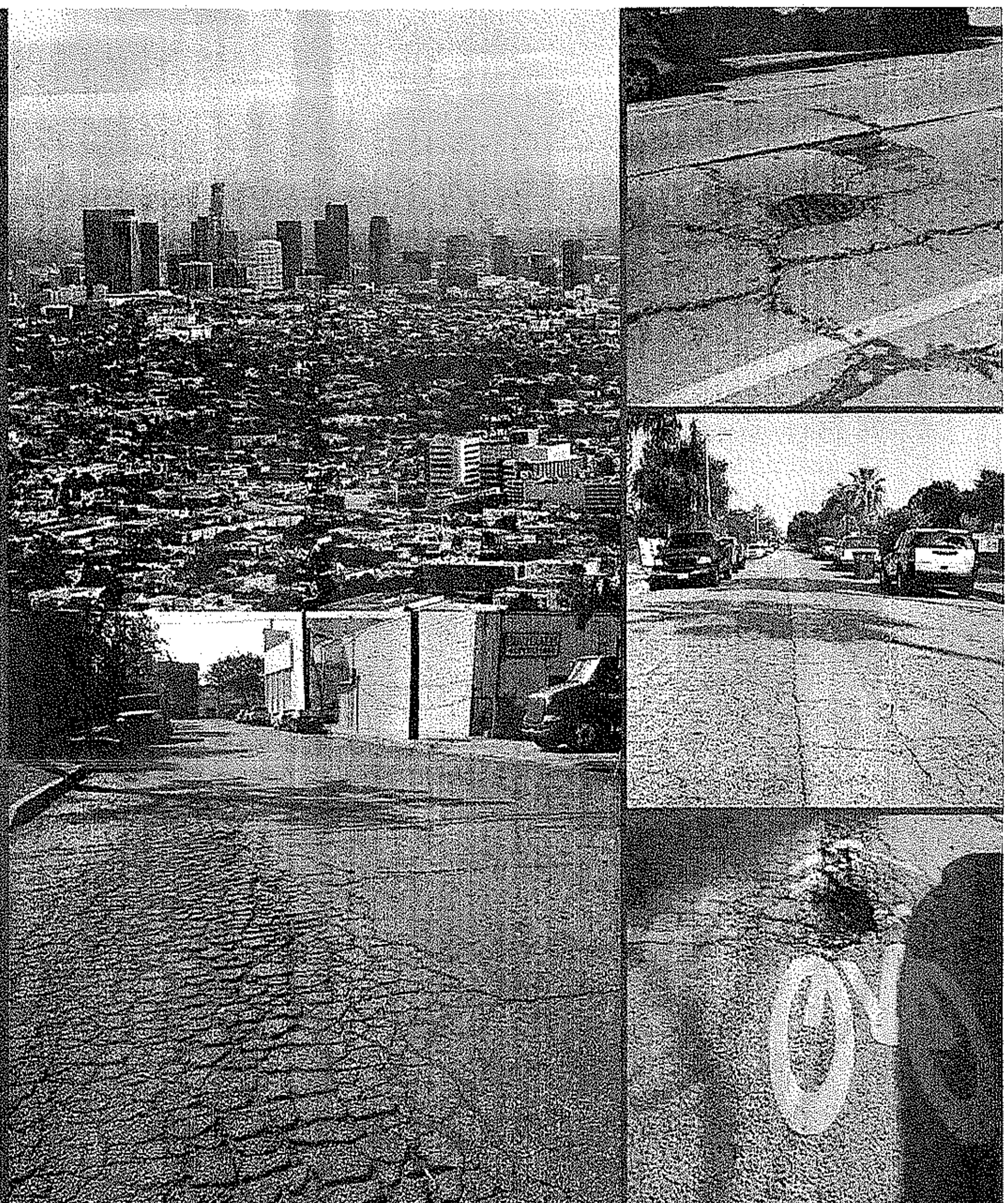
Attachment 2

# City of Los Angeles



# Save Our Streets Los Angeles Program
## Estimate Report

February 27, 2014

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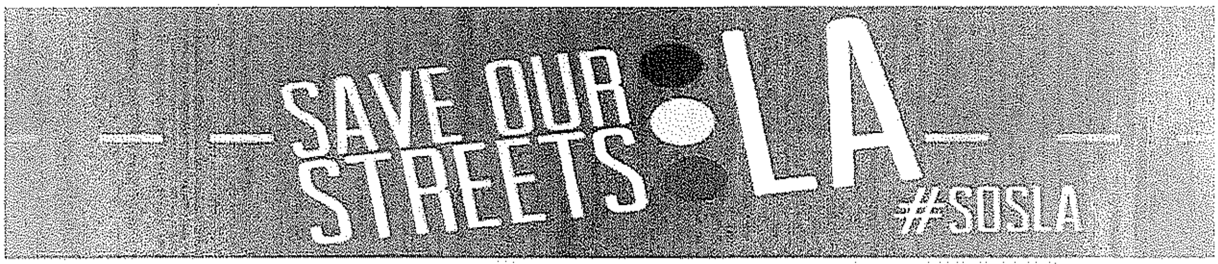
## Appendices

# 1. Executive Summary




The City of Los Angeles has the largest municipal street system in the nation with over 6,500 centerline miles of improved residential and arterial streets. It is estimated that over 35% of the roadway system, approximately 2,400 centerline miles (8,200 lane miles), are currently failing or in near failing (Grade D or F) condition. The program scope estimated in this report also provides for an additional 500 lane miles that may deteriorate during the life of the program, for a total of 8,700 lane miles. The proposed Save Our Streets LA (SOSLA) Program (Program) would provide the funding for implementation, rehabilitation and reconstruction of these streets to improve the City's overall roadway network service level.

Harris & Associates (Harris) was retained by the City's Bureau of Engineering (BOE) to develop an independent program level cost estimate (Estimate) to confirm and/or refine previous estimates prepared by the City's Bureau of Streets Services (BSS). The focus of the Estimate is to develop a baseline cost for the reconstruction of roadway improvements with pedestrian access ramps. A minimal amount of adjacent concrete improvements are also included in the Estimate, but are limited to those required for the roadway reconstruction. The Estimate is based on utilizing traditional roadway construction methods and materials and does not include other elements such as 'Great Streets', 'Complete Streets', 'Green Streets', alley improvements, traffic signal modifications, water quality elements, sidewalk improvements, utility relocations, or storm drain and sewer improvements. Some of the basic Program elements such as construction duration and program delivery were reviewed to assess their impact on the overall Program cost. The Estimate is further broken down by Arterial (Select) and Residential (Local) street type, and by grade (D and F).

BSS developed and maintains a Pavement Management Program (PMP) that assesses the condition of streets within the City's roadway system. The PMP is considered a network level tool that has information on roadway types and conditions, is primarily used for planning purposes, and is not intended to be used in the development of actual construction quantities or contract documents. The roadway pavement condition is expressed in terms of a Pavement Condition Index (PCI), which is a scale from 0 to 100, 100 being best. The streets considered for the SOSLA Program are based on the PCI condition ratings established by the City's PMP, and are identified as streets being in failed (grade-F, PCI range of 0-40) and near failing (grade-D, PCI range of 41-55) condition.

In October of 2013, BSS provided PMP data for grade D and F streets. This data included a total of approximately 2,400 centerline miles or 8,200 lane miles of pavement. Since fiscal year 2011/12, it has been the City of Los Angeles' policy to stabilize the condition of the road network at a weighted average PCI of 62, by funding at least 800 lane miles of annual resurfacing and 1,200 lane miles of annual slurry seal. For the purposes of the Estimate, it was assumed that up to 500 lane miles of streets might deteriorate to D or F, conditions during the 18 year program as a result of unforeseen utility trenches, transit bus wear, and other factors. These 500 lane miles were added to the original 8,200 lane miles provided by BSS, by adding approximately 6% to the quantities established for each of the subcategories including: Select streets, grade D and F; and Local streets, grade D and F. This resulted in the 8,700 lane miles established for the Estimate. The 8,700 lanes miles included in the Estimate is proportional to the original 8,200 lane miles and is comprised of 1,717 lane miles of "Select" F Streets, 1,634 lane miles of "Select" D Streets, 2,287 lane miles of "Local" D Streets, and 3,067 lane miles of "Local" F Streets. See Figure 1-1 for the distribution of streets by grade and type for the original 8,200 lane miles provided by BSS. Figure 1-2 shows a similar distribution of streets by grade and type for the projected 8,700 lane miles used for the Estimate.

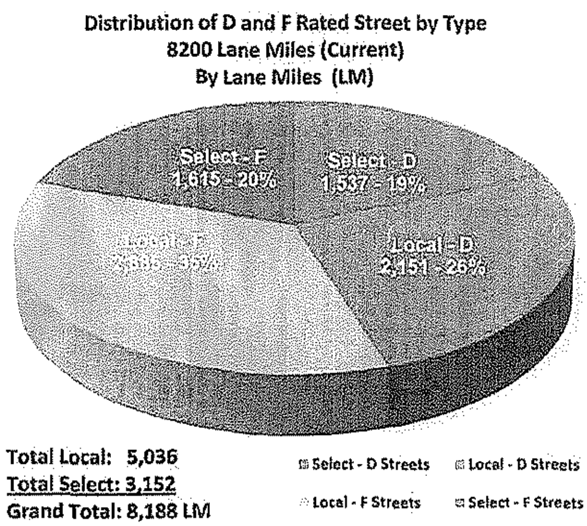



FIGURE 1-1

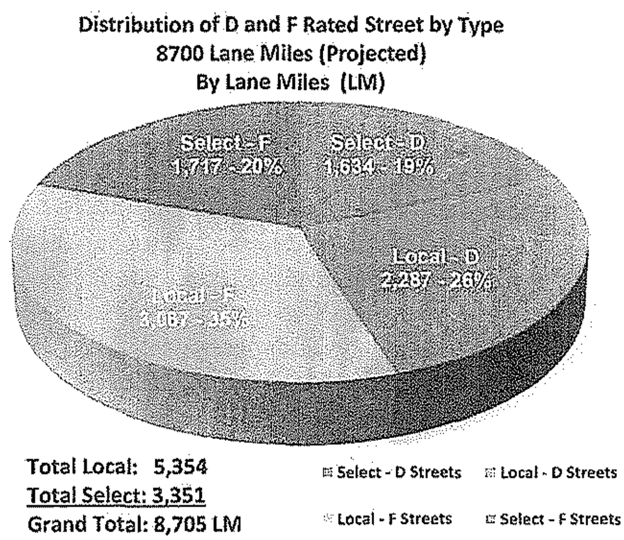



FIGURE 1-2

One of the challenges in developing the Estimate was digesting and interpreting a range of network level information to approximate construction level quantities and costs. The development of the Estimate was performed within a relatively short time frame using existing available data and information. The degree of accuracy of the Estimate is consistent with a Class "C" cost estimate, as identified in the BOE Street Design Manual, Section E 141, which is intended to indicate a preliminary estimate that is subject to revisions based on future design development. The ultimate selection of candidate streets to be included in the Program will require a more detailed investigation during the design and development of the Program.

There are two main types of costs required for the Program:

- Hard Costs - These are associated with construction activities, including cost of material, labor and equipment necessary to construct the proposed roadway improvements.
- Soft Costs - These are associated with Program delivery and include program management, design, construction management and inspection, and overall program administration.

One of the major elements in developing hard costs was estimating the overall construction quantities, including the percent of pavement areas exhibiting base failure requiring removal and reconstruction. The estimated quantity of roadway removal and reconstruction is one of the most significant items influencing the overall Program cost. The Harris team collaborated with BOE and BSS staff to obtain data and develop the methodology, quantities and costs for pavement areas requiring reconstruction. The methodology used included a visual field survey of a random sampling of streets. This was done to determine a range of pavement removals in terms of a percentage of the total area of all streets. The field survey sample obtained was approximately 3% (773 out of approximately 24,700 street segments). Construction quantities were developed based on the range of removals established from the sampling data and the existing roadway surface areas.


*The Harris team collaborated with BOE and BSS staff to develop a methodology, quantities and costs for percent of pavement areas to be reconstructed.*

Another cost consideration is the overall duration of the Program. The hard and soft costs associated with the Program increase with time based on the escalation factors applied to materials and labor. A longer overall Program duration will have a higher cost compared to a shorter duration. A Program of this scale is unprecedented and will require a massive coordination effort for its success. Some factors considered in determining the duration of the Program included the capacity of the contracting community, consultant and City staffing required for program implementation, ability of the roadway network to handle traffic restrictions, and the public's tolerance of traffic delays.

Construction durations of 10, 15 and 20 years were analyzed to determine a realistic time period for the Program delivery. Based on this analysis, it is recommended that a 15-year construction period is most appropriate for use in developing the Estimate. A 10-year construction duration would require constructing approximately 250 centerline miles per year, and would require full production in the first year of the construction phase, and that full production be maintained through the last year. This would be difficult to achieve on both ends. It would be more efficient to ramp up production in the beginning of the program as staff is hired and trained. Also, achieving full production in the last year would be very difficult as well because the odds of all remaining projects in that last year not having any type of challenges would be remote.

