RON GALPERIN
CONTROLLER

September 17, 2015

Eugene Seroka, Executive Director
Los Angeles Harbor Department
425 Palos Verdes Street
San Pedro, CA 90731

Dear Mr. Seroka:

Enclosed is the final report entitled "Audit of the City's Change Order Management Process." A draft of this report was previously provided to your Office and comments and additional information provided by your staff at the exit conference held on August 5, 2015 were considered as we finalized the report.

Please review the report and advise the Controller's Office by October 16, 2015 of the actions planned and/or taken to implement the recommendations that are addressed to POLA. An electronic template can be provided to your staff to facilitate this process.

If you have any questions or comments, please contact me at farid.saffar@lacity.org or (213) 978-7392.

Sincerely,

FARID SAFFAR, CPA
Director of Auditing

cc: Vilma Martinez, President, Board of Harbor Commissioners
Ana Guerrero, Chief of Staff, Office of the Mayor
Sharon Tso, Chief Legislative Analyst
Holly L. Wolcott, City Clerk
Independent City Auditors

RON GALPERIN
CONTROLLER

September 17, 2015

Deborah Flint, Chief Executive Officer and General Manager
Los Angeles World Airports
#1 World Way
Los Angeles, CA 90045

Dear Ms. Flint:

Enclosed is the final report entitled "Audit of the City's Change Order Management Process." A draft of this report was previously provided to your Office and comments and additional information provided by your staff at the exit conference held on August 14, 2015 were considered as we finalized the report.

Please review the report and advise the Controller's Office by October 16, 2015 of the actions planned and/or taken to implement the recommendations that are addressed to LAWA. An electronic template can be provided to your staff to facilitate this process.

If you have any questions or comments, please contact me at farid.saffar@lacity.org or (213) 978-7392.

Sincerely,

FARID SAFFAR, CPA
Director of Auditing

cc: Sean O. Burton, President, Board of Airport Commissioners
Ana Guerrero, Chief of Staff, Office of the Mayor
Sharon Tso, Chief Legislative Analyst
Holly L. Wolcott, City Clerk
Independent City Auditors

RON GALPERIN
CONTROLLER

September 17, 2015

Marcie Edwards, General Manager and Chief Engineer
Los Angeles Department of Water and Power
111 N. Hope Street, Room 1550
Los Angeles, CA 90012

Dear Ms. Edwards:

Enclosed is the final report entitled "Audit of the City's Change Order Management Process." A draft of this report was previously provided to your Office and comments and additional information provided by your staff at the exit conference held on August 27, 2015 were considered as we finalized the report.

Please review the report and advise the Controller's Office by October 16, 2015 of the actions planned and/or taken to implement the recommendations that are addressed to DWP. An electronic template can be provided to your staff to facilitate this process.

If you have any questions or comments, please contact me at farid.saffar@lacity.org or (213) 978-7392.

Sincerely,

FARID SAFFAR, CPA
Director of Auditing

cc: Mel Levine, President, Board of DWP Commissioners
Ana Guerrero, Chief of Staff, Office of the Mayor
Sharon Tso, Chief Legislative Analyst
Holly L. Wolcott, City Clerk
Independent City Auditors

RON GALPERIN
CONTROLLER

September 17, 2015

Gary Lee Moore, City Engineer
Department of Public Works – Bureau of Engineering
1149 S. Broadway, Suite 700
Los Angeles, CA 90015

Dear Mr. Moore:

Enclosed is the final report entitled "Audit of the City's Change Order Management Process." A draft of this report was previously provided to your Office and comments provided at the exit conference held on August 18, 2015 were considered as we finalized the report.

Please review the report and advise the Controller's Office by October 16, 2015 of the actions planned and/or taken to implement the recommendations that are addressed to BOE. An electronic template can be provided to your staff to facilitate this process.

If you have any questions or comments, please contact me at farid.saffar@lacity.org or (213) 978-7392.

Sincerely,

FARID SAFFAR, CPA
Director of Auditing

cc: Kevin James, President, Board of Public Works
Ana Guerrero, Chief of Staff, Office of the Mayor
Sharon Tso, Chief Legislative Analyst
Holly L. Wolcott, City Clerk
Independent City Auditors

KPMG LLP
Suite 1500
550 South Hope Street
Los Angeles, CA 90071-2629

September 16, 2015

Mr. Ron Galperin
City Controller
City of Los Angeles
200 North Main Street
Los Angeles, CA 90012

Dear Mr. Galperin:

This report presents the results of our Performance Audit of City of Los Angeles construction change orders. Our work was performed during the period of September 24, 2014 through the date of this report.

We conducted this Performance Audit in accordance with Generally Accepted Government Auditing Standards (GAGAS). Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our issues and conclusions based on the audit objectives. We believe that the evidence obtained provides a reasonable basis for our issues and conclusions based on the audit objectives.

This Performance Audit did not constitute an audit of financial statements in accordance with GAGAS. KPMG was not engaged to, and did not render an opinion on LACCD's internal controls over financial reporting or over financial management systems (for purposes of OMB's Circular No. A-127, *Financial Management Systems*, July 23, 1993, as revised). KPMG cautions that projecting the results of our evaluation to future periods is subject to the risk that controls may become inadequate because of changes in conditions or because compliance with controls may deteriorate.

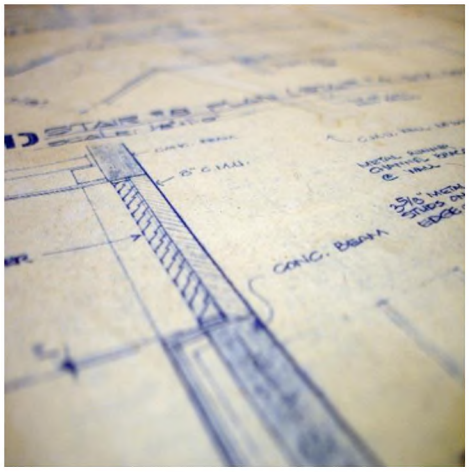
The report includes an executive summary, background, objective, audit scope and methodology, audit results and recommendations, and list of acronyms, as well as appendices. This report provided to the City of Los Angeles is for the sole use of the City of Los Angeles, and is not intended to be, and may not be, relied upon by any third party.

We thank you and the members of your staff who have worked diligently with our team in providing information throughout this Performance Audit. We look forward to serving the City in the coming years.

Sincerely,

KPMG LLP

AUDIT



City of Los Angeles

Audit of the City's Change Order Management Process

September 16, 2015

RON | GALPERIN
Los Angeles City Controller
controller.lacity.org

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EXHIBITS:

SUMMARY

During July 1, 2011 through June 30, 2014, the City of Los Angeles (City) held external vendor construction contracts with a collective original value of $4.9 billion. Contracted construction projects included airport terminal improvements, lake and park rehabilitation, underground power line installation, water pipe modifications, reservoir storage replacements, wharf improvements, and waterfront enhancements, among others.

A robust project delivery strategy can significantly affect the success of a large construction or infrastructure project. An appropriate delivery strategy can help to positively drive project cost, quality, long-term maintenance and operations performance metrics. The spectrum of project delivery strategies ranges from those where the owners are fully involved, such as design-bid-build, to others such as design-build, where owner involvement is minimal. Other examples include construction manager at-risk (CMR), construction manager not-at-risk, and integrated project delivery (IPD) methods. Each delivery strategy allocates the risk and responsibility between the contractor and the owner (the City) in different ways depending on the owner's appetite for risk as well as its skills and resources to support the project. A major factor in selecting a particular project delivery methodology is an early estimate of potential change orders.

The City spent $602 million on change orders from July 1, 2011 through June 30, 2014. These change orders represent 12.2% of the City's original contract value of $4.9 billion. A comparison to other U.S. cities noted a range of 5% to 10% for change orders, as compared to original contract value. A significant portion of the change order amount, $415 million, relates to the Tom Bradley West Terminal at the Los Angeles Airport, which used a project delivery method that allows for additional awards to be executed as change orders as the project progressed. Excluding the Tom Bradley West Terminal project, the change order percentage for the City is 4.3%.

Change orders are common among construction projects due to the complexities and challenges that may be encountered during major construction. When there are unforeseen circumstances, contracts must be revised to address those issues. The prevalence of change orders does not necessarily indicate poor project planning or inadequate management efforts; it may reflect the chosen project delivery method, fluctuating market conditions, or changing stakeholder needs and demands.

Change orders, however, can result in substantial cost increases. Thus, the objective of this audit was to determine whether the City received the best value for change order work performed. This audit included determining the causes for the change orders and whether they were necessary, reasonable, and adequately supported.

The City departments included in the scope of the audit are those that manage large-scale construction projects performed by contractors. These include the City's three proprietary departments: the Port of Los Angeles (POLA), Department of Water and Power (DWP), and Los Angeles World Airports (LAWA); along with the Bureau of Engineering (BOE) of the Department of Public Works, which manages construction for the remainder of Council-controlled departments Citywide.

I. Overall Assessment

Based on a review of a sample of 90 change orders totaling $90 million, for approximately one third of its change orders, the City did not consistently initiate, plan, and manage change orders in accordance with leading practices, resulting in additional cost exposure.

Most notably, the City could have improved their analysis and negotiation of change order pricing and is at risk of having paid significantly more than necessary during the audit period of July 1, 2011 through June 30, 2014. Although many change orders contained sufficient pricing and negotiation documentation, $19 million of the $90 million change orders audited lacked or contained limited independent estimates, while $26 million of the $90 million lacked or contained limited records of negotiation.

An exact amount of overpayment is difficult to calculate. In our experience change orders evaluated in accordance with leading practices yield on average a 5%–10% savings over the contractor's initial estimate.

The audit recommends several measures aimed at increasing the City's ability to anticipate, manage, price, report, and competitively negotiate change orders, to help maximize the value received for each construction dollar spent and reduce the potential for overpayment. Among the recommendations are improvements to documentation of pricing evaluations and Records of Negotiations.

II. Key Points

Several City departments had insufficient policies and procedures related to change order initiation, execution, and closeout.

Policies and Procedures

Several City departments lacked key information within their change order management policies and procedures that are typically found among leading practices. For example, four of the five departments had limited or no documented procedures on emergency change orders; and all of the departments lacked sufficient policies on evaluating projects with excessive change orders.

LAWA did not have adequately formalized and documented policies and procedures. The Port and BOE had adequately developed documentation consistent with best practices. DWP-Water and DWP-Power had adequately documented policies and procedures, though some areas can be improved.

City change orders did not consistently incorporate adequate pricing documentation.

20% of the change orders reviewed did not include adequate pricing analysis, which auditors estimate can achieve a 5%–10% savings.

Change Order Pricing

A sample of 90 change orders totaling $90,180,764 did not always contain adequate change order pricing documentation such as independent estimates, Records of Negotiations, and reference to pricing sources and assumptions. Further, City construction contracts did not clearly specify the contractors' requirements for change order pricing or detailed directives on how pricing was to be developed. Best practices dictate that the contractor should be directed, within the contract terms, as to whether a proposed change order must be based on unit prices as listed in the construction agreement, new agreed-upon unit prices, a fixed fee cost proposal, or actual costs, with the appropriate reference to the pricing sources to be used.

The audit found approximately $19 million of change orders, or approximately 20% of the $90 million sample, lacked sufficient and/or finalized pricing evaluation. Although this indicates that 80% of the change orders audited contained sufficient pricing evaluation documentation, there is room for the City to improve. Based on the auditors' experience with organizations, an estimated savings of approximately 5%–10% over the contractor's initial estimate can be achieved when the organizations have adequate pricing documentation and employ leading practices in negotiation and pricing evaluation.

The City lacks an adequate change order reporting and tracking mechanism

Change Order Tracking and Reporting

None of the audited departments were able to produce a report that listed all change orders within the audit period. The level of detail available and capabilities of change order tracking and status reporting varied among departments. In addition, certain relevant information was not visible or immediately available, for example: the compensation basis, the type of change order, if it was considered an "emergency" change order; whether work started before there was agreement on cost and schedule, whether a rebid was triggered, or a percentage threshold had been reached.

Without meaningful tracking and reporting of change order information, it is not possible to analyze change order data to identify trends or anomalies warranting further scrutiny. Gaps in the change order management process can lead to insufficient evaluation, improper approvals, and possibly overpayment and/or acceptance of unreasonable and costly schedule delays.

At times, change order work started prior to change order execution without evidence of appropriate evaluation and approval.

Start of Work Prior to Approval

City change orders where work started prior to the formal execution of the change order consistently lacked one or more critical elements to justify and allow for early start of the work. For example, if it was a) an emergency; b) undefinable scope; c) no agreement could be reached with contractor; d) an adjustment to a unit quantity. Other necessary elements should also include the impact to the critical path schedule, and an authorization to start the work early, preapproved rates or unit prices, and/or requirements to account for and approve daily time and materials tickets.

Auditors noted a significant variance between when change order work began and when the change order was finalized. Citywide, the average was 315 days, although it significantly varied between the proprietary departments, and was sometimes attributed to the practice of bundling change orders rather than executing them individually or more regularly.

36% of the change orders reviewed lacked at least one type of documentary support expected by leading practices.

Change Order Supporting Documentation

Change orders frequently lacked sufficient documentation to facilitate an efficient and effective evaluation. Of the 90 change orders tested, 54 (with a combined value of $32,932,840, or 36% of the sample) contained one or more exceptions to the documentation standards expected by leading practices. For example: an independent and/or contractors' estimate was not provided or had insufficient detail; a schedule impact analysis was not included; there was no record of negotiation; a pricing source was not referenced; or assumptions were not stated.

The lack of policies and procedures, or the lack of compliance with existing policies related to change

A standardized template and checklist would prevent lapses in change order documentation and risk of overpriced or unwarranted work.

order documents appears to be the root cause of these limitations. A lapse in change order documentation can expose the City to overpriced or unwarranted work, and may also result in project schedule delays. A standardized document template, and checklist of the required items and actions, would help ensure departments have sufficient documentation to evaluate the reasonableness of the change order, and protect the City from schedule delays, overpayment, or both.

The City lacks a formal "lessons learned" and knowledge sharing function among departments

Knowledge Sharing and Lessons Learned

The City lacks a formal lessons learned or knowledge sharing function between different departments with respect to capital program management and change orders.

Though individual departments may conduct an internal "lessons learned" review, such as part of a routine project closeout, there are likely many areas where several departments could benefit from inter-departmental knowledge-sharing as they may be pursuing similar initiatives, such as capital project reporting software and project delivery methods.

Interdepartmental efforts could increase awareness of project risks and improve change order management practices, and lead to adopting best practices across departments. Historically, there has been no requirement for this type of interdepartmental collaboration and knowledge sharing. Such sharing could lead to a decreased number of change orders while recognizing efficiencies and shared goals.

