CITY OF OXNARD CALIFORNIA

CITY OF OXNARD

ENTERPRISE FUND ALLOCATION STUDY

HF&H Consultants, LLC

January 9, 2014

CITY OF OXNARD

300 West Third Street
Oxnard, CA 93030

ENTERPRISE FUND ALLOCATION STUDY

FINAL REPORT

January 9, 2014

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January 9, 2014

Mr. James Cameron
Chief Financial Officer
City of Oxnard
300 West Third Street
Oxnard, CA 93030

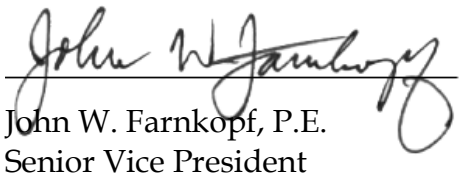
Subject: Enterprise Fund Allocation Study

Dear Mr. Cameron:

HF&H is pleased to submit this Enterprise Fund Allocation Study to you. The report summarizes the analysis that was conducted to develop the recommended fund transfers from the Water, Sewer and Environmental Resource Enterprises to the General Fund for reimbursement of costs related to public safety, use of City facilities and right-of-way maintenance.

Very truly yours,

HF&H CONSULTANTS, LLC



John W. Farnkopf, P.E.
Senior Vice President

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I. EXECUTIVE SUMMARY

The City has historically transferred funds from the Water, Sewer, and Environmental Resource Enterprise Funds to the General Fund as reimbursement for governmental costs incurred by the General Fund on behalf of the Enterprises. Much of this funding reimburses the General Fund for salaries, equipment, and program costs associated with general services. There are additional significant costs that are incurred by the General Fund on behalf of the Enterprises that the Enterprises reimburse through transfers referred to as the Infrastructure Use Fee. The budget for the Infrastructure Use Fee for FY 2012-13 was $4,000,000.

The purpose of this study is to quantify the derivation of the Infrastructure Use Fee transfer. This study focused on three cost allocation areas: public safety, governmental facilities, and right-of-way maintenance. Each of these areas represents a service provided for the benefit of the Enterprises and for which the Enterprises should provide reimbursement.

This report documents the allocation of the Enterprises' share of costs. Where appropriate, adjustments were made to apportion funding among other beneficiaries so that the Enterprises receive their proportionate share. To avoid double counting, any overlapping costs already included in the Enterprises' budgets were netted out. The Water Enterprise is used to illustrate the application of the method. Each section concludes by showing the results of applying the same method to the City's other Enterprises.

FINDINGS

The allocations of public safety, governmental facilities, and right-of-way maintenance costs to the Enterprises are summarized in **Figure I-1**.

Figure I-1. Allocation Summary

Allocation Type	Water Enterprise	Sewer Enterprise	Environmental Resource Enterprise	Total Enterprise Allocation
Public Safety	$ 1,172,149	$ 1,203,164	$ 117,351	**$ 2,492,663**
Governmental Facilities	$ 114,996	$ 157,838	$ 178,132	**$ 450,967**
Right-of-Way Maintenance	$ 1,428,091	$ 967,888	$ 1,704,898	**$ 4,100,877**
Total	$ 2,715,236	$ 2,328,891	$ 2,000,380	**$ 7,044,507**

The public safety allocation represents the Enterprises' share of police and fire services and other related public safety programs. The allocation is in proportion to the value of each of the Enterprises' capital assets compared with the value of all public and private property in the City.

The governmental facilities allocation represents the Enterprises' share of the costs of the City Administrative Buildings and Annex and the Civic Center. In this case, the cost is based on repaying the City in the form of a return and depreciation on the depreciated original cost of these facilities.

The right-of-way maintenance allocation is the Enterprises' share of the cost of street construction and maintenance, which are the major components of right-of-way maintenance expenses.

The combination of these three allocations totals $7,044,507, which represents 5.5% of the $127,400,627 combined budgets for these three Enterprises.

