Public Infrastructure Costs

Case Studies

July 2009

Introduction

Purpose

The region is in the process of deciding where and how to grow. These decisions will have long-term financial costs and benefits for current and future residents. An understanding of the factors that contribute to infrastructure costs will be essential to making those decisions.

To assist in the region's discussions about growth management, this report focuses on the capital costs and capacity of public infrastructure provision for new and infill developments throughout the region. This report uses a variety of analyses and information to provide a beginning framework for future conversations on infrastructure investment. Local case studies analyzing residential and employment areas throughout the region help illustrate the distinct factors that influence infrastructure costs.

Report Findings and Conclusions

A few things are readily apparent from the information gained in this report:

- Public infrastructure is extremely expensive. Even in locations where existing infrastructure has adequate capacity and can be extended to serve newly developing properties, it is not cheap.

- There is so much variation from one site to the next that it is difficult to make meaningful comparisons. One site already has available infrastructure and the next does not. One has steep slopes and the next does not. One has good connectivity and the next does not. The list goes on.

- Infrastructure to serve development is generally less expensive where infrastructure is already in place, even if the existing infrastructure needs maintenance work or capacity upgrades.

- Only the developments that have been fully built-out can claim to have accurate information on infrastructure cost. All the rest are estimates. Even where sites have been fully developed, it is not possible to accurately identify all of the regional infrastructure costs that result.

- Public infrastructure is an essential part of our quality of life. Given that the region must find a way to accommodate a million more residents in the next 20 to 30 years, and to do it in vibrant and sustainable communities, the public's understanding of the costs of building and maintaining that infrastructure is critical. The public will be asked to invest

even more in infrastructure in the future and should demand a meaningful return on that investment.

- This report provides only a general estimate of the demands created by local development on regional infrastructure. Each case study includes data on average commute distances, but does not include specific cost estimates for regional infrastructure. Unlike local and community infrastructure costs, there is no mechanism in place to collect revenues from developments to pay for regional infrastructure.

Summary of Cost Findings

Some of the developments studied here have already been built, others are still at the concept planning stage. Some are intended exclusively for housing development, while others are intended to create new jobs. Most include both jobs and housing. The following list shows the range of cost estimates for local infrastructure that have been found.

A review of the summary numbers that follow makes it obvious how varied these case studies are. Comparing the first four cases listed below (Shute Road, Coffee Creek, S.W. Tualatin and Lake View Village) shows how different they are – in spite of the fact that they are all planned for non-residential development. Additional to the infrastructure costs per job created, the following differences are noted:

Lake View Village is a commercial development within a downtown redevelopment area. While it created more than 200 jobs, its primary function was to support and stimulate redevelopment of the surrounding properties. Most of its costs went for the development of a public parking structure; something not anticipated in the other three areas. The other three areas are primarily planned for industrial uses.

Shute Road has the lowest anticipated local infrastructure cost per job. That is primarily because of the existing infrastructure and road network in the area.

S. W. Tualatin will require major upgrades to its surrounding streets to be viable. On a per-job basis, these local transportation costs are expected to be more than four times as high as those of the Shute Road area.

The Coffee Creek area is expected to have local infrastructure costs that are almost as high as the Shute Road area, while resulting in less than half as much job creation.

Project status (as of April 2009):

*	Planning not complete
**	Plan complete (not necessarily adopted)
***	Development underway
****	Development complete

Job Creation Only

Shute Road area (Hillsboro)***
3,660 jobs $9,136,000 local infrastructure cost: +/-$2,500/job

Coffee Creek area (Wilsonville)**
1,474 jobs $8,058,000 local infrastructure cost: +/-$5,500/job

S.W. Tualatin*
5,760 jobs $60,627,000 local infrastructure cost:+/- $10,500/job

Lake View Village (Lake Oswego)****
207 jobs $5,116,000 local infrastructure cost: +/-$24,500/job

Housing Only

Witch Hazel area (Hillsboro)***
2,000 units $39,560,000 local infrastructure cost: +/- $20,000/unit

Park Place area (Oregon City)**
1,458 units $71,760,000 local infrastructure cost: +/-$49,000/unit

In other areas studied, which have been planned primarily (but not exclusively) for housing or for job creation, per unit and per job costs are somewhat more generalized and should be considered only as "order of magnitude" estimates. These include:

Primarily Job Creation

Brewery Blocks (Portland)****
2,440 jobs (113 units) $40,647,000 local infrastructure cost: +/- $13,500 to $15,000/job

Springwater (Gresham)**
15,330 jobs (1,456 units) $375,791,000 local infrastructure cost: +/- $16,500 to $24,000/job

Primarily Housing

Rock Creek (Happy Valley)***
2,932 units (619 jobs) $48,796,000 local infrastructure cost: +/- $14,000 to $16,000/unit

South Hillsboro**
10,182 units (879 jobs) $295,517,000 local infrastructure cost: +/- $26,000 to $28,500/unit

North Bethany (Washington County)**
5,000 units (276 jobs) $416,633,000 local infrastructure cost: +/- $79,000 to $82,500/unit

Job/Housing Mix

N. Main (Milwaukie)****
95 units (40 jobs) $919,000 local infrastructure cost

Civic (Gresham)****
636 units (2,433 jobs) $11,606,000 local infrastructure cost

Beavercreek Road (Oregon City)**
1,450 units (3.652 jobs) $115,900,000 local infrastructure cost

Pleasant Valley (Gresham and Portland)**
4,926 units (4,935 jobs) $304,073,000 local infrastructure cost

S. Waterfront (Portland) ***
10,000 units (3,600 jobs) $323,457,000 local infrastructure cost

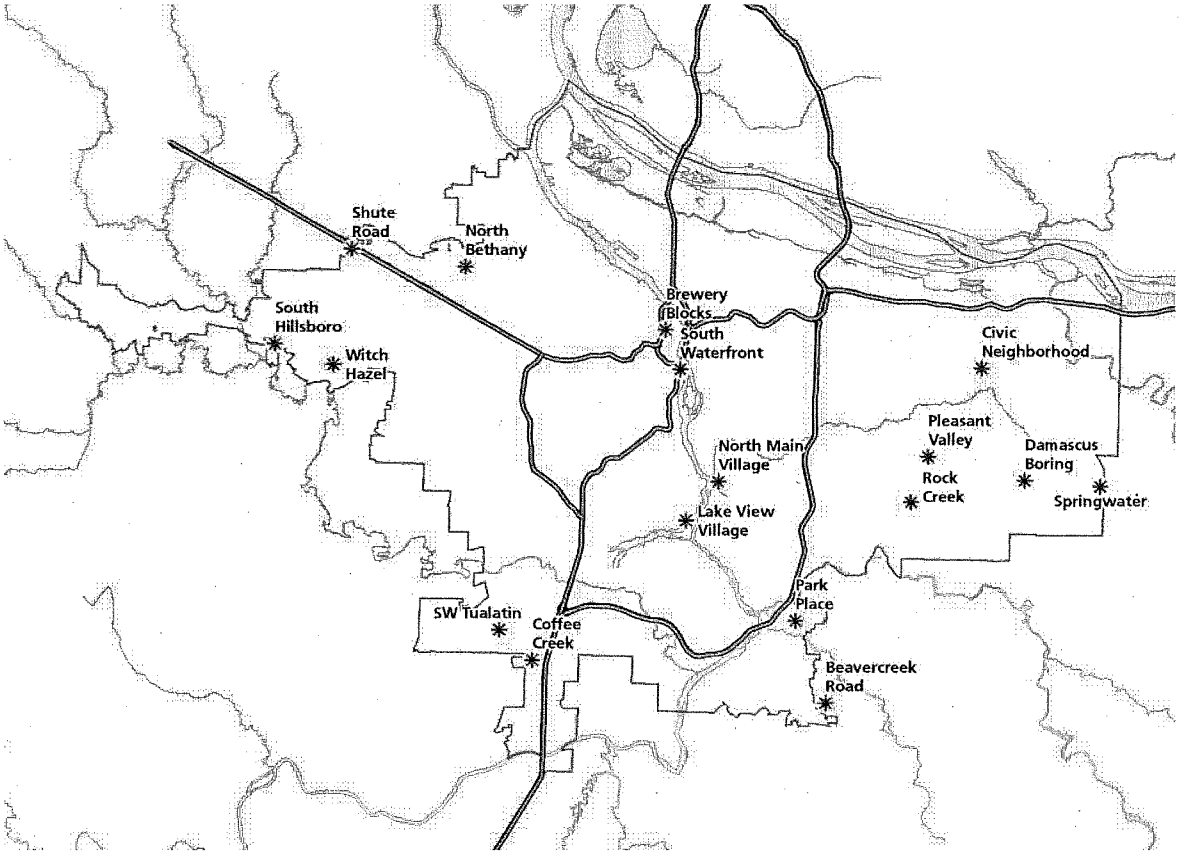
Damascus/East Happy Valley* (Planning complete for Happy Valley portion.)
21,934 units (45,000 jobs) $3,119,295,000 local infrastructure cost

Local Case Study Analysis

The developments used in the local case study analysis are each unique, having different benefits, proposed uses, levels of service, surrounding uses, and topography. Since each case study is distinct, the analysis clearly shows factors that differ between case study areas. So, as a whole, the case studies help to illustrate the general lessons that can be learned from current infrastructure investments and provide one useful means of understanding what factors can influence infrastructure costs.

Although these case studies focus on specific geographic areas, each location exists as part of a larger community. Because of this, it is not possible to isolate every cost or benefit of the study areas relative to those larger communities. For instance, a study area may include amenities (e.g., a public park or a parking structure) that serve surrounding properties. In another instance, properties near the study area may be providing amenities that benefit the study area. No effort has been made to attempt to quantify these characteristics.

Case study locations



Methods

Types of infrastructure considered

The focus of this analysis is on the following categories of infrastructure:

- Civic buildings, parking structures, public plazas
- Regional facilities such as marine and air ports
- Parks
- Sanitary Sewers
- Schools
- Stormwater
- Transportation
    - Roads, bridges, highways
    - Transit, bike, pedestrian
- Water

Reconciling differences between case studies

Generally speaking, one job will place fewer demands on infrastructure than will one household. However, different kinds of employment can place very different demands on infrastructure. It is also not possible to be exact in comparing costs from one unique geographic area to another.

Because the developments included in this analysis span several years, all costs have been shown in first quarter 2008 dollars.

Return on public investment

In an era of insufficient infrastructure funding, a primary concern for policy makers needs to be cost effectiveness of different public infrastructure investments. This report is intended to allow for some discussion of the return on public investments in infrastructure. This report documents how much it costs to provide infrastructure to serve new households and employees in each study area. This analysis, however, does not incorporate all of the costs faced by the private sector in building out any given development.

The number of households and jobs created as a result of public infrastructure investment is by no means the only return on investment that should be considered. The quality of the communities that are created through these investments and their possible contributions to local and regional goals are also essential considerations. This report does not attempt to judge the relative benefits of investments in different developments as each area is different.

Types of costs

This analysis used case studies to evaluate and identify factors that can influence infrastructure costs, but it is limited in its scope. Specifically, this report only documents the capital costs of providing new local infrastructure. Nor does it include the cost of ongoing maintenance and operations of public facilities. It should be emphasized that those ongoing costs can be more significant than the initial costs of infrastructure. (A good example would be sewer service to a specific site. It might be initially less expensive to serve the area with pumps than with gravity, but the long-term costs of operating and maintaining a pump system could easily exceed the initial savings.) Finally, this report does not capture the infrastructure costs and savings to individual homeowners and employers in the region.

