SUSTAINABLE STREETS OR MORE POTHOLES: DEVELOPING THE CITY OF WEST SACRAMENTO'S STREET REHABILITATION STRATEGY

Samuel Joseph Shelton
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SUSTAINABLE STREETS OR MORE POTHOLES:
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A Thesis

by

Samuel Joseph Shelton

Approved by:

_____, Committee Chair
Mary K. Kirlin, D.P.A.

_____, Second Reader
David Booher, M.A., M.S.P

_____
Date

Student: Samuel Joseph Shelton

I certify that this student has met the requirements for format contained in the University format manual, and that this Thesis is suitable for shelving in the Library and credit is to be awarded for the Thesis.

_____, Department Chair _____
Robert Wassmer, Ph.D. Date

Department of Public Policy and Administration

Abstract

of

SUSTAINABLE STREETS OR MORE POTHOLES:
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With more travel demand and more miles of roadway, West Sacramento has an increasing street rehabilitation responsibility. This thesis develops a sustainable, equitable, and politically and administratively feasible City of West Sacramento Street Rehabilitation Strategy. By reviewing best practices and assessing neighboring agency's ability to collaborate, I define seven revenue options and three expenditure options for street rehabilitation. I then then compare those options against the criteria of sustainability, equity, and political and administrative feasibility. Using these options, I tie their uses together into a set of goals and recommended steps for the development of a street rehabilitation strategy.

_____, Committee Chair
Mary K. Kirlin, D.P.A.

_____
Date

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Chapter 1

INTRODUCTION

There will not be enough funding to maintain streets and roads in the City of West Sacramento as current funding sources evaporate and street rehabilitation practices remain the same. At the invitation of the City of West Sacramento's City Manager Toby Ross and through the California State University of Sacramento's Department of Public Policy and Administration Graduate Program, I wrote this thesis to develop a sustainable, equitable, and politically and administratively feasible City of West Sacramento street rehabilitation strategy.

In 2000, West Sacramento was a city of 31,000 people driving a combined 280,470 vehicle miles on a daily basis (or 9 miles a day per person) along 140 miles of city roadway (California Department of Finance, 2011; Caltrans, 2009). By 2009, West Sacramento grew to be a city of 47,800 people driving a combined 557,980 vehicle miles on a daily basis (or 11.6 miles a day per person) along 201 miles of city roadway. With more West Sacramento residents traveling farther along more miles of roadway, the City has an increasing street rehabilitation responsibility. What steps can West Sacramento take to ensure consistently reliable streets and roads for its residents and businesses?

To provide a general understanding of street maintenance issues, Chapter 2 describes how deferring street maintenance results in escalating costs. This chapter also reviews statewide trends of cities deferring street rehabilitation maintenance. Chapter 3 compares these trends to the last 10 years of West Sacramento's street rehabilitation

program. This chapter describes how West Sacramento's program fixed 39% of its roads by 2010, and then shifted funds from street rehabilitation to other priorities. Chapter 4 explains my methodology for uncovering and analyzing potential revenue and expenditure options. In this chapter, I also define the criteria I use to analyze the suitability of each option (i.e., sustainability, equity, and administrative and political feasibility). Using the criteria from Chapter 4, Chapter 5 analyzes the most likely revenue and expenditure options available to the City of West Sacramento. I also assess how collaborating with neighboring agencies makes some options more feasible. Using combinations of the options described in Chapter 5, Chapter 6 I propose goals and make recommendations for West Sacramento's street rehabilitation strategy.

Chapter 2

WHY PAY ATTENTION TO STREET REHABILITATION?

There are few local infrastructure investments used by almost every citizen. Almost everyone benefits from local streets and roads. From sidewalks and crosswalks, to neighborhood streets and 4-lane boulevards, effective local streets and roads promote mobility for West Sacramento residents traveling to their jobs, getting to school, and making local purchases. Every trip begins and ends with local streets and roads. Ignoring these critical facilities can cost a city more than its roadway system. By deferring maintenance, cities balloon the cost of street rehabilitation projects, resulting in uncomfortable tradeoffs for cities (e.g., building new community centers vs. repairing failed streets). When cities wait until streets reach critical and expensive maintenance needs, cities must pay for pavement asphalt at the going cost of oil, potentially magnifying the cost. This chapter describes how deferring street maintenance results in escalating costs and reviews how this is happening in cities statewide.

How Bad Pavement Becomes Expensive Pavement

According to various street rehabilitation studies, deferring maintenance of city streets by 5 to 10 years can degrade streets in "moderate" conditions to "failed" conditions, multiplying the cost of repairs by five times (Larsen, 2010; Street Resurfacing Finance Working Group, 2010; TRIP 2010).

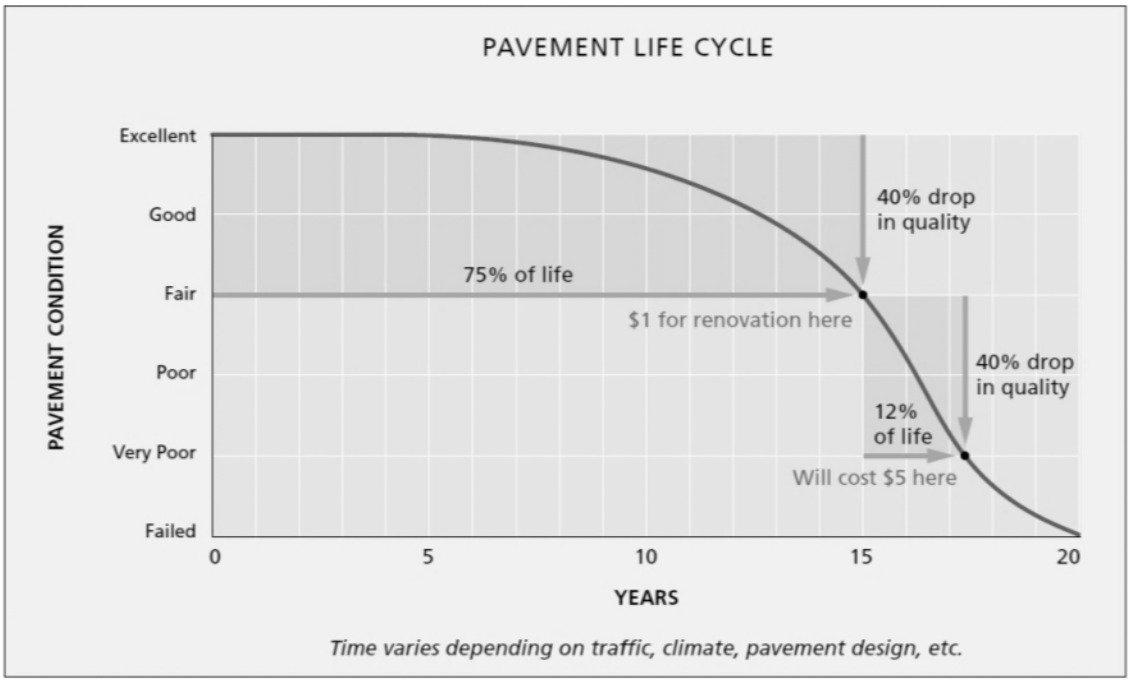


Figure 1. Pavement Life Cycle

The pavement life cycle chart in figure 1 shows that as street pavement drops below "Fair" quality over 10-15 years, where drivers encounter more cracks and potholes, "$1 of renovation will cost $5" for reconstruction in as little as three years (Metropolitan Transportation Commission, 2000). Since 2005, more California cities have started reaching this $5 range.

Between 2005 and 2009, California cities paid for a greater number of more expensive street repairs with local funding, not federal or state funds. According to the California State Controller, between 2000 and 2009, about 71% of city street rehabilitation funding comes from local sources (Westly S., Chang, 2010). Figure 2

shows how mostly local funding paid for a 53% increase in street reconstruction projects (Westly S., Chang, 2010).

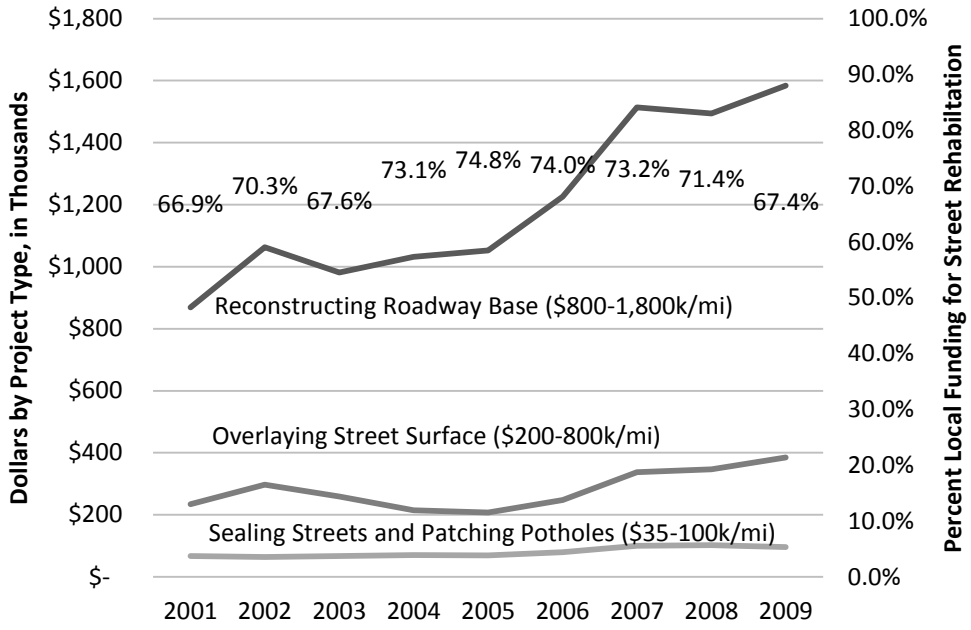


Figure 2. Local Funding Pays for an Increasing Number of Expensive California City Street Reconstruction Projects

Figure 2 describes three main categories of street rehabilitation projects: 1) Sealing Streets and Patching Potholes, 2) Overlaying Street Surfaces, and 3) Reconstructing Roadway Bases. In the first 15 years of a typical street's life, public works departments can extend the life of the street by 5 to 10 years through regular maintenance, such as patching potholes and sealing cracks for about $35,000 to $100,000 per mile. Without maintenance, the top one to two inches of pavement will need to be removed and overlaid with new pavement for about $200,000 to $800,000 per mile. Near

the end of a street's life, the entire surface and several feet into the roadway base below the pavement must be removed and reconstructed, costing about $800,000 to $1,800,000 per mile. (Larsen, 2010; Street Resurfacing Finance Working Group, 2010)..

