53 | 0.41 | 5.81 |
| Glisan 48th to 72nd | V54 | 0.48 | 8.32 |
| Gresham Regional Center | V55 | 0.00 | NA |
| Hillsboro Regional Center | V56 | 0.09 | 1.31 |
| Kruse Way | V57 | 0.86 | 14.64 |
| Lower 82nd | V58 | 0.36 | 7.79 |
| Lower Lombard | V59 | 0.42 | 3.10 |
| McLoughlin | V60 | 0.00 | NA |
| Outer SE Division | V61 | 0.31 | 3.97 |
| Outer SE Stark | V62 | 0.32 | 2.71 |
| Pacific Highway Tigard | V63 | 0.30 | 2.51 |
| Pearl - Street Car | V64 | 1.80 | 32.08 |
| Sellwood - 13th Ave. | V65 | 0.82 | 5.96 |
| Tanasbourne Town Center | V66 | 0.57 | 10.51 |
| TV Highway | V67 | 0.19 | 3.88 |

Looking at Table Three and assuming our extreme self selection hypothesis as the basis for interpretation, we observe that residents in the Gresham area while unwilling to pay a price premium for the Gresham Regional Center pay roughly a 30% price premium for East Burnside, Division and Stark. Similarly, residents of Hillsboro Regional Center area are unwilling to pay a significant premium for the Hillsboro Regional Center but pay a 57% price premium for the attributes of the Tanasbourne Town Center and about a 20% premium for TV Highway. Similarly, Clackamas residents are willing to pay a 60% premium for

Clackamas Regional Center, a 36% premium for the Lower 82nd Ave. area but nothing for the McLoughlin Corridor. Likewise Kruse Way commands an 86% price premium on the West Side while Pacific Highway has a 30% premium typical of suburban corridors in general.

Moving to the Central City areas we note that the Pearl attributes command for their users a 180% price premium over our base line areas. Likewise the Sellwood – 13th Ave. Main Street (Corridor) has an 82% value for its surrounding users over our base line areas. All the “Main Street” areas show a 40 – 60% price premium that their users are willing to pay for the attributes they value.

A notable exception from Table Three is the Central Eastside wherein the price premium is but 15%. Relying on our strong self-selection hypothesis, we would conclude that unlike the Pearl (an area very close to it in all other locational and demographic respects) the area presently contains very few attributes of value to the surrounding inhabitants.

The above interpretations of Table Three rely on strongly on a complete self selection hypothesis of both choosers and choices. What that hypothesis says is that both attributes and the users who value them have evolved together into very different markets. Attempting to move attributes from one market to another will remain problematic in result.

Table Four below presents the other book end assumption of complete transferability of attributes between areas. Here we make the assumption that the attributes are continuous in space, separable in individual effect and valued the same regardless of location. Street trees and sidewalks are valued the same in Sellwood as they are on McLoughlin Blvd.

## Table Four: Relative Property Values by Design or Location Attribute

| Area | Variable Number | Coefficient Value | T- Value |
|---|---|---|---|
| Finish Brick | V7 | 0.16 | 2.46 |
| Finish Concrete | V8 | 0.07 | 1.09 |
| Finish Glass/Steel | V9 | 0.05 | 0.31 |
| Finish Wood | V10 | 0.04 | 0.65 |
| Moderate Condition | V11 | -0.20 | -3.28 |
| Good/New Condition | V12 | 0.15 | 3.76 |
| Store Front Design | V13 | -0.09 | -2.23 |
| Exclusive Residential Use | V14 | 0.14 | 0.84 |
| Exclusive Retail-Commercial | V15 | 0.24 | 1.40 |
| Mixed Retail-Comm-Residential | V16 | 0.53 | 2.99 |
| Number of Building Floors | LV17 | 0.12 | 3.68 |
| Area: Commercial Mix | V18 | 0.02 | 0.37 |
| Area: Residential Mix | V19 | 0.13 | 2.08 |
| Area: Suburban Mall | V20 | 0.28 | 2.94 |
| Area: Strip Commercial | V21 | 0.10 | 1.87 |
| On Street Parking | V22 | 0.09 | 2.64 |
| Off Street Parking | V23 | 0.09 | 2.59 |
| Surrounding area: tradtional neighborhood | V24 | 0.15 | 3.88 |
| Surrounding area: sidewalks>75% | V25 | -0.12 | -2.19 |
| Surrounding area: street trees>50% | V26 | 0.15 | 2.71 |
| Surrounding area: tradtional grid pattern | V27 | -0.07 | -0.36 |
| Surrounding area: Cul de Sac pattern | V28 | 0.49 | 2.77 |
| Surrounding area: Separated Land Uses | V29 | -0.43 | -6.67 |
| Zoning Mixed Use Residential | V30 | 0.09 | 2.00 |
| Zoning Multi Family Residential | V31 | 0.07 | 1.45 |
| Zoning Commercial | V32 | 0.36 | 7.35 |
| Incompatible Zoning | V33 | -0.53 | -6.88 |
| Number of Single Family DU < 1/2 mile | LV36 | -0.13 | 7.13 |
| Number of Multi Family DU < 1/2 mile | LV37 | -0.04 | -1.53 |
| Traffic Speed | LV38 | -0.09 | -1.21 |
| Traffic Volume | LV39 | -0.02 | -0.47 |

| | | | |
|---|---|---|---|
| Number of Traffic Lanes | LV40 | 0.12 | 2.30 |
| Two Way Street | V41 | -0.01 | -0.33 |
| Left Turn Lane Present | V42 | 0.10 | 2.85 |
| Surrounding Area Neighborhood Score | V46 | 0.91 | 6.97 |

Variables V7 through LV17[6] attempt to measure various aspects of the property comprising the tax lot being measured. Keep in mind our previous caveats about this being a first time study and our limited ability and resources needed to measure attribute values.

Variables V7 through V10 describe the finish of the building being measured. These variables are measured relative to industrial/corrugated/sheet metal which was omitted for statistical purposes. All have price premiums but only brick is significantly different. We expect that these variables are more important and consistent but that the present results reflect the limitations of our measurement techniques and experience.

Variables V11 through V13 measure our rating of building condition and whether the building fronted directly onto the sidewalk or street as opposed to set back. The condition variables are in relation to bad/poor condition which we omitted. Moderate condition comes in negative (20% worse than

[6] Since we are using a log-log equation specification, continuous variables are transformed to logs and denoted as LV. Dummy variables, neighborhood score and weighting variables are not transformed and retain the V notation. Neighborhood score is not transformed because the coefficient is taken from a SFD study using the log-log specification and so it already represents transformed data. Consequently, if the non residential and SFD values were identical the neighborhood score coefficient in this study would have a value of 1.

bad) which speaks to our ability to accurately assess building condition from google earth pics. Good/new provides a 15% price premium. Storefront registers a negative 9% contrary to our pre study expectations. The present reality seems to be that in many areas of the region; storefront design constitutes functional obsolescence in terms of what the building can be used for.

Variables V14 through V16 measure the use mix embodied in the building being measured.[7] Exclusive residential use on all floors has a slight premium; exclusive retail-commercial has a larger premium and mixed retail-commercial-residential usage has the largest and only significant premium over omitted usage types.

Variable LV17 shows the effects of the number of floors in a building on that building's value. Here we find that each additional floor adds 12% to the buildings' value. Throughout the study we were continually impressed with the ubiquity of particularly retail designs that exaggerated building height. Many single story retail buildings of recent construction exceeded 18 – 20 feet in height with the bulk of the interior being unoccupied below a 12 foot false ceiling.

Variables V18 through V46 measure some aspect (often redundantly) of the area surrounding the building in question. Variables V18 through V21 attempt to characterize the surrounding area with industrial type uses omitted. We note that mixed commercial is not much more valuable than mixed industrial (in our sample areas they were mixed together – choosing one over another was simply a matter of intensity). Mixed residential commands a 13% price premium, while a designed suburban mall commands a 28% price premium. Suburban strip malls are 10% more valuable.

Variables 22 and 23 show both the presence of onstreet and offstreet parking to produce a 9% premium.

Variables 24 through 29 represent our attempts to characterize design aspects of the immediate market areas surrounding the measured properties. Being located adjacent to what we considered to be a traditional neighborhood (grid street patterns, curbs, sidewalks, trees, and diversity of housing types) produces a 15% price premium though the general presence

[7] Again we have omitted industrial uses. In general wherever our use of dummy variables requires the omission of a variable to sustain our obligation of mathematical independence in our equations, we omit the lowest valued use so that parameters compared to it are estimated as positive differences.

of sidewalks independently[8] produces a 12% price penalty. However, the general provision of a continuous tree canopy offsets this penalty with a 15% premium. Having a grid pattern by itself appears not to add or subtract anything. Cul-de-Sac patterns in the surrounding community actually confer a 49% price advantage but since these communities also usually have separated land uses they experience a 43% price decrease offsetting the advantage of the Cul-de-Sac. Unfortunately, variables 24 through 29 reflect the vagaries of using fairly redundant dummy variables.

Variables 30 through 33 measure the impacts of the zoning in which the measured building is located. In this instance industrial and single family zoning is omitted. All listed zoning types produce some price premium with commercial zoning being the largest at 36%. We also noted if the existing zoning was not compatible with a buildings' current use. If so, incompatible zoning produced a 53% price reduction. The area with the highest number of incompatible usage was the Central Eastside where the private real estate market and public policy exhibit the starkest conflict.