If a 10-year construction duration were to accommodate scaling up and down, the remaining full years of production would require approximately 300 centerline miles per year, which is considered too aggressive, especially considering that the BSS resurfacing program will be continuing as well. Overall, the 10-year construction duration is thought to be technically feasible, however, staffing levels for those early full production years would be very difficult to acheive. Proper coordination of work would likely be an extreme challenge and the potential for increased traffic impacts would be high. A 15-year construction duration allows additional time for the construction level to scale up and down in the first and last few year of construction, and therefore would allow for more efficient staffing and for time for Program coordination. It would also offer much more of an opportunity to coordinate with potential grant funding that might be obtained for elements related to things such as 'Green Streets' and 'Great Streets' by leveraging the basic street work funding. Delivery of the program over a 15-year construction period would still not be easy by any means, as the peak construction years would still require completing about 200 centerline miles per year, but it would be much more manageable. A 20-year construction period would offer further opportunities for coordination and ramp-up of staffing and construction, however, the benefits of a 20-year construction period are not found to outweigh the extra escalation cost that would be incurred. It is estimated that the overall Program delivery period will be approximately 20-years for a 15-year construction period, with approximately 3 years of pre-construction activities required prior to the start of major construction activities in 2017, and approximately 2 years needed after the 15-year construction period to close out projects and the Program's coordination, financial and administrative elements.

Unit prices for construction costs were developed based on the cost of labor and material for similar types of projects in the greater Los Angeles area in 2012 and 2013. These costs were adjusted to reflect Program economy of scale and complexity of projects for Select and Local streets. In establishing unit costs for year one of the Program, unit prices for 2012 and 2013 were escalated to November of year 2017 (assumed year one for commencement of Program construction). From there the unit prices were escalated to the middle of the 15 year construction period (2024). The unit prices estimated for the middle of the construction period represent the 'average' unit price for the entire construction period and were used as the unit prices shown in the Estimate over the 15 year construction period. Escalation factors used in the Estimate were based on historic construction cost indexes developed by Engineering News Record (ENR) in the greater Los Angeles Area over the last 20 years. An average escalation of 3% was used in the Estimate to coincide with the historic average over the last 20 years. Soft costs were based on a percentage of construction costs and from feedback obtained from BOE based on their historic program delivery costs, adjusted downward to account for an expectation of a streamlined design process and economy of scale.

Two estimates were developed for the Program based on a 15-year construction period. The separate Estimates vary based on the percent of the pavement area requiring removal and reconstruction. The percentage of reconstruction area is one of the most significant factors influencing the construction cost. The range of the percentage of reconstruction was established based on a random field sampling of the current D and F streets. The field sampling results were statistically analyzed and a range of removal percentages was established for the high, mean and lower range of reconstruction. The First Estimate for the SOSLA program is $3.85 Billion. This estimate uses an average escalation of 3% and the mean range of removal percentages.

The Second Estimate was developed using an average escalation of 3% and the lower range of the percentage of reconstruction that may be required. This was done to present a potential lower Program cost option. Using these lower values, the program is estimated to cost approximately $3.54 Billion. However, it is important to note that during construction, should the actual reconstruction percentage be greater than the lower range, additional funding may be needed to complete the program.

The following pages summarize the two Estimate scenarios developed based on the ranges for the percent of roadway reconstruction.

This report was in response to a request from the Los Angeles City Council (CF 13-1300-S1). Under the leadership of Councilmember Mitchell Englander and Councilmember Joe Buscaino, the Bureau of Engineering was asked to take the lead in developing program costs. We would like to thank Deborah Weintraub and her staff Ted Allen, Mati Laan, Shaun Yepremian and others from Engineering for their leadership and close collaboration on this report. In addition, the assistance from Nazario Saucedo and his staff from the Bureau of Street Services was important. Input from John Reamer and his staff from the Bureau of Contract Administration was also invaluable. Feedback and input from Miguel Santana and his staff from the City Administrative Office, and from Gerry Miller and his staff from the Chief Legislative Analyst's Office has also been significant.

## Estimate - SOSLA Cost Estimate

**CONSTRUCTION COST ESTIMATE (Level 'C')**

REVISED 2-18-14

**15 Year Construction Period**
**20 Year Program Devilery**
**2550 Centerline Miles/ 8700 Lane Miles**
**Average 170 Miles (Ranging from 64 to 230 Miles per Year)**
**Mean Range of Pavement Removals**
**Unit Costs includes 3% Annual Escalation**

| Item No. | Item Description | Unit Cost | Units | Probable Quantity | Item Total | % of Total Cost | Basis/ Assumption |
|---|---|---|---|---|---|---|---|
| | **Hard Construction Costs** | | | | | | |
| 1 | Construct 2-inch Asphalt Concrete (AC) Surface Course | $1.50 | SF | 501,045,390 | $751,568,085 | 19.48% | Total Area |
| 2 | Remove & Replace Failed Roadway - Select (12" Removal, Replace 6"AC/ 6"AB) | $9.30 | SF | 45,437,730 | $422,570,889 | 10.95% | 23% to Total Area Based Field Reviews (Appendix) |
| 3 | Remove & Replace Failed Roadway - Local (8" Removal, Replace 2"AC/ 6"AB) | $4.80 | SF | 59,982,770 | $287,917,296 | 7.46% | 20% to Total Area Based Field Reviews (Appendix) |
| 4 | Removal of failing APC and PCC (12-inch Depth) and Construct 6"AC/6" AB - Select | $13.75 | SF | 5,105,360 | $70,198,700 | 1.82% | 6% of APC and PCC Areas Outside HPOZ (Appendix) |
| 5 | Removal of failing APC and PCC (8-inch Depth) and Construct 2"AC/6" AB - Local | $7.30 | SF | 6,499,970 | $47,449,783 | 1.23% | 8% of APC and PCC Areas Outside HPOZ (Appendix) |
| 6 | Remove and Replace PCC Roadway in HPOZ (8" Thick) - Local | $14.90 | SF | 814,370 | $12,134,113 | 0.31% | 20% of PCC Area in HPOZ |
| 7 | Remove and Replace PCC Roadway (10" Thick, HPOZ) - Select | $21.10 | SF | 89,570 | $1,889,927 | 0.05% | 20% of PCC Area in HPOZ |
| 8 | Access Ramps - Local (includes removals) | $3,595.00 | Each | 48,570 | $174,609,150 | 4.53% | 2.5 Ramps Per Segment (Appendix) |
| 9 | Access Ramps - Select (includes removals) | $3,970.00 | Each | 20,650 | $81,980,500 | 2.12% | 3 Ramps Per Segment |
| 10 | Grinding/ Coldmilling | $0.45 | SF | 312,340,810 | $140,553,365 | 3.64% | Locals - 6' wedge grind along gutter (AC & PCC) Select - Total Area |
| 11 | Adjust Surface Utility to Grade | $620.00 | Each | 60,240 | $37,348,800 | 0.97% | Length/ 250' (local), Length/ 175' (Select) |
| 12 | PCC Curb and Gutter R&R - Local ( 6-inch ) | $34.75 | LF | 490,440 | $17,042,790 | 0.44% | 5% of Centerline Length |
| 13 | PCC Curb and Gutter R&R - Select ( 8-inch ) | $42.00 | LF | 183,740 | $7,717,080 | 0.20% | 5% of Centerline Length |
| 14 | Bus Pads - Select Streets only | $22.45 | SF | 591,570 | $13,280,747 | 0.34% | 1 Bus Pad per Mile, includes removal of existing |
| 15 | PCC Cross Gutter R&R 6-inches - Local | $17.45 | SF | 349,660 | $6,101,567 | 0.16% | 15% of Existing to be Reconstructed (0.60 per Segment) |
| 16 | PCC Cross Gutter R&R 8-inches - Select | $24.85 | SF | 72,280 | $1,796,158 | 0.05% | 15% of Existing to be Reconstructed (0.20 per Segment) |
| 17 | Striping Replacement - Local | $1.20 | LF | 9,808,910 | $11,770,692 | 0.31% | Lineal foot of striping (1 x Centerline Length) |
| 18 | Striping Replacement - Select | $1.20 | LF | 22,048,420 | $26,458,104 | 0.69% | Lineal foot of striping (6 x Centerline Length) |
| 19 | Traffic Loops - Select | $440.00 | Each | 58,790 | $25,867,600 | 0.67% | 20 Loops per Signalized Intersections (Assume intersection at every 1250') |
| | | | | Sub-Total = | $2,138,255,345 | | |
| | **Misc Construction Costs** | | | | | | |
| 20 | Mobilization | 2.00 | % | Hard Cost | $42,765,107 | 1.11% | Assumed based on Past Construction Projects |
| 21 | Traffic Control | 1% to 3% | % | Hard Cost | $42,255,436 | 1.10% | 1% Local streets, 3% for Select streets |
| 22 | SWPPP Implementation | 0.75 | % | Hard Cost | $16,036,915 | 0.42% | Assumed based on Past Construction Projects |
| 23 | Construction Staking and Monument Preservation | 1.50 | % | Hard Cost | $32,073,830 | 0.83% | Assumed based on Past Construction Projects |
| | | | | Misc Construction Cost Sub-Total = | $133,131,288 | | |
| | | | | Construction Cost Sub-Total = | $2,271,386,633 | | |
| | | | | 15% Construction Contingency = | $340,707,995 | 8.83% | |
| | | | | Construction Cost = | $2,612,094,628 | 67.70% | |
| | **Program Delivery Costs** | | | | | | |
| 24 | Material Testing for Construction (Batch Plant inspections & in-place testing) | 2.00 | % | Construction Cost | $52,241,893 | 1.35% | Assumed based on Past Construction Projects |
| 25 | Program Management & Public Outreach | 6.05 | % | Construction Cost | $158,031,725 | 4.10% | Performed By City & Consultant Staff |
| 26 | Design - Local (includes, Survey, Geotechnical, Deflection Testing, PS&E) | 8.50 | % | Local Streets Construction Cost | $112,615,655 | 2.92% | Performed By City & Consultant Staff |
| 27 | Design - Select (includes, Survey, Geotechnical, Deflection Testing, PS&E) | 10.00 | % | Select Streets Construction Cost | $128,720,457 | 3.34% | Performed By City & Consultant Staff |
| 28 | Construction Management | 8.50 | % | Construction Cost | $222,028,043 | 5.75% | Performed By City & Consultant Staff |
| 29 | Inspection | 8.50 | % | Construction Cost | $222,028,043 | 5.75% | Performed By City & Consultant Staff |
| | | | | Project Delivery Cost Sub-Total = | $895,665,816 | 23.21% | |
| | | | | Sub-Total= | $3,507,760,445 | | |
| | | | | 10% Program Contingency = | $350,776,044 | 9.09% | |
| | | | | Total Cost = | $3,858,536,489 | | |

## Alternative Estimate - SOSLA Cost Estimate

**CONSTRUCTION COST ESTIMATE (Level 'C')**

**REVISED 2-18-14**

**15 Year Construction Period**
**20 Year Program Devilery**
**2550 Centerline Miles/ 8700 Lane Miles**
**Average 170 Miles (Ranging from 64 to 230 Miles per Year)**
**Lower Range of Pavement Removals**
**Unit Costs Includes 3% Annual Escalation**

