Ms. Martha DeBry  
Assistant to Town Manager  
Town of Hillsborough  
1600 Floribunda  
Hillsborough, CA 94010

Subject: Refuse and Construction Vehicle Street Maintenance Cost Analysis – Final Report  
Reference Number: S1963

Dear Ms. DeBry:

Hilton Farnkopf & Hobson, LLC (HF&H) was engaged by the Town of Hillsborough (Town) to analyze the impact of residential solid waste, recycling, and yard waste vehicles (Refuse Vehicles) and construction-related vehicles (Construction Vehicles) on street maintenance costs (i.e., maintenance, rehabilitation, and reconstruction costs). This report communicates our results and transmits a legal opinion regarding the validity of imposing a Refuse Vehicle impact fee (attached).

Our analysis is based on available information related to street maintenance costs, funding sources, traffic volumes, and vehicle profiles for the types of Refuse and Construction Vehicles providing service in the Town, their weights and axle configurations, and service frequency. Should there be any future material changes to that information, the Town may wish to review the results of the analysis and change the calculated impacts and any associated fees that might be established.

Objectives

The objectives of the engagement were to calculate the impact in costs to the Town’s street maintenance program attributable to Refuse Vehicles and Construction Vehicles based on the current (Scenario 1) Average Annual Non-Discretionary Funding Shortfall¹ (Shortfall) and assuming three alternative funding scenarios wherein the town will spend $1 million (Scenario 2), $1.5 million (Scenario 3), or $2 million (Scenario 4) per year on pavement-related street maintenance costs to improve the Town’s Pavement Condition Index (PCI).

¹ The total of the City’s average annual discretionary funding requirement minus the average annual change in the City’s Restricted Balances for Street Purposes (i.e., balances of non-discretionary street purpose funding), as reported to the State of California.
Findings

As shown in the following table, based on the approach described below:

1. We project a Shortfall of $242,000 in pavement-related maintenance expenses to maintain the Town’s current PCI;
2. Refuse Vehicles and Construction Vehicles account for approximately 5.0% and 48.7%, respectively, of the total impact that a typical street experiences; and,
3. Based on the percentage impacts identified in finding #2 above, the share of the Shortfall attributable respectively to the Refuse Vehicles and Construction Vehicles is:
   - $11,000 and $117,000 in Scenario 1;
   - $49,000 and $486,000 in Scenario 2;
   - $73,000 and $730,000 in Scenario 3; and
   - $100,000 and $973,000 in Scenario 4.

Accordingly, if the Town wishes to recover the Shortfall attributed to Refuse Vehicles, it would assess its refuse hauler an annual fee between $11,000 and $100,000.

If the Town wishes to recover the Shortfall attributed to Construction Vehicles it could assess a fee ranging from 0.17% to 1.38% on the value of all building permits issued by the Town (e.g. for a permit valued at $100,000 the Town would collect $1,000 from the permittee if the fee was set to 1% of the building permit value). The Construction Vehicle fee percentage was calculated by dividing the Shortfall attributed to Construction Vehicles ($117,000; $486,000; $730,000; and, $973,000) by the average annual value of building permits from 2001 through 2004 ($70,732,733).

This is a common approach for assessing the Construction Vehicle Impact Fees in California.

### TABLE 1 – STREET IMPACT ANALYSIS

<table>
<thead>
<tr>
<th>Vehicle Type / Other Impacting Factors</th>
<th>Total ESAL Loadings / Vehicle Type</th>
<th>Average Annual Non-Discretionary Funding Shortfall</th>
<th>Percent of Total Vehicle Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20-yr Lifetime</td>
<td>@ Current Funding (Scenario 1)</td>
<td>@ Target Funding (Scenario 2)</td>
</tr>
<tr>
<td>Solid Waste Vehicles</td>
<td>2,577</td>
<td>1,289</td>
<td>$5,000</td>
</tr>
<tr>
<td>Yard Waste Vehicles</td>
<td>2,237</td>
<td>1,118</td>
<td>$5,000</td>
</tr>
<tr>
<td>Recycling Vehicles</td>
<td>438</td>
<td>219</td>
<td>$1,000</td>
</tr>
<tr>
<td><strong>Subtotal Refuse Vehicles</strong></td>
<td><strong>5,252</strong></td>
<td><strong>2,626</strong></td>
<td><strong>$11,000</strong></td>
</tr>
<tr>
<td>Other Trucks</td>
<td>107,867</td>
<td>53,933</td>
<td>$100,000</td>
</tr>
<tr>
<td><strong>Construction Vehicles</strong></td>
<td><strong>199,219</strong></td>
<td><strong>99,610</strong></td>
<td><strong>$117,000</strong></td>
</tr>
<tr>
<td>Automobiles</td>
<td>15,192</td>
<td>7,596</td>
<td>$13,000</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>332,781</strong></td>
<td><strong>166,391</strong></td>
<td><strong>$242,000</strong></td>
</tr>
</tbody>
</table>