Variables LV36 and LV37 measure the number of SFD and MFD units within ½ mile of the property being measured. Both are negative with SFD numbers being significantly so. What this means is that we are not measuring one commercial area located on an island but a number of overlapping commercial area located in an urban setting with 130 years of development history. In a word, the market is saturated. Any number of these areas are accessible from an number of market areas so the number of dwelling units nearby rarely matters at the regional scale though one may argue that walk able communities are important in the Pearl but decidedly less so in Tanasbourne Town Center.

Traffic speed is negative as expected but much less so than the simple correlation would suggest. A ten percent increase in traffic speed produces roughly a 1 percent reduction in property value but the low T-Value indicates this relationship varies across locations. Other things equal the more traffic lanes increase the value of property with each additional lane of traffic producing a 12% increase in value.[9] Likewise, having a left turn refuge lane present, improved property values 10%. Again we are seeing the results of different markets with

[8] The use of partially redundant dummy variables usually results in one or more of those variables measuring an unobserved characteristic only present in a limited number of observations.

[9] Many of the corridors in the study had high value properties with highway and auto oriented uses adjacent to strategic locations with many lanes and traffic signals.

different purposes self-selecting for users who value attributes very differently.

Finally, we note that the surrounding area neighborhood score has a value of .91; close to our expectation of 1.0. This means the value of any center or corridor is very much like the value of the surrounding SFD neighborhood independent of design attributes. This result again reflects the underlying self-selection process of choosers and choices.

Table Five below presents both design attribute variables and area dummy self selection variables in one statistical assessment. Many people including a number of technical analysts regard multi-variate statistical techniques as having the capacity to extract the independent effects on highly inter-correlated attributes. Unfortunately, only an explicit orthogonal experimental design that produces zero covariances actually has that property. Most often statistical analysis of a number of conflated variables averages the net effect over all the variables so the coefficients tend to be “averaged out”. The results reported below in Table Five reflect the “averaging out” property of including a large number of conflated variables in the analysis.

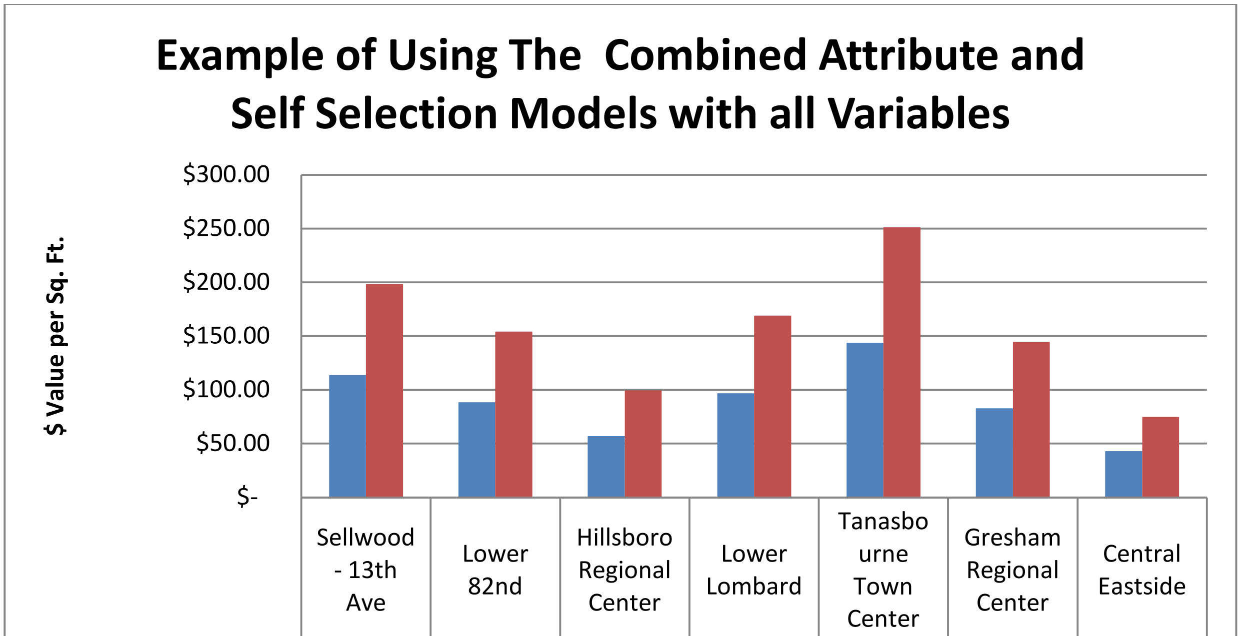
## Table Five Self Selection and Continuous Attribute Models Combined

| Area | Variable Number | Coefficient Value | T- Value |
|---|---|---|---|
| Building Size | LV4 | 0.74 | 41.55 |
| Lot Size | LV5 | 0.12 | 8.47 |
| Building Age | LV6 | -0.07 | -6.09 |
| Finish Brick | V7 | 0.13 | 2.15 |
| Finish Concrete | V8 | 0.08 | 1.41 |
| Finish Glass/Steel | V9 | 0.19 | 1.28 |
| Finish Wood | V10 | 0.02 | 0.35 |
| Moderate Condition | V11 | -0.17 | -2.91 |
| Good/New Condition | V12 | 0.17 | 4.13 |
| Store Front Design | V13 | -0.09 | -2.38 |
| Exclusive Residential Use | V14 | 0.03 | 0.20 |
| Exclusive Retail-Commercial | V15 | 0.21 | 1.25 |
| Mixed Retail-Comm-Residential | V16 | 0.41 | 2.41 |
| Number of Building Floors | LV17 | 0.09 | 2.83 |

| | | | |
|---|---|---|---|
| Area: Commercial Mix | V18 | -0.22 | -3.07 |
| Area: Residential Mix | V19 | -0.09 | -1.30 |
| Area: Suburban Mall | V20 | 0.14 | 1.03 |
| Area: Strip Commercial | V21 | 0.04 | 0.79 |
| On Street Parking | V22 | 0.24 | 6.28 |
| Off Street Parking | V23 | 0.11 | 3.26 |
| Surrounding area: traditional neighborhood | V24 | 0.15 | 2.98 |
| Surrounding area: sidewalks>75% | V25 | -0.11 | -0.69 |
| Surrounding area: street trees>50% | V26 | -0.17 | -1.07 |
| Surrounding area: traditional grid pattern | V27 | 0.04 | 0.20 |
| Surrounding area: Cul de Sac pattern | V28 | 0.39 | 2.22 |
| Surrounding area: Separated Land Uses | V29 | -0.61 | -7.57 |
| Zoning Mixed Use Residential | V30 | 0.07 | 1.71 |
| Zoning Multi Family Residential | V31 | 0.11 | 2.11 |
| Zoning Commercial | V32 | 0.27 | 5.41 |
| Number of Single Family DU < 1/2 mile | LV36 | -0.01 | -0.10 |
| Number of Multi Family DU < 1/2 mile | LV37 | 0.01 | 0.12 |
| Traffic Speed | LV38 | -0.02 | -0.31 |
| Traffic Volume | LV39 | 0.06 | 1.54 |
| Number of Traffic Lanes | LV40 | 0.22 | 4.13 |
| Two Way Street | V41 | -0.01 | -0.15 |
| Left Turn Lane Present | V42 | 0.05 | 1.37 |
| 122nd- 148th E. Burnside | V47 | 0.29 | 3.54 |
| Alberta - Grant to 32nd | V48 | 0.26 | 1.23 |
| Allen Rd. Beaverton | V49 | 0.41 | 3.31 |
| Central Eastside | V50 | -0.50 | -3.88 |
| Clackamas Regional Center | V51 | 0.49 | 4.81 |
| Cornelius | V52 | 0.54 | 5.22 |
| Division-20th to 39th | V53 | 0.21 | 1.97 |
| Glisan 48th to 72nd | V54 | 0.19 | 1.98 |
| Gresham Regional Center | V55 | 0.00 | NA |
| Hillsboro Regional Center | V56 | -0.09 | -0.81 |
| Kruse Way | V57 | 1.12 | 6.38 |
| Lower 82nd | V58 | 0.17 | 2.32 |
| Lower Lombard | V59 | -0.06 | -0.26 |
| McLoughlin | V60 | 0.00 | NA |
| Outer SE Division | V61 | 0.10 | 1.14 |
| Outer SE Stark | V62 | 0.06 | 0.44 |
| Pacific Highway Tigard | V63 | 0.00 | -0.01 |
| Pearl - Street Car | V64 | 1.21 | 8.39 |
| Sellwood - 13th Ave. | V65 | 0.60 | 3.94 |
| Tanasbourne Town Center | V66 | 0.36 | 1.65 |
| TV Highway | V67 | 0.20 | 2.59 |

Without going into a boring rendition of each coefficient value we can look at some graphical output for a set of specific areas where we show the change in value for a change in selected design attribute values.

## Exhibit One – Sample Area Specific Example of Mixed Area and Attribute Model




| | Sellwood - 13th Ave | Lower 82nd | Hillsboro Regional Center | Lower Lombard | Tanasbourne Town Center | Gresham Regional Center | Central Eastside |
|---|---|---|---|---|---|---|---|
| 50 Year Old Vintage | $113.68 | $88.39 | $57.02 | $96.92 | $143.93 | $82.94 | $42.88 |
| New Replacement | $198.39 | $154.26 | $99.51 | $169.15 | $251.19 | $144.75 | $74.83 |

In the above graph we used our Table 5 equation to estimate the value of a 50 year old residential building of 2000 sq. ft. on a 4000 sq. ft. lot. The characteristics of the building were held constant for all test areas but the characteristics of the test areas remained what we measured in our study.

From the graph you can discern that Tanasbourne Town Center had the highest value per sq. ft.[10] while Central Eastside had the lowest value.