| Item No. | Item Description | Unit Cost | Units | Probable Quantity | Item Total | % of Total Cost | Basis/ Assumption |
|---|---|---|---|---|---|---|---|
| | **Hard Construction Costs** | | | | | | |
| 1 | Construct 2-inch Asphalt Concrete (AC) Surface Course | $1.50 | SF | 501,045,390 | $751,568,085 | 21.20% | Total Area |
| 2 | Remove & Replace Failed Roadway - Select (12" Removal, Replace 6"AC/ 6"AB) | $9.30 | SF | 37,323,850 | $347,111,805 | 9.79% | 23% to Total Area Based Field Reviews (Appendix) |
| 3 | Remove & Replace Failed Roadway - Local (8" Removal, Replace 2"AC/ 6"AB) | $4.80 | SF | 54,529,790 | $261,742,992 | 7.39% | 20% to Total Area Based Field Reviews (Appendix) |
| 4 | Removal of failing APC and PCC (12-inch Depth) and Construct 6"AC/6" AB - Select | $13.75 | SF | 1,914,510 | $26,324,513 | 0.74% | 6% of APC and PCC Areas Outside HPOZ (Appendix) |
| 5 | Removal of failing APC and PCC (8-inch Depth) and Construct 2"AC/6" AB - Local | $7.30 | SF | 2,736,825 | $19,978,825 | 0.56% | 8% of APC and PCC Areas Outside HPOZ (Appendix) |
| 6 | Remove and Replace PCC Roadway in HPOZ (8" Thick) - Local | $14.90 | SF | 814,370 | $12,134,113 | 0.34% | 20% of PCC Area in HPOZ |
| 7 | Remove and Replace PCC Roadway (10" Thick, HPOZ) - Select | $21.10 | SF | 89,570 | $1,889,927 | 0.05% | 20% of PCC Area in HPOZ |
| 8 | Access Ramps - Local (includes removals) | $3,595.00 | Each | 48,570 | $174,609,150 | 4.93% | 2.5 Ramps Per Segment (Appendix) |
| 9 | Access Ramps - Select (includes removals) | $3,970.00 | Each | 20,650 | $81,980,500 | 2.31% | 3 Ramps Per Segment |
| 10 | Grinding/ Coldmilling | $0.45 | SF | 312,340,810 | $140,553,365 | 3.97% | Locals - 6' wedge grind along gutter (AC & PCC) Select - Total Area |
| 11 | Adjust Surface Utility to Grade | $620.00 | Each | 60,240 | $37,348,800 | 1.05% | Length/ 250' (local), Length/ 175' (Select) |
| 12 | PCC Curb and Gutter R&R - Local ( 6-inch ) | $34.75 | LF | 490,440 | $17,042,790 | 0.48% | 5% of Centerline Length |
| 13 | PCC Curb and Gutter R&R - Select ( 8-inch ) | $42.00 | LF | 183,740 | $7,717,080 | 0.22% | 5% of Centerline Length |
| 14 | Bus Pads - Select Streets only | $22.45 | SF | 591,570 | $13,280,747 | 0.37% | 1 Bus Pad per Mile, includes removal of existing |
| 15 | PCC Cross Gutter R&R 6-inches - Local | $17.45 | SF | 349,660 | $6,101,567 | 0.17% | 15% of Existing to be Reconstructed (0.60 per Segment) |
| 16 | PCC Cross Gutter R&R 8-inches - Select | $24.85 | SF | 72,280 | $1,796,158 | 0.05% | 15% of Existing to be Reconstructed (0.20 per Segment) |
| 17 | Striping Replacement - Local | $1.20 | LF | 9,808,910 | $11,770,692 | 0.33% | Lineal foot of striping (1 x Centerline Length) |
| 18 | Striping Replacement - Select | $1.20 | LF | 22,048,420 | $26,458,104 | 0.75% | Lineal foot of striping (6 x Centerline Length) |
| 19 | Traffic Loops - Select | $440.00 | Each | 58,790 | $25,867,600 | 0.73% | 20 Loops per Signalized Intersections (Assume intersection at every 1250') |
| | | | | Sub-Total = | $1,965,276,812 | | |
| | **Misc Construction Costs** | | | | | | |
| 20 | Mobilization | 2.00 | % | Hard Cost | $39,305,536 | 1.11% | Assumed based on Past Construction Projects |
| 21 | Traffic Control | 1% to 3% | % | Hard Cost | $38,138,985 | 1.08% | 1% Local streets, 3% for Select streets |
| 22 | SWPPP Implementation | 0.75 | % | Hard Cost | $14,739,576 | 0.42% | Assumed based on Past Construction Projects |
| 23 | Construction Staking and Monument Preservation | 1.50 | % | Hard Cost | $29,479,152 | 0.83% | Assumed based on Past Construction Projects |
| | | | | Misc Construction Cost Sub-Total = | $121,663,250 | | |
| | | | | Construction Cost Sub-Total = | $2,086,940,062 | | |
| | | | | 15% Construction Contingency = | $313,041,009 | 8.83% | |
| | | | | Construction Cost = | $2,399,981,071 | 67.71% | |
| | **Program Delivery Costs** | | | | | | |
| 24 | Material Testing for Construction (Batch Plant inspections & in-place testing) | 2.00 | % | Construction Cost | $47,959,621 | 1.35% | Assumed based on Past Construction Projects |
| 25 | Program Management & Public Outreach | 6.05 | % | Construction Cost | $145,198,855 | 4.10% | Performed By City & Consultant Staff |
| 26 | Design - Local (Includes, Survey, Geotechnical, Deflection Testing, PS&E) | 8.50 | % | Local Streets Construction Cost | $107,096,530 | 3.02% | Performed By City & Consultant Staff |
| 27 | Design - Select (Includes, Survey, Geotechnical, Deflection Testing, PS&E) | 10.00 | % | Select Streets Construction Cost | $114,002,190 | 3.22% | Performed By City & Consultant Staff |
| 28 | Construction Management | 8.50 | % | Construction Cost | $203,998,391 | 5.76% | Performed By City & Consultant Staff |
| 29 | Inspection | 8.50 | % | Construction Cost | $203,998,391 | 5.76% | Performed By City & Consultant Staff |
| | | | | Project Delivery Cost Sub-Total = | $822,293,978 | 23.20% | |
| | | | | Sub-Total= | $3,222,275,048 | | |
| | | | | 10% Program Contingency = | $322,227,505 | 9.09% | |
| | | | | **Total Cost =** | **$3,544,502,553** | | |

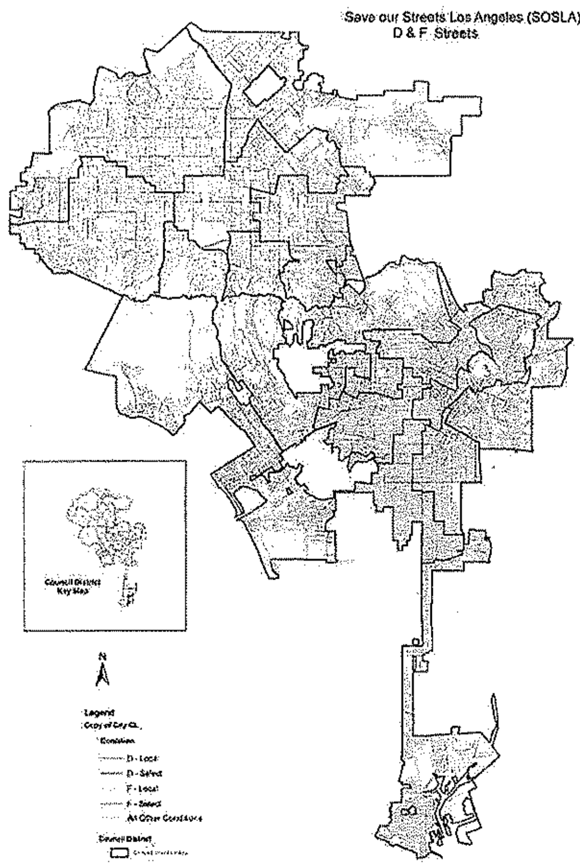
# 2. Glossary of Terms

| Term | Definition |
|---|---|
| AB | Aggregate Base is a mixed gradation of rock and sand that is placed and compacted in place to create the underlying layer of the roadway section. |
| AC | Asphalt Concrete is a mixed gradation of rock and sand bound together by a bituminous/asphalt. Asphalt concrete is mixed and placed hot and compacted in place to create the upper layers of the roadway section. |
| Access Ramp | Access ramps at street corners as required by the Americans with Disabilities Act (ADA) when performing roadway reconstruction and resurfacing. |
| APC | An existing Portland Cement Concrete (PCC) roadway covered with a layer of Asphalt Concrete (AC). |
| Appendix | See the appendix of the report for supporting data and documentation of assumptions. |
| Asphalt Overlays | This technique involves adding one or more Asphalt Concrete layers to an existing asphalt or concrete pavement. |
| Base Failure | Base failures occur when the layer beneath the binding layer and driving surface can no longer adequately support the weight of vehicular traffic. Base failures can occur for a number of reasons, including: ground water, excessive load counts (too much weight), and inadequate design. |
| Base Repair | Localized reconstruction of full section of failed pavement area. |
| Batch Plant | Outdoor plant/facility where asphalt concrete (AC) is created from a stockpile of materials. Process includes using large industrial equipment and machinery to create hot AC that is carried to the job site by trucks. |
| BMP | Best Management Practices (related to control of storm water runoff). |
| BOE | City of Los Angeles Department of Public Works Bureau of Engineering |
| BSS | City of Los Angeles Department of Public Works Bureau of Street Services |
| CAO | City Administrative Officer |
| Centerline Mile | Length of street measured along the center of the roadway. |
| CEQA | California Environmental Quality Act |
| CIPR Technology | A process in which the asphalt pavement is recycled in-place (cold in-place recycling (CIPR) process), where the Recycled Asphalt Pavement is combined without heat and with new emulsified or foamed asphalt and/or a recycling or rejuvenating agent, possibly also with virgin aggregate, and mixed at the pavement site, at either partial depth or full depth, to produce a new cold mix end product. |
| Collector Streets | The collector street system provides both land access service and traffic circulation within residential neighborhoods, commercial and industrial areas. It differs from the arterial system in that facilities on the collector system may penetrate residential neighborhoods, distributing trips from the arterials through the area to the ultimate destination. |

| Term | Definition |
|---|---|
| **Construction Contingency** | Contingency added to over all construction cost to account for unforeseen conditions or changes during construction. Unforeseen items could include: damage due to tree roots, poor underlying soil that is difficult to compact and will require additional excavation and reconstruction, utility conflicts and repairs, and unstable roadways in hilly areas. |
| **Crack Sealing** | A specially prepared mixture of asphalt emulsion, well graded fine aggregate, and water and mineral filler used to fill and seal surface cracks on a pavement. |
| **Dig-Out** | Localized reconstruction of full section of failed pavement area. |
| **Distress** | External (visible) indications of pavement defects or deterioration. |
| **Distress Quantity** | Amount of external (visible) indications of pavement defects or deterioration typically measured as length or area. |
| **Distress Severity** | Level of external (visible) indications of pavement defects or deterioration. Typically expressed as low, medium and high. |
| **Distress Type** | Identification and categorization of external (visible) indications of pavement defects or deterioration. |
| **LADOT** | City of Los Angeles Department of Transportation |
| **ENR** | Engineering News-Record is a weekly magazine that provides news, analysis, data and opinion for the construction industry worldwide. It is owned by The McGraw-Hill Companies. Cost indexes published by ENR are widely-used benchmarks used by the industry. |
| **Escalation** | The annual change in construction material and labor costs based on historic records, such as those from Engineering News Record (ENR) magazine. |
| **ft** | Feet |
| **GIS** | Geographic Information System |
| **Grinding/ Coldmill** | The removal of damaged pavement with specially designed equipment. |
| **Harris** | Harris and Associates, Inc. |
| **HPOZ** | Historic Preservation Overlay Zone. PCC Streets in HPOZ's are replaced in kind to maintain historic materials. |
| **Improved Streets** | Developed street complying with city standards, typically, paved with an asphalt or concrete surface from curb to curb. |
| **Lane Mile** | A lane mile is equal to an 11 foot wide lane that is one mile long. Area = 11' x 5,280' = 58,080 sf. Example: A roadway that is 64' wide and 1000' long, (64'x1000')/11'/5280' = 1.1 lane miles. |
| **LF** | Lineal Foot |
| **Local/ LO** | Local or Residential Streets |
| **MicroPAVER™** | A pavement management system developed by the US Army Corps Of Engineers. MicroPAVER™ provides pavement management capabilities to: develop and organize pavement inventory; assess the current condition of pavement; develop models to predict future conditions; report on past and future pavement performance; develop scenarios for maintenance and rehabilitation based on budget or condition requirements; and plan projects. |
| **NPDES** | National Pollutant Discharge Elimination System |
| **PCC** | Portland Cement Concrete |

| Term | Definition |
|---|---|
| **PCI** | Pavement Condition Index. Standardized rating system on a scale of 0 to 100. 100 being a new roadway and 0 being a completely failed roadway at the end of its life cycle. PCI's for this estimate are established by the BSS. |
| **PMP** | Pavement Management Program |
| **Primary Arterials** | The principal arterial system serves the major centers of activity of a metropolitan area, the highest traffic volume corridors, and the longest trip desires; and carry a high proportion of the total urban area travel on a minimum of mileage. The system should be integrated, both internally and between major urban connections. |
| **Program** | Includes all program elements such as Management, Design, Construction and Administration. |
| **R&R** | Remove and replace, includes removal of existing and replacement of existing improvements with new construction. |
| **Reconstruction** | This technique involves the removal and replacement of the entire existing pavement structure. |
| **Residential Streets** | The local street system comprises all facilities not on one of the higher systems. It serves primarily to provide direct access to abutting land and access to the higher order systems. It offers the lowest level of mobility and usually contains no bus routes. Service to through traffic movement usually is deliberately discouraged. |
| **Resurfacing** | This technique involves the removal and replacement of one or more layers of an existing asphalt or concrete pavement without replacing the base material. |
| **Secondary Arterials** | The minor arterial street system interconnects with and augments the urban principal arterial system and provide service to trips of moderate length at a somewhat lower level of travel mobility than principal arterials. This system also distributes travel to geographic areas smaller than those identified with the Primary Arterial system. |
| **Segment** | Equal to one street segment as defined by the PMP, typically from block to block. |
| **Select/ SE** | Collector and arterial streets |
| **SF** | Square foot |
| **Slurry Sealing** | A specially prepared mixture of asphalt emulsion, well graded fine aggregate, water and mineral filler used to provide a surface seal to a structurally sound pavement. |
| **Structural condition** | The design integrity of the pavement, capable of supporting vehicle traffic loads. |
| **Surface operational condition** | The operability of the pavement ensuring a safe and smooth ride for the commuter. |
| **Surface utilities** | Utility covers that are visible in the roadway surface such as maintenance holes and water valve frames and covers. |
| **SWPPP** | Storm Water Pollution Prevention Plan, consists of best management practices related to controlling storm water run off during construction. |
| **Traffic Loop** | A cable imbedded in the roadway surface that detects vehicles or bicycles at signalized intersections. |

# 3. Background




The City of Los Angeles has the largest municipal street system in the nation with over 6,500 centerline miles (28,000 lane miles) of residential and arterial streets. The roadway network represents one of the City's largest and most visible assets. Many of the streets in the roadway system are nearing, or beyond, the end of their intended life cycle and showing signs of distress and deterioration. An estimated one third of the system, over 500 million square feet of pavement, equating to 2,550 centerline miles (8,700 lane miles) will require major rehabilitation beyond the City's existing maintenance efforts and funded expenditures. The proposed Save Our Streets LA (SOSLA) Program would provide needed funding to deliver a program focused on the reconstruction and rehabilitation of the network's failing streets.