II. PUBLIC SAFETY

COST ALLOCATION METHODOLOGY

The City provides public safety services to safeguard property and lives located within the City. Private residents and businesses as well as the public infrastructure and employees benefit from these public safety services. The Enterprises benefit from public safety services in a variety ways. For example, in the case of the Water Enterprise, police presence helps deter (1) tampering with water facilities, valves, instrumentation, and other controls; (2) vandalism and theft of salvageable materials; (3) theft of water; and (4) introduction of contaminants into source water and other acts of terrorism. Public safety personnel are available to investigate acts of tampering, vandalism, theft, and terrorism. Public safety personnel are also available to respond to emergencies such as main breaks, hydrant damage, and natural disasters that could interrupt operations. These public safety services are in addition to the security services that may already be present in the Enterprises budgets and that should also be funded by rates.

Funding for public safety services is derived from a variety of sources, of which tax revenue is the primary source. Taxes paid by property owners constitute their share of reimbursement for public safety services. Absent from these funding sources is reimbursement from the Enterprises for their share of public safety services. The Enterprises' share of the cost of public safety services should be commensurate with the benefits received. These benefits are proportionate to the value of the public and private property protected within the City.

A multi-step analysis was conducted to allocate a portion of the City's public safety budget to each of the Enterprises in proportion to the benefits received. The analysis determines the Enterprises' shares of the public safety budget in proportion to the value of each Enterprises' property compared to the value of all public and private property in the City. The first step determines the value of the City's public property, which includes non-Enterprise public property as well as its Enterprises. In the next step, the City's public property value is compared with the value of private property in the City in order to allocate the City its proportionate share of public safety costs. In the final step, each Enterprise's value is used to determine its respective allocation of public safety costs. The Water Enterprise is used as an example to illustrate the method for allocating the public safety budget to the other Enterprise funds. The same method was also used to determine the proportionate shares for Sewer and Environmental Resource Enterprises.

VALUE OF PUBLIC PROPERTY

Because public property is tax exempt, it has no assessed value for comparison with taxable private property. For lack of assessed value, another form of value was calculated based on the City's capital asset records. The City's capital asset records indicate the original cost of its assets, the accrued depreciation, and the net book value (original cost minus depreciation).

It is noted that there are certain conditions that result in undervaluing the City's enterprise assets for which no adjustment could be made. First, the City's inventory of its infrastructure may not be complete. Municipalities were not required to maintain accurate capital assets records the way private enterprises are required to until the 1986 Tax Reform Act. Prior to that time, most cities had incomplete capital asset records; the problem persists today in many cases.

In addition to missing assets, the original costs of the City's infrastructure may be low because some assets were donated or dedicated to the City at nominal value. Land values may also be undervalued. By comparison, the County's tax rolls are considered to include all private property. The result of omissions and low values in the City's capital assets is an undervaluation of the City's assets, which results in a lower allocation of the public safety budget to the Enterprises.

The approach used to value the City's public property relies on a valuation procedure commonly used to estimate fair market value for utilities. This approach determines the fair market value based on "replacement cost new less depreciation" (or RCNLD as it is referred to by appraisers). RCNLD represents the value in today's construction cost minus wear and tear. RCNLD represents the cost as though the assets were constructed today, minus the accrued depreciation. The RCNLD value is commonly recognized by the courts for purposes of estimating fair market value.

In order to establish today's fair market value, the cost is estimated in today's dollars by escalating the depreciated original cost (i.e., net book value) using the Engineering News Record's Construction Cost Index. By averaging the acquisition dates of the City's capital assets, it was determined that the average acquisition dates for its existing infrastructure ranges from 1991 to 1999 across the Enterprises. The depreciated original cost on the City's accounting records was escalated from the average acquisition date for each enterprise to 2013 to derive the current replacement cost new less depreciation. The resulting 2013 calculated value of City and Enterprise capital assets is shown in **Figure II-1**.

Figure II-1. City Public Property Value

	Total Municipal	Water Enterprise Fund
A. Net Book Value [1]		
Capital Assets, net depreciation	$ 2,071,487,651	$ 258,107,617
B. Net Book Value Escalated to 2013 Value		
Average Asset Acquisition Date - Water Enterprise [2]		1997
ENR CCI [3]		
Base Year - Acquisition Date		6,664
2013		10,292
Construction Cost Inflation Factor		1.54
2013 Value [4]	$ 3,422,179,122	$ 398,659,882

1. City of Oxnard Comprehensive Annual Financial Report, Statement of Net Assets, Proprietary Funds (June 30, 2012)
2. HF&H analysis based on City of Oxnard Asset Detail
3. ENR Cost Construction Index, Base 1913=100
4. Escalated Total Municipal value reflects a composite of the enterprises' and governmental activities' escalated values (See Figure II-5 for detail)

Figure II-1 indicates that the estimated fair market value of the City's public property is $3.422 billion, which includes $0.399 billion in Water Enterprise value.