Construction contingencies are not consistently evaluated on a risk-based approach.

Contingencies and Change Order Estimation

Contingencies provide a budgetary allocation for uncertainties, and are typically noted as a percentage addition to a base estimate. Contingency should be a measure of risk. The City does not consistently evaluate construction contingencies on a risk-based approach. At times, an evaluation of the construction contingency is not completed prior to commencement of construction.

Departments do not require a reevaluation of the construction contingency at the time of bidding to properly reflect the risk of change orders. In addition, no City department had a clear, documented process for estimating and documenting construction contingencies – including a consideration of change orders – for construction contracts that are expected to include normal change orders.

Without a meaningful assessment of the risk for change order occurrence, the City will not have a meaningful baseline estimate of the amount of expected change orders for change variance reporting. If change order variance expectations are established early on, it can provide a useful measurement of reasonableness. However, if a contingency level is estimated too high, instead of optimized, it may result in a less strict approach to evaluating, pricing, and authorizing change orders.

III. Significant Recommendations

Policies and Procedures

- LAWA should develop formal change order management policies and procedures. Other audited City departments (POLA, BOE, DWP-Power and DWP-Water) should update and refine their policies and procedures to incorporate all elements of the change order process, ensuring they follow leading practices.

Change Order Pricing Documentation

- Departments should improve their approach to change order pricing, including consistently utilizing independent estimates[1], maintaining Records of Negotiations, and clearly referencing pricing sources and assumptions.

Change Order Tracking and Reporting

- The City should direct departments to develop a standard dashboard for reporting and tracking change orders using a prescribed format and content, based on improved reporting of change order information that is collectively determined necessary to support improving the process of change order management.

Start of Work Prior to Approval

- Departments should clarify parameters surrounding emergencies and change order work that starts prior to change order execution.

Change Order Supporting Documentation

- Departments should include a checklist document in change order packages to ensure relevant information is collected and used to facilitate change order evaluations.

[1] An independent cost estimate refers to the process of engaging the services of professionals, external or internal, who are not directly involved with the project to conduct a detailed estimate as to the cost of a proposed project. The main idea behind the use of independent estimators for assessing the cost of a project is to obtain an objective view of the cost.

Knowledge Sharing and Lessons Learned

- The City should establish a formal committee to promote interdepartmental collaboration and lessons learned regarding the change order management process and knowledge sharing between departments.

Contingencies and Change Order Estimation

- Departments should improve and document their approach to estimating the construction contingency, relative to the risk of potential change orders on projects.

IV. Review of the Report

On July 14, 2015, a draft of this report was provided to BOE, POLA, LAWA, and DWP Management. We met with representatives of these departments at an exit conference(s); specifically:

POLA – Wednesday, August 5, 2015
LAWA – Friday, August 14, 2015
BOE – Tuesday, August 18, 2015
DWP – Thursday, August 27, 2015

Department representatives provided comments and additional documents, which were assessed and considered as we finalized the report. The Departments generally agreed with the findings and recommendations, and several have already begun to implement the report's recommendations. For example, we acknowledged that LAWA is in the process of developing detailed policies and procedures, and DWP has modified some policies, indicating they will continue to refine areas as recommended by the audit.

BACKGROUND

Project Delivery Methodologies

Construction contracts are based on a particular project delivery methodology that allocates the risk and responsibility between the contractor and the owner (the City) in different ways. Evaluating and selecting an appropriate project delivery method helps ensure the project uses the most cost-effective and reasonable strategy based on the assumed risk of the project and the City's requirements. A major factor in selecting a particular project delivery methodology is an early estimate of potential change orders.

There are many options for delivery methodologies and many variations within those options. An owner faced with choosing a project delivery method should consider several factors in making the decision, including project size, type of project, legislative and regulatory requirements, tolerance for risk, schedule, local market conditions, desired level of involvement, owner's resources and capabilities and last but not least, the potential for project change.[2]

Each project delivery methodology carries a different level of risk for the owner. Generally, the level of control retained by the owner correlates with the level of risk, and those levels typically have an inverse relationship to the risk and control levels of the contractor. Without carefully selecting a project delivery methodology that takes into consideration the potential impact of unknown factors, or changes, the risk of change orders may not be adequately estimated and managed throughout the project.

The most common project delivery methodologies in government construction, include:

- Design-Bid-Build (DBB) – The traditional project delivery method, which customarily involves three project phases: design, procurement, and construction. With this method, costs are somewhat predictable for the owner once the bids are received as long as design does not change and unforeseen conditions do not occur. In DBB, the owner has more control over the design content, relative to other delivery methods. However, this method typically involves a longer time period to execute, in that construction may not begin until the design and procurement phases are complete. DBB is prone to creating more adversarial relationships between all parties when issues develop, as there is no contractual relationship

[2] The Construction Management Association of America, AN OWNER'S GUIDE TO PROJECT DELIVERY METHODS

between the contractor and the designer and no opportunity for collaboration during the design phase.

- Design-Build (DB) – A project delivery method that combines architectural and engineering design services with construction performance under one contract. Under this system, the owner contracts with a DB team, capable of performing both design and construction. The DB approach offers the opportunity to save time and money. However, the advantages of the system are offset by a significant loss of control and involvement by the owner and other stakeholders. Accordingly, it is difficult for the owner to verify that it is receiving the best value for its money without having a great deal of transparency in the DB team. The primary caution for an owner considering DB is that the owner should carefully consider the level of involvement it requires for a successful project.

- Construction Management At Risk (CMAR) – A project delivery method in which the Construction Manager acts as a consultant to the owner in the development and design phases, but assumes the risk for construction performance as the equivalent of a general contractor holding all trade subcontracts during the construction phase. This delivery method is also known as CM/GC. In CMAR, the owner gains the benefit of having the opportunity to incorporate a contractor's perspective and input to planning and design decisions and there is and the ability to "fast-track" early components of construction prior to full completion of design. While the CMR provides the owner with professional advisory management assistance during design, this same assistance is not present during the construction phase, as the construction manager is in an "at-risk" position during construction.

- Integrated Project Delivery (IPD) – A project delivery method that contractually requires collaboration among the primary parties – owner, designer, and builder – so that the risk, responsibility, and liability for project delivery are collectively managed and appropriately shared. This approach is relatively new to industry and the City is not yet widely using the IPD method.

All of the methods discussed have been used successfully in government construction, and have weaknesses, which can limit their success. If an Owner is aware that its requirements may change considerably during the project,

this should be evaluated against the potential cost of such changes. For example, a DB team may present the most fluid method of incorporating changes during construction, but those changes may cost more than through other methods.

The Importance of Change Order Management

Change order management is concerned with a) influencing the factors that create changes to ensure cost, price and schedule impacts related to changes are agreed upon, b) determining that a change has occurred, and c) managing actual changes when they occur.

The original project scope and performance baselines must be maintained by continuously managing changes to the baselines. Change order management requires maintaining the integrity of the performance measurement baselines and coordinating changes across project functional areas. Projects lacking a formal change control system will always be at risk for major cost overruns, contractor disputes, and "gold plating." Once the changes begin, it can be difficult to stop the flow of resources and gain control of the project without jeopardizing the entire project and the corresponding relationships.

Exhibit 1 presents the Anatomy of a Change Order.

Anatomy of Change Order Management

Exhibit 1

Tracking, Reporting & Management

- Electronic CO Tracking Log or Database to track COs by categories, status, response dates, etc.
- Routine (weekly, bi-weekly) reconciliation of contractor CO tracking log to Owner change order tracking log.
- Utilization of past CO data for benchmarking and comparison purposes during CO review and negotiation.
- Standardized process for routinely (weekly/bi-weekly) reporting and reviewing CO metrics (status, type, status, amount, etc.)
- Formal process for contractor CO reporting.

Policies & Procedures

Policy/procedure structure, format, level of detail/guidance, formalization and ease of use.

- Overall policy outlining purpose, roles/responsibilities, process/controls, key references, process flow charts and checklists for key process steps.
- Standardization across all departments as summary of deviations and exceptions to the process.
- Templates for key process documents including template guidelines and notes/legends.
- Integration and cross reference to other related policies and procedures.

Analysis & Compliance

The processes and controls ensuring compliance with CO policies and procedures.

- Formal process for analyzing change orders for contractual compliance on a routine basis for every major project at pre-established project milestones/ phases as well tracking, reporting and follow-up on all identified issues.
- Formal process for reviewing contractor payments to ensure proper change order billing as well tracking, reporting and follow-up on all identified issues.

Change Order Review & Pricing Validation

The process and requirements for reviewing change orders for accuracy, justification, reasonableness and compliance with contractual requirements and design specifications.

- AE review including an analysis, points of clarification, issues and areas for cost saving for negotiation.
- Pre-established thresholds for review requirements including guidance for CO review meetings for significant claims.
- Independent schedule review for major schedule impacts along with analysis & schedule recovery recommendations.
- CO checklist for all change orders above a set threshold.
- Independent estimates for all major change orders.
- 3rd party validation of all large $ or potential claims.
- CO review/validation meeting for all large $ changes.

Change Order Identification & Estimating

The format, level of standardization/detail, requirements and overall process for estimating of CO scope.

- Standardized change order categories/taxonomy
- Standardized process for estimating change order cost & schedule impacts.
- 3rd party estimating for large or complex change orders and schedule analytics for major schedule impacts.
- Established thresholds, criteria/requirements and training based on cost, schedule impact & other metrics.
- Defined process for addressing emergency change orders as well as tracking and reporting of emergency changes to management.

Change Order Negotiation

The policy, process and requirements for negotiating contractor change orders.

- Formalized CO negotiation process, negotiation plans and CO meetings for all large $ changes.
- Pre-approval of negotiation plans for all large $ changes
- Formal documentation of CO negotiations.
- Established escalation process for addressing negotiations that fail or Contractors refusing to perform extra work and a reporting process.

Change Order Approval

The policy, process and requirements for approving change orders including delegation of approval authority and expedited approvals.

- Real time tracking of change order approval and commencement status.
- Formal delegation of authority process for CO approval that is monitored for compliance
- Pre-established CO approval meetings for projects with a high volume of changes.
- Electronic approval of COs to expedite process.

Audit Scope

City departments included in the scope of the audit are those that manage large-scale construction projects performed by contractors. These include the City's three proprietary departments: the Port of Los Angeles (POLA), Department of Water and Power (DWP), and Los Angeles World Airports (LAWA); and the Bureau of Engineering (BOE) of the Department of Public Works, which manages construction for the remainder of Council-controlled departments Citywide.

The period under audit was July 1, 2011 – June 30, 2014, when the City had open construction contracts with a collective (original) value of $4.9 billion. Contracted construction projects included airport terminal improvements, lake and park rehabilitation, underground power line installation, water pipe modifications, reservoir storage replacements, wharf improvements, and waterfront enhancements, among others.

The City spent $602 million on change orders during the audit period, which represents 12.2% of the City's original contract value. The vast majority of the change order amount, $415 million, relates to the Tom Bradley West Terminal (Bradley West) at the Los Angeles Airport that used a project delivery method that allowed for additional awards to be executed as change orders as the project progressed. Exhibit 2 presents a summary of the City's contracted construction projects and change orders during the audit period.

As is customary in audits, we reached our conclusions without the benefit of studying every change order. We studied a sample of 90 change orders worth $90 million that we believe is sufficient to allow us to make reasonable judgments about the way city departments that manage large-scale construction projects deal with contractors.

Exhibit 2 – Value of Change Orders Audited

Department	Original Value of All Contracted Construction Projects	Value of Change Orders of all Contracted Construction Projects	Percentage Change Orders	Original Value of Contracts sampled	Value of Change Orders Sampled
Bureau of Engineering:	$ 1,000,869,053	$ 39,488,698	3.95%	$ 138,819,941	$ 7,937,882
LADWP-Power System:	$ 827,054,795	$ 26,405,307	3.19%	$ 827,054,795	$ 19,270,523
LADWP-WETS:	$ 350,821,283	$ 32,614,468	9.30%	$ 353,821,283	$ 9,323,667
Los Angeles World Airport:	$ 1,795,022,013	$ 498,679,858	27.78%	$ 1,429,371,499	$ 50,500,761
Port of Los Angeles:	$ 960,384,265	$ 4,836,530	0.50%	$ 405,520,982	$ 3,147,931
Total (Citywide)	$ 4,934,151,409	$ 602,024,861	12.20%	$ 3,154,588,500	$ 90,180,764

Excluding the Bradley West project from the City's change order calculation results in an overall change order amount of $187 million, which comprises 4.3% of the original contract value of $4.3 billion. Exhibit 3 presents a summary of the City's contracted construction projects and change orders during the audit period, excluding the Bradley West project.

Exhibit 3 – Value of Change Orders Audited (Excluding Bradley West)

Department	Original Value of All Contracted Construction Projects	Value of Change Orders of all Contracted Construction Projects	Percentage Change Orders	Original Value of Contracts sampled	Value of Change Orders Sampled
Bureau of Engineering	$ 1,000,869,053	$ 39,488,698	3.95%	$ 138,819,941	$ 7,937,882
LADWP-Power System	$ 827,054,795	$ 26,405,307	3.19%	$ 827,054,795	$ 19,270,523
LADWP-WETS	$ 350,821,283	$ 32,614,468	9.30%	$ 353,821,283	$ 9,323,667
Los Angeles World Airport	$ 1,173,487,133	$ 83,990,845	7.16%	$ 1,429,371,499	$ 50,500,761
Port of Los Angeles	$ 960,384,265	$ 4,836,530	0.50%	$ 405,520,982	$ 3,147,931
Total (Citywide)	**$ 4,312,616,529**	**$ 187,335,848**	**4.34%**	**$ 3,154,588,500**	**$ 90,180,764**

Policies and Procedures

Within the City, each department or division operates autonomously and has different levels of policies and procedures in place for change order management. They are responsible for authoring, implementing, and upholding policies and procedures related to change order management.

The Board of Public Works (PW) advertises and invites proposals for bids and awards construction contracts for the City's Capital Improvement Expenditure Program (CIEP) projects. The BOE administers contract documents and provides construction management for these PW projects.

In addition to the council-controlled PW projects, the City's three proprietary departments, LAWA, DWP, and POLA, each manages its own capital improvement project approval and administration processes and budgets for its construction projects.

Change Order Pricing

Change order pricing practices vary from one department to the next and are largely dictated by the policies and procedures in place and/or the type of change encountered in each individual change situation. For purposes of auditing change order pricing we considered the following departmental change order items relative to leading practices:

- Contract language in place related to the contractor's responsibility for change order pricing involving contracts for which change orders were audited;
- Each department's policies and procedures related to change order pricing;
- Physical examination of the pricing documentation included with each change order package including independent estimates, record of negotiations, and reference to pricing sources and assumptions.