In August of 2013, a motion initiated by Councilmembers Joe Buscaino and Mitchell Englander was adopted (Council File No. 13-1300-S1) directing city staff to develop a joint report based on 24 separate items requested in the Council File. The joint report was requested to gain additional information regarding the SOSLA initiative. The singular form of the word 'Estimate' used in this report is intended to include the two separate estimates, collectively, that are presented in the report.

The focus of the Estimate is to develop a baseline cost for the reconstruction of roadway improvements with pedestrian access ramps. A minimal amount of adjacent concrete improvements, such as the repair damaged curbs and gutters and construction of access ramps, are also included in the Estimate, but are limited to those required for the roadway construction. The Estimate is based on utilizing traditional roadway construction methods and materials and does not include other elements such as 'Great Streets', 'Complete Streets', 'Green Streets', alley improvements, traffic signal modifications, water quality elements, sidewalk improvements, utility relocations or storm drain and sewer improvements. Some of the basic program elements such as construction duration and program delivery were reviewed to assess their impact on the overall Program cost.

# 4. Data Collection

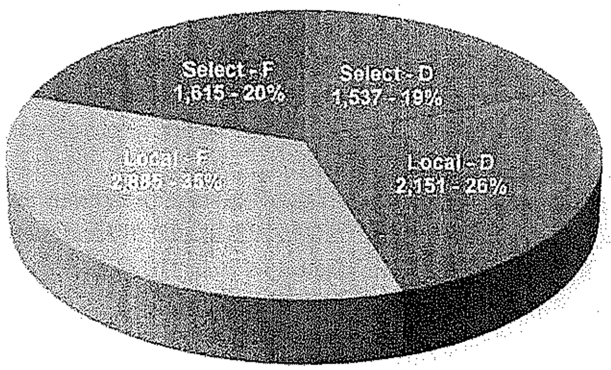
The Bureau of Streets Services (BSS) developed and maintains a Pavement Management Program (PMP) and performs roadway maintenance throughout the City. BSS utilizes specialized automated vehicles to capture data on existing pavement distresses. This data is analyzed using MicroPAVER software to assess the condition of the streets within the City's roadway network. The PMP is a network level analysis that uses basic roadway information such as work history, street types and current condition for forecasting, budgeting and maintenance planning. The overall roadway condition in the PMP is expressed in terms of a Pavement Condition Index (PCI). The PCI ranges between "0" and "100". A PCI of "0" would correspond to a severely deteriorated pavement with virtually no remaining life, while a PCI of "100" would correspond to a properly engineered and constructed roadway at the beginning of its life cycle.

Streets are constantly in a state of deterioration, and for this reason the pavement condition changes with time. Re-inspections, utilizing the automated vehicles, are performed approximately every three years to obtain current condition data and update the PCI ratings. Streets that have been Slurry Sealed since the last inspection are typically excluded from re-inspections in the following cycle. MicroPAVER establishes the PCI for streets based on distress inspection data, recent work histories and life cycle curves that simulate the deterioration of the roadway.

The MicroPAVER data used to determine the streets to be included in the Estimate was provided by BSS in October of 2013 and included 8,200 lane-miles for streets that had PCI's in the range of 0-55 (D and F). The PCI ranges for this report were separated into two major categories: Grade D (PCI 41-55) and Grade F (PCI 1-40). Streets were further broken down into residential streets (Local) and arterial and collector streets (Select).

Since fiscal year 2011/12, it has been the City of Los Angeles' policy to stabilize the condition of the road network at a weighted average PCI of 62. For the purposes of the Estimate it was assumed that up to 500 lane miles of streets might deteriorate to D or F conditions during the 18 year span required to complete the construction of the Program as a result of unforeseen utility trenches, transit bus wear, and other factors. These 500 lane miles were added to the original 8,200 lane miles provided by BSS, by adding approximately 6% to the quantities established for each of the subcategories including: Select streets, grade D and F; and Local streets, grade D and F. This resulted in the 8,700 lane miles established for the Estimate. The 8,700 lanes miles included in the Estimate is proportional to the original 8,200 lane miles and is comprised of 1,717 lane miles of "Select" F Streets, 1,634 lane miles of "Select" D Streets, 2,287 lane miles of "Local" D Streets, and 3,067 lane miles of "Local" F Streets.

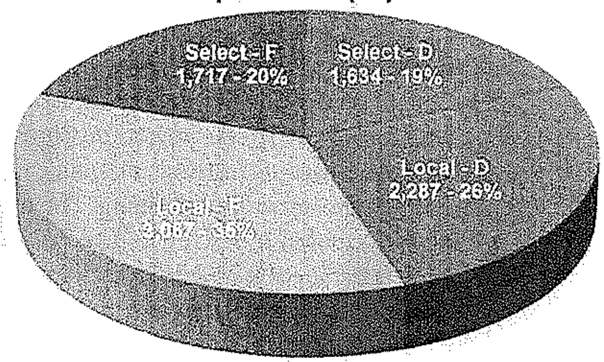
**Distribution of D and F Rated Street by Type**
**8200 Lane Miles (Current)**
**By Lane Miles (LM)**




**Total Local: 5,036**
**Total Select: 3,152**
**Grand Total: 8,188 LM**

Select - D Streets
Local - D Streets
Local - F Streets
Select - F Streets

**Distribution of D and F Rated Street by Type**
**8700 Lane Miles (Projected)**
**By Lane Miles (LM)**




**Total Local: 5,354**
**Total Select: 3,351**
**Grand Total: 8,705 LM**

Select - D Streets
Local - D Streets
Local - F Streets
Select - F Streets

Review of the BSS PMP data indicates that the City's street network information is reasonably current, with nearly 90% of the streets having been inspected or received maintenance treatments within the last three years. Figure 4-1 shows the distribution of recent work or re-inspection of the base 8,200 line miles included in the existing BSS data.

| Latest Inspection or Work Completed on D and F Streets | | |
|---|---|---|
| Year of Last Inspection or Work | Number of Street Segments | Percentage of D & F Streets |
| 2000 - 2007 | 272 | 1.10% |
| 2008 | 444 | 1.79% |
| 2009 | 409 | 1.65% |
| 2010 | 1635 | 6.61% |
| 2011 | 8896 | 35.94% |
| 2012 | 6504 | 26.28% |
| 2013 | 6590 | 26.63% |
| | 24750 | 100.00% |

FIGURE 4-1

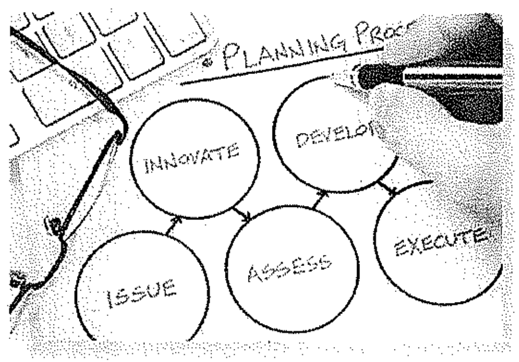
## Additional Data Assessments

The accuracy of the Estimate is dependent on the amount of information available and assumptions used to determine the type of construction and material quantities. Consideration was given to potentially collecting additional data to improve the accuracy of the Estimate. Additional methods considered for developing more data on the existing pavement condition included use of the automated data collection vehicles driving each and every lane of the existing 8,200 lane-miles. Additional data collected from this process would include crack detection and severity, rutting, pot holes, patching, raveling, and joints in concrete. 3D imaging, asset inventory, ground penetrating radar and deflection testing were also considered. Although additional data would be useful in developing the Estimate, these additional assessments were considered to be too costly and time prohibitive to be used in the Estimate. It is recommended that these data collection methods be considered during the design and development phase within the ramp up years of the Program.

# 5. Estimate Development Methodology

## 5.1 Cost Estimate Classification

Typically PMP data is not used in the development of actual construction quantities or contract documents. One of the challenges in developing the Estimate was digesting and interpreting a range of network level information to determine estimated construction level quantities and costs. The development of this Estimate was performed within a relatively short time frame using existing available data and information supplemented by visual and statistical analysis. The degree of accuracy of the Estimate is consistent with a Class "C" cost estimate, as identified in the BOE Street Design Manual Section E 141, which is intended to indicate a preliminary estimate and is subject to revisions and refinements based on the design development phase. The ultimate selection of candidate streets to be included in the Program will require a more detailed investigation during the design development phase of the Program.




## 5.2 Hard and Soft Costs

There are two main types of costs associated with the Program:

- Hard Costs - These are associated with construction activities, including cost of material, labor and equipment necessary to construct the proposed roadway improvements.
- Soft Costs - These are associated with Program delivery and include program management, design, construction management and inspection, and overall program administration.

### 5.2.1 Pavement Rehabilitation

Developing quantity and cost estimates for rehabilitation of pavement sections required the following data:

- Street length
- Street width
- Street classification
- Thickness of treatments
- Type of resurfacing treatment (i.e. AC reconstruction, AC overlay or PCC reconstruction)
- Square foot area of pavement requiring localized or total reconstruction

MicroPAVER data information obtained from BSS provided adequate information to determine the length and width, and square foot area of street segments.

Developing a quantity for the percentage of pavement area requiring reconstruction could not be determined from the information available in the PMP data, so it was necessary to develop a methodology for estimating the removal quantities. The methodology used for the developing the reconstruction quantities in the Estimate consisted of a visual survey of a random sampling of the current grade D and F streets.

The field survey sample obtained was approximately 3% of the candidate streets (775 out of 24,700 segments or 257 out of 8,200 lane-miles). This was a random sample representing all 15 Council Districts. A breakdown of the sampling is as follows:

- Local – AC Sample % by area=4.32%
- Local – PCC Sample % by area=2.02%
- Select – AC Sample % by area=3.55%
- Select – PCC Sample % by area=3.79%

Estimated quantities for reconstruction areas are based on standard pavement sections as indicated in Section E 422.116, Recommended Standard Practices of BOE Street Design Manual and on input from BOE.

The quantity for Portland Cement Concrete (PCC) roadways designated as D and F streets was also determined utilizing the PMP data. The rehabilitation method primarily used for PCC streets includes applying an asphalt concrete surface over the existing PCC. The final Estimate accounts for PCC streets and streets within Historic Preservation Overlay Zones (HPOZ). Candidate PCC Streets within HPOZ's require special consideration for rehabilitation to retain their historic character. Consequently PCC streets within these historic areas will be reconstructed in kind using PCC instead of resurfacing with asphalt concrete.

Since the reliability of estimating the percent of pavement areas requiring reconstruction is so critical to the confidence level of the overall Estimate, Harris retained True North Research, Inc., a firm specializing in statistical analysis. True North estimated the reliability of the projected percent reconstruction needed based on the results of the random sampling of streets.

Table 5-2 presents the results of the analysis to estimate the reliability of the percent reconstruction estimates based on the visual sampling. Because, in practice, streets that are determined to have 50% or greater removal will be completely removed and reconstructed to gain better construction production and a uniform structural section, all streets in the database that had a percent removal value of 50% or greater were recoded to have 100% removal. By making this adjustment prior to the analysis, the percent removal estimates shown in Table 5-2 factor in this consideration.

| Descriptive Statistics | | | | | | 95% Confidence Interval | | |
|---|---|---|---|---|---|---|---|---|
| # of streets | Minimum % Removal | Maximum % Removal | Mean % Removal | Standard Error | Standard Deviation | Lower Bound | Mean % Removal Estimate | Upper Bound |
| **All Streets** | | | | | | | | |
| 773 | 0 | 100 | 23.19 | 1.209 | 33.610 | 20.82 | 23.19 | 25.56 |
| **Local AC Streets** | | | | | | | | |
| 514 | 0 | 100 | 22.32 | 1.477 | 33.481 | 19.42 | 22.32 | 25.21 |
| **Local PCC Streets** | | | | | | | | |
| 38 | 0 | 100 | 18.45 | 5.476 | 33.754 | 7.72 | 18.45 | 29.18 |
| **Select AC Streets** | | | | | | | | |
| 189 | 0 | 100 | 27.80 | 2.490 | 34.228 | 22.92 | 27.80 | 32.68 |
| **Select PCC Streets** | | | | | | | | |
| 32 | 0 | 100 | 15.66 | 5.268 | 29.799 | 5.33 | 15.66 | 25.98 |

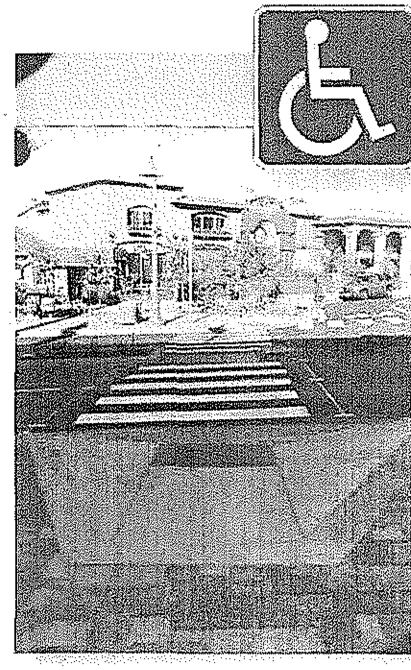
Table 5-2 Results of Percent Dig-out Analysis based on Random Sample

For each category of street shown on the left of the table, Table 5-2 represents the number of streets in the sample for that category, the minimum and maximum percent reconstruction among streets in the sample, the mean (average) percent for that category, as well as the standard error and standard deviation for the mean estimate. For example, there were a total of 773 total streets in the all streets categories. Among all streets, the minimum percent reconstruction was 0% and the maximum 100%, with a mean of 23.19% reconstruction. The standard error of the mean estimate is 1.209, with a standard deviation of 33.61.