VALUE OF PRIVATE PROPERTY

Private property can be valued based on assessed value. Assessed value represents the market value at the time of sale plus subsequent annual increases, which have been limited to 2% per year since the passage of Proposition 13 in 1978. As such, the total assessed value in the City is the composite of all taxable and tax exempt property at the time of the most recent sale plus any subsequent increases and reassessments. The amount by which assessed value differs from current fair market value will depend on how long ago it was last sold and the lag since that last sale between appreciation in real estate market value and the restrictions imposed by Proposition 13.

Assessed value is typically less than RCNLD value. The construction cost index increased nearly 70% since 1991 (the average acquisition date for all non-enterprise City assets); however Proposition 13 limits assessed value to 2% increases per year, which potentially increased as much as 55% over the same period. Because construction cost has escalated at a greater rate than assessed values, the value of the City's infrastructure increased greater than the assessed value of private property.

To adjust for the difference between the rate of construction cost inflation and the 2% cap imposed on assessed value by Proposition 13, a ratio was applied to the assessed

value to account for the lag between assessed value and market value. In this way, the difference between assessed value and RCNLD value was substantially eliminated. The adjustment ratio was based on data provided by the State Board of Equalization, which has developed what is known as the "4R Ratio" for commercial/industrial property.[1] The Board has maintained annual records since 1990 comparing the assessed value of commercial/industrial property with its value at the time of sale.

The numerator of the 4R Ratio is assessed value and the denominator is sales value.[2] Whereas assessed value generally increases gradually over time, sales value can fluctuate considerably from year to year depending on the real estate economy. Year-to-year fluctuations in the real estate market should not have an undue influence on the allocation of public safety costs. There is also considerable difference among counties. To stabilize the allocation, the State-wide average of the 4R Ratio from 1990 to 2013 was used. The resulting market value adjustment ratio is 137.6%, as well as the combined total value in the City is shown below in **Figure II-2**.

Figure II-2. City Private Property Value

Non-Municipal Property Assessed Value		
Taxable property [1]	$	14,931,699,786
Tax exempt property [1]	$	673,465,559
Total Assesed Value	$	15,605,165,345
Market Value Adjustment Factor		1.376
Assessed Value Factored up to Market	$	21,475,404,012
Municipal City property (from II-1)	$	3,422,179,122
Total Value in City	$	24,897,583,135

1. City of Oxnard Comprehensive Annual Financial Report, Assessed Value and Actual Value of Taxable Property (June 30, 2012)

Figure II-2 shows the assessed value of taxable and tax-exempt (e.g., County, State, and Federal property) private property at $15.605 billion and, with the 4R Ratio adjustment, it becomes $21.475 billion in market value.

Figure II-3 determines how much the Water Enterprise value is as a percent of the total value of all taxable and tax-exempt property in the City. Of the total, the Water Enterprise represents 1.60%.

[1] The 4R Ratio is a result of the Railroad Revitalization and Reform Act of 1976. The 4R Ratio is used to reduce the value of railroad property to approximate assessed value so that railroad property can be taxed on par with the assessed value of other commercial and industrial property.
[2] The "market value adjustment ratio" used in this report is the mathematical inverse of the 4R Ratio.

Figure II-3. Water Enterprise as a Portion of Total City Value

Enterprise Allocation Factor		
Total Value in City (from II-2)	$	24,897,583,135
Enterprise 2013 Value (from II-1)	$	398,659,882
Enterprise Value as a Percent of Total Value in City		1.60%

WATER ENTERPRISE SHARE OF PUBLIC SAFETY BUDGET

Figure II-4 shows how the Water Enterprise's share of the public safety budget is derived based on the relative value of the Water Enterprise compared with the total value in the City.