Change Order Tracking and Reporting	Change order tracking and reporting, as well as information systems in place to facilitate these processes, are also responsibilities of each individual City department. Therefore, the design and function of each information system, as well as tracking and reporting capabilities of change order data, vary among departments. The City does not centrally dictate a standard related to change order tracking and reporting for the departments' individual information system, nor does it prescribe content of any available change order reports.
Start of Change Order Work prior to Change Order Execution	The practice of allowing a contractor to start change order work before an analysis of schedule and cost impact has been completed is common throughout the City. Policies and procedures related to qualifying circumstances and appropriately managing such work vary between the departments.
Change Order Supporting Documentation	Requirements on format and content of supporting documentation included with change order packages are established by each City department and include varying levels of policies and procedures related to justifying and quantifying the impact of a change order and documenting those results, such as including reason, type, approval, pricing, schedule impact analysis, records of negotiation, references, and checklists with the change order package.
Knowledge Sharing and Lessons Learned	The City's lessons learned and knowledge sharing function is currently practiced on a departmental level. Since many City departments share program goals and deliver projects with similar characteristics utilizing similar delivery methodologies, the City has expressed an interest in implementing a centralized lessons learned forum.

Contingency and Change Order Estimation	Construction contingency estimation practices, including estimation of change order costs during each phase of project planning, design, and delivery, are established by each City department. Like most other change order management practices, they vary from one department to the next. The City does not centrally dictate a standard related to contingency estimation and management.

Audit Objectives

The objective of this audit was to determine the causes or reasons for change orders and determine whether they were necessary, reasonable, and adequately supported.

Specific objectives included:

A. Change Order Initiation

1) Does the City have well-developed and comprehensive processes in place for initiating and approving change orders?
2) Are change orders properly authorized and approved?
3) Since changes to scope could result either in a reduction or increase to the work efforts required, are those specific authorized changes appropriately reflected as either a decrease or increase to the contract price?
4) Was the appropriate type (time and materials, fixed cost, and actual cost) of change order used?
5) Is additional work initiated only after approval of the change order?
6) Does the City have adequate controls over change orders for emergency work performed?

B. Change Order Oversight

1) Does the City analyze the reasons for change orders to identify how overall costs can be reduced? For example, could change orders have been avoided, were they a result in a change of scope, or were they due to unforeseen circumstances?
2) Does the City have strategies/controls to discourage contractors from artificially "low-balling" bids to benefit from costly change orders?
3) Do construction contracts include appropriate contingencies to allow for unforeseen circumstances?
4) Is the number of change orders and the associated amount reasonable in light of the original contract amount to identify potential low bidding contractors?
5) Are the reasons for change orders properly documented, and are the amounts reasonable? For example, are labor and material charges consistent with the initial contract and/or prevailing wages?

6) How do the City's change order statistics and related management processes for the council-controlled and proprietary departments compare against similar entities in other jurisdictions?

C. Change Order Closeout/Completion

1) Are adequate contract administration procedures in place to ensure the work was inspected timely to ensure its completion?
2) Are amounts paid on change orders adequately supported? Were the amounts paid in compliance with negotiated change order agreements with respect to items such as labor, materials, equipment, overhead, and other direct costs? Are the calculations correct and properly reviewed and authorized?
3) Are disputed change orders properly addressed through claims management?

Performance Measurement

For purposes of this audit, we referenced leading practices in change order management as well as leading policies and procedures, as described in section I of the Findings & Recommendations. The City's change order policies and procedures were compared against leading practices observed by the auditors and employed by other organizations and governmental agencies in California. Sources of leading practices are further described in Appendix IV.

We also undertook a detailed assessment of individual change orders and compared the City's inclusion of certain key elements within each individual change order package to leading practices, then quantifying the results.

Based on our audit, the City should undertake some improvement efforts in order to achieve its desired objectives.

Other Audits, Investigations, and Reviews

In 2011, the Audit Division surveyed 89 construction contracts awarded by the BOE from FY06 through FY10. Of the 89, 45 (50%) included change orders that increased the initial awarded amount. While the total initial awarded amount for these 45 projects was $180 million, the change orders for those

projects totaled $15 million. There were 17 projects whose change orders increased the initial awarded amount by at least 10%.

The Audit Division also conducted audits of the Construction Management Processes at the DWP and of LAWA's Capital Development Program in 2012 and 2013, respectively. The DWP audit found that the change management controls for internally managed projects were not operating effectively, and the LAWA audit found a considerable number of change orders for the capital improvement projects related to the modernization of the international terminal at Los Angeles International Airport (LAX). For example, one significant project had a total base contract value of $1.2 billion. However, at the time of the audit, prior to the project's completion, the project included 3,051 closed change orders, which totaled $191.7 million, or 15% of the initial contract amount.

Datasets

The detailed data set of change orders evaluated for this project are included in Appendix V.

FINDINGS & RECOMMENDATIONS

Section I: Policies and Procedures

Finding No. 1: Several City departments have insufficient policies and procedures related to change order initiation, execution, and closeout.

Policies and procedures help create an internal control framework for an organization. It is this internal control framework that management will rely upon and that will ensure the organization's objectives are being met. Well-written policies and procedures also allow employees to clearly understand their roles and responsibilities within predefined limits.

Policies and procedures can save money. For example, having an appropriate process in place for reviewing change orders and requiring certain approvals ensures that efforts and resources are not duplicated. In addition, change orders that are subject to a process with specified control points typically are scrutinized more deeply and such a process reduces wasteful spending. Policies and procedures also help ensure compliance with the law.

Lack of formally documented procedures may lead to insufficient change order analysis and improper or unjustified change order approval. Without comprehensive policies and procedures, the appropriate approvals at a particular step in the change order management process and related decision making is left to the individual's interpretation instead of being explicitly prescribed. These control gaps in the change order management process may lead to an overall insufficient change order analysis, improper approvals, and ultimately overpayment of change orders and City acceptance of unreasonable schedule impacts.

Based on our results, we found that there are areas of insufficient policy and procedure coverage within all City departments reviewed in the scope of this audit. The audit team identified specific areas of weakness that can be improved within each department's policies and procedures.

- LAWA lacks a formalized policies and procedures manual, which governs the management of change orders during construction. Rather, the Airport Development Group relies on a one-page flow chart as their change order management procedures, in addition to several standardized forms, flow

charts, and training materials. Subsequent to field work, LAWA utilized these various materials as a foundation to develop formalized policies and procedures. (Deficient)

- DWP-Power has a brief policies and procedures document for change order management. This document provides a general overview of the department's procedures; however, it is sometimes limited in depth of detail and omits several areas, which are crucial to effective change order management. (Insufficient, several areas identified with room for improvement).

- DWP-WETS has a brief policies and procedures document for change order management. This document provides a general overview of the department's procedures; however, it is sometimes limited in depth of detail and omits several areas, which are crucial to effective change order management. (Insufficient, several areas identified with room for improvement)

- POLA has a well-developed change order section within its Policies and Procedures Manual, and ranks highly when compared to other City departments. Notwithstanding, we have identified certain areas where there is room for improvement. (Sufficient, some room for improvement)

- BOE has a highly developed, comprehensive set of change order policies and procedures that we deem comparable in quality and thoroughness to those of other Public Works departments of similar size. However, based on our analysis, we identified some areas where there is room for improvement. (Sufficient, some room for improvement)

Based on our comparison of critical elements of the change order management process against generally accepted leading practices, we noted deficiencies or weaknesses in what exists in the individual departments' policies and procedures. We have identified several areas where the policies and procedures do not contain all relevant sections identified by various leading practices.

Exhibit 4 contains our gap analysis, which identifies incomplete and/or missing procedures.

Exhibit 4 – Assessment of Policies and Procedures

Description	BOE	POLA	WETS	Power	LAWA
Compensation Methodology (T&M, Lump Sum, Unit Price)	🟢	🔴	🟢	🟢	🔴
Classification of Change Orders	🟢	🟡	🟢	🟡	🟡
Emergency Change Orders	🟢	🔴	🔴	🔴	🔴
Starting Work Prior to Finalization of Cost and Schedule Impact	🟡	🟡	🟡	🟡	🔴
Record of Negotiation	🟢	🟢	🟡	🟡	🔴
Schedule Impact Analysis	🟢	🟢	🟡	🟡	🔴
Pricing and Estimating of Change Orders	🟢	🟢	🟢	🟡	🔴
Approval of Change Orders	🟢	🟢	🟢	🟢	🔴
Evaluation of Projects with Excessive Change Orders	🔴	🔴	🔴	🔴	🔴
Required Components of a Change Order	🟢	🟢	🟢	🟢	🔴
Independent Estimate	🟢	🟢	🟡	🔴	🔴
Negotiating a Change Order Settlement	🟢	🟡	🔴	🟡	🔴
Disputed Change Order or Claim	🟢	🟡	🔴	🟡	🟡
Standardized Forms	🟢	🟢	🟡	🟡	🟢

Green = Satisfactorily documented, **Yellow** = Partially documented, **Red** = Not documented/limited

An additional graphic summary of the policies and procedures gap analysis is provided in Exhibit 5.

Leading practices in change order management and in developing written policies and procedures were reviewed and considered during this analysis. The prevailing industry standards on policies and procedures prescribe the following key elements of an effective procedure:

- The procedure identifies WHO is acting.
- The procedure identifies the precise action required: WHAT is to be done and HOW.
- The procedure states WHEN the act needs to occur.
- The procedure references DOCUMENTS to be used.
- The procedure includes the sequence of events in sequential steps, which may be written (or supplemented with) as a pictorial (flow chart).
- The procedure identifies RECORDS created as a result of the procedure, where they are stored, and for how long.
- There is a centralized function for issuing amendments to the procedure.
- Amendments to the procedure are issued timely and nonverbally.
- USERS should be involved in developing the procedures.
- Ambiguous words and expressions such as "may, should, as applicable, and as necessary," are better replaced with definite, clearly stated requirements.

- We have noted that not all of the procedures reviewed contain these key elements and, therefore, may not be effective. We encourage each department to consider these key elements as they produce updated versions of their change order management policies and procedures.

LAWA has recognized that their change order policies and procedures need improvement. During audit fieldwork, policies and procedures were being revised to remedy deficiencies. DWP-Power, POLA and BOE are continuously improving and seeking to update their policies and procedures as leading practices evolve. DWP-WETS' policies and procedures were in draft form during our audit, and agreed that there was room for improvement in this area.

It is difficult to estimate how much savings the City would be able to realize by establishing and implementing effective policies and procedures, but if the savings were just 1%–2% during the audit period, hypothetically speaking, this would have equated to approximately $1–$2 million dollars in savings, calculated as 1%–2% of the $90 million change order sample. This would translate into $6–$12 million based on the total amount of change orders in the audit period, $602 million, if calculated as 1%–2% of $602 million.

Recommendations:

1.1. LAWA should develop formal policies and procedures for change order management that includes all critical elements of the process.

1.2. DWP-WETS, DWP-Power, BOE, and POLA should continue to update and refine their policies and procedures to incorporate all critical elements of the change order process.

Exhibit 5

CO Management Areas for Improvement

LAWA

- No formal CO management/ control policy or standardized process or procedure outside of flow charts and training materials.
- The CO examples appear appropriate, but we could not determine if the templates are standard or project specific .
- The number of example CO forms/templates may be excessive and may cause confusion (a. Contractor Potential Change Notice, b. Field Directive, c. Contractor Change Request, d. Change Directive, e. Change Order).
- No apparent reference to CO logs/templates, or other CO tracking/ management at the project or program level.
- No apparent guidance for emergency COs or for managing CO order negotiations.
- No apparent guidance on CO estimating, validation and CO review.

Standard CO Management Practices

LADWP – Water

- Procedure appears organized with purpose, references, responsibilities, attachments & process.
- Structure is strong, but needs consolidation.
- Standard forms and templates appear appropriate.
- Strong guidance on "how" to perform various tasks.
- Great notes and additional guidance (updating).

LADWP – Power

- Same comments as for LADWP-Water. However, DWP-Power's Policies and Procedures are less detailed in several areas and would benefit from further development and detail.

Leading CO Management Practices

Port of LA

- Detailed procedures and flow charts.
- Each of the key change areas are distinct and easy to follow.
- The forms/templates are a leading practice - they provide examples with legends/keys as to what each field is and how to fill them out.
- Several elements could be utilized as a model for other City entities.

Bureau of Engineering

- Well designed overall structure & format.
- Appropriate level of detail & guidance.
- Standardized forms and templates .
- Change order categories defined.

Section II: Change Order Pricing

Negotiating change orders and, in particular, change order pricing, is a process. Well-negotiated change orders result from up-front preparation and documentation. Good documentation facilitates easier approvals from upper management, demonstrates and records that the City is following contractual procedures, becomes an official record of what transpired for future reference, and documents the contractor's and the City's positions. Generally, more specific and complete documentation result in less confusion and fewer disputes as the change order negotiation progresses.

This audit assessed the change order negotiation process as evidenced by the change order documentation, when such documentation was available. Such documentation consists of Record of Negotiations, negotiation emails, cost estimates, and pricing references. For the City, a City employee ultimately signs off and approves change orders, although consultants may be involved in the process of documenting the City's position and recommending final approval or rejection.

Elements of successful negotiations often utilized by the private sector include the utilization of specially trained project negotiators and representation from outside the project management team and/or the direct line of command. These team members help execute the nontechnical aspect of the negotiation process and often bring a different skill set to the table than the project engineers and project management team members. For purposes of this audit, however, we note that we audited the documentation available to facilitate the negotiations, but not the negotiations themselves.

Finding No. 2: City change orders do not consistently incorporate an adequate independent cost estimate.

An independent cost estimate is a cost estimate prepared independently of the contractor's cost estimate and is ideally prepared by someone who does not have a direct interest in the project (i.e., not a project manager or designer). An independent estimate does not constitute reviewing the cost estimate already prepared by the contractor unless it is simple in nature, which is typically defined as below a certain dollar value.

Certain government agencies require that an independent estimate be prepared regardless of the change amount, but more commonly, a suitable estimated dollar threshold is established. Based on our experiences and observations of leading practices, $10,000 is a common threshold for change orders requiring an independent estimate. The exact dollar threshold and circumstances requiring an independent estimate should be established by each organization, and documented in an agency's formal policies and procedures.

Additionally, it is critical that an independent estimate contains sufficient information such as full itemization of labor, equipment, and materials, unit costs, assumptions, appropriate mathematical calculations, mark-up, date, name of preparer, and a reference to pricing sources.