We then used our equation to replace the vintage building with a 12,000 sq. ft., 3 story building on the same 4000 sq. ft. lot.; holding all building features constant between areas. Design attributes and surrounding area attributes remain as we measured them. All areas had a 75% increase in per sq. ft. value but since some areas are considerably more valuable this increase produced different dollar value outcomes. Sellwood-13th Ave and Tanasbourne had values in the $200 – 250 range while Central Eastside and Hillsboro did not exceed $100 per sq. ft.

[10] We won't quibble over the fact that there are no 50 year old buildings in Tanasbourne Town Center.

The above graph shows promise of being a useful tool to evaluate particular development proposals in the context of the design attributes of the area in which the proposal is located. For marginal projects we are able to evaluate just how many design features would need be changed to reach a market feasible demand price.

Below we have included the more detailed statistical outputs associated with Tables Seven, Eight and Nine.

**Guidelines Toward Implementing Center and Corridor Design Improvements.**

To implement our design results to all areas we redefined our sample areas into 5 classes that could be extended to all the non-residential and non-exclusive industrial areas represented in the 2040 Plan Map. We presently recognize 114 areas with zoning that is other than single family residential or exclusive use industrial. In Table Six below we have classified each of these areas in to one of five land use classes. These are:

1. Central City
2. Old Central City Main Street
3. Old Suburban City Core
4. Suburban Strip Corridor
5. New Suburban Center

This classification is not meant to replace the 2040 Plan designation but rather to provide a designation that allows the statistical measurements shown in Statistical Table Ten to be meaningfully applied. Note that in Table Six below the area Central City – Nob Hill $21^{st}$-$23^{rd}$ NW has no measurements as it was inadvertently omitted from the “Centers-Corridors” analysis on which the data are based. We should point out that while the geographies below follow exact tax lot boundaries, these geographies remain unofficial and are used for research purposes only. All of the areas listed in Table Six are delimited in Map 1. In effect in terms of changing future patterns of development these are the areas directly applicable to regional 2040 development policy.

## Table Six All Non-Residentially Designated Urban Development Areas in the 3 County region

| Jurisdiction | 2040 Plan Class | Non-Residential Hedonic Study Class | Name | Tax Lot Area Sq.Ft. | No. of Tax Lots | Total Market Value 2008 |
|---|---|---|---|---|---|---|
| Portland | Central City Center | Central City | Downtown/Macadam | 17,498,564 | 7,549 | $ 7,909,244,790 |
| Portland | Central City Center | Central City | Rose Quarter/Lloyd Center | 14,368,625 | 802 | $ 2,200,052,450 |
| Portland | Central City Center | Central City | SouthEast/Central East Side | 16,758,182 | 1,325 | $ 1,087,917,400 |
| Portland | Central City Center | Central City | Goose Hollow | 3,987,054 | 1,809 | $ 805,479,780 |
| Portland | Central City Center | Central City | Northwest/Pearl District | 10,586,714 | 9,304 | $ 3,254,675,480 |
| Portland | Corridor/Main Street | Central City | Nob Hill 21st-23rd Street NW | NA | NA | NA |
| Portland | Town centers | Old Suburban City Core | St. Johns | 1,549,226 | 191 | $ 56,671,640 |
| Washco | Town centers | New Suburban Center | Bethany | 5,185,027 | 787 | $ 224,322,714 |
| Hillsboro | Town centers | New Suburban Center | Tanasborne | 24,643,222 | 465 | $ 806,762,100 |
| Hillsboro | Town centers | New Suburban Center | Orenco | 10,000,985 | 868 | $ 418,839,820 |
| Multco | Town centers | Old Suburban City Core | Troutdale | 19,297,745 | 520 | $ 211,852,410 |
| Portland | Town centers | Old Central City Main Street | Hollywood | 2,725,839 | 338 | $ 258,941,750 |
| Portland | Regional centers | Suburban Strip Corridor | Gateway | 28,940,613 | 2,041 | $ 1,171,670,400 |
| Beaverton | Town centers | Suburban Strip Corridor | Cedar Mill | 15,986,596 | 744 | $ 300,602,752 |
| Washco | Town centers | Old Suburban City Core | Forest Grove | 3,784,960 | 142 | $ 58,962,670 |
| Multco | Town centers | New Suburban Center | Fairview | 13,325,806 | 538 | $ 309,721,790 |
| Hillsboro | Regional centers | Old Suburban City Core | Hillsboro | 11,064,980 | 631 | $ 324,227,610 |
| Beaverton | Town centers | New Suburban Center | Sunset Transit Center | 10,625,162 | 470 | $ 354,005,400 |
| Gresham | Town centers | Suburban Strip Corridor | Rockwood | 7,755,196 | 331 | $ 196,716,860 |
| Gresham | Regional centers | Old Suburban City Core | Gresham | 16,698,328 | 866 | $ 573,656,440 |
| Beaverton | Town centers | Suburban Strip Corridor | Aloha | 19,869,017 | 1,896 | $ 502,102,010 |
| Beaverton | Regional centers | Old Suburban City Core | Beaverton | 15,054,039 | 539 | $ 510,000,630 |
| Beaverton | Town centers | Suburban Strip Corridor | Raleigh Hills | 7,673,883 | 319 | $ 260,910,810 |
| Portland | Town centers | Old Central City Main Street | Hillsdale | 7,899,519 | 467 | $ 296,412,410 |
| Portland | Town centers | Suburban Strip Corridor | Lents | 3,074,522 | 377 | $ 88,414,370 |
| Washco | Regional centers | New Suburban Center | Washington Square | 40,803,575 | 869 | $ 1,054,863,060 |
| Gresham | Town centers | New Suburban Center | Pleasant Valley | 10,666,076 | 69 | $ 31,980,690 |
| Portland | Town centers | Suburban Strip Corridor | West Portland | 10,596,290 | 891 | $ 353,386,770 |
| Clackco | Town centers | Old Suburban City | Milwaukie | 18,519,938 | 1,220 | $ |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | Core | | | | 544,254,133 |
| Clackco | Town centers | Suburban Strip Corridor | Happy Valley | 4,081,362 | 67 | $ 28,487,457 |
| Beaverton | Town centers | Suburban Strip Corridor | Murray Hill | 10,407,550 | 942 | $ 274,996,480 |
| Clackco | Regional centers | New Suburban Center | Clackamas | 28,744,563 | 553 | $ 1,019,612,834 |
| Washco | Town centers | Old Suburban City Core | Tigard | 10,795,205 | 227 | $ 153,417,240 |
| Clackco | Town centers | New Suburban Center | Lake Oswego | 19,273,047 | 924 | $ 535,328,142 |
| Clackco | Town centers | Suburban Strip Corridor | Lake Grove | 4,787,096 | 218 | $ 209,165,429 |
| Clackco | Town centers | Suburban Strip Corridor | Damascus | 14,203,444 | 194 | $ 85,030,367 |
| Washco | Town centers | Suburban Strip Corridor | King City | 5,252,602 | 104 | $ 165,117,580 |
| Washco | Town centers | New Suburban Center | Tualatin | 21,619,948 | 510 | $ 463,815,790 |
| Clackco | Town centers | Old Suburban City Core | Gladstone | 4,526,191 | 364 | $ 115,015,734 |
| Clackco | Regional centers | Old Suburban City Core | Oregon city | 25,351,319 | 444 | $ 279,233,740 |
| Washco | Town centers | Old Suburban City Core | Sherwood | 4,999,933 | 69 | $ 165,751,240 |
| Clackco | Town centers | Suburban Strip Corridor | West Linn | 7,451,974 | 524 | $ 196,280,054 |
| Clackco | Town centers | Old Suburban City Core | Old West Linn | 10,534,640 | 472 | $ 225,212,583 |
| Clackco | Town centers | New Suburban Center | Wilsonville | 13,538,107 | 181 | $ 284,436,288 |
| Portland | Corridor/main street/station area | Suburban Strip Corridor | 17th_Mcloughlin_Ochoco | 2,729,794 | 439 | $ 188,988,920 |
| Portland | Corridor/main street/station area | Suburban Strip Corridor | McLoughlin_Holgate_Hwy224 | 15,843,335 | 388 | $ 291,965,756 |
| Portland | Corridor/main street/station area | Old Central City Main Street | 13th_Sellwood | 621,148 | 171 | $ 68,704,320 |
| Portland | Corridor/main street/station area | Old Central City Main Street | Multnomah_Barbur | 7,450,477 | 749 | $ 357,996,970 |
| Clackco | Corridor/main street/station area | Suburban Strip Corridor | 82ndAve_I84_Clackamas | 58,000,128 | 4866 | $ 1,871,741,785 |
| Portland | Corridor/main street/station area | Old Central City Main Street | Tacoma_Sellwood Brdg_Mcloughlin | 2,175,559 | 383 | $ 144,703,550 |
| Portland | Corridor/main street/station area | Old Central City Main Street | Macadam | 5,362,608 | 864 | $ 472,099,710 |
| Portland | Corridor/main street/station area | Suburban Strip Corridor | Foster_122nd_136th | 6,199,364 | 344 | $ 112,491,150 |
| Portland | Corridor/main street/station area | Old Central City Main Street | Woodstock_42nd_82nd | 2,629,867 | 355 | $ 120,322,730 |
| Portland | Corridor/main street/station area | Suburban Strip Corridor | 122nd_Sacramento_Foster | 28,248,756 | 2288 | $ 896,485,220 |
| Portland | Corridor/main street/station area | Suburban Strip Corridor | Foster_Powell_82nd | 4,213,010 | 636 | $ 184,072,070 |
| Beaverton | Corridor/main street/station area | Suburban Strip Corridor | BvrtnHillsdale_Shattuck_Dosch | 2,977,515 | 212 | $ 94,253,920 |
| Gresham | Corridor/main street/station area | Suburban Strip Corridor | Powell_136th_Highland | 14,606,692 | 798 | $ 308,251,620 |
| Portland | Corridor/main street/station area | Suburban Strip Corridor | Barbur_Naito | 3,996,039 | 738 | $ 309,401,070 |
| Portland | Corridor/main street/station area | Suburban Strip Corridor | Powell_112th | 3,783,528 | 131 | $ 70,786,500 |
| Portland | Corridor/main street/station area | Old Central City Main Street | Gladstone_28th_39th | 1,446,336 | 201 | $ 64,891,090 |
| Portland | Corridor/main street/station area | Suburban Strip Corridor | Powell_26th_82nd | 8,038,728 | 779 | $ 359,644,270 |
| Portland | Corridor/main street/station area | Old Central City Main Street | Division_20th_82nd | 6,881,845 | 755 | $ 358,889,300 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Gresham | Corridor/main street/station area | Suburban Strip Corridor | Division_136th_182nd | 10,766,159 | 667 | $ 263,439,730 |
| Portland | Corridor/main street/station area | Suburban Strip Corridor | Division_I205_112th | 4,011,385 | 216 | $ 91,382,520 |
| Portland | Corridor/main street/station area | Old Central City Main Street | Hawthorne_17th_51st | 3,047,014 | 448 | $ 276,146,590 |
| Gresham | Corridor/main street/station area | Suburban Strip Corridor | Stark_Hogan_Kane | 6,754,667 | 268 | $ 180,922,770 |
| Portland | Corridor/main street/station area | Suburban Strip Corridor | Stark_122nd_182nd | 15,626,389 | 1130 | $ 406,408,850 |
| Gresham | Corridor/main street/station area | Suburban Strip Corridor | Stark_202nd_Cleveland | 5,972,099 | 232 | $ 93,782,550 |
| Portland | Corridor/main street/station area | Old Central City Main Street | Belmont_17th_60th | 2,709,109 | 619 | $ 247,818,760 |
| Portland | Corridor/main street/station area | Old Central City Main Street | Glisan_47th_82nd | 6,204,207 | 797 | $ 657,671,850 |
| Portland | Corridor/main street/station area | Old Central City Main Street | KernsNbrhd_I84_Burnside_20th_33rd | 5,759,737 | 779 | $ 439,487,410 |
| Portland | Corridor/main street/station area | Old Central City Main Street | Broadway_19th_33rd | 3,038,668 | 405 | $ 285,191,600 |
| Portland | Corridor/main street/station area | Suburban Strip Corridor | 82nd_Sandy_I84 | 3,676,058 | 181 | $ 144,212,600 |
| Portland | Corridor/main street/station area | Old Central City Main Street | Sandy_50th_I205 | 3,182,204 | 348 | $ 161,146,470 |
| Portland | Corridor/main street/station area | Suburban Strip Corridor | Sandy_122nd_162nd | 10,968,566 | 635 | $ 247,050,650 |
| Portland | Corridor/main street/station area | Suburban Strip Corridor | Hwy99E_Columbia_Greeley | 7,065,780 | 979 | $ 449,032,450 |
| Portland | Corridor/main street/station area | Old Central City Main Street | Albina_Williams_Killingsworth | 7,517,693 | 1131 | $ 381,054,550 |
| Portland | Corridor/main street/station area | Old Central City Main Street | MLK_Killingsworth_Fremont | 2,329,992 | 348 | $ 139,211,500 |
| Portland | Corridor/main street/station area | Old Central City Main Street | PiedmontNbrhd_Lombard_RosaParks | 1,736,848 | 326 | $ 82,282,610 |
| Portland | Corridor/main street/station area | Old Central City Main Street | Lombard_Hwy99E | 1,495,163 | 228 | $ 72,221,090 |
| Portland | Corridor/main street/station area | Old Central City Main Street | Lombard_UnivPark | 1,872,390 | 214 | $ 80,203,010 |
| Clackco | Corridor/main street/station area | Old Central City Main Street | Willamette_43rd_Pimlico | 2,341,156 | 103 | $ 61,747,084 |
| Clackco | Corridor/main street/station area | Suburban Strip Corridor | McLoughlin_Hwy224_I205 | 29,284,094 | 911 | $ 674,363,790 |
| Clackco | Corridor/main street/station area | New Suburban Center | KruseWay | 8,353,817 | 158 | $ 570,523,289 |
| Clackco | Corridor/main street/station area | Suburban Strip Corridor | Sunnyside_105th_162nd | 13,324,380 | 839 | $ 331,627,615 |
| Clackco | Corridor/main street/station area | Suburban Strip Corridor | Hwy224_McLoughlin_I205 | 20,458,810 | 131 | $ 363,205,762 |
| Portland | Corridor/main street/station area | Old Central City Main Street | Fremont_42nd_52nd | 511,720 | 90 | $ 43,445,060 |
| Portland | Corridor/main street/station area | Suburban Strip Corridor | Cully | 3,255,567 | 309 | $ 91,955,670 |
| Portland | Corridor/main street/station area | Suburban Strip Corridor | Sandy_I84_122nd_MaywoodPark | 6,710,454 | 570 | $ 197,337,120 |
| Portland | Corridor/main street/station area | Old Central City Main Street | Killingsworth_33rd_Cully | 4,338,847 | 432 | $ 136,091,910 |
| Portland | Corridor/main street/station area | Old Central City Main Street | Alberta_MLK_33rd | 1,481,323 | 274 | $ 89,881,670 |
| Portland | Corridor/main street/station area | Old Central City Main Street | Killingsworth_MLK_33rd | 1,515,827 | 339 | $ 82,551,930 |
| Portland | Corridor/main street/station area | Old Central City Main Street | MLK_Lombard_Killingsworth | 2,291,711 | 381 | $ 133,682,940 |
| Portland | Corridor/main street/station area | Old Central City Main Street | Lombard_StJohns | 1,151,216 | 105 | $ 54,187,770 |
| Portland | Corridor/main street/station area | Old Central City Main Street | Fessenden | 1,219,652 | 161 | $ 42,642,120 |
| Clackco | Corridor/main | Suburban Strip | Mollalla_Hwy213_ | 37,973,919 | 553 | $ |