Shown on the right side of the table is the 95% confidence interval that surrounds the mean estimate for each category. Keeping with the "All Streets" categories as an example, the mean estimated percent reconstruction is 23.19%, with the lower bound of the 95% confidence interval being 20.82% reconstruction and the upper bound being 25.56% reconstruction. In other words, we can be 95% confident that the actual mean percent removal and reconstruction for all streets in the Program from which this sample was drawn will average between 20.82% and 25.56%. This is a percentage of the total surface area and includes localized reconstruction on some streets and complete reconstruction on other streets.

As shown in the Table 5-2, there is substantial variation in the mean percent reconstruction estimates across the subgroups, ranging from a low of 15.66% for Select PCC streets to a high of 27.80% for Select AC streets. The table also makes clear that although streets with a sufficiently large sample size have reasonably tight confidence intervals about the mean estimate (i.e., All Streets, Local AC Streets, and Select AC Streets), categories for which there were few streets sampled (Local PCC Streets and Select PCC Streets) have very large confidence intervals and thus a lower degree of reliability for the mean estimate.

### 5.2.2 Access Ramps



A significant amount of concrete improvements directly adjacent to the proposed roadway reconstruction is included in the Estimate. The majority of this adjacent work will be the construction or the reconstruction of access ramps at street intersections. At an escalated cost of approximately $3,000-$4,000 per ramp, these costs are a significant percentage of the overall Program cost. The approach to develop the quantity and costs for these ramps was as follows:

- Conduct a random sampling of two areas within each of the 15 Council Districts using maps and desktop visual surveys using publicly available digital street imagery.
- Determine the number of access ramps required per street segment based on this sampling.
- Exclude residential neighborhoods with no sidewalk and/or having rural settings from ramp construction requirements.

Based on the analysis, it was determined that the number of ramps required equates to approximately 2.5 ramps per street segment for Local streets with sidewalks and approximately 3 ramps per street segment for Select streets. The above findings were then broadcast over all street segments to determine the potential total number of access ramps required.

### 5.2.3 Incidental Improvements

Incidental improvements include several improvement items that are required for pavement rehabilitation and reconstruction work. Some of these items include:

- Adjustment of surface utilities, i.e. maintenance holes, valves, vaults, etc.
- Replacement of traffic loops
- Replacement of damaged curbs, curb and gutter and cross gutters
- Replacement of affected striping and pavement markers
- Mobilization of contractors' construction forces and equipment
- Traffic control and construction staging
- Construction staking and survey monument preservation
- Material testing during construction
- Construction of concrete bus pads on Select streets
- Storm Water Pollution Prevention Plans (SWPPP) during construction

The methodology for developing the quantities, for the incidental improvements, is listed in the right hand column of the Estimate and is typically a percentage of the hard construction costs or an assumed numerical value.

## 5.3 Soft Costs

Soft costs associated with the Program include the following key items:

1. Program Management
    - Program Planning, including identifying overall Program goals and general road map
        - » Set project priority lists
        - » Identify project groupings
        - » Coordinate work assignments among all parties
        - » Reporting and oversight
        - » Resource acquisition (contracts/staffing)
    - Design Team Oversight to ensure project objectives, and goals are met consistently
        - » Multiple design team oversight (possibly 4 or more separate teams)
    - Program administration and tracking, including scheduling, financing and reporting
    - Community outreach
    - Procurement of professional services and construction contractors throughout the life of the program
2. Design costs for preparation of construction documents for the Program. Design costs were adjusted for Local and Select streets based on the complexity of the design efforts required.
3. Construction management, construction inspection, material testing for the Program.

# 6. Development of Unit Prices

## 6.1 Hard Costs

Unit prices for construction costs were developed based on the cost of labor and material for similar types of projects in the greater Los Angeles area in 2012 and 2013. These costs were adjusted to reflect Program economy of scale and the complexity of projects for Select and Local streets. In establishing unit costs used in the Estimate, unit prices for 2012 and 2013 were escalated to year 2017 (assumed year one for commencement of Program construction). Unit prices were then escalated to the middle of the 15 year construction period (2024), based on the escalation factors discussed in the section below. The unit prices estimated for the middle of construction are considered the 'average' unit price for the entire construction period and were used as the unit prices shown in the Estimate.

## 6.2 Soft Costs

Soft costs were based on percent of construction costs, and from feedback obtained from BOE based on their historic program delivery costs, adjusted downward to account for an expectation of a streamlined design process and economy of scale. The percentages used for the various soft costs are listed in the Estimate.

## 6.3 Cost Escalation

Cost escalation is defined as the probable change in the cost of construction over the life of the Program, and is a standard component of any Construction Program estimate. Escalation is similar in concept to inflation and deflation, except that in this case escalation is specific to construction and not general in nature as is overall inflation. While escalation includes general inflation related to the money supply, it is also driven by changes in supply-demand imbalances that are specific to construction in a given economy. For example, while general inflation may be less than 3% for any given time period, construction prices may increase (escalate) by over 5% because of a supply-demand imbalance. Over a long period of time, as market supply and demand imbalances are corrected, escalation will tend to more-or-less equal inflation, unless there are sustained impacts specific to the construction industry.

In cost engineering, escalation and contingency are both considered risk mitigation factors that should be included in estimates. When projected escalation is minimal, it is sometimes included in the contingency. However, this is not a best practice, particularly when potential escalation is significant.

The starting point for the escalation used in the Estimate is based on historic construction cost indices developed by Engineering News Record (ENR). ENR has been collecting and publishing price data on different construction labor and materials, in 20 major U.S. cities (including the greater Los Angeles area) on a monthly basis for over 50 years. ENR uses data to create two index numbers each month known as the Construction Cost Index (CCI). The CCI is a widely used benchmark for measuring changes in construction costs over the years. Figure 6-1 shows a table and graph of the historic changes in construction cost in the greater Los Angeles Area. Based on this data the cost of construction has increased an average of 3.90% and 2.7% over the last ten and twenty years, respectively. Based on this data, the escalation of cost used in the Estimate could be as low as 2.7% based on the 20 year average. The average escalation of 3% was used in the Estimate to reflect the approximate average over the last 20 years. What costs a dollar today escalated at 3% would cost approximately $1.70 at the end of the projected construction period.

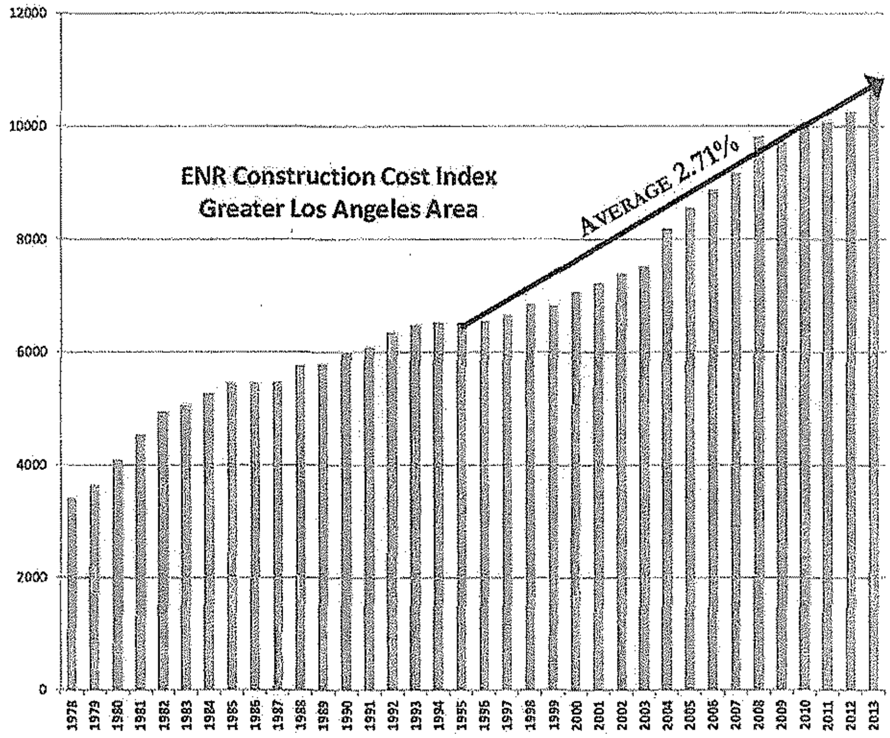
## 6.4 Contingency

In general, the contingency included in the Estimate is based on a percentage of the estimate's costs and is included to account for unforeseeable risk factors and expenses during construction and delivery of the Program. For the Estimate, a contingency was applied to the construction cost as well as the overall cost of the Program, which includes both construction and program delivery cost.

Construction contingency accounts for risk factors associated with constructing the project and include unforeseen conditions including: increase of pavement reconstruction areas; inclement weather, relocation/ reconstruction of existing shallow utilities impacted by construction; increased thickness of assumed pavement structural section on Select streets due to high truck traffic volumes; and other factors that are not accounted for in the Estimate. Due to the aforementioned risk factors, a 15% construction contingency was added to the estimated hard construction costs to account for unforeseen construction conditions.

A 10% Program contingency was applied to the entire Program cost, to account for general risks in delivering the overall Program not directly related to construction field conditions. General risk factors include such items as: an increase in the assumed cost escalation for material, equipment and labor, including the cost of oil - a component of asphalt. Risks also include such items as: future regulatory requirements related to both design and construction that do not currently exist; the availability of professional labor such as engineers, construction managers and program managers needed to staff the Program; and potential additional general and regional cost escalation.

At the regional level, there are several other large agencies in the Los Angeles area that have plans for major construction programs over the next ten years. These agencies include: the Los Angeles County Metropolitan Transportation Authority (Metro); the Ports of Los Angeles and Long Beach; and the Los Angeles International Airport. These proposed regional programs will increase the demand for construction material and labor in the region. The magnitude of the cost escalation, attributed to these general and regional risk factors, is difficult to determine given the limited time frame available to perform the Estimate.




| Year | Construction Cost Index | % Change | Year | Construction Cost Index | % Change |
|---|---|---|---|---|---|
| 1978 | 3421.25 | 8.20% | 1996 | 6558.44 | -4.90% |
| 1979 | 3638.81 | 6.36% | 1997 | 6663.55 | 1.60% |
| 1980 | 4102.37 | 12.74% | 1998 | 6851.95 | 2.83% |
| 1981 | 4530.96 | 10.45% | 1999 | 6825.97 | -0.38% |
| 1982 | 4934.14 | 8.90% | 2000 | 7068.04 | 3.55% |
| 1983 | 5063.89 | 2.63% | 2001 | 7226.92 | 2.25% |
| 1984 | 5258.93 | 3.87% | 2002 | 7402.75 | 2.43% |
| 1985 | 5446.69 | 3.55% | 2003 | 7531.77 | 1.74% |
| 1986 | 5452.2 | 0.10% | 2004 | 8192.14 | 8.77% |
| 1987 | 5474.14 | 0.40% | 2005 | 8567.42 | 4.58% |
| 1988 | 5770.84 | 5.42% | 2006 | 8878.97 | 3.64% |
| 1989 | 5789.77 | 0.33% | 2007 | 9181.67 | 3.41% |
| 1990 | 5994.56 | 3.54% | 2008 | 9823.19 | 6.99% |
| 1991 | 6090.12 | 1.59% | 2009 | 9763.69 | -0.61% |
| 1992 | 6348.55 | 4.24% | 2010 | 10004.3 | 2.46% |
| 1993 | 6477.84 | 2.04% | 2011 | 10088.8 | 3.33% |
| 1994 | 6532.95 | 0.85% | 2012 | 10270.93 | 1.81% |
| 1995 | 6526.22 | -0.10% | 2013 | 10740.93 | 4.58% |
| | | | Average - 2010-2013 = +3.04% | | |
| | | | Average - Last 10 Year = +3.90% | | |
| | | | Average - Last 20 Year = +2.71% | | |

FIGURE 6-1

# 7. Program Delivery

## 7.1 Program Duration

Another consideration affecting the Estimate is the overall duration and schedule of Program delivery. The hard and soft costs associated with the Program will increase with time based on the escalation factors applied to materials and labor. A longer overall Program duration will have a higher cost relative to a shorter Program. A Program of this scale is unprecedented and will require a massive coordination effort for its success. Construction durations of 10, 15 and 20 years were considered to determine a realistic time period for the Program delivery. Consideration was given to the factors that would affect the Program duration and overall coordination. BOE and Harris interviewed representatives from the construction industry and investigated other citywide street programs in the cities of San Francisco and Santa Ana. This section includes an analysis of the factors and concerns that could affect the Program duration and provides a preliminary concept of how the Program would be structured.