- BOE does not require independent estimates for change orders in which the value is below $10,000. This is commensurate with leading practices. The auditors reviewed 20 change orders in the amount of $7,987,882. Out of those, five change orders totaling $536,755 did not contain an independent estimate or were lacking a sufficiently prepared independent estimates.

- LADWP-WETS on one occasion did not utilize its established template when developing an independent cost estimate. Rather than providing an independent cost estimate, the department modifies an estimate provided by the contractor, resulting in costs that may not be entirely objective. The auditors reviewed 19 change orders in the amount of $9,323,667. Out of those, one change order totaling $243,687 did not contain an independent estimate or was lacking a sufficiently prepared independent estimate.

- DWP-Power's change orders were unique in that many of them were Purchase Order Adjustments (POA) to existing contracts, which merely consisted of adjustments to a unit quantity, based on actual units installed. (Many DWP-Power contracts involve adjustments to actual units installed compared to the initial estimate and for those, unit process are defined in the contract.) For the remaining change orders, we did not consistently find an independent estimate included with the change order documentation. The auditors reviewed 11 change orders totaling $19,270,523. Out of those, three change orders totaling $15,280,559 did not contain an independent estimate or were lacking a sufficiently prepared independent estimate.

- LAWA does not consistently perform an independent estimate for its change orders, although their cost estimators are involved in review of the change orders. According to the LAWA Project Manager, independent estimates are not performed for all requested changes because many of these are canceled and not carried out to completion. Rather than use departmental resources for low-value changes, they prefer to provide estimates for larger, high-value changes that are more likely to be executed. Due to LAWA's lack of a formalized procedures manual, there are no requirements or thresholds for when an independent estimate is required. The auditors reviewed 20 change orders totaling $50,500,761. Out of those, six change orders in the amount of $2,687,187 did not contain an independent estimate or were lacking a sufficiently prepared independent estimate.

- POLA does not consistently perform an independent estimate for its change orders the auditors reviewed 20 change orders totaling $3,147,931. Out of those, two change orders totaling $177,053 did not contain an independent estimate or were lacking a sufficiently prepared independent estimate POLA's policies and procedures currently require an independent estimate for "any change"; a dollar threshold, although commensurate with industry practices, is currently not incorporated.

Recommendation:

2.1 All departments' documented procedures should indicate when an independent estimate should be used to evaluate pricing for change orders; for example, by setting a change order dollar value threshold.

Finding No. 3: City change orders do not consistently incorporate an adequate Record of Negotiation.

A Record of Negotiation (RON) is a document used by owners and contractors to memorialize each side's statements about pricing, schedule, and any other project details in the change order process. A sufficiently prepared RON should include a summary of all communication between the involved parties, describe the reason for concession or demands, and provide a location for the signatures for those involved, indicating that the contents of the record are correct.

- BOE generally utilized a sufficient RON document. Occasionally, a negotiation will occur through e-mail, which BOE considers to be an adequate record. The auditors reviewed 20 change orders totaling $7,987,881. Out of those, two change orders in the amount of $702,061 did not contain a RON and one change order in the amount of $722,448 was lacking a sufficiently prepared RON.

- DWP-WETS did not consistently utilize a RON document in its change orders, despite this being included in its policies and procedures. The auditors reviewed 19 change orders in the amount of $9,323,667. Out of those, eight change orders in the amount of $6,142,434 did not contain a RON.

- DWP-Power does not appear to have a standardized RON document. The auditors reviewed 11 change orders in the amount of $19,270,523. Of those, five change orders in the amount of $17,631,373 did not contain a RON.

- LAWA did not consistently use their RON for final negotiations of change orders. The auditors reviewed 20 change orders in the amount of $50,500,761. Out of those, five change orders totaling $1,357,250 did not contain a RON and two in the amount of $1,228,477 were lacking sufficiently prepared RONs.

- POLA did not have many change orders using a RON, as most were Time and Materials (T&M) change orders or contained adjustments to bid units, which does not require a RON, provided that a competent inspector was present to verify all work. The auditors reviewed 20 change orders totaling $3,147,931. Out of those, one change order totaling $58,339 did not contain a RON; it was only after the change order was finalized, that a RON and acceptable documentation was provided by POLA.

Recommendation:

3.1 Departments should consistently utilize a standard Record of Negotiation document containing a clear description of all negotiations and final cost estimate.

Finding No. 4: City change orders do not consistently incorporate an adequate reference to pricing sources and assumptions.

Pricing of change orders occurs in a noncompetitive environment and hinges upon a strong negotiation process and an appropriately prepared and documented cost estimate. Without clearly referenced and stated pricing sources and assumptions included with the estimate, the reliability, and comparability of the estimate diminishes.

Pricing sources aside from labor were rarely referenced in the change order documentation reviewed. Of the 90 samples tested, only three of the change orders tested explicitly stated where pricing information was obtained.

All City departments (BOE, LADWP-WETS, LADWP-Power, LAWA, and POLA) acknowledged that labor pricing (union and prevailing wages) should consist of rates established by the California Department of Industrial Relations (DIR), as required by the contracts. Since the source was considered known to all, estimators did not make reference to it. Compliance with prevailing wage rates are regularly audited and enforced for all City departments including audits conducted by the Bureau of Contract Administration.

Change order estimates prepared prior to actual work being performed, which do not contain clearly state assumptions and reference pricing sources, cannot be easily verified.

In addition to labor, assumptions surrounding units, materials, and equipment etc. should be clearly stated.

Recommendation:

4.1 Departments should clearly reference pricing sources and state assumptions in their independent estimates.

Finding No. 5: City construction contracts do not consistently include adequate contractor change order pricing requirements.

The various construction contracts evaluated in this audit did not consistently adhere to leading practices by clearly specifying contractor requirements for change order pricing. We identified the following contractual inclusions and provisions that did not always contain detail directives on pricing:

BOE maintained clearly defined pricing within its contracts including schedules of stipulated unit prices when applicable.

- DWP-WETS contracts varied and some contained an exhibit on contract pricing and option pricing or reference pricing from bid proposal documents including price per worker, price per hour, etc., or markups for additive lump-sum change orders.

- DWP-Power contracts varied and some contained an exhibit on contract pricing and option pricing or reference pricing from bid proposal documents including price per worker, price per hour, etc., or markups for additive lump-sum change orders.

- LAWA contracts varied but contained sufficient contractor pricing requirements and timelines for submitting change orders. While contracts contained a section on "Prevailing Wage" or "Los Angeles Department of Airport Construction Project Labor" agreement, change orders did not make reference to the trade or union agreements for labor rates, making rates difficult to verify.

- POLA contracts included a section instructing the contractor to abide by all laws including adherence to all California labor codes.

- These provisions did not consistently specify the contractor's obligations such as requirements for pricing sources, itemization of labor, unit costs, or format of cost proposal. The contractor should always be directed in the contracts to whether the proposed change order is based on unit prices as listed in the construction agreement, agreed-upon unit prices, a fixed fee cost proposal, or actual costs.

Recommendation:

5.1 DWP-WETS, DWP-Power and POLA should make sure contractor contracts include clear and detailed requirements for change order pricing and that change orders always make reference to contractually stipulated pricing sources.

A contributing factor to the limitations in the City's change order pricing practices is the lack of clearly defined policies and procedures with requirements for use of independent cost estimates, RONs, documentation of pricing sources, and assumptions for change orders. This has resulted in inconsistent use and application among City departments as well as a lack of adherence to existing policies and procedures.

The lack of an independent estimate, RON, and clearly referenced pricing sources and assumptions for change orders may result in an inability for the City departments to obtain a fair price for change order work. This may lead to higher project cost, and possible budget overruns.

Based on our experience with other organizations of similar size and complexity[3], we estimate average savings of approximately 5%–10% in change order costs when leading practices in negotiation and pricing evaluation are consistently employed compared to when they are not. Based on our analysis, we identified approximately $19 million of change orders with inconsistent pricing evaluation from our $90 million change order sample, or approximately 20% of the change order sample. 5%–10% of $19 million equates to approximately $1–2 million.

It is not possible to fairly estimate how much savings the City would be able to realize Citywide in the audit period with $602 million in change orders or even beyond the audit period.

[3] These organizations include other municipalities, cities, and government entities with capital programs exceeding $1 billion, many of them located in California.

Section III: Change Order Tracking and Reporting

Finding No. 6: The City does not have an adequate change order reporting and tracking mechanism in place.

None of the departments audited were able to easily generate a single report that lists all change orders within the audit period. Additionally, each department generated reports for this audit with various levels of detail where the audit team identified weaknesses and room for improvement.

- DWP-Power does not have a mechanism in place to generate a single report listing all change orders executed within a given time period. For purposes of this audit, DWP-Power generated Excel spreadsheets containing change order information on a contract basis. Although this ultimately provided a population of change orders within the audit period, it is not a leading practice and does not confirm completeness or reconciliation back to a standardized system-generated report. DWP-Power maintains additional change order information from Excel spreadsheets by individual contract. The information was limited to change order number, amount, date of execution, and description. Further, the Excel spreadsheets did not provide a summary count or total amount of change orders for all contracts.

- BOE generated a single "BOE Change Order Summary" report listing the projects awarded during the audit period. Although the BOE is the only City department to produce a system-generated change order summary report, the report provided change order data limited to the number of change orders and the change order amount. BOE maintains additional change order information from Excel spreadsheet change order logs by individual project. The spreadsheets varied by layout, format, and content.

- DWP-WETS does not have a mechanism in place to generate a single report listing all change orders executed within a given period of time. For purposes of this audit, DWP-WETS generated Excel spreadsheets containing executed change order information on a contract basis for the audit period. Although this ultimately provided a population of change orders within the audit period, it is not a leading practice and does not

conform to completeness or reconciliation back to a standardized system-generated report. DWP-WETS maintains additional change order information from a system-generated "WETS CM Project Tracking – Report – Change Order Details" by individual contract. Pending (proposed) and potential (anticipated) change orders are tracked in their construction management system. There is a live report that is available online of the potential and pending change orders for all active construction projects. It is updated automatically whenever a new item is entered.

- POLA does not have a mechanism in place to generate a single report listing all change orders executed within a given time period. For purposes of this audit, POLA provided a system-generated "Contract Change Report" for open contracts by individual audit year and a "Closed Construction Projects" with final payment date for the audit period. POLA maintains additional change order information for the contracts with change orders in the audit period as an Excel spreadsheet or a system-generated "AFA/CO Log" report. In order to generate change orders within the audit periods, the contracts with change orders within the audit period have to be estimated and for each of those contracts, an individual change order report has to be generated. Additionally, these contract-based change order reports cannot all be generated centrally, but have to be produced by field.

- LAWA now maintains its change orders in Prolog, a construction project management software. However, certain older projects did not utilize Prolog and therefore it was not possible to obtain a consolidated report that included all projects. For purposes of this audit, LAWA prepared a "Contract Summary" Excel spreadsheet containing a summary of executed change order information on a contract basis by division (Airside, Landside, Terminal, and Bradley West). LAWA maintains additional change order information by contract number, which differs by element or type of construction. Airside[4] maintains change order logs either as an Excel spreadsheet, which varied by layout, format, and content and did not adhere to a consistent application for tracking, or a system-generated

[4] The Airside Element consists of multiple projects necessary for accommodating the movement of aircraft between the north and south airfields; reconfiguring traffic movement to accommodate the Tom Bradley International Terminal (TBIT) modernization program; and provide airfield improvements as required by Airfield Operations, the Federal Aviation Administration and other Federal and State regulatory agencies.

"Change Order Logs" by contract. Landside[5], Terminal, and Bradley West maintain Excel spreadsheets referred to as, "Contractor Potential Change Notice (CPCN) Log" by contract, which categorizes contracts as under merit review, statement of work review, under negotiations, ongoing Time and Materials (T&M), waiting for authorization, denied, disputed, closed, canceled, and on hold.

Additionally, certain relevant attributes of the change orders were not visible in the change order listings provided such as (a) compensation basis (fixed fee, T&M, and unit price), (b) type of change order (owner directed, unforeseen, regulatory, and errors & omissions), whether this was an emergency change order, whether work started before the cost and schedule impact could be agreed to, references to underlying documentation (request for information, request for quote, field order, etc.), whether a rebid was triggered, or whether a percentage threshold was reached.

Since the change order reporting function currently rests with each individual City department, the level of detail and capabilities of the individual departmental change order tracking and reporting software as well as the frequency and level of change order status reporting vary. Historically, there has not been a requirement for standardized or centralized project change order reporting to the City or evaluation of the data at a centralized level.

Without meaningful change order reporting, the City will not get an accurate or timely measure of the overall cost exposure on each contract or project. Additionally, without capturing and reporting critical elements of each change, it is not possible to analyze change order data to identify trends or anomalies that may warrant further scrutiny and possible corrective action. These control gaps in the change order management process may lead to an overall insufficient change order evaluation, improper approvals, and ultimately may lead to overpayment of change orders and/or City acceptance of unreasonable and costly schedule impacts and delays.

[5] Various Landside projects designed to provide for the efficient and effective movement of people through the airport; and to provide convenient parking for individuals using the airport. Landside projects are typically related to parking lots, public transportation, train stations, tank farms, warehouse and cargo areas and access roads and perimeter fencing.

Recommendations:

6.1 The City should develop a Citywide standard for departmental tracking and reporting of change orders.

6.2 All departments should develop consistent change order logs and monthly change order reports based on Citywide standardized requirements.

Section IV: Start of Change Order Work prior to Issuance of Change Order

Finding No. 7: At times, change order work started prior to change order execution without evidence of appropriate evaluation and approval.

Change order work may be the result of unforeseen circumstances or emergencies that impact the critical path schedule, which require immediate attention and that work start prior to issuance of a change order.

- Emergency Change Orders (ECO) that directly affect the project schedule, work must proceed as soon as possible to avoid costly delays.
- Uncertain scope may require completion of all or a significant portion of the change order work on a T&M basis prior to finalization of cost and schedule impact and issuance of the change order.
- In rare cases where lump-sum negotiations fail, work may also start as T&M prior to finalization of the change order.
- Lastly, when adjustments are needed of a unit quantity, a change order will be issued after completion of the work to account for the actual number of units installed or removed.

All of these circumstances are unique and require policies and procedures to govern use, documentation, and approval requirements in order to properly authorize and account for change order work that must commence prior to finalization of a change order.

The results of our audit indicate that several departments lack adequate policies and procedures with regard to emergency change orders and work commencing prior to execution of a change order and/or execute change orders without clearly explaining and justifying why the early start was necessary. The results of our audit indicate that for 28 change orders out of the 90 evaluated (or 31%), work commenced prior to change order execution.