Recent statewide street rehabilitation reports document this growing cost as cities defer street maintenance projects. According to a 2010 report from The Road Information Program (TRIP), an advocacy group of industries involved in road rehabilitation, California will need to invest over $26.6 billion annually to maintain streets and highways in their current conditions (TRIP, 2010). A 2009 report commissioned by the California Association of Counties (CSAC) estimates that to bring California's cities and counties up to cost-effective rehabilitation levels (maintaining streets above the "fair" category), local governments would need to first invest about $67.6 billion over the next 10 years and then spend $1.8 billion per year on maintenance (Nichols Consulting Engineers, 2009).

Cities that deferred street rehabilitation maintenance during good economic times are finding their costs skyrocketing without the means to pay for rehabilitation during poor economic times. The City of San Jose predicts that if the public works department does not find alternative funding sources or rehabilitation strategies, the current San Jose street maintenance backlog could quadruple from $250 million in 2010 to $1 billion by 2020 (Larsen, 2010).

Road Rehabilitation Costs Are Connected to Truck Damage and Oil Prices

Overtime, normal car traffic will deteriorate streets, but heavier trucks damage the streets at much faster rates. According to the American Association of State Highway and Transportation Officials (AASHTO) and the Federal Highway Administration, the typical truck can damage the roadway at the same rate as 10,000 passenger vehicles (Brewer, 2007). According to Caltrans, 10% of I-80 and U.S. 50 traffic in 2009 is truck traffic. Caltrans predicts that traffic demand will more than double by 2027, placing more truck traffic on the Sacramento region's roadways (Caltrans District 3, 2009). As cities defer street maintenance and roadways deteriorate under the weight of more trucks, cities will need to spend increasing amounts of money on street reconstruction projects. The costs of those projects are connected to the price of oil.

Asphalt producers derive asphalt from crude oil residue, which glues small rocks together to form street surfaces. When the price of oil fluctuates, so does the cost of any street rehabilitation project. According to the Caltrans Office Engineer's Asphalt Price Index, which monitors crude oil prices posted by Chevron, Exxon Mobil and Union 76, the price of asphalt skyrocketed to a 8-year high in July of 2008 with asphalt prices being seven times as much as they were in 2000 (Caltrans, 2011a). However, the price dropped back to 2003 levels by February 2009, due to the housing market crash and subsequent economic slump. By March of 2011, the cost of asphalt has jumped back to July 2008 levels, mostly due to a combination of public unrest in Egypt and Libya, global oil speculation, and the growing economic recovery in the U.S. (The Economist, 2011). During the price dip between 2008 and 2011, agencies across California experienced

20% to 40% project cost savings between earlier project engineer estimates and final project costs (Buegley, 2010). In times of high oil prices, a $15 to $20M citywide street repair program could become a $18M to $28M program, forcing a city to scale back its street program or scale back other capital improvements. Depending on when a city reaches critical street repair stages, the price of oil could make or break a city's capital improvement program. Recent statewide and city reports show how cities are approaching a perfect storm of street rehabilitation issues, where costs skyrocket, truck traffic increases, and asphalt prices fluctuate. But does West Sacramento's situation look like the rest of the cities in California? The next chapter describes how West Sacramento rehabilitates its local streets and roads and explains if the City's current rehabilitation strategy resembles the trends of other California cities.

Chapter 3

HOW WEST SACRAMENTO REHABILITATES STREETS

In the previous chapter, I describe how cities across California defer street maintenance, resulting in higher pavement rehabilitation costs over time. But, how does the City of West Sacramento compare to this statewide trend? In this chapter, I describe how West Sacramento funded a robust street rehabilitation program with sales tax dollars beginning in 2002, and then shifted those sales taxes to other priorities in 2008, leaving West Sacramento without a stable funding source for street rehabilitation.

A Brief Profile of West Sacramento Streets

West Sacramento's street can be separated into three categories 1) older neighborhood streets north of I-80, 2) industrial truck routes located along I-80, the deep water shipping channel, and rail lines; and 3) newer residential streets south of I-80 in Southport neighborhoods. West Sacramento's older neighborhoods north of I-80 (Brodrick and Bryte) date back to the 1910s, which is where most of West Sacramento's recent street improvement projects were located (Mintier & Associates, 2009). West Sacramento's truck routes focus on serving industrial areas and distribution centers connected by rail lines and the Port of West Sacramento. 2009 general plan update documents describe West Sacramento as a "central geographic location with extensive north-south, east-west highway access", making the city "an ideal location for many kinds of distribution-based businesses" (Mintier & Associates, 2009). Since 2000, West Sacramento built over 60 additional miles of streets and grew by nearly 17,000 people,

mostly in the Southport area south of I-80 (California Department of Finance, 2011; Caltrans, 2009). Each of these three areas have different needs which West Sacramento addressed in the last ten years with a sales tax funded street rehabilitation program.

West Sacramento's Sales Tax Funded Street Rehabilitation Program

To justify the need for street rehabilitation prior to a sales tax vote in 2002, the West Sacramento Public Works Department commissioned a pavement study that defined where rehabilitation projects were needed most. This study identified critical but expensive street rehabilitation projects in older and poorer areas of the city and along truck routes in industrial areas of the city ("City of West Sacramento Annual Measure K Report," 2010) . Figure 3 is an excerpt from a map showing the require pavement rehabilitation projects in 2000. The map highlights streets that need various pavement rehabilitation treatments, such as slurry seals, surface overlays, and roadway base reconstruction projects.

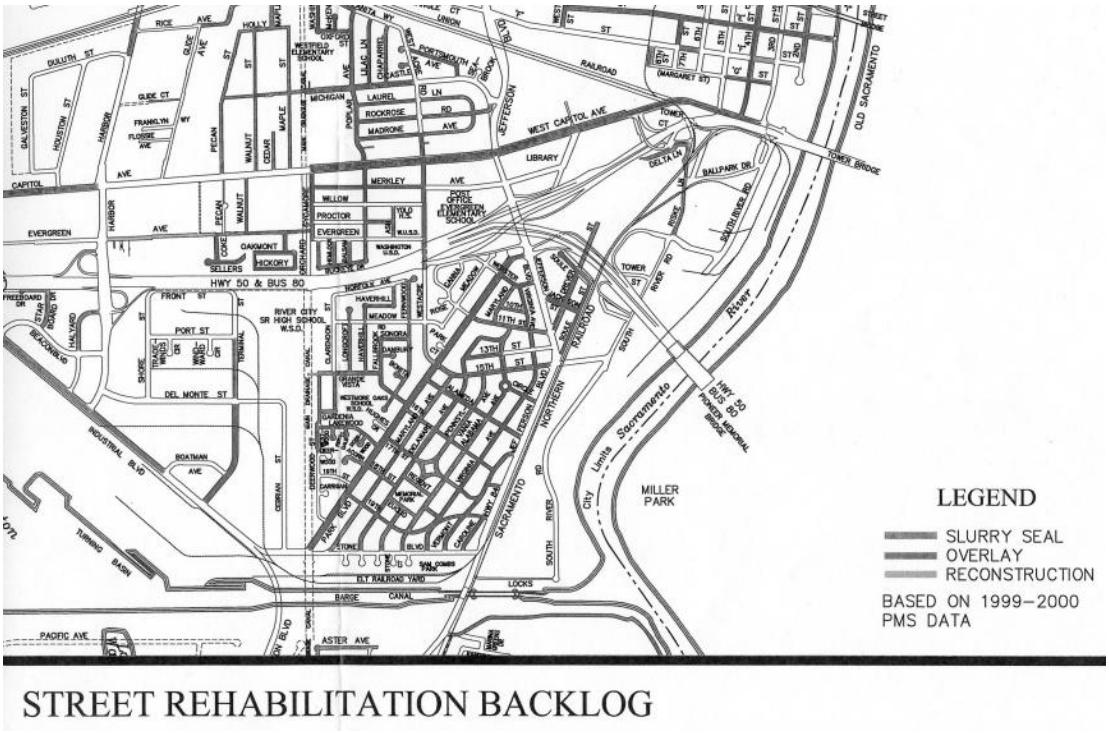


Figure 3. Excerpt from West Sacramento Pavement Condition Map (City of West Sacramento, 2002)

After understanding the pavement needs, the City of West Sacramento passed two ballot measures in 2002, one being a funding measure, the other an advisory measure directing the use of those funds. Measure K created a half-cent general-purpose sales tax, passed by a majority vote as opposed to a special tax, which requires a two-thirds super-majority vote. Measure J, an advisory measure, described a multitude of projects and tax expenditures, including the "repair and maintenance of city streets, new parks and community facilities, library services, after-school programs, childcare and senior facilities, expanded police and fire protection, and reductions in utility bills and property tax assessments" (City of West Sacramento, 2010). Measure K's half-cent sales tax

sunsets at different times. The measure created a permanent city services quarter-cent sales tax and a temporary capital project quarter-cent sales tax set to expire by FY 2012-13.

