LEAGUE OF OREGON CITIES

INFRASTRUCTURE SURVEY REPORT (TRANSPORTATION)

TECHNICAL REPORT

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Technical Report

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A League of Oregon Cities' study of city water and transportation infrastructure statewide found significant funding needs. Specifically, $11.4 billion is needed over the next 20 years for infrastructure maintenance and upgrades. For transportation infrastructure, the needs are diverse: $3.7 billion is needed for street projects, including funding for paving, signage, sidewalks, bike/pedestrian paths, and bridge repair or replacement. Needs and type of infrastructure funding vary slightly by region and population.

Introduction

In 2010, the Oregon section of the American Society of Civil Engineers (ASCE) published a report on the state or Oregon's infrastructure. In the report, the ASCE highlighted flaws and deficiencies in the state infrastructure by examining a select number of cities and counties. Overall, the grade given to Oregon's combined infrastructure was a C-, with roads and bridges receiving a C- and drinking water and wastewater receiving a D. In water infrastructure alone, ASCE estimated $4.4 billion was needed to improve Oregon's city and county water systems.

The League of Oregon Cities further explored infrastructure needs in the areas of water and transportation. A survey was sent to the League's 242 members that would detail each city's infrastructure needs and the estimated costs associated with these capital projects. Combined the respondent cities account for the majority of the city population in Oregon. Roughly 16,700 lane miles of roads within city limits need funding for paving, sign replacement, street sweeping etc. Additionally, large portions of the surveyed cities have demand for additional water system improvements, including water treatment and water storage.

Methods

The survey was conducted from January 22 to March 4 and received responses from 120 cities. These cities represent 2,297,557 residents, or 85 percent of the population residing in Oregon cities. The League created the survey using Qualtrics, and it was sent to city managers, city recorders and other individuals with positions equal to a city's chief executive officer. These individuals often relied on support from city land use experts or forwarded the survey to be completed by that individual.

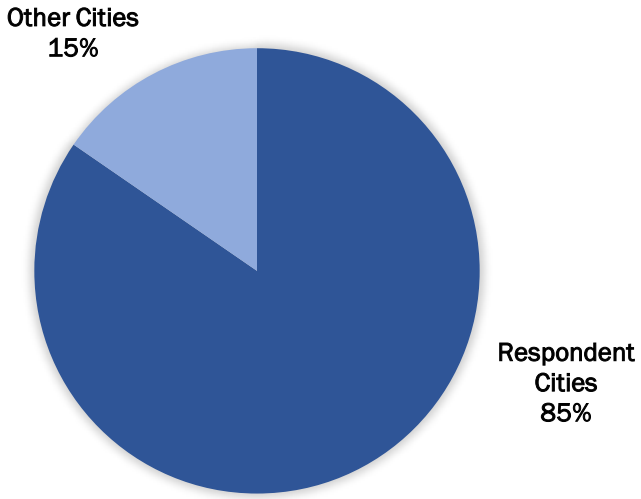

Figure 1: Respondent Population Proportionate to Oregon City Population

Cities are divided into population quintiles or groups of cities representing roughly one-fifth of the 242 total cities. This is done to provide a more accurate comparison of differences among city populations. If LOC randomly selected cities from each quintile, we would expect 20 percent to come from each of the five quintiles.

Among respondent cities, there was over representation in the fifth quintile population category. This means that there were more respondent cities then would be expected in the quintile of cities with populations greater than 10,000. This is most likely due to efforts to increase the response rate by targeting specific categories of cities, including: cities with a population greater than 10,000; ensuring a response from at least one city in each legislative district; cities with League board members; and cities with policy committee members. This would also explain the underrepresentation in the first, second, and third quintiles. Further, the survey had an over representation for respondents in the Valley region, which is historically common in other League surveys.

Category	Population Range	# Cities	% Cities	Diff. from OR Population
1st Quintile	<450	18	15%	-5%
2nd Quintile	451-1,250	14	12%	-8%
3rd Quintile	1,251-3,100	22	18%	-2%
4th Quintile	3,101-10,000	27	23%	3%
5th Quintile	>10,000	39	33%	13%
Region		**# Cities**	**% Cities**	**Diff. from OR Population**
N. Coast		6	5%	-3%
Metro		30	25%	1%
Valley		26	22%	5%
S. Coast		7	6%	1%
S. Valley		15	13%	0%
Central Oregon		15	13%	2%
NE Oregon		10	8%	-5%
E. Oregon		11	9%	-1%
TOTAL		**120**	**50%**	

Table 1: Respondent Characteristics by Population and Region

Transportation Results

Due to the nature of this survey, the report is divided into two parts to better accommodate the divergent infrastructure needs for transportation and water.

