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WEEK IN REVIEW:

| Mon (Feb 15) | Tues (Feb 16) | Wed (Feb 17) | Thurs (Feb 18) | Fri (Feb 19) | Sat (Feb 20) |
|---|---------------|--|--|--------------|---|
| 12:00 PM Council Agenda Briefing (Optional), Room 886 12:00 PM Intergovernmental Relations Committee, Room 280 5:00 PM Zoning Meeting, Room CH-14 | | 12:00 PM Economic Development & Global Competitiveness Committee, Room CH-14 | 12:00 PM Community Safety Committee, Room 280 | | 9:00 AM District 3 Budget Workshop & Resource Fair, 4150 Wilkinson Blvd. |

CALENDAR DETAILS:

Monday, February 15

- 12:00 PM Council Agenda Briefing (Optional)
- 12:00 PM Intergovernmental Relations Committee, Room 280
AGENDA: Federal update; 2016 federal legislative agenda; 2015-2016 state legislative agenda; Legislative calendar; Trending topics
- 5:00 PM Council Zoning Meeting, Room CH-14

Wednesday, February 17

- 12:00 PM Economic Development & Global Competitiveness Committee, Room CH-14
AGENDA: Disparity study; Regulatory land development user fees; Future meeting topics and schedule

Thursday, February 18

- 12:00 PM Community Safety Committee, Room 280
AGENDA: Review of 2015 crime statistics; Community relations programs in CMPD

Saturday, February 20

- 9:00 AM District 3 Budget Workshop and Resource Fair, West Service Center
4150 Wilkinson Boulevard

December and January calendars are attached.



Feb-March 2016.pdf

INFORMATION:

February 18 – Community Meeting About Train Horn Noise

Staff Resources: Debbie Smith, CDOT, 704-336-3935, dsmith@charlottenc.gov

Judy Dellert-O'Keef, CDOT, 704-432-0105, jdellert-okeef@charlottenc.gov

The Charlotte Department of Transportation (CDOT) will host an informational meeting for west side residents regarding train horn noise on Thursday, February 18, 2016 from 6 – 7:30 p.m. in Room 280 of the Charlotte Mecklenburg Government Center.

The Federal Rail Administration (FRA) requires that trains must sound a horn prior to crossing a roadway. The FRA provides for an exemption to this requirement called a quiet zone. The

exemption to the train horn requirement prescribes specific crossing infrastructure that must be installed to make the crossing equally safe as if the train sounded the horn. CDOT staff met with residents on April 21, 2015 and shared information about Charlotte's research and associated costs of creating quiet zones.

CDOT will share new information related to use of wayside horns, a device that directs horn sound to the roadway. CDOT will also discuss research related to environmental grants.

Internal Audit Report – Construction Change Orders

Staff Resource: Greg McDowell, Internal Audit, 704-336-8085, gmcowell@charlottenc.gov

Internal Audit has completed an evaluation of policies and practices related to pricing and approval of change orders, focusing on the four departments primarily responsible for construction within the City: Aviation, Charlotte Area Transit System (CATS), Engineering and Property Management (E&PM) and Charlotte Water.

The audit concluded: Four City departments' independent approaches to construction have led to inconsistent change order management, exposing the City to potential unnecessary costs. The City could benefit from a policy to establish a best practices framework to guide a consistent construction change order process. Such a framework would reduce the risk of excessive contingencies, and out-of-range overhead and profit rates.

Management has developed the following Action Plan: The Contracts Officers Community of Practice (COCOP) will address change order policies, procedures and best practices related to disclosure, contractual terms, materiality and documentation. A memo (attachment B of the audit report), jointly authored by the four City department heads noted, indicates that COCOP has begun addressing the audit recommendations and anticipates completion of its plan in May 2016.

The Construction-Change Order Audit Report is attached.



Construction Change
Orders Audit Rpt.pdf

US DOT Smart City Challenge

*Staff Resources: Debra Campbell, City Manager's Office, 704-336-2671, dcampbell@charlottenc.gov
Hyong Yi, City Manager's Office, 704-336-3403, hyi@charlottenc.gov*

The City of Charlotte's submitted its proposal to the US Department of Transportation (US DOT) Smart City Challenge on February 4, 2016. The application, letters of support, and the technical grant details total 108 pages. The City Manager's report at last Monday's Business Meeting summarized the major components of the City's proposal; Part 1, which details the City's proposal, is attached below. If Mayor and Council would like to see the letters of support (Part 2) please contact Hyong Yi.

The City's proposal is novel not just in what is proposed, but how it was developed in partnership with private, non-profit, and academic sectors. Participants, while predominantly local, also came from Detroit, Philadelphia, Raleigh and other places to help staff develop the proposal over a three day workshop. The focus on impacting the lives of Charlotte residents and workers to improve their economic opportunities, staff believes, is also a differentiator for the City's application.

The US DOT will announce the five finalists to receive Round 2 funding at SXSW in Austin, TX on March 12.



Charlotte SmartCity
Challenge Application

Storm Water Fee Changes

Staff Resource: Jennifer Smith, E&PM, 704-336-7924, jasmith@charlottenc.gov

The Storm Water Services program is based on the premise that all rate payers are charged according to their impervious surface and its impact on storm water runoff and water quality. The greater the impervious surface area, the more the rate payer is charged for storm water runoff. However, the previous rate structure resulted in rate payers with larger impervious surface paying less, which is counter to the intent of the rate structure (see chart). During the FY2016 budget development process, Charlotte City Council evaluated options and ultimately changed the Storm Water Fee structure, resulting in a more equitable billing rate for impervious surface. This change was effective with the start of the fiscal year, July 1, 2015.

The City moved from a two-rate structure to a four-rate structure to recover costs associated with managing runoff from residential properties with the largest amounts of impervious surface. The rate adjustment resulted in a consistent 33/100 penny stormwater rate per median square foot of impervious surface per month across the four Detached Single-Family Residential Tiers. All other rate payers also pay the 33/100 penny rate.

Data presented to City Council in Spring 2015 indicated the four-rate Storm Water Fee structure held rates the same for about 108,000 (61%) of the total 179,000 detached single-family residential accounts. Rates increased for approximately 39% of detached single-family residential accounts with 3,000 or more square feet of impervious area falling within Tiers III and IV.

Rate change information was highlighted on Storm Water Services' website in July and August 2015, and an insert was included in August 2015 monthly water bills. Some customers, such as well users, receive semi-annual bills. Unfortunately, the rate change insert was not included with semi-annual bills recently mailed to those rate payers. Storm Water Services will highlight the rate change information on its website and contact rate payers with semi-annual accounts to communicate the rate structure change and the basis for it.

In staff's impact analysis of the bills recently mailed to 7,054 semi-annual accounts, 3,027 have a Storm Water Fee increase.

- 1,579 customers within Tier III billed semi-annually have an increase of \$23.46 per bill, from approximately \$60 to \$84.
- 1,448 customers within Tier IV have an increase of \$70.68 per bill, from approximately \$68 to \$138.

| City of Charlotte Monthly Rates* | | | | |
|--|------------------|----------------------------|----------------------------|----------------------------|
| | Median (sq. ft.) | FY2015 2 Rates | FY2016 4 Rates | Change |
| Detached Single-Family Residential Impervious Area | | | | |
| Tier I < 2,000 sq. ft. (35,631 accounts – 20.0%) | 1,673 | \$5.52 (33/100 penny) | \$5.52 (33/100 penny) | No Change |
| Tier II 2,000 to <3,000 sq. ft. (72,362 accounts – 40.5%) | 2,467 | \$8.13 (33/100 penny) | \$8.13 (33/100 penny) | No Change |
| Tier III 3,000 to <5,000 sq. ft. (52,335 accounts – 29.3%) | 3,648 | \$8.13 (22/100 penny) | \$12.04 (33/100 penny) | Increased \$3.91/month |
| Tier IV 5,000 sq. ft. & up (18,195 accounts – 10.2%) | 6,034 | \$8.13 (13/100 penny) | \$19.91 (33/100 penny) | Increased \$11.78/month |
| All Other Impervious Area | | | | |
| Per Impervious Acre (43,560 sq. ft. per acre) | | \$135.56 (31/100 penny) | \$143.73 (33/100 penny) | Increased \$8.17/month |

*The Storm Water Fee also includes a county fee and billing processing fee.

Update on November 2015 Diesel Spill in Little Sugar Creek

Staff Resource: Craig Miller, E&PM, 704-336-7605, cmmiller@charlottenc.gov

Last November, diesel fuel drained from an uptown Parkway Properties building through the storm drainage system and into Little Sugar Creek. The petroleum sheen was observed as far as eleven miles downstream of its origin. Impacts were most apparent along Little Sugar Creek greenway from the Midtown area to Park Road Shopping Center where ducks, turtles, and fish died from fuel exposure.

As a result, Parkway Properties, Inc. has paid \$46,990, including \$37,765 for clean-up costs, \$4,225 for the civil penalty assessed by the City of Charlotte, and \$5,000 voluntarily donated to the Carolina Waterfowl Rescue. In addition, the company is paying for upgrades to the building's fuel system to prevent future spills.

The civil penalty was based on the City's Stormwater Pollution Control Ordinance Penalty/Enforcement guidance document. Some factors that determine the penalty amount include the violator's compliance history, the amount and type of material released, environmental impacts, and the violator's cooperation and responsiveness once the violation was identified.

As mandated by state law, money collected from civil penalties is deposited into the Civil Penalty and Forfeiture Fund and transferred to local education agencies via the State Public School Fund. This fund provides more than \$130 million per year to the North Carolina public schools budget.

The Charlotte Fire Department and Charlotte-Mecklenburg Storm Water Services were the first responders, and wide media coverage alerted residents to avoid contact with the water until cleanup was complete. The majority of the spill was cleaned up within three days. It is estimated 90% of the fuel discharged into the creek was recovered.

