

**DEPARTMENT OF PUBLIC WORKS  
CITY AND COUNTY OF SAN FRANCISCO**

**THE CITY AND COUNTY OF SAN FRANCISCO  
MUNICIPAL ASPHALT PLANT STUDY**



**October 2006**



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## I. EXECUTIVE SUMMARY

### ***Purpose***

This report is submitted in response to questions raised by the Mayor's Budget Office, Controller's Office, and the Board of Supervisors' Budget Analyst regarding the budgetary impact of operating the City and County of San Francisco's Municipal Asphalt Plant (Plant). The Board of Supervisors has placed six months of funding for the Plant on reserve pending submittal of this report.

The chief objectives of this report are to analyze Plant operations in order to evaluate the viability of the City and County of San Francisco (City) continuing operation of it on a self-sustaining and cost-competitive basis, compare the costs of hot-mix asphalt from the City's Plant with procurement from outside asphalt suppliers, and present options to the Mayor and the Board of Supervisors for future procurement of asphalt by the Department of Public Works (DPW).

### ***Background for Report***

In 2002, in response to the City's budgetary constraints, DPW proposed to improve the production capacity of its Asphalt Plant by adding storage silos in anticipation that the Plant could generate net positive revenue to the City.

The original analysis prepared by DPW in FY 2002-03 projected that the Plant could realize net revenue of \$911,000 by FY 2005-06 on production and sales of 85,000 tons of asphalt. Current FY 2005-06 projections forecast a shortfall of \$107,372 on 31,863 tons of asphalt production.

The variance in current performance of the Asphalt Plant from the original projections can be attributed to three primary factors: (1) the price of raw materials, (2) the amount of fixed costs, and (3) the volume of production and sales.

### ***Cost-Effective and Cost-Competitive Levels of Asphalt Production***

Our current and recent past costs to produce asphalt exceeded the revenues that were collected from street paving projects and pothole repair operations. Insufficient street resurfacing funding for DPW paving projects has impacted our ability to produce asphalt on a cost-effective and cost-competitive basis. As a result of the funding over the last few years for the street resurfacing program, there has not been adequate demand for asphalt to achieve the economies of scale to cost-effectively produce asphalt. Our analysis indicates that the City would have to annually fund the street resurfacing program at the \$34-\$38 million level to achieve the economies of scale necessary to produce asphalt cost-effectively. The current anticipated annual funding

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for street resurfacing and pothole repairs from FY 2007-08 through FY 2010-11 is between \$17.9-\$20.6 million. In order for the Plant to break even, which would require annual production between 60-65,000 tons, General Fund or alternative funding support for street resurfacing of \$14.9-\$17.5 million per year would be required.

This report also considers whether the City's street paving projects are paying a reasonable price for asphalt. In FY 2005-06, average price paid for a ton of asphalt from the City's Plant was more than the average price that the City paid to outside vendors for asphalt and its transportation to job sites.

### ***Options***

Our analysis in this report indicates that the Plant will not be able to turn a profit, or break even, with the current projected levels of street resurfacing funding. This report has analyzed five options of continuing to operate the Plant or closing it.

#### **Option 1: Continue to Operate the Plant As-is**

This option would require replacement of some key components of the Plant at an estimated cost of \$1.2 million, or \$162,000 per year when amortized over ten years. It is estimated that an annual General Fund subsidy of \$649,000 would be required.

#### **Option 2: Optimize Plant Operations**

Under this option, the City would make investments in the Plant to improve its efficiency to allow a greater percentage of recycled materials, reducing the cost per ton of finished asphalt. The capital costs to make these improvements would be \$1.7 million, or \$229,000 per year when amortized over ten years. This option would require an annual General Fund subsidy of \$716,000. Under this option, approximately 9,000 tons per year of grinding could be recycled rather than trucked to a recycling facility in Brisbane.

#### **Option 3: Close the San Francisco Asphalt Plant**

Under this option, production at the Plant would cease, presumably beginning in FY 2007-08. The City would continue to spend \$266,000 per year through 2013 to make payments on the storage silos that were constructed in 2003. DPW would draft contracts on a low-bid basis for procurement of finished asphalt from outside vendors to supply the Big Gang (the City's street paving crew), paving projects and pothole repairs. The closure of the Plant would result in the elimination of at least one position from DPW's budget and the layoff of one of the three permanent employees assigned there.

Assuming that DPW truck drivers would continue to pick up asphalt from outside plants for pothole repair and the Big Gang, it is anticipated that DPW would need to add two trucks to its fleet and hire two truck drivers.

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Closing the Plant carries a number of risks as well. These risks include loss of a reliable nearby asphalt supply source with the anticipated closing of the nearest private plant in Brisbane. San Francisco could find itself with sharply escalating prices for asphalt if it becomes subject to what could amount to monopoly pricing.

**Option 4: Cease Production at the San Francisco Asphalt Plant and Create an Asphalt Distribution Facility**

Under this option, the existing property and the storage silos would be developed into a smaller asphalt storage/distribution facility. This facility would be utilized as a central distribution facility of asphalt for DPW.

This option requires more time and engineering analysis to determine its feasibility and costs. Whether the City decides to close the Plant or not, the possibility of establishing an asphalt distribution facility should receive further exploration.

**Option 5: Privatize Operations**

Under this option, Plant operations would be privatized either through a private asphalt plant operator or a partnership with another public agency such as the Port of San Francisco. It is unlikely that private operators will be interested in operating the Plant because of its small facility size and production capacity. This assumption has been borne out by experience in Minneapolis and Pittsburgh, two cities that recently attempted to privatize municipal asphalt plants.

A more viable Joint Venture proposal is one that partners with another public agency. Subject to outreach to its advisory groups and Commission, the Port of San Francisco has expressed an interest in analyzing the environmental and economic viability of developing an asphalt plant on Port property. Whether the City decides to close the Asphalt Plant or continue to produce asphalt there, this joint venture option should receive further exploration.

***Next Steps***

1. **Releasing Reserve:** By submitting this report to the Board of Supervisors, DPW has met the conditions to release reserved funds for six months of Plant operations. DPW respectfully requests that the Board approve this action.
2. **Funding for Street Resurfacing:** Because the level of funding for street resurfacing will determine the cost effectiveness of operating the Asphalt Plant, the Capital Planning Committee, the Mayor and Board should determine the funding levels to be included in the Capital budget as soon as possible. This decision will be informed in part on the outcome of the November vote on state Proposition 1B that could provide as much as \$4 million annually to San Francisco for street resurfacing. In order to operate the Plant cost-effectively,

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street resurfacing will have to total between \$34-\$38 million annually in 2006 dollars.

3. Directing Future Budgeting: This report serves as a platform for analyzing the future operation of the Plant. As such, DPW requests direction from the Mayor and the Board of Supervisors on how to budget for future Plant operations. Should DPW be directed to close the Plant, DPW staff should immediately begin to prepare bid documents for asphalt procurement beginning July 1, 2007. The Department will also have to procure additional trucks to transport asphalt from plants outside the City. If the Department is directed to continue producing asphalt at the Plant, the Department should immediately hire a consultant to conduct an evaluation of the Plant's long-term capacity.
4. Improving Operations: DPW should begin examining how to improve the efficiency of its paving operations, including a study of new paving equipment that would be required.



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## II. INTRODUCTION

Three years ago the City implemented a pilot project to operate the Asphalt Plant as an enterprise that would turn a profit. Up until that time, the Plant had operated as an internal service unit within the Bureau of Street and Sewer Repair. Its positions and expenditures were part of the Bureau's Road Fund Budget, along with pothole repairs, bridge and tunnel operations.

In 2004, DPW installed two hot asphalt storage silos with the intent of allowing the Plant to operate continuously to produce all of the asphalt required for a day's paving operations. The silos were intended to increase the production capacity of the Plant, and thus reduce the cost of producing asphalt. It was projected that the Plant would turn a profit selling asphalt to projects at a price competitive with private asphalt suppliers.

After three years of the pilot project, DPW has found that it is unable to produce asphalt at a price competitive with private asphalt suppliers. Instead, paving projects have been charged a price that is greater than would have been charged by an outside vendor. Even so, the price charged for asphalt has not produced enough revenue for the Plant to break even, let alone turn a profit.

Although the Plant has not been profitable, it does provide many advantages that need to be weighed against the costs. Having an asphalt plant operated by the City means that City projects are priority customers; asphalt is always available for our pothole repair and paving needs. If we were to rely upon outside suppliers, such as those on the peninsula, asphalt may not be available to us when a major highway or airport paving job is being done. Operating our own plant means we can produce asphalt needed in emergencies such as earthquakes. Having the plant in the City means that trucks carrying asphalt drive fewer miles to paving jobs, resulting in less fuel burned and less pollution from emissions.

In approving DPW's FY 2006-07 Budget, the Board of Supervisors placed one half of the appropriation for the Plant on reserve pending submission of a report analyzing the pilot project and setting out options for the City to meet its asphalt needs. This report is in response to that requirement. The objectives of the report are to:

- Provide an overview of City-owned Plant operations to give a context in which to evaluate options for future operations.
- Compare the costs of asphalt from the City-owned Plant with procurement from private asphalt suppliers.
- Present options to the Mayor and the Board of Supervisors for future procurement of hot-mix asphalt by DPW.
- Fulfill the requirement by the Board of Supervisors to release six months of reserved FY 2006-07 funding for Plant operations.

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## III. OVERVIEW

### *Overview of the Asphalt Plant Operations*

DPW has operated a city-owned and city-run asphalt plant since 1909. The current plant, built in 1954, is located at 1801 Jerrold Street adjacent to Central Shops, the Southeast Wastewater Treatment Plant, and the Water Department. One side of the property is bounded by railroad right-of-way (see Attachment 1). Operated and maintained by DPW's Bureau of Street and Sewer Repair, the Plant produces asphalt (often called hot-mix asphalt) for DPW crews to pave, patch and repair potholes in City streets. The Plant also provides asphalt for private contractors that pave City streets.