Cities identified an aggregated transportation infrastructure need of $3.7 billion. This included $2.6 billion for highway projects and $1.1 billion for non-highway projects. A majority of the funds for highway projects relate to costs associated with state highways and interstate highways that pass through city limits. Costs related to Interstate 84 and Interstate 5 improvements in the Rose Quarter of Portland constituted the largest single cost, at $350,000,000 in estimated costs over the lifetime of the project. This indicates that highway costs are significantly higher than other costs associated with non-highway projects in city limits.

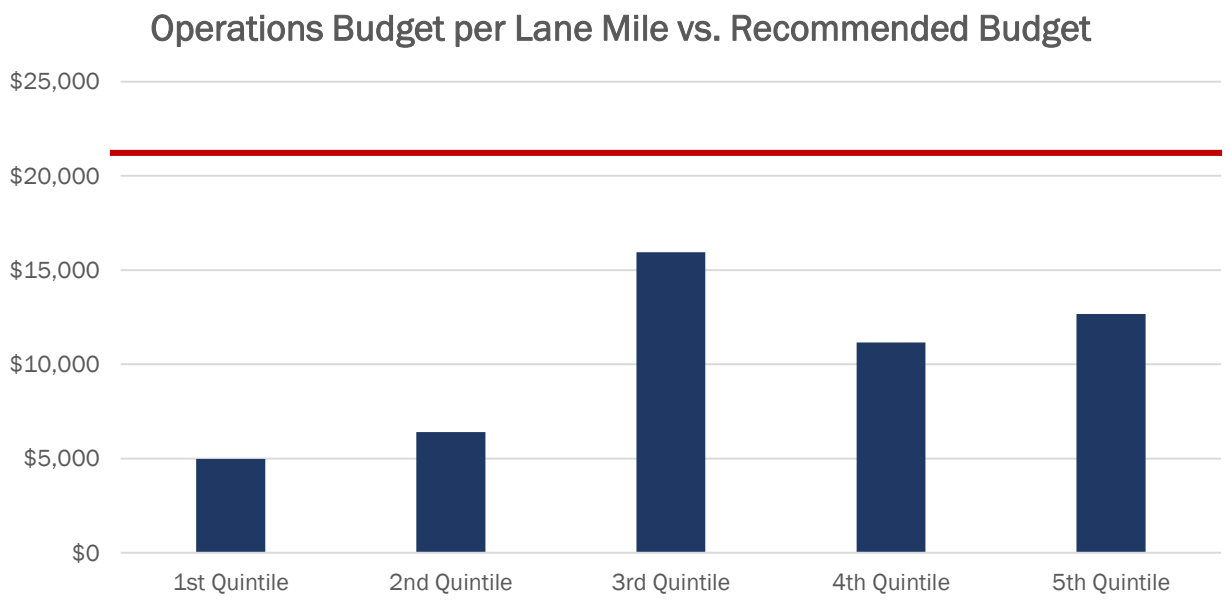

Figure 2: Budgets per Lane Mile by Quintile

Capital street projects are only one-half of the story of transportation funding needs. City budgets for operating and maintaining transportation infrastructure averaged $11,912.61 per lane mile. The Federal Highway Administration[1, 2] recommends $21,198.91 per lane mile for FY 2015. This means that cities chronically under budget the amount needed to adequately reconstruct their highways and streets. Respondent cities would need $354 million to properly maintain city streets. This $9,286.30 difference in per lane mile operations budgets means respondent cities were $217 million short in FY2014-15 to properly maintain their infrastructure.

While this budget issue is endemic across populations and regions, cities in the first and second quintiles (population of less than 1,250) are most affected. These cities budget on average $4,981 and $6,404 per lane mile, respectfully. Regionally, cities in Eastern Oregon and cities along the North and South Coast are the most effected. Respondent cities in Eastern Oregon budget on average $2694.17 per lane mile; more than $18,000 below recommended per lane mile levels to operate and maintain infrastructure.