ATTACHMENTS:

January 11 Budget Committee Summary



January 11 Budget
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February

| <i>Sun</i> | <i>Mon</i> | <i>Tue</i> | <i>Wed</i> | <i>Thu</i> | <i>Fri</i> | <i>Sat</i> |
|------------------|--|------------------|---|---|------------------|---|
| | <p>1</p> <p>11:00am Ad Hoc Committee on City Mgr's Compensation and Contract, Room 274</p> <p>12:00pm Environment Committee Mtg., Room 280</p> | <p>2</p> | <p>3</p> <p>12:00pm Housing & Neighborhood Development Committee Mtg., Room 280</p> | <p>4</p> | <p>5</p> | <p>6</p> |
| <p>7</p> | <p>8</p> <p>12:00pm Budget Committee Mtg., Room 280</p> <p>2:00pm Transportation & Planning Committee Mtg., Room 280</p> <p>5:00pm Council Business Mtg., Room 267</p> | <p>9</p> | <p>10</p> <p>10:30am Ad Hoc Committee re City Manager's Compensation & Contract, Room 274</p> | <p>11</p> | <p>12</p> | <p>13</p> |
| <p>14</p> | <p>15</p> <p>12:00pm Council Agenda Briefing (optional), Room 886</p> <p>12:00pm Intergovernmental Relations Committee Mtg., Room 280</p> <p>5:00pm Zoning Meeting, Room CH-14</p> | <p>16</p> | <p>17</p> | <p>18</p> <p>12:00pm Community Safety Committee Mtg., Room 280</p> | <p>19</p> | <p>20</p> <p>9:00am – 12:00pm District 3 Budget Workshop & Resource Fair, West Svc. Ctr. – 4150 Wilkinson Blvd.</p> |
| <p>21</p> | <p>22</p> <p>12:00pm Governance & Accountability Committee Mtg., Room 280</p> <p>5:00pm Citizens' Forum/Council Business Mtg., Room 267</p> | <p>23</p> | <p>24</p> <p>1:30pm Budget Workshop, Room 267</p> <p>5:30pm MTC Meeting, Room 267</p> | <p>25</p> <p>12:00pm ED & Global Competitiveness Committee Mtg., Room CH-14</p> | <p>26</p> | <p>27</p> |
| <p>28</p> | <p>29</p> <p>1:30pm Budget Committee Mtg., Room 280</p> | | | | | |

2016

March

| <i>Sun</i> | <i>Mon</i> | <i>Tue</i> | <i>Wed</i> | <i>Thu</i> | <i>Fri</i> | <i>Sat</i> |
|---|---|------------|---|---|-------------------|--|
| | | 1 | 2 12:00pm Housing & Neighborhood Development Committee Mtg., Room 280 | 3 | 4 | 5 NLC Congressional City Conference, Washington, DC |
| 6 | 7 | 8 | 9 | 10 12:00pm ED & Global Competitiveness Committee Mtg., Room CH-14 | 11 | 12 |
| NLC Congressional City Conference Washington, DC | | | | | | |
| 13 | 14 12:00pm Environment Committee Mtg., Room 280 2:00pm Transportation & Planning Committee Mtg., Room 280 5:00pm Council Business Mtg., Room 267 | 15 | 16 1:30pm Budget Workshop, Room 267 | 17 12:00pm Community Safety Committee Mtg., Room 280 | 18 | 19 |
| 20 | 21 12:00pm Council Agenda Briefing (optional), Room 886 12:00pm Intergovernmental Relations Committee Mtg., Room 280 1:30pm Budget Committee Mtg., Room 280 5:00pm Zoning Meeting, Room CH-14 | 22 | 23 5:30pm MTC Meeting, Room 267 | 24 12:00pm ED & Global Competitiveness Committee Mtg., Room CH-14 | 25 Good Friday | 26 |
| 27 | 28 12:00pm Governance & Accountability Committee Mtg., Room 280 5:00pm Citizens' Forum/Council Business Mtg., Room 267 | 29 | 30 | 31 | | |

2016



CHARLOTTESM

INTERNAL AUDIT

**Audit Report
Construction – Change Orders
February 11, 2016**

**City Auditor's Office
Gregory L. McDowell, CPA, CIA**

Audit Report
Construction – Change Orders
February 11, 2016

Purpose and Scope

The purpose of this audit was to determine whether departments have established effective controls for the identification, pricing and approval of change orders and whether the City has established consistent practices City-wide for tracking and managing change orders and contingency balances.

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 City Manager's Office, City Council and all City Departments.

Conclusion

Four City departments' independent approaches to construction have led to inconsistent change order management, exposing the City to potential unnecessary costs. The City could benefit from a policy to establish a best practices framework to guide a consistent construction change order process. Such a framework would reduce the risk of excessive contingencies and out-of-range overhead and profit rates.

Summary Recommendations

1. A City-wide policy should guide all departments' approach to negotiating and pricing change orders and work change directives.
2. The disclosure of contingency balances should be consistent and transparent.
3. Specific terms should be included within contracts to establish the basis for pricing additional work and to establish the right to examine change order pricing data.
4. Change order pricing review guidance should be established for City-wide consistency.
5. City departments should utilize independent cost estimates and records of negotiations to justify the reasonableness of change order pricing.

Action Plan

The Contracts Officers Community of Practice (COCOP) will address change order policies, procedures and best practices related to disclosure, contractual terms, materiality and documentation. The attached memo (Attachment B) indicates that COCOP has begun addressing the audit recommendations and anticipates completion of its plan in May 2016.

Background

There are usually hundreds (currently over 400) of open construction contracts throughout the City, mostly administered by one of four departments – Aviation, Charlotte Area Transit System (CATS), Engineering and Property Management (E&PM) and Charlotte Water. The City policy that governs construction contracts is EPM 1 “Citywide Policy for Procurement of Design and Construction Services.” EPM 1, issued in July 2014, establishes authority limits for approving change orders but does not provide specific guidance or policy for pricing, documenting and negotiating extra work and change orders. COCOP is a team of contracts and procurement representatives established to guide the City organization in the acquisition of construction and construction related services. The roles and responsibilities of COCOP are outlined in a charter that is included as Attachment A to this report.

Best practices are referenced throughout this document. The source of these best practices include documentation from the American Institute of Architects (AIA); the Federal Transit Administration (FTA); the North Carolina Department of Transportation (NCDOT); industry experts such as Baker Tilly and Moss Adams LLP; and from audit reports and discussions with various colleagues across the nation. While the City is not mandated to follow guidance provided by these sources, the practices referenced form a reasonable basis for establishing policies and procedures for pricing change orders, extra work and contingency spending.

Audit Findings and Recommendations

1. A City-wide policy should guide all departments’ approach to negotiating and pricing change orders and work change directives.

Auditors reviewed a judgmentally selected sample of 20 construction contracts which required change orders and/or work change directives. The sample included contracts from Aviation, CATS, E&PM and Charlotte Water which were active in FY15. These four departments were selected because they comprise the nucleus of COCOP. While change orders must go through a formal process outlined in City policy and normally result in an increase to contract value, work change directives are less formal requests for extra work normally defined in the contract general conditions. Work change requests are often funded by available contingency balances.

From the sample selected by auditors, it was evident that departments took different approaches to establishing practices for the review of change orders, including the extent to which contractor proposals would be scrutinized for reasonableness during negotiations. The departments also utilized different methods for documenting and reporting the use of contingency balances.

City-wide policies and procedures should provide a uniform change order control process. Consistent management of the change order process is essential to ensure change orders processed in conjunction with construction projects are accurate, complete and in the best interest of the City. Although there is not a formal City-wide policy on change orders, departments have created their own as outlined below:

- Aviation developed a change order policy and created a checklist to document completion of the steps outlined in the change order process. The policy addresses signature authority levels and describes the negotiation process. Aviation incorporates North Carolina Department of Transportation's (NCDOT) "Standard Specifications for Roads and Structures" and the American Institute of Architects' (AIA) document A201 "General Conditions of the Contract for Construction" into their construction contracts. Aviation also references various federal standards and requirements.
- CATS' Change Control Procedure provides a detailed process for review of change orders, cost authority levels for contingencies and change orders, contractors' proposal requirements, record of negotiations, dispute resolution and records retention. The use of project management software (e-Builder) allows CATS to enforce each element of the policy while documenting each process electronically. CATS' internal policy and execution of each element most closely aligns with best practices.
- Charlotte Water is developing a formal change order and work change directive policy. The department does have informal procedures that provide for the authorization of change orders and the order of preference for how change order work should be valued. Many of Charlotte Water's construction contracts incorporate standard general conditions published by the Engineers Joint Contract Documents Committee (EJCDC). According to Charlotte Water staff, EJCDC contract documents will be used more regularly in the future.
- E&PM does not have a department-specific policy for change orders, but is spearheading COCOP, which has discussed developing a City-wide policy for change orders and contingency spending. Like Aviation, most E&PM construction contracts reference standard general conditions published by the AIA or NCDOT.

Certain policy elements considered to be best practice have been included in construction contracts through the incorporation of standard conditions published by

AIA, EJCDC and NCDOT. Audit staff compared existing City policies and procedures to best practices, as described in the Background section above. The most significant elements not addressed by City-wide policy include:

- negotiation guidelines,
- requirement for records of negotiation,
- auditing of change order pricing after the fact,
- reporting/disclosing the amount and use of contingency balances,
- limits on the amount or percentage of contingency to include in contracts,
- time limits for responses to requests for information (RFI) and work change directives, and
- evaluation of the lessons learned after each project.

Auditors noted that departments modify, delete or omit various clauses in the AIA, EJCDC and NCDOT standard conditions referenced in construction contracts. In addition to the standard general conditions, the referenced organizations also have published guides for supplementary conditions. For example, the AIA Document A503 “Guide for Supplementary Conditions” provides model language and guidance related to establishing overhead and profit percentages for changes in work. This language was often not included in City construction contracts (in some cases, federal requirements may supersede standard language). While the referenced documents are intended to be modified for individual entity use, a standardized approach may direct that specific clauses or language included in the standards should not be allowed to be modified, deleted or omitted without explanation, review and/or approval.

Recommendation: Establish a City-wide policy for change orders based on best practices and review of the remainder of this report.

Actions Taken: COCOP has established a sub-committee to review the audit recommendations and develop recommended policies and procedures for City-wide use.

2. The disclosure of contingency balances should be consistent and transparent.

Construction contingency allowances are added to contracts to provide a predetermined sum of money designated for potential issues which are unknown at the start of construction. The City uses contingency funds to cover overruns and scope changes. (Based upon interviews, auditors noted that the definition and application of a “scope change” is not consistent throughout the City.) Construction contingency amounts typically range 5-10% of anticipated construction costs. Any unused contingency amounts at contract close-out remain with the City and are available for funding other projects. During the construction phase, there are four major change of scope categories:

- Unknown Conditions
- Building Inspector’s Modifications

- Project Owner Requested Changes (including tenant requests at Aviation)
- Design Clarifications or Modifications

City policy (EPM 1 “Citywide Policy for Procurement of Design and Construction Services”) requires that contract modifications (including construction change orders) be approved by City Council if they add more than \$100,000 to the contract. The City Manager must approve a contract modification when, combined with all other modifications, it exceeds the approved contract amount by \$100,000. In this case, the City Manager will decide to approve the modification or refer the modification to City Council for approval.

Departments do not specifically disclose the contingency amount included in contracts when seeking Council approval nor do the departments prepare periodic reports of the contingency used on projects. Auditors reviewed a judgmentally selected sample of 20 contracts City-wide. For the contracts reviewed, contingency percentages ranged from 2.5% to 15% of the contract amount. All but three of the contracts reviewed by auditors included an amount for contingency. The exceptions were three older contracts administered by Aviation, which only recently began including contingency amounts.

Based upon discussions with department representatives, the amount of contingency is determined by professional judgment, taking into consideration such factors as the size of the project, the type of construction, the probability of unknown circumstances and the likelihood of owner requests. Although the ability to use professional judgment is necessary, the lack of a policy indicates that a consistent approach within an established framework may not be utilized in establishing contingency amounts. This could result in contingency amounts outside desired ranges, which have not yet been established in City-wide guidance.