| | | | | | | |
|---|---|---|---|---|---|---|
| | street/station area | Corridor | OregonCity | | | 647,866,426 |
| Washco | Corridor/main street/station area | Suburban Strip Corridor | ForGrov_Cornelius | 29,217,870 | 1241 | $ 497,049,520 |
| Hillsboro | Corridor/main street/station area | Suburban Strip Corridor | Cornell_to 185th | 54,894,383 | 1648 | $ 898,551,250 |
| Washco | Corridor/main street/station area | Suburban Strip Corridor | Hwy26_158th | 12,259,492 | 91 | $ 300,718,220 |
| Washco | Corridor/main street/station area | Suburban Strip Corridor | 185th_Springville_WestUnion | 2,515,466 | 245 | $ 119,163,800 |
| Washco | Corridor/main street/station area | New Suburban Center | Sherwood | 7,974,460 | 304 | $ 138,045,390 |
| Washco | Corridor/main street/station area | Suburban Strip Corridor | PacificHWy_KingCity | 17,069,697 | 121 | $ 289,565,210 |
| Washco | Corridor/main street/station area | Suburban Strip Corridor | PacificHwy_South Tigard | 3,443,549 | 71 | $ 92,381,590 |
| Washco | Corridor/main street/station area | Suburban Strip Corridor | PacificHwy_Northof217 | 6,371,728 | 102 | $ 156,650,300 |
| Beaverton | Corridor/main street/station area | Suburban Strip Corridor | SchollsFerry | 4,419,736 | 240 | $ 152,772,420 |
| Beaverton | Corridor/main street/station area | Suburban Strip Corridor | HallBlvd | 2,184,850 | 62 | $ 57,070,020 |
| Beaverton | Corridor/main street/station area | Suburban Strip Corridor | GardenHome_Oleson_69th | 1,106,093 | 39 | $ 42,029,320 |
| Beaverton | Corridor/main street/station area | Suburban Strip Corridor | AllenBlvd_Murr_217 | 9,670,064 | 637 | $ 262,818,410 |
| Washco | Corridor/main street/station area | Suburban Strip Corridor | Farmington_185th_170th | 6,033,308 | 335 | $ 125,701,180 |
| Beaverton | Corridor/main street/station area | Suburban Strip Corridor | TVHwy_173rd_CedarHills | 15,302,516 | 766 | $ 346,468,580 |
| Beaverton | Corridor/main street/station area | Suburban Strip Corridor | Jenkins_185th_CedarHills | 50,029,064 | 869 | $ 691,191,100 |
| Beaverton | Corridor/main street/station area | Suburban Strip Corridor | Hwy8_BvrtnHillsHwy | 16,801,548 | 555 | $ 484,978,430 |
| Hillsboro | Corridor/main street/station area | Suburban Strip Corridor | TVHwy_10th_198th | 41,631,433 | 1344 | $ 1,022,980,070 |
| Washco | Corridor/main street/station area | Suburban Strip Corridor | Baseline | 2,637,035 | 461 | $ 93,581,510 |

Given that we have arrayed our target areas in terms of the statistical equation in Table Ten, we can create a spreadsheet that estimates the demand price for various land use and design configurations in each of the 114 non-residential areas. In Exhibit One we have produced an example of that application using slightly simpler version of the mixed model documented in Table Nine. While an adequate model for the areas sampled, it cannot be extended directly to the 90 – 95% of the nonresidential area not represented in the sample. The model documented in Table Ten can be applied directly (with some modification for individual, nonconforming areas) to all the areas displayed in Table Six.