Figure II-4. Water Enterprise Share of Public Safety Budget

A. Public Safety Budget		
Fire Budget FY 2012-13 [1]	$	14,880,400
Police Budget FY 2012-13 [1]	$	48,800,964
Depreciation (not included in Budgets) [2]	$	9,523,058
Total Public Safety Budget	$	73,204,422
B. Enterprise Allocation		
Allocation to Enterprise (from II-3)		1.60%
Public Safety Budget (from A)	$	73,204,422
Enterprise Proportional Share of Public Safety	**$**	**1,172,149**

1. City of Oxnard Adopted Budget 2012-2013, General Fund Expenditures
2. City of Oxnard Finance Department

Based on the Water Enterprise's share of property in the City, the Water Enterprise is allocated $1,172,149 of the public safety budget, which represents 3.30% of the Water Enterprise's budget. Applying the same methodology to the Sewer and Environmental Resource Enterprises yields allocations of $1,203,164 and $117,351, respectively. The Water and Sewer Enterprise allocations are comparable because of the comparable values of their infrastructures. By contrast, the Environmental Resource Enterprise's infrastructure value is much less. **Figure II-5** shows the complete calculations of the public safety allocation for the Water, Sewer and Environmental Resource Enterprise Funds.

Figure II-5. Total Public Safety Allocation

PUBLIC SAFETY ALLOCATION

I. City of Oxnard Capital Assets	Total	Water Enterprise Fund	Sewer Enterprise Fund	Environmental Resource Enterprise Fund	Other Enterprise Funds	Governmental Activities
A. Net Book Value [1]						
Capital Assets, net depreciation	$ 2,071,487,651	$ 258,107,617	$ 257,553,520	$ 26,470,570	$ 70,014,238	$ 1,459,341,706
Less:	$ -	$ -	$ -	$ -	$ -	$ -
Adjusted Capital Assets	$ 2,071,487,651	$ 258,107,617	$ 257,553,520	$ 26,470,570	$ 70,014,238	$ 1,459,341,706
B. Net Book Value Escalated to 2012 Value [2]						
Average Asset Acquisition Date [3] [4]		1997	1993	1999	1997	1991
ENR CCI [5]						
Base Year - Acquisition Date		6,664	6,478	6,826	6,664	6,090
2013		10,292	10,292	10,292	10,292	10,292
Construction Cost Inflation Factor Enterprise		1.54	1.59	1.51	1.54	1.69
2013 Value [4]	$ 3,422,179,122	$ 398,659,882	$ 409,208,500	$ 39,912,257	$ 108,140,427	$ 2,466,258,057
II. Enterprise as a Portion of Total Value in City						
A. Property Assessed Value						
Non-Municipal Property Assessed Value						
Taxable property [6]	$ 14,931,699,786					
Tax exempt property [6]	$ 673,465,559					
Total Assesed Value	$ 15,605,165,345					
Market Value Adjustment Factor	1.376					
Assessed Value Factored up to Market Value	$ 21,475,404,012					
Municipal City property (from IB above)	$ 3,422,179,122					
Total Value in City	$ 24,897,583,135					
C. Enterprise Allocation Factor						
Total Value in City (from above)		$ 24,897,583,135	$ 24,897,583,135	$ 24,897,583,135		
Enterprise 2013 Value (from IB above)		$ 398,659,882	$ 409,208,500	$ 39,912,257		
Enterprise Value as a Percent of Total Value in City		1.60%	1.64%	0.16%		
III. Enterprise Share of Public Safety Budget						
A. Public Safety Budget						
Fire Budget FY 2012-13 [7]	$ 14,880,400					
Police Budget FY 2012-13 [7]	$ 48,800,964					
Depreciation (not included in Budgets)	$ 9,523,058					
Total Public Safety Budget	$ 73,204,422					
B. Enterprise Allocation						
Allocation to Enterprise (from IIC above)		1.60%	1.64%	0.16%		
Public Safety Budget (from above)		$ 73,204,422	$ 73,204,422	$ 73,204,422		
Enterprise Proportional Share of Public Safety	**$ 2,492,663**	**$ 1,172,149**	**$ 1,203,164**	**$ 117,351**		

Notes:

1. City of Oxnard Comprehensive Annual Financial Report, Statement of Net Assets, Proprietary Funds (June 30, 2012)
2. Escalated book value of the municipal assets is used as a proxy for assessed value
3. HF&H analysis based on City of Oxnard Asset Detail
4. Escalated Total Municipal asset net book value reflects a composite of the enterprises' and governmental activities' escalated values
5. ENR Cost Construction Index, Base 1913=100
6. City of Oxnard Comprehensive Annual Financial Report, Assessed Value and Actual Value of Taxable Property (June 30, 2012)
7. City of Oxnard Adopted Budget 2012-2013, General Fund Expenditures

III. GOVERNMENTAL FACILITIES

COST ALLOCATION METHODOLOGY

Certain facilities that benefit the Enterprises were paid for by the General Fund at no cost to the Enterprises. The Civic Center and the City Administrative Building and Annex are two primary examples. These assets represent public investments for which repayment should be made for their proportionate share. The form of repayment is patterned after the methodology approved by regulatory commissions such as the California Public Utilities Commission by which investor owned utilities are allowed to recover the cost of their investment in the plant. Under this method, investors are entitled to earn a return on investment and to recover depreciation.

The return on investment is derived by multiplying the net book value of the investment times a reasonable rate of return. For purposes of this study, recent rates of return on equity granted by the California PUC to its Class A water utilities was used. The net book value is the depreciated original cost. As assets depreciate, the return diminishes to zero when the asset is fully depreciated (excluding salvage value). The depreciation method used in this case is straight-line depreciation. With this methodology, investors effectively earn interest on their investment, which gradually diminishes as the capital is recovered through depreciation. The series of steps taken to allocate each Enterprise a share of the return and depreciation on governmental facilities is described below using the Water Enterprise as an example.

VALUE OF GOVERNMENTAL FACILITIES

Figure III-1 identifies the major governmental facilities for which the Water Enterprise should provide its proportionate share of reimbursement. The original cost is escalated to today's cost based on the ENR Construction Cost Index.

Figure III-1. Original and 2013 Value of Governmental Facilities

	Original Cost [1]	Acquisition Date	ENR CCI Index at Acquisition	ENR CCI Index in 2013	Const. Cost Inflation Factor	2013 Value
Administrative Building and Annex	$ 4,158,000	1989	5,790	10,292	1.78	$ 7,391,465
Civic Center	$ 1,095,369	1967	1,318	10,292	7.81	$ 8,551,686
	$ 5,253,369					$ 15,943,152

1. HF&H Analysis using City of Oxnard Fixed Asset Detail

Since construction, the Water Enterprise has received free use of these facilities. At this time, the Water Enterprise should provide compensation not only for the original construction cost but for the foregone reimbursement that the public did not receive. The 2013 value represents the value of these public investments for which the Water Enterprise should provide reimbursement. The return on investment will be based on

the depreciated value beginning in 2013 with the 2013 value. Annual depreciation will be subtracted over the remaining life of the facilities. This accelerated depreciation is summarized in **Figure III-2**.

Figure III-2. Accelerated Annual Depreciation

	2013 Value [1]	Acquisition Date	Service Life (Years)	Remaining Life (Years) [2]	Accelerated Annual Depreciation
Administrative Building and Annex	$ 7,391,465	1989	45	21	$ 351,975
Civic Center	$ 8,551,686	1967	45	10	$ 855,169
					$ 1,207,143

1. HF&H Analysis using City of Oxnard Fixed Asset Detail
2. The greater of the calculated remaining life using the assumed service life, and 10 years

ALLOCATION OF FACILITIES TO WATER ENTERPRISE

The Water Enterprise's share of these facilities is based on its number of employees relative to the total number of City employees. Head count is a reasonable measure of the relative size of the Water Enterprise's activities that are dealt with by offices and other shared space located in these facilities.

Figure III-3. Water Enterprise Allocation Factors

	Total City	Water Enterprise Fund
Employees [1]	1200	51
Share of Total City	100.00%	4.25%

1. City of Oxnard Comprehensive Annual Financial Report, Full-Time Equivalent City Government Employees by Function (June 30, 2012)

WATER SHARE OF RETURN AND DEPRECIATION

When the allocation factors in **Figure III-3** are applied to the respective facilities, the Water Enterprise's share is determined in **Figure III-4**. The values in **Figure III-4** are net of the accrued depreciation determined in **Figure III-1**. The resulting investment that is attributable to the Water Enterprise is then multiplied by the current rate of return on equity granted by the California PUC to derive the return on investment.