Contingencies are typically included in construction contracts, in recognition that additional costs are likely to be identified during construction, which cannot be known in advance. Based upon current policy and practice, a potential risk exists for a project manager to include a large amount of contingency allowance for a contract and then utilize the contingency balance for a significant contract change order that is not required to be disclosed or approved by City Council or the City Manager. For example, a five percent contingency allowance on a \$20 million contract would be \$1 million, resulting in a contract value of \$21 million. A change order for \$350,000 would therefore not need to be disclosed as the \$350,000 would not result in the contract value increasing above \$21 million. A set of circumstances such as these did occur, as follows:

- At Charlotte Water in 2014, a significant change on the Briar Creek Sewer Relief project resulted in a \$689,000 change directive being processed on the \$17.6 million dollar contract, which Council approved in FY12. Because the amount of the change did not exceed the available contingency balance, department management, City Manager and City Council approval was not

obtained. While this was in line with current City practices, a risk exists that significant scope changes to contracts could be processed using contingency funds without additional review. Executive management and/or City Council may expect that scope changes above a certain threshold should require additional review and approval – regardless of the availability of contingency funding.

Departments were inconsistent in how they handled additional work. CATS processed all changes to construction contracts as change orders in their e-Builder project management system, requiring that each be formally documented and approved. Other departments processed contract changes as change directives unless an increase in contract value occurred, in which case they followed a more formal change order process. E&PM had separate documentation requirements for changes resulting in the spending of contingency balance as opposed to changes requiring an increase in contract value, which were processed as formal change orders.

In reviewing available data in Munis, the City's system of record, auditors were not able to identify those contracts that had large contingency balances. Auditors were able to identify contracts with change orders that had been approved by City Council, but extra work paid with contingency funds does not have the same level of transparency.

Only CATS was able to readily provide a list of change orders and contingency spending by contract. The remaining departments indicated that the information could be produced, but it would require a manual, time-consuming effort to prepare.

It is possible that contingency amounts for contracts could be recorded in Munis through user-defined fields in the contract entry screen. User-defined fields allow users to record specific information in Munis for which a pre-defined field is not available. This may allow procurement staff to record the amount of contingency funds available for each contract. In defining the field, the user is also able to make the selection to have the field input be mandatory. Because some controls over change orders were found to be inadequate, the ability to readily identify contingency amounts and extra work is necessary to ensure that proper oversight is achieved.

Departments tracked contingency spending using software, personal spreadsheets or the payment application. In Aviation, Charlotte Water and E&PM, individual project/construction managers are responsible for tracking contingency usage; making it difficult to create a universe of such spending. There were instances where the contingency was not tracked at all. Rather, it was considered to be a part of the contract like any other line item – an approach which limits the effectiveness of contract management. Without a City policy to provide guidance on reporting of contingency spending, auditors were unable to categorize the scope of the changes or summarize lessons learned at project completion.

Auditors noted that project managers added contingency amounts to five change orders or work change directives. This is not considered best practice as it increases the risk that contractors will receive payment for the contingency amount by including the amount in a change order pay item on payment applications. Auditors noted an example where a \$50,000 contingency was added to a \$2.5 million change order for the Remote Rental Car Facilities contract (approved by City Council in February 2015). No separate authorization was provided to the contractor to spend the contingency amount, which was subsequently allocated among various line items on the resulting pay application. The contractor then received payment for those line items as work was completed.

Recommendation 2A: Determine whether the following should be addressed by City-wide change order policy:

- Dollar or percentage limitations on contingency amounts
- Disclosure of contingency amounts at contract approval (by Council or CMO)
- Periodic internal (Department management, City Manager) and/or external (City Council) reporting of contingency funds used and lessons learned
- Requiring change orders (significant scope changes) above an established threshold to go through the established approval process regardless of the availability of contingency funding
- The inclusion of contingency amounts on change orders

Recommendation 2B: Work with the ERP Support team to identify a method to record contingency amounts for contracts in Munis.

Actions Taken: As noted above, COCOP's sub-committee has been formed to address the recommendations.

3. **Specific terms should be included within contracts to establish the basis for pricing additional work and to establish the right to examine change order pricing data.**

Establishing the basis for pricing change orders within construction contracts would help ensure that the City does not pay more than is necessary for extra work. Contract language can also establish vendor expectations regarding the amount of documentation that will be required to support change order proposals. This can be particularly useful in establishing labor burden rates, overhead rates and profit percentage.

Referenced standards and contract language in the majority of sampled City contracts allow for flexibility in the negotiation and establishment of overhead and profit rates for change orders. For example, Article 11 of the EJCDC standard general conditions details how cost should be calculated for "extra work" – but this only applies if the contractor and owner cannot mutually agree on a lump sum (commonly referred to as "force account"). EJCDC allows a contractor's fee of 15% on work performed by the contractor and 5% for work performed by subcontractors. Only Charlotte Water

referenced EJCDC general conditions in the sampled contracts. While auditors did not note any change orders or change directives for Charlotte Water that exceeded these percentages, the contract language actually allows the Construction Manager to negotiate rates higher than those published in the EJCDC standard general conditions.

In vertical construction, City contracts usually incorporate AIA A201-2007 "General Conditions of the Contract for Construction." While not all vertical City construction contracts include reference to change order pricing, auditors noted the following example (see Exhibit A) where the allowable contractor and subcontractor overhead and profit percentages were detailed in the contract documents. Not only does this contract language establish overhead and profit percentages, it also indicates those items that will be considered as paid from the stated percentages.

Exhibit A – Contract Excerpt Overhead and Profit

§ 7.2.3 Overhead and Profit: Ten percent (10%) of net increase of labor and material for work performed by the Contractor's own forces and five percent (5%) on net increase of subcontractor's work. Bonuses; sick leave; vacation and holiday pay; bookkeeping, clerical, estimating, superintendence, project management, or other items of indirect costs or overhead; shall be compensated for by payment of the overhead and profit percentages listed herein. Such allowance for the combined overhead and profit included in the total cost to the City shall be based on the following schedule:

- .1 For the Contractor, for Work performed by the Contractor's own forces, ten percent (10%) of the cost;
- .2 For the Contractor, for Work performed by the Contractor's Subcontractor, five percent (5%) of the cost;
- .3 For each Subcontractor's or Sub-subcontractor's Work performed by the Subcontractors or Sub-subcontractor's own forces, ten percent (10%) of the cost;
- .4 For each Subcontractor, for Work performed by the Subcontractor's Sub-subcontractors, five percent (5%) of the amount due the Sub-subcontractor shall be added as the allowance for overhead and profit;
- .5 DELETED;
- .6 DELETED;
- .7 In order to facilitate the review of quotations for extras or credits, all proposals shall be accompanied by a complete itemization of costs, including labor, materials, and subcontracts. Labor and materials shall be itemized in the manner prescribed above. Where major cost items are subcontracts, they shall be itemized also, submitted in the same form under the Subcontractor's letterhead. Under no circumstance will a change involving more than one hundred dollars (\$100.00) be approved without such itemization;
- .8 Payments for overhead and profit as stated above will be limited up to second tier subcontractors. Lower tier subcontractors shall not subcontract work to the Contractor or higher tier subcontractors; and
- .9 All change order costs shall be submitted on the Change Order Form provided in the Contract Documents.

Source: BLE Contract 8: Parking Garage

City construction contracts do not generally establish acceptable methodologies for calculating labor burden and overhead rates, except for contracts referenced to federal cost standards. Labor costs for contractor and/or subcontractor work were often presented in total only, without breaking out base wage from fringe benefits and taxes. Guidance on calculating labor burden and other rates was not included in the contract language. Similarly, the basis for calculating contractor-owned equipment rental rates is not included in contracts or policies and procedures.

Change orders and change directives reviewed were not generally supported by detailed documentation. For example, labor costs were not always detailed to show rates for a given number of hours for specific classifications of employees. Without estimated hours and rates, construction managers are not able to verify the reasonableness of labor charges.

The contracts sampled contained language requiring access to the contractor's accounting records for auditing purposes, but it usually pertained to DBE purposes. Adding an audit clause to change orders will protect the City in cases of emergency change orders and will notify the contractor that change orders and work change directives will be subject to a higher level of scrutiny if necessary. Best practices indicate that municipalities should establish contract language giving the Owner's Representative the right to examine the records of the contractor, subcontractors and sub-subcontractors up to three years after final payment is made. Without specific policies and procedures, approval of change order pricing will be inconsistent and departments could negotiate change order pricing that is unfavorable to the City while not subject to audit.

The following Aviation examples highlight the need for consistency and the importance of outlining markup percentages in construction contracts:

- On a \$3.3 million change order (approved by City Council in February 2015) for the Checked Baggage In-Line System (CBIS), the contractor was allowed to add 10% to subcontractor costs for both overhead and profit. On earlier change orders, only a 5% profit was allowed. Limiting the prime contractor to a 5% markup on subcontractor work and 10% overhead and 5% profit on their own work would have resulted in a savings of \$194,040. Because the original contract (\$25.4 million approved by City Council in October 2012) did not specify change order overhead and profit percentages, the contractor was able to propose percentages that could be considered unfavorable to the City.
- On the Elevated Roadway Utilities contract (approved by City Council in January 2015), a \$27,600 change (authorized via email in March 2015 by the construction manager) was approved that included \$2,983 in "Project Management" costs, \$2,640 in labor and sales taxes of \$1,123 on \$960 of material charges. Project management costs are usually considered part of overhead and profit and could have been excluded. This change request did not separately identify subcontractor overhead and profit; however, the prime contractor added 15% to the subcontractor costs. The labor charges were not supported by detail identifying the number of hours, rate or classification of workers and it appears that sales tax was incorrectly extended on the subcontractor quote, resulting in an overpayment of sales tax of more than \$1,000.

Recommendation 3A: Determine what standard language should be included in construction contracts regarding the basis for pricing change orders, including maximum labor burden, overhead and profit percentages.

Recommendation 3B: Establish minimum documentation standards to be outlined in construction contracts for the various elements of change order costs such as labor, materials, equipment, subcontractor costs, fringe benefits, overhead and profit.

Recommendation 3C: Establish standard contract language regarding the right to examine pricing data on change orders and require that such language be included in construction contracts.

Actions Taken: As noted above, COCOP's sub-committee has been formed to address the recommendations.

4. **Change order pricing review guidance should be established for City-wide consistency.**

As noted earlier, City-wide change order policies and procedures do not exist, including guidance on the extent to which project and construction managers should scrutinize change order pricing. Without such guidance, the City risks paying more than prevailing wage rates on change orders; paying artificially inflated prices for materials, equipment and subcontract costs; and paying markups for profit and overhead that exceed typical industry rates.

Contract terms or other guidance do not exist that could be used to establish materiality when reviewing change orders or contingency spending. There was a wide variation in the level of detail required by each department to support change order pricing. While construction managers in one department (CATS) appeared to scrutinize supporting documentation for change orders valued at less than \$1,000, other construction managers approved change orders and contingency spending in excess of \$100,000 without much scrutiny. The following describes some of the lack of detailed supporting documentation by each element of cost:

- a. Labor – The City did not always require contractors to detail labor costs by job title, wage rate and hours. Contractors were also not generally required to provide a payroll register for work that was already performed prior to change order negotiation.