An asphalt plant mixes rock and sand with a petroleum-based emulsion (AR4000) to produce "asphalt" in a process that dates back to the days of the Romans. At the plant, rock and sand is unloaded by bucket elevator and stored in overhead bins according to size. Asphalt Oil (AR4000) is stored underground in heated tanks. When the plant is set into motion for producing asphalt, the rock and sand are metered out of the bins onto a conveyor belt, which transport it to the dryer. The dryer is a large cylindrical hollow drum set at a slightly sloping angle while a large gas jet flame burns inside. Rock and sand is introduced at one end and is heated by the gas jet. There are two different types of asphalt plants, Batch and Continuous Drum. The City operates a batch mix plant.<sup>1</sup>

In November of 1989, the Board of Supervisors approved a major rehabilitation of the Plant using \$1.5 million of the 1987 Proposition B road improvement bond funds. The approval came in the aftermath of the Loma Prieta earthquake when it was demonstrated how valuable the Plant was in being able to supply asphalt immediately and on-demand.<sup>2</sup> The Plant was shut down from 1990 to mid 1993 for the rehabilitation work. No capital improvements have been made to the plant since 1993 with the exception of installing storage silos in 2004.

In 2004, DPW installed two hot asphalt storage silos with the intent of allowing the Plant to operate continuously to produce all of the asphalt required for a day's paving operations in addition to storing excess asphalt material for private sale, or emergency and weekend work without the need to activate the entire Plant. The additional silos were intended to allow for more cost-effective and energy efficient asphalt production, allow the Plant to serve larger projects than was then possible, and extend the life of other Plant equipment by limiting the start-stop cycling of the Plant. The total project cost was approximately \$1,730,000 with a 20-year estimated life. The annual principal and interest payments are approximately \$266,000; final payment is due in October 2013.

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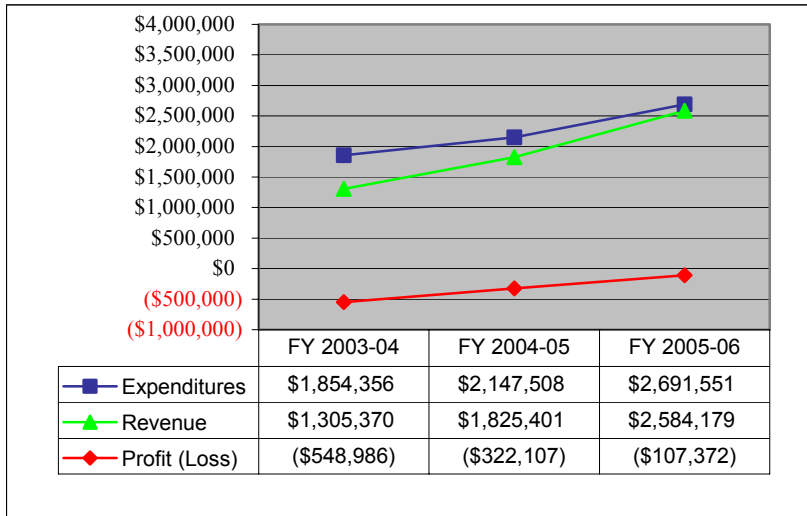
<sup>1</sup> See Attachment 8 for a detailed description of these two types of asphalt plants.

<sup>2</sup> "Asphalt Plant Report", San Francisco Department of Public Works, June 1998.

The analysis prepared by DPW in FY 2002-03 projected that the Plant could realize a profit of \$911,000 by FY 2005-06 on production and sales of 85,000 tons of asphalt. Current projections for FY 2005-06 forecast a shortfall of \$107,372 on only 31,863 tons of production.<sup>3</sup>

The following Figure 1 describes the recent operating budget history of the Plant:

**Fig. 1 - Asphalt Plant Operating Revenues vs. Expenditures**



A complete table of supporting data is listed in Attachment 6. As Figure 1 indicates, operating costs have exceeded revenue for the last three years resulting in losses posted in each of those years; this means that the City’s sales pricing did not keep up with the cost of goods sold. The cost of asphalt from the Plant did, however, exceed the cost to projects had the asphalt been procured from outside vendors, including the added cost of transportation. Continued operations of the Asphalt Plant would require annual General Fund support to fill the deficit.

**Asphalt Production**

The Plant has a current permit from the Bay Area Air Quality Management District (BAAQMD) to operate and produce hot-mix asphalt not exceeding 100,000 tons per year, but demand has not required production at capacity. Over the past several years, the Plant’s dry weather production has averaged 500-700 tons per week, and 17,000-32,000 tons annually.

The Plant provides two main types of asphalt mixes for the majority of DPW’s paving needs: Topeka Mix used in street resurfacing accounts for 80-90% of the Plant’s production; School Mix, used for pothole filling, makes up the remaining 10-20% (at

<sup>3</sup> See Attachment 2 for an analysis of the variances from FY 2002-03 projections.

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historical levels of about 4,000-6,000 tons).<sup>4</sup> The Plant also sells a minimal amount of asphalt to other City departments (in FY 2005-06 about 900 tons were sold to the Port and another 2,400 tons were used by DPW on Recreation and Park and other departments' jobs). Each year, DPW purchases some of its asphalt from outside suppliers when the Plant is down for repair and servicing.

### ***Street Paving Operation***

DPW maintains approximately 12,458 blocks of City streets. DPW's Bureau of Street and Sewer Repair (BSSR) pothole crews use School Mix to fill potholes. Filling potholes that are DPW's responsibility is performed exclusively by BSSR and is not contracted out. BSSR utilizes its Big Gang crew to pave many of San Francisco's streets by mill and fill paving, where they grind off existing pavement and overlay it with new asphalt without doing any base repair or paving design. Paving that requires street reconstruction (base repair and/or paving design) is contracted out to private contractors whose work is overseen by DPW. Since 2004, private contractors on DPW paving jobs (with the exception of those funded by federal funds) have been required to use asphalt produced by the Plant. Both the Big Gang and private contractors use Topeka Mix for their street paving work.

### **Plant Crew**

DPW maintains a full-time crew of three (one supervisor, one operator and one operating engineer) at the Plant and hires temporary laborers as need arises. The crew operates the Plant for hot-mix asphalt production as well as recycling old asphalt for Reclaimed Asphalt Pavement (RAP) to be reused in street paving.

### **Pothole and Patch Crews/Equipment**

DPW has three 3-person crews and one truck to fill potholes using School Mix. The pothole crews use one patch truck and two pothole trucks. A pothole truck will place 1-3 tons per day.

A sewer patch truck and crew fills in sinkholes and pavement subsidence caused by broken or leaking sewers. One truck driver, one supervisor, 4 asphalt workers and 2 finishers will place 4 to 6 tons of asphalt per day.

### **Big Gang Crew/Equipment**

The Big Gang paves approximately 100 blocks per year. On average, the Big Gang places 150-250 tons of asphalt per day for every block of paving, totaling from 15,000-25,000 tons of asphalt placed per year.

A Big Gang crew typically consists of two operating engineers to operate the paver and roller, two finishers at back of the paver, and 4 to 6 asphalt workers for flagging and

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<sup>4</sup> See Attachment 3 for the compositions of Topeka and School mixes.

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miscellaneous paving finishing work. The Big Gang uses 4 to 6 trucks when grinding old pavement, and 6 to 8 trucks to deliver asphalt to the pavement site when paving.

### ***Street Paving Funding Levels***

One of the most important factors affecting the Plant's ability to produce sufficient volumes of asphalt to be cost-effective is the level of funding for street resurfacing.

The amount of asphalt placed per million dollars of funding is highly variable, ranging from 1,200 to 5,900 tons, depending upon design costs, base repair required, and difficulty of construction conditions. On average, we will place between 2,000-2,500 tons of asphalt for each \$1 million in construction dollars in street resurfacing. Also affecting the variance between asphalt demand and the actual asphalt production by the Plant is that federal funding for street resurfacing requires DPW to bid out the construction, prohibiting the Plant from providing asphalt for these federally funded street projects.

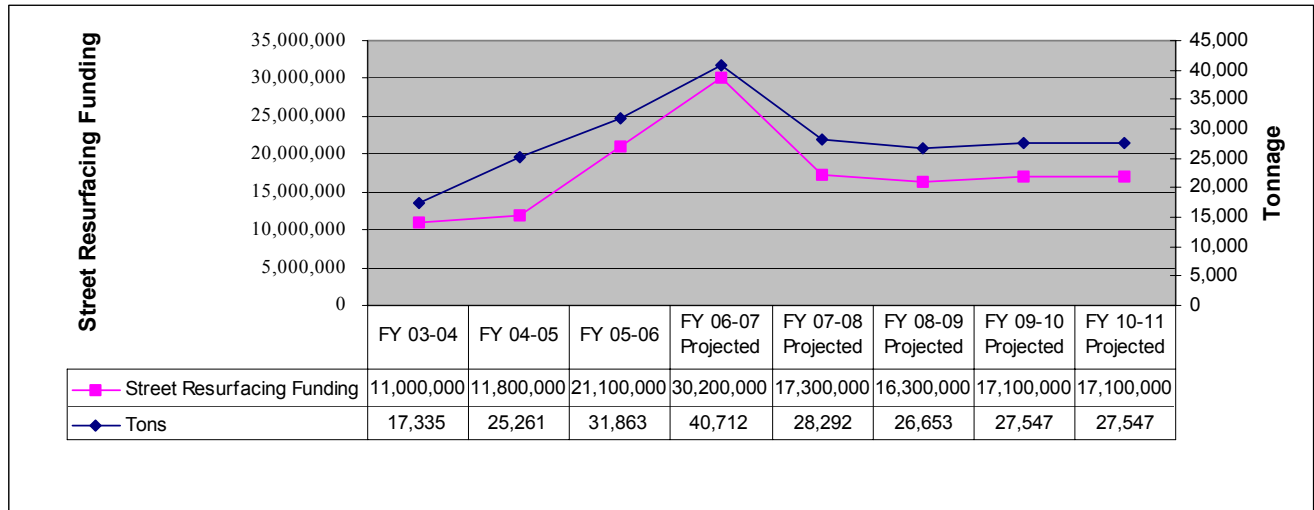
In recent years, the street resurfacing program has received inconsistent funding levels<sup>5</sup>. Due to the State fiscal crisis at the beginning of the decade, the City did not receive millions of dollars it was anticipating from Proposition 42 for street resurfacing. This, along with the reduction in local sales taxes for street resurfacing, meant a significant drop in available street resurfacing funding. In FY 2006-07, we anticipate \$25.4 million in available construction dollars (design and construction management dollars are omitted) for street resurfacing. This includes one-time added funding of \$15 million from General Fund due to an unexpected City budget surplus, the first General Fund appropriation for DPW's capital street resurfacing program since the mid-1980s.