Figure III-4. Water Enterprise Return on Investment (FY 2012-13)

	2013 Value	Water Allocation	Water Share
Administrative Building and Annex	$ 7,391,465	4.25%	$ 314,137
Civic Center	$ 8,551,686	4.25%	$ 363,447
Total	$ 15,943,152		$ 677,584
Rate of Return [1]			9.40%
Return on Investment			**$ 63,693**

1. Based on California Public Utilities Commission adoped rate of return on equity for Class A water companies

The Water Enterprise's share of annual depreciation is derived in **Figure III-5**.

Figure III-5. Water Enterprise Annual Depreciation (FY 2012-13)

	Annual Depreciation	Water Allocation	Water Share
Administrative Building and Annex	$ 351,975	4.25%	$ 14,959
Civic Center	$ 855,169	4.25%	$ 36,345
Total annual depreciation			**$ 51,304**

The sum of the return and depreciation is summarized in **Figure III-6**.

Figure III-6. Water Enterprise Combined Return and Depreciation (FY 2012-13)

	Water Share
Return on Investment (Figure III-4)	$ 63,693
Annual Depreciation (Figure III-5)	$ 51,304
Total Return and Depreciation	**$ 114,996**

Each year, the asset value of these facilities decreases by the amount of annual depreciation. As a result, the return on investment decreases. Annual depreciation will also decrease as facilities reach the end of their service lives. The City should update the value of these facilities for any future improvements or new facilities that are constructed by the General Fund on behalf of the Water Enterprise. The City should also periodically update the rate of return. **Figure III-7** shows the governmental facility cost allocation for all three Enterprise Funds.

Figure III-7. Total Governmental Facility Cost Allocation

	Water Share	Sewer Share	Env. Res Share	Total Enterprise Share
Return on Investment (Figure III-4)	$ 63,693	$ 87,422	$ 98,662	$ 249,776
Annual Depreciation (Figure III-5)	$ 51,304	$ 70,417	$ 79,470	$ 201,191
Total Return and Depreciation	**$ 114,996**	**$ 157,838**	**$ 178,132**	**$ 450,967**

IV. RIGHT-OF-WAY MAINTENANCE

COST ALLOCATION METHODOLOGY

Right-of-way maintenance encompasses a variety of activities ranging from pavement management to mapping, fencing, and real estate. The majority of the budget is involved with pavement management. Any service such as water and sewer with buried infrastructure located within the City's rights of way benefits from well constructed and maintained pavement, which protects against vehicle and environmental impacts such as erosion and subsidence. Services such as solid waste collection, which is provided by the City's Environmental Resource Enterprise, also benefits from sound pavement that is needed by vehicles.

When buried infrastructure is constructed, the costs of excavation and pavement repair are included in the construction cost. Hence, when a water main is installed, the cost of the installation is covered by water rates. Subsequent to the construction, the City incurs ongoing pavement construction and maintenance expenses that are partially related to the presence of buried infrastructure. For example, trench excavations disturb the soil. If backfill and compaction is imperfect, subsidence and differential settlement can occur, particularly where vehicle loads are greatest. When excessive settlement occurs, pavements are weakened, allowing water to intrude, which shortens the pavement service life.

Regarding activity occurring on the surface of the rights-of-way, nearly all of the damage may be attributed to the presence of vehicles. 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. Refuse vehicles are generally some of the heaviest vehicles regularly operating on City streets. Accordingly, these vehicles contribute significantly to the cost of maintaining those streets.

The cost of this ongoing pavement construction and maintenance expense is borne by the Department of Public Works, which typically does not seek direct reimbursement from its enterprises. The methodology for determining the proportionate shares of reimbursement follows a series of steps that allocates costs to surface and subsurface functions. The Environmental Resource Enterprise receives its allocation in proportion to other surface functions and the Water and Sewer Enterprises are allocated their shares in proportion to other subsurface functions.

ALLOCATION FACTORS

The assumptions reflected in the cost allocation factors follow in succession beginning with the allocation between surface and subsurface factors. The surface factors are allocated between vehicles and drainage; vehicles are sub-allocated between refuse and other vehicles. The subsurface factors are allocated between pipelines and other utilities; the pipelines are sub-allocated between water, sanitary sewer and storm sewer pipelines.

