



Audit Report
CATS Blue Line Extension
Civil Segment B/C – Lane Construction
December 20, 2017

City Auditor's Office
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Purpose and Scope

The purpose of this audit was to determine whether the City has implemented appropriate controls to ensure that work associated with the Blue Line Extension (BLE) Civil Segment B/C contract with Lane Construction Corporation (Lane Construction) is completed within budget, in accordance with specifications and in compliance with major federal requirements. The audit also included the review of payments made to Lane Construction for change orders to ensure that amounts were properly supported and documented.

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.

This report is intended for the use of the Charlotte Area Transit System (CATS) and Engineering and Property Management (E&PM) Departments, the City Manager's Office and City Council.

Conclusion

The City has implemented significant controls to ensure that the \$145.7 million Civil Segment B/C contract work is completed as specified, within budget (as amended from the original \$119.1 million contract award) and in compliance with federal requirements related to suspension and debarment, procurement and Davis-Bacon. The City negotiated change orders based upon independent cost estimates. While this is an acceptable approach to establish a fair and reasonable price, the City may have missed opportunities to negotiate additional cost savings.

Effective Project Management Controls

Auditors noted that CATS and E&PM have established many effective controls to manage the Civil Segment B/C contract with Lane Construction. CATS has established policy and procedures manuals to guide the Blue Line Extension project, as follows:

- Project Management Plan – establishes the framework for managing the BLE project and provides guidance for procurement, communications, construction management and testing.
- Project Quality Plan – outlines the overall framework for implementation of Federal Transit Administration (FTA) required quality assurance and quality control activities. It covers, in detail, activities and procedures to be employed to ensure that construction

contracts are delivered as specified during construction. The plan provides a systematic approach to attaining the expected and acceptable level of quality.

- Change Control Procedure – designed to ensure that impacts on cost, schedule, and scope are estimated and considered; elevates decision-making to the proper level of authority; and captures an audit trail, producing a complete record of the change process.
- Construction Management Manual – outlines the duties and responsibilities of the construction management staff and consultants, including procedures related to contractor payments, submittals, contract changes, inspections and close-out.
- Procurement Manual – establishes the policies and procedures that CATS uses to procure goods and services, as well as contract administration procedures including contract changes and payments.

Effective Compliance Controls and Results

Testing of the following areas indicated compliance with federal and state requirements, in addition to CATS internal policies and procedures:

- Inspections and testing – Inspection records were maintained in accordance with NCDOT standards and the required third-party testing of materials was performed in accordance with the guidance provided in the Project Management Plan.
- Payment applications – Except as noted in some of the acceleration items in the Detailed Findings and Recommendations section of this report, auditors verified that quantities and dollar amounts reported on payment applications were supported by adequate documentation of work completed.
- Suspension and debarment – The City and contractor complied with federal requirements for suspension and debarment.
- DBE goal – Auditors confirmed that Lane Construction accurately calculated and met the DBE commitment goal at the time of contract award.
- Davis-Bacon requirements – CATS has implemented controls to ensure that contractor and subcontractor employees are paid the minimum wages outlined in Davis-Bacon requirements.
- Change orders – Independent Cost Estimates (ICE) were prepared for all change orders for new items greater than \$10,000 and the proper approvals were obtained as outlined in the Change Control Procedure manual.

Summary Results

While the majority of controls were functioning well and provide assurance that the contract is administered properly, auditors noted opportunities for improvement.

Significant private utility delays at the beginning of the contract period resulted in a \$21.7 million global settlement with the prime contractor, which included provisions for accelerating the work to keep the project on schedule. The acceleration created additional risk; i.e., the potential for excess payments and unsubstantiated claims related to payment applications and change orders. Several opportunities to increase accountability related to change orders were also noted as outlined briefly following and detailed in the Findings and Recommendations section of this report starting on page five.