Voting districts with the highest percentage of dissenting voters lived in areas of southern West Sacramento's newer suburban neighborhoods with newer streets (Yolo Elections Office, 2011). West Sacramento staff and politicians were able to join the problem event of deteriorating roadways and a supportive political mood by identifying projects and programs across a majority of the city, garnering enough support to pass a sales tax to fix roads as well as supplement the general fund.

In 2008, the City of West Sacramento passed two more ballot measures. Measure U approved the continuation of the quarter-cent capital project sales tax for an additional 20 years. Measure V was another advisory measure, which changed the capital program from 70% street rehabilitation projects to future streetcar operation and flood protection projects by FY 2012-13. Measures U and V effectively cut off sales tax funding for street rehabilitation by FY 2012-13. Public Works staff "advanced" street rehabilitation funding shares of Measure K funds for earlier projects, meaning no new funding for street rehabilitation is expected from sales tax measure dollars by the end of FY 2010-11. But, does this mean that West Sacramento's streets no longer need rehabilitation?

Is Street Rehabilitation Still a Problem for West Sacramento?

Did West Sacramento's sales tax funded street rehabilitation investments solve West Sacramento's street rehabilitation problems? The short answer might be, no one

knows for sure. This program spent about $15.5 M in sales tax funding to rehabilitate about 39% of the entire city's streets and roads (City of West Sacramento, 2010a). When combined with other funds, the State Controller's Annual Road Reports show that West Sacramento spent about half of its available street rehabilitation funding on street reconstruction projects between 2002 and 2008 (Westly S., Chang, 2010). The last completed pavement study in 2000 helped identify a set of streets that the city mostly addressed with the sales tax funded program. However, rising asphalt costs during FY 2006-07 forced the city to scale back the scope of the program, leaving several roads falling into disrepair. Without another pavement study, the City of West Sacramento does not know the rehabilitation costs of streets left out of the last rehabilitation program or future rehabilitation costs. It is also possible that streets rehabilitated in 2003 with sales tax dollars are already due for some pavement rehabilitation treatments. Given the 10-year life cycle of street rehabilitation, streets built in Southport in 2006 would require maintenance by 2016 while truck routes and older northern Brodrick and Bryte neighborhood streets rehabilitated in 2003 would need maintenance by 2013.

Without a stable funding source, the City of West Sacramento will not be able to pay for additional street rehabilitation, without considering alternative revenue or expenditure options. Just as it did in FY 2006-07, the City may also fall victim to the fluctuating price of oil, depending on when its streets reach critical maintenance stages. To combat these challenges, the next chapter describes how I uncover and analyze potential revenue and expenditure options for a West Sacramento street rehabilitation strategy.

Chapter 4

METHODOLOGY

West Sacramento could fall into the statewide pattern of cities spending greater amounts of money on street reconstruction projects. In the absence of a funded street rehabilitation program, what new sources of funding or ways of rehabilitating streets would be appropriate for West Sacramento's needs? If appropriate, who would West Sacramento collaborate with to implement these new ideas? This chapter explains 1) where I found new revenue options, 2) where I found new expenditure options, 3) how I assessed if these options could benefit from collaboration, and 4) how I critique each option by analyzing its ability to contribute to a sustainable, equitable, and feasible street rehabilitation strategy for West Sacramento.

Revenues for governments often take the form of fees and taxes. These revenues pay for expenditures, such as street rehabilitation projects. New revenue options will be different ways West Sacramento can raise additional revenue for street rehabilitation, by either manipulating current revenues or creating new taxes or fees. New expenditure options will be different ways West Sacramento can rehabilitate streets, either using new budgeting procedures or new pavement technologies. Finding the most appropriate revenue and expenditure options for a local street rehabilitation strategy involved reviewing many reports and city council items.

Finding New Revenue Options

To find the best revenue options for West Sacramento, I reviewed street rehabilitation reports at the national, statewide, and local level. These reports describe many revenue options, ranging from new fees and taxes, to advocating for more federal and state funds. Reports from the City of San Francisco and the City of San Jose, two cities currently struggling with street rehabilitation issues, ultimately contained the most feasible West Sacramento revenue and expenditure options.

Starting with national and statewide reports, I found that most described aggregated street rehabilitation needs (e.g., billions in total costs), advocated for additional revenues (e.g., more federal funds) and advocated indexing gas tax rates to roadway project costs (Nichols Consulting Engineers, 2009; TRIP, 2010). While these reports provide excellent background information, which I use in earlier chapters, their recommended federal and state revenue advocacy steps are less important for informing West Sacramento's local revenue and expenditure choices.

I then turned to local City council reports and workshops. A majority of the reports I found focused on presenting consultant data about the total cost of rehabilitating city pavement while seldom delving into the issues of new revenues or expenditure options. I reviewed city council agendas and websites, limiting the scope of this search to cities comparable in size to West Sacramento (California cities with populations between 35,000 to 60,000). Of these 80 cities, only a few looked at new revenue mechanisms beyond listing broad funding categories, such as federal funding or state gas taxes. After broadening my search to cities in critical need of rehabilitating pavement, I

found reports that looked in depth at new local revenue options, which were drafted by the cities of San Jose and San Francisco (Larsen, 2010; Street Resurfacing Finance Working Group, 2010).

Based on this search, I plan to analyze the following revenue options: 1) General-purpose sales taxes, 2) Countywide Sales Taxes for Transportation, 3) Bonding, 4) Port fees, 5) Countywide Vehicle License Fees, and 6) Federal and State funding. Each of these revenue options are within the local authority of West Sacramento to change an incorporate within a street rehabilitation strategy.

Finding New Expenditure Options

Cities across the state are considering state-of-the-art pavement rehabilitation technology (e.g., Cold-in-place recycling), designating lower functioning roadway standards at gravel levels, and abandoning streets and roads to private ownership (Kovner, 2010; Kuennen, 2010; Stevens, 2010). To find the most applicable street rehabilitation budgeting techniques and pavement technology for West Sacramento, I reviewed national engineering standards manuals, California reports on new pavement technologies, and local reports on various street-related austerity measures.

Beginning at the national level, the American Association of State Highway and Transportation Officials (AASHTO) updates roadway and maintenance design manuals every three to four years. The 2007 version of this manual recommends monitoring pavement conditions using a computerized pavement management system and practicing preventative maintenance to prolong the life of street pavement (Brewer, 2007).

At the statewide and local level, reports describe various experiments with alternative pavement technologies, such as incorporating used tires into new pavement (e.g., Rubberized Asphalt Concrete) and recycling existing pavement at the project site (e.g., Cold In-Place Recycling and Full-Depth Reclamation) (California Department of Resources Recycling and Recovery, 2011a). Local reports from neighboring agencies, such as Woodland and Davis, confirm the use of some of these alternative paving practices (City of Davis, 2010; City of Woodland, 2011).

Other local reports describe various street-related austerity measures, such as abandoning roads to private ownership or reducing street standards by either narrowing the roadway or reducing the quality of pavement (Kovner, 2010). However, these measures are more applicable for rural county roadways with low traffic volumes.

Based on this search, I plan to analyze the following expenditure alternatives: 1) Preventative Maintenance, 2) Rubberized Asphalt, and 3) Cold In-Place Recycling. Each of these options are being practiced by either nearby agencies or local agencies in Northern California.

Avoiding Non-Applicable Options and Implementation Details

Local government revenue mechanisms and street rehabilitation engineering technology contain tedious implementation details and variety that this thesis avoids in favor of describing the general benefits of the most appropriate options for West Sacramento street rehabilitation needs. For example, the State Treasurer's bonding data shows how some local agencies lease property through certificates of participation to pay

for street projects (California State Treasurer, 2011). These street leases are only applicable for toll road projects, such as Southern California's Toll Roads, so I do not include this style of bonding as an option. Another example would be traffic impact fees, which can only be charged against the impacts of new development (e.g., new roads) and not the issues of existing development (e.g., road repairs).

Understanding the Benefits of Collaboration

Within applicable revenue and expenditure options, I evaluate the potential for West Sacramento to collaborate with other local agencies in Yolo County. The City of West Sacramento does not need to act alone to generate new revenues or try different expenditure options if other agencies are willing to help each other address shared street rehabilitation issues; thus, increasing the feasibility of new options. Some options will be completely dependent on collaboration to succeed (e.g., lobbying for federal funding) while others are not suited to collaboration between agencies (e.g., parcel tax measures).

Yolo County Local Agency Public Works Staff Collaboration Assessment

For both revenue and expenditure options, I assess the potential for collaboration to increase the political or administrative feasibility of those options. To conduct this assessment, I interviewed public works staff from various local agencies in Yolo County. As most agency staff requested anonymity, I reference when staff made general points of debate or consensus regarding the possibility of collaboration. This assessment focused on 1) the history of their collaboration, 2) their understanding of a shared street

rehabilitation issue, 3) identifying other potential stakeholders, and 4) their willingness to participate in a future collaborative effort. Below is a list of questions I asked public works staff as part of this research:

1) Describe any past collaborative efforts with the City of West Sacramento.
2) What are your agency's main issues related to street rehabilitation? (e.g., securing future funding, appropriate environmentally sensitive pavement technology, cost-saving pavement management techniques, etc.).
3) What other organizations do you believe have a stake in the adequate maintenance of streets and roads? What do you believe their interests or concerns could be?
4) Would you be willing to engage in a consensus building effort designed to address street rehabilitation issues with the City of West Sacramento?

Understanding collaborative opportunities within revenue and expenditure options will also help define option suitability when analyzed using the criteria described in the next section.

Analyzing Options Using Criteria

While describing each revenue or expenditure option, I compare these options against criteria to understand the appropriateness of each option. Maintaining objectivity within an inherently subjective analytical process is challenging. Bardach describes two types of criteria: 1) Evaluative criteria, which are "used to judge the goodness of the projected policy outcomes" and 2) Practical criteria, which are used to judge the "prospects an alternative faces as it goes through the policy adoption and implementation

process" (Bardach, 2005). To analyze the usefulness and appropriateness of street rehabilitation options, I chose sustainability and equity for evaluative criteria and political and administrative feasibility for my practical criteria.