Different scales of infrastructure

This report divides infrastructure into two categories, depending on the infrastructure's user base:

- Local / community infrastructure
- Regional infrastructure

These two categories are described below.

Local / Community Infrastructure

Local / community facilities are those that are most directly necessitated by a particular development. The costs of these facilities are typically well documented and case studies are a useful way to understand them.

- Costs for newly urbanizing areas were taken from concept plans. These costs are early estimates that will, no doubt, change as plans are refined.

- Costs for urban redevelopment projects were provided by the responsible urban renewal and planning agencies and are for completed projects.

- Costs that were included in concept plans, but that can be categorized as regional costs (e.g., state highway improvements), were deducted from local/community costs.

- Local planning and urban renewal departments had the opportunity to review, comment on and correct case studies within their jurisdictions.

Regional Infrastructure

Regional infrastructure includes facilities such as highways, light rail, bridges, and marine and air terminals. Unlike local and community level facilities, it is difficult to link any particular development with the need for a regional facility. Instead, the need for regional facilities is cumulative in nature and their costs are rarely included in estimates for a particular development. It is also hard to separate the need to replace obsolete regional infrastructure from the need to replace regional infrastructure in order to increase capacity for increased population growth. However, local development does place certain demands on regional facilities and no direct method exists to pay for these regional costs to roads and bridges. Due to these factors, regional infrastructure costs can be difficult to completely isolate and understand, but still need to be considered in this analysis. Therefore, this report includes a general statement of the costs that these case study areas will place on regional infrastructure.

Past studies have focused on the costs of regional infrastructure. The cost assumptions listed below were based on these secondary sources: (Balboni, 2006) (Cogan, Sharpe, Cogan, 1990) (Sonny Conder Fiscal and Economic Consulting, 1991) (Speir & Stephenson, 2002) (United States Bureau of Economic Analysis, 1960-2005) (Waier, 2007).

Given that the trip generation patterns of different non-residential land uses vary so widely (e.g., from retail to warehousing) no effort has been made in this study to quantify the regional infrastructure costs that are attributable to each new job. Instead, each case study lists the projected commute distance in 2035 relative to the regional average, and the reader is encouraged to consider the regional cost implications of new jobs that result in different commute distances.

The estimated average cost of regional infrastructure per dwelling unit in the 7-county area (Clackamas, Multnomah, Washington, Clark, Yamhill, Marion, and Columbia counties) is approximately:

Transportation – transit (variable cost)	$ 3,000
Transportation – roads, bridges (variable cost)	$20,000
Transportation – marine, air (flat cost)	$ 1,500
Public facilities (flat cost)	$ 5,500
Average cost per dwelling unit of regional infrastructure	**$ 30,000**

Flat regional infrastructure costs

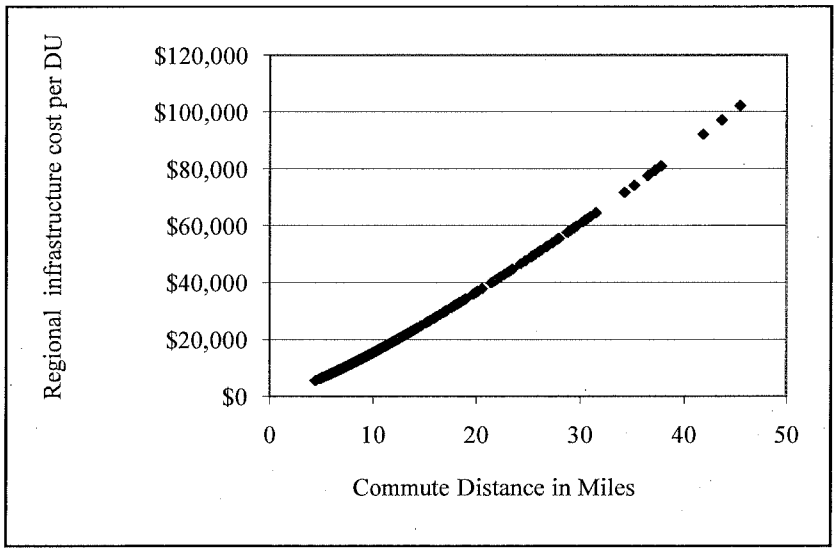
Using the above-cited sources of cost estimates, flat costs can be applied to each new household (with a somewhat lower assumption for each new job) for marine, air, and other non-transportation regional facilities. These costs are not for specific facilities, but are, instead, intended to represent the typical regional infrastructure demands that new households and jobs create. The use of a flat cost for these facilities is based on the assumption that, generally speaking, most households in the study areas will place similar demands on these types of facilities[1].

[1] Though this is clearly not the case, a flat cost is used in the absence of a more accurate means of estimating how frequently a particular household may, for instance, use the airport or purchase goods that were received in our region's marine ports.

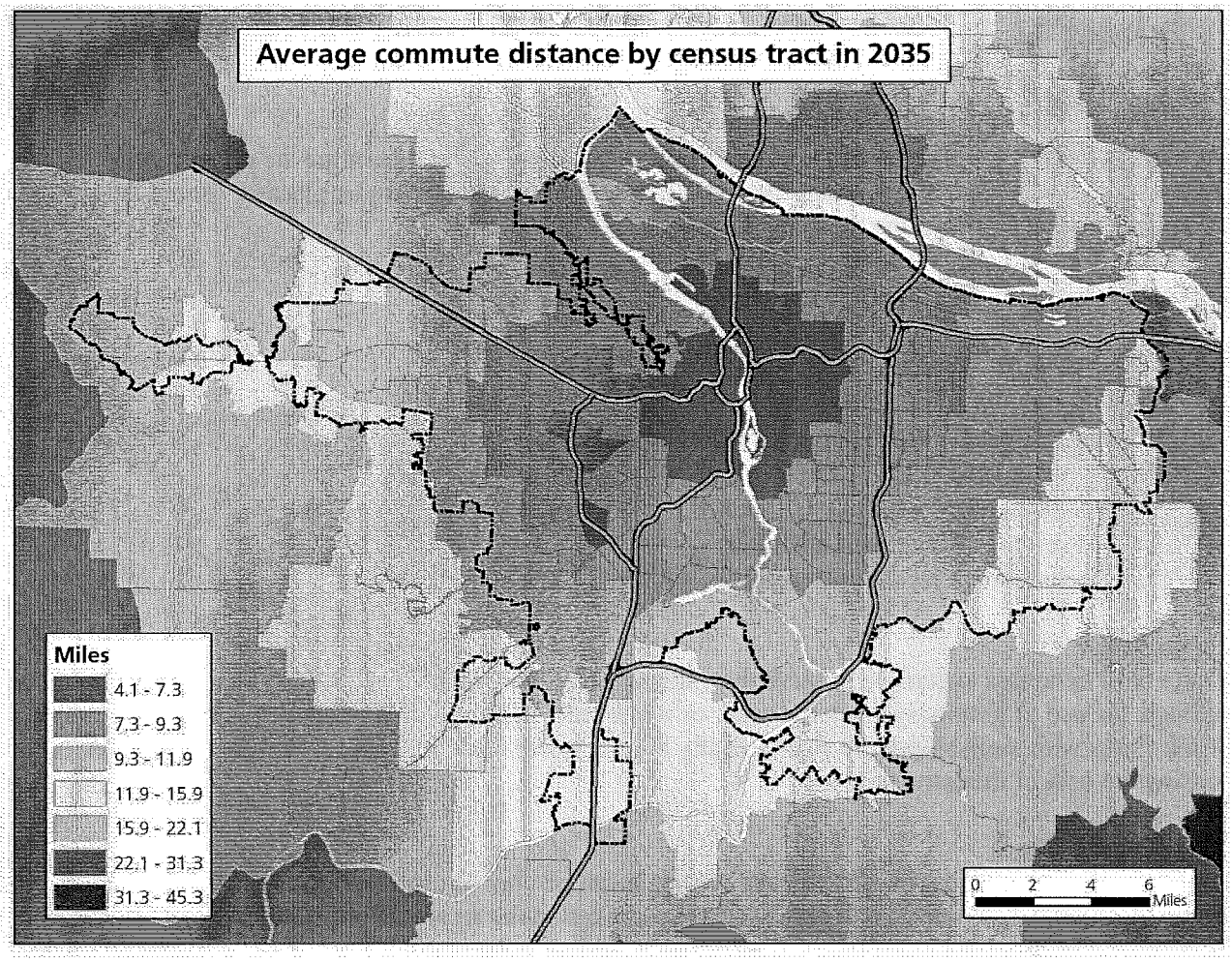
Variable regional infrastructure costs

To more accurately represent the differences in demand that different case study locations may place on regional transportation facilities (such as highways, transit and bridges), variable costs can be attributed.

A household that makes longer distance trips places greater demands on transportation facilities than a household that makes shorter trips. A household's demand for regional transportation facilities was assumed to vary according to forecast commute distances[2].



[2] Though commute travel is a relatively small portion of a household's total travel, it serves as a reasonable proxy for overall travel behavior. Households with relatively short commutes also tend to be relatively close to retail and other services, thereby reducing the length of other trips.



Using MetroScope[3], an integrated land use and transportation forecasting model, commute distances were estimated for new households and jobs in the region by the year 2035[4]. Commute distances that are reported in this analysis are one-way and calculated based on the job and household distributions that result from the modeled scenario.

The MetroScope model does not assume that all workers commute to the central city. Instead, the model measures commute distances from census tracts to a variety of employment centers throughout the region. As a result, proximity to any employment center in the region reduces the commute distance of a census tract.

[3] Because MetroScope cannot predict future policy changes made by cities or actions taken by firms or individuals, these forecasted commute distances are not a foregone conclusion. Policy changes and other dynamics (e.g. new regulations or changes in fuel costs) can serve to shorten or lengthen forecasted commutes. Generally, however, MetroScope scenarios can give reliable estimates of the likely outcomes of a given set of policy choices. The set of assumptions used in this scenario represents an extrapolation of past and current policy direction.

[4] Average commute distances are calculated at the census tract level.

Primary findings

Factors that can influence infrastructure costs

This case study analysis is not a statistical analysis that can definitively determine the effects of any particular factor on infrastructure costs. However, some general lessons can be gleaned. Some factors that can influence the costs of serving new development include:

- Site topography
- Environmental features
- Land ownership patterns
- Distance from existing infrastructure
- Presence or absence of existing infrastructure capacity
- Development density
- Proposed use
- Level of service or quality of amenities
- Travel behavior (of residents or employees)

Site topography

Flat sites tend to be less expensive to serve than sloped sites. For instance, sloped sites can either benefit or complicate the use of gravity systems for water or wastewater or can require the use of a non-grid street network. Sites with steep slopes are also typically built at lower densities, which can also have the effect of increasing the cost of infrastructure.

Environmental features

Though site features such as riparian areas or wetlands can be viewed as green infrastructure (for instance, as open space or as stormwater facilities), their presence can make an area more expensive to serve by reducing the potential development density of a site or by increasing actual construction costs.

Land ownership patterns

Fragmented land ownership patterns can require coordination with numerous land owners and can add time and cost to the development of an area. Having to cross multiple ownerships with streets, trails, or pipelines can add significantly to costs.

Distance from existing infrastructure

Increased distance from existing facilities can raise infrastructure costs. For instance, a new development that is further from existing facilities could require additional lengths of sewer pipe to connect to existing facilities or, an even more expensive proposition, the construction of a new sewage treatment plant.