As an example, Change Order Contingency Request #36 (\$27,388 approved in May 2013, by an E&PM Project Manager) for the Charlotte Fire Department Headquarters contract (\$10.9 million approved by City Council in December 2011) included a line item for 105 hours of iron worker field wages at a rate of \$65 per hour (\$6,825). The hourly rate was not broken down further into a base wage rate, fringe benefits rate and overhead and profit. E&PM management

noted that the labor rate was reasonable based on comparison to an industry standard published rate that included material and equipment costs. E&PM management further explained that change orders are scrutinized by the Architect, the Project Manager (PM), and the Contracts division but not consistently documented. Because contractor change proposals equate to a non-competitive bid, leading practices require contractors to document and support actual costs as much as feasible. Without a detailed breakdown of proposed labor, equipment and material costs, PMs and auditors will be unable to compare actual costs to proposed costs and determine whether the contractor submitted accurate cost and pricing data. Although pricing for the above extra work was considered reasonable, sufficient itemization was not obtained for auditors to form an objective opinion on the accuracy of pricing data. It is also relevant to note that once more formal policies and procedures are developed, City management will likely establish materiality thresholds for the review of change order pricing data. The example noted above may not meet the eventual materiality thresholds.

- b. Labor burden – City-wide, construction contracts do not generally specify acceptable labor burden rates or provide guidance on how acceptable burden rates should be calculated. Labor burden includes employee benefits, social security tax, workmen’s compensation, unemployment taxes, and fringe benefits. For the sampled contracts, auditors found labor burden rates varied from 38% to 93% but noted that contracts did not specify what should be included in the labor burden calculation. NCDOT requires that contractors submit actual labor burden rates (up to 60%) but allows for a rate of 35% if the contractor is not able to verify its labor burden rate. Departments did not always require contractors and subcontractors to document labor burden calculations. It was often difficult to determine whether proposed wage rates included labor burden or were meant to be base wage rates only.

On the Charlotte Water Utilities Zone 3 Field Operations Center contract (\$5.0 million approved by City Council in May 2014), change order proposal #23 (\$3,971 approved in February 2015 by a Charlotte Water construction manager) included a line item for laborer at \$32.00 per hour. On a previous change order, laborers were proposed at \$22.96 per hour. It was not clear whether these rates intended to include fringe benefit costs and/or markup. The construction manager did not request or require detailed supporting documentation. Without such-detail, it is not possible to determine whether wage rates or fringe benefits amounts were reasonable for the work performed.

- c. Materials – Estimates should be supported by price quotations or invoices from material suppliers that are itemized with unit prices. Costs should reflect reductions available to the contractor due to trade discounts, credits and/or volume rebates. Material costs were not always supported by price quotations or actual invoices.

For example, on a change request for the Eastburn Storm Drain Improvement Project (approved by City Council for \$5.0 million in April 2011), an email quote was obtained for \$40 per linear foot for 8" SS PVC pipe. For 235 linear feet, this resulted in a cost of \$9,400 (approved via email by an E&PM construction manager in June 2013). Documentation provided to auditors did not include vendor invoices or quotes on vendor letterhead – only an email from the prime contractor. Documentation provided did not indicate that the quoted price per foot included installation costs as part of a standard NCDOT specification. According to E&PM management, the bid amount included installation costs and was determined to be reasonable by the construction manager based on comparison to a historical unit price database.

Best practice is to require change orders and extra work to be priced at actual cost plus reasonable overhead and profit margins. Contract language should require contractors to submit change order proposals with cost and pricing data which is accurate, complete and current. Agreeing to a unit price based on historical data may result in a reasonable price for extra work. However, without a breakdown of costs by labor and materials, auditors would be unable to compare proposed costs to actual costs to determine whether contractors submitted accurate, complete and current pricing data. One of the goals of the COCOP sub-committee will be to establish procedures that set materiality thresholds for the more detailed review of pricing data.

- d. Equipment – For force account work, NCDOT allows contractors hourly rental rates of 1/176 of the published monthly rate in the Rental Rate Blue Book for Construction Equipment (“Blue Book”), a comprehensive guide to cost recovery for construction equipment produced by EquipmentWatch. Rates listed in the book are intended as a guide to determine the amount an equipment owner should charge in order to recover equipment-related ownership and operating costs. NCDOT also allows contractors 100% of the operating cost per hour listed in the Blue Book to cover fuel, lubricants, repairs, servicing and other incidentals. For commercially rented equipment, NCDOT allows the contractor payment based on the approved invoice rate for the equipment. Auditors noted that equipment rental rates were generally not supported by invoices and that construction or project managers did not document any review performed to determine that rates agreed to published Blue Book rates.

For EJCDC force account work, contractors and subcontractors are not allowed to add markup percentages to transportation, travel and subsistence expenses; materials, supplies and equipment costs (including rentals); and sales, consumer and use taxes. Although not specifically stated in the guidance, it appears that the rationale for not including markup on these costs is that no additional overhead expenditure is being made by the contractor in supplying the equipment or paying the sales tax. While this requirement applies only to force account work, the rationale could be applied to negotiated prices as well. Similar guidance does not exist for vertical contracts (normally referenced to AIA standards). For the

sampled contracts, most departments accepted change proposals that included equipment costs and sales taxes in markup calculations.

- e. Bonds, warranties, and insurance – Best practices indicate that contracts should establish whether additional bonding, warranties, and insurance costs for change orders should be included as the cost of overhead or require proof the additional bonding was actually paid. In addition, leading practices suggest that markup percentages should not be applied to bond and insurance premiums.

On Change Order #3 for the Aviation Checked Baggage In-Line System contract, the markup on bond and insurance premiums totaled about \$15,000. Other City departments utilize change order forms that add the cost of bond and insurance premiums *after* markup is applied to all other costs.

Recommendation: Develop guidelines for contract managers regarding the level of scrutiny expected on change orders, and provide training as necessary to ensure that established guidelines and expectations are consistently followed.

Actions Taken: As noted above, COCOP's sub-committee has been formed to address the recommendations.

5. **City departments should utilize independent cost estimates (ICE) and records of negotiations (RON) to justify the reasonableness of change order pricing.**

According to the Federal Transit Administration (FTA), the independent cost estimate is a tool to assist in determining the reasonableness of the bid or proposal and is required for all procurements funded by the FTA regardless of dollar amount. The FTA requires that grantees "perform a cost or price analysis in connection with every procurement action, including contract modifications...the starting point for these cost/price analyses is an independent cost estimate (ICE) which is made before receiving bids or proposals."

Because the CATS Blue Line Extension is funded in part by the FTA, CATS has established policies and procedures related to independent cost estimates. According to CATS Change Control Procedure, the resident engineer will request an ICE if a change request is greater than \$10,000. This ICE is performed by a contracted third party. For change requests less than \$10,000, the resident engineer may complete the cost analysis.

Independent cost estimates do not necessarily have to be performed by third parties. Organizations not funded by the FTA require that a resident engineer or project manager develop an ICE before reviewing a contractor's change proposal. The ICE may be developed by the resident engineer, other in-house resources or by a design consultant. The ICE needs to be completed in sufficient detail to allow for comparison to the anticipated contractor proposal.

While other departments (besides CATS) utilized independent cost estimates at times, no other department has established formal policies or procedures requiring that an ICE be completed before review of contractor proposals. The risk of accepting an unreasonable change order proposal increases if an ICE is not performed.

Although ICE's were not performed for some contracts, department management indicated that engineers and construction managers reviewed change proposals as warranted. Auditors were not always successful in verifying that these reviews occurred, as only CATS has implemented an automated system (e-Builder) that assists in the documentation and retention of cost estimates and other construction procurement actions. Automated construction systems such as e-Builder serve as a repository for all project information and can create audit trails of all events that occur during a project. While the determination for the need of an automated system or the recommendation of any specific system was beyond the scope of this audit, the existence of e-Builder within CATS greatly increased the availability of supporting documentation.

The purpose of a Record of Negotiation (RON) is to clearly demonstrate that the contractor's proposal has been given a detailed review, that proper rates were used in determining the price and that the final price is fair and reasonable. RON's should include a comparison of proposed and negotiated cost with a clear description of the differences broken down by labor, equipment, material and final negotiated price. ICE differences should be discussed in the RON.

Except for CATS, detailed RON's were not prepared. However, construction managers noted that they retain similar information in email format. According to best practices, the RON should include:

- Changer order number and description
- Date and location of meetings
- Final resolution and justification
- Proposed cost and negotiated cost with clear description of differences
- Profit calculation and agreement

Recommendation 5A: Determine how independent cost estimates should be incorporated in change order policy, including policy or guidance on when an ICE should be utilized.

Recommendation 5B: Establish standards and expectations regarding records of negotiations, including when they should be required, what they should include and how they should be retained.

Actions Taken: As noted above, COCOP's sub-committee has been formed to address the recommendations.

November 19, 2008



City of Charlotte
Contracts Officers Community of Practice Charter

General Summary

The Contracts Officers Community of Practice (COCOP) is a team of contracts and procurement representatives from various Key Business Units (KBU) established to guide the City organization in the acquisition of construction and construction related services; to ensure the City's process is legal, fair, consistent, open, transparent, complies with City policies and identifying city-wide best practices.

Purpose

The primary purpose of the COCOP is to provide a strategic linkage and vehicle for collaboration between individual KBU's. The COCOP will communicate regularly about best practices, standard processes and training across the City organization.

Roles and Responsibilities

The COCOP's roles and responsibilities will include:

- developing and recommending city-wide policies and strategies for acquisition of construction and construction related services
- develop, recommend and establish city-wide construction and construction related processes and standards; and
- carrying out training activities for their KBU's.

Governance

The COCOP will serve under the direction of and report to the Engineering & Property Management Key Business Executive. The Executive will appoint one individual to serve as convener of the COCOP. The convener will call and facilitate meetings and set agendas. The COCOP will establish its own governance rules for its internal operation. These rules will include, but are not limited to:

- Meeting procedures.
- The establishment and management of subcommittees and workgroups.

November 19, 2008

Membership

The Engineering & Property Management Key Business Executive will serve as Executive Sponsor of the Team and report to the Assistant City Manager.

The City Attorney will select one or two representatives to serve as legal advisors.

Each Construction KBE will select one or two representatives to serve on the team for indefinite terms. Representatives should have the following abilities:

- To be strategy leaders for construction procurement issues.
- To readily access and advise their KBU leadership regarding strategies to address issues and challenges;
- To partner with the other KBUs to develop and recommend processes and strategies;
- Developing and considering best practices as related to procurement of construction and construction related services;
- To perform periodic procurement analysis specific to their KBU;
- To identify potential process improvements and innovations for recommendation to the COP, the Executive Sponsor and/or their KBU;
- To recognize contracting skills gaps in their KBU and work with management more strategically to fill the gaps through hiring, training, outsourcing, etc.;
- To provide training for City staff
- To understand the financial, morale, and organizational efficacy impacts of procurement strategies and practices.