The following graph - Figure 2 - shows actual and projected annual funding for street resurfacing and the number of tons of asphalt anticipated to be produced by the Plant. See Attachment 5 for details on the current funding projections for FY 2006-07 through FY 2010-11.

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<sup>5</sup> DPW Bond Report, "Proposed \$208 Million G.O. Bond for Street Resurfacing, Pedestrian Safety & Access Improvements," April 2005: *"For the past ten years, DPW has received approximately \$15 million annually for street resurfacing which is \$19 million less than the ideal."*

**Fig. 2 - Funding vs. Asphalt Tonnage<sup>6</sup>**

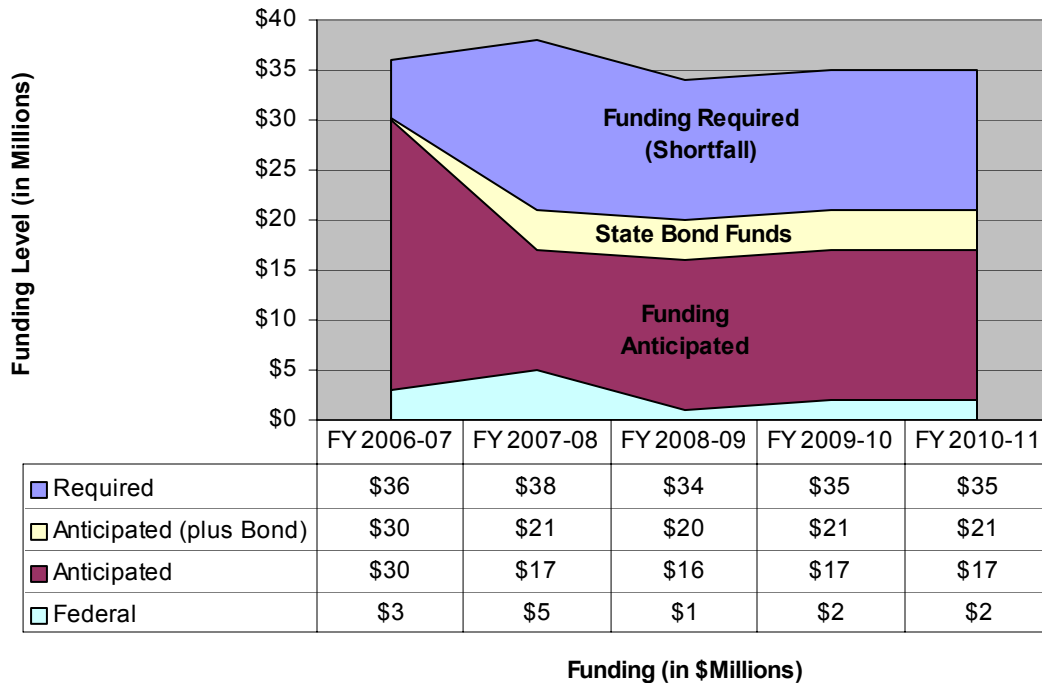


If the City were able to consistently fund the street resurfacing program at the \$34-\$38 million level, this would translate into a demand of 62,000 tons of asphalt. If we could sustain production at that level - this would require capital improvements to overhaul existing Plant equipment - the Plant economics would shift favorably.

Unfortunately, the City currently lacks a consistent, dedicated funding stream for street resurfacing. The following Figure 3 chart shows the required level of funding and the anticipated shortfall for the Plant to produce 60-65,000 tons annually, allowing full cost recovery and competitive prices.

<sup>6</sup> Projected tonnage is based on Topeka demand calculated from estimated available funding for construction plus an average of 6,000 tons/year of School mix, minus 15% for offline asphalt purchases due to Plant downtime for maintenance and repairs.

**Fig. 3 – Anticipated vs. Required Funding for Break-Even and Cost-Competitive Production Levels**



California voters will consider state infrastructure bonds for transportation in November 2006. Approval of the transportation bonds could bring a total of \$40 million to San Francisco for local street and road maintenance, or an estimated \$4 million per year over ten years. The Citywide Capital Plan adopted by the Board of Supervisors in May 2006 calls for continuing General Fund appropriations of between \$16-\$30 million over the next ten years. Because appropriations are made from the General Fund on an annual basis, and are affected by changes in the economy and competing City priorities, this cannot be considered a stable source. Without a General Fund appropriation in FY 2007-08, funding is projected to fall to \$15.5 million in FY 2007-08 funded by Proposition K and federal funds. That level of funding would only result in the placement of roughly 20,000 tons of asphalt purchased from the Plant, although total Topeka tonnage demand for Plant production is projected to be 28,000 tons due to carry-over from FY 2006-07. These levels are not nearly enough to support the cost-effective operation of the Plant.

DPW is exploring additional street resurfacing funding options, including closing a parking tax loophole. However, a central question to be answered in determining the future operational viability of the asphalt plant is what level of funding the City will commit to street resurfacing.



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## ***Capital Improvements***

There are varying levels of capital improvements required at the Plant, depending on the direction of future operations. At a minimum, the Plant will require improvements estimated to cost \$1.2 million within the next three years if operations continue. Improvements could cost an estimated \$1.7 million if the City decides to improve the Plant's capacity to use Reclaimed Asphalt Pavement (RAP).

## ***Asphalt Recycling***

When a street is selected for paving, the old pavement is ground off before the installation of the new. On jobs performed by the Big Gang, the grindings are stockpiled for recycling and re-use in the Topeka mixes. The grindings are incorporated into the fresh asphalt mix at the rate of up to 15% per ton. The Plant's recycling capacity is currently limited to 15% per ton of asphalt mix due to the heating capacity and gaseous hydrocarbon emissions of our existing Plant equipment, and the lack of equipment at the Plant to limit the size of grindings going into the mix. By adding a RAP crusher and platform at an estimated cost of \$110,000, the Plant could increase the RAP to 25% per ton of the Topeka mix composition. By replacing the existing dryer shell and pug mill equipment with a rotary drum mixer, at an estimated cost of \$1.4 million, there is a potential to increase the RAP to 50% per ton.

In FY 2005-06, 37% of the Topeka Mix produced at the Plant contained 15% RAP. It is possible that as much as 90% of our Topeka mix could contain 15% RAP with the existing Plant equipment. As aggregates and liquid asphalt costs continue to rise, using RAP in more of our mixes makes economic as well as environmental sense by conserving resources and reducing waste. The positive aspects of recycling asphalt include promoting the City's "Green" policy, eliminating the need to transport demolished pavement to a remote storage area or location outside the City, which saves time and fuel, and eases demand for more costly virgin aggregate. Even with cost savings from recycling factored in, the Plant's cost of asphalt per ton remains non-competitive with the private sector.

The asphalt grindings that are not recycled are hauled to Brisbane Recycling for disposal at \$15-\$17 per ton. The disposal cost of old asphalt on DPW paving jobs performed by private contractors is included in the bid price.

The Department is investigating a mobile asphalt machine that recycles grindings on site. This equipment, which costs between \$130,000-\$180,000 per unit, can produce up to 10 tons of asphalt an hour. Pothole crews could use this machine in the field instead of transporting hot asphalt from the Plant. It may also be appropriate for use at the Plant to increase the recycled content of asphalt produced there.

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## IV. ASPHALT COSTS AND PRICES

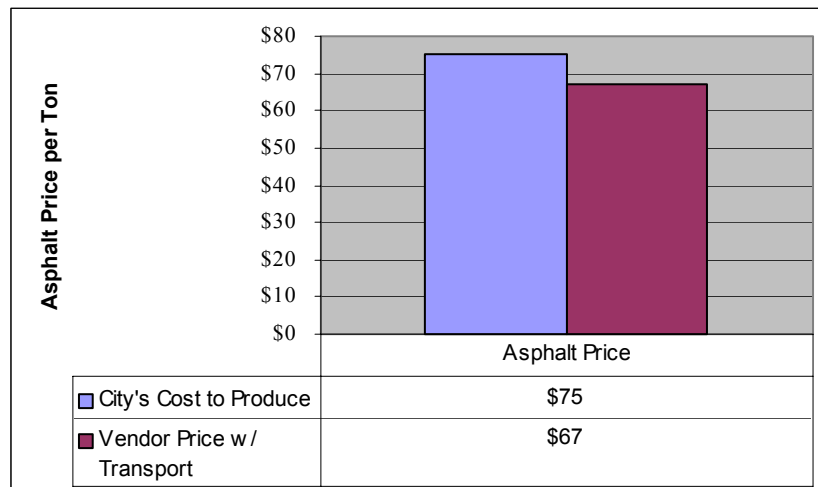
Both the cost to the City to produce asphalt at its Plant and the cost to projects (for example, street repaving projects, pothole and patch paving programs), as reflected in the price charged for asphalt, are important in evaluating the economics of the asphalt plant. The previous section of this report showed that the cost to the City to produce asphalt exceeded the revenues that were collected from projects. This means that the price per ton charged by the Plant for asphalt was less than the cost per ton to produce it. In each of the last three years, the General Fund made up the difference, and in effect provided a subsidy to the Plant. This General Fund subsidy could be eliminated by raising the price of asphalt, and over the last two years, DPW has raised the price we charge. However, we have not raised the price enough to cover all of our costs. Essentially, the Department's pricing has not kept up with the steep inflation in raw materials, especially those influenced by the price of petroleum and natural gas.