Presence or absence of existing infrastructure capacity

In most cases, using existing infrastructure capacity before constructing new capacity makes sound financial sense. There is, however, a tipping point at which existing capacity will be fully utilized. This tipping point is inherently captured in these case studies. If additional capacity is necessitated by a particular development, the costs of those facilities have been included, where known.

Development density

Higher density developments tend to be less expensive to serve (on a per unit basis) than lower density developments. The relationship between residential density and infrastructure demand is fairly intuitive – larger lots require more lineal feet of pipes and pavement per household. These increased lengths generally

translate into higher infrastructure costs for both initial construction and long-term maintenance (Speir & Stephenson, 2002).

Despite this general rule, however, the lower density case study areas reveal a great deal of variation in the costs per job or per household. This variation is attributable to the many other factors that can influence costs. These factors may include level of service or the provision of amenities such as parks and sidewalks and other facilities such as schools.

Proposed uses

The case studies include both employment and residential uses and do not indicate that one type of use is inherently more expensive than the other. When considered on a cost-per-job basis, there are examples of both relatively inexpensive (e.g., Shute Road) and relatively expensive (e.g., Lake View Village) employment uses. This small sampling of case studies appears to indicate that variations in costs are contingent upon factors other than land use.

Level of service / quality of amenities

Two of the more important determinants of infrastructure cost are level of service and the presence of community amenities. Different case study areas need different facilities to support their intended use. Some of the case study developments require the entire gamut of new infrastructure facilities while others require little more than the addition of structured parking. This variation in the mix of facilities shows up in the information below. These facilities are all elements of creating great communities and it should be recognized that providing them is desirable.

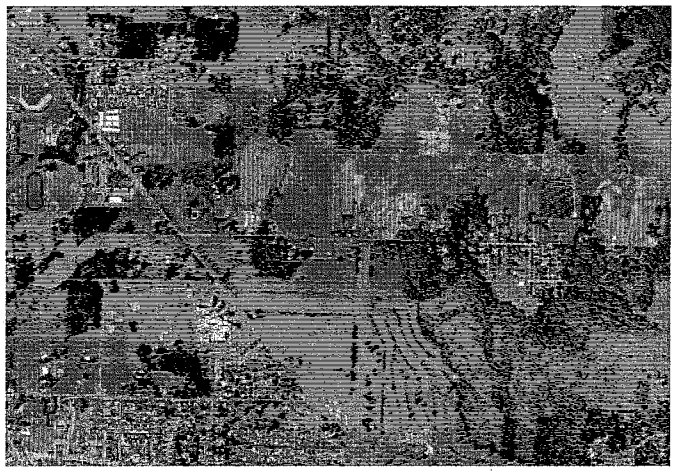
Redevelopment projects that make use of existing facilities can provide a high level of service/amenity, while also controlling costs. This is not to suggest that there are no costs associated with using existing infrastructure capacity, but merely that a large portion of those costs are already sunk and that it makes more sense to use that available capacity where possible.

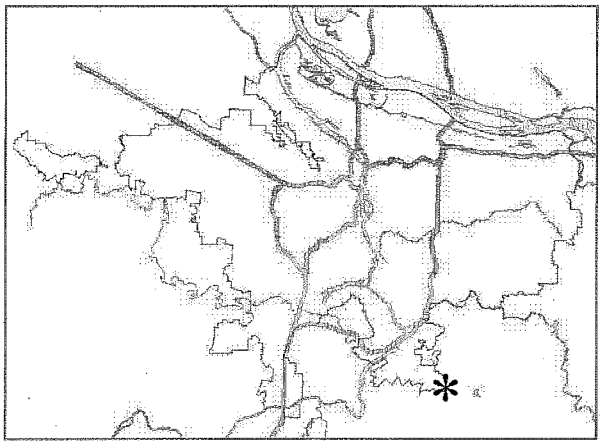
Travel behavior

The relationship between travel behavior and infrastructure demand is intuitive. More frequent and longer trips place greater demands on the transportation system, resulting in a collective need for more highway, bridge and transit capacity. Residents of areas near employment centers tend to have shorter trips by all modes.

Beavercreek Road concept planning area

Oregon City





Estimated local infrastructure capital costs: $115,900,000

Total acres:	453
Gross buildable acres:	292
Net new households:	1,450
Net new jobs:	3,652
Avg. commute miles in the year 2035:	17.09

Proposed Use

The plan for this newly urbanizing area envisions a diverse mix of uses (an employment campus north of Loder Road, mixed use districts along Beavercreek Road, and two mixed use neighborhoods). One purpose of the plan is to improve the jobs-housing balance in Clackamas County. Transit-oriented land uses are planned to increase the feasibility of transit service in the future. The concept area is adjacent to Clackamas Community College, providing workforce-training opportunities for future area residents and employees.

Existing Conditions and planned improvements – Beavercreek Road

Transportation

The site is adjacent to Beavercreek Road and south of the intersection of Highways 213 and 205. Traffic on Highway 213 is congested during peak hours. Beavercreek Road is a major local connector. There is very limited bike and pedestrian infrastructure. Of the projected infrastructure costs, 57% 0f the local share is for transportation improvements. It should also be noted that regional infrastructure costs will be affected by average commute distances from the Beavercreek area that are nearly 5 miles longer than the regional average.

Commute Distances
Longer travel distances translate into a need for more regional infrastructure per household. Residents of the census tract that comprises the Beavercreek Road area are forecasted to have an average commute distance of 17.09 miles in the year 2035, significantly higher than the 7-county average (12.32 miles).

Water
Water is sourced from the Clackamas River. While there is sufficient water supply, the study area currently lacks an onsite distribution system.

Wastewater
An existing treatment plant has the capacity to serve the study area. There is a 12-inch sewer trunk that runs the length of Beavercreek Road, but this line lacks the capacity to serve the projected development.

Stormwater
The concept plan area drains into two basins, Abernethy Creek and Caufield Creek, both of which drain into the Willamette River, south of downtown Oregon City. Stormwater systems are largely undeveloped. This is one reason why stormwater infrastructure costs are expected to be significantly above the regional average at 22% of the total local infrastructure costs. The Beavercreek Road concept plan calls for green streets and onsite stormwater management. The plan also includes public open space in areas designated for natural stormwater treatment, which is intended to serve a dual function as both park and stormwater conveyance.

Parks, plazas, public places
There are no existing public parks within the plan area. There is an existing golf course on a portion of the site.

How do Beavercreek Road's infrastructure costs add up?

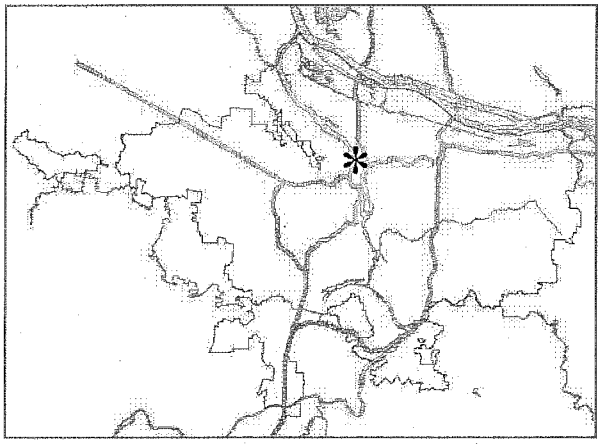
Estimated local infrastructure capital costs:

	Beavercreek Rd.
Transportation	$66,300,000
Transit, Bike, Pedestrian	-
Sewer	$8,500,000
Water	$15,900,000
Stormwater	$25,200,000
Parks	-
Other	-
Total	$115,900,000

Note that costs are related to both housing and job creation. Approximately 57% of costs are attributed to transportation infrastructure and approximately 22% are attributed to stormwater systems, including natural stormwater areas. The concept plan for the Beavercreek Road area does not project the need for any additional schools as a result of this development. Costs for regional transportation improvements (not included above) are significantly higher than average, due to commute distances projected to 2035.

Brewery Blocks

Portland



Estimated local infrastructure capital costs
$40,647,000

Total acres:	4.6
Gross buildable acres:	4.6
Net new households:	113
Net new jobs:	2,440
Avg. commute miles in the year 2035:	4.99

Proposed Use (completed project)

The Brewery Blocks redevelopment consists of a mix of high-density residential and commercial uses. The primary focus has been on job creation, with roughly 20 times as many new jobs as new housing units. It should be noted that the Brewery Blocks are located within a thriving redevelopment area of Portland, with the activities within this area completely interconnected with surrounding land uses. The Brewery Blocks have been able to take advantage of existing facilities, including transit, sewer, water, parks, and streets.

Existing Conditions – Brewery Blocks

Transportation

An urban street grid exists and the area is accessible by multiple modes. The streetcar system was developed as a part of the larger River District redevelopment. Many of the residents and employees within the Brewery Blocks are able to meet their transportation needs without their own motor vehicles.

Commute distance

Shorter travel distances translate into less regional infrastructure needed per household. Residents of the census tracts that include the Brewery Blocks are forecasted to have an average commute distance of 4.99 miles in the year

2035, considerably shorter than the 7-county average of 12.32 miles. This is expected to significantly reduce regional infrastructure costs over time.

Water
Sufficient water facilities already existed within the area in advance of development.

Wastewater
Sufficient wastewater facilities already existed within the area in advance of development.

Stormwater
Sufficient stormwater facilities already existed within the area in advance of development.

Parks, plazas, public places
Though there are no public parks within the Brewery Blocks, the development is able to take advantage of an existing park system that includes the North and South Park Blocks, Jamison Square, and Tanner Springs.

Structured parking and other improvements: The public costs associated with the redevelopment of the Brewery Blocks were attributed to the construction of structured parking, provision of street furnishings, and sidewalk improvements.

How do the Brewery Blocks' infrastructure costs add up?

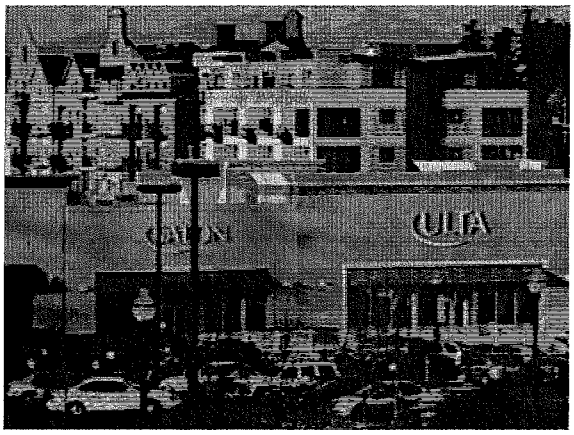
Estimated local infrastructure capital costs:

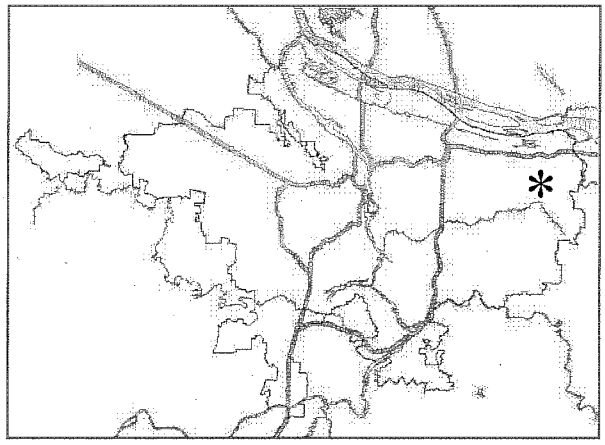
	Brewery Blocks
Transportation	-
Transit, Bike, Pedestrian	-
Sewer	-
Water	-
Stormwater	-
Parks	-
Other (See structured parking and other improvements, noted above)	$40,647,000
Total	$40,647,000

Note that, if all costs were related to job creation, the local infrastructure costs would average less than $17,000 per new job. Costs for regional transportation improvements attributed to the Brewery Blocks (not included above) are significantly lower than average, due to commute distances projected to 2035.