Surface/Subsurface Allocations

Streets are designed to withstand vehicle loads, to drain runoff, and to cover and protect buried infrastructure. Moisture is a critical element affecting pavement life cycles:

> Premature distress in both flexible and rigid pavements is generally caused by exposure to heavy truck traffic when the pavement structural section is in a saturated condition. Saturation of the structural section or underlying foundation materials or both generally results in a decrease in strength or ability to support heavy truck axle loads.[3]

At the pavement surface, drainage is important in protecting roadways from saturation, as further discussed below. The presence of buried infrastructure can also lead to saturation because it often entails pavement cuts, excavation, backfilling, compaction, and pavement repair, which in turn can lead to a reduction in pavement service life because of uneven settling, percolation of runoff into cuts, and trench saturation from pipeline leaks. Studies[4,5] indicate that that installation and repair of buried infrastructure can result in a reduction in pavement service life from 30% to 35% or approximately one-third. Pavement cuts for utility patches alone can reduce pavement life by 25%.[6] For that reason, one-third (33%) of the costs of right-of-way maintenance was allocated to subsurface factors and 67% to surface factors.

Surface Allocations

Surface factors consist of supporting vehicles and providing drainage of runoff. To provide proper drainage, streets must be sloped to allow drainage to occur, to avoid ponding and flooding, and to allow flow to enter storm sewers. Poorly designed streets

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[3] *Highway Design Manual*. California Department of Transportation. July 1, 1995. Page 600-14.
[4] *Impact of Utility Cuts on Seattle Streets*. Nichols-Vallerga & Associates. January 2000.
[5] "Accordingly, the reduction in pavement lifecycle due to utility trenching, when proportioned back based on the contributing trenched areas, is calculated to be 32.4 percent." *Impact of Utility Trenching and Appurtenances on Pavement Performance in Ottawa-Carleton*. Steven Lee, Katherine Lauter, prepared for the Environment and Transportation Department, Ottawa, Ontario. July 1999. Page 16.
[6] *Analysis of the Impact of Utility Cuts on Rehabilitation Costs in Santa Cruz County, CA*. Shahin & Associates, prepared for Santa Cruz County. November 2002. Page 3.

that do not effectively convey runoff away from streets can lead to saturation of roadway substrate, which will shorten pavement service lives. Streets can be designed to drain properly consistent with providing for vehicles. Although street design for vehicle transit and drainage are integral, vehicle loads typically result in significantly greater impacts than the impacts associated with poor drainage. In our judgment, most of the cost of surface functions performed by streets should be allocated to vehicles, which we judge to be 85%, with the remaining 15% (in other words, 57% and 10% of the overall allocation, respectively) associated with drainage.

For the purposes of this report, we distinguish refuse vehicles from other vehicles. The basis for allocating by vehicle type is made by calculating the Equivalent Single Axle Load (ESAL) of each type of vehicle traveling on the City's streets. The analysis is based on the fact that the City's streets are designed to handle a certain amount of vehicle traffic (loading) over their 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. Through our 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. The results of our analysis indicate that refuse vehicles are responsible for 25% of the total impact on the rights-of-way attributable to vehicles. When this is considered within the context of this study, with total vehicle impact equaling 57% of total right-of-way maintenance costs, refuse vehicles account for 14%.

Subsurface Allocations

Buried infrastructure consists of "dry" and "wet" utilities. Dry utilities such as telecommunication conduits, gas pipelines, and electrical conduits pose less risk to roadways because they are typically smaller in diameter, not buried as deeply, and do not convey liquids. Moreover, most of these "dry" utilities are privately owned by companies that pay franchise fees for the use of the public rights-of-way; revenue from franchise fees can be used to offset the costs associated with pavement repair.

By comparison, "wet" utilities such as water and sanitary sewer pipelines are larger, buried deeper, and convey liquids. They are also often publicly owned and do not pay franchise fees that could help defray costs. All water pipelines and some sewer pipelines are under pressure. Leaks from these pipelines weaken soils, which can lead to subsidence and accelerate vehicle wear when pavement substrate is saturated.