1. When entering into an acceleration agreement, the City should ensure that methods exist to segregate the costs of acceleration from costs required to complete the initial project scope, overruns and change orders.
 - CATS and E&PM are satisfied that reasonable payments were negotiated and paid for acceleration. The departments agree that additional documentation (to segregate the costs related to acceleration) should be required in the future.
2. The City could have re-negotiated two line items with significantly under-estimated quantities. In the future, the City should require detailed cost analyses to support decisions not to re-negotiate line items with significant under-estimated quantities.
 - For the BLE project, HNTB has performed monthly reviews of quantity over-runs and prices, including discussion with the Resident Engineer; however, it did not complete written documentation of its determination. CATS and E&PM agree that additional documentation of the price analysis for all items in excess of 100% of the original bid amount would be a best practice going forward, and CATS will add this procedure to its Construction Management manual.
3. The City paid the prime contractor \$12.39 per ton for concrete crushing despite subcontractor billing at only \$8.50 per ton, resulting in a \$103,730 difference on a \$775,600 change order.
 - While performance of independent cost estimates can lead to “fair and reasonable” pricing, the example in this audit indicates that contractor proposals can be reasonable based on comparison to independent cost estimates and yet still contain proposed costs that should be questioned.

CATS and E&PM have identified some additional best practices as a result of lessons learned from the BLE, including the establishment of overhead and profit calculations for changes. In addition, Records of Negotiations are improving by including the basis of the ICE and an explanation of the price differences to the proposal.

Background

The City of Charlotte made a commitment to extend the existing LYNX Blue Line Light Rail from its current terminus in downtown Charlotte to the UNCC campus. This \$1.16 billion dollar undertaking consists of 9.3 miles of track construction, 11 new train stations, four park and ride structures, and various major civil improvements such as bridges, walls and roadways.

In order to complete a project of this magnitude, the city divided the project's scope into multiple contracts. The contract for Civil – Segment B/C, was awarded to the Lane Construction Corporation in the spring of 2014. Contained within the scope of this project are the heavy civil infrastructure improvements related to the final 4.8 miles of track, the majority of which will run down the median of North Tryon Street.

The contract includes grading, drainage, erosion control, bridges, arterial roadways, retaining walls, traffic control, traffic signal, water main and sanitary sewer installation and related works. Lane Construction was the lowest bidder at \$119,051,742 (including contingency of \$8,236,168) and was awarded the contract. Some of the major highlights of this contract include:

- Four structural steel bridges which will carry the light rail over the existing roadways at Old Concord Road, the I-85 Connector, University City Blvd and WT Harris Road.
- One pre-cast concrete girder bridge to carry the light rail over Toby Creek on the UNCC campus.
- One cast-in-place / cut & cover tunnel to carry the northbound lanes of Tryon Road over the light rail.
- 45,000 linear feet of new storm drainage
- 158,00 tons of asphalt pavement
- 185,000 square feet of mechanically stabilized earth (MSE) retaining walls

In March 2013, the City contracted with HNTB Corporation (HNTB) as a construction management consultant (CMC) for the BLE project. For the Civil Segment B/C construction contract, HNTB is responsible for inspection services, schedule management, change order management and pay application certification, with oversight by CATS.

Several City Council actions have resulted in a total contract value of \$145,751,742 as shown in the table below:

Item	Date	Amount	Purpose
Initial Contract	April 14, 2014	\$ 119,051,742	Initial award
Amendment #1	January 26, 2015	21,700,000	Delay claims and acceleration
Amendment #2	January 27, 2016	-	Modified ICT dates and incentives
Amendment #3	April 25, 2016	-	Est. terms to allow closure of N. Tryon St.
Amendment #4	March 30, 2017	5,000,000	Additional misc civil work
Total Contract Value		\$ 145,751,742	

Through October 31, 2017, expenditures totaled \$137.5 million and change orders (including delay and acceleration payments) equaled 31% of the initial base bid amount, as shown in the following table:

	Base Contract	Contingency/Change Orders	Total
Initial Contract	\$ 110,815,574	\$ 8,236,168	\$ 119,051,742
Contract Amendments		26,700,000	26,700,000
Total	\$ 110,815,574	\$ 34,936,168	\$ 145,751,742
Expenditures Through 10/31/2017			\$ (137,526,508)
Remaining Balance			\$ 8,225,234

Audit Findings and Recommendations

1. When entering into an acceleration agreement, the City should ensure that methods exist to segregate the costs of acceleration from costs required to complete the initial project scope, overruns and change orders.