Note: Numbers may not add exactly due to rounding.
TABLE 2 – CONSTRUCTION VEHICLE ANALYSIS

<table>
<thead>
<tr>
<th></th>
<th>@ Current Funding (Scenario 1)</th>
<th>@ Target Funding (Scenario 2)</th>
<th>@ Target Funding (Scenario 3)</th>
<th>@ Target Funding (Scenario 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Annual Building Permit Value 01/02/03/04 =</td>
<td>$117,000</td>
<td>$486,000</td>
<td>$730,000</td>
<td>$973,000</td>
</tr>
<tr>
<td>Construction Vehicle Impact =</td>
<td>0.17%</td>
<td>0.69%</td>
<td>1.03%</td>
<td>1.38%</td>
</tr>
<tr>
<td>Percentage Assessed to Each Permit =</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It should be noted that reasonable ranges exist for various key assumptions used in our analysis, and that the analysis is highly sensitive to changes in certain of the key assumptions. A discussion of key assumptions and sensitivities is provided later in this report.

Overview

Road maintenance is based on deterioration. While roads will deteriorate if simply left unused, most deterioration is associated with use. The damage caused by vehicles increases much more than proportionately with size and weight. Hence, maintenance costs are greater for trips made by heavy vehicles. A single, large truck can cause as much damage as thousands of automobiles, and a truck’s configuration can affect the amount of damage as well. If the load is spread over more axles, allowing for less weight on each wheel, then damage is reduced. Refuse and Construction Vehicles are generally some of the heaviest vehicles regularly operating on Town streets. Accordingly, these vehicles contribute significantly to the cost of maintaining those streets.

It is generally acknowledged that preventative maintenance is the single most important component of an effective pavement management program and that each dollar spent on preventative maintenance now saves as much as five dollars or more in future costs. The key is to maintain streets and roads in good condition (at a relatively low cost), rather than allowing pavement to deteriorate to the point where extensive rehabilitation or reconstruction becomes necessary.

Local roads within the Bay Area have an average PCI of 65. The City’s streets have an average PCI of 64, which falls in the category of “Good” (60-74). While this is a generally positive rating, rapid deterioration of pavement typically occurs after roadways drop to a PCI score of 60 or lower. Therefore, assuring adequate funding for an effective pavement management program for the City’s streets is critical. Delays in preventative maintenance increase the quantity and severity of pavement defects, and result in higher costs during pavement life. Consequently, using only a routine and reactive approach will considerably increase the life cycle costs of the pavement.

2 Rufolo, Cost-Based Road Taxation, Cascade Policy Institute, Policy Perspective #5, November 1995.
3 Bay Area Transportation, State of the System 2003; Metropolitan Transportation Commission and Caltrans District 4.
5 A Pavement Preventative Maintenance Program; Larry Galehouse, P.E., L.S.; Michigan Department of Transportation.
Background

Browning-Ferris Industries (Company) provides residential solid waste, recycling, and yard waste services in the City. Residential solid waste service is provided weekly with two-person rear-loading vehicles that generally make a single pass down each street to provide service (i.e., they service both sides of the street on the same pass). Recycling and yard waste service is provided every other week. Recycling services are provided with manual side loading vehicles, while yard waste service is provided with semi-automated side loading vehicles. Recycling vehicles make two passes down each street to provide service (i.e., they service one side of the street on each pass). Depending on the route, yard waste vehicles make either one or two passes down each street to provide service.

The Town of Hillsborough experiences a considerable amount of remodeling of homes. As a result, the volume of construction vehicle traffic on the Town’s roads is substantial. This construction traffic was monitored on numerous Town streets by HF&H during the course of a week at various times of the day to determine the percentage of vehicles operating on the streets that were conducting construction-related activity.