Civic Neighborhood

Gresham





Estimated local infrastructure capital costs: $11,606,000

Total acres:	5
Gross buildable acres:	5
Net new households:	636
Net new jobs:	2,433
Avg. commute miles in the year 2035:	11.13

Proposed Use

The City of Gresham intends the Civic Neighborhood, a redevelopment project, as an extension of its downtown. The area consists of a mix of residential, retail, and office uses served by transit. This case study area represents a 5 acre portion of the larger 130 acre Civic Neighborhood.

Existing Conditions and Planned Improvements – Civic Neighborhood

Transportation

The site is bisected by a light rail line and is served by four-lane major arterials and one local connector: Burnside Road, Division St., Eastman Parkway and the two-lane Wallula Road. Division St. was recently improved. The bulk of projected Civic Neighborhood infrastructure costs are attributable to transit ($6,194,000) and transportation ($3,413,000) improvements.

Commute distance

Shorter travel distances translate into less regional infrastructure needed per household. Residents of the census tract that includes Civic Neighborhood are forecasted to have an average commute distance of 11.13 miles in the year 2035, more than a mile less than the 7-county average of 12.32 miles.

Water
The site is integrated into Gresham's existing water infrastructure.

Wastewater
The site is integrated into Gresham's existing sewer infrastructure.

Stormwater
Stormwater is handled by existing City of Gresham infrastructure.

Parks, plazas, public places
Though there are no parks within the Civic Neighborhood area, it is being developed with a pedestrian orientation.

Existing facilities: Civic Neighborhood is able to take advantage of existing facilities, including streets, sewer and water.

How do Civic Neighborhood's infrastructure costs add up?

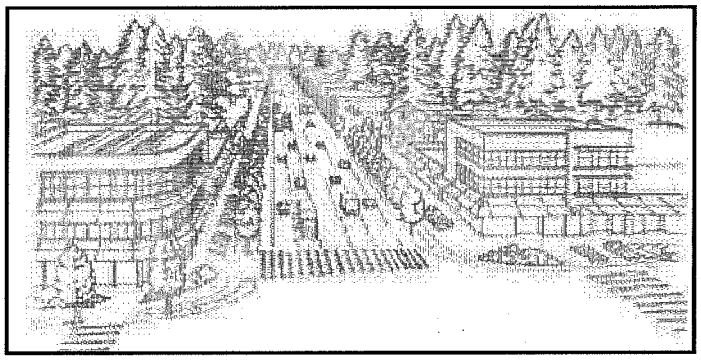
Estimated local infrastructure capital costs:

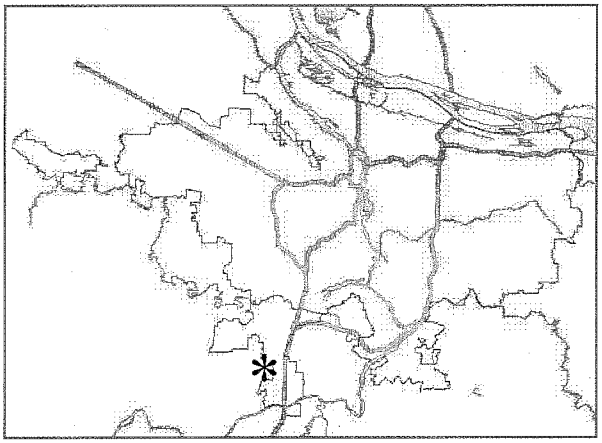
	Civic Neighborhood
Transportation	$3,413,000
Transit, Bike, Pedestrian	$6,194,000
Sewer	$366,000
Water	$266,000
Stormwater	$1,365,000
Parks	-
Other	-
Total	$11,606,000

Note that, even if all costs were related to job creation, the local infrastructure costs would average less than $5,000 per new job. More than 50% of all local infrastructure costs in the Civic Neighborhood are attributed to transit, bicycle, and pedestrian improvements. Costs for regional transportation improvements (not included above) are lower than average, due to commute distances projected to 2035.

Coffee Creek (1) master plan area

Wilsonville





Estimated local infrastructure capital costs:
$ 8,058,000

Total acres:	216
Gross buildable acres:	196
Net decrease in households:	10
Net new jobs:	1,474
Jobs per gross buildable acre:	7.5
Avg. commute miles in the year 2035:	12.82

Proposed Use

The Coffee Creek area is being planned as an employment area and is mapped as a Regionally Significant Industrial Area. Note that the area is planned to have no net increase in residential uses.

Existing Conditions and planned improvements – Coffee Creek

Transportation

The area is within 1/2 mile of the Wilsonville I-5 north interchange, with vehicle access via SW Lower Boones Ferry Road, Day Road and SW Grahams Ferry Road. There are few existing bicycle and pedestrian facilities and no transit service within the Coffee Creek Master Plan area. The closest transit stop is located nearby with a SMART bus line that provides stops along 95th Avenue and Commerce Circle (within ½ mile of the Master Plan area). West side commuter rail also provides service to the area. Over half of Coffee Creek's projected local infrastructure costs are attributable to transportation improvements ($4,518,000).

Commute distance

Longer travel distances translate into more regional infrastructure needed per household. Residents of the census tract that includes Coffee Creek are forecasted to have an average commute distance of 12.82 miles in the year 2035. This distance is ½ mile longer than the average for the 7-county region (12.32 miles).

Water
Water main transmission supply lines exist through the central and southern portions of the Master Plan area. An additional reservoir will be needed at some point to provide adequate peak capacity prior to build out of the Master Plan area.

Wastewater
Sewer main trunk links are located within the central portion of the Coffee Creek Master Plan area. Site survey work will need to occur and the City will need to update its sewer system model to determine on and offsite sewer system improvements and trunk line size/location, pump station requirements, and more detailed cost estimates.

Stormwater
The north tributary to Basalt Creek is located south of Day Road. Basalt Creek drains into Coffee Creek Lake and extends north of Day Road into the City of Tualatin UGB. The master plan area is relatively flat with topography that varies only a few feet in elevation, and gently slopes from north to south. The City requires each new development within the Coffee Creek Industrial Master Plan area to detain and treat run off.

Parks, plazas, public places
There are no existing park facilities within the Master Plan area.

How do Coffee Creek's infrastructure costs add up?

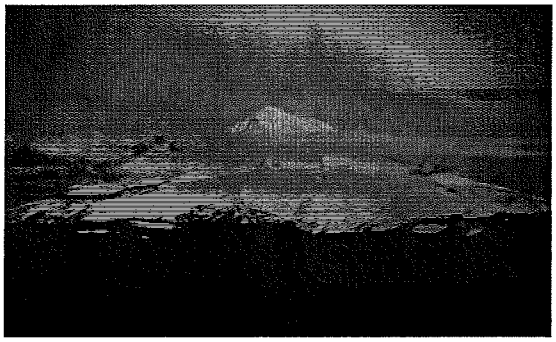
Estimated local infrastructure capital costs:

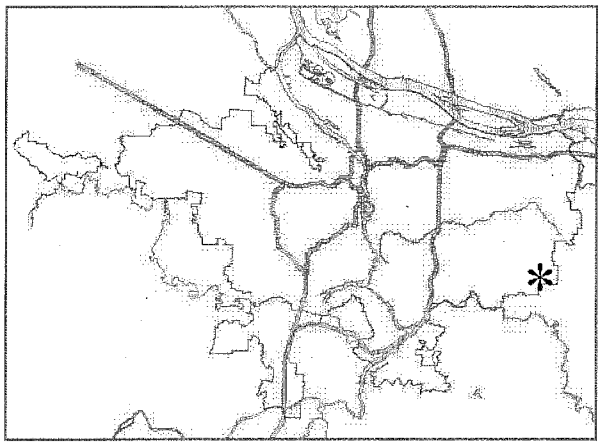
	Cost per job	Totals
Transportation	$3,065	$4,518,000
Transit, Bike, Pedestrian	-	-
Sewer	$1,038	$1,530,000
Water	$773	$1,140,000
Storm	$204	$300,000
Parks	$387	$570,000
Other	-	-
Total	$5,467	$8,058,000

Note that all costs are related to job creation. The local infrastructure costs are projected to average less than $5,500 per new job. More than 55% of all local infrastructure costs in the Coffee Creek area are attributed to transportation improvements. Costs for regional transportation improvements (not included above) are slightly higher than average, due to commute distances projected to 2035.

Damascus / East Happy Valley Concept Plan

Damascus and Happy Valley





Estimated local infrastructure capital costs:
$3,119,295,000

Total acres:	12,200
Gross buildable acres:	5,739
Net new households:	21,934
Net new jobs:	45,000
Avg. commute miles in the year 2035:	13.5

Proposed Use

The Damascus area is a newly urbanizing area, and is being planned as a new community that will include a variety of housing densities, mixed-use areas, and employment zones. The study area includes both the City of Damascus and some land in eastern Happy Valley. The concept plan has not yet been adopted. With estimated local infrastructure capital costs totaling more than $3 billion, it is easy to see why creating a new city is so difficult.

Existing Conditions and planned improvements -- Damascus

Transportation

The area is served by a transportation system that was designed for farm-to-market travel purposes. The street system is primarily made up of narrow, two-lane roads that carry urban levels of traffic. Highway 212, 172nd Avenue, Foster Road, 242nd Avenue, 222nd Avenue and Sunnyside Road are the primary routes that connect the communities of Damascus and Boring to other parts of the region. Some roads perform adequately during rush hour, but significant congestion and safety issues exist in the current Damascus city center (where Sunnyside, Highway 212, and Foster Road converge). Streets do not have bicycle and pedestrian facilities, except for sidewalks along limited sections of Highway 212 in the Damascus and Boring rural centers. Transit service is limited to two bus lines; a park-and-ride lot is located in Carver. The majority of the study area is located outside of the TriMet service

boundary. $1,731,623,000 of the projected local infrastructure costs for Damascus are for transportation improvements. Regional transportation facilities (Sunrise Hwy) have not been included in the cost estimates.

Commute distance: Longer travel distances translate into more regional infrastructure needed per household. Residents of the census tracts that comprise the Damascus area are forecasted to have an average commute distance of 13.5 miles in the year 2035. This distance is more than a mile longer than the average for the 7-county region (12.32 miles).

Water
Two water districts, the Boring Water District and the Sunrise Water Authority, serve portions of the study area. Substantial portions of the area have no public water service.

Wastewater
Most of the primary study area has no sanitary sewer service. Only the far eastern edge of Damascus (Rock Creek corridor) has sanitary service. There are no sanitary sewage treatment facilities within the primary study area. There is a small, publicly-owned sanitary sewage treatment facility in the Boring rural center, but it is not available for additional hook-ups.

Stormwater
There is no existing public stormwater service in the study area.

Parks, plazas, public places
North Clackamas County contains a wide range of regional, state and county parks and recreation facilities. Metro owns a parcel in the Damascus Buttes area. Clackamas County, the City of Portland, and the state own the right-of-way for the Cazadero and Springwater trails, which are currently undeveloped. Clackamas County provides parks near the study area, including Barton Park, a 116-acre county recreation facility located along the Clackamas River.