Another issue is whether projects are paying a reasonable price for asphalt. When comparing the actual sales price per ton, we have determined that the additional transportation cost per ton must also be factored in, as any asphalt procured from private suppliers will have to be trucked from outside the City (see Figure 5 and Attachment 4 for locations of local private plants.) In this report, we use the full cost of producing asphalt at the Plant as the point of comparison, not the price that has been charged which has been subsidized by the General Fund.

### ***Public vs. Private Sales Price Comparison***

Figure 4 below shows that in FY 2005-06, the weighted average cost to produce a ton of asphalt (including both Topeka and School mixes), was \$74.49 per ton, or \$15.60 per ton more than the weighted average price that that the City paid to an outside vendor for these mixes in March 2006. (In the middle of FY 2005-06, contractors were reporting that they were paying between \$48 - \$50 per ton for Topeka mix. That price has increased to \$55-\$60 per ton as of the end of August 2006.) The City's average weighted sales price for asphalt was \$71.52/ton in FY 2005-06.

**Fig. 4 - Comparison of Public vs. Private Asphalt Mix Sales Prices in FY 2005-06**

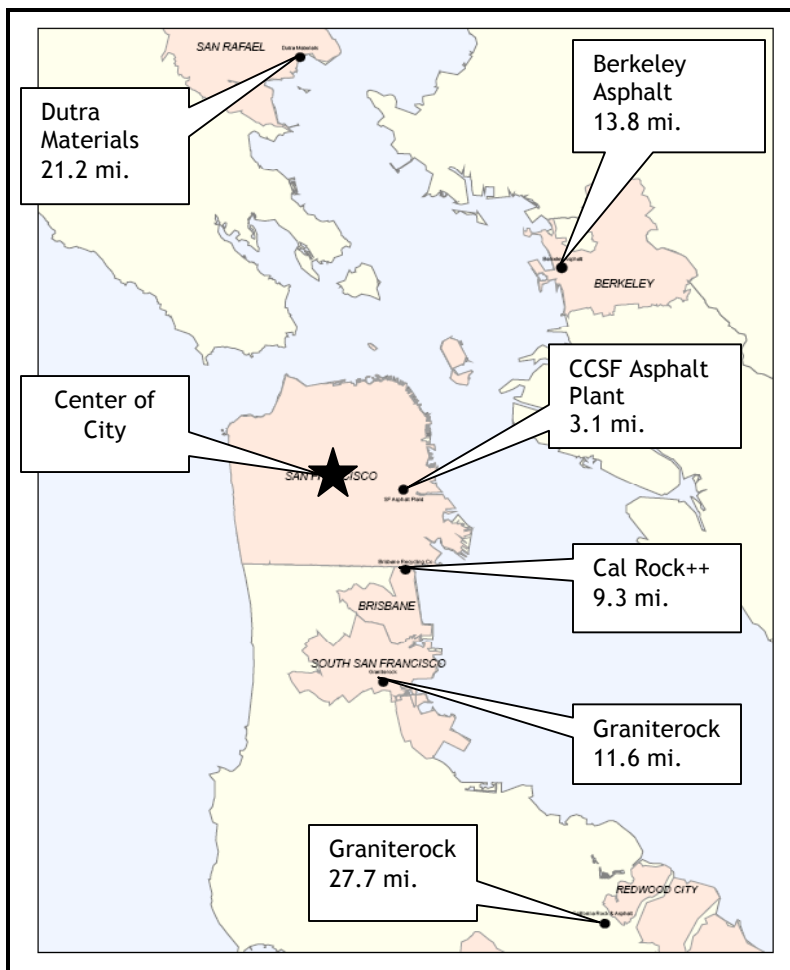


Even after adjusting the prices that the private vendors charged the City to include our trucking and transportation costs, break-even Plant prices were still not competitive with the private sector.

***City vs. Private Trucking and Transportation Costs***

When the Plant is shutdown for repairs, or if the City should decide to close the Plant, asphalt would need to be procured from private vendors. There are currently no asphalt plants within the City limits other than DPW’s Plant. The closest plant to the City is in Brisbane, but all indications are that this plant will be closing in the next two years, as the land on which it sits has been approved for a major housing development. The next closest plant is in South San Francisco, or approximately 11.6 miles from the center of San Francisco. It is from this plant that the City and contractors most often purchase asphalt when DPW’s plant is down. Figure 5 shows the locations and distance to the center of the City of all Bay Area asphalt plants.

Fig. 5 - Local Asphalt Plants\*



\* Distances shown on map are one-way from plant to the center of San Francisco.

DPW operates its own fleet of trucks to transport hot mix asphalt from its own Plant and the private asphalt plants. Its rate for trucking is currently \$94.06/hour. Private trucking costs are reported at \$70.00/hour for small projects similar to DPW's Big Gang projects.

To compare the cost to projects for asphalt purchased at the Plant to the cost when procured from private vendors, we have estimated the per ton cost of \$7.84 to truck asphalt from South San Francisco (SSF) to the Asphalt Plant, which is located relatively centrally in the City. The estimate was based upon the cost of the City's 12-ton trucks, operated by City truck drivers. Round trip travel, including waiting time at the SSF plant was calculated to be one hour per trip. This was confirmed by GPS records that were kept of a paving job in June 2006 on Portola Drive, which is located 13 miles from the SSF plant. Private contractors' costs would probably be lower than this because they are able to use larger trucks, and so require fewer round trips to pick up asphalt.

### **Break-even Plant Production Levels at Cost-Competitive Level**

For the past three years, the cost of producing asphalt at the Plant has exceeded the revenues generated through asphalt sales. In addition, the cost of City-produced asphalt has exceeded that which the City would have paid to outside producers, even when additional transportation costs are factored in.

As we discussed in the previous section of this report, there has not been adequate demand for asphalt over the last few years to achieve the economies of scale to cost-effectively produce asphalt. This is because the fixed costs, such as the lease payments for the silos, are spread over a smaller number of tons.

For FY 2006-07, we have analyzed both the number of tons the Plant would have to produce to achieve a cost per ton of asphalt that is competitive with prices charged by outside suppliers, and the cost per ton of producing asphalt based upon available funding for paving projects.

Figure 6 compares various scenarios for Asphalt Plant production volumes, costs and subsidies. Total production is estimated at 35,000 tons.

The first column of numbers shows the benchmark of what it would cost paving projects to procure asphalt from a private supplier and transport it to the City. The second column shows the level of General Fund subsidy that would be required if projects were to pay a price equivalent to the benchmark price. The third column shows the price per ton that paving projects would pay if the Plant were to fully recover its costs through asphalt sales (and receive no General Fund subsidy). The fourth column illustrates the tonnage the Plant would have to produce in order to sell asphalt at the benchmark price and fully recover its cost of operation through these revenues. This final scenario is really theoretical, as it is unlikely that the Plant could produce this volume, more than double what it produced in FY 2005-06, without additional personnel and capital improvements.

**Fig. 6 - Break-Even Projections for FY 2006-07  
Various Cost, Pricing and Tonnage Scenarios**

	<b>Benchmark: Private Supplier plus Transport Cost</b>	<b>Asphalt Plant: Competitive Price For Projects</b>	<b>Asphalt Plant: Projects Subsidize Plant</b>	<b>Asphalt Plant: Required Production No Subsidy</b>
Production Tonnage	35,000	35,000	35,000	61,740
Weighted Average Sales Price/Ton	\$67.84	\$67.84	\$86.38	\$67.84
Total Revenues	N/A	\$2,374,400	\$3,023,155	\$4,188,442
Total Expenditures	-	\$2,757,155	\$3,023,155	\$4,188,442
Plant Profit/(Loss)	-	(\$382,755)	\$0.00	\$0.00

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This higher level of production could be achieved with an increase in funding for street resurfacing, as discussed in the previous section. In addition, should this increased funding for street resurfacing be forthcoming, the cost of producing asphalt would drop and it would become attractive for other entities that use asphalt in San Francisco. At the present time, the Port and contractors for the Water Department and for PG&E buy asphalt from the Plant when nearby plants are down. They do not regularly buy from the Plant because of the high price charged. The Water Department uses as much as 6,000 tons of asphalt per year in the City, and PG&E uses nearly twice this amount. The Port does not have a regular paving program, but occasionally has a demand for asphalt. The Airport is a large user of asphalt, but its proximity to other plants makes it unlikely that it would become a customer of the City's Asphalt Plant.

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## V. OPTIONS FOR FUTURE PROCUREMENT OF ASPHALT BY DPW

Three years ago the City implemented a pilot project to operate the Asphalt Plant as an enterprise that would turn a profit. It is clear from the analysis presented in Section IV of this report that the Plant will not be able to turn a profit, or even break even, with tonnage production at projected levels of street resurfacing funding. Although asphalt can currently be obtained from a private vendor at a lower price, and without the current de facto General Fund subsidy to cover the annual operating deficit, closing the Plant carries a number of risks as well. This section of the report describes the options of continuing to operate the Plant or closing it.