Approach

While the Town currently receives various non-disccretionary funds to maintain its streets (e.g., gas tax apportionments; traffic congestion relief funds) this funding generally does not cover all costs, and any resulting shortfall must be paid from discretionary funds (e.g., general fund, motor vehicle license fee revenue) and/or available Restricted Balances for Street Purposes (i.e., balances of non-disccretionary street purpose funding).

Our analysis calculates the Average Annual Non-Discretionary Funding Shortfall net of restricted balances (Shortfall) and allocates the Shortfall attributed to the impacts of Refuse and Construction Vehicles on the Town’s streets, under the four funding scenarios described above. The basis for allocating the Shortfall is made by calculating the Equivalent Single Axle Load (ESAL) of each type of vehicle traveling on the Town’s streets, as described below.

The underlying premise for the analysis is that the weight and loading of Refuse and Construction Vehicles impose a particular, specific, and quantifiable impact on Town streets. The analysis is based on the fact that the Town’s streets are designed to handle a certain amount of vehicle traffic (loading) over its design life. That loading is a function of both the number and weight of vehicles. The lifetime “vehicle loading” that a street can accommodate can be expressed as the total number of ESALs. Each vehicle type (e.g., Refuse Vehicles, Construction Vehicles, other trucks and automobiles) can be converted into an associated ESAL, based on the vehicle’s weight and the distribution of that weight among the vehicle’s axles. By projecting the type and number of vehicles that will travel on a street over its design life, the total number of ESALs can be calculated, and the street designed to handle that projected loading. Similarly, the relative impact of each type of vehicle on that street can be calculated, based on the percentage of the total ESALs attributed to each vehicle type.
While understanding these elements for the Refuse Vehicles is relatively straight-forward (because the same trucks travel on the streets every week), the variables for the Construction Vehicles require more work to understand. In response to this need, HF&H conducted a traffic survey of 16 different sites within the Town to sample the volume of Construction traffic relative to other types of traffic. This survey generated the percentage of traffic that was related to Construction Vehicles relative to automobiles and other trucks. Additionally, HF&H has visited construction sites around the bay area and spoken with contractors regarding the types and sizes of vehicles that visit their sites on a daily and weekly basis to establish a model for the ESALs attributable to each construction vehicle.

Methodology

The methodology used to project the impact of Refuse and Construction Vehicles can be summarized as follows:

**Determine Number of Vehicle Trips by Vehicle Type**

HF&H worked with the Town and the Company (where appropriate) and performed an independent investigation of construction traffic to develop an understanding of the number of average daily vehicle trips by vehicle type (refuse, construction, other truck, and automobile). During this process, HF&H:

- Consulted with the Company to determine the number of trips their vehicles took on each street within the Town,
- Reviewed information provided by the Town that reported average daily traffic counts; and,
- Conducted a sampling of traffic on numerous streets throughout the Town to determine the amount of traffic that was attributable to Construction Vehicles.

**Determine the Impact of Each Vehicle Type**

HF&H collected from the Company and through independent investigation, vehicle weights and profiles for the various vehicles being studied in this analysis. Each vehicle type was modeled based on weight, vehicle specifications, axle profile, and average payload. This modeling produced an average ESAL for each vehicle type which was then used to assess the direct impact of each vehicle trip by each vehicle type.

**Project Maintenance Costs Associated with Each Vehicle Type**

**Scenario 1 – At Current Maintenance Levels**

- The Average Annual Non-Discretionary Funding Shortfall (the annual discretionary funding used for street purposes minus the annual change in the Town’s Restricted Balances) was determined based on data for fiscal years ending (FYE) 2002, 2003 and 2004 reported to the State of California by the Town;
• The Average Annual Non-Discretionary Funding Shortfall was allocated among pavement- and non-pavement-related activities in proportion to the average percentage of expenditures for pavement- and non-pavement-related activities, based on data for FYE 2002, 2003 and 2004;

• The Average Annual Non-Discretionary Funding Shortfall for pavement-related activities was allocated among residential, collector and arterial streets in proportion to the percentage of lane miles for each of those street classifications; and

• The residential, collector, and arterial street portions of the Average Annual Non-Discretionary Funding Shortfall for pavement-related activities was allocated among the various vehicle types in proportion to the calculated impact of each vehicle type, as determined above.