Topography / natural features: Buttes and transition areas (15-25% slopes) cover large portions of the Damascus area. Riparian areas are also found throughout the concept plan area. These features reduce average densities, making each unit more expensive to serve. The topography is expected to split the wastewater system to the east and to the west, resulting in increased cost of collection and conveyance. Existing treatment facilities are located some distance from the urban centers.

How do Damascus' infrastructure costs add up?

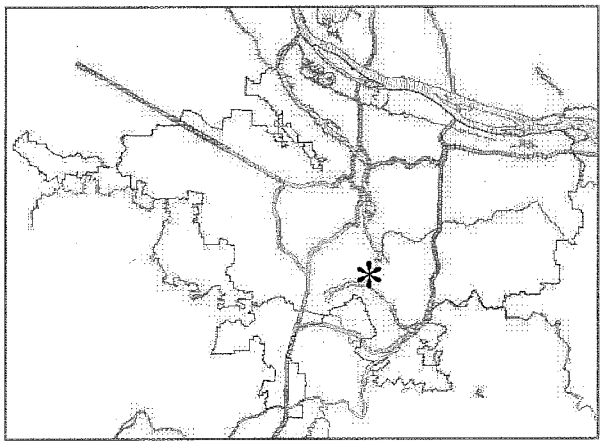
Estimated local infrastructure capital costs:

	Damascus
Transportation	$1,731,623,000
Transit, Bike, Pedestrian	-
Sewer	$162,200,000
Water	$282,843,000
Stormwater	$75,712,000
Parks	$390,203,000
Other	$476,674,000
Total	$3,119,295,000

Note that costs are related to both new housing and job creation. More than 55% of all local infrastructure costs in the Damascus area are attributed to transportation improvements. Costs for regional transportation improvements (not included above) are slightly higher than average, due to commute distances projected to 2035.

Lake View Village Center

Lake Oswego



Estimated local infrastructure capital costs:
$5,116,000

Total acres:	2.39
Gross buildable acres:	2.39
Net new households:	0
Net new jobs:	207
New jobs per gross buildable acre:	86.6
Avg. commute miles in the year 2035:	8.83

Proposed Use (project completed)

Lake View Village Center is a redevelopment project that includes mixed uses (restaurant, retail, office) with structured parking. Although the Lake View Village Center development included no housing units, this commercial development has stimulated the construction of numerous housing units on surrounding blocks. The focus has been on job creation, and on stimulating new development in the rest of downtown Lake Oswego. The land uses resulting from redevelopment of this area are completely interconnected with surrounding land uses. This area has been able to take advantage of existing facilities, including sewer, water, parks, and streets.

Existing Conditions – Lake View Village Center

Transportation

An existing street network serves the area.

Commute distance: Shorter travel distances translate into less regional infrastructure needed per household. Residents of the census tracts that include Lake View Village are forecasted to have an average commute distance of about 8.83 miles in the year 2035, approximately 3 ½ miles less than the 7-county average of 12.32 miles

Water
Adequate water supply exists for the plan area.

Wastewater
Adequate sewer capacity exists in the plan area.

Stormwater
Adequate capacity to handle stormwater exists in the plan area.

Parks, plazas, public places
Millennium Plaza Park is adjacent to the project area.

Structured parking: Most of the local infrastructure costs are attributable to the construction of a structured parking garage which provides service to the subject area and to surrounding businesses.

How do Lake View Village's infrastructure costs add up?

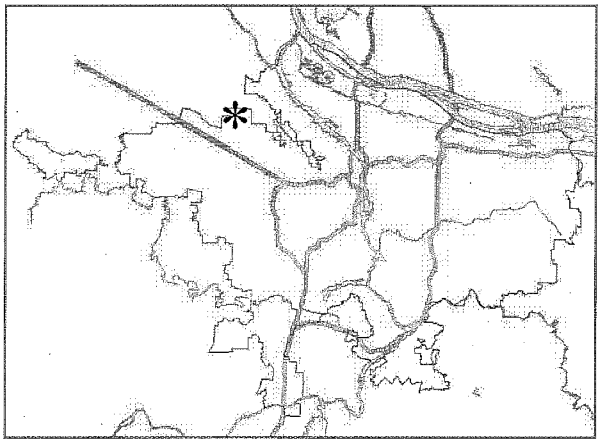
Estimated local infrastructure capital costs:

	Cost per job	Totals
Transportation	$3,850	$797,000
Transit, Bike, Pedestrian	-	-
Sewer		
Water		
Storm		
Parks		
Other	$20,865	$4,319,000
Total	$24,715	$5,116,000

Note that all costs are related to job creation. The local infrastructure costs averaged almost $25,000 per new job. More than 80% of all local infrastructure costs in the Lake View Village development are attributed to the construction of a public parking structure. Costs for regional transportation improvements (not included above) are considerably lower than average, due to average commute distances projected to 2035.

North Bethany concept planning area

Washington County



Estimated local infrastructure capital costs:
$416,633,000

Total acres:	800
Gross buildable acres:	680
Net new households:	5,000
Net new jobs:	276
Avg. commute miles in the year 2035:	11.92

Proposed Use

The North Bethany area is a newly urbanizing area that is being planned as a primarily residential community with ancillary commercial and institutional uses.

Existing Conditions and planned improvements – North Bethany

Transportation

Major transportation facilities in the vicinity of the plan area include Springville Rd., Kaiser, 185th, and Germantown Rd. There is bus service on Springville, 185th, and Kaiser. The Concept Plan includes costs for off-site improvements (Bethany Blvd. / US 26 overpass). Those costs have not been included in North Bethany's local infrastructure costs since they are regional facilities.

Commute distance

Shorter travel distances translate into less regional infrastructure needed per household. Residents of the census tract that comprises North Bethany are forecasted to have an average commute distance of 11.92 miles in the year 2035, slightly lower than the 7-county average (12.32 miles).

Water
The current source of water in the concept area is private wells. When developed, the area will be served by Tualatin Valley Water District.

Wastewater
Wastewater is currently handled on-site through the use of septic systems.

Stormwater
Stormwater runoff from the project site follows the natural topography, and is generally managed by several stream channels and culverts. The western end of the project site drains directly to Rock Creek. The remainder of the site is the headwaters of small drainages that are tributaries to Abbey Creek and Bethany Creek.

Topography and natural areas
The North Bethany area is relatively flat with the exception of the northern portion, which is sloped. A number of riparian zones cross the area.

Parks, plazas, public places
Though there are a number of open spaces, trails, and parks in the vicinity, there are no such areas that currently exist within the concept plan area. Envisioned as a "Community of Distinction," the North Bethany Concept Plan projects significant amounts of parkland ($38,700,000 estimated cost). These parks would match the level-of-service standards of the Tualatin Hills Park and Recreation District.

Schools: North Bethany's local infrastructure costs include the construction of 3 schools ($90 -$111 million). These projected costs include both land purchase and school construction.

How do North Bethany's infrastructure costs add up?

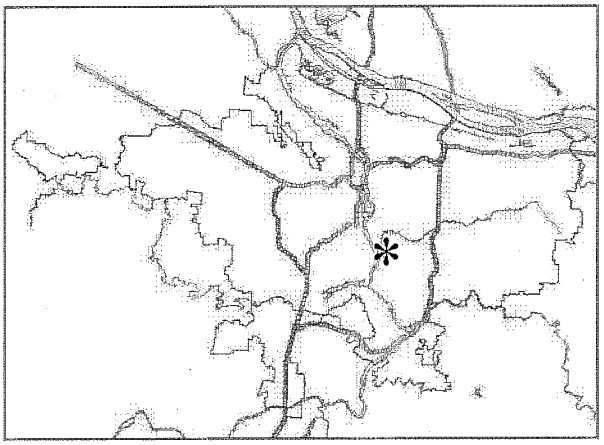
Estimated local infrastructure capital costs:

	North Bethany
Transportation (including Transit, Bike, Pedestrian)	$170,460,000
Sewer	$14,602,000
Water	$16,873,000
Stormwater	$14,926,000
Parks	$41,858,000
Other (schools, fire station and civic building)	$157,914,000
Total	$416,633,000

Note that, if all costs were related to housing, the local infrastructure costs would average about $83,500 per housing unit. More than 40% of all local infrastructure costs in the North Bethany area are attributed to transportation improvements. Washington County also calculated an additional $23,000,000 cost in providing affordable housing and another $131,300,000 in off-site transportation improvements (not included above). Costs for regional transportation improvements (not included above) are slightly lower than average, due to commute distances projected to 2035.

North Main Village

Milwaukie



Estimated local infrastructure capital costs
$ 919,000

Total acres:	1.9
Gross buildable acres:	1.9
Net new households:	95
Net new jobs:	40
Avg. commute miles in the year 2035:	7.99

Proposed Use (completed)

North Main Village is a redevelopment project located in downtown Milwaukie that consists of three-story townhomes, each with a garage and ground floor commercial element with two stories of living space above. The project also includes twenty condominium units.

Existing Conditions – North Main Village

Transportation

North Main Village's location in an already urbanized setting affords it access to existing transportation facilities including the Milwaukie Transit Center. However, transportation improvements are necessary to serve the area's growth.

Commute distance

Shorter travel distances translate into less regional infrastructure needed per household. Residents of the census tract that includes North Main Village are forecasted to have an average commute distance of 7.99 miles in the year 2035, considerably lower than the 7-county average of 12.32 miles. This is expected to reduce regional infrastructure costs over time.

Water
Existing water facilities are sufficient to serve North Main Village.

Wastewater
Existing wastewater facilities are sufficient to serve North Main Village.

Stormwater
Existing stormwater facilities are sufficient to serve North Main Village.

Parks, plazas, public places
North Main Village has no on-site parks, but a number of parks are nearby: Milwaukie Riverfront Park, Scott Park, and Dogwood Park.

Land write-downs
About $108,000 is attributable to land write-downs (included in "other" costs).

How do North Main Village's infrastructure costs add up?

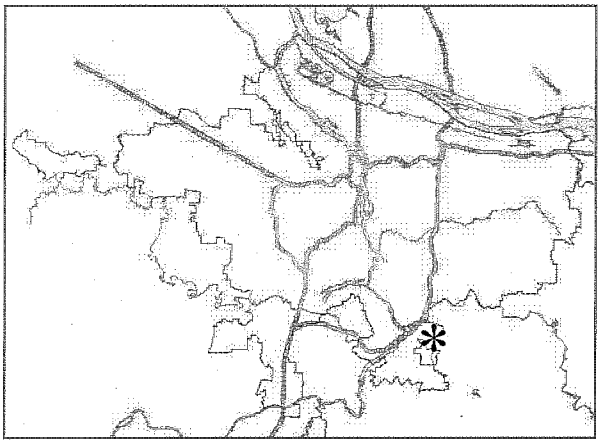
Estimated local infrastructure capital costs:

	North Main Village
Transportation	$811,000
Transit, Bike, Pedestrian	-
Sewer	-
Water	-
Stormwater	-
Parks	-
Other	$108,000
Total	$919,000

More than 88% of all local infrastructure costs in the North Main Village area are related to transportation improvements. Costs for regional transportation improvements (not included above) are significantly lower than average, when compared to commute distances projected to 2035.

Park Place concept planning area

Oregon City



Estimated local infrastructure capital costs:
$ 71,760,000

Total acres:	480
Gross buildable acres:	266
Net new households:	1,458
Net new jobs:	0
New households per gross buildable acre:	5.48
Avg. commute miles in the year 2035:	12.27

Proposed Use

Park Place is a newly urbanizing area, planned as a residential community with neighborhood retail and service uses. A developer has been consolidating ownership of over half of the plan area. It is hoped that ownership consolidation will simplify the provision of public facilities.