Sustainability: The Capacity to Endure

The word sustainability carries ecological and environmental meaning for many people. I use the term in its most basic sense: "the capacity to endure". Evaluating the sustainability of any option allows me to judge the long-term relationship between the stability of potential revenue streams and the fluctuation of deferred or addressed street maintenance.

Equity: Who Pays and Who Benefits?

The criterion of equity attempts to answer the following questions: 1) who should pay for street rehabilitation? and 2) whose street should be rehabilitated? Revenues sources may be either progressive (federal income taxes) or regressive (sales taxes), placing a disproportionate share of the tax burden on either the rich or the poor. Some options limit the scope of street rehabilitation investments to specific areas. The federal government limits federal transportation funding to improvements along major roadways that everyone uses, making federal funding more equitable. Options that focus on truck routes could favor businesses over residents.

Political Feasibility: Can West Sacramento Approve Another Tax or Fee?

The political mood of West Sacramento affects the approval success of any option, be it a City Council majority vote or a ballot measure requiring a two-thirds vote. I define options as being less politically feasible if they attempt to change the status quo or require additional voter support. Alternatively, options will be more politically feasible if they do not change the status quo or avoid ballot measures altogether. For example, options that make changes to current local taxes or add new fees will be less politically feasible. Options that require a simple majority vote will be more politically feasible than a measure requiring a two-thirds vote. Using collaborative techniques may increase the political feasibility of some options by building agreement between multiple stakeholders with shared interests.

Administrative Feasibility: Easy Street or Uphill Battle?

Bardach explains that a policy alternative "should be robust enough so that even if the implementation process does not go very smoothly, the policy outcomes will still prove to be satisfactory" (Bardach, 2005). Some options will ask West Sacramento staff to work harder to prepare federal funding lobbying documents, collaborate with other agencies, and try new budgeting and paving techniques. As options become more difficult for West Sacramento staff to administer within existing resources or expertise, the options become less feasible. Some options will be more time demanding (working more on federal lobbying documents), require additional expertise (understanding new paving technology), and ask staff to foster new relationships (collaborating with other

agencies). Each option will also have an upfront cost for setting up a new option (e.g., setting up a new fee program) and an ongoing cost for maintaining that option (e.g., paying and training program staff).

Using these four criteria and the information from my collaboration assessment interviews, I analyze each revenue and expenditure option to understand how they could fit into West Sacramento's street rehabilitation strategy in the next chapter.

Chapter 5

REVENUE AND EXPENDITURE OPTIONS

Without a stable funding source sustaining a street rehabilitation program that is equitable and feasible, the city runs the risk of returning to the poor street conditions of 2000 and paying for expensive reconstruction projects. At the same time, the city's substantial investments over the last decade give West Sacramento the option to pursue a cheaper preventative maintenance strategy. This chapter describes each new revenue and expenditure option listed in the previous chapter. After defining each option, I analyze how each option could be part of a sustainable, equitable, or feasible street rehabilitation strategy. I also discuss how collaborating with neighboring agencies can increase the feasibility of some options.

Revenue Options

Cities across the region have begun prioritizing street rehabilitation funding strategy studies as they approach "the point of no return", where street rehabilitation costs are close to ballooning beyond the control of local governments. Some of the best local revenue options are those already used by the City of West Sacramento and those being considered by the City of San Francisco and the City of San Jose. In the following sections, I analyze seven different revenue options.

General-Purpose Sales Taxes

Based on a simple majority vote, cities can raise additional general-purpose sales and use taxes over the state sales tax rate of 8.25% (California State Board of Equalization, 2011). West Sacramento can either raise its sales tax above 8.75% or amend the existing quarter-cent capital improvements sales tax to include a street rehabilitation element. California city sales tax rate increases range from 0.10% (Fresno County Zoo Authority) to 1.00% increases in eight cities (California State Board of Equalization, 2011b). A general-purpose sales tax requires a simple majority vote of the people and requires the city council to agree to place a general-purpose tax measure on the ballot.

Sustainability

The sustainability of a sales tax depends on the stability of businesses in West Sacramento and the stability of the economy. West Sacramento's sales tax revenues grew from $16.4 M in 2006 to $18.0 M in 2010, with a high of $20.2M in 2009 (City of West Sacramento, 2010b). As the economy ebbs and flows, so will the stability of revenue for street rehabilitation. As a general-purpose tax, the City of West Sacramento would retain the ability to change expenditure priorities, making this option less stable than dedicated revenue sources.

Equity

Sales taxes are classically more regressive than other forms of revenues, as the poor would pay a higher proportion of their income on taxed purchases than the rich, making a sales tax less equitable than other options. According to demographic maps

produced by ESRI using US Census data, about 22.3% of West Sacramento's population is below the poverty line, largely living in older communities along West Capitol Avenue and Sacramento Avenue (ESRI, 2011). These communities also experience 15% to 32% unemployment in 2010 (ESRI, 2011). Additional sales taxes would hit these communities the hardest.

Political Feasibility

This option is potentially feasible when the economy turns around. All Yolo County cities followed a similar model of passing a general-purpose sales tax measure with a simple majority vote (50%) guided by an advisory measure that discusses specific uses of the sales tax (Yolo Elections Office, 2011). As long as the public trusts their elected officials to follow the advisory measure, the general-purpose sales tax can act like a special purpose tax that funds street rehabilitation projects. This option could be politically feasible once the economy strengthens

Administrative Feasibility

West Sacramento staff are familiar with managing sales tax programs as they have been doing so for the last 9 years. Adding a new tax or maintaining the existing tax would be a relatively simple issue for staff, making this option administratively feasible.

Countywide Sales Tax for Transportation

According to the Self Help Counties Coalition, 19 counties in California have super-majority approved sales taxes for transportation purposes (Self-Help Counties Coalition, 2011). Countywide sales taxes fund a variety of transportation capital

improvements across the state, often including "return to source" road rehabilitation programs (Hamideh, Eun Oh, Labi, & Mannering, 2010). For example, 30% (over $24M) of the Sacramento Transportation Authority's Measure A half-cent sales tax funded road rehabilitation projects in FY 2009/10 (Sacramento Transportation Authority, 2010). 35% (over $12M) of the San Joaquin Council of Governments' Measure K half-cent sales tax funded road rehabilitation projects in FY 2009/10 (San Joaquin County Transportation Authority, 2010).

Using Yolo County's taxable sales total in FY 2008/09 ($2.8 billion of California's $456 trillion in taxable sales), I can estimate the potential revenue from a Yolo County half-cent transportation sales tax (California State Board of Equalization, 2011c). 30% (over $4.3M) of a potential Yolo County Transportation District half-cent sales tax measure would have funded road rehabilitation in FY 2008-09. Added to the nearly $15M spent by Yolo County cities in FY 2008-09 for road rehabilitation, this revenue would have funded 28% more road rehabilitation projects.

Sustainability

A countywide sales tax would have a broader portfolio of taxable sales than West Sacramento's specific sales tax receipts, making this option more stable than an individual city's sales tax. For example, between 2006 and 2009, West Sacramento experienced a $4M increase in sales tax receipts with the addition of IKEA and Walmart stores in (City of West Sacramento, 2009a)

Equity

The equity of this option would be similar to the equity of a city sales tax, with the exception of countywide project benefits. During collaboration interviews with public works staff, all staff commented on the relative difficulty of jointly selecting projects with equitable countywide benefits, as each city in Yolo County has distinct regional mobility needs. For example, each of the major cities in Yolo County are located at the points of a freeway triangle along I-5, I-80, and SR 113. No one freeway project would serve all Yolo County residents. However, countywide pothole and crack sealing services could benefit all residents.

Political Feasibility

There are currently no countywide sales taxes in Yolo County for any purpose, making any change in the status quo a political challenge (California State Board of Equalization, 2011b). The Yolo County Transportation District (YCTD) would be the likely sponsor of such a transportation sales tax measure. The Yolo County Board of Supervisors would also need to approve placing the measure on the ballot. The 2006 YCTD Short Range Transit Plan's Finance section proposes a modest countywide quarter-cent sales tax as a future revenue option to fund some transit services, but does not consider any further details of a sales-tax measure (Yolobus, 2006).

If a measure was placed on the ballot by these two governing bodies, the measure would still need to be shaped in a way to garner the most votes. Hannay and Wachs describe how countywide sales taxes have a higher possibility of passing if 1) proposed projects are located closer to voters, 2) voters have relatively higher incomes, 3) political

leanings match the proposed mobility projects (e.g., conservative highways versus liberal transit service), and 4) the proposed measure offers a variety of modal options, such as walking, bicycling, and bus service (Hannay & Wachs, 2006). Locating projects close to Yolo County voters would be a challenge, which I discussed earlier under the equity section. Yolo County poverty levels and per-capita income levels are comparable to Sacramento and San Joaquin Counties, meaning passage of a countywide fee could be equally as difficult for poorer communities in Yolo County as it was in poorer communities in Sacramento and San Joaquin counties (ESRI, 2011). However, Hannay and Wachs conclusions regarding income may not hold in today's challenging economic environment. While Davis is a multi-modal model city and West Sacramento is pursuing streetcars, selling Woodland voters on multimodal improvements could prove politically challenging.

Administrative Feasibility

During collaborative interviews, public work staff discussed how each city could pass its own sales tax for street rehabilitation and not need to deal with sharing street rehabilitation funds, jointly selecting project priorities, or administering a countywide measure, making this revenue option less administratively feasible in their opinion. Despite this feedback from public works staff, YCTD staff would administer the fee, just as the Sacramento Transportation Authority and San Joaquin Council of Governments administer their sales tax programs for their member cities. With other agency staff doing the work, this option becomes more administratively feasible.