The options for keeping the Plant open show a required annual General Fund subsidy to keep the price of asphalt competitive with the price the City would pay for asphalt from an outside producer, including transportation and other costs. The options for closing the Plant show a required General Fund subsidy for making lease payments on the silos, and calculate a cost per ton of asphalt, which includes these lease payments, and marginal transportation costs.

For the purposes of comparing the options, we have selected an annual asphalt demand by the City of 35,000 tons. The current five-year paving plan shows an estimate of 42,000 tons for FY 2006-07, falling to 27,285 tons in FY 2007-08 and 25,357 tons in FY 2008-09. These latter years represent known funding availability for street resurfacing from federal, state and San Francisco's half-cent sales tax for transportation purposes. Revenue projections do not include General Fund appropriations. Because known funding could be increased by additional funding sources, such as funding from the proposed state infrastructure bond or the General Fund, a total of 35,000 tons has been chosen for purposes of comparison in this report. The first two options described below are predicated on the following assumptions: that there will be no unforeseen catastrophic breakdown of the Plant, that raw materials and energy prices do not continue to increase at a rate faster than inflation, and that the Plant will be able to utilize recycled asphalt (15% in Option 1 and 50% in Option 2.)

The Plant would be able to break even with annual production of between 60-65,000 tons. This would require annual General Fund or alternative funding support for street resurfacing to total \$17.9 - \$20.6 million per year beginning in FY 2007-08.

### *Options*

#### **Option 1: Continue To Operate the Plant As-is**

The Asphalt Plant can currently meet approximately 85% of the City's asphalt demand for paving and pothole filling operations. All asphalt plants require some period of downtime each year for repairs, and San Francisco's plant is no different. Although

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the storage silos were constructed in 2003, key components of the Plant are worn and need to be replaced within the next two to three years. We estimate the cost of such improvements to be \$1.2 million, or \$162,000/year when amortized over ten years at an interest rate of 6%.

The Plant itself has not received significant capital investment for 13 years, and no improvements were made to the Plant when the new silos were installed. If a decision is made to continue producing asphalt at the Plant, we would want to conduct a thorough evaluation of the condition of the Plant to ensure that it could produce higher volumes of asphalt without additional, unknown, capital investments. This evaluation would be made by an outside expert on asphalt plants and would cost approximately \$10,000.

With the new storage silos, the Plant is able to produce asphalt so as to minimize waiting time for trucks picking up asphalt for both Big Gang and contractor paving projects. As the City is essentially the only customer for asphalt from the Plant, our paving and pothole operations will almost always have a ready supply of asphalt, and be able to operate with a great deal of flexibility. This means that response time to pothole repair needs, or to emergencies (caused by sinkholes or earthquakes, for example) will be minimized. Because it is centrally located, travel time to paving locations is limited.

In its current configuration, asphalt produced by the Plant can include 15% recycled material, meaning that approximately 2,700 tons of grindings from paving projects can be re-used as pavement rather than trucked to a disposal facility in Brisbane. Because of its central location in the City, the number of truck miles required to deliver asphalt to paving projects is lower than if we had to obtain asphalt from a private vendor, thus reducing diesel emissions. (We have not quantified the pollution savings of the San Francisco Plant.) The fact that the Plant is operated by the City means that City paving projects, pothole repairs and emergency needs receive top priority.

Due to the small production volume at San Francisco's Plant, economies of scale mean that the production cost per ton of asphalt is quite high at the Plant. If paving projects and the pothole program were to pay for City produced asphalt at the same price they would be required to pay for privately produced asphalt, including the additional costs for transportation and remaining lease payments for the silos, an annual General Fund subsidy of \$649,000 would still be required.

The following table Figure 7 summarizes the impact of selecting Option 1:

**Fig. 7 - Financial Impact of Option 1**

	Total	Asphalt	Transportation
Cost per ton	\$ 86.38	\$ 86.38	N/A
Cost for 35,000 tons	\$ 3,023,155	\$ 3,023,155	N/A
GF Subsidy 35,000 tons*	\$ 648,755		
Capital Cost**	\$ 161,855		
Annual Trucking Miles to AP	0		
Tons Grindings Recycled	2,700		
Tons Grindings Disposed	31,000		

\*Comparable cost from outside provider, including transport and silo payments = \$67.84/ton

\*\*Capital costs are amortized over 10 years at 6% interest and included in cost/ton

**Option 2: Optimize Plant Operations**

Under this option, the City would continue to operate the Plant, but it would make investments in the Plant to improve its efficiency and to allow a greater percentage of recycled materials, thus reducing the cost per ton of finished asphalt. The Plant currently produces finished asphalt with 15% RAP. Installation of a RAP crusher and platform, and replacement of the current pug mill technology with a drum mixer would allow for finished asphalt containing 50% RAP. Using this amount of recycled material would reduce the cost of finished asphalt by about 10%, or approximately \$8 a ton. In addition, we would reduce the amount of asphalt grindings trucked for disposal by approximately 6,300 tons/year.

The capital costs to make these improvements would be \$1.7 million, or \$229,000/year when amortized over ten years at an interest rate of 6%.

The following table Figure 8 summarizes the impact of selecting Option 2:

**Fig. 8 - Financial Impact of Option 2**

	Total	Asphalt	Transportation
Cost per ton	\$ 88.31	\$ 88.31	N/A
Cost for 35,000 tons	\$ 3,090,690	\$ 3,090,690	N/A
GF Subsidy 35,000 tons*	\$ 716,290		
Capital Cost**	\$ 229,390		
Annual Trucking Miles to AP	0		
Tons Grindings Recycled	9,000		
Tons Grindings Disposed	24,700		

\*Comparable cost from outside provider, including transport and silo payments = \$67.84/ton

\*\*Capital costs are amortized over 10 years at 6% interest and included in cost/ton

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### **Option 3: Close the San Francisco Asphalt Plant**

Under this option production at the San Francisco Plant would cease, presumably beginning in FY 2007-08. The City would continue to spend \$266,000 per year through 2013 to make payments on the silos that were constructed in 2003. In the spring of 2007, DPW would draft contracts for procurement of finished asphalt from outside vendors to ensure a continuous supply of asphalt for Big Gang paving projects and pothole repair. Private contractors would revert to procuring asphalt for their projects as they did prior to 2004. The closure of the Plant would result in the elimination of at least one position from DPW's budget and the layoff of one of the three permanent employees assigned there.

As there are no other asphalt plants within the City limits of San Francisco, contractors and DPW crews would have to go to Plants outside the City to get asphalt. Figure 5 in Section IV shows the location of Bay Area asphalt plants. Because the plant in Brisbane is likely to close within the next two years, the closest plant to San Francisco is Granite Rock in South San Francisco, which is 11.6 miles from the center of the City, or about 8.5 miles further than the City's Plant. This is the plant from which asphalt is most often purchased when the City Plant is down for repairs. Because of the travel times to plants in Redwood City, Berkeley and San Rafael, it may not be feasible for the City to purchase asphalt from them, as the asphalt is likely to cool down during transport to a temperature at which it is not usable for street paving. As a result, paving crews would likely be idle at times when the South San Francisco plant is not producing asphalt.

For the purposes of this report, we assume that DPW truck drivers would continue to pick up asphalt from the outside plants for pothole repair and the Big Gang. The hourly cost of contracted trucking is significantly lower than DPW trucking costs (approximately \$94 compared to \$70). However, the trucks that deliver asphalt to Big Gang paving locations physically attach themselves to DPW's paving machinery to pave a street, as opposed to dumping the material while a separate machine paves. In order to realize the savings possible through private hauling contracts, DPW would have to change its method of paving, and procure new paving equipment. While these changes would undoubtedly result in a more efficient paving program, they are outside the scope of this report.

As discussed in Section III of this report, the Department is investigating a mobile asphalt machine that recycles grindings on site. This equipment, which costs between \$130,000-\$180,000 per unit, can produce up to 10 tons of asphalt an hour, which would be adequate for the pothole crew and most jobs performed by the patch crew, and could be used by these crews instead of getting hot asphalt from the Plant. If the Plant is closed, and this machinery proves to be a feasible option for pothole repair and patch paving, its use would save a number of trips outside the City to procure asphalt.

In order to continue the current level of paving by the Big Gang, DPW would need to add two trucks to its fleet, and hire two truck drivers. This is because of the additional distance, and therefore travel time, from the privately operated plants in Brisbane and South San Francisco. If these plants are closed on a given day, the next closest asphalt plants would be in Redwood City, Berkeley, and San Rafael, meaning even longer travel times, and therefore, much less productive paving days. The cost of the additional equipment and personnel is assumed in the hourly cost for trucking.

The following table Figure 9 summarizes the impact of selecting Option 3:

**Fig. 9 - Financial Impact of Option 3**

	Total	Asphalt	Transportation
Cost per ton	\$ 67.84	\$ 60.00	\$ 7.84
Cost for 35,000 tons	\$ 2,374,400	\$ 2,100,000	\$ 274,400
GF Subsidy 35,000 tons	\$ 266,000		
Capital Cost	N/A		
Annual Trucking Miles to AP	18,328		
Tons Grindings Recycled	0		
Tons Grindings Disposed	33,700		

There is a further unknown regarding dependence on outside suppliers of asphalt. With the current array of asphalt plants in the Bay Area,<sup>7</sup> procuring asphalt from private producers would save the City funds. However, there is a significant risk that this will not always be the case. The private plant closest to the City, Cal Rock in Brisbane, is likely to close in the near future, as the site it occupies is slated for redevelopment. With San Francisco's Plant and the Brisbane plant closed, the plants owned by Graniterock in South San Francisco and Redwood City would have little competitive pressure to keep prices at the relatively low levels they are at present. The next closest plants to San Francisco are in Berkeley and San Rafael, either of which would require carrying asphalt over the bay. Transporting asphalt across the Golden Gate or Bay Bridge, notorious Bay Area bottlenecks, would risk delayed delivery times during which asphalt could cool below the temperature that it can be used in paving projects. The same risk will apply should the South San Francisco plant be closed for repairs, or because it is unavailable to the City while it fills a major order from the Airport or some other jurisdiction.