A primary question was to consider how many years would be required for the construction of approximately 8,700 lane miles of roadway improvements? This is a complex question with many factors to consider, including the capacity of the contracting community, consultant and City staffing required, ability of the roadway network to handle traffic restrictions and the public's tolerance of traffic delays. There are multiple factors that could cause delays to individual projects or streets or to the Program as a whole. Table 7-1 shows a list of considerations for a 10, 15 or 20 year construction period.

Table 7-1

| No. | Subcategory | Consideration | Comments |
|---|---|---|---|
| Category: Program Management | | | |
| 1 | Scope | Prioritization and Annual Selection of Streets & Traffic Impacts | The approach to how the streets will be packaged each year could have a significant influence on cost and traffic impacts. One approach would be to objectively analyze every street segment, package projects to maximize contractor efficiency and minimize traffic impacts. Another would be to annually package those streets that are most desired to be completed. A blended approach would start with a small number of the highest priority streets and then build efficient packages around those. |
| 2 | Scope & Public Expectations | Definition of Eligible Streets | The pavement condition shown in the database of D & F streets will change over time as streets age and complete assessments are conducted. The SOSLA program should not limit the eligible streets to those currently mapped in order to ensure that the streets most in need in the future can be repaired. |
| 3 | Scope & Public Expectations | Great/Green/Complete Street Elements Not Included in Estimate, Schedule | The current program schedule and cost estimate does not include construction beyond fundamental needs for paving, access ramps, and curb and gutter repair. However the funding of these elements will increase the likelihood of leveraging them to obtain grant or other funding for other elements such as Great/Green/Complete/Cool Street concepts. Including of these items will be more feasible with a longer construction period. |
| 4 | Scope & Public Expectations | Sidewalks/Stormdrains/Alleys/Griffith Park Not Included in Estimate, Schedule | Very similar to Great/Green/Complete street elements; sidewalks, stormdrains and alleys are not included in the cost estimate or schedule. A limited level of sidewalk and storm drain reconstruction will likely be necessary whether officially part of the program or not, just to be able to reconstruct failed curb and gutter locations and install new access ramps. However, a longer construction duration would provide a greater ability to coordinate effectively with a sidewalk or other related program should one be funded separately. |
| 5 | Cost/Time | Cost Escalation | Cost estimates for all schedule options are heavily influenced by the assumed escalation rate and thus the actual future escalation compared to the assumed rate will have a greater influence on whether the full program can be delivered within the estimated cost. A shorter construction schedule results in less cost due to escalation, however a schedule that is too short may also result in increased costs due to potential delivery inefficiencies and saturation of the construction marketplace. |

TABLE 7-1

| No. | Subcategory | Consideration | Comments |
|---|---|---|---|
| 6 | Cost/Time | Schedule Delays and Overlaps | There are many items that could cause construction delays such as unforeseen field conditions or contractor insolvency. Shorter program timelines have less tolerance for recovering from project schedule issues. |
| 7 | Staffing | Staffing Implementation | The magnitude of this construction program will be immense. Even though a large portion of staffing would be provided by consultants a significant number of City staff will also be required. It will still take a great deal of time and effort to put the full team together. It will require many rounds of interviews and hiring of City and consultant staff, as well as the solicitation and execution of consultant contracts and the definition and issuance of work tasks. Selected consultants will also need to hire new staff and train them for a program of this size. Longer program schedules will allow for smoother and more efficient staffing and will actually reduce the overall number of people that would need to be hired by spreading the work such that less would need to be delivered each year. |
| 8 | Staffing | Necessary Staffing Level | We can estimate the staffing needs, but because a program of this type and magnitude in LA is unprecedented it will not fully be known until we are underway and have delivered some projects. Longer timelines allow for some early learning at a lower delivery level before needing to fully staff and therefore allow for an optimized staffing plan avoiding potential excess costs of overstaffing. |
| 9 | Coordination | Coordination with Other Programs (Metro, Gas, Sewer, Storm Drain, DWP, BSS) | Ideally this program will be well coordinated with planned work and system upgrades with City projects as well as other entities with projects in the streets such that construction work among the various agencies would be coordinated to coincide or be back to back when possible but at the very least would avoid situations where new streets would be cut. Longer programs offer more time for coordination of work. |
| 10 | Cost/Time | Ramping Up - Building Public Trust and Incorporating Lessons Learned | The early years of the program will be under great public scrutiny. A longer program duration offers the ability to start on a smaller scale with well thought out projects to build public trust and incorporate lessons learned before rolling out a massive scale of projects. |
| 11 | Cost/Time | Definition of Eligible Time Period | It is almost certain that there will be some projects that encounter delays for a variety of reasons, or that should be put on hold for a reasonable time period to coordinate with other outside work or new grants. If the target time frame for construction is worded in the funding eligibility as a hard requirement, it could result in not being able to complete some of the projects in the program or not being able to coordinate effectively in the latter years of the program. |
| 12 | Staffing | Trees – Need for Arborists to Address Root Pruning | Although the early program description and cost estimates do not provide for sidewalk repair, there will be some cases where sidewalk repair will be required or where curb/gutter repairs will require tree root pruning which will require the services of specialized arborists. Some of these may also require coordination with private property owners. |
| 13 | Staffing | Monument Preservation | The City is required, per Business and Professional Code 8771, to maintain a network of survey monuments which are used by public and private surveyors. The preservation of survey monuments is very important because every lost monument will require more than double the cost to replace as compared to the cost to preserve the monument in coordination with construction. Shorter programs with less ramp-up times will be more of a challenge to monument preservation. |
| 14 | Coordination | Caltrans and Railroad Permits | Permits such as these take a lot of lead time, sometimes years, and some of the subject streets will require them. |
| 15 | Maintenance | Future Maintenance by BSS | With a greater inventory of streets with ratings from A-C, Bureau of Street Services will need to do more annual maintenance. Longer program timelines allow for a more gradual adjustment. |
| Category: Design and Construction | | | |
| 16 | Utilities | Utility Coordination - Street Cuts | The City will issue an estimated 55,000 utility and sewer permits for the candidate streets during a 15 year construction program. The SOSLA program will be coordinated with utility companies to minimize new streets from being damaged, however due to the sheer volume of work, street cuts are unavoidable. Longer Programs offer opportunity to better coordinate projects and for Utilities to get their work done prior to construction. |
| 17 | Unforeseen Conditions | Variations in Existing Street Thickness | Due to the age of the street system, the thickness of existing streets is often not well known and thus assumptions have been made to develop a cost estimate. Variations from the assumed thicknesses could result in significant cost impacts. |
| 18 | Construction Contracting | Project Construction Contract Procurement Process (and the Impact on the Marketplace) | The shorter the timeline, the greater the risk that the marketplace for contractors and materials will be saturated and thus drive up the price due to material cost escalations or a reduction in competitiveness |
| 19 | Construction Contracting | Trucking Availability | Trucking costs for the size of the construction program will be influenced by the length and design of the program. |
| 20 | Traffic Coordination | Reducing Traffic Impact | The program could gridlock traffic in certain areas if not carefully planned and implemented. It will be critical to package and phase projects to minimize traffic impacts. Longer program schedules will reduce the annual impact and allow for more effective coordination. |
| 21 | Transit Coordination | Coordination with Transit | A street program of this magnitude will require extensive coordination with transit agencies for transit route adjustments. |
| 22 | Unforeseen Conditions | Inclement Weather | Inclement weather is a significant uncertainty. Some years have little rain while others have rain on and off for months. Streets are not reconstructed during rainy weather because the exposed subgrade becomes saturated and muddy resulting in delays and extra costs. The shorter the timeline to complete the program, the more significant it would be to make up time lost to rain delays. |
| 23 | Traffic Mitigation | Construction During Peak Hours | Currently work is not allowed on City streets during peak traffic hours. But, in some cases, full or partial exemptions are approved because it may make sense to get the street back in service quicker. Longer program timelines allow for more planning and less concurrent construction. |
| 24 | Utilities | Street Cut Moratorium | A One Year Street Cut Moratorium exists currently. Extension to a longer moratorium for streets would preserve pavement. |
| 25 | Unforeseen Conditions | Changes in Oil Prices | Asphalt is a large portion of the cost of the program and asphalt prices are tied to oil prices. Increases in oil prices could result in additional cost escalation. |
| 26 | Unforeseen Conditions | Need for Soil Stabilization | The cost estimate assumes that reconstructions will require base and paving reconstruction, but in some areas subgrades may require improvements that are not included in the cost estimate. |
| 27 | Nonstandard Areas | Hilly Areas - Drainage Patterns Could Increase Liability | Extra care must be taken in hilly areas that may not have regular curbs/gutters with subsurface storm drain systems because errant runoff can result in slope damage and liability. Even maintaining existing geometry may increase liability because it could be argued that the street should have been improved via the project. |
| 28 | Nonstandard Areas | Hilly Areas - Road Stabilization | Hilly areas often contain unique challenges including the absence of curbs and thus the need for special edge confinement and/or support that will require extra design and will cost more, but early estimates have not had the time/resources to estimate the full impact. |
| 29 | Utilities | Utility Impacts | Project delays due to unforeseen utilities, accidental utility damage and/or utilities with prior rights. These will likely consist of vaults, cabinets (in curb ramps), meters, etc., as opposed to utility pipelines. |

TABLE 7-1

| No. | Subcategory | Consideration | Comments |
|---|---|---|---|
| Category: Public Relations | | | |
| 30 | Business Impacts | Business Coordination and Impact | Coordination with businesses is often significant even with small street projects. A program of the SOSLA magnitude will require extensive coordination effort. Longer timelines reduce the annual coordination effort and also provide more flexibility in scheduling. Longer durations allow for more notice for businesses to prepare for the disruption. |
| 31 | Community | Coordination with Schools and Community Events | Shorter program timelines make community coordination more challenging due to the magnitude of the annual workload and the short ramp-up period. |
| 32 | Community | Public Relations (Neighborhood meetings, Media, Website) | Shorter program timelines make public relations more challenging due to the magnitude of the annual workload and the short ramp-up period. |
| 33 | Environment | Public Works Green Street Policy | The Board of Public Works adopted a green street policy on July 11, 2011, which, among other things, calls for the incorporation of green street elements and BMP's whenever funding is available. With a program of this size, it would be desirable to have at least some green street elements in suitable projects. Longer program timelines give more time to study and implement such features. |
| 34 | Traffic Impacts | Unique Impacts to Hillside Neighborhoods | Hillside areas are often more challenging for mitigation of construction impacts. For example, detours can be more challenging due to the irregularity of the road network. |
| 35 | Traffic Impacts | Impacts to Traffic and Parking on Local and Select Streets | Longer Programs offer opportunity to spread work out and reduce traffic impacts |
| 36 | Community | Planning Mobility Element | Planning has initiated a mobility element in the new City General Plan, and the feedback from this should be captured in the paving effort. |
| 37 | Community | 2010 Bicycle Plan Not Incorporated | The 2010 bicycle plan adopted by City Council March 1, 2011 (C.F. 102385-S2) and also implemented under Executive Directive 20 (AV Series July 1, 2011) is not currently incorporated into the work plan or the cost estimates. While some elements such as striping could likely be incorporated into the projects, there would still be some complications because many streets only have patchwork segments rated as D or F which would be problematic unless there is a plan to carry the striping through the other segments as well. |
| 38 | Community | Trucking Haul Routes | Truck haul routes could have significant community impacts and thus would require careful review and coordination. |

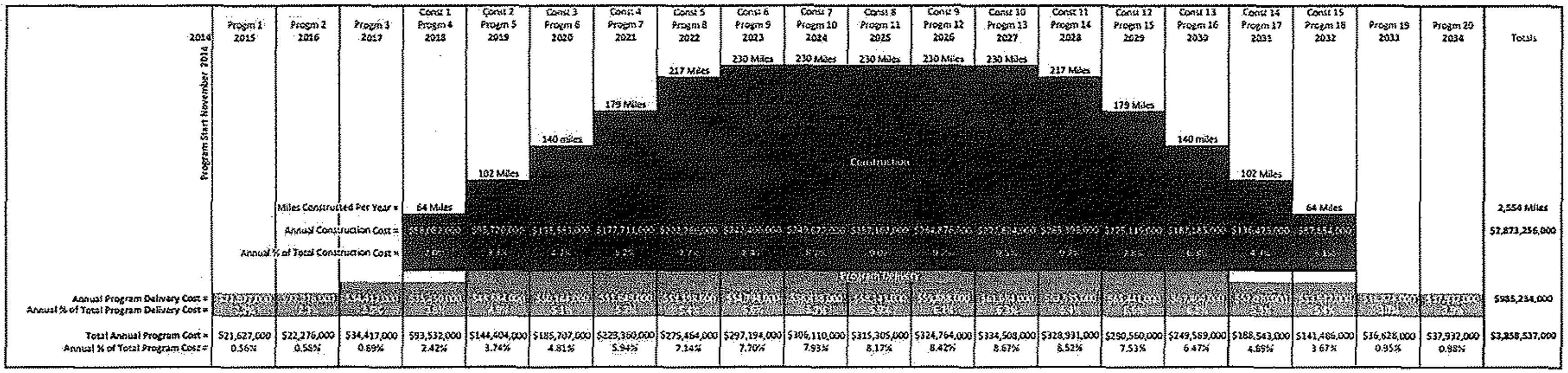
It is recommended that a 15-year construction period be used for the Program Estimate because it offers a balance between constructing the work in a relatively short time to minimize costs, and allowing for adequate time to plan and coordinate the work. All references in this document to construction periods are intended as "scheduled construction periods" and are not intended to be interpreted as a proposed funding eligibility window.