Since the modeling of a particular nonresidential area involves potentially 10 – 20 variables, this approach is best done from a "pro forma" spreadsheet. As part of the project we shall construct the spreadsheet that embodies the coefficients displayed in Table Ten and join it with the construction cost pro forma being developed independently as part of the overall project.

## Table Seven - Model of Property Values Using Area Specific Variables

```
Welcome to SHAZAM - Version 9.0  -  JAN 2002 SYSTEM=WIN-XP   PAR= 70000
CURRENT WORKING DIRECTORY IS: C:\Shazam\
|_par 70000
..PAR IS  70000 MAXIMUM VARIABLES IS   1000
|_file 11 nonres_hed_flat_file_6_06_10.csv
UNIT 11 IS NOW ASSIGNED TO: nonres_hed_flat_file_6_06_10.csv
|_read (11) v1-v68/skiplines=1

...SAMPLE RANGE IS NOW SET TO:         1      1572
|_genr lv3=log(v3)
|_genr lv4=log(v4)
|_genr lv5=log(v5)
|_genr lv6=log(v6)
|_genr lv17=log(v17)
|_genr lv36=log(v36)
|_genr lv37=log(v37)
|_genr lv38=log(v38)
|_genr lv39=log(v39)
|_genr lv40=log(v40)

|_ols lv3 lv4-lv6 v47-v54 v56-v59 v61-v67/weight=v68

REQUIRED MEMORY IS PAR=    1283 CURRENT PAR=   70000
OLS ESTIMATION
```

```
1572 OBSERVATIONS     DEPENDENT VARIABLE= LV3
...NOTE..SAMPLE RANGE SET TO:      1,   1572
SUM OF LOG(SQRT(ABS(WEIGHT)))  =  -202.11

R-SQUARE =   0.9030     R-SQUARE ADJUSTED =   0.9016
VARIANCE OF THE ESTIMATE-SIGMA**2 =  0.13614
STANDARD ERROR OF THE ESTIMATE-SIGMA =  0.36897
SUM OF SQUARED ERRORS-SSE=   210.88
MEAN OF DEPENDENT VARIABLE =   13.000
LOG OF THE LIKELIHOOD FUNCTION = -853.757
```

| VARIABLE NAME | ESTIMATED COEFFICIENT | STANDARD ERROR | T-RATIO 1549 DF | P-VALUE | PARTIAL CORR. | STANDARDIZED COEFFICIENT | ELASTICITY AT MEANS |
|---|---|---|---|---|---|---|---|
| LV4 | 0.73982 | 0.1570E-01 | 47.11 | 0.000 | 0.767 | 0.8209 | 0.4449 |
| LV5 | 0.13579 | 0.1138E-01 | 11.93 | 0.000 | 0.290 | 0.2998 | 0.0775 |
| LV6 | -0.12397 | 0.1110E-01 | -11.17 | 0.000 | -0.273 | -0.1275 | -0.0279 |
| V47 | 0.28354 | 0.6534E-01 | 4.339 | 0.000 | 0.110 | 0.0408 | 0.0006 |
| V48 | 0.59373 | 0.1215 | 4.885 | 0.000 | 0.123 | 0.0407 | 0.0003 |
| V49 | 0.16438 | 0.7731E-01 | 2.126 | 0.034 | 0.054 | 0.0191 | 0.0002 |
| V50 | 0.14539 | 0.5429E-01 | 2.678 | 0.007 | 0.068 | 0.0334 | 0.0009 |
| V51 | 0.59837 | 0.5048E-01 | 11.85 | 0.000 | 0.288 | 0.1333 | 0.0034 |
| V52 | 0.82511E-01 | 0.6192E-01 | 1.333 | 0.183 | 0.034 | 0.0131 | 0.0002 |
| V53 | 0.40731 | 0.7014E-01 | 5.807 | 0.000 | 0.146 | 0.0552 | 0.0008 |
| V54 | 0.48441 | 0.5824E-01 | 8.317 | 0.000 | 0.207 | 0.0879 | 0.0018 |
| V56 | 0.94665E-01 | 0.7254E-01 | 1.305 | 0.192 | 0.033 | 0.0122 | 0.0002 |
| V57 | 0.86157 | 0.5885E-01 | 14.64 | 0.000 | 0.349 | 0.1461 | 0.0027 |
| V58 | 0.35598 | 0.4571E-01 | 7.788 | 0.000 | 0.194 | 0.1038 | 0.0037 |
| V59 | 0.41643 | 0.1342 | 3.103 | 0.002 | 0.079 | 0.0256 | 0.0002 |
| V61 | 0.30527 | 0.7693E-01 | 3.968 | 0.000 | 0.100 | 0.0356 | 0.0004 |
| V62 | 0.32161 | 0.1186 | 2.711 | 0.007 | 0.069 | 0.0225 | 0.0002 |
| V63 | 0.30072 | 0.1198 | 2.511 | 0.012 | 0.064 | 0.0209 | 0.0002 |
| V64 | 1.7963 | 0.5600E-01 | 32.08 | 0.000 | 0.632 | 0.6492 | 0.0327 |
| V65 | 0.81712 | 0.1370 | 5.964 | 0.000 | 0.150 | 0.0490 | 0.0003 |
| V66 | 0.57376 | 0.5458E-01 | 10.51 | 0.000 | 0.258 | 0.1146 | 0.0026 |
| V67 | 0.19362 | 0.4994E-01 | 3.877 | 0.000 | 0.098 | 0.0432 | 0.0011 |
| CONSTANT | 5.8860 | 0.8145E-01 | 72.26 | 0.000 | 0.878 | 0.0000 | 0.4528 |

```
..INPUT FILE COMPLETED..TYPE A NEW COMMAND OR TYPE: STOP
```

## Table Eight - Model Using Design Specific Variables

```
Welcome to SHAZAM - Version 9.0  -  JAN 2002 SYSTEM=WIN-XP   PAR= 70000
CURRENT WORKING DIRECTORY IS: C:\Shazam\
|_par 70000
..PAR IS  70000 MAXIMUM VARIABLES IS   1000
|_file 11 nonres_hed_flat_file_6_06_10.csv
UNIT 11 IS NOW ASSIGNED TO: nonres_hed_flat_file_6_06_10.csv
|_read (11) v1-v68/skiplines=1

...SAMPLE RANGE IS NOW SET TO:         1      1572
|_genr lv3=log(v3)
|_genr lv4=log(v4)
|_genr lv5=log(v5)
|_genr lv6=log(v6)
|_genr lv17=log(v17)
|_genr lv36=log(v36)
|_genr lv37=log(v37)
|_genr lv38=log(v38)
```

```
|_genr lv39=log(v39)
|_genr lv40=log(v40)

|_ols lv3 lv4-lv6 v7-v16 lv17 v18-v33 lv36-lv40 v41-v42 v46/weight=v68

REQUIRED MEMORY IS PAR=    1484 CURRENT PAR=   70000
OLS ESTIMATION
1572 OBSERVATIONS     DEPENDENT VARIABLE= LV3
...NOTE..SAMPLE RANGE SET TO:      1,   1572
SUM OF LOG(SQRT(ABS(WEIGHT)))  =  -202.11

R-SQUARE =   0.9160     R-SQUARE ADJUSTED =   0.9139
VARIANCE OF THE ESTIMATE-SIGMA**2 =  0.11914
STANDARD ERROR OF THE ESTIMATE-SIGMA =  0.34517
SUM OF SQUARED ERRORS-SSE=   182.64
MEAN OF DEPENDENT VARIABLE =   13.000
LOG OF THE LIKELIHOOD FUNCTION = -740.761


VARIABLE   ESTIMATED  STANDARD   T-RATIO        PARTIAL STANDARDIZED ELASTICITY
NAME    COEFFICIENT   ERROR    1533 DF   P-VALUE CORR. COEFFICIENT  AT MEANS
LV4       0.72449     0.1730E-01   41.87     0.000 0.730     0.8039     0.4357
LV5       0.13233     0.1366E-01   9.687     0.000 0.240     0.2922     0.0756
LV6      -0.64716E-01 0.1171E-01  -5.526     0.000-0.140    -0.0665    -0.0145
V7        0.15823     0.6421E-01   2.464     0.014 0.063     0.0516     0.0022
V8        0.67348E-01 0.6156E-01   1.094     0.274 0.028     0.0268     0.0017
V9        0.45071E-01 0.1466      0.3074     0.759 0.008     0.0026     0.0000
V10       0.43060E-01 0.6624E-01  0.6501     0.516 0.017     0.0183     0.0016
V11      -0.19506     0.5948E-01  -3.280     0.001-0.083    -0.0343    -0.0007
V12       0.15322     0.4078E-01   3.757     0.000 0.096     0.0400     0.0105
V13      -0.88421E-01 0.3968E-01  -2.229     0.026-0.057    -0.0364    -0.0026
V14       0.14462     0.1720      0.8410     0.401 0.021     0.0607     0.0047
V15       0.24384     0.1741       1.400     0.162 0.036     0.0977     0.0062
V16       0.53105     0.1776       2.991     0.003 0.076     0.1937     0.0099
LV17      0.11793     0.3203E-01   3.682     0.000 0.094     0.0888     0.0075
V18       0.23524E-01 0.6414E-01  0.3668     0.714 0.009     0.0099     0.0008
V19       0.13457     0.6473E-01   2.079     0.038 0.053     0.0542     0.0035
V20       0.27736     0.9440E-01   2.938     0.003 0.075     0.0586     0.0014
V21       0.10369     0.5532E-01   1.874     0.061 0.048     0.0274     0.0009
V22       0.94714E-01 0.3587E-01   2.640     0.008 0.067     0.0382     0.0048
V23       0.91272E-01 0.3526E-01   2.589     0.010 0.066     0.0239     0.0063
V24       0.14924     0.3846E-01   3.881     0.000 0.099     0.0619     0.0070
V25      -0.12087     0.5514E-01  -2.192     0.029-0.056    -0.0513    -0.0044
V26       0.14630     0.5396E-01   2.711     0.007 0.069     0.0619     0.0050
V27      -0.66679E-01 0.1828     -0.3647     0.715-0.009    -0.0284    -0.0026
V28       0.49308     0.1781       2.769     0.006 0.071     0.2097     0.0191
V29      -0.42752     0.6405E-01  -6.674     0.000-0.168    -0.1803    -0.0185
V30       0.89627E-01 0.4488E-01   1.997     0.046 0.051     0.0381     0.0033
V31       0.72160E-01 0.4989E-01   1.447     0.148 0.037     0.0272     0.0015
V32       0.36256     0.4932E-01   7.352     0.000 0.185     0.0899     0.0026
V33      -0.53087     0.7719E-01  -6.877     0.000-0.173    -0.1203    -0.0031
LV36     -0.13037     0.1827E-01  -7.134     0.000-0.179    -0.1394    -0.0597
LV37     -0.38591E-01 0.2528E-01  -1.526     0.127-0.039    -0.0186    -0.0208
LV38     -0.85013E-01 0.7016E-01  -1.212     0.226-0.031    -0.0249    -0.0211
LV39     -0.17016E-01 0.3619E-01 -0.4702     0.638-0.012    -0.0051    -0.0095
LV40      0.11671     0.5066E-01   2.304     0.021 0.059     0.0345     0.0081
V41      -0.11006E-01 0.3362E-01 -0.3274     0.743-0.008    -0.0031    -0.0007
V42       0.10033     0.3517E-01   2.852     0.004 0.073     0.0393     0.0023
V46       0.90999     0.1306       6.968     0.000 0.175     0.2506     0.0222
CONSTANT   6.6801     0.4727       14.13     0.000 0.340     0.0000     0.5139

..INPUT FILE COMPLETED..TYPE A NEW COMMAND OR TYPE: STOP
```