Representatives are expected to serve terms of at least one year, and multi-year service is preferred. The Engineering & Property Management Key Business Executive or the KBE's may choose to select different representatives after each one-year term.

Leadership

The individual appointed as convener by the Engineering & Property Management Key Business Executive will have the following responsibilities:

- Schedule and facilitate meetings;
- Plan the agendas for meetings, calling upon members for topics to be addressed.
- Arrange for meeting minutes to be kept and distributed.
- Report discussions, findings, and recommendations to the Engineering & Property Management Key Business Executive.

The Engineering & Property Management Key Business Executive will have the following responsibilities:

- Provide strategic leadership and direction of the COCOP
- Define project priorities for the COCOP
- To give full consideration to any recommendations of the Team as they relate to changes in policies, strategies and practices of the City that affect construction procurement.
- To communicate with the ACM regarding the work and recommendations of the Team.

November 19, 2008

The Assistant City Manager will have the following responsibilities:

- To communicate with the City Manager and Manager's Cabinet regarding the work and recommendations of the Team
- Act as a final authority for decisions that affect multiple KBUs .

CITY OF CHARLOTTE

AVIATION, CHARLOTTE AREA TRANSIT, CHARLOTTE WATER, ENGINEERING & PROPERTY MANAGEMENT

January 27, 2016

TO: City of Charlotte Internal Audit

FROM: Brent Cagle, Interim Aviation Director

John Lewis, Charlotte Area Transit Director

Barry Gullet, Charlotte Water Director

Jeb Blackwell, Engineering & Property Management Director

RE: Construction Departments' Response to Construction-Change Orders Audit Report

The four construction departments have reviewed and provided comments to Internal Audit regarding the Construction-Change Orders Audit Report. We acknowledge the need to manage change orders and contingency balances Citywide in a manner that promotes consistent practices. Throughout the development of the report's earliest drafts, the construction departments have worked with Internal Audit to explain our procedures and policies. While we accept the findings of the report and intend to work cooperatively to establish best Citywide practices in accordance with the report's recommendations, we seek to establish those practices keeping in mind the diverse nature of each department's construction activities and the federal, state and local policies and procedures that govern each type of construction activity.

Our primary focus is to work through the Contract Officers Community of Practices (COCOP) and selected construction management staff from each department to develop and implement the report recommendations. We seek to incorporate the recommendations into the Citywide Policy for Procurement of Design and Construction Services (EPM 1). Each department will be responsible for implementing all activities with the understanding that some activities, such as changing language within current and future construction contracts, will take time to complete. Additionally, federal and state regulations require compliance with appropriate granting authority, for example, the Charlotte Area Transit system has established processes mandated by the Federal Transit Administration for construction projects. One of the COCOP team's first priorities is to develop a plan and estimated date for incorporation of the recommendations.

Internal Audit recommended five (5) areas in the Construction- Change Orders Audit Report that need to be addressed by COCOP and its respective members. The proposed schedule below addresses anticipated timeframes for COCOP to develop best practices in the five (5) areas recommended by Internal Audit.

| Internal Audit Recommendation | Anticipated Completion |
|--|------------------------|
| Contingency – establishing and disclosure of balances | February 2016 |
| Change order pricing, negotiations, pricing review, and independent cost estimates | April 2016 |
| Consistent change order terms incorporated into contracts | May 2016 |

BEYOND TRAFFIC

SMART CITY CHALLENGE



ACCESS ● CHOICE ● OPPORTUNITY

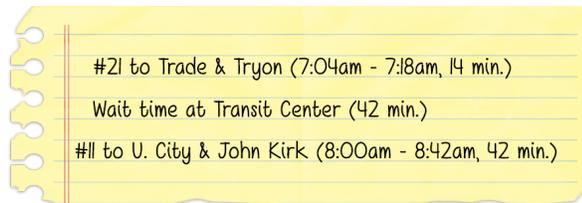


ACT I

MEANWHILE IN CHARLOTTE 2016...

ANITA

Anita looked down at the piece of paper partially crumpled in her hand.



She had written out these directions last night after walking to the library to use their free Wi-Fi.

Once settled on her first bus, Anita started perusing the textbook for her Paralegal Certificate course at UNC Charlotte. Everyone told her that education would help her get out of poverty, but she was finding it hard to even get out of Druid Hills and over to the University area. The upcoming Blue Line Extension would drop her off right on campus. ***But how is the Blue Line Extension going to help me if I can't even get to it?***

TONY

When a green tech startup in Charlotte offered Tony a job, he immediately packed up and moved all the way from Portland, OR. The city was completely unfamiliar, but his bicycle was an old friend, so he decided to bike to his first day of work.

The ride was harrowing. Tony wove through congested lanes of honking cars and trucks and buses before arriving at the office visibly frazzled. Not exactly the first impression he was going for.

That night, he was supposed to meet up with new friends over in the Coulwood neighborhood. Biking was off the table, so he pulled out his phone to look up bus schedules, light rail routes, and Uber availability. He grew frustrated trying to figure out which buses went where and it wasn't clear how to buy a ticket. Uber was on surge pricing. ***I guess I'll have to drive. So much for green commuting.***

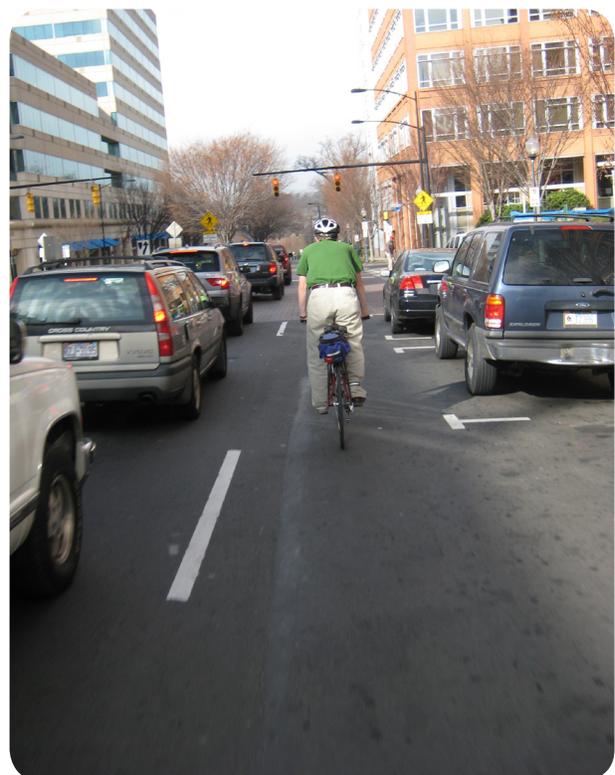
JOE AND SARAH

Joe took another swig of 5-Hour Energy. He'd left this morning at 4:15 with a load bound towards Charlotte, but the traffic on I-77 extended as far as he could see.

He reluctantly reached for his iPhone, on which his very stressed-out dispatcher was calling yet again. "Are you almost there?" Sarah asked. No pleasantries.

It was 4:56 pm. The customer closed their docks around 5:00, but maybe if he arrived soon, they would still receive the load. Either way, he would have to pull off the road as soon as his 11-hour limit hit.

Meanwhile, Sarah sat in her office staring at the map littered with digital truck emblems. None of them seemed to be moving. Congestion in urban areas across America made it shockingly difficult for her to get trucks from points A to B, and the number of accidents has slowed down the trucks and decreased the bottom line even more. She thought she might get a promotion this year, but the way things were going for her company, she would be lucky to stick around at all. ***I hope he gets there in time.***



Cyclist navigating a busy street

ACT II

INTRODUCTION

Charlotte is one of the fastest growing cities in the nation, and this growth is expected to accelerate over the next few decades. There are 731,424 people living in Charlotte (2010 census), with 2,457 persons/mile, and an urbanized area population percentage of 59%. Approximately 400,000 new residents will call Charlotte their home in the next 25 years. This level of growth offers enormous opportunity for our community but will also challenge our infrastructure, environment, and quality of life.

How might we provide our existing and future residents with more transportation choices and quality access to jobs, all while maintaining a competitive edge in the global economy?

The Smart City Challenge couldn't have come at a better time for our city as we grapple with growth challenges that are virtually unprecedented. From Anita's need for more convenient access to transit (and the Internet), to Tony's desire to drive less in order to exemplify his environmental priorities, to Joe and Sarah's concerns about reliable transport times

and their small company's economic viability, their issues are woven together as they try to navigate their lives in Charlotte.

We believe the Smart City Challenge will help us in addressing some of the key challenges we are facing:

- First mile / last mile connection
- Digital exclusion
- Equitable access to opportunities
- Safety
- Navigating transportation options
- Environmental issues exacerbated by congestion
- Productivity loss / decreased quality of life due to congestion
- Distracted driving

Like many other southeastern cities, Charlotte needs to improve the economic mobility of lower income residents. A recent study by University of California – Berkeley and Harvard University identified the Charlotte area as ranking 50th out of the 50 largest urban areas in its residents' ability to achieve economic mobility into an income level above the one in which they were born. While many



City of Charlotte skyline

factors play into addressing this alarming reality in Charlotte, shortening commute times and providing access to affordable transportation are both identified as key indicators necessary to increase economic opportunity.

Our Smart City Challenge action items included in this proposal will help us create more inclusive neighborhoods, improve transportation choices, and help our residents achieve increased upward economic mobility. That is why our Smart City Challenge proposal focuses so strongly on access, choice, and opportunity for all residents. Ultimately, it is about the people who live and work here. People like Anita, Tony, Joe, and Sarah and the thousands of existing and future residents who call Charlotte their home.

The Smart City Challenge funding, combined with Charlotte’s commitment to transportation choices, the environment, a maturing transit system, our track record of getting things done, our public and private sector partnerships, and our rapid growth are a recipe for success and opportunity.

CHARLOTTE’S SMART CITY VISION

The only thing we can be sure about the future is that Charlotte is committed to leading the way. Smart cities are not only about the utilization of data and technology, they are, more importantly, about community and people. To Charlotte, a smart city is a platform on which we connect people, places and things. It is an ecosystem where collaboration, cooperation, and communication build on a data and technology platform to improve the quality of life of all its citizens that results in making them safer, enhancing their mobility options, and addressing climate change. Charlotte has already begun to build a smarter city and is seeing tangible results through programs like Envision Charlotte, the Greater Charlotte Smart City Cabinet, and the Digital Inclusion Task Force.

We realize, however, that we have just scratched the surface and the possibilities are limitless, but not without obstacles that must be identified and

overcome. USDOT’s Smart City Challenge provides Charlotte and its partners the opportunity to build upon what we have already established and develop and implement a vision that will enable us to create Charlotte’s Urban Mobility Ecosystem. As part of the application process, Charlotte engaged in a process with over 50 public and private partners to identify our transportation challenges and the needs of our citizens and businesses, and to determine which technologies, strategies, applications and institutional arrangements hold the most promise. Bringing together partners from various industries, universities and firms, Charlotte hosted a three-day human-centered design workshop to evaluate how we might:

- ...increase economic opportunities through mobility choices
- ...collect, analyze, and use big data
- ...utilize or build upon existing resources, relationships, and partnerships
- ...better move goods in, around, and through our region
- ...continue to implement transportation infrastructure and land use policies to provide choices to move and live differently.