Scenario 2, 3, and 4 – At Projected Maintenance Levels to Improve Town’s PCI

• Three annual pavement-related maintenance cost scenarios, intended to improve the Town’s current pavement condition index, were provided by the Town;

• The additional annual pavement-related maintenance costs were allocated among residential, collector and arterial streets in proportion to the percentage of lane miles for each of those street classifications; and

• The residential, collector, and arterial street portions of those costs were allocated among the various vehicle types in proportion to the calculated impact of each vehicle type.

Key Assumptions/Inputs

The analysis relied in part on the following key assumptions, provided largely by the Town, the Company, and HF&H’s field study (supplemented with data from other sources as noted):

• Residential streets account for approximately 51% of the total residential, collector, and arterial lane miles in the Town;

• Collector streets account for approximately 44% of the total residential, collector, and arterial lane miles in the Town;

• Arterial streets account for approximately 5% of the total residential, collector, and arterial lane miles in the Town;

• An average of 311 vehicles travel on a typical residential street each day, with 4.68% of those vehicles being trucks, and 38.43% of those trucks being construction vehicles;

• An average of 2,468 vehicles travel on a typical collector street each day, with 6.33% of those vehicles being trucks, and 65.70% of those trucks being construction vehicles;

• An average of 5,191 vehicles travel on a typical arterial street each day, with 4.64% of those vehicles being trucks, and 64.67% of those trucks being construction vehicles;
Residential solid waste service is provided weekly;

Residential yard waste and recycling service is provided biweekly;

Residential solid waste vehicles typically travel on each residential street segment once to provide service (i.e., they service both sides of the street on a single pass);6

Residential recycling vehicles travel on each residential street segment twice to provide service (i.e., they service one side of the street on a single pass);7

Residential yard waste make either one or two passes down each street to provide service, depending on the route, averaging 1.3 passes;

Refuse Vehicle tare weight and payload weight data was provided by the Company, and was based on actual data for a “representative” vehicle from the Company’s total fleet for each of the three commodities;

Refuse Vehicle axle weight distribution profiles were based on data provided by vehicle manufacturers for the same or similar vehicle types;

Axle weight data for Other Trucks and automobiles was based on data compiled from a variety of sources including vehicle manufacturers and industry publications;

Axle weight data for Construction Vehicles was based on data compiled by HF&H through vehicle manufacturers and building-site observations in the Bay Area;

Pavement-related activities accounted for approximately 27% of the Town’s annual pavement and non-pavement expenditures for street purposes;

The Town’s Average Annual Non-Discretionary Funding Shortfall is approximately $902,000; and,

A total of $2 million per year in pavement-related spending over the next 10 years is estimated to be required to achieve a PCI of 73, the upper end of the City’s target range, with discretionary revenues required to fund that amount.

Using the assumptions noted above, the portion of the Town’s Average Annual Non-Discretionary Funding Shortfall associated with Refuse and Construction Vehicles was calculated following the previously described methodology.

**Sensitivity Analysis**

As noted in the Limitations section below, our analysis is based on a number of key assumptions, and changes to those assumptions may have a material impact on the resulting findings. The following information provides an overview of the relative impact of changes in

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6 The analysis does not account for any additional passes due to vehicle routing (e.g., “dead-heading” over a previously serviced street).

7 Ibid.
certain of our key assumptions on the projected impacts associated with Refuse and Construction Vehicles.

Average Annual Non-Discretionary Funding Shortfall
Our analysis is based on an Average Annual Non-Discretionary Funding Shortfall of approximately $902,000. Changes to that amount would have a directly proportional effect on the amount allocated to Refuse and Construction Vehicles (e.g., a change in the Average Annual Non-Discretionary Funding Shortfall amount of 10% would result in a 10% change in the amount of costs allocated to Refuse and Construction Vehicles).

Refuse Vehicle Trips
Changing the number of trips assumed for Refuse Vehicles has a direct effect on the projected impacts (e.g., the calculated impact for a Refuse Vehicle making two passes down each street segment is twice that of a Refuse Vehicle making only one pass). While the current number of trips associated with residential Refuse Vehicles is well established, changes to the collection methods (e.g., switching from two-pass fully automated side loader solid waste collection to one-pass semi-automated side- or rear-loader collection) would impact the number of Refuse Vehicle trips and the associated impact.

Total Vehicle Trips and Percentage of Vehicle Types
Changing the number of total vehicle trips (without changing the number of Refuse Vehicle trips), affects the projected impacts in roughly inverse proportion (e.g., doubling the number of total vehicle trips reduces the calculated impact of Refuse Vehicles by about half, while halving the number of total vehicle trips roughly doubles the calculated impact).