Issuing Bonds: Borrowing Now Can Save Money Later

Going into debt by borrowing is a popular method for financing capital projects. According to Mikesell, "the fundamental rule of debt policy is, "do not issue debt for a maturity longer than the financed project's future useful life" (Mikesell, 2010). The Institute for Local Government also notes that "incurring debt obligates the community into the future and reduces financial flexibility" as well as recommending that city debt service not exceed 10% of revenues (Institute for Local Government, 2010). According to the last adopted two-year City of West Sacramento budget, for FY 2007-08, the city's debt service was 21% of revenues and projected to be 15.3% in FY 2008-09, 13.2% in FY 2009-10, and 12.8% in FY 2010-11 (City of West Sacramento, 2009a). West Sacramento may be in a position in future years to responsibly bond for capital projects, making this option sustainable, should the City's debt service drop below 10%.

Put simply by California Treasurer Bill Lockyer, "To issue a bond is to borrow money. A bond is simply the evidence of the debt" (Lockyer, 2006). I focus on bonds that California cities typically use for the financing of street projects, such as tax obligation bonds and special assessment bonds. Table 1 shows the distribution of the type of debt for all California streets and roads projects since 2000 (California Debt and Investment Advisory Commission, 2011).

Table 1. 2000-2011 Debt Issued for Streets and Roads Projects by California Local Agencies

Debt Type	Percent	Principal
Certificates of participation/leases	35.65%	$ 186,745,000
General obligation bond	1.91%	$ 10,000,000
Limited tax obligation bond	27.81%	$ 145,665,000
Public lease revenue bond	4.66%	$ 24,420,000
Revenue bond (Pool)	8.18%	$ 42,875,000
Sales tax revenue bond	2.24%	$ 11,750,000
Special assessment bond	19.55%	$ 102,396,441
Grand Total	100.00%	$ 523,851,441

Since 2000, local governments issued about $523M in statewide bonds for streets and roads construction projects, 19.55% of which were Special Assessment Bonds, which are bonds that are paid off through an assessment on real property, such as a traffic impact fee on the price of a home or a parcel tax in an assessment district (California Debt and Investment Advisory Commission, 2011). However, the State Treasurer does not specifically state if these bonds helped pay for street rehabilitation or new street construction.

Data from the State Controller's Annual Local Streets and Roads reports show that debt financing for street construction began to grow from 4.3% of all street project spending in 2000 to 22% by 2005, then decreased to about 14% in 2008 (Westly S., Chang, 2010). However, the State Controller reports lack sufficient detail to understand if these debt funds are property assessments or other types of bonds since State Controller staff changed how they code debt over the years. The reports also do not connect funding

types with project types, such as assessment bonds with street reconstruction projects. This makes it difficult to determine if bonds typically finance street maintenance projects versus new street projects, such as when cities use Mello-Roos assessment districts to build new residential neighborhood streets. Fortunately, West Sacramento's Capital Improvement Program records line up with state treasurer and state controller records, showing us how West Sacramento used bond funding to help rehabilitate a main roadway in West Sacramento.

To widen and rehabilitate Jefferson Boulevard in FY 2004/05, the city bonded against development impact fees and used available sales tax dollars to build this project (City of West Sacramento, 2009). In 1998, City of West Sacramento issued a total of about $20 M in special assessment bonds for "street construction improvements" and "multiple capital improvement public works projects", which were part of a 1915 Act Assessment Bond " (California State Treasurer, 2011). The City of West Sacramento combined these bond funds with about $10 M in Measure K sales tax funds for a total of $30 M for Jefferson Boulevard and several other street rehabilitation projects in FY 2003-04 and FY 2004-05. This spending represents about 22% of the last 10 years of street maintenance spending for the City of West Sacramento (Westly S., Chang, 2010).

Sustainability

For bonding to be a sustainable option for future street maintenance projects, West Sacramento will need to bring their debt service below 10% and connect bond payments to a reliable funding source for a better bond rating. Only street reconstruction projects that can last 15-20 years will satisfy the time horizon for a bond. For street

reconstruction purposes, bonding makes sense as a long-term capital investment, but not for routine maintenance or street resurfacing which only have useful lives of five to ten years.

Equity

The equity of this option depends on the location of such a large investment of money. Projects along major roadways (e.g., Jefferson Blvd.) would be more equitable than projects along isolated truck routes benefiting primarily industrial traffic. The equity of the option will also depend on the funding source that pays off the bond. For example, if development impact fees pay the debt service for a project that was mostly street rehabilitation, the burden of the project would fall on new residents instead of existing residents. Alternatively, if sales taxes pay the debt service, then the burden would fall on anyone making purchases or doing business in West Sacramento.

Political Feasibility

It has been over ten years since the City of West Sacramento issued a bond, but the latest budget documents show a willingness to issue debt again. As shown in Figure 4, between 1987 and 2010, the City of West Sacramento and its affiliated districts and authorities issued a total of $704M in bonds for mostly capital improvement projects and street improvements (California Debt and Investment Advisory Commission, 2011).

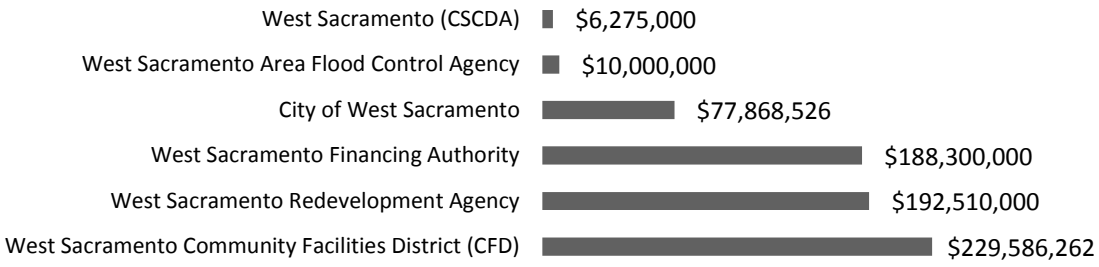


Figure 4. West Sacramento Entities Sold over $700M in bonds between 1987 and 2010

West Sacramento's last budget expressed a goal to "increase the ability to issue debt, collateralized by property taxes, from 2% to 5%" (City of West Sacramento, 2009a). This budget also proposes issuing debt to cover the last 30% of its Capital Improvement Program, making debt a politically feasible option, if West Sacramento's 2009 budget projections hold true. If the 2009 budget projections fail to lower the debt service ratio to acceptable levels, then this option becomes less politically feasible regardless of the last budget's goals of issuing more debt.

Administrative Feasibility

The Jefferson Boulevard project is a good example of the administrative feasibility of this option for West Sacramento staff. However, it has been ten years since the City of West Sacramento issued bonds. Since 1998, other West Sacramento districts and agencies issue revenue and assessment bonds. West Sacramento's twenty-seven Community Facilities Districts bonded for over $229 M against Mello-Roos assessments while West Sacramento's Financing Authority bonded for over $188M against future hotel transient taxes (California Debt and Investment Advisory Commission, 2011). The

City or any other West Sacramento entity has yet to bond specifically for projects that only maintain existing infrastructure without adding additional value. The Jefferson Boulevard project addressed both existing deficiencies of failing pavement and the future deficiencies of new resident travel demand. For bonding to be an administratively feasible option, city staff will need to build projects that address both street maintenance needs with street capacity needs.

Parcel Taxes: Comparable to Water and Garbage Fees

Parcel taxes are a form of property tax, but are not an ad valorem tax (a tax based on the value property). Local agencies can set parcel taxes at a flat rate per parcel of property or set the rate based on the characteristics of property, such as the square footage of the parcel or square footage of the building on the parcel. The establishment of a general parcel tax for any type of expenditure would require a simple majority vote of the public while a citywide or specific area special assessment district for street rehabilitation projects would require a two-thirds vote of the public (Street Resurfacing Finance Working Group, 2010).

Sustainability

This option is the most sustainable option as the City can consistently charge parcel taxes year after year because these taxes are not tied as intimately to the economy as sales taxes. A parcel tax is not connected to property values, as it is not an ad valorem tax. Unless the City condemns and purchases the property, the landowners will always pay a flat parcel tax regardless of the success of the economy. City of San Jose staff

valued the reliability of collecting a specific parcel tax for street rehabilitation. For example, San Jose is considering a tax of $300 per parcel per year or $25 per month, which would be comparable to West Sacramento's garbage collection fees ($15-$24/month) or water service fees ($33-$38 flat rates) as shown in West Sacramento's Book of Fees (City of West Sacramento, 2011a).

Equity

The equity of this option depends on if the City imposes a general parcel tax or a special assessment district tax on property owners. The City of San Francisco's street financing committee considers a citywide special parcel tax for street rehabilitation as a "challenging but possible option", fearing that residents may believe that core city services like street rehabilitation should not be paid for through special taxes, which would violate Proposition 218 (Street Resurfacing Finance Working Group, 2010). To comply with Prop. 218, the City would need to demonstrate that the special benefits of parcel taxpayers were separate from the general benefits of those who do not pay the parcel tax. This would be difficult as the benefits of public streets and roads are not exclusive to property owners. A general parcel tax would avoid Prop. 218 requirements. To make the tax equitable, the City can structure the tax by building square footage or by type of parcel, charging more for business and industry and less for residents.

Political Feasibility

As a special tax, voters must approve a parcel tax by a two-thirds supermajority, making this option less politically feasible, but potentially one of West Sacramento's better revenue options. As a general tax, only a simple majority vote is required, making

this option more feasible. The City of San Jose values the stability of parcel taxes and considers this revenue option their primary street maintenance funding alternative (Larsen, 2010). By June 2011, the City of West Sacramento could raise utility rates gradually over the course of four to five years (City of West Sacramento, 2011b). If the City were to gradually increase a parcel tax in the same manner, it tax could become more politically feasible.

Administrative Feasibility

The administrative feasibility of this option may be comparable to the current City of West Sacramento proposal to increase utility rates. This would be one more property-related bill to administer by city staff, making this option administratively feasible.