## Table Nine - Model of Property Values Using Mix of Design and Area Specific Variables

```
Welcome to SHAZAM - Version 9.0  -  JAN 2002 SYSTEM=WIN-XP   PAR= 70000
CURRENT WORKING DIRECTORY IS: C:\Shazam\
|_par 70000
..PAR IS  70000 MAXIMUM VARIABLES IS   1000
|_file 11 nonres_hed_flat_file_6_06_10.csv
UNIT 11 IS NOW ASSIGNED TO: nonres_hed_flat_file_6_06_10.csv
|_read (11) v1-v68/skiplines=1

...SAMPLE RANGE IS NOW SET TO:         1      1572
|_genr lv3=log(v3)
|_genr lv4=log(v4)
|_genr lv5=log(v5)
|_genr lv6=log(v6)
|_genr lv17=log(v17)
|_genr lv36=log(v36)
|_genr lv37=log(v37)
|_genr lv38=log(v38)
|_genr lv39=log(v39)
|_genr lv40=log(v40)

|_ols lv3 lv4-lv6 v7-v16 lv17 v18-v32 lv36-lv40 v41-v42 v47-v54 v56-v59 v61-
v67/weight=v68

REQUIRED MEMORY IS PAR=    1700 CURRENT PAR=   70000
OLS ESTIMATION
1572 OBSERVATIONS     DEPENDENT VARIABLE= LV3
...NOTE..SAMPLE RANGE SET TO:      1,   1572
SUM OF LOG(SQRT(ABS(WEIGHT)))  =  -202.11

R-SQUARE =   0.9254     R-SQUARE ADJUSTED =   0.9227
VARIANCE OF THE ESTIMATE-SIGMA**2 =  0.10700
STANDARD ERROR OF THE ESTIMATE-SIGMA =  0.32711
SUM OF SQUARED ERRORS-SSE=   162.21
MEAN OF DEPENDENT VARIABLE =   13.000
LOG OF THE LIKELIHOOD FUNCTION = -647.509
```

| VARIABLE NAME | ESTIMATED COEFFICIENT | STANDARD ERROR | T-RATIO 1516 DF | P-VALUE | PARTIAL CORR. | STANDARDIZED COEFFICIENT | ELASTICITY AT MEANS |
|---|---|---|---|---|---|---|---|
| LV4 | 0.74191 | 0.1786E-01 | 41.55 | 0.000 | 0.730 | 0.8232 | 0.4462 |
| LV5 | 0.12092 | 0.1428E-01 | 8.467 | 0.000 | 0.213 | 0.2670 | 0.0690 |
| LV6 | -0.74418E-01 | 0.1221E-01 | -6.093 | 0.000 | -0.155 | -0.0765 | -0.0167 |
| V7 | 0.13242 | 0.6171E-01 | 2.146 | 0.032 | 0.055 | 0.0432 | 0.0018 |
| V8 | 0.84013E-01 | 0.5957E-01 | 1.410 | 0.159 | 0.036 | 0.0334 | 0.0021 |
| V9 | 0.18835 | 0.1468 | 1.283 | 0.200 | 0.033 | 0.0109 | 0.0001 |
| V10 | 0.22601E-01 | 0.6370E-01 | 0.3548 | 0.723 | 0.009 | 0.0096 | 0.0008 |
| V11 | -0.16828 | 0.5778E-01 | -2.913 | 0.004 | -0.075 | -0.0296 | -0.0006 |
| V12 | 0.16882 | 0.3990E-01 | 4.231 | 0.000 | 0.108 | 0.0440 | 0.0116 |
| V13 | -0.92528E-01 | 0.3893E-01 | -2.377 | 0.018 | -0.061 | -0.0381 | -0.0027 |
| V14 | 0.33196E-01 | 0.1639 | 0.2026 | 0.839 | 0.005 | 0.0139 | 0.0011 |
| V15 | 0.20767 | 0.1662 | 1.250 | 0.212 | 0.032 | 0.0832 | 0.0053 |
| V16 | 0.41106 | 0.1705 | 2.411 | 0.016 | 0.062 | 0.1500 | 0.0077 |
| LV17 | 0.88728E-01 | 0.3132E-01 | 2.833 | 0.005 | 0.073 | 0.0668 | 0.0056 |
| V18 | -0.21829 | 0.7101E-01 | -3.074 | 0.002 | -0.079 | -0.0922 | -0.0074 |
| V19 | -0.94656E-01 | 0.7294E-01 | -1.298 | 0.195 | -0.033 | -0.0381 | -0.0025 |
| V20 | 0.13593 | 0.1324 | 1.027 | 0.305 | 0.026 | 0.0287 | 0.0007 |
| V21 | 0.42751E-01 | 0.5441E-01 | 0.7857 | 0.432 | 0.020 | 0.0113 | 0.0004 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| V22 | 0.24134 | 0.3844E-01 | 6.279 | 0.000 | 0.159 | 0.0973 | 0.0122 |
| V23 | 0.11242 | 0.3448E-01 | 3.261 | 0.001 | 0.083 | 0.0294 | 0.0077 |
| V24 | 0.15402 | 0.5166E-01 | 2.981 | 0.003 | 0.076 | 0.0639 | 0.0072 |
| V25 | -0.10686 | 0.1552 | -0.6887 | 0.491 | -0.018 | -0.0454 | -0.0039 |
| V26 | -0.17208 | 0.1603 | -1.074 | 0.283 | -0.028 | -0.0728 | -0.0059 |
| V27 | 0.38178E-01 | 0.1874 | 0.2037 | 0.839 | 0.005 | 0.0162 | 0.0015 |
| V28 | 0.39314 | 0.1772 | 2.218 | 0.027 | 0.057 | 0.1672 | 0.0152 |
| V29 | -0.61411 | 0.8116E-01 | -7.567 | 0.000 | -0.191 | -0.2590 | -0.0266 |
| V30 | 0.74751E-01 | 0.4365E-01 | 1.713 | 0.087 | 0.044 | 0.0317 | 0.0027 |
| V31 | 0.10738 | 0.5089E-01 | 2.110 | 0.035 | 0.054 | 0.0405 | 0.0022 |
| V32 | 0.27002 | 0.4988E-01 | 5.414 | 0.000 | 0.138 | 0.0670 | 0.0019 |
| LV36 | -0.47756E-02 | 0.4642E-01 | -0.1029 | 0.918 | -0.003 | -0.0051 | -0.0022 |
| LV37 | 0.45372E-02 | 0.3696E-01 | 0.1228 | 0.902 | 0.003 | 0.0022 | 0.0024 |
| LV38 | -0.23503E-01 | 0.7476E-01 | -0.3144 | 0.753 | -0.008 | -0.0069 | -0.0058 |
| LV39 | 0.64722E-01 | 0.4212E-01 | 1.537 | 0.125 | 0.039 | 0.0192 | 0.0360 |
| LV40 | 0.21777 | 0.5276E-01 | 4.127 | 0.000 | 0.105 | 0.0643 | 0.0151 |
| V41 | -0.48552E-02 | 0.3305E-01 | -0.1469 | 0.883 | -0.004 | -0.0013 | -0.0003 |
| V42 | 0.52644E-01 | 0.3834E-01 | 1.373 | 0.170 | 0.035 | 0.0206 | 0.0012 |
| V47 | 0.28994 | 0.8189E-01 | 3.541 | 0.000 | 0.091 | 0.0417 | 0.0007 |
| V48 | 0.26142 | 0.2133 | 1.226 | 0.221 | 0.031 | 0.0179 | 0.0001 |
| V49 | 0.41223 | 0.1246 | 3.309 | 0.001 | 0.085 | 0.0480 | 0.0006 |
| V50 | -0.49542 | 0.1276 | -3.881 | 0.000 | -0.099 | -0.1137 | -0.0030 |
| V51 | 0.48992 | 0.1018 | 4.813 | 0.000 | 0.123 | 0.1091 | 0.0028 |
| V52 | 0.53723 | 0.1029 | 5.222 | 0.000 | 0.133 | 0.0853 | 0.0015 |
| V53 | 0.21256 | 0.1079 | 1.971 | 0.049 | 0.051 | 0.0288 | 0.0004 |
| V54 | 0.19375 | 0.9769E-01 | 1.983 | 0.048 | 0.051 | 0.0352 | 0.0007 |
| V56 | -0.87395E-01 | 0.1084 | -0.8061 | 0.420 | -0.021 | -0.0113 | -0.0002 |
| V57 | 1.1221 | 0.1759 | 6.380 | 0.000 | 0.162 | 0.1902 | 0.0036 |
| V58 | 0.16787 | 0.7227E-01 | 2.323 | 0.020 | 0.060 | 0.0489 | 0.0018 |
| V59 | -0.56513E-01 | 0.2159 | -0.2618 | 0.794 | -0.007 | -0.0035 | 0.0000 |
| V61 | 0.96325E-01 | 0.8459E-01 | 1.139 | 0.255 | 0.029 | 0.0112 | 0.0001 |
| V62 | 0.57345E-01 | 0.1302 | 0.4403 | 0.660 | 0.011 | 0.0040 | 0.0000 |
| V63 | -0.13310E-02 | 0.1292 | -0.1030E-01 | 0.992 | 0.000 | -0.0001 | 0.0000 |
| V64 | 1.2149 | 0.1448 | 8.392 | 0.000 | 0.211 | 0.4391 | 0.0221 |
| V65 | 0.60210 | 0.1528 | 3.939 | 0.000 | 0.101 | 0.0361 | 0.0002 |
| V66 | 0.35877 | 0.2178 | 1.647 | 0.100 | 0.042 | 0.0717 | 0.0016 |
| V67 | 0.20390 | 0.7876E-01 | 2.589 | 0.010 | 0.066 | 0.0455 | 0.0012 |
| CONSTANT | 4.9711 | 0.5691 | 8.735 | 0.000 | 0.219 | 0.0000 | 0.3824 |