Changing the percentage of total vehicles assumed to be trucks has a material impact on the analysis. The impact of trucks is substantial; therefore, as the percentage of trucks increases, their relative impact increases, while the relative impact of Refuse Vehicles decreases. There is a similar relationship with automobiles, however, that impact is not as significant due to the lesser relative impact of automobiles.

Equivalent Single Axle Loadings (ESAL)
Changing the assumed ESAL for Refuse or Construction Vehicles has a roughly proportional effect on the calculated impact. If we double the associated ESAL, the impact roughly doubles. Similarly, if we reduce the assumed ESAL by half, the impact is reduced by about half. While we have attempted to estimate the ESALs for Refuse and Construction Vehicles as accurately as possible, those calculations are highly sensitive to assumed vehicle weights (both loaded and unloaded) and the distribution of that weight among the vehicles' axles.

The assumptions regarding the ESALs of each vehicle type affect the calculated impacts associated with each other vehicle type. Changes in the assumed ESALs of Other Trucks, construction vehicles, and automobiles have an inverse effect on the calculated impact of Refuse Vehicles (i.e., as the assumed ESAL of Other Trucks, construction vehicles, and/or automobiles increases, the calculated impact of Refuse Vehicles decreases and visa versa).
Limitations

- Our analysis does not account for the potential impact of any non-vehicle-related factors (e.g., repair and maintenance of underground utilities). To the extent any such factors affect street maintenance and rehabilitation costs the impact attributed to the different vehicle types would be affected.

- Our analysis is based on the various assumptions noted, including the total number of vehicle trips and average ESALs associated with the various vehicle types. Changes to these assumptions may have a material affect on the analysis.

- Annual street maintenance costs can vary widely from year to year, both in total and specific to pavement- and non-pavement-related expenses as well the amount spent on residential, collector and arterial streets. In addition, annual discretionary and non-discretionary, street-related funding can also vary annually. Our analysis is based on the Town’s street maintenance cost and funding data for Fiscal Year Ending (FYE) 2002, 2003 and 2004 and the noted assumptions regarding those factors. Changes to those assumptions may have a material impact on the associated projections.

- We have not made any allowances for how discretionary or non-discretionary funds have been or will be spent by the Town with regard to specific road related purposes (i.e., pavement versus non-pavement versus overhead related costs). The analysis assumes that discretionary and non-discretionary funds are distributed between pavement- and non-pavement-related expenses in proportion to the relative percentage of those expenses.

- We have not made any adjustments to account for any non-discretionary funding received from the federal government or other sources, which may or may not be received in the future.

- We have not accounted for any differences in the contribution of non-discretionary revenues by the various vehicle types/sources (e.g., the amount of Gas Tax revenues generated by automobiles versus refuse vehicles).

- Our analysis does not consider the amount of the Town’s current Restricted Balances for Street Purposes, only the average annual change in that amount for FYE 2002, 2003 and 2004.

Legal Opinion

In Howard Jarvis Taxpayers Association v. City of Los Angeles, the court reaffirmed that: (1) a fee imposed on a user (such as a refuse collection company) rather than a property owner is not a property-related fee; and (2) a fee may not exceed the cost of service or facility provided. A legal opinion from Betsy Strauss, Esq., City Attorney for the City of Rohnert Park and Special Counsel to the League of California Cities found that such a fee:

- Is a (regulatory) fee, not a tax, provided the amount of the fee does not exceed the sum reasonably necessary to cover the costs of the regulatory program (street maintenance);
• Is not subject to the procedures and restrictions of Proposition 218, because it is not a property-related fee or charge, since it will not be imposed on property owners for a public service having a direct relationship to property ownership;

• Would require a study that considers appropriate jurisdiction-specific factors necessary to substantiate the basis of the amount of such a fee; and

• Would be lawful to include in any new refuse collection franchise, and may be possible to impose during the term of an existing franchise, provided certain conditions are met.

The legal opinion is attached.

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We appreciate the opportunity to be of service to the Town. If you have any questions regarding this submittal, please do not hesitate to call me directly at (925) 977-6952, or Rick Simonson at (925) 977-6956.

Very truly yours,

HILTON FARNKOPF & HOBSON, LLC

Robert D. Hilton, CMC
President