This equates to $19 million (21%) of the total value of the change orders sampled ($90 million).

Additionally, nearly all departments agreed that at times, change orders are started on a T&M basis and later converted to a fixed price. At what time in the change order process a T&M may be converted to a fixed fee is not defined by any of the departments' policies and procedures, but a common reply was "no later than 50% completion." In the instances a T&M change order was converted to a fixed price change order, the change order file may not have included records indicating that work commenced prior to change order execution. As a result, the actual number of change orders where work started prior to change order execution is unknown. Without clearly defined requirements regarding emergency change order work and/or start of work prior to negotiation, we are unable to conclude that these change orders were adequately evaluated, authorized, and executed, and that fair pricing was obtained by the various departments.

Exhibit 6 indicates the frequency in which change order work was initiated prior to final authorization and the number of days elapsed between work commencing and the change order being executed.

Exhibit 6 – Work Initiated prior to Change Order (CO) Finalization

Description	BOE	POLA	WETS	Power	LAWA	Citywide Total
Number of COs Evaluated	20	20	19	11	20	90
COs With Uncertain Work Start Dates	14	9	11	9	15	58
COs Where Work Began Before CO was Finalized	4	10	7	2	5	28
Value of COs Where Work Began Before CO was Finalized	$268,810	$1,280,647	$2,631,526	$11,441,021	$3,089,500	$18,711,504
Average Variance *	102	339	626	166	101	315
Median Variance *	71	245	467	166	11	263
Value of COs Evaluated	$7,937,881	$3,147,931	$9,323,667	$19,270,523	$50,500,761	$90,180,762

*) Days elapsed where work started before CO was finalized.

The change orders where work started early were consistently lacking one or more critical elements to allow for early start of the work:

- An indication of whether the early start of work was a result of (a) an emergency, (b) undefinable scope, (c) an agreement could not be reached with the contractor, or (d) the change order was adjusting a unity quantity;
- Impact to critical path schedule;
- An explanation of why the scope was indeterminate in nature, or if there was an emergency, or why an agreement could be reached with the contractor related to cost and time impacts;
- Approval and authorization to start work early;
- Requirements to account for and approval of daily T&M tickets;
- Preapproved rates and/or unit prices.

Additionally, we found that there was a significant variance between when work related to the change order began and when the change order was finalized. Citywide, the average variance was 315 days, although this varied significantly between the proprietary departments. In extreme instances, change order work began nearly four years (1,205 days) prior to the change order being executed. This type of delay was sometimes attributable to the practice of "bundling" change orders, rather than executing changes individually or more regularly.

All City departments embark on projects involving underground construction in older parts of the City. Such underground construction has historically resulted in change orders due to unforeseen conditions. These include, but are not limited to unknown underground obstructions, uncharted utilities, and unfavorable soil composition. With this in mind, underground construction within the City of Los Angeles will likely include a certain number of "known unknowns" – i.e., a high number of change orders with unpredictable scope as a result of the uncertain underground conditions. Such change orders are often conducted as emergencies and/or T&M work.

The policies and procedures related to emergency change orders and/or commencing change order work prior to execution of a change order are lacking requirements for inclusion and documentation of the critical elements stated above.

- LAWA does not have a clearly documented and formalized procedure to address emergency change orders and work starting prior to change order execution.

- DWP-Power does not have a clearly documented process to address emergency change orders and work starting prior to change order execution. (DWP-Power reportedly relies on "on-call" contractors to handle emergency work, resulting in a number of emergency change orders that do not follow any prescribed process.)

- DWP-WETS does not have a clearly documented process to address emergency change orders and work starting prior to change order execution. Their policies and procedures state that contractor will be authorized to proceed with the work by issuing a Pending Change Order (PCO) for the contractor's labor, material, and equipment used to perform the work. The Construction Manager (CM) will issue a PCO with a "not-to-exceed" price limit. The "not-to-exceed" limit must be conservative enough to cover costs of the proposed change and not require additional change orders.

- The nature of the work at DWP-WETS often requires emergency change order work. Qualified, "on-call" contractors are selected from a rotating list and notified to proceed on a T&M change order basis. There is no mention of converting T&M change orders to fixed price change orders.

- POLA does not have a clearly documented process to address emergency change orders. There is no mention of converting T&M change orders to fixed price change orders.

- BOE has an emergency change order procedure and methods of initiating work prior to the change order being finalized. BOE's Project Delivery Manual (PDM) defines what they consider to be an emergency change order and includes examples of the documents the contractor is required to submit prior to proceeding with the work. The PDM outlines the procedure for initiating the work and sets a maximum allowable expenditure limit for all work associated with the emergency change. There is no mention of converting T&M change orders to fixed price change orders.

> Section 20.3 reads, *"In order to avoid delays to the project, and when the scope of the change is easily defined, an ECO (emergency change order), with a specific not-to-exceed price limit, is used to direct the Contractor to start work prior to negotiating the lump-sum cost for the required change. If the cost of the change order work is estimated to exceed $100,000, authorization from both the Program Manager and the Board is required prior to proceeding with the change."*

LAWA and POLA operate in a similar fashion, engaging contractors on a T&M basis with departmental inspectors overseeing work as it progresses. POLA proceeds by issuing a not-to-exceed (NTE) amount, which is occasionally surpassed by the contractor, requiring POLA to seek additional funds from their overseeing Board.

Lack of formal, documented procedures may lead to emergency and early start charge orders that are insufficiently supported, exceed the NTE amount, or result in schedule delays that neither the contractor nor the City agree to, resulting in potential claims at the completion of the project. Without clearly defined policies and procedures to outline the change order process in the event of an emergency, the City finds itself vulnerable to improper approvals, overpayment of change order work, and City acceptance of schedule impacts that may cause significant delays to the critical path. Additionally, if change order work is initiated on a T&M basis prior to finalization of the cost and schedule impact, the City will incur higher administrative costs due to the oversight effort involved to verify the work and will still have to finalize actual cost negotiations and change order execution with the contractor. Finally, there is the risk of incurring additional cost for work being executed via an emergency change order that does not actually impact the critical path schedule and still having to pay for overtime, expedited materials, and equipment.

Recommendations:

7.1 DWP-Power and LAWA should develop policies and procedures to include all critical elements for emergency change orders and for work starting prior to change order execution.

7.2 DWP-WETS, POLA, and BOE should update and refine their policies and procedures to include all critical elements for work starting prior to change order execution.

Section V: Change Order Supporting Documentation

Finding No. 8: Change orders do not consistently contain sufficient documentation presented in an orderly manner to adequately facilitate an efficient and effective evaluation of the change order.

A complete change order package requires numerous forms documenting all aspects of the change as well as signature approvals from all involved parties. The scope of work must be clearly identified and should include the contractor's plan to execute the work, along with the associated costs and schedule impact.

Our results indicate that all departments evaluated in the scope of this audit at times do not include all the documents required for a change order to be properly executed, and that the documents provided are sometimes of insufficient quality. We identified documentation that was presented in a disorderly fashion without being labeled and referenced, duplicates, superseded versions of documents, and documentation whose relevance and purpose was unclear.

Based on our review of 90 change order packages, we identified various levels of gaps and inconsistencies in the supporting documentation.

Exhibit 7 lists forms and other information pertinent to the change order that were expected to be provided, and where our audit identified gaps. The numbers in Exhibit 7 represent the number of instances when a document was either absent from the change order, or did not meet leading practices.

Of the 90 change orders totaling $90,180,762 54 change orders totaling $32,932,840 (nearly 36%) contained one or more exceptions to leading practices.

The lack of formal policies and procedures or the lack of enforcement of and compliance with existing policies and procedures related to change order documentation appears to be the root cause of the limitations and instances of noncompliance we identified. Although various processes exist at the

departments, some documented and others not, these do not rise to the level of formal policies and procedures. The departments were lacking complete steps identifying (a) action steps required to be performed during the change order initiation and execution process, (b) what documents are required to be included with the change order package, (c) the order in which documents and forms are required to be included, and (d) what information each document should contain. All these items would collectively constitute "the Anatomy of a Change Order." (Exhibit 1)

A lapse in change order documentation may expose the City to overpriced or unwarranted work to be added to the project scope and/or may also result in unwarranted schedule impacts. Without standardized document templates and a final checklist of required items and actions, incomplete, and unorganized change order packages may continue to be received and processed. This may result in the City being held liable for added scope that is not clearly defined, resulting in schedule delays, overpayment of change order work, or both.

Recommendations:

8.1 BOE and POLA should consider including a change order "checklist" document outlining all required change order information.

8.2 DWP-WETS, DWP-POWER, and LAWA should implement policies and procedures that clearly state all of information required before a change order can be processed. Examples of the forms should be included in an appendix of the document or should be easily accessible online.

Exhibit 7 - Summary of Exceptions from Testing of Completeness of Change Order Documentation

Description	BOE	CO Amount	WETS	CO Amount	POWER	CO Amount	LAWA	CO Amount	POLA	CO Amount	TOTAL Count	TOTAL Amount
Independent Estimate Not Provided/Insufficient Detail	5	$ 536,755	1	$ 243,687	3	$ 15,280,559	6	$ 2,687,187	2	$ 177,053	**17**	$ 18,925,240
Contractor's Estimate Not Provided/Insufficient Detail	0	$ -	2	$ 2,835,287	1	$ 9,835,421	1	$ 975,000	0	$ -	**4**	$ 13,645,708
No Evidence of Review of Contractor's Estimate	0	$ -	0	$ -	0	$ -	1	$ 35,850	0	$ -	**1**	$ 35,850
Not-to-Exceed Amount Exceeded	0	$ -	0	$ -	0	$ -	0	$ -	2	$ 156,129	**2**	$ 156,129
Independent Schedule Impact Analysis Not Included	1	$ 722,448	5	$ 1,739,718	0	$ -	1	$ 123,655	3	$ 261,803	**10**	$ 2,847,624
Contractor's Schedule Impact Analysis Not Included	0	$ -	2	$ 920,554	0	$ -	0	$ -	2	$ 175,809	**4**	$ 1,096,363
No Evidence of Review of Contractor's Schedule Analysis	0	$ -	2	$ 734,577	0	$ -	0	$ -	2	$ 175,809	**4**	$ 910,386
T&M Tickets Not Sufficiently Provided	0	$ -	1	$ 234,577	0	$ -	0	$ -	0	$ -	**1**	$ 234,577
No Record of Negotiation Document Provided	2	$ 702,061	8	$ 6,142,434	5	$ 17,631,373	5	$ 1,357,250	1	$ 58,339	**21**	$ 25,891,457
Insufficient Quality Record of Negotiation	1	$ 722,448	0	$ -	0	$ -	2	$ 1,228,477	0	$ -	**3**	$ 1,950,925
Invoice Does Not Itemize CO Costs Separately	0	$ -	2	$ 478,263	0	$ -	0	$ -	0	$ -	**2**	$ 478,263
Labor and Material Charges Inconsistent with Contract	0	$ -	0	$ -	0	$ -	0	$ -	2	$ 214,200	**2**	$ 214,200
CO Not Executed within Available Contingency or Lacking Supporting Documentation	1	$ 98,902	0	$ -	0	$ -	0	$ -	0	$ -	**1**	$ 98,902
CO Not Appropriately Justified	0	$ -	0	$ -	0	$ -	1	$ 130,000	1	$ 115,000	**2**	$ 245,000
Pricing Source Not Referenced / Assumptions Not Stated	0	$ -	1	$ 169,811	0	$ -	0	$ -	9	$ 1,710,815	**10**	$ 1,880,625
Total Change Orders with Exceptions (excl. double count)	**9**	**$ 1,068,655**	**16**	**$ 8,154,034**	**5**	**$ 17,631,373**	**12**	**$ 4,010,253**	**12**	**$ 2,068,525**	**54**	**$ 32,932,840**
Total Change Orders Tested	**20**	**$ 7,937,882**	**19**	**$ 9,323,667**	**11**	**$ 19,270,523**	**20**	**$ 50,500,761**	**20**	**$ 3,147,931**	**90**	**$ 90,180,764**

Section VI: Knowledge Sharing and Lessons Learned

Finding No. 9: The City does not have a formal "lessons learned" and knowledge sharing function.

The City does not have any formal lessons learned or knowledge sharing function between the different City departments with respect to capital program management and change orders. Although this audit focused specifically on change order management, our analysis indicates that all departments are striving to make improvements across their capital programs and are in constant need of information that allows them to make decisions that result in increased efficiency and effectiveness.

All City departments reported that they conduct some form of internal "lessons learned" from change orders, such as specifying a particular construction method in the construction documentation or increasing contingency for projects with a high-risk of underground-related unforeseen conditions. However, the execution of the "lessons learned" communication is not formalized and not shared between departments.

POLA procedures manual includes a section on "lessons learned" as part of project closeout. The "lessons learned" process requires the project construction manager (PCM) to prepare a power point presentation covering trade areas such as structural, mechanical/electrical/plumbing (MEP), and grading/paving/striping and present to key stakeholders and project team.

Example of where knowledge sharing could result in efficiencies for City departments includes the DWP-Water and POLA, who both reported exploring options for implementation of new capital project reporting software. It would make sense for the departments to collaborate and share their collective knowledge and perhaps pursue a joint effort in this area. There are likely many other areas where two or more departments are pursuing similar initiatives, which would benefit from inter-departmental collaboration and resource leverage/efficiencies.

Another example of a "lessons learned" includes a construction project by POLA, whereby a certain construction method was preferred and expected by POLA. However, this construction method was not specified in the construction documents and when the contractor initiated a different construction method, POLA realized that this alternate method was used in Northern California and was considered common to the industry. As a result of this information, the contractor was issued a Change Order for the incremental cost of using POLA's desired construction method. Going forward, POLA revised its construction document language for similar projects.

Since the "lessons learned' responsibility currently resides with each individual City department, without being formally documented or communicated, there have been no collaborative efforts between the departments. Historically, there has not been a requirement for this type of inter-departmental collaboration and knowledge sharing.

Sharing of lessons learned and pooling of resources through inter-departmental joint efforts will increase the awareness level, help to continually improve change order management practices, and likely lead to a decreased number of change orders while recognizing efficiencies and shared goals. Documentation and communication of "lessons learned" and associated project risks leads to identification and promotion of best practices across the City departments.

The lessons learned and knowledge-sharing practices reviewed during this analysis were compared to leading practices observed by the auditors in a number of other organizations and government agencies in California.

Recommendations:

9.1 The City should establish a formal committee on lessons learned and knowledge sharing of best practices between City departments.

9.2 All departments should establish formal knowledge sharing of lessons learned, project risks, and best practices of change orders.