Transportation costs are linked to several overarching needs. The most common overall transportation needs cities identified (in order of most common) are:

- Paving and repaving
- Signage replacement
- Sidewalks repair
- Street sweepers
- Drainage improvements
- Crosswalk improvement
- Bridge repair and/or replacement
- New striping
- Street lights replacement

[1] *Reconstruction, Rehabilitation and Resurfacing costs from Highway Statistics – 2001 FHWA.*
[2] *National Highway Construction Cost Index. October 2015. Table PT-1.*

Paving and repaving (which is an amalgamation of several identified needs, including filling potholes and funds for chip and slurry seal) was the single largest identified transportation improvement need. This list illustrates several takeaways. First, transportation needs are very diverse. The highly personalized nature of each city's transportation needs makes overall conclusions of statewide needs difficult. This means solutions should be discovered on a case-by-case basis.

Common Responses by Transportation Needs Category	
Safety Needs	*Disaster Resilience*
Safe School Routes	Bridges
Bike/Ped Paths	Flooding
Sidewalks & Turn Lanes	Earthquakes
Intersection Improvements	Wastewater
	Water Distribution
Multimodal Needs	*Jurisdictional Transfer*
Sidewalks	Funding Needs
Bike/Ped Paths	City Standards

Table 2: Common Responses to Transportation Needs Categories

As shown in the table above, safety needs and multimodal needs are often synonymous. Bike/ped paths as well as sidewalks appear in both categories. This indicates the usefulness of these projects in serving dual functions. For example, repaired sidewalks reduce risk of injury from broken cement and uneven sidewalk, while improving a common path for bicycle and foot traffic. Many smaller cities responded that sidewalks were their only form of multimodal transportation, and as such sidewalk improvements are of extra importance to smaller communities. This is further supported by the need for sidewalk improvements in the list of most common overall transportation infrastructure needs. Disaster resilience was also highlighted, with the most common transportation-related need focused on bridges.

Finally, jurisdictional transfer needs varied widely from one city to the next. Jurisdictional transfer encapsulates the methods and authority for transferring infrastructure (most often roads and highways) between different units of government. Common throughout Oregon is the operation of state highways and county roads within city limits. The survey shows that the jurisdiction that maintains a road or other transportation infrastructure depends on the city in question. However, the most common trait is the inability to transfer jurisdiction. The most commonly stated barriers included lack of funding and the effort it would take to bring roads up to city standards. Transfer from county authority to city authority was the most common transfer type. This indicates that as cities grow and expand toward their urban growth boundary, there is increased incentive to transfer transportation assets to city control. However, the resources to do this are not always available.

Analysis & Discussion

The total identified infrastructure needs for both water and transportation are $11.4 billion. This is substantially more than was identified by the American Society of Civil Engineers in their 2010 report for Oregon. Although the ASCE report included the needs of counties, the survey used didn't address issues faced by cities of less than 10,000 population. Cities in this category constitute 80 percent of the incorporated cities in Oregon, making it crucial for the League's survey to adequately capture the needs of these members. While the majority of needs still come from large cities, small cities have important

infrastructure needs as well. The needs of each of Oregon's cities vary dramatically, from $4.6 billion asked for Portland, to Ukiah's $49,000 need.

Average Combined Infrastructure Needs	
Quintile	
1st Quintile	$1,029,300.39
2nd Quintile	$8,634,748.86
3rd Quintile	$18,098,292.50
4th Quintile	$36,841,478.44
5th Quintile	$252,197,658.67
Region	
N. Coast	$36,846,001.17
Metro	$264,349,711.60
Valley	$51,320,053.96
S. Coast	$34,724,588.57
S. Valley	$33,925,842.47
Central Oregon	$56,598,264.93
NE Oregon	$14,968,633.40
E. Oregon	$11,954,191.73

Table 3: Average Combined Infrastructure Needs by Population and Region

Cities in the fifth quintile need on average $252 million in combined infrastructure needs. This number falls off dramatically in other quintiles. By comparison, respondent cities in the fourth quintile have on average $37 million of combined needs. Regionally, the Metro region has by far the largest infrastructure needs, with average $264 million in needs. The next largest average regional needs include Central Oregon ($56.6 million) and the Valley ($51.3 million) small cities regions. These regions needing more infrastructure funding can be supported by examining the relationship between population and total infrastructure needs.

Average Combined Needs Per Capita	
Quintile	
1st Quintile	$12,520.20
2nd Quintile	$8,084.20
3rd Quintile	$9,134.44
4th Quintile	$5,514.51
5th Quintile	$5,791.68
Region	
N. Coast	$9,788.87
Metro	$9,088.88
Valley	$4,084.14
S. Coast	$5,073.96
S. Valley	$4,010.28
Central Oregon	$9,368.55
NE Oregon	$5,785.89
E. Oregon	$16,601.91

Table 4: Average Combined Needs Per Capita

The median per capita need for combined infrastructure was $4,675. Water needs are $2,743 per person, and transportation needs are $629 per capita. While these averages vary dramatically, it is important to recognize the trends in this data. Each city, large or small, has infrastructure funding needs that amount to thousands of dollars per person over the next two decades. More importantly, per capita averages across all populations and regions are not equal.