Existing Conditions and planned improvements – Park Place

Transportation

Isolated portions of the roadway system experience congestion and delays. The Highway 213 corridor is approaching capacity, particularly on the segment between Redland Road and the I-205 interchange. The public transit system provides limited service to this low-density, suburban location. The bicycle and pedestrian systems are incomplete, but plans exist to make incremental improvements. Park Place's transportation costs are projected to be $58,400,000, and make up the bulk of its local / community level infrastructure costs.

Commute distance

Travel distances correlate to more regional infrastructure needed per household. Park Place residents are forecasted to have an average commute distance of 12.27 miles in the year 2035. This distance is about average for the 7-county region (12.32 miles).

Water

Water conveyance facilities are limited within the study area. The Oregon City water system has sufficient water supply to serve the study area.

Wastewater
Limited wastewater collection facilities exist within the study area. Most properties are on septic systems. Two trunk interceptor lines, owned by the Tri-City Sewer District, pass through the study area. These interceptors connect with the Highway 213/ Newell interceptor, which conveys their flows to the wastewater treatment plant. These interceptors and the treatment plant have capacity to serve future development within the study area.

Stormwater
Stormwater is currently managed with roadside ditches and natural drainage channels. No other major stormwater facilities exist on site. All stormwater within the study area is conveyed to Abernethy Creek, Newell Creek, and Livesay Creek. Abernethy Creek and Newell Creek are subject to occasional flooding.

Topography / natural features
Large portions of the Park Place concept area have limited development potential because of constraints such as steep slopes and wetlands. These natural features provide valuable site amenities.

Parks, plazas, public places
Clackamas County and Metro own open spaces within the concept plan area.

How do Park Place's infrastructure costs add up?

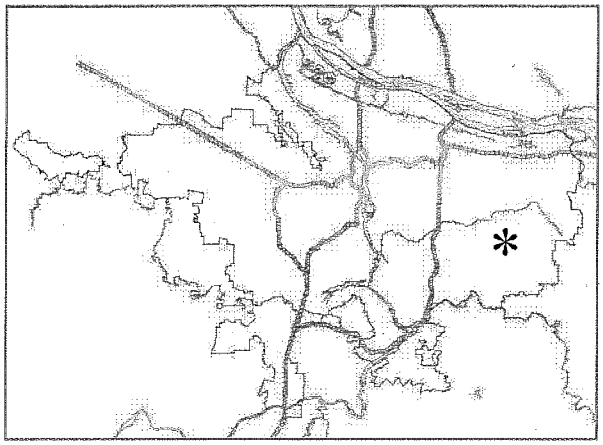
Estimated local infrastructure capital costs:

	Cost per housing unit	Totals
Transportation	$40,055	$58,400,000
Transit, Bike, Pedestrian	-	-
Sewer	$3,780	$5,520,000
Water	$2,606	$3,800,000
Storm	$562	$820,000
Parks	$2,209	$3,220,000
Other	-	-
Total	$49,218	$71,760,000

Note that all costs are related to new housing. The local infrastructure costs are projected to average more than $49,000 per housing unit. More than 80% of all local infrastructure costs in the Park Place area are attributed to transportation improvements. Costs for regional transportation improvements (not included above) are about average, due to commute distances projected to 2035.

Pleasant Valley concept planning area

Gresham and Portland



Estimated local infrastructure capital costs: $304,073,000

Total acres:	1,530
Gross buildable acres:	1,071
Net new households:	4,926
Net new jobs:	4,935
Avg. commute miles in the year 2035:	10.8

Proposed Use

Pleasant Valley is a newly urbanizing area that is planned with a town center, residential neighborhoods, and employment zones. Of the total planning area, approximately 290 acres are within the City of Portland.

Existing Conditions and Planned Improvements – Pleasant Valley

Transportation
Foster Blvd., a two-lane rural road, is the main road that currently provides access to the area.

Commute distance
Shorter travel distances translate into less regional infrastructure needed per household. Residents of the census tracts that comprise the Pleasant Valley area are forecasted to have an average commute distance of about 10.8 miles in the year 2035, lower than the 7-county average (12.32 miles).

Water
The area is primarily served by private wells.

Wastewater
Wastewater is handled with private septic systems.

Stormwater
Stormwater is currently directed to ditches along local roads.

Parks, plazas, public places
The Springwater Corridor, a regional trail, passes through the Pleasant Valley plan area. There are no other existing parks within the area, though there is open space associated with Pleasant Valley Elementary School (existing). About ¼ of Pleasant Valley's projected local infrastructure costs are attributable to parks ($70,186,000).

Topography
The Pleasant Valley area is mostly flat, but has a number of riparian areas.

Green practices
Most of the streets will be green streets. All stream crossings will use bridges (no culverts).

How do Pleasant Valley's infrastructure costs add up?

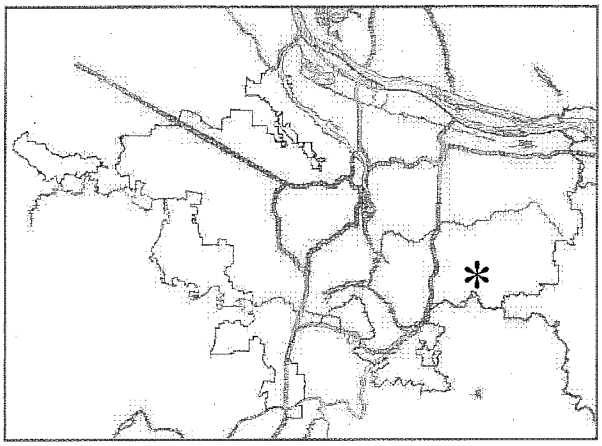
Estimated local infrastructure capital costs:

	Pleasant Valley
Transportation	$103,823,000
Transit, Bike, Pedestrian	-
Sewer	$22,686,000
Water	$21,172,000
Stormwater	$32,213,000
Parks	$70,186,000
Other	$53,993,000
Total	$304,073,000

Note that costs are related to a mix of new housing and new jobs. Approximately 34% of all local infrastructure costs in the Pleasant Valley area are attributed to transportation improvements. Costs for regional transportation improvements (not included above) are slightly lower than average, when compared to commute distances projected to 2035.

Rock Creek concept planning area

Happy Valley



Estimated local infrastructure capital costs
$ 48,796,000

Total acres:	670
Gross buildable acres:	357
Net new households:	2,815
Net new jobs:	619
Avg. commute miles in the year 2035:	10.72

Proposed Use

Rock Creek is a newly urbanizing area that is planned for residential, mixed-use, and employment uses.

Existing Conditions and Planned Improvements – Rock Creek

Transportation
Two-lane rural roads with soft shoulders and roadside drainage ditches are typical in the plan area. Approximately 2/3 of Rock Creek's local infrastructure costs are attributable to transportation improvements ($33,576,000). Roads, including Sunnyside Road, and 147th Avenue, have been improved to urban standards to provide multimodal access.

Commute distance
Shorter travel distances translate into less regional infrastructure needed per household. Residents of the census tracts that include the Rock Creek area are forecasted to have an average commute distance of 10.72 miles in the year 2035, less than the 7-county average (12.32 miles).

Water
Two wells and water from the Clackamas River supply the area. According to the Mt. Scott Water District, all necessary facilities are in place for any new developments in the planning area with the exception of a 12" water line for the higher areas.

Wastewater
There are three points of connection to the existing sewer system. There will need to be additional pumps installed in order to get the effluent to a point where a gravity flow system will work.

Stormwater
Storm drainage in the area is mostly over land, with some culverts under existing roads and ditches running alongside these roads. The area is split into two drainage areas that flow into Rock Creek and Sieben Creek.

Parks, plazas, public places
The area does not have any existing parks.

Topography
The Rock Creek area has slopes to the north (over 30% slopes) and Rock Creek and its tributaries flow through the area. South of Sunnyside Road, the area is relatively flat.

How do Rock Creek's infrastructure costs add up?

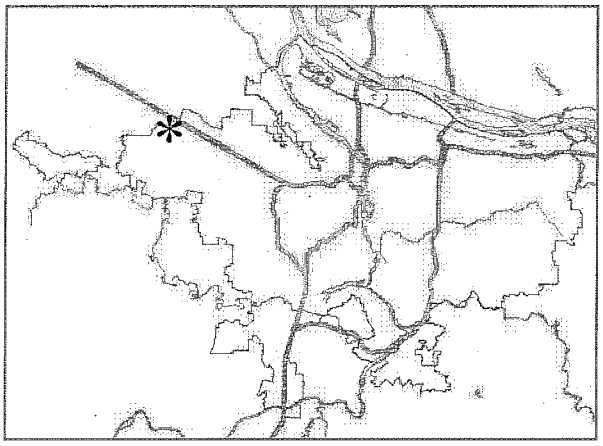
Estimated local infrastructure capital costs:

Transportation	$33,576,000
Transit, Bike, Pedestrian	-
Sewer	$1,076,000
Water	$3,185,000
Stormwater	$4,664,000
Parks	$6,295,000
Other	-
Total	$48,796,000

Note that most costs are related to housing. Almost 70% of all local infrastructure costs in the Rock Creek area are attributed to transportation improvements. Costs for regional transportation improvements (not included above) are slightly lower than average, when compared to commute distances projected to 2035.

Shute Road concept planning area

Washington County



Estimated local infrastructure capital costs:
$ 9,136,000

Total acres:	215
Gross buildable acres:	175
Net new households:	0
Net new jobs:	3,660
New jobs per gross buildable acre:	20.91
Avg. commute miles in the year 2035:	13.99

Proposed Use

The Shute Road concept area is a newly urbanizing area that is being planned to provide large lots for industrial uses. Genentech, an international biomedical manufacturer, has acquired nearly half of this site (85 acres). Genentech has developed phase 1 facilities and will provide 300-400 jobs in the first phase. Genentech has developed approximately 15% of the total planning area.

Existing Conditions and Planned Improvements – Shute Rd.

Transportation
The site is adjacent to the Shute Road exit of the Sunset Highway. Shute Road and Evergreen Road, both five-lane local connectors, intersect at the southwest corner of the site. Approximately 2/3 of local infrastructure cost for the Shute Road area is attributable to transportation improvements ($6,350,000).

Commute distance
Longer travel distances translate into more regional infrastructure needed per household. Residents of the census tract that comprises the Shute Rd. area are forecasted to have an average commute distance of 13.99 miles in the year 2035, longer than the 7-county average (12.32 miles).

Water
Water mains run along Shute Road and Evergreen Road, adjacent to the site.

Wastewater
There are currently no sanitary lines running though the site. One trunk line runs up Evergreen Road to the corner of the site and another line dead-ends into Shute Road near the center of the site.

Stormwater
Storm lines parallel water lines along Shute Road and Evergreen Road.

Parks, plazas, public places
There are no existing public parks or green spaces within the site.

Topography
The Shute Rd. concept area is relatively flat with a small riparian area associated with Waibel Creek. The area around the creek is not considered to be wetland.

How do Shute Road's infrastructure costs add up?