Section VII: Contingencies and Change Order Estimation

Finding No. 10: Construction contingencies are not consistently evaluated and/or are not evaluated on a risk-based approach.

Contingencies are budgeted amounts used to provide for uncertainties associated with a construction project. Traditionally, the contingency is a percentage addition on top of the base estimate. In a construction project, there are typically several types of contingencies, such as design contingency, construction contingency, and owner's contingency.

Leading practices for contingency estimating prescribe frequent adjustments of the contingency as the project progresses. As each project progresses through the design phase, the design contingency should be reduced until it eventually reaches zero when the design is complete. Similarly, as the project progresses, the construction contingency is reduced, either through change order issuance during the construction phase or as a result of a reduced risk of change orders. A project that is facing incomplete design, high likelihood of unforeseen conditions (such as underground construction in old City areas or renovations to existing buildings), or outstanding owner decisions regarding construction may have a higher construction contingency.

Cost estimating using risk analysis, Estimating Risk Analysis (ERA), is a leading methodology that can be used to substantiate the contingency by identifying uncertainties and estimating their financial implications. Additionally, by using a measure of expected change orders in the overall contingency evaluation, there is a potential to analyze and justify any variances to the contingency at a later date.

For example, all City departments embark on projects involving underground construction on nonvirgin land. Within the City of Los Angeles, such underground construction has historically resulted in change orders due to unforeseen conditions as a result of unknown underground obstructions, uncharted utilities, or unfavorable soil composition. With this in mind,

underground construction projects within the City of Los Angeles will likely include a certain number of "known unknowns" – i.e., a high number of change orders as a result of the unpredictable underground conditions.
The City does not consistently evaluate construction contingencies on a risk-based approach. At times, an evaluation of the construction contingency is not completed prior to commencement of construction.

- LAWA assigns a set contingency percentage at the project start depending on the type of work; flat work (10%), vertical work (15%), and renovation work (25%). Additionally, LAWA will adjust these percentages based on delivery method on a case-by-case basis. For example, for a vertical job that is delivered using the DB delivery methodology where LAWA does not own the design risk, LAWA may reduce that contingency percentage. Downward adjustment decisions are made when LAWA is setting the budgets for Board approval prior to award of the construction contract. The process above is not included or described in any formal policies and procedures.

- DWP-Power reported contingencies are based on past experience and expected difficulty of construction such as design development changes, schedule adjustments, general administration changes (such as wage rates), differing site conditions for those expected, and third-party requirements imposed during construction, such as new permits. DWP-Power also reported utilizing methodologies and processes to determine contract contingencies during project development. Risk assessments and analysis are formalized in the Board Approval documents. DWP-Power recognizes the need to consistently refine these processes in estimating construction contingencies for projects by utilizing an Estimating Risk Analysis (ERA) approach for substantiating change orders.

- POLA assigns a construction contingency based on a graduated scale dependent on construction contract value. The construction contingency is also dependent on whether or not the project is being constructed on an older part of the Port where the risks may be higher, or on newly created land where the risks may be lower. Although POLA evaluates the overall project contingency on a risk-based approach, POLA's policies and procedures do not specify how to conduct an evaluation of the risk for change orders as a separate element to construction contingency.

Additionally, POLA does not have a standardized form to document evaluation of the construction contingency.

- BOE applies a budget contingency to account for change order work anticipated once the project is underway in the field. A 10% budget contingency is often used on larger projects and a 20% contingency on smaller ones. This occurs at the time a project budget is prepared to obtain project funding. BOE's Project Delivery Manual, Ch. 3.7, defines "Budget Contingency" as a percentage of the construction value used to cover change orders that may occur during construction. It further states, "the budget contingency is normally 10% for projects greater than $1 million construction value."

- DWP-WETS generally assigns a standard contingency of 10% of the estimated construction cost. This amount historically has been sufficient to cover the risks DWP-WETS have experienced from most unforeseen circumstances. For those projects that are beyond the typical, they reportedly conduct a risk analysis to determine if additional contingency is required. The project risk analysis is required as part of DWP-WETS Project Management Plans that Project Managers are required to perform for the projects. Depending upon the impact of the risk, additional contingency may be added to the contract as one of the mitigation measures. DWP-WETS policies and procedures do not specify how to conduct an evaluation of the risk for change orders as a separate element to construction contingency. Additionally, DWP-WETS does not have a standardized form to document evaluation of the construction contingency.

What generally appears to be lacking for all departments is a requirement for reevaluation of the construction contingency at the time of bidding to properly reflect the risk of change orders.

Currently, no City department has a clear, documented process for estimating and documenting construction contingencies - including a consideration of change orders - for construction contracts that are expected to include normal change orders.

Construction contingency estimating should include a consideration of risk at the time of construction, including whether or not the project is likely to have "known unknowns" i.e., change orders that are expected as a result of

predictable but undefinable underground conditions, incomplete design, outstanding and/or uncertain agency reviews, particular complexity, and pending City changes; etc.

Without a meaningful assessment of the risk for change order occurrence, the City will not have a meaningful baseline estimate of the amount of expected change orders for change variance reporting. If change order variance expectations are established early on, it can provide a useful measurement of reasonableness. However, if a contingency level is estimated too high, instead of optimized, it may result in a less strict approach to evaluating, pricing, and authorizing change orders.

Recommendation:

10.1 LAWA, DWP-WETS, DWP-Power, and POLA should formalize the process in its policies and procedures for estimating the construction contingency on projects.

We thank the departments and their personnel who provided information and answered questions during the execution of this audit: DWP-WETS, DWP-Power, LAWA, BOE, and POLA.

GLOSSARY OF KEY TERMS

Bureau of Engineering (BOE) *is responsible for the City's vast network of infrastructure within the public right of way, and includes the planning, design, and construction of public facilities, and the management and delivery of voter-approved public bond funds.*

California Department of Industrial Relations (DIR) *establishes prevailing wage rates.*

Capital Improvement Expenditure Program (CIEP) *is the City's approved plan for construction.*

Emergency Change Order (ECO) *is a change order where work has to commence immediately. The emergency change order procedure is typically designed to allow a quick response when unforeseen field conditions threaten project progress.*

Estimating Risk Analysis (ERA) *is a methodology and leading practice for construction cost estimating, including analysis of future risk (such as change orders).*

Los Angeles Department of Water & Power, Power System Engineering Division (DWP-Power) *is the electrical utility division of DWP, servicing 1.4 million electric customers.*

Los Angeles Department of Water & Power, Water Engineering & Technical Services Division (DWP-WETS) *is the water utility division of DWP, servicing 660,000 water customers.*

Los Angeles World Airports (LAWA) *owns and operates three airports, including Los Angeles International, Ontario International, and Van Nuys. The airport system operates under the direction of a policy-making Board of Airport Commissioners appointed by the Mayor of Los Angeles.*

Mechanical-Electrical-Plumbing (MEP), *acronym for a group of trade contractors with similar work characteristics.*

NTE (not-to-exceed) *indicates a monetary contract ceiling; an amount that may not be exceeded. Once the NTE amount has been reached, billings must cease.*

Pending Change Order (PCO) *is a proposed change that has not yet been fully approved and executed as a change order.*

Port of Los Angeles (POLA) *is also known also Los Angeles Harbor Department, one of the world's busiest seaports. POLA is considered a landlord port and leases its facilities to tenants.*

Project Construction Manager (PCM) or Construction Manager (CM) *is the entity managing construction of a project. The PCM or CM function can be outsourced or provided in-house.*

Record of Negotiation (RON) *is a document used to negotiate (and document the negotiation of) pricing and other terms with the contractor pertaining to a quote or contract. It is intended to help strengthen the negotiations.*

Time and Materials (T&M) *is a compensation methodology whereby the contractor is compensated on the basis of actual materials used and/or installed and time incurred.*

APPENDIX I: ACTION PLAN

	Finding	Page		Recommendation	Page	Entity Responsible for Implementation	Priority
	Section I: Policies and Procedures						
1	Several City departments had insufficient policies and procedures related to change order initiation, execution, and closeout.	13	1.1.	LAWA should develop formal policies and procedures for change order management that includes all critical elements of the process.	16	LAWA	A
			1.2.	DWP-WETS, DWP-Power, BOE, and POLA should update and refine their policies and procedures to incorporate all critical elements of the change order process.		DWP-WETS, DWP-Power, BOE, and POLA	B
	Section II: Change Order Pricing						
2	City change orders do not consistently incorporate an adequate independent cost estimate.	18	2.1	Departments' documented procedures should indicate when an independent estimate should be used to evaluate pricing for change orders; for example, by setting a change order dollar value threshold.	20	LAWA, DWP-Power, DWP-WETS, BOE, and POLA	A
3	City change orders do not consistently incorporate an adequate Record of Negotiation.	20	3.1	Departments should consistently utilize a standard Record of Negotiation document containing a clear description of all negotiations and final cost estimate.	21	LAWA, DWP-Power, DWP-WETS, BOE, and POLA	B

	Finding	Page		Recommendation	Page	Entity Responsible for Implementation	Priority
4	City change orders do not consistently incorporate an adequate reference to pricing sources and assumptions.	22	4.1	Departments should clearly reference pricing sources and state assumptions in their independent estimates.	22	LAWA, DWP-Power, DWP-WETS, BOE, and POLA	B
5	City construction contracts do not consistently include adequate contractor change order pricing requirements.	23	5.1	DWP-Power, DWP-WETS, and POLA should make sure contractor contracts include clear and detailed requirements for change order pricing and that change orders always make reference to contractually stipulated pricing sources.	24	DWP-Power, DWP-WETS, and POLA	B
	Section III: Change Order Tracking and Reporting						
6	The City does not have an adequate change order reporting and tracking mechanism in place.	25	6.1	The City should develop a Citywide standard for departmental tracking and reporting of change orders.	28	Centralized function of the City	A
			6.2	Departments should develop consistent change order logs and monthly change order reports based on Citywide standardized requirements.		LAWA, DWP-Power, DWP-WETS, BOE, and POLA	B

	Finding	Page		Recommendation	Page	Entity Responsible for Implementation	Priority
	Section IV: Start of Change Order Work prior to Issuance of Change Order						
7	At times, change order work started prior to change order execution without evidence of appropriate evaluation and approval.	29	7.1	DWP-Power and LAWA should develop policies and procedures to include all critical elements for emergency change orders and for work starting prior to change order execution.	33	LAWA and DWP-Power	B
			7.2	DWP-WETS, POLA, and BOE should update and refine their policies and procedures to include all critical elements for work starting prior to change order execution.		DWP-WETS, BOE, and POLA	B
	Section V: Change Order Supporting Documentation						
8	Change orders do not consistently contain sufficient documentation presented in an orderly manner to adequately facilitate an efficient and effective evaluation of the change order.	34	8.1	BOE and POLA should consider including a change order "checklist" document outlining all required change order information.	35	BOE and POLA	B
			8.2	DWP-WETS, DWP-Power, and LAWA should implement policies and procedures that clearly state all of information required before a change order can be processed. Examples of the forms should be included in an appendix of the document or should be easily accessible online.		LAWA, DWP-Power, and DWP-WETS	A

	Finding	Page		Recommendation	Page	Entity Responsible for Implementation	Priority
	Section VI: Knowledge Sharing and Lessons Learned						
9	The City does not have a formal "lessons learned" and knowledge sharing function.	37	9.1	The City should establish a formal committee on lessons learned and knowledge sharing of best practices between City departments.	38	Centralized function of the City	B
			9.2	Departments should establish formal knowledge sharing of lessons learned, project risks, and best practices of change orders.		LAWA, DWP-Power, DWP-WETS, BOE, and POLA	C
	Section VII: Contingencies and Change Order Estimation						
10	Construction contingencies are not consistently evaluated and/or are not evaluated on a risk-based approach.	39	10.1	LAWA, DWP-Power, DWP-WETS, and POL should formalize the process for estimating the construction contingency on projects.	42	LAWA, DWP-Power, DWP-WETS, and POLA	B

A – High Priority *- The recommendation pertains to a serious or materially significant audit finding or control weakness. Due to the seriousness or significance of the matter, immediate management attention, and appropriate corrective action is warranted.*

B – Medium Priority *- The recommendation pertains to a moderately significant or potentially serious audit finding or control weakness. Reasonably prompt corrective action should be taken by management to address the matter. Recommendation should be implemented no later than six months.*

C – Low Priority *- The recommendation pertains to an audit finding or control weakness of relatively minor significance or concern. The timing of any corrective action is left to management's discretion.*

N/A – *Not Applicable*

APPENDIX II – FINANCIAL SCORECARD

	Finding/Recommendation	Page	Category	Financial Impacts
1	Several City departments have insufficient policies and procedures related to change order initiation, execution, and closeout.	13	Cost Savings, Cost Avoidance	Ongoing cost savings and cost avoidance of an estimated minimum of 1%–2% of total change order costs, or $6–$12 million based on our audit results projected on the total population of change orders in the audit period, $602 million. This is an estimate and actual savings may be substantially higher.
2	City change orders do not consistently incorporate an adequate independent cost estimate.	18	Cost Savings, Cost Avoidance	Findings 2–5 relate to ongoing cost savings and cost avoidance as a result of improved change order pricing. Based on our analysis, we identified approximately $19 million of change orders with inconsistent pricing evaluation from our $90 million change order sample, or approximately 20% of the change order sample. 5%–10% of $19 million equates to approximately $1–2 million. It is not possible to fairly estimate how much savings the City would be able to realize Citywide in the audit period with $602 million in change orders or even beyond the audit period.

Appendix II: Financial Score Card

	Finding/Recommendation	Page	Category	Financial Impacts
3	City change orders do not consistently incorporate an adequate Record of Negotiation.	20	Cost Savings, Cost Avoidance	See above.
4	City change orders do not consistently incorporate an adequate reference to pricing sources and assumptions.	22	Cost Savings, Cost Avoidance	See above.
5	City construction contracts do not consistently include adequate contractor change order pricing requirements.	23	Cost Savings, Cost Avoidance	See above.

Appendix II: Financial Score Card

Cost Recovery: Monies that may be recoverable.

Cost Savings and Efficiencies: Cost savings opportunity and process enhancements.

Cost Avoidance: Monies that are lost but are avoidable in the future.

Increased Revenue: Revenue opportunities.

Wasted Funds: Monies that are lost and not recoverable due to reckless act or mismanagement of funds.

We strive to identify and recommend actions that will result in real financial impact, whereby the City can achieve significantly more through cost savings and/or increased revenue than the cost of the audit function. The above dollar estimates are dependent upon various factors, such as full implementation of audit recommendations and should not be used as guaranteed amounts.