Because of the uncertainty of the future of the asphalt market, this option does not contemplate the immediate sale of the Asphalt Plant and its equipment. (A vendor that deals in used construction equipment visited the Plant and estimated the salvage value of the Plant's reusable equipment at \$600,000.) Nor does this option contemplate sale of the land on which the asphalt plant sits at this time. Although the property is small and irregularly shaped, it is surrounded on all sides by other

<sup>7</sup> See Attachment 4 for asphalt plant locations.

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municipal facilities, one of which could potentially utilize it.<sup>8</sup> However, the property serves as the storage and dispatch location for the BSSR crews and equipment, and no other property is available for these purposes.

**Option 4: Cease Production at the San Francisco Asphalt Plant and Create an Asphalt Distribution Facility**

This option requires more time and engineering analysis to determine its feasibility.

Under this option, the existing property and the silos would be developed into a smaller asphalt storage/distribution facility. This facility would be utilized as a central distribution facility of hot-mix asphalt for DPW. The silos would be pre-loaded with hot-mix asphalt purchased from the private asphalt producers.

If this approach were to prove to be viable, it would meet DPW's street maintenance needs, such as filling potholes that requires a constant and reliable supply of hot-mix asphalt for its daily need. It would take advantage of economies of scale for trucking hot-mix asphalt to the facility, and minimize extended waiting times for DPW trucks.

Before this option could be seriously entertained, an engineering study would have to be undertaken to determine the capital costs of converting the silos to be able to load asphalt from trucks at ground level as opposed to being dropped in from conveyor belts that run from the plant to the top of the silos. In addition, we would have to analyze whether the temperature of asphalt could be maintained at a usable temperature during transportation and transfer to the silos. Whether the City decides to close the Asphalt Plant or continue to produce asphalt there, the possibility of establishing an asphalt distribution facility should receive further exploration.

**Option 5: Privatize Operations**

DPW staff examined the possibility of privatizing operations at the Plant. We have determined the main reason that the Plant cannot produce asphalt at a competitive price is because it is too small to realize economies of scale. The Plant is permitted to produce 100,000 tons/year by the Bay Area Air Quality Management District. (The highest annual production of the Plant was 57,946 tons in 1985.) By comparison, the Graniterock plant in South San Francisco has a capacity of 3 million tons a year. Thus, the San Francisco Plant is unlikely to attract the interest of private operators. This assumption has been borne out by experience in Minneapolis and Pittsburgh, two cities that recently attempted to privatize municipal asphalt plants.

A more viable Joint Venture proposal is one that partners with another public agency. Subject to outreach to its advisory groups and Commission, the Port of San Francisco has expressed an interest in analyzing the environmental and economic viability of developing an asphalt plant on Port property. The Port property would be a more desirable location for plants of this nature because of its proximity to rail lines and the

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<sup>8</sup> See Attachment 1 for aerial view of the Plant and its adjacent properties.

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availability of storage space for raw materials. Both of these factors would mean that it would be more cost economical to purchase raw materials. Whether the City decides to close the Asphalt Plant or continue to produce asphalt there, this joint venture option should receive further exploration.

### **Next Steps**

1. **Releasing Reserve:** By submitting this report to the Board of Supervisors, the Department of Public Works has met the conditions to release reserved funds for six months of Plant operations. DPW respectfully requests that the Board approve this action.
2. **Funding for Street Resurfacing:** Because the level of funding for street resurfacing will determine the cost-effectiveness of operating the Asphalt Plant, the Capital Planning Committee, the Mayor and Board should determine the funding levels to be included in the Capital budget as soon as possible. This decision will be informed in part on the outcome of the November vote on state Proposition 1B that could provide as much as \$4 million annually to San Francisco for street resurfacing. In order to operate the Plant cost-effectively, street resurfacing will have to total between \$34 - \$38 million annually in 2006 dollars.
3. **Directing Future Budgeting:** This report serves as a platform for analyzing the future operation of the Plant. As such, the Department requests direction from the Mayor and the Board of Supervisors on how to budget for future Plant operations. Should the Department be directed to close the Plant, DPW staff should immediately begin to prepare bid documents for asphalt procurement beginning July 1, 2007. The Department will also have to procure additional trucks to transport asphalt from plants outside the City. If the Department is directed to continue producing asphalt at the Plant, the Department should immediately hire a consultant to conduct an evaluation of the Plant's long-term capacity.
4. **Improving Operations:** DPW should begin examining how to improve the efficiency of its paving operations, including a study of new paving equipment that would be required.

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## VI. APPENDIX

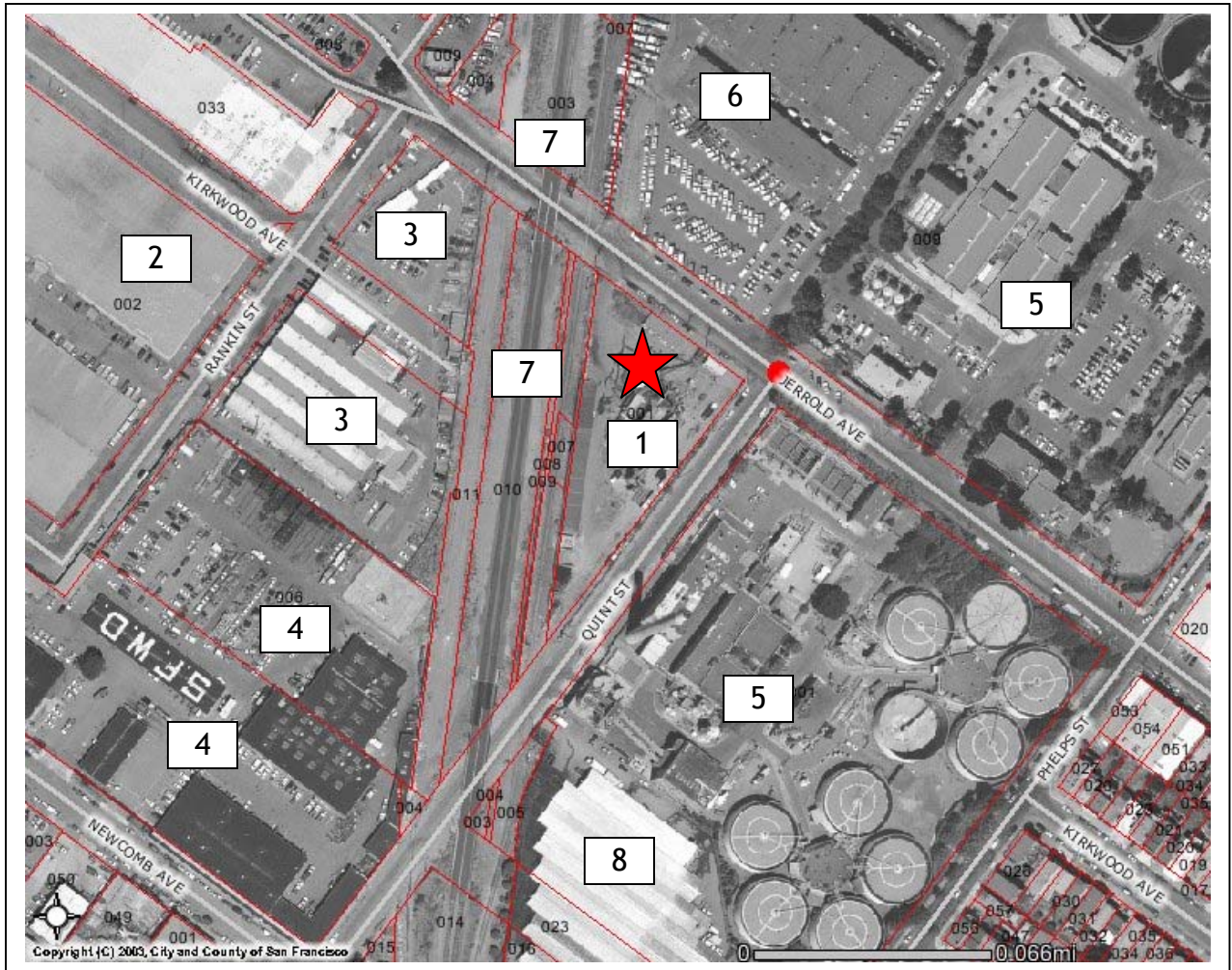
<b>Attachment 1</b>	Aerial View of Existing Plant Location
<b>Attachment 2</b>	Analysis of Asphalt Plant Shortfall
<b>Attachment 3</b>	Compositions of City Asphalt Mixes
<b>Attachment 4</b>	Local S.F. Area Asphalt Plant Locations
<b>Attachment 5</b>	Asphalt Tonnage Projections for Capital Street Resurfacing
<b>Attachment 6</b>	Asphalt Plant Operating Revenues and Expenditures
<b>Attachment 7</b>	Capital Improvements Cost Details
<b>Attachment 8</b>	Types of Asphalt Plants

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# ATTACHMENT 1

## S.F. Municipal Asphalt Plant - 1801 Jerrold Avenue



- ★ 1 = City Municipal Plant (1801 Jerrold Avenue)
- 2 = Private Property
- 3 = DTIS
- 4 = SFWD CDD
- 5 = Southeast Wastewater Treatment Plant
- 6 = Central Shops
- 7 = Peninsula Joint Power Authority
- 8 = SE Community Center Greenhouse

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## ATTACHMENT 2 - ANALYSIS OF ASPHALT PLANT SHORTFALL

### VARIANCE FROM 2002 PROJECTIONS

The variance in the current performance of the City's asphalt plant from original 2002 projections can be attributed to three primary factors:

1. The price of raw materials.
2. The amount of fixed costs.
3. The volume of production and sales.

#### 1. Price of Raw Materials

The DPW has seen a dramatic jump in the cost of the three principal raw materials in asphalt production - coarse aggregate (rock), sand, and AR4000 (the petroleum-based emulsion in asphalt) during the FY 2005-06. The prices for these materials from original 2002 projections and current costs for FY 2005-06 are summarized below in Fig. A:

**Fig. A - Raw Materials Bulk Costs  
Original Forecast vs. FY 2005-06**

Raw Materials	Original 2002 Forecast	Current FY 2005-06	% Variance
Rock	\$20.64 /ton	\$25.75 /ton	+ 25%
Top Sand	\$21.88 /ton	\$25.06/ton	+ 15%
Liquid Asphalt (AR4000)	\$272.29 /ton	\$383.64/ton*	+ 41%

\*Invoices from Graniterock for July and August 2006 show that the City is paying \$468.75/ton for AR4000.