Table 5 shows that the average first quintile city (cities with a population less than 450 people) have needs of average $13,686 per person. This compared to cities in the fifth quintile (cities greater than 10,000) have needs of almost $6,000 per person. For this reason, small cities need even more support for water and transportation infrastructure improvements proportionately. This means any solutions to city infrastructure needs must account for additional funding for smaller cities, instead of a single per capita funding calculation like would be found in other funding sources, such as state shared revenue. In other words, costs of infrastructure improvements and repairs scale; the larger the population, the less per person costs associated.

While per capita figures show one potential calculation for infrastructure funding, another can be demonstrated through road miles. The median respondent city needs $109,000 per lane mile in transportation infrastructure funding. This however, differs from one population to another. Table 6 shows that larger cities or smaller cities in more populated areas tend to have more costs associated per lane mile. The second quintile outlier appears to be from the infrastructure needs of the city of Happy Valley, which is requesting funding for a stretch of Highway 26, at $5.5 million estimated per lane mile. In fact, most of the cities with the highest per lane mile costs require infrastructure funds for highway or interstate highway projects.

Transportation Needs per Lane Mile	
Quintile	
1st Quintile	$121,189.30
2nd Quintile	$710,264.97
3rd Quintile	$335,317.06
4th Quintile	$278,428.75
5th Quintile	$464,882.96
Region	
N. Coast	$173,047.04
Metro	$789,865.20
Valley	$152,695.09
S. Coast	$125,015.75
S. Valley	$58,446.78
Central Oregon	$569,190.74
NE Oregon	$98,114.71
E. Oregon	$157,887.32

Table 5: Transportation Needs per Lane Mile

While population plays a role in the costs per mile of cities, region also appears to be a factor, as costs in small cities in the Metro region as well as those in Central Oregon are significantly higher than in adjoining small cities regions. For these reasons, estimating infrastructure needs using lane miles must also account for the regional needs as well as the presence of major highways running through city limits.

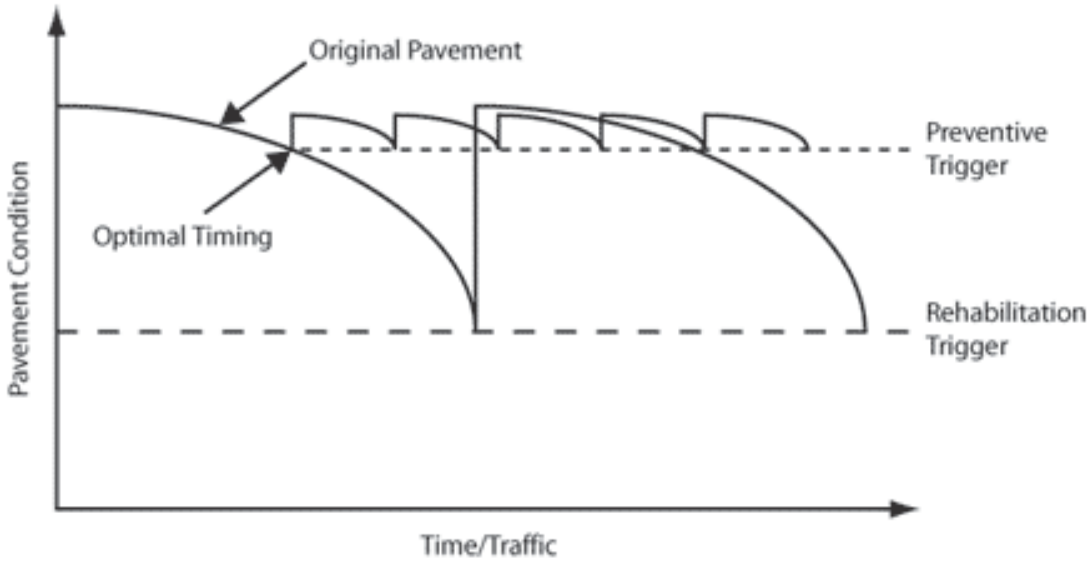

Figure 3: Pavement Conditions over Time[3]

Figure 3 shows that as the state's population continues to increase, the amount of traffic will also increase. Over time, this will lead to degrading pavement conditions and exponential need for transportation infrastructure repairs. This means that the longer cities are unable to make critical repairs, the worse (and more expensive) the issue becomes.