The first amendment (dated April 6, 2015) to the Lynx Blue Line Extension (BLE) Civil-segment B/C with Lane Construction outlines the modified terms under which the City would pay the contractor up to \$21,750,000 for accelerating contract work. According to the Request for Council Action (RCA), the amendment was necessary to recover a schedule that would maintain the projected opening of summer 2017 and minimize further delay and inconvenience to businesses, residents and commuters. The RCA further noted that utility relocations along North Tryon Street did not meet the estimated schedule and would be completed approximately six months later than originally scheduled, creating a delay to a large portion of the Civil B/C contract work.

The contract amendment included up to \$5,500,000 for costs incurred to have subcontractors accelerate their sub-contractual work scopes as well as to take on additional work to meet the compressed contract schedule. The amendment stated “that in order for a cost to be eligible for payment pursuant to the subcontractor acceleration pay item, the following conditions must be met:

- a. The costs must be for acceleration or work performed by a Subcontractor pursuant to a written and executed agreement that has been properly and promptly reviewed and approved by the City;
- b. Any City request for documentation related to the Subcontractor, its financial standing related to the BLE Project, or the Work performed has been fulfilled to the reasonable satisfaction of the City;
- c. The City reserves the right to request from the Subcontractor a proposal, inclusive of a detailed cost breakdown, and time impact analysis justifying the claimed monetary

amount for compensation, based on the compressed work schedule and accelerated work...”

The amendment provided the contractor an incentive to not utilize the entire cap amount of \$5,500,000 by allowing the contractor to bill the City for 50% of the amount remaining upon satisfactory completion of the contract work as outlined in the agreement as revised critical Intermediate Contract Times (ICT). (However, the entire cap was used and there remained no shared savings for the contractor and City.)

Through April 2016, Lane Construction identified \$3.7 million in subcontractor acceleration payments. These payments were based on acceleration agreements that were reviewed and approved by the City prior to the work being done.

City attorneys and project managers reviewed and approved the subcontract and subcontract acceleration agreements (detailed below) but the City did not request detailed cost breakdowns or time impact analyses from any of the subcontractors (as allowed, but not required). Most of the acceleration agreements were lump sum amendments to the original subcontracts and many withheld final payment to the subcontractor based on satisfactory completion of the ICT dates.

Accountability and internal control would be enhanced if the subcontractors were required to submit detailed cost breakdowns justifying the acceleration costs. This would also allow the City to subsequently review acceleration payments for contract compliance and reasonableness.

Subcontract Acceleration Agreements			
Subcontractor	Spent	Contract in eBuilder?	Work Performed
Tricor	\$ 359,285.80	4/23/2015	MSE Walls
Lane Asphalt	\$ 500,000.00	5/1/2015	Asphalt paving
BBH	\$ 1,580,000.00	5/27/2015	Electrical
PW&SC	\$ 75,000.00	6/2/2015	Curbs, wheelchair ramps
Smith Rowe	\$ 320,000.00	6/11/2015	Soil nail wall
Hiatt & Mason	\$ 50,000.00	8/3/2015	Reinforcing steel
Concrete Specialty Contractors	\$ 227,358.26	9/25/2015	Sub-ballast curb
Dakota	\$ 300,000.00	6/4/2015	Under-drain and sub-drain
PW&SC (New Scope-Ballast Curb)	\$ 99,408.18	6/10/2016	Ballast Curb
Southern Concrete	\$ 10,000.00	9/25/2015	Sub-ballast curb
Trucking Acceleration	\$ 1,783,947.76	No	Trucking
Tricor Acceleration #2	\$ 195,000.00	3/30/2016	MSE Walls
Total	\$ 5,500,000.00		

No separate acceleration agreements were made with the initial three subcontracted trucking companies, but Lane did contract with two additional trucking companies. At the end of the acceleration period, Lane requested the remaining \$5.5 million CAP on subcontractor acceleration by submitting the following schedule:

Subcontractor	Executed Contract Amount	Actual to Date
All Points Trucking	\$ 142,900.00	\$ 1,870,321.91
Blue Max Trucking Inc.		319,967.01
Daugherty Trucking	1,055,000.00	804,801.51
Paul M. Bost Trucking		157,123.81
Yenrof Trucking	1,024,000.00	929,764.16
Total	\$ 2,221,900.00	\$ 4,081,978.40
Actual to Date		\$ 4,081,978.40
Executed Contract Amount		2,221,900.00
Actual Less Executed Contract Amount		\$ 1,860,078.40
Remaining to Complete (Projected)		191,481.66
Total Sub Acceleration Amount		\$ 2,051,560.06

Because the trucking costs caused the contractor to reach the subcontractor acceleration cap of \$5,500,000, the contractor was only paid for \$1,783,948 of the \$2,051,560 shown in the schedule above.