APPENDIX III – SCOPE & METHODOLOGY

SCOPE

The audit assessed the City's process for initiating, authorizing, approving, and managing construction change orders. The scope will include change orders made after June 30, 2011 for active and completed construction contracts for projects developed by council-controlled departments and proprietary departments, including BOE, LAWA, POLA, and DWP. A list of audited change orders is included in Appendix V.

METHODOLOGY

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Our understanding was obtained through examining documentation submitted by and interviewing key personnel from each of the audited departments as well as members of the Bureau of Contract Administration, Department of Public Works.

Our fieldwork for this audit was performed from October 2014 through February 2015 at BOE, DWP, POLA and LAWA. Through inquiry, observation, and other substantive testing, including testing of source documentation, we performed the following.

Change Order Initiation

1. Prepared a GAP analysis between the departments' change order processes against leading practices for key elements of the change order process.
2. Tested change orders and underlying change order requests for proper authorization and approval.
3. Compared scope of change orders to the resulting price to evaluate whether authorized changes are appropriately reflected as either a decrease or increase to the contract price.

4. Evaluated the compensation methodology used and determined if the appropriate type (time and materials, fixed cost, actual cost) of change order was used, according to leading practices.
5. Determined if any change order work was inappropriately initiated prior to obtaining all relevant approval.
6. Compared the City's controls in place over change orders for emergency work against leading practices and identified areas for improvement.

Change Order Initiation

1. Evaluated the City's "lessons-learned" from past change orders, where there was an opportunity to avoid a change order and reduce cost exposure, and documented identified improvements to the process. Evaluated how the City has communicated these "lessons-learned" to its staff.
2. Evaluated the City strategies and controls to discourage contractors from artificially "low-balling" bids to benefit from costly change orders by comparing the City's bid evaluation practices to leading practices.
3. Evaluated whether construction contracts include contingencies to allow for unforeseen circumstances and whether they are based on a risk-based estimate as per recommended by leading practices.
4. Based on the completeness of construction documentation available at the time of bid, evaluated if the number of change orders, scope, and the associated amount is reasonable in light of the original contract amount (the objective is to identify potential low bid contractors). Also, evaluated whether errors and omissions by the architect/engineer were appropriately documented and contractually enforced.
5. Compared the completeness and organization of change order documentation with leading practices and identified instances where documentation is not sufficient and improvements can be made.
6. Compared change order pricing to the initial contract and/or prevailing wages.
7. Compared the City's change order statistics and related management processes for the council-controlled and proprietary departments compared against similar entities in other jurisdictions that the auditors have experience with.

Change Order Close-out/Completion

1. Compared the City's contract administration procedures against leading practices and determined if they are adequate to facilitate timely inspection of the work and timely completion.
2. Audited change order invoiced amounts and compared the invoice to executed changes orders. Determined if the amounts invoiced are adequately supported based on leading practices, contract terms and conditions, and supporting documentation included with the invoice.
3. Analyzed calculations of change order costs and evaluated whether the amounts paid complied with the terms of the change order agreement with respect to items such as labor, materials, equipment, overhead, and other direct costs. Determined if the calculations are correct and properly reviewed and authorized.
4. Evaluated how disputed change orders are addressed through claims management and compared the City's process to leading practices.

We incorporated a targeted sampling of change orders based on industry change order criteria such as type of change order, type of contract, timing of change order, type of construction, and type of contractor compensation. Our sample of change orders included an initial sample during the audit planning phase and an expanded sample in the audit's substantive testing phase.

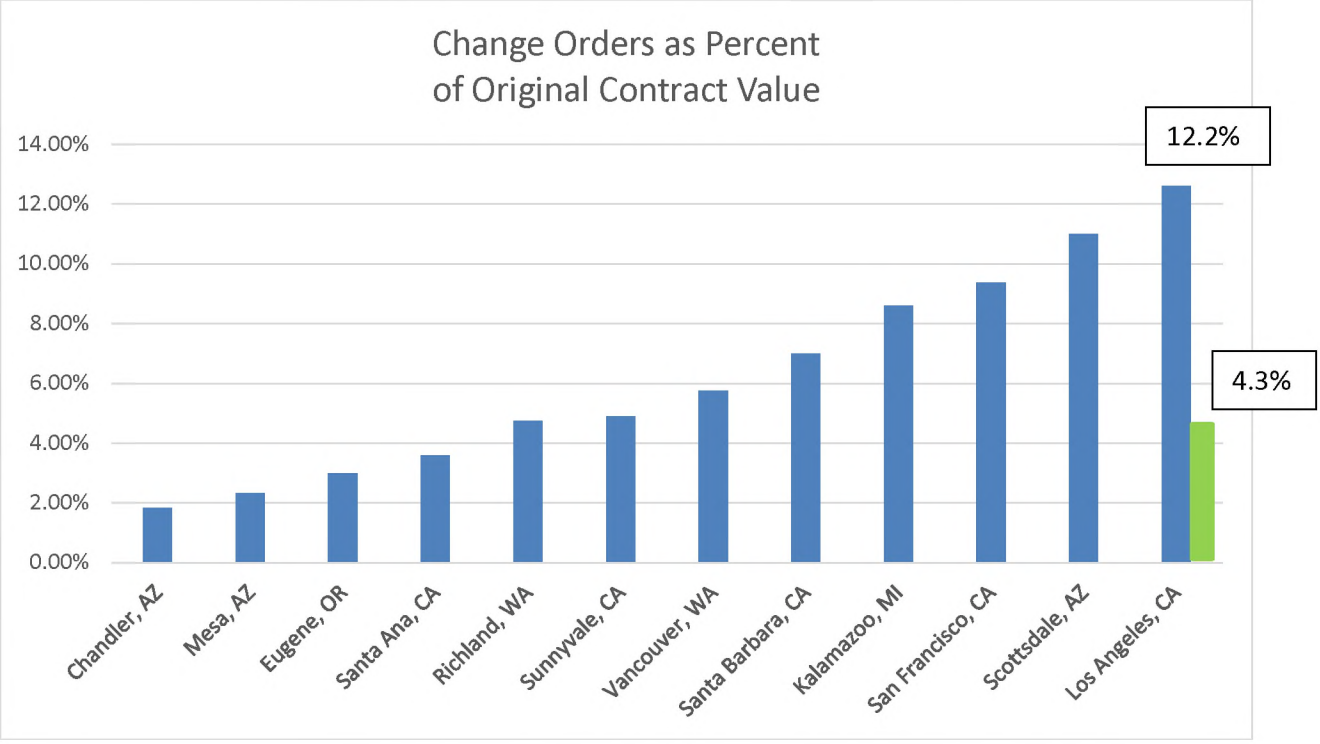
We determined that the data used in the report were sufficiently reliable and believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

This performance audit did not constitute an audit of financial statements in accordance with Government Auditing Standards. The auditors were not engaged to, and did not, render an opinion on the City of Los Angeles' internal controls over financial reporting or over financial management systems (for purposes of OMB's Circular No. A-127, *Financial Management Systems*, July 23, 1993, as revised). The auditors caution that projecting the results of our evaluation to future periods is subject to the risks that controls may become inadequate because of changes in conditions or because compliance with controls may deteriorate.

APPENDIX IV –BENCHMARKING & BEST, LEADING & NEXT PRACTICES

Over our audit period, the City's total change orders represented 12.2% of the original contract value. This average exceeds other Cities as surveyed by Municipal Benchmarks[6]. However, a significant portion of the change order amount, $415 million, relates to the Tom Bradley West Terminal (Bradley West) at the Los Angeles Airport that used a project delivery method that allowed for additional awards to be executed as change orders as the project progressed. Excluding the Bradley West project from the City's change order calculation results in an overall change order amount of $187 million, which comprises 4.3% of the original contract value of $4.3 billion.

Exhibit 8 – Change Order Percentages Benchmarking



This comparison has to be done with local variations in mind and the many reasons why change orders may or may not be utilized on a project. San Francisco, for example, encompasses construction in older parts of the City

[6] *Municipal Benchmarks: Assessing Local Performance and Establishing Community Standards* (third edition), David Ammons, Table 25.4.

with significant unknown underground conditions, similar to that of the City of Los Angeles.

In addition to the survey above, the auditors have a proprietary database with change order information from private sector clients as well as public agencies where change orders normally fall within the range of 5%-10% of original contract value.

There is a special limitation on government contracts that were awarded under an open, competitive bidding requirement. At some point, the public agency can no longer modify a contract by change order, but must go back out to competitive bidding for the new work. In the State of California, this limit is generally 10% of the contract price with some variations and conditions depending on type of municipality or agency it involves.

Leading practices in change order management as well as leading practices in policies and procedures writing were reviewed and considered during this audit. The change order policies and procedures were compared against leading practices employed by the auditors and other organizations and governmental agencies in California. Included, but not limited to those leading practices are:

- Project Management Institute of America (PMI)
- Construction Management Association of America (CMAA) "Construction Management Standards of Practice"
- Construction Industry Institute (CII) "Best Practices"
- American Institute of Architects (AIA), The Architect's Handbook of Professional Practice
- "Public Works Construction Manual, a Legal Guide for California", BNi Building News
- Construction Industry Institute (CII) - Best Practices
- Association for the Advancement of Cost Engineering (AACE) – Professional Practices Guides
- Elements of change order policies & procedures for a variety of agencies previously reviewed by the auditors.

Additionally, we based the quality of the change order documentation based on the auditors' experience with government organizations with capital programs of similar size and complexity as City of Los Angeles.

Appendix IV: Benchmarking & Best, Leading & Next Practices

Cost estimating using risk analysis (ERA) is a leading contingency and risk estimating methodology referenced for purposes of this audit. Other industry publications of cost estimating leading practices include:

- American Institute of Architects (AIA) – "Managing the Contingency Allowance"
- American Society of Civil Engineers (ASCE) – Budgeting Owner's Construction Contingency
- Association for the Advancement of Cost Engineering (AACE) – Professional Practice Guide #8: Contingency

APPENDIX V

LISTING OF CHANGE ORDERS SAMPLED

City of Los Angeles - Controllers Office
Performance Audit of the City's Construction Change Order Management Practices
Contract/Change Order Sample
(Audit Period 7/1/2011 - 6/30/2014)

Department	Change Order Type	Original Value of All Contracted Construction Projects	Value of Change Orders of all Contracted Construction Projects	Percentage Change Orders	Original Value of Contracts sampled	Value of Change Orders Sampled
Bureau of Engineering:		**$ 1,000,869,053**	**$ 39,488,698**	**3.95%**	**$ 138,819,941**	**$ 7,937,882**
BOE Change Order Summary Projects Awarded Since July 1, 2010		$ 1,000,869,053	$ 39,488,698			
Air Treatment Facility - ECIS - Mission & Jesse Project No. C501 / Contract No. C-121539 / CO No: 001	Error and Omissions	$ -	$ -		$ 14,892,000	$ 610,061
Air Treatment Facility - ECIS - Mission & Jesse Project No. C501 / Contract No. C-121539 / CO No: 024	Unforeseen Conditions	$ -	$ -		$ -	$ 92,000
DWP La Kretz Innovation Campus Project No. G906 / Contract No. C-122872 / CO No: 005	Change in Scope	$ -	$ -		$ 21,114,233	$ 129,098
DWP La Kretz Innovation Campus Project No. G906 / Contract No. C-122872 / CO No: 010	Error and Omissions	$ -	$ -		$ -	$ 35,000
Echo Park Lake Rehabilitation Project No. O/01-29 / Contract No. C-119056 / CO No: 005	Error and Omissions	$ -	$ -		$ 24,485,000	$ 47,127
Echo Park Lake RehabilitationCO No: 048 Project No. O/01-29 / Contract No. C-119056 /	Unforeseen Conditions	$ -	$ -		$ -	$ 80,000
Manchester Jr. Arts/Vision Theater Phase 1A & 1B Project No. K244 / Contract No. C-118549 / CO No: 9	Error and Omissions	$ -	$ -		$ 3,744,500	$ 315,307
Manchester Jr. Arts/Vision Theater Phase 1A & 1B Project No. K244 / Contract No. C-118549 / CO No: 36	Change in Scope	$ -	$ -		$ -	$ 24,078
Rain Forest of the Americas Project No. Z298 / Contract No. C-119174 / CO No: 22	Change in Scope	$ -	$ -		$ 11,711,707	$ 69,720
Rain Forest of the Americas Project No. Z298 / Contract No. C-119174 / CO No: 176	Change in Scope	$ -	$ -		$ -	$ 2,500,000
1932 Project No. X140 / Contract No. C-118976 / CO No: 31	Unforeseen Conditions	$ -	$ -		$ 38,895,057	$ 1,136,100
1932 Project No. X140 / Contract No. C-118976 / CO No: 40	Error and Omissions	$ -	$ -		$ -	$ 79,432
Temescal Canyon Stormwater BMP Phase 1 Project No. O/01-22e / Contract No. C-119253 / CO No: 004	Unforeseen Conditions	$ -	$ -		$ 7,019,800	$ 722,448
Temescal Canyon Stormwater BMP Phase 1 Project No. O/01-22e / Contract No. C-119253 / CO No: 042	Error and Omissions	$ -	$ -		$ -	$ 50,954

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Penmar Water Quality Improvement Phase I Project No. O/01-22g / Contract No. C-118096 / CO No: 034	Change in Scope	$ -	$ -		$ 11,360,700	$ 90,729
Penmar Water Quality Improvement Phase I Project No. O/01-22g / Contract No. C-118096 / CO No: 063	Unforeseen Conditions	$ -	$ -		$ -	$ 98,902
Albion Dairy-Demolition & Remediation Project No. O/01-55a / Contract No. C-111421 / CO No: 013	Unforeseen Conditions	$ -	$ -		$ 1,269,555	$ 27,209
Albion Dairy-Demolition & Remediation Project No. O/01-55a / Contract No. C-111421 / CO No: 016	Unforeseen Conditions	$ -	$ -		$ -	$ 1,699,181
Scientific Investigation Division Project No. G682 / Contract No. Null / CO No: 114	Change in Scope	$ -	$ -		$ 4,327,389	$ 37,452
Scientific Investigation Division Project No. G682 / Contract No. Null / CO No: 164	Change in Scope	$ -	$ -		$ -	$ 93,083
LADWP-Power System:		**$ 827,054,795**	**$ 26,405,307**	**3.19%**	**$ 827,054,795**	**$ 19,270,523**
Excel Workbook, "City Controller Audit - Change Order List-PSED-B.xlsx"		$ 827,054,795	$ 26,405,307			
Haynes Units 5&6 Repowering Project Contract No. 47997 / CO No: 3	Unforeseen Conditions, Other	$ -	$ -		$ 250,279,805	$ 1,605,600
Haynes Units 5&6 Repowering Project Contract No. 47997 / CO No: 4	Unforeseen Conditions, Design Error, Agency Requested Change	$ -	$ -		$ -	$ 9,835,421
Haynes Units 5&6 Repowering Project Contract No. 47997 / CO No: 7	Unforeseen Conditions, Other	$ -	$ -		$ -	$ 3,839,538
Scattergood Unit 3 Repowering Project Contract No. 47174-3 / CO No: 1	Unforeseen Conditions, Design Error, Agency Requested Change	$ -	$ -		$ 440,755,433	$ 190,773
Scattergood Unit 3 Repowering Project Contract No. 47174-3 / CO No: 4	Unforeseen Conditions, Design Error, Differing Site Conditions, Agency Requested Change	$ -	$ -		$ -	$ 2,160,041
Services for Installing, Removing, and Splicing Underground Distribution Cables Contract No. 103 / CO No: 1	Agency Required Change	$ -	$ -		$ 35,880,981	$ -
Services for Removing Asbestos from Underground Distribution Systems Cables Contract No. 104 / CO No: 1	Agency Required Change	$ -	$ -		$ 31,928,579	$ -