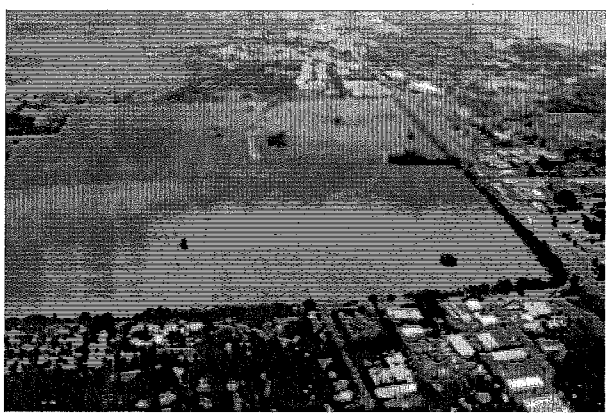
Estimated local infrastructure capital costs per new job:

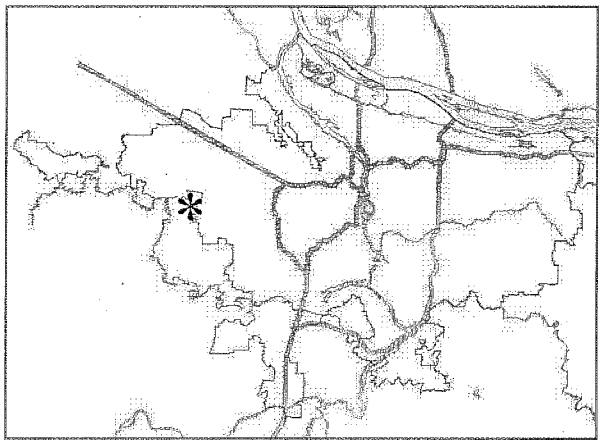
	Cost per job	Totals
Transportation	$1,735	$6,350,000
Transit, Bike, Pedestrian	-	-
Sewer	$264	$967,000
Water	$169	$619,000
Stormwater	$328	$1,200,000
Parks	$387	$570,000
Other	-	-
Total	$2,496	$9,136,000

Note that all costs are related to new job creation. Approximately 70% of all local infrastructure costs in the Shute Road area are attributed to transportation improvements. Roughly 13% of costs are for stormwater conveyance. Costs for regional transportation improvements (not included above) are slightly higher than average, when compared to commute distances projected to 2035.

South Hillsboro concept planning area

Hillsboro





Estimated local infrastructure capital costs:
$295,517,000

Total acres:	1,565
Gross buildable acres:	1,030
Net new households:	10,182
Net new jobs:	879
Avg. commute miles in the year 2035:	12.2

Proposed Use

South Hillsboro is an area that includes land both inside and adjacent to the Urban Growth Boundary. The concept plan for the area includes residential, retail, and office uses. Note that the area is planned to include roughly 11 ½ housing units for each new job.

Existing Conditions and Planned Improvements – South Hillsboro

Transportation

Current transportation facilities generally consist of two lane sections without curbs. Drainage crossings are primarily culverts with some minor retaining / transition structures. At-grade railroad crossings connect the study area to Tualatin Valley Highway.

Commute distance

Longer travel distances translate into more regional infrastructure needed per household. Residents of the census tract that comprises the South Hillsboro area are forecasted to have an average commute distance of 12.2 miles in the year 2035, slightly less than the 7-county average.

Water
Existing 8" and 10" waterlines to the northwest of the study area provide distribution to current development in that area and will eventually be connected to the grid for the South Hillsboro planning area. An existing 42" transmission line is located at the south side of the railroad tracks along the north edge of the South Hillsboro planning area. Connection to this line will be made to serve south into the planning area.

Wastewater
A 24" trunk sewer in Davis Road extending from the River Road Pump Station to SW 234th Avenue is currently being constructed. The trunk sewer is designed to serve 525 acres, including a significant portion of the South Hillsboro planning area. Area 71 is within this service area. The Clean Water Services "Aloha Pump Station" on SW 209th Avenue near SW Stoddard Drive and the Cross Creek Pump Station further south on 209th Avenue near SW Murphy Lane can serve Area 69 of the South Hillsboro planning area.

Stormwater
Development to the west and north of the study area includes storm drainage conveyance, storage and treatment of the areas consistent with standards in place at the time of the respective land use action. Outfall from these systems is to natural drainage tributaries of the Tualatin River. Throughout the South Hillsboro planning area, ditches provide storm water management along roadways. Large agricultural tracts have surface ditches that direct flow to natural conveyances, including a number of creeks. No stormwater facility costs have been identified for the area.

Topography
The South Hillsboro area is relatively flat.

Parks, plazas, public places
The City of Hillsboro currently has no park or recreation facilities located within the South Hillsboro Community Plan Study Area. The Bonneville Power Administration right-of-way north of Tualatin Highway extends south into the study area and could accommodate a trail.

How do South Hillsboro's infrastructure costs add up?

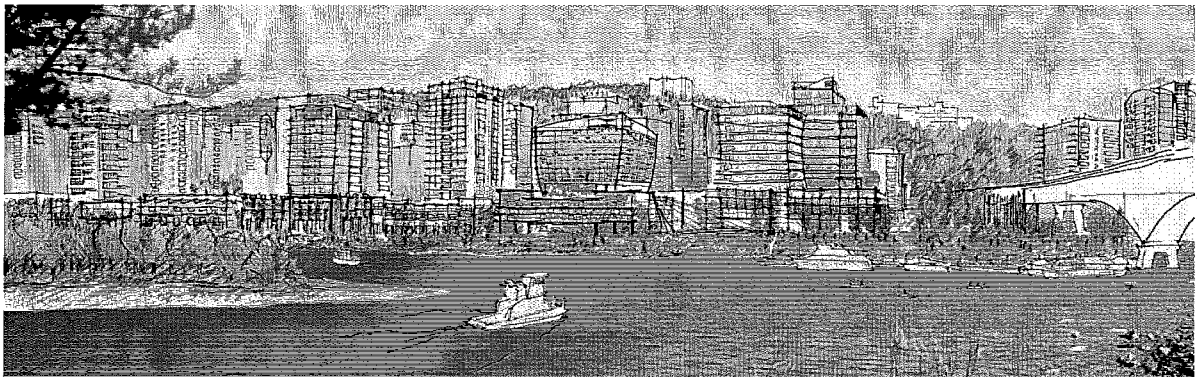
Estimated local infrastructure capital costs:

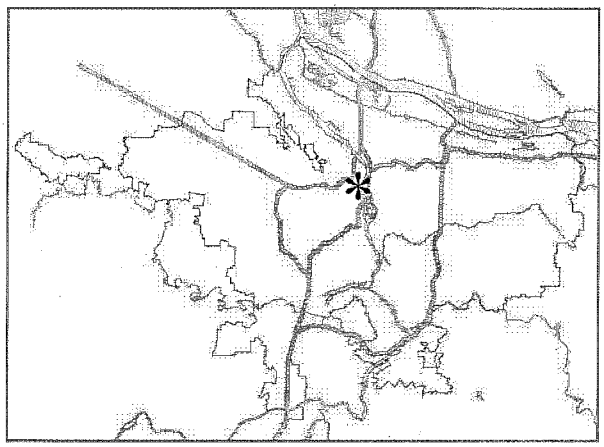
	South Hillsboro
Transportation	$203,057,000
Transit, Bike, Pedestrian	-
Sewer	$7,550,000
Water	$11,316,000
Stormwater	-
Parks	$56,894,000
Other	$16,700,000
Total	$295,517,000

Note that costs are related to both new housing and job creation. Approximately 69% of all local infrastructure costs in the South Hillsboro area are attributed to transportation improvements. No costs were projected for either schools or stormwater facilities. Costs for regional transportation improvements (not included above) are slightly lower than average, when compared to commute distances projected to 2035.

South Waterfront

Portland





Estimated local infrastructure capital costs:
$323,457,000

Total acres:	130
Gross buildable acres:	100
Net new households:	3,600
Net new jobs:	10,000
Avg. commute miles in the year 2035:	5.33

Proposed Use

The South Waterfront District offered a unique opportunity for redevelopment as it provided the largest block of vacant or underutilized land within the city's core. The district is being redeveloped with a mix of urban-scale offices, housing, hotels, parks and retail uses – with substantially more new jobs than housing units. The area is served by a multimodal transportation system and may serve as a transit hub for south downtown. Redevelopment in the district is meant to serve as a catalyst for the creation of a larger science and technology-based economy in the Central City.

Existing Conditions – South Waterfront

Existing facilities

South Waterfront is able to take advantage of existing streets, sewer, and water facilities. Most local / community costs are attributable to transportation ($148,445,000), transit / bike / pedestrian ($29,900,000), park ($92,553,000), and affordable housing requirements.

Transportation

Though the South Waterfront's central Portland location affords it extensive transportation connections, a substantial amount of redevelopment is contemplated.

Commute distance
Shorter travel distances translate into less regional infrastructure needed per household. Residents of the census tracts that include South Waterfront are forecasted to have an average commute distance of 5.33 miles in the year 2035, almost 7 miles shorter than the 7-county average of 12.32 miles. This is expected to significantly reduce regional infrastructure costs over time.

Water
Existing water facilities are sufficient to serve South Waterfront.

Wastewater
Existing sewer facilities are sufficient to serve South Waterfront.

Stormwater
Upgrades to the areas stormwater system will be necessary to serve the planned development.

Parks, plazas, public places
There is a park within the plan area. The plan also includes the restoration of the Willamette River Greenway through the site. Given the area's central location, numerous parks and trails are in the vicinity.

How do South Waterfront's infrastructure costs add up?

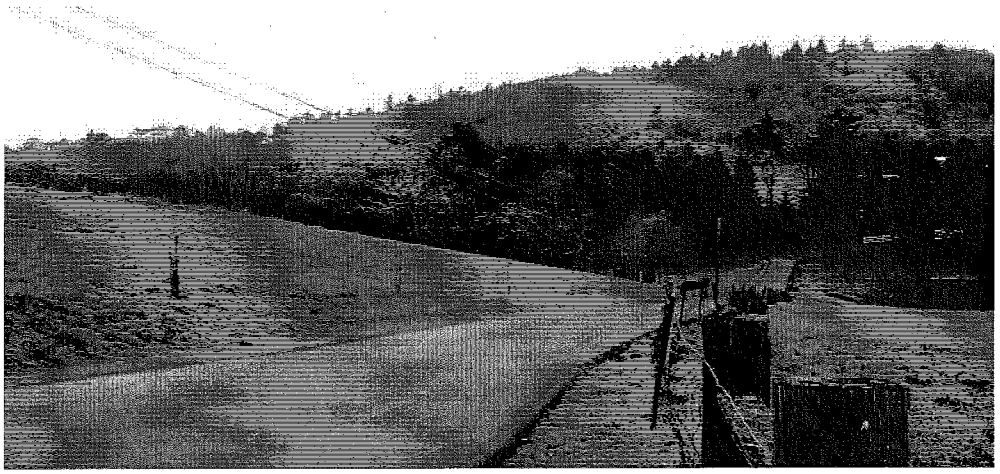
Estimated local infrastructure capital costs:

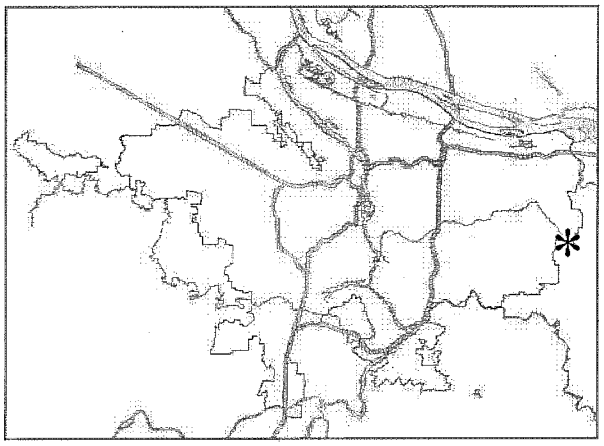
	South Waterfront
Transportation	$148,445,000
Transit, Bike, Pedestrian	$29,900,000
Sewer	-
Water	-
Stormwater	$710,000
Parks	$92,553,000
Other	$51,850,000
Total	$353,457,000

Note that costs are related to both new housing and job creation. Approximately 46% of all local infrastructure costs in the South Waterfront area are attributed to transportation improvements, with 29% for parks and open spaces. Costs for regional transportation improvements (not included above) are significantly lower than average, when compared to commute distances projected to 2035.