City project management staff assert that the work was completed according to the accelerated schedule; therefore, the contractor met the requirement for payment in full. That is, staff considered all costs as accelerated costs, regardless of whether a portion of the work was already required under the original contract. However, costs due to acceleration should have been segregated from costs included in the original scope of the contract.

In trying to verify the validity of the claimed trucking costs, auditors noted the following:

- The schedule above assumes that the Executed Contract Amount of \$2.2 million was sufficient to perform the required amount of trucking required by the original scope of work.
- Lane included trucking acceleration expenses of \$818,857 in its \$30.8 million settlement proposal. Although a separate negotiated amount was not determined for trucking expenses, the \$30.8 million was negotiated down to \$21.7 million. CATS approved and paid the claimed \$1,783,948 in trucking acceleration costs (versus the originally requested \$818,857) without requesting any additional information, because the \$5.5 million acceleration cap had not been reached.

- c. An undetermined amount of additional trucking expense is related to line item overruns. For example, line item 4 (unclassified excavation) was originally estimated at 45,600 cubic yards but ultimately the City paid \$30.51 per CY for 123,380 cubic yards. Hourly hauling is a component of the total cost of unclassified excavation. However, the cost of hauling was not separately disclosed by the prime contractor in the initial bid – making it impossible to determine the dollar value of additional trucking related to overruns.

By not being able to segregate costs to perform the original scope of work from the costs to perform work resulting from acceleration, the City is not able to validate the amount of trucking costs incurred due to the accelerated schedule.

Recommendation 1.A.: When entering future acceleration agreements, the City should ensure that methods exist to segregate the costs of acceleration from costs required to complete the initial project scope, overruns and change orders.

Recommendation 1.B.: To reduce opportunities for contractor fraud and collusion, the City should require supporting documentation for subcontractor acceleration agreements, including detailed cost breakdown schedules and time impact analyses.

Response: CATS and E&PM are satisfied that reasonable payments were negotiated and paid for completion of trucking on an accelerated basis. The departments agree that additional documentation (to segregate the costs related to acceleration) should be required in the future.

Audit Conclusion #1: Despite CATS' and E&PM's satisfaction, the City did not require or obtain sufficient documentation to determine whether the payments were reasonable. When the City adopts change order policies recommended in the February 2016 Construction Change Orders internal audit report, the City will be able to more effectively negotiate changes.

2. **The City could have re-negotiated two line items with significantly under-estimated quantities. In the future, the City should require detailed cost analyses to support decisions not to re-negotiate line items with significant under-estimated quantities.**

During the course of any contract, it is possible that various quantities of material identified in the bid document may require amendment. As a result, contracts generally include provisions for pricing such changes. The NCDOT Standard Specifications allow for increases or reductions in the contract unit price when an overrun or underrun in a **major** contract item by more than 15% or an overrun in a **minor** contract item by more than 100% of original bid quantities occurs.

Per the NCDOT Standard Specifications, major items are listed in the project special provisions. For the BLE Civil Segment B&C contract with Lane Construction, the project

special provisions did not outline any major contract items. Therefore, all 634 line items were considered “minor,” in accordance with current City practice.

For the Civil B&C contract, two line items (Item #4 Unclassified Excavation and Item #78 Asphalt Plant Mix, Pavement Repair) reached quantity usage in excess of 100% over the bid quantity (171% and 112%, respectively), and exceeded the price per unit per the engineer’s estimate and the other bidders by a significant amount. For Item #4, the original bid price of \$30.51 per CY was 308% of the engineer’s estimate of \$9.92 per CY. The original bid price for Item #78 (\$191.09) was 147% of the engineer’s estimate (\$129.56).

The potential existed that the winning bidder would benefit greatly from increased quantities of these items through change orders and overruns. Subsequently, change orders and overruns for these items exceeded 100% of the original bid quantity, as shown in the table below.