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Services for Installing, Removing, and Maintaining Overhead Distribution Facilities Contract No. 105 / CO No: 1	Agency Required Change	$ -	$ -		$ 57,544,624	$ -
Services for Construction of Electrical Underground Conduits and Substructures Contract No. 00956 / CO No: 2	Scope Change	$ -	$ -		$ 10,665,373	$ -
Services for Construction of Electrical Underground Conduits and Substructures Contract No. 00956 / CO No: 3	Scope Change	$ -	$ -		$ -	$ 1,500,000
Services for Construction of Electrical Underground Conduits and Substructures Contract No. 00956 / CO No: 4	Scope Change	$ -	$ -		$ -	$ 139,150
LADWP-WETS:		**$ 350,821,283**	**$ 32,614,468**	**9.30%**	**$ 353,821,283**	**$ 9,323,667**
Construction Contracts w/CO's Executed between 7/1/2011 and 6/30/2014		$ 350,821,283	$ 32,614,468			
Groundwater Monitoring Wells Installation Contract No. 7315 / CO No: 01	Differing Site Conditions, Regulatory Requirements, Other	$ -	$ -		$ 21,499,715	$ 234,577
River Supply Conduit Lower Reach Unit 1B Contract No. 7060 / CO No: 04	Error	$ -	$ -		$ 16,286,353	$ 543,932
River Supply Conduit Lower Reach Unit 1B Contract No. 7060 / CO No: 27	Differing Site Conditions, Regulatory Requirements, User Requested Change	$ -	$ -		$ -	$ 420,555
Cover Contract No. 7106 / CO No: 10	User-Requested Change	$ -	$ -		$ 16,533,890	$ 169,810
Cover Contract No. 7106 / CO No: 15	Regulatory Requirements, User-Requested Change, Other	$ -	$ -		$ -	$ 23,357
Terminal Hill Tunnel and Shaft Contract No. 7112 / CO No: 7	Differing Site Conditions, Error, Other, Omission, User-Requested Change	$ -	$ -		$ 11,041,000	$ 240,975
Terminal Hill Tunnel and Shaft Contract No. 7112 / CO No: 8	Differing Site Conditions	$ -	$ -		$ -	$ 250,000
City Trunk Line South Unit 2 Contract No. 7162 / CO No: 38	Differing Site Conditions	$ -	$ -		$ 35,956,906	$ 168,544
City Trunk Line South Unit 2 Contract No. 7162 / CO No: 54	Differing Site Conditions	$ -	$ -		$ -	$ 101,370
River Supply Conduit Lower Reach Unit 3 Contract No. 7194 / CO No: 19	Other	$ -	$ -		$ 48,863,418	$ 128,939
River Supply Conduit Lower Reach Unit 3 Contract No. 7194 / CO No: 22	Omission, Other	$ -	$ -		$ -	$ 118,420
MWD-LA 29 Modifications & Pipe Jacking Contract No. 7231 / CO No: 6	Differing Site Conditions, Regulatory Requirement, User-Requested Change, Other	$ -	$ -		$ 10,530,000	$ 343,612
MWD-LA 29 Modifications & Pipe Jacking Contract No. 7231 / CO No: 10	Differing Site Conditions	$ -	$ -		$ -	$ 500,000
Silver Lake Reservoir Storage Replacement Contract No. 23067 / CO No: 2	Regulatory Requirements, Other	$ -	$ -		$ 126,500,000	$ 512,194

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Silver Lake Reservoir Storage Replacement Contract No. 23067 / CO No: 11	Omission & Regulatory Requirements	$ -	$ -		$ -	$ 2,594,312
Van Norman Chloramination Stations 1 & 2 Contract No. 7042 / CO No: 8	Error, Omission, User-Requested Change	$ -	$ -		$ 32,495,000	$ 1,515,229
Van Norman Chloramination Stations 1 & 2 Contract No. 7042 / CO No: 9	Error, Omission, User-Requested Change, Other	$ -	$ -		$ -	$ (243,687)
Contract Title: River Supply Conduit Improvements - Unit 4 Contract No. 7038 / CO No: 44	Regulatory Requirements	$ -	$ -		$ 34,115,000	$ 954,049
Contract Title: River Supply Conduit Improvements - Unit 4 Contract No. 7038 / CO No: 49	Other, Omission, User-Requested Change	$ -	$ -		$ -	$ 747,479
Los Angeles World Airport:		**$ 1,795,022,013**	**$ 498,679,858**	**27.78%**	**$ 1,429,371,499**	**$ 50,500,761**
Contract Summary, September 26, 2014		$ 1,795,022,013	$ 498,679,858		$ -	$ -
Airside		$ 277,448,384	$ 49,847,776		$ -	$ -
Landside		$ 513,750,749	$ 33,339,186		$ -	$ -
Terminal		$ 382,288,000	$ 803,883		$ -	$ -
Bradley West		$ 621,534,880	$ 414,689,013		$ -	$ -
Airside - Taxiway T Contract No.: DA-4803 / CO No: 0003	Owner Betterment	$ -	$ -		$ 36,466,480	$ 60,000
Airside - Taxilane S Contract No.: DA-4398 / CO No: 0035	Document Correction	$ -	$ -		$ 95,866,597	$ 950,000
Airside - Taxilane S Contract No.: DA-4398 / CO No: 0065	Owner Betterment	$ -	$ -		$ -	$ 897,599
Airside - Taxilane S Contract No.: DA-4398 / CO No: 0072	Unforeseen Conditions	$ -	$ -		$ -	$ 240,146
Airside - Demolition of Low Bay Hangar Contract No.: DA-4690 / CO No: 0003	Document Correction	$ -	$ -		$ 15,595,000	$ 130,000
Airside - Demolition of Low Bay Hangar Contract No.: DA-4690 / CO No: 0008	Unknown	$ -	$ -		$ -	$ 123,655
Horizontal Conveyance Upgrades - Priority One Units Procurement and Installation Contract No.: DA-4344 / CO No: 0011	Unforeseen Conditions	$ -	$ -		$ 23,749,000	$ 108,117
Landside - Vertical and Horizontal Conveyance Upgrades - Priority One Units Procurement and Installation Contract No.: DA-4344 / CO No:	Omission	$ -	$ -		$ -	$ 35,850
Landside - Central Utility Plant Contract No.: DA-4554 / CO No: 0052	Owner Betterment	$ -	$ -		$ 271,519,000	$ 975,000

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Landside - Central Utility Plant Contract No.: DA-4554 / CO No: 0234	Unforeseen Conditions	$ -	$ -		$ -	$ 224,149
Landside - Elevator/Escalator System Upgrades-Site Modifications for Priority 1 Units Contract No.: DA-4371 / CO No: 0006	Unforeseen Conditions	$ -	$ -		$ 8,709,422	$ 1,208,156
Landside - Elevator/Escalator System Upgrades-Site Modifications for Priority 1 Units Contract No.: DA-4371 / CO No: 0010	Code/Third Party Requirement	$ -	$ -		$ -	$ 1,500,500
Terminal - Central Terminal Area Improvements Contract No.: DA-4779 / CO No: 0001	Field Condition	$ -	$ -		$ 300,000,000	$ 13,086
Terminal - Central Terminal Area Improvements Contract No.: DA-4779 / CO No: 0002	Owner Betterment	$ -	$ -		$ -	$ 20,321
Terminal - T-4 Connector - Turner Contract No.: DA-4798 / CO No: 0001	Field Condition	$ -	$ -		$ 82,288,000	$ 56,185
Terminal - T-4 Connector - Turner Contract No.: DA-4798 / CO No: 0004	Field Condition	$ -	$ -		$ -	$ 120,377
Bradley West - Bradley West Gates Contract No.: DA-4337 / CPCN No. 8002; CGMP $6.5M	Document Correction	$ -	$ -		$ 10,978,000	$ 6,571,658
Bradley West - Bradley West Gates Contract No.: DA-4337 / Ref: 10310 CPCN No. ALL; "Final Contract Closeout"; $27M	Owner Betterment	$ -	$ -		$ -	$ 27,499,136
Bradley West - Bradley West Core Contract No.: DA-4382 / CPCN No. 7513; CPCN Recv'd: 7/18/12; FD: 12/24/12; CGMP: 1.80 $5M	Owner Betterment	$ -	$ -		$ 584,200,000	$ 5,000,000
Bradley West - Bradley West Core Contract No.: DA-4382 / CPCN No. 8104; CPCN Recv'd: 12/7/12; FD: 2/6/13; CGMP $4.7M	Owner Betterment	$ -	$ -		$ -	$ 4,766,826
Port of Los Angeles:		**$ 960,384,265**	**$ 4,836,530**	**0.50%**	**$ 405,520,982**	**$ 3,147,931**
Projects in Construction (July 2014)		$ 744,988,760	$ 2,258,719		$ -	$ -
Closed Construction Projects Final Payment Date frm 7/1/11 to 7/1/14						
Spec No 2699		$ 54,439,144	$ 2,094,854			
2697						
2712		$ 124,566,775	$ 1,028,893			
2737		$ 5,920,320	$ (452,914)			
2720A		$ 1,856,556	$ (40,909)			

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2719		$ 3,387,000	$ (194,318)			
2711		$ 17,715,360	$ (50,946)			
2634		$ 1,815,650	$ (272,657)			
2701		$ 5,694,700	$ 465,807			
2723						
Berth 102 Wharf and Backland Improvements Spec No. 2696 / Contract No. 2266 / AFA: 15 / CO: 3	Unforeseen Conditions		$ -		$ 47,629,680	$ 41,684
Berth 102 Wharf and Backland Improvements Spec No. 2696 / Contract No. 2266 / AFA: 29	Unforeseen Conditions	$ -	$ -		$ -	$ 132,701
Cabrillo Way Marina Spec No. 2712 / Contract No. 2262 / AFA: 37 / CO: 1	Unforeseen Conditions	$ -	$ -		$ 124,566,775	$ 129,168
Cabrillo Way Marina Spec No. 2712 / Contract No. 2262 /AFA: 91 / CO: 11	Design	$ -	$ -		$ -	$ 465,891
LA Waterfront - Downtown Harbor - Water Cut Spec No. 2722 / Contract No. 2275 / AFA: 7 / CO: 5	Unforeseen Conditions	$ -	$ -		$ 12,284,861	$ 85,994
LA Waterfront - Downtown Harbor - Water Cut Spec No. 2722 / Contract No. 2275 / AFA: 13 / CO: 1	Unforeseen Conditions	$ -	$ -		$ -	$ 20,295
Harry Bridges Boulevard Voluntary Improvements Federal Aid Project No. ESPL-5006-(602) Spec No. 2711 / Contract No. 2268 / AFA: 20 / CO: 19	Scope Change	$ -	$ -		$ 17,715,360	$ 100,680
Harry Bridges Boulevard Voluntary Improvements Federal Aid Project No. ESPL-5006-(602) Spec No. 2711 / Contract No. 2268 / AFA: 28	Unforeseen Conditions	$ -	$ -		$ -	$ 119,617
Berth 102 Rear Backland Development Spec No. 2736 / Contract No. 2285 / AFA: 12 / CO: 09	Design	$ -	$ -		$ 20,959,750	$ 114,445
Berth 102 Rear Backland Development Spec No. 2736 / Contract No. 2285 / AFA 15 / CO: 07	Unforeseen Conditions	$ -	$ -		$ -	$ 58,339
San Pedro Waterfront Enhancements - Southern Pacific Slip Spec No. 2701 / Contract No. 2274 / AFA: 7 / CO: 5	Unforeseen Conditions	$ -	$ -		$ 5,694,700	$ 62,165
San Pedro Waterfront Enhancements - Southern Pacific Slip Spec No. 2701 / Contract No. 2274 / Spec No. 2701: AFA: 16R	Design	$ -	$ -		$ -	$ 44,352
2010-2012 Site Improvement Spec No. 2705 / Contract No. 2270 / AFA: 2	Scope Change	$ -	$ -		$ 16,396,600	$ 9,185

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2010-2012 Site Improvement Spec No. 2705 / Contract No. 2270 / AFA: 37	Scope Change	$ -	$ -		$ -	$ 1,102,282
Project Title: South Wilmington Grade Separation Spec No. 2690A / Contract No. 2283 / AFA: 4	Design	$ -	$ -		$ 50,643,125	$ 76,609
Project Title: South Wilmington Grade Separation Spec No. 2690A / Contract No. 2283 / AFA: 14	Scope Change	$ -	$ -		$ -	$ 110,000
Berths 200 Rail Yard Spec No. 2724 / Cont No. 2279 / AFA: 1	Design	$ -	$ -		$ 89,990,801	$ 99,200
Berths 200 Rail Yard Spec No. 2724 / Cont No. 2279 / AFA: 5	Unforeseen Conditions	$ -	$ -		$ -	$ 115,000
Project Title: LA Waterfront Downtown Harbor Landslide and Rail Improvements Spec No. 2739 / Cont No. 2286 / AFA: 11 / CO: 13	Unforeseen Conditions	$ -	$ -		$ 19,639,330	$ 115,460
Project Title: LA Waterfront Downtown Harbor Landslide and Rail Improvements Spec No. 2739 / Cont No. 2286 / AFA: 18 / CO: 3	Design	$ -	$ -		$ -	$ 144,865
Total (Citywide)		**$ 4,934,151,409**	**$ 602,024,861**	**12.20%**	**$ 3,154,588,500**	**$ 90,180,764**

Percentage Change Orders 12.20%