The jump in the price of AR4000 occurred after the Hurricanes Katrina and Rita struck in August/September 2005 and appears to have been triggered in large part by the impact of those events on national petroleum production. Although there have been significant fluctuations in the price of gasoline since Hurricanes Katrina and Rita, the price of diesel fuel and the price of AR4000 have remained relatively stable and high since that time.

The jump in the price of aggregate has undoubtedly been impacted by the increase in diesel fuel costs, but it is impossible to separate that impact from a secondary source, i.e., the closure of quarries near Sunol from which the DPW used to purchase aggregate. The cost of aggregate is a combination of the quarrying cost and transport costs. Since the local quarries closed, we now purchase aggregate quarried in British Columbia, shipped by barge to the Port of San Francisco and trucked to the Asphalt Plant. This is currently the most economical source of aggregate available to the DPW, but a local source might be more economical had diesel fuel costs not increased to the extent that they have. Aggregates delivered by rail might also be more

economical; however, we cannot accept deliveries of that volume due to space constraints at the Plant.

The impact of these increases on the raw materials cost per ton of asphalt produced is reflected below in Fig. B.

**Fig. B - Weighted Average Raw Materials Costs for Asphalt Mix<sup>1</sup>  
Original Forecast vs. FY 2005-06**

Raw Materials	Original 2002 Forecast for FY 2005-06	Actual for FY 2005-06
Weighted Average for Asphalt Mix	\$56.53/ton	\$74.49

## 2. Fixed Costs

### Fixed vs. Variable Costs

There are a number of costs associated with the operation of the Plant that are characterized as fixed costs. Some of these costs are truly fixed, like the debt service on the silos, and others, such as energy and labor, are not truly fixed but do not vary directly with tonnage such that they are more accurately characterized as fixed rather than variable.<sup>2</sup>

The original FY 2002 forecast fixed operation costs of the Plant for FY 2005-06 were \$1,308,437, and the forecasted tonnage was 85,000. On a per ton basis, this results in costs of \$15.39 per ton. Fixed Plant operation costs in FY 2005-06 were \$1,268,490 due primarily to increases in labor costs. On a forecasted production of only 31,863 tons, this results in a fixed cost per ton of \$39.81.

**Fig. C - Fixed Costs  
Original Forecast vs. Current Forecast for FY 2005-06**

	FY 2002-03 Forecast (Original)	FY 2005-06 (Current)
Fixed Costs	\$1,308,436	\$1,268,490
Tons	85,000	31,863
Costs/Tons	\$15.39/ton	\$39.81/ton

The original proposal to add silos to the Plant was intended to increase the demand volume of material produced by the Plant in order to reduce the share of the fixed costs per ton and thus, reduce the cost of goods sold. Without increasing production

<sup>1</sup> As previously discussed, the City uses two main types of asphalt mixes. The City produces and uses the Topeka Mix in greater quantities for street resurfacing projects - historically 80-90% of all asphalt demand. See Attachment 3 for the compositions of Topeka and School mixes.

<sup>2</sup> The discussion of fixed and variable costs can be confusing. In this discussion, we are referring to net costs of operating the Plant that are relatively fixed independent of production volume. In this context, material costs would be variable costs. Conversely, when discussing the cost of producing a single ton of asphalt, the material costs would be a fixed cost per ton while other costs - debt service, labor, etc. - would be variable (i.e., the cost per ton would be inversely proportionate to the volume produced.)

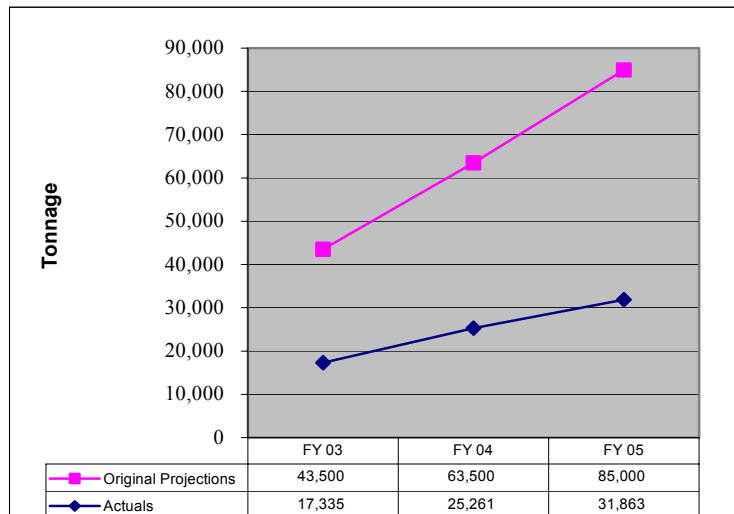
through internal and/or external sales, it will be impossible for the Plant to break even, much less, to realize a positive operating return to the Department on a cost-competitive basis with private hot-mix asphalt suppliers.

### 3. Volume of Production and Sales

Finally, and perhaps most significantly, we failed to produce the volume of asphalt that we had projected. The original projections assumed that the Plant would produce all of the asphalt for the DPW's needs and also sell a significant amount to outside contractors doing paving work in the City for private utilities, i.e., PG&E, AT&T, etc. Although the Plant did provide asphalt for the majority of DPW's needs - with the exception of some outside purchases to allow downtime for Plant repair and servicing - sales to outside customers were negligible.

As shown in Figure D below, the actual hot-mix asphalt produced at the Plant from FY 2003 through FY 2005-06 did not meet the original 2002 projected production volumes.

**Fig. D - Hot Mix Asphalt Production Volumes  
Original Forecast vs. Actual/Current Forecast for FY 2003 - FY 2005**



From speaking with some of those outside contractors, the sales price of our asphalt was the primary reason for their decision to buy from other suppliers. In FY 2005-06, our weighted average sales price for asphalt mix was \$74.49 per ton for School Mix. Contractors doing work for and/or in the City report that they pay \$48 to \$50 per ton.

#### **External Sales**

Our original model assumed that because ours is the only asphalt plant within the City's borders, asphalt from our Plant would sell at a premium over asphalt from other plants (see Attachment 4 for locations of nearby private asphalt plants and distances from the City.) This assumption was based upon two factors: (1) that contractors would realize a shorter travel time to and from our Plant and that procuring asphalt from another location would limit contractors' productivity or require the use of more drivers and trucks; and (2) that the shorter travel gives the contractor a longer period to safely place the material before the temperature of the material fell to

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unacceptable levels. It appears that we over-estimated the value of these factors to contractors, because purchases by outside vendors were slow to materialize. The increased material costs necessitated a price increase that effectively shut off any potential for significant purchases from outside vendors and initiated further escalations in price as fixed costs of operation are distributed across smaller sales volumes.



## ATTACHMENT 3 - COMPOSITIONS OF CITY ASPHALT MIXES

### Composition of Topeka Mix with Recycling Materials

Raw Materials	Mix
Rock	43.5%
Top Sand	37.0%
Liquid Asphalt (AR4000)	4.5%
Recycled Material	15.0%
<b>TOTAL</b>	<b>100%</b>

### Composition of Topeka Mix without Recycling Materials

Raw Materials	Mix
Rock	58.0%
Top Sand	37.5%
Liquid Asphalt (AR4000)	4.5%
Recycled Material	0.0%
<b>TOTAL</b>	<b>100%</b>