..INPUT FILE COMPLETED..TYPE A NEW COMMAND OR TYPE: STOP

## Table Ten – Design and Area Coefficients for Central City, Old Central City Main Streets, New Suburban Centers, Old Suburban Strip Corridors and Old Suburban City Cores

```
CURRENT WORKING DIRECTORY IS: C:\Shazam\
|_par 70000
..PAR IS  70000 MAXIMUM VARIABLES IS   1000
|_file 11 nonres_hed_flat_file_6_30_10.csv
UNIT 11 IS NOW ASSIGNED TO: nonres_hed_flat_file_6_30_10.csv
|_read (11) v1-v45/skiplines=2

...SAMPLE RANGE IS NOW SET TO:         1      1572
|_genr lv3=log(v3)
|_genr lv4=log(v4)
|_genr lv5=log(v5)
|_genr lv6=log(v6)
|_genr lv17=log(v17)
```

```
|_genr lv34=log(v34)
|_genr lv35=log(v35)
|_genr lv36=log(v36)
|_genr cclv50=v40*lv4
|_genr cclv51=v40*lv5
|_genr cclv52=v40*lv6
|_genr ccv53=v40*v13
|_genr ccv54=v40*v14
|_genr ccv55=v40*v15
|_genr ccv56=v40*v16
|_genr cclv57=v40*lv17
|_genr ccv58=v40*v22
|_genr ccv59=v40*v23
|_genr ccv60=v40*v24
|_genr ccv61=v40*v25
|_genr ccv62=v40*v26
|_genr ccv63=v40*v27
|_genr ccv64=v40*v28
|_genr ccv65=v40*v29
|_genr ccv66=v40*v30
|_genr ccv67=v40*v31
|_genr ccv68=v40*v32
|_genr ccv69=v40*v33
|_genr cclv70=v40*lv34
|_genr cclv71=v40*lv35
|_genr cclv72=v40*lv36
|_genr ccv73=v40*v37
|_genr ccv74=v40*v38
|_genr ccv75=v40*v39
|_genr mslv50=v41*lv4
|_genr mslv51=v41*lv5
|_genr mslv52=v41*lv6
|_genr msv53=v41*v13
|_genr msv54=v41*v14
|_genr msv55=v41*v15
|_genr msv56=v41*v16
|_genr mslv57=v41*lv17
|_genr msv58=v41*v22
|_genr msv59=v41*v23
|_genr msv60=v41*v24
|_genr msv61=v41*v25
|_genr msv62=v41*v26
|_genr msv63=v41*v27
|_genr msv64=v41*v28
|_genr msv65=v41*v29
|_genr msv66=v41*v30
|_genr msv67=v41*v31
|_genr msv68=v41*v32
|_genr msv69=v41*v33
|_genr mslv70=v41*lv34
|_genr mslv71=v41*lv35
|_genr mslv72=v41*lv36
|_genr msv73=v41*v37
|_genr msv74=v41*v38
|_genr msv75=v41*v39
|_genr sclv50=v43*lv4
|_genr sclv51=v43*lv5
|_genr sclv52=v43*lv6
|_genr scv53=v43*v13
|_genr scv54=v43*v14
|_genr scv55=v43*v15
|_genr scv56=v43*v16
|_genr sclv57=v43*lv17
|_genr scv58=v43*v22
|_genr scv59=v43*v23
|_genr scv60=v43*v24
|_genr scv61=v43*v25
|_genr scv62=v43*v26
|_genr scv63=v43*v27
|_genr scv64=v43*v28
|_genr scv65=v43*v29
```

```
|_genr scv66=v43*v30
|_genr scv67=v43*v31
|_genr scv68=v43*v32
|_genr scv69=v43*v33
|_genr sclv70=v43*lv34
|_genr sclv71=v43*lv35
|_genr sclv72=v43*lv36
|_genr scv73=v43*v37
|_genr scv74=v43*v38
|_genr scv75=v43*v39
|_genr sslv50=v44*lv4
|_genr sslv51=v44*lv5
|_genr sslv52=v44*lv6
|_genr ssv53=v44*v13
|_genr ssv54=v44*v14
|_genr ssv55=v44*v15
|_genr ssv56=v44*v16
|_genr sslv57=v44*lv17
|_genr ssv58=v44*v22
|_genr ssv59=v44*v23
|_genr ssv60=v44*v24
|_genr ssv61=v44*v25
|_genr ssv62=v44*v26
|_genr ssv63=v44*v27
|_genr ssv64=v44*v28
|_genr ssv65=v44*v29
|_genr ssv66=v44*v30
|_genr ssv67=v44*v31
|_genr ssv68=v44*v32
|_genr ssv69=v44*v33
|_genr sslv70=v44*lv34
|_genr sslv71=v44*lv35
|_genr sslv72=v44*lv36
|_genr ssv73=v44*v37
|_genr ssv74=v44*v38
|_genr ssv75=v44*v39
|_genr oslv50=v42*lv4
|_genr oslv51=v42*lv5
|_genr oslv52=v42*lv6
|_genr oslv57=v42*lv17
|_genr osv58=v42*v22
|_genr osv59=v42*v23
|_genr oslv71=v42*lv35
|_genr oslv72=v42*lv36
|_genr osv75=v42*v39

|_ols lv3 v7-v16 v26-v29 cclv50-cclv52 cclv57 ccv58-ccv59  cclv71 cclv72 ccv73-ccv75 &
| mslv50-mslv52 mslv57 msv58-msv59  mslv71 mslv72 msv73-msv75 sclv50-sclv52 &
| sclv57 scv58-scv59 sclv71 sclv72 scv73-scv75 sslv50-sslv52 sslv57 ssv58-ssv59 &
| sslv70-sslv72 ssv73-ssv75 oslv50-oslv52 oslv57 osv58 osv59 oslv71 oslv72 osv75/restrict

REQUIRED MEMORY IS PAR=    2937 CURRENT PAR=   70000
OLS ESTIMATION
1572 OBSERVATIONS     DEPENDENT VARIABLE= LV3
...NOTE..SAMPLE RANGE SET TO:      1,   1572
|_restrict cclv51=.05
|_end
F TEST ON RESTRICTIONS=   50.927     WITH    1 AND 1503 DF  P-VALUE= 0.00000

R-SQUARE =   0.9372     R-SQUARE ADJUSTED =   0.9344
VARIANCE OF THE ESTIMATE-SIGMA**2 =  0.80578E-01
STANDARD ERROR OF THE ESTIMATE-SIGMA =  0.28386
SUM OF SQUARED ERRORS-SSE=   121.19
MEAN OF DEPENDENT VARIABLE =   12.896
LOG OF THE LIKELIHOOD FUNCTION = -216.250


VARIABLE   ESTIMATED  STANDARD   T-RATIO        PARTIAL STANDARDIZED ELASTICITY
NAME    COEFFICIENT   ERROR    1504 DF   P-VALUE CORR. COEFFICIENT  AT MEANS
V7        0.18558     0.6423E-01   2.889     0.004 0.074     0.0656     0.0027
V8        0.14722     0.6205E-01   2.373     0.018 0.061     0.0610     0.0034
```