Did You Know?

HUMAN-CENTERED DESIGN WORKSHOP

Our commitment and the dedication of our partners were demonstrated during our recent three-day human-centered design workshop. The workshop focused on identifying ideas that united the Smart City Challenge criteria with the city’s existing vision and priorities. The workshop assembled more than 50 people from a variety of public, private, academic, and non-profit organizations. The participants engaged in human-centered design exercises, such as empathy building and rapid prototyping. The collaborative group built upon each other’s concepts while keeping the needs, wants, and constraints of our citizens at the forefront.

Out of this process emerged the vision described in the following pages, which outlines our evolutionary steps to integrate data and technology into the management and operations of our City while examining the technical, policy and institutional mechanisms needed to make these steps become reality. Most importantly, in conjunction with our partners, we will be able to demonstrate, quantify and evaluate the impact of our vision and assess its reproducibility and transferability to other cities facing similar challenges and to improve the lives of Anita, Tony, Joe and Sarah. Specifically our community's vision will be told through,

1. **Connecting Community:** Using the OneConnect Charlotte mobility interface and analytics platform for payment and trip planning through digital inclusion methodologies (page 6).
2. **Moving People:** Solving the first and last mile challenge through deployment of dedicated infrastructure for autonomous vehicles, electric vehicles, and coordination with a shared economy (page 11).
3. **Transporting Things:** Implementing a freight priority system that includes vehicle to infrastructure technology and priority signalization (page 16).

The proposed geographic areas for these three vision initiatives are shown in the map on the next page. Each vision initiative will make a positive impact on safety, mobility, and climate change.

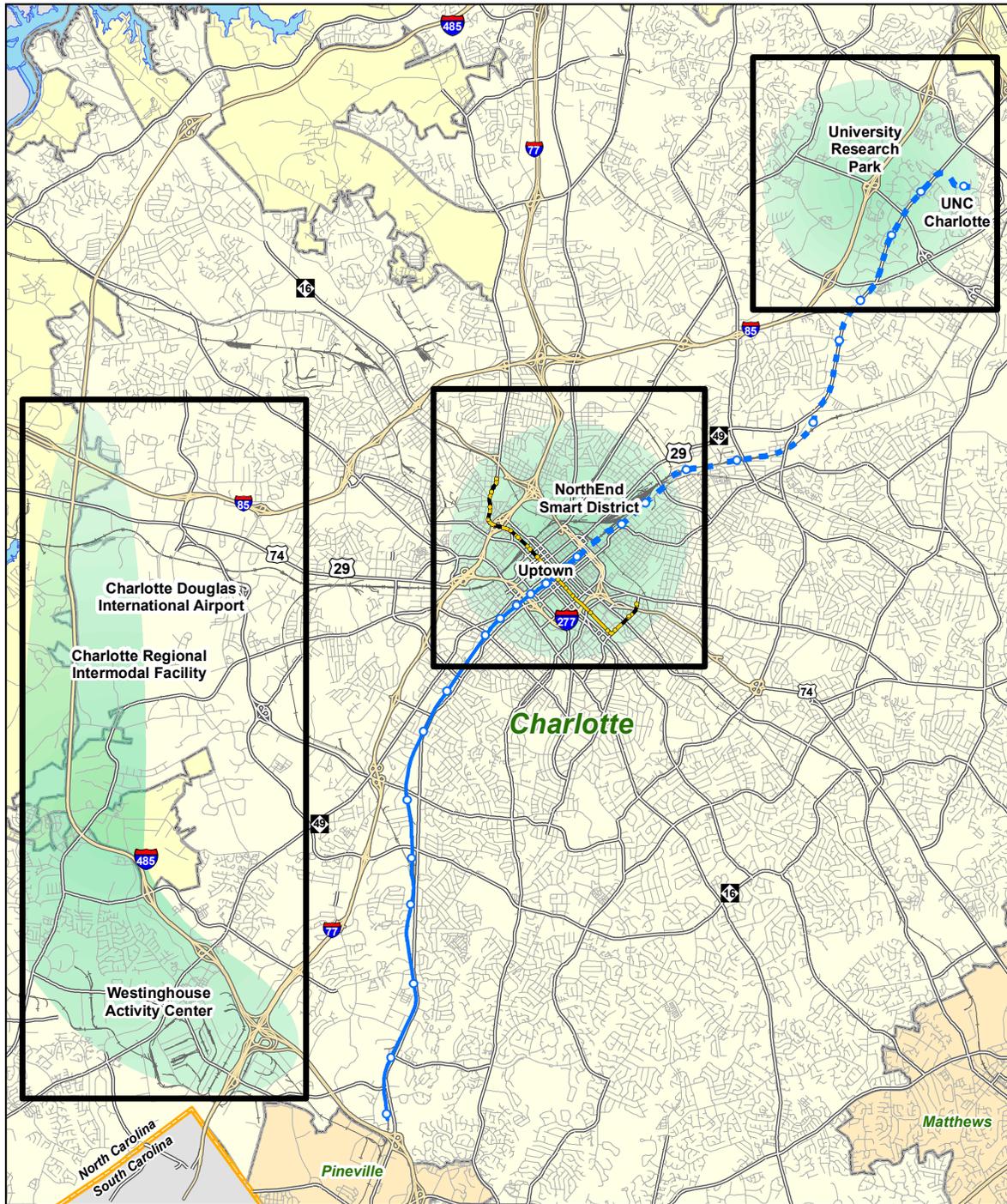


Pedestrians on SouthEnd Rail Trail



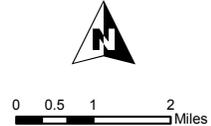
Street Crossing for LYNX Blue Line Train

Charlotte Smart City Challenge: Project Geographies



Legend

- | | | | |
|--|--|--|-----------------------|
| | Charlotte Smart City Challenge Project Geography | | Interstate Highway |
| | LYNX Blue Line | | Thoroughfare |
| | LYNX Blue Line Extension | | Streets |
| | LYNX Station | | Railroads |
| | CityLYNX Gold Line Phase One | | Charlotte City Limits |
| | CityLYNX Gold Line Phase Two | | State Boundary |
| | CityLYNX Gold Line Stop | | |



Data Source: City of Charlotte, Charlotte Area Transit System

Charlotte Smart City Challenge.pdf

02.03.16

CONNECTING COMMUNITIES— ONECONNECT CHARLOTTE

Our first initiative is the new **OneConnect Charlotte (OCC)** integrated interface and network of smart kiosks at existing transit hubs. OCC will leverage existing private services by integrating car sharing, automated-all-electric-transit, fixed-line transit services, bike sharing, parking, and other transportation options in one free, easy-to-access app. In addition to being part an institutional platform, this data will be fed into an open data platform that will allow access to entrepreneurs and innovators to fuel new ideas to leverage technology to enhance mobility, increase safety and address climate change.

Autonomous vehicles hold the promise of drastically improving public transportation by efficiently meeting the needs of people along the first and last mile portion of transit trips. However, we believe that there is an interim period between full autonomous deployment and the current state of privately owned vehicles, where the shared-use economy could begin to solve first and last mile needs more effectively. Our Connecting Communities initiative creates a platform that enables the shared economy to improve first and last mile connectivity to transit as well as to other destinations in one’s neighborhood or the City.

Our vision for the OCC interface, an app accessible through smart devices and smart kiosks in the public domain, in combination with the shared-use economy, is focused on the following four objectives.

1. Create a Data Backbone to Enhance Mobility
2. Bridge the Digital Inclusion Gap
3. Provide Seamless Connectivity and Trip Planning Between All Modes of Transportation
4. Enable a Single Payment per Trip Across Transportation Modes

1. CREATE A DATA BACKBONE TO ENHANCE MOBILITY

An analytics engine is only as good as the data that feeds it.

Charlotte and its partners will create a data backbone to be the heart of our Urban Mobility Ecosystem. Charlotte already has mobility data and infrastructure, but we will augment this through the deployment of connected vehicle technologies, e.g., Mobileye, iBeacon sensors in buses, transit stations, bus stops and high traffic commercial areas to provide data

for anonymous origin/destination and safety analytics. We will also deploy smart streetlights and digital kiosks that will allow us to not only collect more data but to create a digital infrastructure network to support our Urban Mobility Ecosystem.

Over time, as more

Charlotteans use the OCC platform, it will build a robust database containing trip choice and cost information, private industry availability, location and safety information.

Through our partnerships, all this data will be collected, integrated and managed so that it can then be analyzed to determine the most efficient, safest and cost effective methods of improving **ACCESS, CHOICES, and OPPORTUNITIES** for transportation. Charlotte currently has a city-wide communications network composed of a variety of media (fiber optic cable, wireless links, etc.) to support the operation of our traffic management system. This communication network provides us with the flexibility to integrate new detection technologies into the system as they emerge (such as sensors that may be developed to read connected vehicles data).

To augment the existing sensor network, we will be able to leverage the network created by our smart streetlights and kiosks as well as crowd-sourced data to develop CHADS – the Citywide Human Acquisition of Data System. CHADS will be

#3 INTELLIGENT SENSOR-BASED INFRASTRUCTURE



“the deployment of iBeacon sensors in buses, transit stations, bus stops and high traffic commercial areas to provide data for anonymous origin/destination analytics.”

comprised of a diverse, statistically valid sample size of Charlotte residents who are willing to share their trip data. OCC app users may be motivated to share travel data freely for a variety of reasons, including enhanced mobility, competition, and supporting an initiative that will help others, reduce congestion, and minimize greenhouse gas emissions. Our proposed crowd-sourced approach to collecting travel and trip data may require incentives to obtain users from all demographic groups, but even with the expense of potential incentives, this “human” data network would be less expensive and more powerful and accurate than an array of sensors located throughout the city.

Real-time trip data from thousands of users in the Charlotte area, combined with the data from our existing and augmented sensor and vehicle to vehicle network, will provide inputs to our proposed data analytics platform that can be used for many purposes including:

- Powering the OCC app
- Telematics for the proposed “last mile” autonomous vehicle fleet that supports CATS
- Information for the connected vehicles in the freight priority zones

#4 URBAN ANALYTICS



“While data is the fuel for smart mobility, analytics is the engine that turns the data into power.”

The real value of information is apparent when analytical techniques are applied to the data to extract actionable information that allows society to make informed, data-driven decisions. While data is the fuel for smart mobility, analytics is the engine that turns the data into power.

2. BRIDGE THE DIGITAL INCLUSION GAP

Equitable implementation of transportation technology and opportunity is a top priority. The OCC app is the critical link to this desired access. Although the app

will be developed in partnership with the private sector, we are committed to providing it free of charge to the public.

In addition, the OCC app will be available on smart kiosks at all Light Rail Stations, the Amtrak station, the Greyhound station, the airport, and major bus transit stops. Users can populate their digital wallet using debit cards, credit cards, and online methods such as PayPal, but the widely available smart kiosks will also be equipped to accept cash. This system enables patrons to make transportation choices across modes.