Through pay application #25, the following chart identifies the difference in original bid and actual quantities and extended cost for the two line items:

Description	Original Bid Qty	Qty Through Pay App #25	Total Paid Through Pay App #25	Total At Engineer's Estimated Unit Price	Difference
Unclassified Excavation	45,600	123,380	\$ 3,764,311.90	\$ 1,223,925.73	\$ 2,540,386.17
Asphalt Plant Mix, Pavement Repair	2,690	5,716	\$ 1,092,218.85	\$ 740,529.98	\$ 351,688.87
			\$ 4,856,530.75	\$ 1,964,455.71	\$ 2,892,075.04

The chart above indicates that if the engineer’s estimated unit price had been used, the City would have paid approximately \$2.9 million less, about 2% of the total construction contract budget.

At the time of bid review, CATS and E&PM personnel did not believe any specific action was warranted. Therefore, the low bid was accepted as written. CATS did not anticipate significant over-run quantities for these line items and made no specific provisions to limit exposure to significant variances. CATS and E&PM staff noted that they cannot negotiate specific lines items and that the only action they could have taken was to reject all bids.

For the Unclassified Excavation line item noted above, it was determined by the construction management consultant Resident Engineer that it was in the best interest of the City not to renegotiate the line item unit prices. In making that determination for the unclassified excavation line item, the Resident Engineer cited increased hauling costs resulting from an accelerated work schedule (see Finding 1). Auditors noted that the Resident Engineer did not produce a detailed estimate (identifying the separate components of labor, equipment, materials, overhead) of the current costs to perform unclassified excavation.

In addition to the two line items noted above, there were other line items for which overruns exceeded 100% of the original estimated quantity. The top ten line items with the largest increases in quantity had an original contract value of \$2.4 million, with the paid amounts shown below.

For these 10 items, the difference in the total paid and the original contract value exceeded \$5 million, as shown below.

Line Item #	Item Description	Qty Paid to Date (Including CO's)	Current Amount Paid	Dollar Amount over Original Contract
4	UNCLASSIFIED EXCAVATION	123,380	\$ 3,764,311.90	\$ 2,373,055.90
78	ASPHALT PLANT MIX, PAVEMENT REPAIR	5,772	1,102,954.28	588,922.18
136	PORTABLE CONCRETE BARRIER	24,669	629,054.40	535,596.90
134	TEMPORARY CRASH CUSHION	71	432,889.13	402,403.98
191	FLOWABLE FILL	1,451	391,161.73	278,510.73
73	ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B	5,507	366,802.62	241,176.16
329	FITTINGS FOR NONMETALLIC CONDUITS AND TUBING	12,930	212,569.20	164,893.20
395	ELECTRICAL DUCTBANK, 6-2" CONDUIT, CONC. ENCASED	3,499	193,432.07	142,454.69
9	GEOTEXTILE FOR SOIL STABILIZATION	82,905	150,886.70	142,432.80
605	THERMAL IMAGE PROCESSOR	55	191,483.05	135,778.89
	TOTAL		\$ 7,435,545.08	\$ 5,005,225.43

Auditors were not provided documentation related to these line items indicating that analysis was performed to determine whether unit prices should be renegotiated. However, it was noted that the CMC has been tracking over-runs in a spreadsheet and that prices generally increase over time. It could be expected that changes in quantities could have a positive or negative impact on the calculation of unit prices.

Some governmental entities place limitations on the changes or overruns allowed to impact specific line items. The bid price can be limited to the quantity established in the schedule of items, while overruns are set at the market price existing when different quantities are approved.

Recommendation: In the future, CATS should require the Construction Management Consultant (HNTB in this case) to prepare and document a detailed current cost estimate for line items that exceed the NCDOT re-negotiation thresholds.

Response: For the BLE project, HNTB has performed monthly reviews of quantity overruns and prices, including discussion with the Resident Engineer; however, it did not complete written documentation of its determination. CATS and E&PM agree that additional documentation of the price analysis for all items in excess of 100% of the original bid amount would be a best practice going forward, and CATS will add this procedure to its Construction Management manual. The evaluation will not only look at those items with higher costs at time of bid but those with lower costs to determine whether or not it is in the best interest of the City to try and negotiate items in excess of 100%.