Port of West Sacramento Truck Gate Fee

The Port of West Sacramento is one of eleven publicly owned ports in California, managed by the Sacramento-Yolo Port District and operated by the City of West Sacramento (Port of West Sacramento, 2010). Port authorities can charge fees for various services and fees for use of the port's facilities. For example, the Port of Long Beach began collecting a temporary Clean Trucks Fee of $35 per loaded twenty-foot equivalent container unit (TEU) to help finance replacements of older diesel trucks (Port of Long Beach, 2009). Several ports also institute annual fees and drayage truck fees (fees on local trucks that carry cargo from the port to the place of business) such as the $50 per TEU "PierPASS" at the Los Angeles and Long Beach ports (PierPASS, 2011). This fee pays for off-peak terminal operations as an incentive to avoid peak-period port

traffic (Port of Long Beach, 2009). These kinds of fees can add up to between $150 to $250 per TEU depending on the port.

Sustainability

Truck fees are tied to the economies of industries that use the port. At the moment, this is a narrow set of industries, such as rice and recycled materials. This narrow portfolio could make this fee less stable. Once the channel deepening project is complete, a greater variety of imports will reach the port, broadening the portfolio of industries using the port, which would make this option more sustainable than originally, but still tied to the well-being of specific industries.

Equity

Industries connected to the port will feel the brunt of this fee. This fee would remain equitable if the funds generated by the fee were specifically set aside for improvements along truck routes that serve the port. However, other nearby industries also benefit from truck routes used by port trucks. Additional revenue sources, such as a parcel tax, could balance the burden between port trucks and other West Sacramento business trucks.

Political Feasibility

The Port of West Sacramento has been able to finance improvements to the port without raising new revenues, which could mean there is either political unwillingness to raise fees on the port or it could mean that there is an opportunity to raise fees where there are currently no additional fees. Generous public-private partnerships and federal grants fund many of the port's recent and future infrastructure improvements, such as

solar power and channel-deepening projects (Port of West Sacramento, 2010). After reviewing several years of port commission agendas, no discussion of fee increases were evident. The timing of a port fee could coincide with the completion of the channel-deepening project, which would connect additional port trucks to roadway damage. Many truck drayage companies and shipping companies lobbied against the Port of Long Beach regarding its higher fees, potentially creating political difficulties for raising any fees in West Sacramento, regardless of their potential benefits.

One model of overcoming these difficulties would be PierPASS, a non-profit that manages the PierPASS fee, between terminal operators at ports of Los Angeles and Long Beach (PierPASS, 2011). Launched in 2005, in collaboration with key industry stakeholders, the terminals chose to levy a fee to reduce truck congestion during peak periods. A committee of 15 industry stakeholders and terminal operators continue to meet and manage the fee levels and off-peak terminal services. Through a form of collaboration, some of the political difficulties with raising revenue at the port could be minimized, making this option potentially politically feasible.

Administrative Feasibility

The West Sacramento Public Works Department operates the Port of West Sacramento, which would mean the administrative duties of a fee program and the expenditures of the program for street rehabilitation could potentially remain in the same department. However, if West Sacramento follows the PierPASS model, a new non-profit would need to be setup to administer the fee, making this option less administratively feasible. By copying long-standing procedures from other ports or the

existing PierPASS program, a port fee option becomes more administratively feasible, regardless of the entity involved in managing the fee program.

Countywide Vehicle License Fee: SB 83

In October 2009, the Governor signed Senate Bill 83 (Hancock), which "would authorize a countywide transportation planning agency, by a majority vote of the agency's board, to impose an annual fee of up to $10 on motor vehicles registered within the county for programs and projects for certain purposes" (Hancock, 2009). The Yolo County Transportation District (YCTD) would be the natural sponsor of such a fee in Yolo County. Unlike sales tax measures, the YCTD could place a fee measure on the ballot without the approval of the Yolo County Board of Supervisors. A supermajority vote of the public is required to pass this fee increase.

Sustainability

Vehicle registration is typically a stable and sustainable revenue source as national vehicle registration has consistently climbed since the 1960s (Federal Highway Administration, 2009). Despite drops in fuel consumption and vehicle miles traveled since 2007, national vehicle registration has plateaued since 2005 (Federal Highway Administration, 2009). This could indicate that people are driving less during poor economic times, making gas taxes unstable; but, still driving, making vehicle registrations more stable.

Equity

This countywide fee would have similar equity issues as a countywide sales tax. As a flat $10 fee, this revenue option is technically regressive and less equitable. .

Political Feasibility

This option's political feasibility is similar to a countywide sales tax, except that the amount taxed per taxpayer would be significantly less than a sales tax. A $10 annual fee would be considerably less than the total annual sales tax paid by any one household in Yolo County. This reduced burden could make this option more politically feasible than a sales tax. In Yolo County, the Yolo County Transportation District (YCTD) is the countywide transportation-planning agency in addition to being the county's transit service provider (i.e., YoloBus). On June 14, 2010, Terry Bassett, Executive Director of the YCTD discussed the possibility of a $10 vehicle registration fee for Yolo County transportation purposes (Yolo County Transportation District, 2010). However, YCTD staff have not discussed this option further since June 2010.

Administrative Feasibility

The administrative feasibility would be similar to a countywide sales tax measure. Funding programs would be administered by YCTD staff.

Federal and State Funding: Lobbying for Funding Together

The YCTD also coordinates federal and state transportation project lobbying efforts. The YCTD recommends specific projects as federal funding priorities for Yolo County. Once agreed on by the city council, West Sacramento officials begin lobbying

other Yolo County agencies about the regional significance of their projects through YCTD meetings. In February 2011, YCTD adopted a federal lobbying platform that included about $186M in two prioritized tiers of funding requests (Yolo County Transportation District, 2011). West Sacramento received project funding recommendations within the following tiers: $3.5M in tier 1 for the Port of West Sacramento's Channel Deepening Project (49% of YCTD annual federal appropriations request) and $122 M in tier 2 projects for a variety of street car, streetscape, and road widening projects (92% of YCTD Tier 2 requests for the next large federal transportation authorization bill).

Sustainability

Federal and state funding is anything but stable. Relying on federal and state funding to improve streets and roads would not be sustainable. West Sacramento recently spent $3.2 M from the Federal American Recovery and Reinvestment Act on street rehabilitation (SACOG, 2010). When comparing the last ten years of federal funding for all transportation projects in West Sacramento ($8.7M or $870,000/year) to the total new funding shown in SACOG's 2011-14 Metropolitan Transportation Improvement Program ($10.3M or $2.5M/year), West Sacramento can plan for an increasing amount of intermittent federal and state funds. However, West Sacramento plans to spend only $400,000 of future federal funds for street rehabilitation uses.

Equity

Federal and state taxes are progressive, meaning that the rich pay a higher proportion than the poor do. Eligibility requirements for spending federal and state funds

maintain its equitable use. Federal and State funds are limited to streets that are not classified as local residential streets by the Federal Highway Performance Monitoring System (Caltrans, 2011b). If a street meets certain volume and access characteristics (e.g., streets that have access to freeways or city arterials that collect many trips from surrounding areas), then a city can submit a change to the system once a year to reclassify a street, making that street eligible for federal funds. As the City of West Sacramento adds truck routes and new residential collector streets, new roadways become eligible for the equitable use of federal funds.

Political Feasibility

The politics of federal and state funding can be a daunting political feasibility challenge. Federal and state transportation administrations and agencies, such as the Federal Highway Administration (FHWA) and Caltrans, defer planning significant portions of their discretionary funds to Metropolitan Planning Organizations (MPO) such as the Sacramento Area Council of Governments (SACOG). Like many other MPOs in California, SACOG entertains requests from local agencies every two years for federal and state funding.

To be more competitive for federal funding, West Sacramento will need to sell many of its YCTD Tier 2 projects as Tier 1 projects in future years. Without projects that include countywide benefits, lobbying for federal or state funding through the YCTD could come down to voting members attempting to split requests along population lines, taking turns for year-to-year requests, or other political vote trading.

Administrative Feasibility

Preparing West Sacramento council members with lobbying materials will cost staff time and money. Existing staff could generate these materials, which would pull them from their usual duties. Alternatively, the City could hire lobbyists to advocate for specific projects in Sacramento or Washington D.C., which would cost more money. These costs may be borne by the departments advocating for a specific project, such as the department of public works for street rehabilitation projects, making this option less administratively feasible either way.

Expenditure Options

Since the mid-1990s, governments responsible for roadways have been experimenting with technologies that attempt to recycle waste materials or existing roadway materials that lower the cost of bringing in new expensive concrete and asphalt materials. In Chapter 2, I discussed how the fluctuating cost of asphalt and oil can make or break a city's street rehabilitation program, should a city catch the oil market at an expensive time. This section is not an exhaustive civil engineering review of pavement surface technologies and their many variations. This section does describe how West Sacramento can take advantage of the general cost-savings promise of recent pavement technologies tested in California by local agencies.

While analyzing expenditure options, I use the criteria of sustainability, equity, and administrative feasibility differently than for revenue options.

The sustainability of revenue options has more to do with the stability of a funding source. For expenditures, sustainability is a measure of how well a method of street rehabilitation can provide quality pavement over the long run. The equity of revenue options is more a question of who should pay for street rehabilitation. For expenditures, equity is a measure of how well a street rehabilitation method can serve everyone equally in West Sacramento. The political feasibility of revenue options is about the ability of West Sacramento to create a funding source (e.g., council votes, voter approvals, countywide votes, etc.). For expenditures, political feasibility has to do with the risk involved in trying something new as well as understanding the potential short-term and long-term cost savings. The administrative feasibility of revenue options has to do with the cost of creating or implementing a new tax or fee program. For expenditures, administrative feasibility has more to do with the expertise required to manage new ways of rehabilitating streets.