A 10-year construction duration would require constructing approximately 250 centerline miles per year, and would require full production in the first year of the construction phase, and that full production be maintained through the last year. This would be difficult to achieve on both ends. It would be more efficient to ramp up production in the beginning of the program as staff is hired and trained. Also, achieving full production in the last year would be very difficult as well because the odds of all remaining projects in that last year not having any type of challenges would be remote.

If a 10 year construction duration were to accommodate scaling up and down, the remaining full years of production would require approximately 300 centerline miles per year, which is considered too aggressive, especially considering that the BSS resurfacing program will be continuing as well. Overall, the 10 year construction duration is thought to be technically feasible, but staffing for those early full production years would be very difficult. Proper coordination of work would be an extreme challenge and the potential for increased traffic impacts would be high. A 15-year construction duration allows additional time for the construction operations to scale up and down in the first and last few year of construction, and therefore would allow for more efficient staffing and for time for Program coordination. It would also offer much more of an opportunity to coordinate with potential grant funding that might be obtained for elements related to things such as 'Green Streets' and 'Great Streets' by leveraging the basic street work funding. Delivery of the program over a 15-year construction period would still not be easy by any means, as the

**SOSLA Program - Illustration of Potential Annual Cost (Estimate 1)**

Revised 2-27-14




- 15 Year Construction Period
- 3 Year Program Pre-Construction
- 2 Year Program Post-Construction

Figure 7-2

**SOSLA Program - Illustratation of Potential Annual Cost (Estimate 2)**

Revised 2-27-14

| 2014 (Program Start November 2014) | Progm 1 2015 | Progm 2 2016 | Progm 3 2017 | Const 1 Progm 4 2018 | Const 2 Progm 5 2019 | Const 3 Progm 6 2020 | Const 4 Progm 7 2021 | Const 5 Progm 8 2022 | Const 6 Progm 9 2023 | Const 7 Progm 10 2024 |
|---|---|---|---|---|---|---|---|---|---|---|
| Miles Constructed Per Year = | | | | 64 Miles | 102 Miles | 140 miles | 179 Miles | 217 Miles | 230 Miles | 230 Miles |
| Annual Construction Cost = | | | | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| Annual % of Total Construction Cost = | | | | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| Annual Program Delivery Cost = | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| Annual % of Total Program Delivery Cost = | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| Total Annual Program Cost = | $19,858,000 | $20,454,000 | $31,601,000 | $85,945,000 | $132,742,000 | $170,114,000 | $210,756,000 | $252,958,000 | $273,113,000 | $281,307,000 |
| Annual % of Total Program Cost = | 0.56% | 0.58% | 0.89% | 2.42% | 3.75% | 4.81% | 5.95% | 7.14% | 7.71% | 7.94% |

| 2014 (Program Start November 2014) | Const 8 Progm 11 2025 | Const 9 Progm 12 2026 | Const 10 Progm 13 2027 | Const 11 Progm 14 2028 | Const 12 Progm 15 2029 | Const 13 Progm 16 2030 | Const 14 Progm 17 2031 | Const 15 Progm 18 2032 | Progm 19 2033 | Progm 20 2034 | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Miles Constructed Per Year = | 230 Miles | 230 Miles | 230 Miles | 217 Miles | 179 Miles | 140 miles | 102 Miles | 64 Miles | | | 2,554 Miles |
| Annual Construction Cost = | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | | | $2,639,978,000 |
| Annual % of Total Construction Cost = | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | | | |
| Annual Program Delivery Cost = | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | $904,522,000 |
| Annual % of Total Program Delivery Cost = | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | |
| Total Annual Program Cost = | $289,745,000 | $298,439,000 | $307,392,000 | $302,046,000 | $266,979,000 | $228,993,000 | $173,315,000 | $130,000,000 | $33,807,000 | $34,821,000 | $3,544,500,000 |
| Annual % of Total Program Cost = | 8.17% | 8.42% | 8.67% | 8.52% | 7.53% | 6.46% | 4.89% | 3.67% | 0.95% | 0.98% | |

- 15 Year Construction Period
- 3 Year Program Pre-Construction
- 2 Year Program Post-Construction

Figure 7-3

peak construction years would still be completing about 200 centerline miles per year, but it would be much more manageable. A 20-year construction period would offer further opportunities for coordination and ramp-up of staffing and construction, however, the benefits of a 20-year construction period were not found to outweigh the extra escalation cost that would be incurred. It is estimated that the overall Program delivery period will require approximately 20 years for a 15-year construction period, with approximately 3 years of pre-construction activities required prior to the start of major construction in 2017, and approximately 2 years needed after the 15 year construction period to close out projects and the Program's coordination, financial and administrative elements. A cash flow diagram of a 15-year construction program for each estimate is diagrammed in Figures 7-2 and 7-3.

## 7.2 Prioritization of Streets

As stated previously, PMP data is limited and not typically used in the development of actual construction quantities or contract documents. The ultimate selection of streets to be included in the Program should not be based solely on the PCI rating developed from the PMP. The 8,700 lane miles, used for this estimate, is representative of the anticipated scale and scope of the Program based on the information that is presently available. The actual streets and number of lane miles to be constructed under the proposed Program is difficult to predict at this time. Selection of streets to be included in the Program is subject to refinement as streets are prioritized and more details are obtained during the design and development phase of the Program. A preliminary method for prioritizing streets was considered and is outlined below.

It is recommended that a Geographic Information System (GIS) be developed in the early years of the program to apply objective criteria to each street segment for use in prioritizing them and packaging them into projects.

The system would assign a weighted score to each street segment based on specific criteria, such as:

- PCI rating
- Street type
- Traffic density
- Street or drainage complaints
- Readiness for construction
- Clearance of conflict with utilities and other programs
- Public Transit Use
- Bike Plan route type
- Proximity to police and fire stations, hospitals and schools.

Street segments are recommended to be grouped into projects by geographic location such that the segments in an individual project would be in a similar area, and that the projects as a whole would be distributed throughout the City to minimize the impact to individual areas and to provide all areas and Council Districts of the City with some benefit each year.

# 8. ESTIMATE

Two estimates were developed for the Program based on a 15-year construction period. The separate Estimates vary based on the percent of the pavement area requiring removal and reconstruction. The percentage of reconstruction is one of the most significant factors influencing the construction cost. The range of the percentage of reconstruction was established based on a random field sampling of the current D and F streets and as described in Section 5 of this report. The First Estimate for the SOSLA program is $3.85 Billion. This estimate uses an average escalation of 3% and the mean range of removal percentages.

A Second Estimate was also developed using an average escalation of 3% and the lower range of the percentage of reconstruction that may be required. This was done to present a lower Program cost option. Using these lower values, the Program is estimated to cost approximately $3.54 Billion. However, it is important to note that during construction, should the actual reconstruction percentage be greater than the Lower range, additional funding may be needed to complete the Program.

The following pages summarize the two Estimate scenarios developed, based on the ranges for the percent of roadway reconstruction.

## Estimate - SOSLA Cost Estimate

**CONSTRUCTION COST ESTIMATE (Level 'C')**

**REVISED 2-18-14**

**15 Year Construction Period**
**20 Year Program Devilery**
**2550 Centerline Miles/ 8700 Lane Miles**
**Average 170 Miles (Ranging from 64 to 230 Miles per Year)**
**Mean Range of Pavement Removals**
**Unit Costs Includes 3% Annual Escalation**

| Item No. | Item Description | Unit Cost | Units | Probable Quantity | Item Total | % of Total Cost | Basis/ Assumption |
|---|---|---|---|---|---|---|---|
| | **Hard Construction Costs** | | | | | | |
| 1 | Construct 2-inch Asphalt Concrete (AC) Surface Course | $1.50 | SF | 501,045,390 | $751,568,085 | 19.48% | Total Area |
| 2 | Remove & Replace Failed Roadway - Select (12" Removal, Replace 6"AC/ 6"AB) | $9.30 | SF | 45,437,730 | $422,570,889 | 10.95% | 23% to Total Area Based Field Reviews (Appendix) |
| 3 | Remove & Replace Failed Roadway - Local (8" Removal, Replace 2"AC/ 6"AB) | $4.80 | SF | 59,982,770 | $287,917,296 | 7.46% | 20% to Total Area Based Field Reviews (Appendix) |
| 4 | Removal of failing APC and PCC (12-inch Depth) and Construct 6"AC/6" AB - Select | $13.75 | SF | 5,105,360 | $70,198,700 | 1.82% | 6% of APC and PCC Areas Outside HPOZ (Appendix) |
| 5 | Removal of failing APC and PCC (8-inch Depth) and Construct 2"AC/6" AB - Local | $7.30 | SF | 6,499,970 | $47,449,783 | 1.23% | 8% of APC and PCC Areas Outside HPOZ (Appendix) |
| 6 | Remove and Replace PCC Roadway in HPOZ (8" Thick) - Local | $14.90 | SF | 814,370 | $12,134,113 | 0.31% | 20% of PCC Area in HPOZ |
| 7 | Remove and Replace PCC Roadway (10" Thick, HPOZ) - Select | $21.10 | SF | 89,570 | $1,889,927 | 0.05% | 20% of PCC Area in HPOZ |
| 8 | Access Ramps - Local (includes removals) | $3,595.00 | Each | 48,570 | $174,609,150 | 4.53% | 2.5 Ramps Per Segment (Appendix) |
| 9 | Access Ramps - Select (includes removals) | $3,970.00 | Each | 20,650 | $81,980,500 | 2.12% | 3 Ramps Per Segment |
| 10 | Grinding/ Coldmilling | $0.45 | SF | 312,340,810 | $140,553,365 | 3.64% | Locals - 6' wedge grind along gutter (AC & PCC) Select - Total Area |
| 11 | Adjust Surface Utility to Grade | $620.00 | Each | 60,240 | $37,348,800 | 0.97% | Length/ 250' (local), Length/ 175' (Select) |
| 12 | PCC Curb and Gutter R&R - Local ( 6-inch ) | $34.75 | LF | 490,440 | $17,042,790 | 0.44% | 5% of Centerline Length |
| 13 | PCC Curb and Gutter R&R - Select ( 8-inch ) | $42.00 | LF | 183,740 | $7,717,080 | 0.20% | 5% of Centerline Length |
| 14 | Bus Pads - Select Streets only | $22.45 | SF | 591,570 | $13,280,747 | 0.34% | 1 Bus Pad per Mile, Includes removal of existing |
| 15 | PCC Cross Gutter R&R 6-inches - Local | $17.45 | SF | 349,660 | $6,101,567 | 0.16% | 15% of Existing to be Reconstructed (0.60 per Segment) |
| 16 | PCC Cross Gutter R&R 8-inches - Select | $24.85 | SF | 72,280 | $1,796,158 | 0.05% | 15% of Existing to be Reconstructed (0.20 per Segment) |
| 17 | Striping Replacement - Local | $1.20 | LF | 9,808,910 | $11,770,692 | 0.31% | Lineal foot of striping (1 x Centerline Length) |
| 18 | Striping Replacement - Select | $1.20 | LF | 22,048,420 | $26,458,104 | 0.69% | Lineal foot of striping (6 x Centerline Length) |
| 19 | Traffic Loops - Select | $440.00 | Each | 58,790 | $25,867,600 | 0.67% | 20 Loops per Signalized Intersections (Assume intersection at every 1250') |
| | | | | Sub-Total = | $2,138,255,345 | | |
| | **Misc Construction Costs** | | | | | | |
| 20 | Mobilization | 2.00 | % | Hard Cost | $42,765,107 | 1.11% | Assumed based on Past Construction Projects |
| 21 | Traffic Control | 1% to 3% | % | Hard Cost | $42,255,436 | 1.10% | 1% Local streets, 3% for Select streets |
| 22 | SWPPP Implementation | 0.75 | % | Hard Cost | $16,036,915 | 0.42% | Assumed based on Past Construction Projects |
| 23 | Construction Staking and Monument Preservation | 1.50 | % | Hard Cost | $32,073,830 | 0.83% | Assumed based on Past Construction Projects |
| | | | | Misc Construction Cost Sub-Total = | $133,131,288 | | |
| | | | | Construction Cost Sub-Total = | $2,271,386,633 | | |
| | | | | 15% Construction Contingency = | $340,707,995 | 8.83% | |
| | | | | Construction Cost = | $2,612,094,628 | 67.70% | |
| | **Program Delivery Costs** | | | | | | |
| 24 | Material Testing for Construction (Batch Plant inspections & in-place testing) | 2.00 | % | Contruction Cost | $52,241,893 | 1.35% | Assumed based on Past Construction Projects |
| 25 | Program Management & Public Outreach | 6.05 | % | Construction Cost | $158,031,725 | 4.10% | Performed By City & Consultant Staff |
| 26 | Design - Local (includes, Survey, Geotechnical, Deflection Testing, PS&E) | 8.50 | % | Local Streets Construction Cost | $112,615,655 | 2.92% | Performed By City & Consultant Staff |
| 27 | Design - Select (includes, Survey, Geotechnical, Deflection Testing, PS&E) | 10.00 | % | Select Streets Construction Cost | $128,720,457 | 3.34% | Performed By City & Consultant Staff |
| 28 | Construction Management | 8.50 | % | Construction Cost | $222,028,043 | 5.75% | Performed By City & Consultant Staff |
| 29 | Inspection | 8.50 | % | Construction Cost | $222,028,043 | 5.75% | Performed By City & Consultant Staff |
| | | | | Project Delivery Cost Sub-Total = | $895,665,816 | 23.21% | |
| | | | | Sub-Total= | $3,507,760,445 | | |
| | | | | 10% Program Contingency = | $350,776,044 | 9.09% | |
| | | | | Total Cost = | $3,858,536,489 | | |