Audit Conclusion #2: CATS used HNTB to establish a reasonable level of control over quantities and prices. However, an opportunity was missed to further contain costs. CATS' rationale regarding not wanting to reopen negotiations is flawed. Items that were underbid are not eligible for renegotiation until or unless quantities for any specific line item double.

3. **The City paid the prime contractor \$12.39 per ton for concrete crushing despite subcontractor billing at only \$8.50 per ton, resulting in a \$103,730 difference on a \$775,600 change order.**

The FTA Circular 4220 defines the recipient's responsibility to perform cost analysis:

“The recipient must obtain a cost analysis when a price analysis will not provide sufficient information to determine the reasonableness of the contract cost. The recipient must obtain a cost analysis when the offeror submits elements (that is, labor hours, overhead, materials, and so forth) of the estimated cost, (such as professional consulting and A&E contracts, and so forth). The recipient is also expected to obtain a cost analysis when price competition is inadequate, when only a sole source is available, even if the procurement is a contract modification, or in the event of a change order.”

Auditors reviewed all change orders greater than \$50,000 and examined the results of change order negotiations. Based on the record of negotiations (RON), the majority of the change requests were approved for change orders because the City found the contractor's proposal to be fair and reasonable, as it was less than an independent cost estimate. According to CATS, an ICE “based on appropriately calibrated and validated parametric models or cost estimating relationships” is included in the definition of cost analysis. While the City's policies and procedures were followed, the City had an opportunity to reduce costs further because the contractor provided details regarding its existing subcontract for concrete crushing at \$8.50 per ton. However, the City allowed the contractor to charge \$12.39 per ton.

Change order #85 was necessary because unforeseen concrete pavement was encountered within the track bed excavation limits under the existing travel lanes of North Tryon Street. The total negotiated price for the change order was \$775,600, which equaled Lane Construction's proposed cost. The final negotiated unit price was \$19.39 for 40,000 square yards of concrete to be removed and crushed onsite. The ICE projected a cost of \$20.58 per square yard. The contractor's proposal included the following elements:

Contractor Proposal Unforeseen Concrete Removal			Amount
Labor			\$ 54,143.69
Equipment			\$ 51,838.08
Subcontractor Cost			
Crushing	\$	330,391.74	
Breaking	\$	30,000.00	
Mobilization	\$	4,050.00	
Total Subcontractor Cost			\$ 364,441.74
Trucking			\$ 204,000.00
Subtotal			\$ 674,423.51
OH/Profit 15%			\$ 101,163.53
Grand Total			\$ 775,587.04
Number of Units, Square Yards			40,000
Unit Cost, per Square Yard			\$ 19.39

Subcontractor crushing cost was estimated at \$12.39 per ton. The documentation found in eBuilder to support the \$12.39 per ton subcontract cost did not indicate which subcontractor would be performing the work. Auditors noted that the prime contractor had contracted with a concrete removal company to crush concrete at a price of \$8.50 per ton.

Allowing prime contractors to estimate subcontract costs without obtaining such estimate from an actual prospective subcontractor creates the risk that a prime contractor may intentionally overstate subcontract costs recognizing the possibility of achieving additional profit. To combat this risk, best practices from the Construction Audit and Cost Control Institute (CAACCI) suggest that owners require contractors and subcontractors to agree to submit accurate cost and pricing data to support contract price adjustments and that owners reserve the right to examine the records of the contractor. In the change order noted in the audit, this approach would have identified that the contractor submitted pricing data indicating concrete crushing costs at \$12.39 per ton, when the subcontractor was actually paid only \$8.50 per ton. Therefore, although CATS believes they reached the goal of “fair and reasonable” contract pricing, the contractor obtained significant profit for each ton of concrete crushed, after negotiating with the City using an inaccurate cost estimate.