Preventative Maintenance

Instead of deferring maintenance to the point of it becoming expensive, cities can practice cheaper preventative maintenance techniques to save money over time. Preventative maintenance refers to the practice of using cheaper patching and pavement-sealing techniques to extend the life of good pavement for about 5-10 years (City of Sacramento, 2010). Figure 4 taken from the City of San Francisco's Street Resurfacing Program report shows how preventative maintenance techniques can save money over the long run.

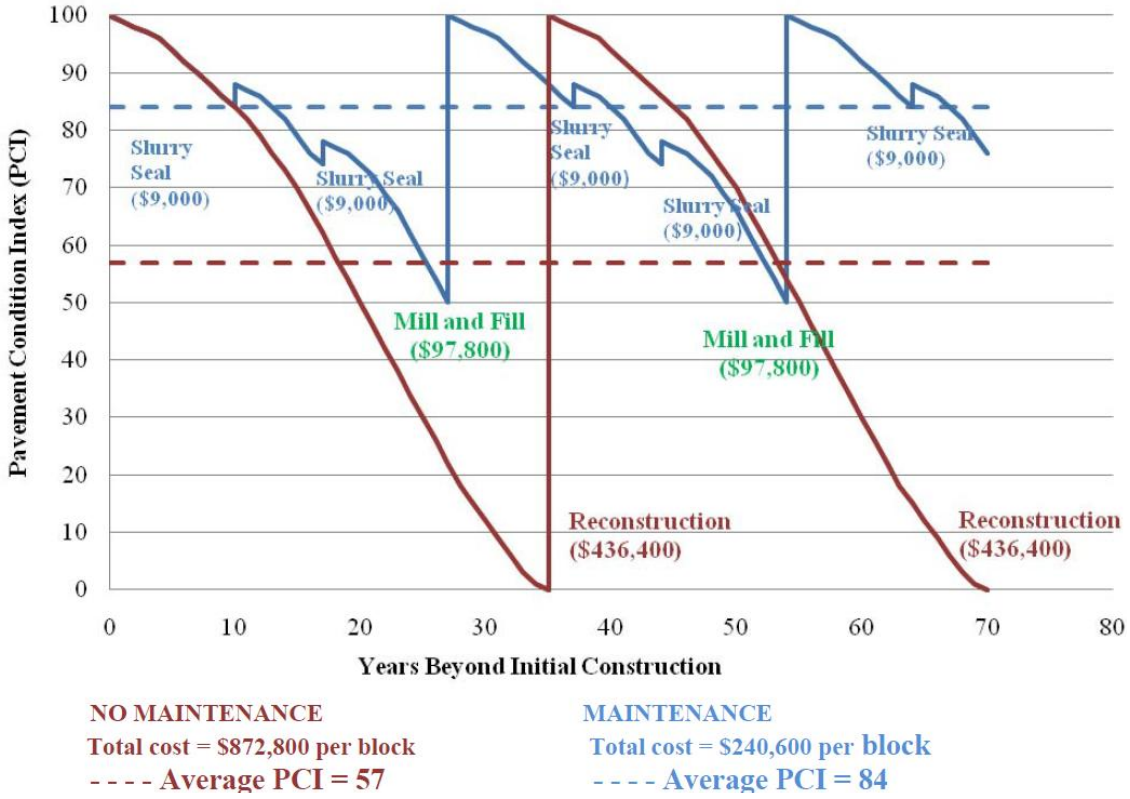


Figure 5. Comparing Cost Effectiveness between Preventative Maintenance (slurry seals, mill and fill) and Reconstruction Projects

The City of San Francisco estimates that only half of its streets can benefit from preventative rehabilitation projects (crack seals to protect good pavement from water damage, filling potholes before they grow larger) that cost approximately $9,000/block. This means that the remaining streets will require resurfacing (mill and fill and surface overlays) costing between $97,000/block, or reconstruction (tearing up failed pavement and replacing the road base) costing about $436,000/block (Street Resurfacing Finance Working Group, 2010).

Sustainability

Maintaining streets with preventative measures is the most sustainable overall method of rehabilitating streets. Extending the life of street pavement with preventative measures creates more quality pavement over longer periods of time.

Equity

This option is inherently more equitable as a greater number of streets will be in better condition, benefiting residents and businesses in a broad fashion.

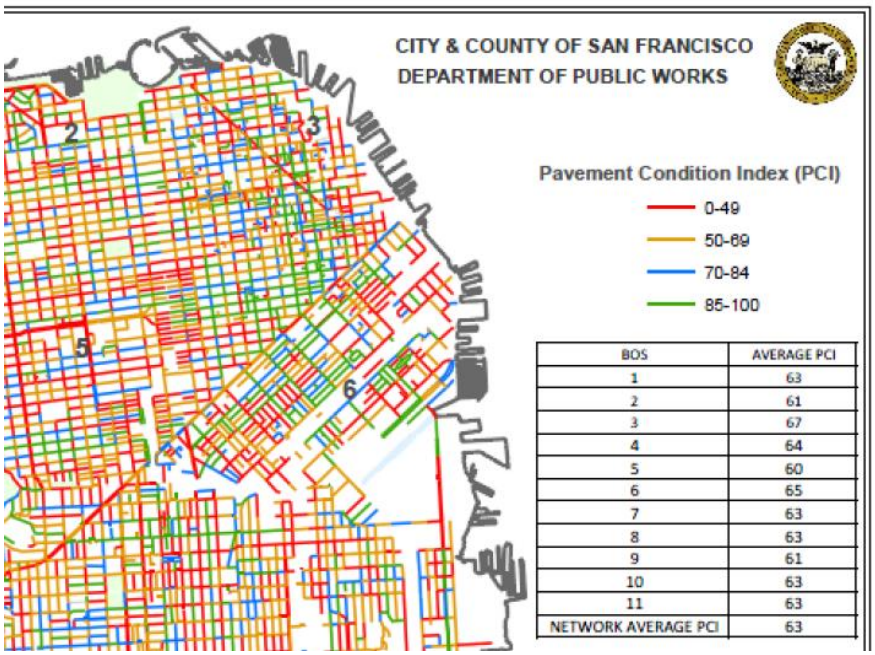
Political Feasibility

This option is politically feasible if decision makers understand the tradeoffs of maintaining pavement cheaply. As shown in Figure 7, the City of San Jose showed how current funding levels of $10 M per year would result in an $860 M backlog of repairs with over half of the city streets in poor or worse condition (Larsen, 2010).

Scenario	Annual Investment ($M)	Conditions After 10-Year Investment		
		PCI	One-Time Backlog ($M)	% of Streets in Poor or Worse Condition
1	Current ($10+)	45	$860	54%
2	$20	49	$775	47%
3	$40	55	$600	36%
4	$60	61	$400	26%
5	$80	67	$250	15%
6	$100	70	$170	10%
7	$130	75	$0	0%
Today (2010)		64	$250	18%

Figure 6. City of San Jose Street Rehabilitation Tradeoff Scenarios

The City of San Francisco and the City of Woodland also map the pavement condition of their streets, which could be further summarized by council district to bring the message closer to home for council members, as shown in Figures 7 and 8 (City of Woodland, 2000; City of San Francisco 2010). The last time the City of West Sacramento drafted pavement condition maps for city streets was in 2000, as part of drafting an expenditure plan for future sales tax dollars (City of West Sacramento, 2002).



BOS	AVERAGE PCI
1	63
2	61
3	67
4	64
5	60
6	65
7	63
8	63
9	61
10	63
11	63
NETWORK AVERAGE PCI	63

Figure 7. City of San Francisco Pavement Condition Map – 2010

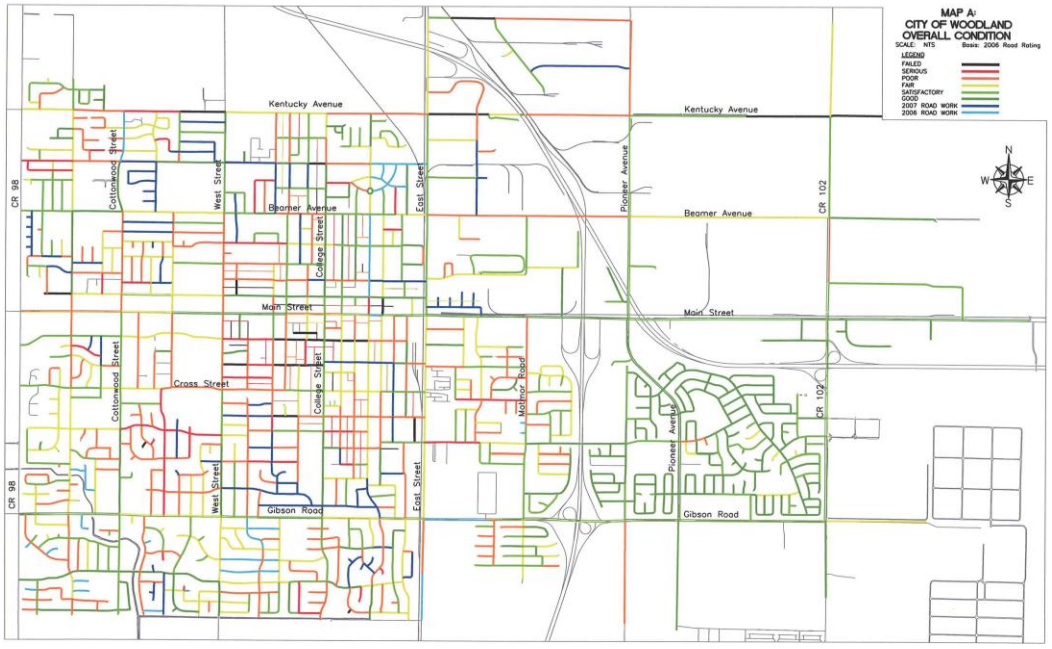


Figure 8. City of Woodland Pavement Condition Map - 2008

Administrative Feasibility

This option would put more pressure on West Sacramento staff to produce these trade-off reports, making this option less administratively feasible. West Sacramento could contract with consultants that specialize in pavement management systems to reduce the technical burdens of maintaining an in-house pavement management system. This would increase the cost of administration, but reduce the stress on current city engineering staff.