The smart kiosks and smart street lights will provide Wi-Fi hotspots so that anyone near the kiosk can access the OCC app with a private smartphone. The smart kiosks will also have a voice-over-IP connection to the City’s 311 line to provide human support for using the OCC app or to offer direction for people needing other types of help.

3. PROVIDE SEAMLESS CONNECTIVITY AND TRIP PLANNING BETWEEN ALL MODES OF TRANSPORTATION

While Google and other transit systems have started to explore multimodal trip planning, the traveling public often struggles to determine the most efficient way to travel within urban areas. The first and last mile connections to existing transit routes, for example, can be the extra hurdle that makes transit seem hopelessly impractical for daily life.

#5 USER-FOCUSED MOBILITY SERVICES AND CHOICES



“Equitable implementation of transportation technology and opportunity is a top priority.”

Charlotte will partner with the private industry to take multimodal trip planning a step further by integrating autonomous vehicles, premium transit service, the private ride-sharing economy, B-cycle (our local bike-share program), bus service, and single occupancy vehicles.

Seamless trip planning will provide citizens with opportunities to make new choices when it comes to cost-efficient, timely, and healthy transportation throughout the City. For the first time, the shared economy of using many different modes of transportation in a day will be open to everyone in the city, regardless of socioeconomic status.

4. ENABLE A SINGLE PAYMENT PER TRIP ACROSS TRANSPORTATION MODES

Currently, travelers have to maintain multiple user accounts or perform several transactions to access different modes of transportation, especially when moving from a private industry mode (e.g. ride-share) to a public transportation mode (e.g. light rail). In addition, it is difficult to make a quick decision to determine the most economical way to travel without familiarity with each individual service provider.

This objective provides access to more transportation modes for all users and enables opportunities for more cost efficient or timely transportation choices. OCC app users will be able to:

- Choose their trip based on what is most important: cost, travel time, environmental impact, or exercise
- Make a single payment for the entire trip
- Pay for mobility across any mode with or without a credit card or a bank account.

#5 USER-FOCUSED MOBILITY SERVICES AND CHOICES



“OCC app users will be able to choose their trip based on total trip cost, make a single payment for the entire trip, and pay for mobility across any mode with or without a credit card or a bank account.”

How does it work?

The OCC app will be developed by private industry partners. Following a competitive procurement, the City will partner with the selected app developer to facilitate the app’s success. The app will integrate several existing and proposed data components and industry partners, including:

- Existing Automatic Vehicle Location (AVL) and Automated Passenger Counter (APC) data from CATS transit vehicles
- Existing B-Cycle bike-share AVL and payment systems
- A proven trip-planning platform from the private industry
- Ride-share partners
- Proposed autonomous AVL systems

Did You Know?

MOBILITY NETWORK

| METRIC | 2016 | 2040 |
|--|------|----------|
|  Miles of Freeway | 192 | 192 |
|  Miles of Thoroughfare | 585 | 646 |
|  Miles of Bikeways | 190 | 390 |
|  Miles of Sidewalk on Thoroughfares | 713 | 963 |
|  Number of B-Cycle Stations | 24 | 50 |
|  Miles of Light Rail | 9.6 | 19 |
|  Miles of Streetcar | 1.5 | 16 |
|  Local and Express Bus Routes | 74 | Expanded |
|  Miles of Commuter Rail | 0 | 25 |

- A proven and secure digital wallet provider
- A proven point-of-sale system provider for the kiosks
- Existing partnerships to support development of the state-of-the-art kiosks
- Hundreds of sensors deployed as a part of this project
- Integration with a data analytics platform provided by our industry partners (see Analytics Platform on page 18).

Data Integration and Analytics

Recognizing the value of data integration and analysis, we recently created a citywide Data and Research Team within the Office of Strategy & Budget. This team is responsible for advancing the use of data in problem-solving and decision-making to improve services, inform policy, increase engagement, and promote economic opportunity and growth in Charlotte. This team is coordinating open data and analytics initiatives across city organizations to:

- Promote a culture of innovation.
- Support the integration of data into performance management.
- Build skills and capacity around data.
- Partner with the community to create actionable intelligence and new applications.

Current partnerships include private companies such as ESRI, SAS, OSIsoft, and Microsoft, as well as institutional and community partners such as the Charlotte Analytics and Big Data Society, the UNC Charlotte Data Science Initiative, the UNC Charlotte Urban Institute and ISC Community Database, Johnson C. Smith University, and the Code for Charlotte Brigade. Each of these partners attended the Smart City Challenge workshop.

As a part of its commitment to accelerating the use of data to meet societal challenges, Charlotte is actively working on a partnership with What Works Cities, a national initiative of Bloomberg Philanthropies that helps cities use data to engage residents, make government more effective, and improve residents' lives. Our What Works Cities project is focused

around open data and problem-solving with analytics. During the cross-department pilot project, Charlotte will:

- Develop a comprehensive data program and governance structure
- Codify the collection and liberation process for data, and
- Establish a process for collaborative, data-based problem-solving.

These efforts demonstrate our commitment to using open data, analytics, and collaboration to affect change. The dedicated infrastructure of the Data and Research Team, the rich partnerships with experts and innovators in the community, and the learnings from our engagement with What Works Cities position us to leverage new datasets to address complex problems and improve current operations.

#7 STRATEGIC BUSINESS MODELS AND PARTNERING OPPORTUNITIES



“This team is coordinating open data and analytics initiatives across city organizations to...create actionable intelligence and new applications.”



Millennials take selfie at LYNX station

How does it impact the lives of people?

The OCC interface is the cornerstone of our vision where our access, choice, and opportunity initiatives converge. The deployment of the mobile app and kiosks will achieve new heights in social equity for mobility. Deployment of the OCC app is a step towards improving the lives of the most fragile in our city.

The OCC app will allow Tony to finally experience Charlotte in the way he imagined before moving here. The seamless trip planning and single payment

options will give him the confidence he needs to navigate the city as an environmentally conscious millennial.

Transportation users throughout the city will see drastic improvements in their transportation choices and opportunities through trip planning, single payment options, and easier multimodal travel. Increases in transit ridership and transformation of the shared economy to provide last-mile transit connectivity will improve safety, reduce greenhouse gas emissions, and reduce dependence on single occupancy vehicles.

Fulfillment of Smart City Challenge Goals



IMPROVE SAFETY

Recent research by the National Transportation Safety Board has shown public transportation to improve safety over single passenger vehicles. This is true for buses (see NTSB study titled "[Report on Curbside Motorcoach Safety](#)") and especially true for light rail systems. Enabling users of our transportation system to more easily gain access to the existing light rail system through the use of the OCC Interface will reduce single occupancy vehicle crash rates, injuries and fatalities in our city.



ENHANCE MOBILITY

The most obvious impact of the OneConnect Interface is its effect on mobility. It enables all users, of all demographics to make mobility choices based on the metrics that are important to them. Whether they choose timeliness, cost, or concern for the environment as their metric, our city will benefit from empowering transportation users to create a more effective transportation system.



ADDRESS CLIMATE CHANGE

The OneConnect Interface enables travelers to make multimodal choices that were previously unknown or unavailable. Every time a trip is planned or purchased with this interface, our smart mobility analytics platform will be working to determine the most effective transportation trip. Whether it's the fastest arterial route for a single occupancy vehicle, a bike-share trip, a transit trip, a ride-share trip, or some combination of all of these, every option will be optimized. Therefore we know that climate change will be addressed every time the OneConnect Interface is used.

MOVING PEOPLE – FIRST AND LAST MILE AV

We are proposing a network of autonomous all-electric driverless transit routes located in two pilot areas of Charlotte:

- NorthEnd Smart District
- University Research Park and UNC Charlotte

In these areas, we will partner with the private industry to cultivate a variety of technology, transit, infrastructure, and livability enhancements. While we focus on the shared-use economy across the entire City, this initiative focuses the first phase of testing autonomous shared vehicles in two focus areas. In the future as autonomous vehicles saturate the market, the new network of autonomous all-electric driverless transit routes will connect the Blue Line Extension and other shared-use transportation options with underserved residential populations, the University, and areas zoned for innovative commercial use.

This network will allow transit users to hail an autonomous all-electric driverless transit vehicle (AV Transit Vehicle) from the OCC app, which they can also access from transit station kiosks.

#8 SMART GRID, ROADWAY ELECTRIFICATION, AND ELECTRIC VEHICLES



“...hail an autonomous all-electric driverless transit vehicle...”

#2 CONNECTED VEHICLES



“...The AV Transit Vehicles will receive transit signal priority with special connected vehicle train/tram signalization at intersections to improve their journey time.”

#1 URBAN AUTOMATION



“We are proposing a network of autonomous all-electric driverless transit routes ...”

#12 SMART LAND USE



“...underserved residential populations, the region’s University, and areas zoned for innovative commercial use with the Blue Line Extension and other shared-use transportation options.”

The AV Transit Vehicle will provide first mile/last mile service to our premium transit service in support of the shared economy. The service will operate with at-grade, rubber-tire transit vehicles similar to the current [CityMobil2 demonstration](#) in several cities in Europe.

The AV Transit Vehicles will receive transit signal priority at intersections to improve their journey time. As demonstrated in CityMobil2, an autonomous transit system of this type is deployable with today’s technology with a public-private partnership. In future phases, the fixed routes will be networked together and additional routes will be added at UNCC and through Uptown to improve point-to-point, on-demand mobility.



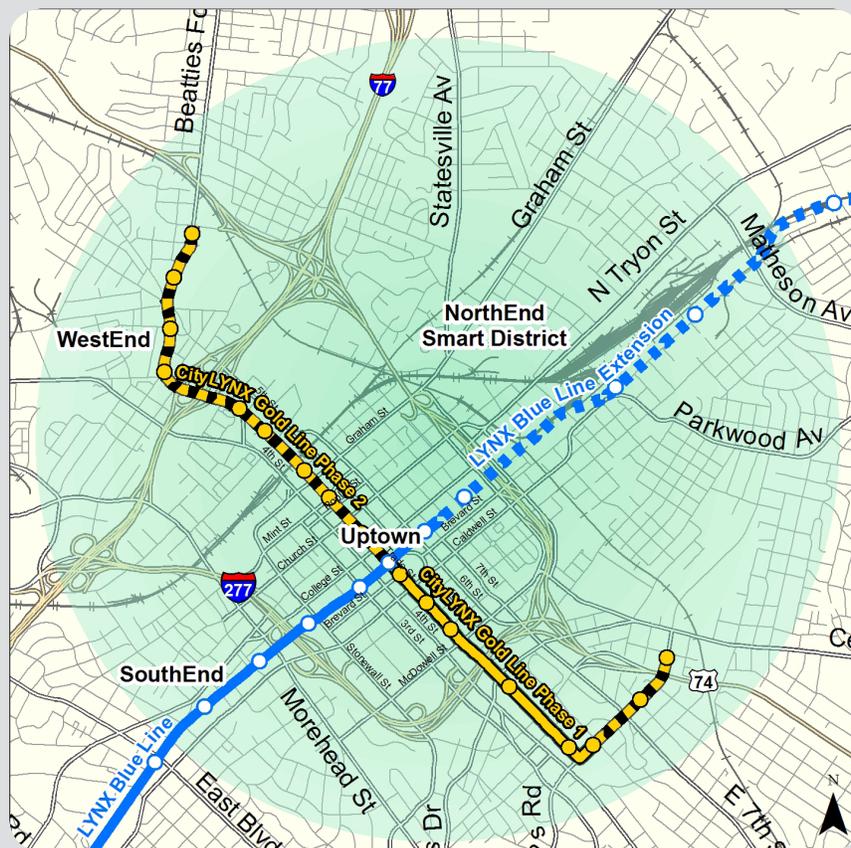
Driverless transit vehicle

Did You Know?