Measurement

The ICE indicates that the concrete to be removed was approximately 10,560 linear feet by 40 feet wide (46,933 SY) with an average depth of 9 inches. This would equate to 11,733 CY, which converts to approximately 23,466 tons of concrete to be crushed. The contractor’s proposal was based on 40,000 SY at an average depth of 12 inches = 13,333 CY and 26,666 tons of concrete to be crushed. The total estimated cost for the change order was expressed in a unit cost per SY, so the extra depth used in the contractor’s calculation results in a higher per unit cost. The extra depth (or total depth) would not be measured and therefore the actual depth could impact the contractor’s profitability as actual crushing costs (measured by tons) could be substantially less (or more) than estimated while square yardage

(basis for payment) remains the same. The Record of Negotiation did not address this apparent discrepancy in the amount of work to be completed.

Initially, inspectors noted the thickness of the concrete in their daily inspection reports, but auditors noted that subsequent reports only noted the total square yards. Without the thickness measurement, auditors were not able to determine the reasonableness of the estimated tonnage of concrete crushed. Auditors noted, however, that there were daily inspection entries where the concrete thickness was noted as 8 inches (lower than the ICE of 9 inches and the contractor proposal of 12 inches). The actual tonnage of concrete crushed as a result of the unforeseen concrete change order was not separately quantified by the City, its representatives or by the prime contractor.

Subcontractor Payment

On December 7, 2015, comments were made in eBuilder by an HNTB staff member requesting additional clarification on the proposed \$12.39 per ton crushing costs when original proposals noted a cost of \$8.50 per ton. The HNTB staff member indicated that the extra work may need to be done as a force account. The HNTB Resident Engineer noted that the work had been done in good faith and needed to be paid. On December 11, 2015, HNTB returned the estimate to the general contractor for documentation of actual crushing costs or support for the proposed per ton cost. Although an additional document and cost breakdown was submitted by Lane Construction on February 2, 2016, Lane did not address the crushing cost question or explain the rationale for charging the City more than the subcontractor cost. The Record of Negotiation did not specifically address the reasonableness of the \$12.39 per ton cost for crushing.

Auditors reviewed the contract between Lane Construction and the crushing contractor and noted that the contract called for a unit price of \$8.50 per ton. Auditors also requested and received invoices submitted to Lane Construction and noted that the subcontractor was paid \$8.50 per ton for crushing concrete. Auditors did not review any documentation indicating that the actual cost incurred by the subcontractor exceeded \$8.50 per ton. (Note: the contractor did not separately account for the actual number of tons crushed due to the change order.) The contractor's proposal was overstated by \$103,730, based on the difference between the proposed (\$12.39 per ton) and actual (\$8.50 per ton) crushing costs.

Change request proposal amounts are negotiated and accepted as fair and reasonable, eliminating the need for the contractor and the City to document and review actual costs, as in a force account situation. The City has placed a priority on completing projects on time and on budget. As such, it is easier to provide both the City and the contractor with flexibility when handling changes to the original scope of work. This allows the work to continue with minimal delay, but creates the risk that contractors can overstate costs.

Recommendation: The City should establish requirements for the review and documentation of contractor's proposals for change orders to include:

- A requirement that all subcontractor proposals be itemized by detailed cost elements and identify the subcontractor that will be performing the work. Alternately (if the prime is unwilling to supply the subcontractor information), a best practice noted above would require the contractor to submit accurate pricing (similar to the Federal "Truth in Negotiations" clause).
- Comparison of contractors' proposals to independent cost estimates, with Record of Negotiations detailing significant differences, regardless of the bottom line total.
- Explanations for discrepancies identified in the measurement of work to be completed, especially those that could impact unit prices.

Response: The City, as a recipient of Federal Transit Administration (FTA) funds, is meeting the requirements of FTA Circular 4220 and the Federal Acquisition Regulation (FAR) for its FTA funded projects. In compliance with the FAR, the goal of contract pricing is "fair and reasonable" pricing. FAR Subpart 15.4 Contract Pricing is the primary source document.

CATS and E&PM have identified some additional best practices as a result of lessons learned from the BLE, including the establishment of overhead and profit calculations for changes. In addition, Records of Negotiations are improving by including the basis of the ICE and an explanation of the price differences to the proposal.

Audit Conclusion #3: CATS and E&PM noted that they have identified some additional best practices, and they believe the current process in place is in compliance with FTA and FAR requirements. While the performance of independent cost estimates is an integral function of reaching "fair and reasonable" pricing, the example provided in this audit indicates that contractor proposals can be reasonable based on comparison to independent cost estimates and yet still contain proposed costs that should be questioned.