Springwater Community Plan

Gresham





Estimated local infrastructure capital costs
$375,791,000

Total acres:	1,272
Gross buildable acres:	762
Net new households:	1,609
Net new jobs:	15,330
Avg. commute miles in the year 2035:	12.82

Proposed Use

The Springwater area is a newly urbanizing area that is planned for industrial/high-tech campuses. To augment the mixed-use theme of the City as a whole, a village center with mixed retail and housing, and low-density residential development are also planned for areas too sloped for industrial use.

Existing Conditions and Planned Improvements -- Springwater

Transportation

The existing transportation system was designed primarily to serve rural residential and farm-to-market uses. The arterials are generally fast moving with most intersections either having no traffic control or only stop signs. Highway 26 is the major thoroughfare that traverses the study area, connecting Gresham with both Portland (to the west) and Sandy (to the southeast). Hogan Road/242nd Avenue also provides a north/south connection through the western portion of Springwater. Almost 2/3 of the projected local infrastructure costs ($237,231,000) for the Springwater area are attributable to transportation improvements.

Commute distance
Longer travel distances translate into more regional infrastructure needed per household. Residents of the census tract that includes the Springwater area are forecasted to have an average commute distance of 12.82 miles in the year 2035. This distance is ½ mile longer than the average for the 7-county region (12.32 miles).

Water
The area has no public water system. Private wells currently serve the area.

Wastewater
The area has no public sewer system. Waste is directed to private septic systems.

Stormwater
The area has no public stormwater system. Stormwater is directed to creeks and to drainage ditches along roads.

Parks, plazas, public places
The area has no public parks, but is bisected by the Springwater Corridor, a regional trail that connects Portland to Boring.

Topography / natural features
With the exception of its western portion, the Springwater area is relatively flat. The sloped, western portion of the area is planned for low-density residential development. The concept area also has a number of riparian areas. These features reduce average densities, making the area more expensive to serve, but may enhance property values.

How do Springwater's infrastructure costs add up?

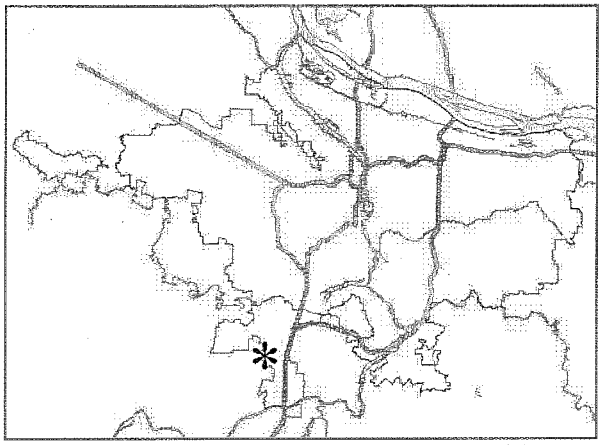
Estimated local infrastructure capital costs:

	Springwater
Transportation	$237,231,000
Transit, Bike, Pedestrian	-
Sewer	$28,894
Water	$35,032
Stormwater	$29,993
Parks	$44,642
Other	-
Total	$375,791,000

Note that costs are related primarily to job creation. Approximately 68% of all local infrastructure costs in the Springwater area are attributed to transportation improvements. Costs for regional transportation improvements (not included above) are slightly higher than average, when compared to average commute distances projected to 2035.

SW Tualatin Concept Plan

Tualatin



Estimated local infrastructure capital costs
$ 60,628,000

Total acres:	431
Gross buildable acres:	352
Net new households:	0
Net new jobs:	5,760
New jobs per gross buildable acre:	16.36
Avg. commute miles in the year 2035:	12.36

Proposed Use

SW Tualatin is a newly urbanizing area that is planned for industrial uses. Note that no residential uses are planned in this area.

Existing Conditions and Planned Improvements – SW Tualatin

Transportation

SW Tualatin-Sherwood Road, SW 115th Avenue and SW 120th Ave to the north and SW Tonquin Road and SW Waldo Way to the south serve the SW Tualatin concept area. A future SW 124th Avenue arterial connection is planned to connect Tualatin-Sherwood Road with SW Tonquin Road, and is expected to become a primary point of vehicle access in the future. This connection would be regarded as a community level facility as it would serve both Tualatin and Sherwood. SW 115th Avenue will serve as a secondary north-south access between SW Tualatin-Sherwood Road and SW Tonquin Road. A railroad line boarders the east boundary of the study area.

A substantial portion of the projected local infrastructure costs for SW Tualatin are attributable to transportation improvements. Since the writing of the concept plan, estimated costs for 124th Avenue have gone up significantly. Other transportation projects have also increased in cost since 2005, including SW 115 Avenue, SW Blake Street, SW 120 Avenue, Tonquin Road and Waldo Way. Tualatin now anticipates dividing a portion of those transportation costs with the county and state.

Commute distance

The SW Tualatin area is forecasted to have an average commute distance of 12.36 miles in the year 2035, roughly the same as the 7-county average (12.32 miles).

Water

No public water lines currently serve the study area.

Wastewater

No sanitary sewer system of adequate size to serve the proposed development exists on or near the study area.

Stormwater

No storm water system exists within the study area. The plan area rises gradually in elevation. Drainage is imperfect, but generally toward the north and toward the south, with a break point at approximately the middle of the Concept

Plan area. Drainage in the northern portion around and in the quarry infiltrates through the fragmented basalt. Drainage to the south flows toward Coffee Lake Creek/Seely Ditch, which flows to the Willamette River.

Parks, plazas, public places

There are no existing parks within the concept area. However, there are long-term plans for a regional trail that would follow the Bonneville Power Administration easement through the area. Additionally, a forested area is envisioned west of a railroad line located in the eastern boundary of the study area to create a transition from residential to industrial uses.

How do S.W. Tualatin's infrastructure costs add up?

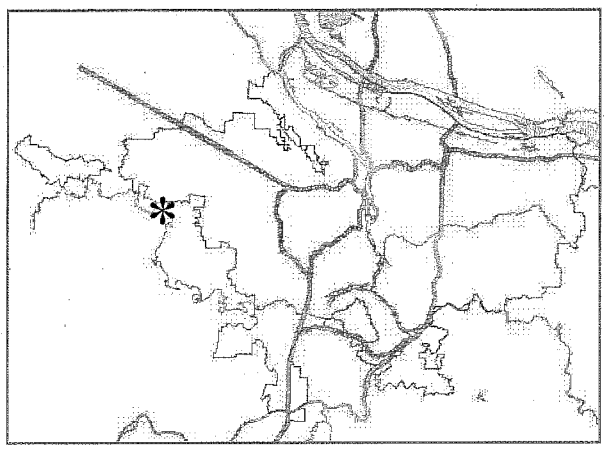
Estimated local infrastructure capital costs:

	Cost per job	Totals
Transportation	$7,147	$41,168,000
Transit, Bike, Pedestrian	-	-
Sewer	$1,680	$9,674,000
Water	$1,601	$9,224,000
Stormwater	$98	$562,000
Parks		
Other	-	-
Total	$10,526	$60,628,000

Note that all costs are related to job creation. Approximately 68% of all local infrastructure costs in the S.W. Tualatin area are attributed to transportation improvements. Costs for regional transportation improvements (not included above) are about average, when compared to commute distances projected to 2035.

Witch Hazel concept planning area

Hillsboro



Estimated local infrastructure capital costs:
$39,559,000

Total acres:	318
Gross buildable acres:	270
Net new households:	2,000
Net new jobs:	0
New households per gross buildable acre:	7.41
Avg. commute miles in the year 2035:	12.20

Proposed Use

Witch Hazel is a newly urbanizing area that is planned as a residential community with eventual mixed-use zones. At this time, however, the concept plan lists only new residential units in the area.

Existing Conditions and Planned Improvements – Witch Hazel

Transportation

Direct north-south access to the Witch Hazel Village plan area is provided by three county roadways: SW River Road (along the western edge), SW 247th / Brookwood Avenue (at the center), and SW 234th/Century Boulevard (along the eastern edge); and east-west access is provided by one city roadway, SE Alexander Street (along the northern edge). Except for River Road, which has a bike lane, the roads are without sidewalks, curbs and bike/pedestrian infrastructure.

Commute distance

Shorter travel distances translate into less regional infrastructure needed per household. Residents of the census tract that comprises the Witch Hazel area are forecasted to have an average commute distance of 12.2 miles in the year 2035, slightly less than the 7-county average (12.32 miles).

Water

Current residents are on private well systems. Water service exists to the north of the area. When the plan area is annexed to the City and is urbanized, water will be supplied by the City of Hillsboro.

Wastewater

With the exception of the new Witch Hazel Elementary School (which has sewer service), all developed properties within the plan area are currently served by private septic systems. Sanitary sewer service exists to the north of the area.

Stormwater

The existing stormwater system within the plan area includes pipes/culverts, subsurface tiling, overland flow, natural swales, irrigation and roadway drainage ditches, all of which flow to Witch Hazel Creek or Gordon Creek, eventually draining to the Tualatin River.

Parks, plazas, public places
There are no existing public parks within the Witch Hazel Village plan area. However, Clean Water Services owns a wetland area in the northwest portion of the concept area.

Schools
There is an existing public school in the area. Note that no capital costs for new school construction have been included in these estimates.

How do Witch Hazel's infrastructure costs compare to the regional average?

Estimated local infrastructure capital costs:

	Cost per housing unit	Totals
Transportation	$3,431	$6,862,000
Transit, Bike, Pedestrian	-	-
Sewer	$4,638	$9,275,000
Water	$4,288	$8,575,000
Stormwater	$5,118	$10,236,000
Parks	$2,306	$4,612,000
Other	-	-
Total	$19,780	$35,559,000

Note that all costs are related to new housing. Approximately 71% of all local infrastructure costs in the Witch Hazel area are attributed to a combination of sewer, water and stormwater improvements. Costs for regional transportation improvements (not included above) are about average, when compared to commute distances projected to 2035.

Bibliography

Balboni, B. (2006). *Heavy Construction Cost Data 2006.* Kingston, MA: RS Means.
Cogan, Sharpe, Cogan. (1990). Tanner Basin Concept Master Plan. OR.
Sonny Conder Fiscal and Economic Consulting. (1991). Metro Region Fiscal Capacity and Growth Management. OR.
Speir, C., & Stephenson, K. (2002). Does Sprawl Cost Us All? Isolating the Effects of Housing Patterns on Public Water and Sewer Costs. *Journal of the American Planning Association , 68* (1), 56-70.
United States Bureau of Economic Analysis. (1960-2005). various tables - National Economic Accounts - Fixed Asset Tables: Current Cost Net Stock of Private and Governmental Fixed Assets. Washington, D.C.
Waier, P. (2007). *Building Construction Cost Data 2007.* Kingston, MA: RS Means.