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| V9 | 0.52762 | 0.1540 | 3.425 | 0.001 | 0.088 | 0.0317 | 0.0002 |
| V10 | 0.25291E-01 | 0.6538E-01 | 0.3868 | 0.699 | 0.010 | 0.0114 | 0.0010 |
| V11 | 0.81082E-01 | 0.5568E-01 | 1.456 | 0.146 | 0.038 | 0.0141 | 0.0002 |
| V12 | 0.17224 | 0.4212E-01 | 4.089 | 0.000 | 0.105 | 0.0422 | 0.0123 |
| V13 | -0.65874E-01 | 0.3928E-01 | -1.677 | 0.094 | -0.043 | -0.0292 | -0.0021 |
| V14 | -0.90704E-01 | 0.1325 | -0.6844 | 0.494 | -0.018 | -0.0406 | -0.0030 |
| V15 | -0.14585 | 0.1341 | -1.087 | 0.277 | -0.028 | -0.0562 | -0.0027 |
| V16 | 0.10577E-01 | 0.1376 | 0.7687E-01 | 0.939 | 0.002 | 0.0045 | 0.0003 |
| V26 | 0.13387 | 0.4309E-01 | 3.106 | 0.002 | 0.080 | 0.0604 | 0.0050 |
| V27 | 0.14980E-01 | 0.1612 | 0.9291E-01 | 0.926 | 0.002 | 0.0068 | 0.0006 |
| V28 | 0.27764 | 0.1605 | 1.729 | 0.084 | 0.045 | 0.1252 | 0.0104 |
| V29 | -0.44314 | 0.6578E-01 | -6.737 | 0.000 | -0.171 | -0.1995 | -0.0184 |
| CCLV50 | 0.87448 | 0.2106E-01 | 41.52 | 0.000 | 0.731 | 2.7314 | 0.1630 |
| CCLV51 | 0.50000E-01 | 0.000 | ------------ | 0.000 | 1.000 | 0.1038 | 0.0056 |
| CCLV52 | 0.18300E-02 | 0.2006E-01 | 0.9123E-01 | 0.927 | 0.002 | 0.0021 | 0.0001 |
| CCLV57 | 0.28242 | 0.3868E-01 | 7.302 | 0.000 | 0.185 | 0.2708 | 0.0149 |
| CCV58 | -2.3589 | 0.8830 | -2.672 | 0.008 | -0.069 | -1.0014 | -0.0604 |
| CCV59 | 0.10078 | 0.5051E-01 | 1.995 | 0.046 | 0.051 | 0.0414 | 0.0023 |
| CCLV71 | -0.90604E-01 | 0.7915E-01 | -1.145 | 0.253 | -0.030 | -0.2745 | -0.0165 |
| CCLV72 | 0.71134 | 0.2886 | 2.465 | 0.014 | 0.063 | 0.2117 | 0.0127 |
| CCV73 | -0.79904E-02 | 0.3504E-01 | -0.2280 | 0.820 | -0.006 | -0.0030 | -0.0001 |
| CCV74 | 0.10482 | 0.1757 | 0.5967 | 0.551 | 0.015 | 0.0041 | 0.0000 |
| CCV75 | 2.1892 | 0.2137 | 10.25 | 0.000 | 0.255 | 0.7734 | 0.0461 |
| MSLV50 | 0.54908 | 0.4176E-01 | 13.15 | 0.000 | 0.321 | 1.1611 | 0.0318 |
| MSLV51 | 0.21459 | 0.4378E-01 | 4.902 | 0.000 | 0.125 | 0.4833 | 0.0132 |
| MSLV52 | -0.18989 | 0.3208E-01 | -5.920 | 0.000 | -0.151 | -0.1996 | -0.0053 |
| MSLV57 | -0.90470E-01 | 0.7470E-01 | -1.211 | 0.226 | -0.031 | -0.0151 | -0.0003 |
| MSV58 | 0.48615 | 0.1771 | 2.745 | 0.006 | 0.071 | 0.1262 | 0.0034 |
| MSV59 | 0.12735 | 0.6262E-01 | 2.034 | 0.042 | 0.052 | 0.0288 | 0.0007 |
| MSLV71 | -0.46000 | 0.1157 | -3.976 | 0.000 | -0.102 | -0.8194 | -0.0226 |
| MSLV72 | 0.21456 | 0.1528 | 1.404 | 0.161 | 0.036 | 0.0464 | 0.0012 |
| MSV73 | 3.5461 | 0.8655 | 4.097 | 0.000 | 0.105 | 0.9320 | 0.0257 |
| MSV74 | 0.44235E-01 | 0.7824E-01 | 0.5653 | 0.572 | 0.015 | 0.0056 | 0.0001 |
| MSV75 | -0.31675 | 0.2672 | -1.186 | 0.236 | -0.031 | -0.0260 | -0.0006 |
| SCLV50 | 0.81147 | 0.4771E-01 | 17.01 | 0.000 | 0.402 | 2.1571 | 0.0787 |
| SCLV51 | 0.10924 | 0.3748E-01 | 2.915 | 0.004 | 0.075 | 0.2873 | 0.0101 |
| SCLV52 | -0.10247 | 0.2190E-01 | -4.678 | 0.000 | -0.120 | -0.0833 | -0.0028 |
| SCLV57 | -0.30839 | 0.9303E-01 | -3.315 | 0.001 | -0.085 | -0.0774 | -0.0025 |
| SCV58 | -0.93570E-01 | 0.1543 | -0.6064 | 0.544 | -0.016 | -0.0048 | 0.0000 |
| SCV59 | -0.83963E-01 | 0.7278 | -0.1154 | 0.908 | -0.003 | -0.0278 | -0.0010 |
| SCLV71 | -0.52184E-01 | 0.6075E-01 | -0.8590 | 0.390 | -0.022 | -0.1264 | -0.0047 |
| SCLV72 | 0.30244 | 0.1152 | 2.624 | 0.009 | 0.068 | 0.1392 | 0.0049 |
| SCV73 | -0.92814E-01 | 0.3363 | -0.2760 | 0.783 | -0.007 | -0.0307 | -0.0011 |
| SCV74 | 0.12489E-01 | 0.1010 | 0.1236 | 0.902 | 0.003 | 0.0038 | 0.0001 |
| SCV75 | 1.1376 | 0.2581 | 4.408 | 0.000 | 0.113 | 0.0781 | 0.0020 |
| SSLV50 | 0.62859 | 0.2246E-01 | 27.99 | 0.000 | 0.585 | 2.0656 | 0.1218 |
| SSLV51 | 0.17092 | 0.1554E-01 | 11.00 | 0.000 | 0.273 | 0.6136 | 0.0355 |
| SSLV52 | -0.10031 | 0.1648E-01 | -6.086 | 0.000 | -0.155 | -0.1389 | -0.0077 |
| SSLV57 | -0.53731E-01 | 0.4612E-01 | -1.165 | 0.244 | -0.030 | -0.0143 | -0.0005 |
| SSV58 | 0.27041 | 0.3694E-01 | 7.320 | 0.000 | 0.185 | 0.1018 | 0.0047 |
| SSV59 | 0.19328 | 0.1097 | 1.762 | 0.078 | 0.045 | 0.0816 | 0.0049 |
| SSLV70 | 0.28666 | 0.1445 | 1.984 | 0.047 | 0.051 | 0.4210 | 0.0253 |
| SSLV71 | -0.14440 | 0.6334E-01 | -2.280 | 0.023 | -0.059 | -0.4519 | -0.0271 |
| SSLV72 | 0.52824 | 0.6368E-01 | 8.295 | 0.000 | 0.209 | 0.2070 | 0.0114 |
| SSV73 | -0.17849 | 0.1022 | -1.746 | 0.081 | -0.045 | -0.0751 | -0.0044 |
| SSV74 | -0.33064E-01 | 0.3663E-01 | -0.9026 | 0.367 | -0.023 | -0.0095 | -0.0003 |
| SSV75 | -2.6538 | 0.5240 | -5.064 | 0.000 | -0.129 | -0.0916 | -0.0049 |
| OSLV50 | 0.45238 | 0.4894E-01 | 9.243 | 0.000 | 0.232 | 0.9229 | 0.0244 |
| OSLV51 | 0.41711 | 0.4928E-01 | 8.464 | 0.000 | 0.213 | 0.9291 | 0.0245 |
| OSLV52 | -0.80288E-01 | 0.4195E-01 | -1.914 | 0.056 | -0.049 | -0.0697 | -0.0017 |
| OSLV57 | 0.20546 | 0.9210E-01 | 2.231 | 0.026 | 0.057 | 0.0341 | 0.0007 |
| OSV58 | 0.15765 | 0.9129E-01 | 1.727 | 0.084 | 0.044 | 0.0363 | 0.0009 |
| OSV59 | -0.14419 | 0.7694E-01 | -1.874 | 0.061 | -0.048 | -0.0324 | -0.0007 |
| OSLV71 | -0.11644 | 0.6455E-01 | -1.804 | 0.071 | -0.046 | -0.2097 | -0.0056 |
| OSLV72 | 0.55185 | 0.1200 | 4.600 | 0.000 | 0.118 | 0.1227 | 0.0031 |
| OSV75 | -4.7903 | 2.284 | -2.097 | 0.036 | -0.054 | -0.1092 | -0.0028 |
| CONSTANT | 6.3221 | 0.5366 | 11.78 | 0.000 | 0.291 | 0.0000 | 0.4902 |

..INPUT FILE COMPLETED..TYPE A NEW COMMAND OR TYPE: STOP