Both dry and wet utilities have service connections that branch off transmission facilities to individual customers. Again, the impact of wet service connections is proportionately greater than dry service connections because of the greater relative size, depth, and fluid content of wet utilities.

Studies[7,8] conducted in other cities have attributed significantly more impact to wet utilities than dry utilities. For similar reasons in the present study, pipelines are attributed the majority of the subsurface costs based on the increased damage that is inherent with wet versus dry buried infrastructure.

Water and sanitary sewer pipelines are the principle pipelines in the City's rights-of-way. Storm sewers are also present but have been excluded from the Enterprise pipelines for purposes of allocation due to the low number of average days per year during which the City experiences precipitation.

Figure IV-1. Functional Allocation Factors

Surface activities			
Vehicles			
Refuse vehicles [1]	14%		
Other vehicles [1]	43%		
		57%	
Drainage [2]		10%	
Surface subtotal [3]			67%
Subsurface activities			
"Wet" Pipelines			
Water [4]	12%		
Sanitary sewers [4]	8%		
Storm sewers [4]	3%		
Pipeline subtotal		23%	
"Dry" utilities (telecom, gas, electric) [5]		10%	
Subsurface subtotal [3]			33%
Total			100%

1. HF&H analysis of loading damage by vehicle type
2. HF&H estimate of drainage impact
3. Water Fund to General Fund Transfer Study, The City of Fullerton, CA, March 2012
4. Based on pipeline inventory from City
5. HF&H estimate of "dry" utility impacts based on [3] and Utility Operations Impacts on Street Maintenance, The City of Roseville, CA, September 2003

[7] "Unlike "dry" utilities, the presence of "wet" utility trenching has a significant impact on the performance and life cycle of a street and as a result has a pronounced impact on the expenditures related to street maintenance." *Water Fund to General Fund Transfer Study.* City of Fullerton. March 2012. Page 13.
[8] "Dry utilities require a smaller trench compared to wet utilities, are located at the edge of the roadbed, and do not carry water that can leak into the ground. For these reasons dry utilities do not have significant impacts on road subsidence and therefore are not included in this analysis." *Utility Operations Impacts on Street Maintenance.* City of Roseville. September 5, 2003. Page 8.

RIGHT-OF-WAY MAINTENANCE COSTS

The City's right-of-way maintenance activities and costs are shown in **Figure IV-2** below. The total expenses are allocated based on the foregoing allocation factors.

Figure IV-2. Right-of-Way Maintenance Expenses

Street reconstruction budget [1]		
Construction Services - Streets	$	1,079,421
Street Maintenance & Repair	$	3,919,328
Traffic & Road Improvements	$	6,965,445
Total	$	11,964,194

1. Represents total of all street-related expenses budgeted for FY 12-13.
Data provided by City.

COST ALLOCATIONS

Figure IV-3 shows how costs are allocated among the various functions when the percentages shown in **Figure IV-1** are applied to the total right-of-way maintenance budget of $11,964,194 shown in **Figure IV-2.**

Figure IV-3. Right-of-Way Cost Allocations

Surface activities				
Vehicles				
Refuse vehicles	$	1,704,898		
Other vehicles	$	5,114,693		
			$6,819,591	
Drainage			$1,196,419	
Surface subtotal				$ 8,016,010
Subsurface activities				
"Wet" Pipelines				
Water	$	1,428,091		
Sanitary sewers	$	967,888		
Storm sewers	$	355,785		
Pipeline subtotal			$2,751,765	
"Dry" utilities (telecom, gas, electric)			$1,196,419	
Subsurface subtotal				$ 3,948,184
Total				$ 11,964,194

As summarized in **Figure IV-4** below, with the 12% allocation to buried water infrastructure, 8% to buried sewer infrastructure, and 14% to refuse vehicles, 34% or

$4,100,877 of the total right-of-way maintenance budget is allocated to these three enterprises.

Figure IV-4. Right-of-Way Cost Allocation Summary

Total Right of Way Allocation	Allocation Amount	ROW Budget
Water Enterprise Allocation	$ 1,428,091	12%
Sewer Enterprise Allocation	$ 967,888	8%
Environmental Resource Enterprise Share	$ 1,704,898	14%
Total Enterprise Allocation to Right of Way	**$ 4,100,877**	**34%**
Total ROW budget	$ 11,964,194	

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