Overall, accounting for both water and transportation needs, population plays the largest role in needs estimates. This is evidenced in Figure 3.

[3] Source: US Department of Transportation

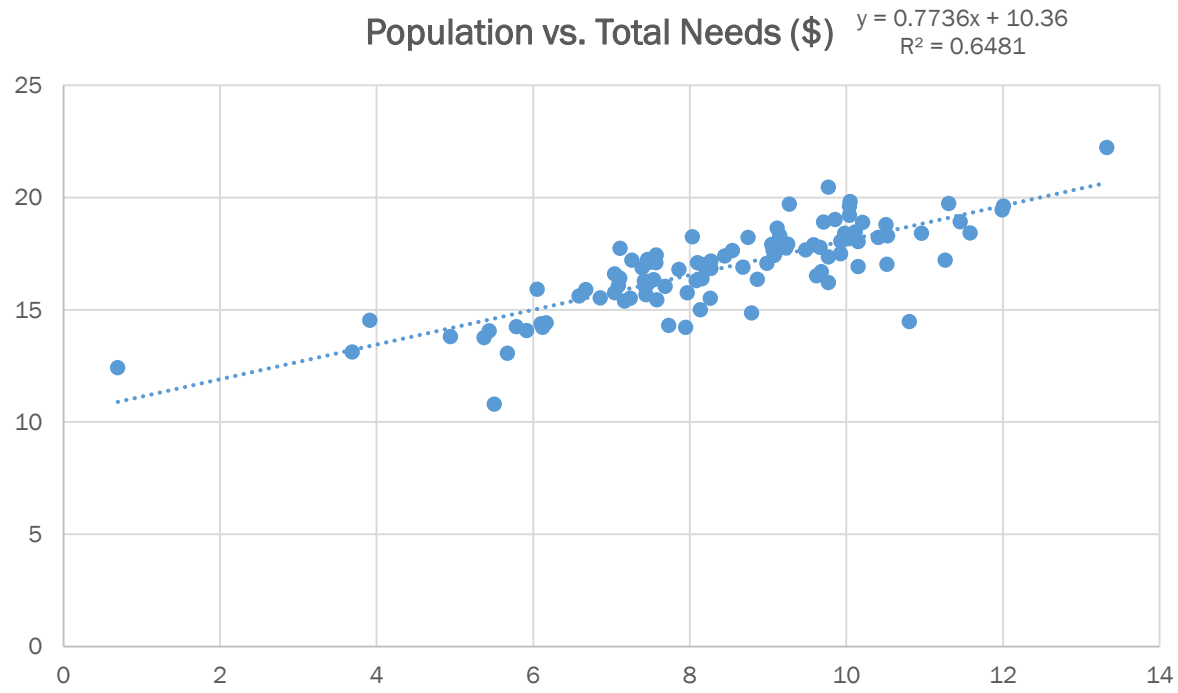

Figure 4: Log-Log Linear Regression of Population vs. Total Infrastructure Needs

Figure 4 above shows a linear regression of the two variables: city population and total infrastructure needs.[4] This shows that percentage total infrastructure needs increase proportionately with an increase in population. While this does not account for all the variation in the data, it sheds light on why regions with higher population are more often those that have greater average infrastructure needs. Transportation needs appear to scale, but water needs increase geometrically, and increase at a fixed rate to city size. This makes intuitive sense as residents need an average amount of water for consumption, hygiene, food preparation, cleaning, etc.

Conclusion

Infrastructure needs in Oregon are a significant financial issue that must be addressed in the near future. Infrastructure funding of $11.4 billion is required for a number of critical projects, ranging from water treatment to road signage. While needs vary significantly from one city to another, several trends appear in cities across the state.

For cities in Oregon, transportation needs are varied and depend significantly on the size of the population and location of the city. However, in the next 20 years $3.7 billion is needed for highway and non-highway expenses. Non-highway transportation and safety needs focus on sidewalks repairs and improvements. Disaster resilience concerns (flooding and earthquakes) are focused primarily on bridges.

[4] The regression above uses a natural log transformation of the variables to reduce skew in the data from large populations and/or large infrastructure needs.

It is important to note from the analysis that apart from the greater cost associated with repair and replacement, the longer infrastructure needs are postponed, population growth becomes an increasingly important factor. Growth in population in Oregon (and especially in cities) means the cost to replace and expand city infrastructure will increase. In other words, the $3.7 billion in transportation infrastructure needs will only increase if left unaddressed in the future.