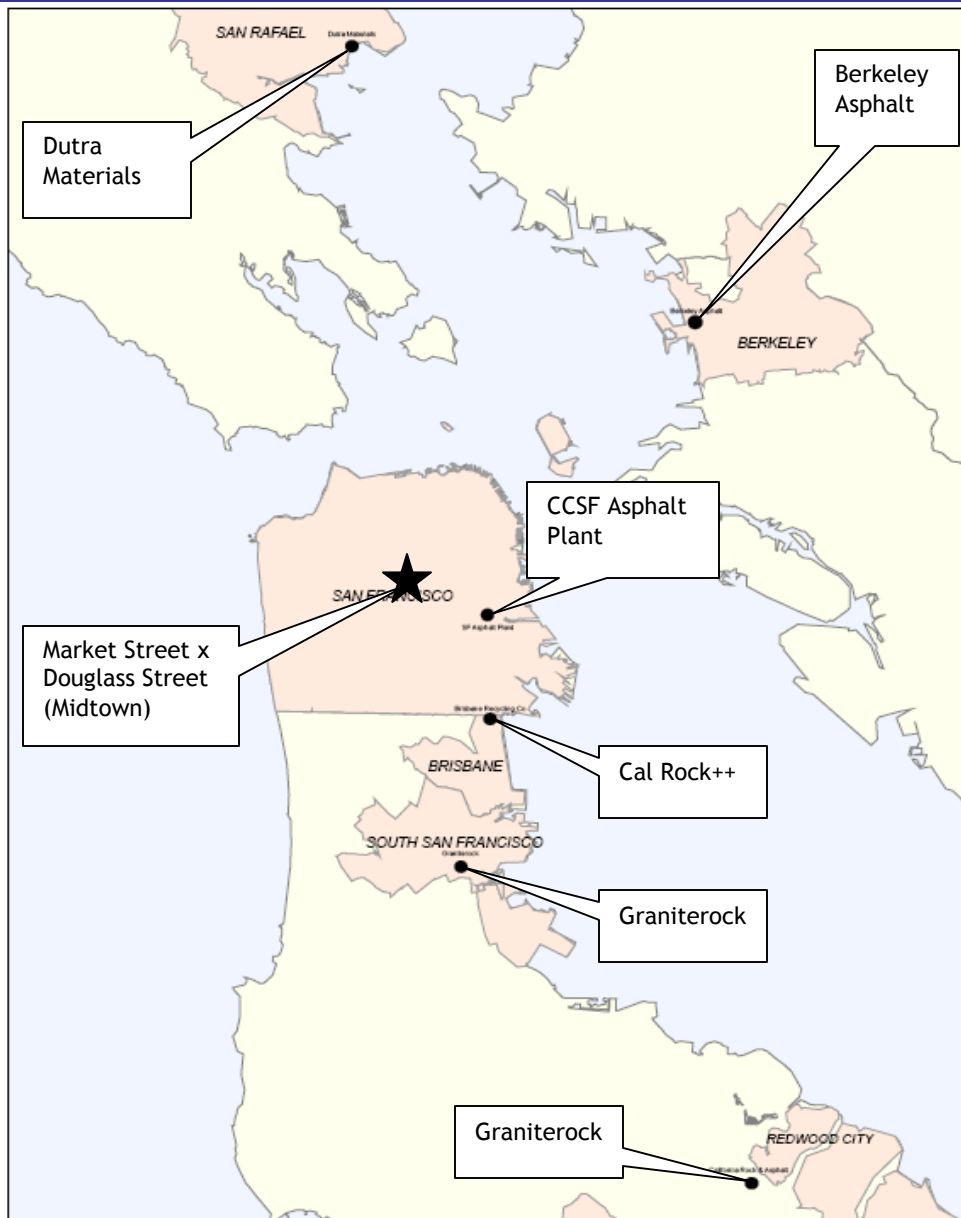
### Composition of School Mix without Recycling Materials

Raw Materials	Mix
Rock	34.0%
Top Sand	60.0%
Liquid Asphalt (AR4000)	6.0%
Recycled Material	0.0%
<b>TOTAL</b>	<b>100%</b>

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## ATTACHMENT 4 - LOCAL S.F. AREA ASPHALT PLANT LOCATIONS



Asphalt Plant	Plant Location	Driving Distance* / Time** to Market St/ Douglass St		Driving Distance* / Time** to CCSF Asphalt Plant @ 1801 Jerrold Ave.	
City and County of San Francisco Asphalt Plant	1801 Jerrold Avenue, San Francisco	3.1 miles	9 min.		
California Rock & Asphalt Inc. (Cal Rock)++	1 Quarry Road, Brisbane	9.3 miles	17 min.	5.4 miles	12 min.
Graniterock	1321 Lowrie Avenue, South San Francisco	11.6 miles	15 min.	7.6 miles	10 min.
Berkeley Asphalt	699 Virginia Street, Berkeley	13.8 miles	20 min.	14.2 miles	21 min.
Dutra Materials	1000 Point San Pedro Rd., San Rafael	21.2 miles	33 min.	24.6 miles	41 min.
Graniterock	355 Blomquist Street, Redwood City	27.7 miles	28 min.	23.8miles	23 min.

\* Distances given are one-way.

++Final EIR for redevelopment of site approved 2/27/06 by Brisbane City Council.

\*\* Driving times given are under optimal traffic conditions. Traffic conditions for travel on Bay Area freeways and across the bridges are often congested and slow.

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## ATTACHMENT 5 - ASPHALT TONNAGE PROJECTIONS FOR CAPITAL STREET RESURFACING

FY 2006-07 - FY 2010-11

Fiscal Year	FUNDING SOURCES					ASPHALT			
	Prop 42 (Millions)	Prop K (Millions)	General Fund (Millions)	Federal Funds (Millions)	Total Budgeted Amount (Millions)	Asphalt Tons Anticipated <sup>B</sup>	Carried Over from Previous Year	Total Tons in Current FY	Carried Forward Next FY <sup>C</sup>
2006-07	\$9.2	\$3.3	\$15.0	\$2.7	\$30.2	59,366	0	41,897	17,469
2007-08	\$0	\$12.4	N/A <sup>A</sup>	\$4.9	\$17.3	19,631	17,469	27,285	9,816
2008-09	\$12.1	\$2.9	N/A <sup>A</sup>	\$1.3	\$16.3	26,174	12,270	25,357	13,087
2009-10	\$12.1	\$3.0	N/A <sup>A</sup>	\$2.0	\$17.1	26,408	13,204	26,408	13,204
2010-11	\$12.1	\$3.0	N/A <sup>A</sup>	\$2.0	\$17.1	26,408	13,204	26,408	13,204
<b>Total</b>	<b>\$45.5</b>	<b>\$24.6</b>	<b>\$15.0</b>	<b>\$12.9</b>	<b>\$98.0</b>	<b>157,987</b>	<b>56,147</b>	<b>147,355</b>	<b>66,780</b>

<sup>A</sup> General Fund is unknown

<sup>B</sup> Anticipated asphalt tonnage does not include Federal Funds

<sup>C</sup> ½ of Anticipated asphalt tons

ATTACHMENT 5

*SAN FRANCISCO ASPHALT PLANT STUDY*

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**ATTACHMENT 5**

*SAN FRANCISCO ASPHALT PLANT STUDY*

## ATTACHMENT 6 ASPHALT PLANT OPERATING REVENUES AND EXPENDITURES

### FY 2003-04 to FY 2005-06

	FY 2003-04	FY 2004-05	FY 2005-06
<b>Tonnage</b>			
Produced	17,335	25,261	31,863
Purchased	3,280	2,955	4,271
<b>Total</b>	<b>20,615</b>	<b>28,216</b>	<b>36,134</b>
<b>Revenue</b>	<b>1,305,370</b>	<b>1,825,401</b>	<b>2,584,179</b>
<b>Expenditures</b>			
General Fund	1,854,356	2,147,508	2,625,642
Road Fund	0	0	36,721
Projects	0	0	29,188
<b>Total</b>	<b>1,854,356</b>	<b>2,147,508</b>	<b>2,691,551</b>
<b>Profit (Loss)</b>	<b>(548,986)</b>	<b>(322,107)</b>	<b>(107,372)</b>
<b>Per Ton Revenue</b>	<b>63.32</b>	<b>64.69</b>	<b>71.52</b>
<b>Per Ton Cost</b>	<b>89.95</b>	<b>76.11</b>	<b>74.49</b>
<b>Expenditure Details</b>			
Materials	729,522	923,783	1,423,061
Labor	617,164	570,386	653,196
BBR Work Order	176,749	136,488	109,618
Light, Heat & Power	190,819	202,450	221,928
Repairs & Maintenance		31,769	8,358
Other Current Expenses	6,855	9,790	6,398
Debt Service	133,246	266,492	266,492
Other Costs	0	6,350	2,500
<b>Total Costs</b>	<b>1,854,355</b>	<b>2,147,508</b>	<b>2,691,551</b>

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## ATTACHMENT 7 - CAPITAL IMPROVEMENTS COST DETAILS

	Improvements	Material and Installation Cost
1.	a. Replace Dryer Shell including gear, rollers, runyons, drive. b. Replace Feeder Buckets and Elevator to double capacity to increase aggregate delivery. c. Replace Material Stacker/Donkey/Shuttle Buggy including drive components.	\$1,029,000
2.	Install Asphalt RAP Crusher and Platform	\$110,000
3.	Replace batch mixer with Rotary Drum mixer	\$1,421,375
4.	Upgrade Electrical Main Service	\$175,000

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## ATTACHMENT 8 - TYPES OF ASPHALT PLANTS

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There are two different types of asphalt plants, Batch and Continuous Drum.

A. Batch

The City's asphalt plant is a batch mix plant. In this type of plant, the aggregates move through the drum and exit the other end. From there, a bucket elevator transports it up into a tower where there are four (or more) metal bins that can store the hot aggregate temporarily. There is a bin for each size of rock plus one or more for sand. When the plant operator decides what type of mix to make, she/he selects the correct quantity of rock from the bin that holds the size needed. To that, the operator adds sand dumps it all into a device called a pugmill which is located beneath the bins in the tower. The pugmill looks like an overgrown cake mixer but it acts to blend the rock and sand together after which asphalt oil is injected into the mill and the mixing process continues until the batch is done. At that point, the pugmill doors are opened and the load falls into a truck or is stored temporarily in a heated/insulated silo.

Batch plants have the advantage of flexibility. Because the operator individually selects each load that comes out of the hopper, a customer can receive the mix he requires on demand. Batch plants are not as productive as drum plants because they do not operate continuously. Each load must go through its own cycle, after which the pugmill is reloaded for another round.

B. Continuous Drum

In a continuous drum mix plant, the aggregates are progressively heated and at a certain point in their travel down the sloped drum, asphalt oil is injected into the drum where it mixes with the aggregates. The material eventually exits out the end of the drum and is either loaded into trucks or stored temporarily in heated/insulated silos.

Drum plants have an advantage when the operator needs to produce a great quantity of one type of mix. There is no interruption of the process as material is loaded and unloaded. The economies of scale are most evident in drum plants and the vast majority of the plants currently in use are drum plants. Drum plants are inflexible in that they cannot quickly change over from one type of mix to another.

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