## Alternative Estimate - SOSLA Cost Estimate

**CONSTRUCTION COST ESTIMATE (Level 'C')**

**REVISED 2-18-14**

**15 Year Construction Period**
**20 Year Program Devilery**
**2550 Centerline Miles/ 8700 Lane Miles**
**Average 170 Miles (Ranging from 64 to 230 Miles per Year)**
**Lower Range of Pavement Removals**
**Unit Costs Includes 3% Annual Escalation**

| Item No. | Item Description | Unit Cost | Units | Probable Quantity | Item Total | % of Total Cost | Basis/ Assumption |
|---|---|---|---|---|---|---|---|
| | **Hard Construction Costs** | | | | | | |
| 1 | Construct 2-inch Asphalt Concrete (AC) Surface Course | $1.50 | SF | 501,045,390 | $751,568,085 | 21.20% | Total Area |
| 2 | Remove & Replace Failed Roadway - Select (12" Removal, Replace 6"AC/ 6"AB) | $9.30 | SF | 37,323,850 | $347,111,805 | 9.79% | 23% to Total Area Based Field Reviews (Appendix) |
| 3 | Remove & Replace Failed Roadway - Local (8" Removal, Replace 2"AC/ 6"AB) | $4.80 | SF | 54,529,790 | $261,742,992 | 7.38% | 20% to Total Area Based Field Reviews (Appendix) |
| 4 | Removal of failing APC and PCC (12-inch Depth) and Construct 6"AC/6" AB - Select | $13.75 | SF | 1,914,510 | $26,324,513 | 0.74% | 6% of APC and PCC Areas Outside HPOZ (Appendix) |
| 5 | Removal of failing APC and PCC (8-inch Depth) and Construct 2"AC/6" AB - Local | $7.30 | SF | 2,736,825 | $19,978,825 | 0.56% | 8% of APC and PCC Areas Outside HPOZ (Appendix) |
| 6 | Remove and Replace PCC Roadway in HPOZ (8" Thick) - Local | $14.90 | SF | 814,370 | $12,134,113 | 0.34% | 20% of PCC Area in HPOZ |
| 7 | Remove and Replace PCC Roadway (10" Thick, HPOZ) - Select | $21.10 | SF | 89,570 | $1,889,927 | 0.05% | 20% of PCC Area in HPOZ |
| 8 | Access Ramps - Local (includes removals) | $3,595.00 | Each | 48,570 | $174,609,150 | 4.93% | 2.5 Ramps Per Segment (Appendix) |
| 9 | Access Ramps - Select (includes removals) | $3,970.00 | Each | 20,650 | $81,980,500 | 2.31% | 3 Ramps Per Segment |
| 10 | Grinding/ Coldmilling | $0.45 | SF | 312,340,810 | $140,553,365 | 3.97% | Locals - 6' wedge grind along gutter (AC & PCC) Select - Total Area |
| 11 | Adjust Surface Utility to Grade | $620.00 | Each | 60,240 | $37,348,800 | 1.05% | Length/ 250' (local); Length/ 175' (Select) |
| 12 | PCC Curb and Gutter R&R - Local ( 6-inch ) | $34.75 | LF | 490,440 | $17,042,790 | 0.48% | 5% of Centerline Length |
| 13 | PCC Curb and Gutter R&R - Select ( 8-inch ) | $42.00 | LF | 183,740 | $7,717,080 | 0.22% | 5% of Centerline Length |
| 14 | Bus Pads - Select Streets only | $22.45 | SF | 591,570 | $13,280,747 | 0.37% | 1 Bus Pad per Mile, includes removal of existing |
| 15 | PCC Cross Gutter R&R 6-inches - Local | $17.45 | SF | 349,660 | $6,101,567 | 0.17% | 15% of Existing to be Reconstructed (0.60 per Segment) |
| 16 | PCC Cross Gutter R&R 8-inches - Select | $24.85 | SF | 72,280 | $1,796,158 | 0.05% | 15% of Existing to be Reconstructed (0.20 per Segment) |
| 17 | Striping Replacement - Local | $1.20 | LF | 9,808,910 | $11,770,692 | 0.33% | Lineal foot of striping (1 x Centerline Length) |
| 18 | Striping Replacement - Select | $1.20 | LF | 22,048,420 | $26,458,104 | 0.75% | Lineal foot of striping (6 x Centerline Length) |
| 19 | Traffic Loops - Select | $440.00 | Each | 58,790 | $25,867,600 | 0.73% | 20 Loops per Signalized Intersections (Assume intersection at every 1250') |
| | | | | Sub-Total = | $1,965,276,812 | | |
| | **Misc Construction Costs** | | | | | | |
| 20 | Mobilization | 2.00 | % | Hard Cost | $39,305,536 | 1.11% | Assumed based on Past Construction Projects |
| 21 | Traffic Control | 1% to 3% | % | Hard Cost | $38,138,985 | 1.08% | 1% Local streets, 3% for Select streets |
| 22 | SWPPP Implementation | 0.75 | % | Hard Cost | $14,739,576 | 0.42% | Assumed based on Past Construction Projects |
| 23 | Construction Staking and Monument Preservation | 1.50 | % | Hard Cost | $29,479,152 | 0.83% | Assumed based on Past Construction Projects |
| | | | | Misc Construction Cost Sub-Total = | $121,663,250 | | |
| | | | | Construction Cost Sub-Total = | $2,086,940,062 | | |
| | | | | 15% Construction Contingency = | $313,041,009 | 8.83% | |
| | | | | Construction Cost = | $2,399,981,071 | 67.71% | |
| | **Program Delivery Costs** | | | | | | |
| 24 | Material Testing for Construction (Batch Plant inspections & in-place testing) | 2.00 | % | Construction Cost | $47,999,621 | 1.35% | Assumed based on Past Construction Projects |
| 25 | Program Management & Public Outreach | 6.05 | % | Construction Cost | $145,198,855 | 4.10% | Performed By City & Consultant Staff |
| 26 | Design - Local (Includes, Survey, Geotechnical, Deflection Testing, PS&E) | 8.50 | % | Local Streets Construction Cost | $107,096,530 | 3.02% | Performed By City & Consultant Staff |
| 27 | Design - Select (Includes, Survey, Geotechnical, Deflection Testing, PS&E) | 10.00 | % | Select Streets Construction Cost | $114,002,190 | 3.22% | Performed By City & Consultant Staff |
| 28 | Construction Management | 8.50 | % | Construction Cost | $203,998,391 | 5.76% | Performed By City & Consultant Staff |
| 29 | Inspection | 8.50 | % | Construction Cost | $203,998,391 | 5.76% | Performed By City & Consultant Staff |
| | | | | Project Delivery Cost Sub-Total = | $822,293,978 | 23.20% | |
| | | | | Sub-Total = | $3,222,275,048 | | |
| | | | | 10% Program Contingency = | $322,227,505 | 9.09% | |
| | | | | Total Cost = | $3,544,502,553 | | |

# Appendix A: Estimate Details

## SOSLA - Cost Estimate - Summary

REVISED 2-18-14

| Local 'D' - Draft Cost Estimate | Mean Range of Removals | Low Range of Removals | 2,287 | Lane-miles |
|---|---|---|---|---|
| Hard Construction Costs | $458,300,077 | $439,157,268 | 56% | of Total |
| Misc Construction Costs | $24,060,754 | $23,055,757 | 3% | of Total |
| Construction Cost Sub-Total | $482,360,831 | $462,213,025 | | |
| 15% Contingency on Construction | $72,354,125 | $69,331,954 | 9% | of Total |
| **Local 'D' Construction Cost** | **$554,714,956** | **$531,544,978** | | |
| Project Delivery Costs | $186,106,868 | $178,333,340 | 23% | of Total |
| 10% Program Contingency | $74,082,182 | $70,987,832 | 9% | |
| **Local 'D' Total Cost** | **$814,904,006** | **$780,866,150** | | |
| | $356,372 | $341,486 | | Cost Per Lane-mile |

| Local 'F' - Draft Cost Estimate | Mean Range of Removals | Low Range of Removals | 3,067 | Lane-miles |
|---|---|---|---|---|
| Hard Construction Costs | $636,311,145 | $601,808,692 | 56% | of Total |
| Misc Construction Costs | $33,406,335 | $31,594,956 | 3% | of Total |
| Construction Cost Sub-Total | $669,717,480 | $633,403,649 | | |
| 15% Contingency on Construction | $100,457,622 | $95,010,547 | 9% | of Total |
| **Local 'F' Construction Cost** | **$770,175,103** | **$728,414,196** | | |
| Project Delivery Costs | $258,393,747 | $244,382,963 | 23% | of Total |
| 10% Program Contingency | $102,856,885 | $97,279,716 | 9% | |
| **Local 'F' Total Cost** | **$1,131,425,734** | **$1,070,076,875** | | |
| | $368,924 | $348,920 | | Cost Per Lane-mile |

| Select 'D' - Draft Cost Estimate | Mean Range of Removals | Low Range of Removals | 1,634 | Lane-miles |
|---|---|---|---|---|
| Hard Construction Costs | $506,927,296 | $448,191,192 | 55% | of Total |
| Misc Construction Costs | $36,752,229 | $32,493,861 | 4% | of Total |
| Construction Cost Sub-Total | $543,679,524 | $480,685,053 | | |
| 15% Contingency on Construction | $81,551,929 | $72,102,758 | 9% | of Total |
| **Select 'D' Construction Cost** | **$625,231,453** | **$552,787,811** | | |
| Project Delivery Costs | $219,143,624 | $193,752,128 | 24% | of Total |
| 10% Program Contingency | $84,437,508 | $74,653,994 | 9% | |
| **Select 'D' Total Cost** | **$928,812,585** | **$821,193,932** | | |
| | $568,351 | $502,498 | | Cost Per Lane-mile |

| Select 'F' - Draft Cost Estimate | Mean Range of Removals | Low Range of Removals | 1,717 | Lane-miles |
|---|---|---|---|---|
| Hard Construction Costs | $536,716,828 | $476,119,660 | 55% | of Total |
| Misc Construction Costs | $38,911,970 | $34,518,675 | 4% | of Total |
| Construction Cost Sub-Total | $575,628,797 | $510,638,335 | | |
| 15% Contingency on Construction | $86,344,320 | $76,595,750 | 9% | of Total |
| **Select 'F' Construction Cost** | **$661,973,117** | **$587,234,086** | | |
| Project Delivery Costs | $232,021,578 | $205,825,547 | 24% | of Total |
| 10% Program Contingency | $89,399,469 | $79,305,963 | 9% | |
| **Select 'F' Total Cost** | **$983,394,164** | **$872,365,596** | | |
| | $572,769 | $508,101 | | Cost Per Lane-mile |

| All Street' - Draft Cost Estimate | Mean Range of Removals | Low Range of Removals | 8,705 | Lane-miles |
|---|---|---|---|---|
| Hard Construction Costs | $2,138,255,345 | $1,965,276,812 | 55% | of Total |
| Misc Construction Costs | $133,131,288 | $121,663,250 | 3% | of Total |
| Construction Cost Sub-Total | $2,271,386,633 | $2,086,940,062 | | |
| 15% Contingency on Construction | $340,707,995 | $313,041,009 | 9% | of Total |
| **Total Construction Cost** | $2,612,094,628 | $2,399,981,071 | | |
| Project Delivery Costs | $895,665,816 | $822,293,978 | 23% | of Total |
| 10% Program Contingency | $350,776,044 | $322,227,505 | 9% | |
| **All Streets Total Cost** | **$3,858,536,489** | **$3,544,502,553** | | |
| | $443,274 | $407,197 | | Ave Per Lane-mile |