Rubberized Asphalt

According to the California Department of Resources, Recycling, and Recovery (CalRecycle), Rubberized asphalt concrete (RAC) "is a road paving material made by

blending ground-up recycled tires with asphalt" (California Department of Resources Recycling and Recovery, 2011a). On average, local governments can save about $76,000 to $280,000 per lane mile using RAC. RAC treatments can last up to 18 years, according to Arizona's Department of Transportation, making RAC an excellent candidate for high-volume roadways and bond-funded projects (Arizona Department of Transportation, 2011).

Sustainability

By recycling rubber and creating longer lasting projects, this option is more sustainable as it helps the city avoid spikes in the asphalt market.

Equity

Using RAC could be less equitable due to engineering constraints. This pavement material requires local agencies to raise the roadway by several inches, potentially making this form of pavement rehabilitation infeasible in some areas (California Department of Resources Recycling and Recovery, 2011a).

Political Feasibility

The long-term benefits of initially pricey RAC projects may make economic sense, but the immediate needs of the city could easily defer RAC investments to later dates, making this option less politically feasible.

Administrative Feasibility

Caltrans has experimented with RAC since the 1970s, making this technology more accessible for local agencies to employ, which makes this option administratively feasible.

Cold In-Place Recycling and Full-Depth Reclamation

CalRecycle also documents the growing use of asphalt pavement recycling technology such as Cold In-Place Recycling (CIR) and Full-Depth Reclamation (FDR). CIR is the practice of removing the first 3 to 4 inches of pavement, pulverizing that pavement, then adding an emulsion additive to repave the street (California Department of Resources Recycling and Recovery, 2011b). CIR cost savings can range from 20% to 40% when compared to conventional means (California Department of Resources Recycling and Recovery, 2011b). FDR is the practice of removing and recycling all of the existing surface asphalt along with some of the deeper roadway base, as an alternative to roadway reconstruction projects for badly deteriorated roadways. The City of Westminster, California, experienced a 50% cost savings on a FDR street overlay project in 1999 (California Department of Resources Recycling and Recovery, 2011b).

Sustainability

Recycling existing roadway materials is perhaps the most sustainable of any of the previously mentioned options.

Equity

This method can benefit all residents in West Sacramento equally, but may potentially benefit residents in older neighborhoods first, as their roads would be in need of rehabilitation earlier than those of newer neighborhoods would. In the long run, all residents would benefit from recycling pavement, making this option equitable.

Political Feasibility

These options are more politically feasible since using these pavement rehabilitation techniques shuts down the roadway for shorter periods of time or only one lane at a time, interrupting less businesses for shorter periods.

Administrative Feasibility

These options are less administratively feasible as the technology is so new that Caltrans has not yet created design standards in Northern California (California Department of Resources Recycling and Recovery, 2011a). However, through collaboration interviews with city public works staff, they expressed interest in sharing their experiences with using different pavement technology, which could lower the administrative burden.

Summary of Revenue and Expenditure Options

This chapter analyzed seven different revenue options and three different expenditure options that could become part of West Sacramento's street rehabilitation strategy. Of the revenue options, no single option was clearly a stable, equitable, and feasible option. General parcel taxes come close to being the most stable, equitable, and feasible option. Preventative maintenance techniques and rubberized asphalt are the most stable, equitable and feasible expenditure options. This is not to say that I recommend that West Sacramento should choose these two revenue and expenditure options and call it a street rehabilitation strategy. The benefits of the other options can be packaged

together to create a more holistic strategy to offset their individual shortcomings. I explain how this can be done in the last chapter.

Table 2. Summary of Options Analysis

Options	Sustainability	Equity	Political Feasibility	Administrative Feasibility
Revenues				
General Purpose Sales Tax	Not stable, connected to economy	Not equitable, harder on poor	Feasible during good economy	Feasible, existing sales tax.
Countywide Sales Tax	Not stable, connected to economy, broader portfolio is more stable	Equitable if funded countywide services	Potentially feasible, but no current countywide taxes passed.	Feasible, administered by YCTD staff
Bonds	Only stable for street reconstruction	Equity depends on debt service funding source.	Not feasible with current debt service ratio and stagnant revenues.	Feasible if projects tie new capacity to existing deficiencies.
Parcel Taxes	Stable, not connected to economy closely	Equitable, if general tax and structured by parcel use	Feasible, if simple majority vote general tax.	Feasible, similar to utilities and other property taxes.
Port Fees	Not stable, tied to specific port industries	Not equitable, burden on port industries only.	Potentially feasible, PierPASS model could help.	Potentially Feasible, PierPASS setup costly.
Countywide Vehicle License Fee	Stable, registration strong despite economy	Not equitable, harder on poor	Potentially feasible, fee burden is small compared to sales tax	Feasible, administered by YCTD staff
Federal & State Funding	Not stable	Equitable, progressive taxes	Not feasible, competition at YCTD	Potentially feasible, lobbyists could assist
Expenditures				
Preventative Maintenance	Most Stable	Most Equitable	Moderately Feasible	Less Feasible
Rubberized Asphalt	Stable	Less Equitable	Feasible	Feasible
Cold In-Place Recycling	Stable	Equitable	Feasible	Moderately Feasible

Chapter 6

RECOMMENDATIONS AND CONCLUSIONS

No single revenue option or expenditure option will be a silver bullet for West Sacramento's street rehabilitation needs. Only a combination of options on various fronts can create a sustainable, equitable, and feasible street rehabilitation strategy for West Sacramento. This chapter ties several revenue and expenditure options together into clear recommendations guided by goals and recommended steps.

Street Rehabilitation Program Goal

I propose the following goal and recommended steps for the City of West Sacramento's Street Rehabilitation Strategy.

Goal: "To maintain the streets and roads of the City of West Sacramento in a sustainable and equitable manner."

Recommendation 1: Understand Trade-offs to Justify Preventative Maintenance

Recommendation 2: Maintain a Stable Funding Source For Preventative Maintenance

Recommendation 3: Avoid Unstable Asphalt Markets With New Technology

Recommendation 4: Target Truck Traffic Damage With Robust Pavement

Recommendation 5: Partner With Local Agencies To Pilot New Technologies

Recommendation 1: Understand Trade-offs to Justify Preventative Maintenance

To enjoy the most sustainable streets, the City of West Sacramento should practice preventative maintenance techniques. For each dollar spent on preventative maintenance, the City could save three dollars for future capital improvement projects (e.g., flood control, ballparks, transit hubs, etc.). To justify a constant flow of funding into streets and roads, West Sacramento staff will need a constant source of information that will help them display the long-term trade-offs of deferring maintenance in total. The City of San Francisco, San Jose, and Woodland all annually update a computer-based Pavement Management System that catalogues their city's pavement conditions. Using this information, they can describe how $250M in street backlogs can grow to $1 billion over ten years. Without this information, West Sacramento cannot properly know the amount of funding needed to practice preventative maintenance or make the case in a persuasive fashion.

Recommendation 2: Maintain a Stable Funding Source For Preventative Maintenance

Sales taxes, parcel taxes, or port fees can all play parts in a stable street rehabilitation funding stream. As long as these revenue sources are stable enough to fund the program at levels prescribed by the pavement management system, the city can show residents how responsible the city is with their tax dollars. Both sales taxes and parcel taxes can be charged citywide while parcel taxes and port fees can be charged and spent in specific areas to account for geographic equity. The City may need to wait for a stronger economy to raise the sales tax rate or wait until the sticker shock of the utility

fee increase subsides before attempting to create a new revenue source for street rehabilitation. Copying the City's current gradual fee increase schedule for utility fees may make a street rehabilitation parcel tax more politically feasible.

Recommendation 3: Avoid Unstable Asphalt Markets With New Technology

By using recycled rubber and recycled pavement, the city can avoid fluctuations in the asphalt market and rehabilitate streets at lower and more predictable costs. While technology can play a role in avoiding oil use, catching the market during good economic times is also part of avoiding unstable asphalt markets. Practicing preventative maintenance allows the City of West Sacramento to choose the best time to rehabilitate a street's surface during good economic times instead of being forced to reconstruct roads at the end of their life, regardless of oil market prices.

Recommendation 4: Target Truck Traffic Damage With Robust Pavement

Durable rubberized asphalt projects can tolerate heavy truck traffic by deflecting a truck's weight damage better than other pavement technologies (California Department of Resources Recycling and Recovery, 2011b). Given a stable funding source, the City can bond against the 18-year life of a rubberized asphalt street project for a truck route. The mobilization costs for smaller projects can make the initial cost of RAC less cost effective than conventional asphalt projects, but the long-term benefits of durable pavement will become cost-effective in the long run. This option can be made more equitable to city residents if the parcel tax was higher for commercial and industrial areas

that depend on truck routes. A port truck fee could also supplement the targeted parcel tax to maintain equity between port trucks and highway delivery trucks.

Recommendation 5: Partner With Local Agencies To Pilot New Technologies

Sharing knowledge can increase the administrative feasibility of new pavement technologies. Successful pilot projects can also increase the political feasibility of trying less tested pavement projects. Through collaborative interviews with public works staff, they indicated a desire to learn more from each other's experiments.

Conclusions

West Sacramento has an opportunity to capitalize on its last decade of street rehabilitation investments by leaving the boom-bust cycle of paying for expensive street reconstruction projects at times of critical need and migrating to a cheaper preventative maintenance cycle using new pavement technologies. The sooner West Sacramento identifies its funding shortfall with a pavement management system and secures a stable funding source, the sooner the City can begin saving money for other capital improvement projects. Collaborative efforts between the cities of Yolo County can leverage local resources and reduce the administrative burden of piloting new pavement technologies.

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