This geography along the NorthEnd Smart District is a story of contrasts. On the surface it compares higher or at the same level to the City of Charlotte in key economic demographics. On first glance the whole area is prospering. It includes Uptown Charlotte and the SouthEnd area. Both have experienced rapid growth due in large to the LYNX Blue Line. In the table below it is apparent that not everyone is able to participate in this prosperity.

| | UPTOWN CHARLOTTE | SMART DISTRICT |
|-----------------------------|------------------|----------------|
| POPULATION | 15, 436 | 11,896 |
| MINORITY | 43.90% | 91.50% |
| HOUSEHOLD INCOME | \$72,648 | \$23,651 |
| UNEMPLOYMENT | 7% | 28% |
| HIGH SCHOOL GRADUATION RATE | 79% | 51% |
| BACHELOR DEGREE | 67% | 13% |

The LYNX Blue Line Extension (BLE) and City LYNX Gold Line are anticipated to stimulate a new age of development to the NorthEnd Smart District area. A challenge for the City is to balance economic growth across all segments of its population. In order to meet this challenge, new mobility options and digital inclusion strategies will be developed.



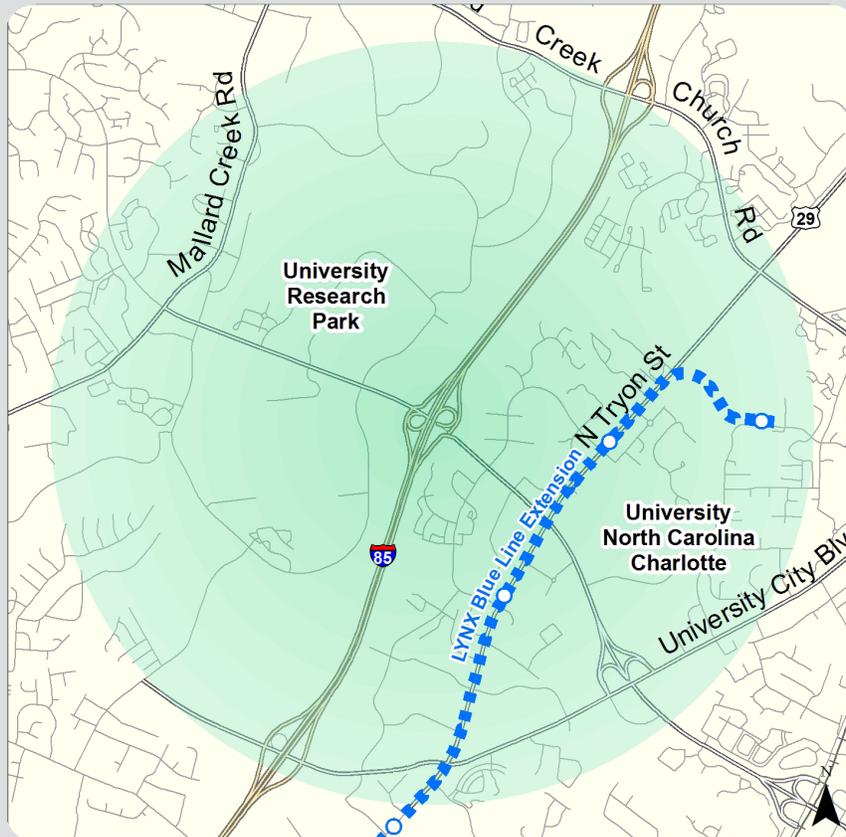
Did You Know?

University Research Park (URP) has 30,000 employees that range from back office support to corporate headquarters and research facilities. Superior utility infrastructure with dual redundant power and extensive fiber infrastructure make URP especially attractive to data and research intensive businesses that rely on uninterrupted power.

UNC Charlotte enrollment in the past eight years has grown 28% topping out at 28,000 students.

The Charlotte Research Institute (CRI) opened in 2005. Regionally, CRI works with the community and the campus to accelerate technology commercialization, increase the growth of entrepreneurial ventures, develop intellectual capital, as well as partner in new business and research ventures to spur economic growth in the community, region, and state.

Additionally on campus is the Energy Production and Infrastructure Center (EPIC). EPIC is a collaborative industry/education partnership formed by UNC Charlotte to supply highly trained engineers to meet industry demands and provide sustainable support by increasing capacity for applied energy research.



How does it work?

Our AV transit system will use proven technologies from established system developers through a competitive procurement after the grant award. As demonstrated in CityMobil2, autonomous transit operation is deployable today with appropriate preparation of the infrastructure, signage, and station design. This implementation will be an important first step in demonstrating the viability of revolutionary transit vehicles that can transform transit as we know it today.

The AV Transit Vehicles use GPS, radar, lidar, and video technologies to navigate from station to station avoiding obstacles and other road users. The City has existing high resolution GIS and lidar data to use for this purpose. We will support the safety of the system by using dedicated lanes and operating at relatively lower speeds during the demonstration phase. The transit vehicle will be hailed by patrons using the integrated mobility smartphone app or via simple selections at the smart kiosks at each station stop. While at stations, the all-electric vehicles will be charged using smart charging plugless charging technology.

A team of transit operators will monitor the vehicles using high bandwidth connected vehicle links during revenue service times using remote video surveillance, remote diagnostics, and the ability for remote piloting of the AV Transit Vehicles should trouble arise. Our existing high bandwidth transportation communications backbone will provide a baseline for these connected vehicle communications. As the vehicle approaches signalized intersections, transit priority will be enacted

#4 URBAN ANALYTICS



“Transit pick-up and destination requests, service time performance, and other metrics will be monitored in real time and analyzed with our smart analytics system.”

#5 USER-FOCUSED MOBILITY SERVICES AND CHOICES



“The transit vehicle will be hailed by patrons using the integrated mobility smartphone app or via simple selections at the smart kiosks at each station stop.”

using our connected vehicle software platform. Dedicated and concurrent traffic phases for the transit crossing will be enabled where possible to send the transit vehicle on its way without delays. Transit pick-up and destination requests, service time performance, and other metrics will be monitored in real time and analyzed with our previously described smart analytics system.

Did You Know?

CHARLOTTE'S COMMITMENT TO ELECTRIC VEHICLES

Charlotte continues to be a leader in the EV space. Using Energy Efficiency and Conservation Block Grant Program funds, we implemented a publicly accessible EV charging program and added several plug-in electric vehicles to our fleet. The program included a public education campaign where we partnered with Chevy and Nissan dealers to educate customers on the EV charging stations. The City currently operates 22 free level-2 charging stations and is home to 50 additional privately-owned charging stations throughout the City. As part of the Smart City demonstration project, we will continue to implement our vision to make Charlotte EV-friendly and convert our fleet, including transit, to a low-carbon one. Four of our corporate partnerships, including Vulcan, will allow us to do this.

How does it impact the lives of people?

An AV transit system focused on first and last mile connections demonstrates how cost-effective transit service can be provided to underserved populations and locations. The system helps solve the age-old transit service problem of making these first and last mile connections. Public sector benefits include reduced cost for providing transit service to underserved areas, zero emissions, improved level of service, and increased ridership.

This demonstration will directly impact residents and businesses within the service regions. Residents will enjoy improved mobility, improved safety, and decreased travel time to their destinations. Businesses will enjoy improved access for employees and customers. Quality transportation expands the worlds of our residents. As we expand AV operations to include Uptown, UNC Charlotte, and the surrounding Charlotte region, we will attract new residents, industries, jobs, and economic opportunities.

For Anita, the AV transit system represents a brighter future. The ability to connect from her neighborhood directly to the Blue Line will shorten her commute time drastically, giving her more time to spend with her kids and study for her Paralegal Certificate course.



Electric vehicle charging on North Tryon Street.

Fulfillment of Smart City Challenge Goals



IMPROVE SAFETY

We all know that autonomous and connected vehicles hold the promise of revolutionizing automobile travel. The safety impacts of these technologies are simply remarkable. The autonomous and connected vehicles we have proposed in this section will provide a foundational test environment with the ultimate aim of spurring deployment of these vehicles along first and last mile routes throughout Charlotte and in other cities. The near-term safety impacts of our initial deployment will be measurable and impactful, but these vehicles will have a monumental effect on safety in this country for years to come.



ENHANCE MOBILITY

The autonomous vehicle connections to the light rail transit line will address the first and last mile gap between traditional transit service and the communities within the Applied Innovation Corridor, University Research Park, and UNCC Charlotte. These connections will cause dramatic reductions in transit travel times between home, work, amenities, and attractions for thousands of travelers in Charlotte.



ADDRESS CLIMATE CHANGE

Every trip made in our proposed electric autonomous vehicles will effectively reduce greenhouse gas emissions for that trip to zero. The connection of these vehicles with the light rail line will make longer trips possible, enabling more prevalent use of transit for trips over ten miles and eliminating greenhouse gas emissions for the entire trip. Assuming a minimum of 100 ten-mile trip reductions per day, autonomous vehicles could reduce greenhouse gas emissions by up to 175 tons over the course of a year.

TRANSPORTING THINGS – FREIGHT PRIORITY ZONES

Charlotte’s largest employment sector is the freight and distribution industry. The City currently is the nation’s fifth largest distribution center, and in just the last five years, Charlotte’s annual freight traffic has increased from \$6 billion to \$15 billion. Our prominence as a freight distribution hub is expected to continue to grow by leveraging the following local advantages:

- Proximity to southeastern ports
- Excellent highway access (I-77, I-85, I-485, and US 74)
- Extensive rail network
- Charlotte Regional Intermodal Facility at Charlotte-Douglas International Airport

A majority of these distribution centers are concentrated in the Westinghouse Activity Center and around the airport. Together these two geographic areas will form Charlotte’s first Freight Priority Zone. These zones will focus on improving the first and last miles of freight movement to and from Charlotte’s distribution centers by giving signal priority to freight traffic in these areas.

How does it work?

Signal priority at signalized intersections is not a new concept; it has been used by emergency and transit vehicles for at least 25 years. Charlotte currently uses emergency and transit preemption at approximately 100 signalized intersections. We are in the process

#6 URBAN DELIVERY AND LOGISTICS



“...These zones will focus on improving the first and last miles of freight movement to and from Charlotte’s distribution centers...”

#2 CONNECTED VEHICLES

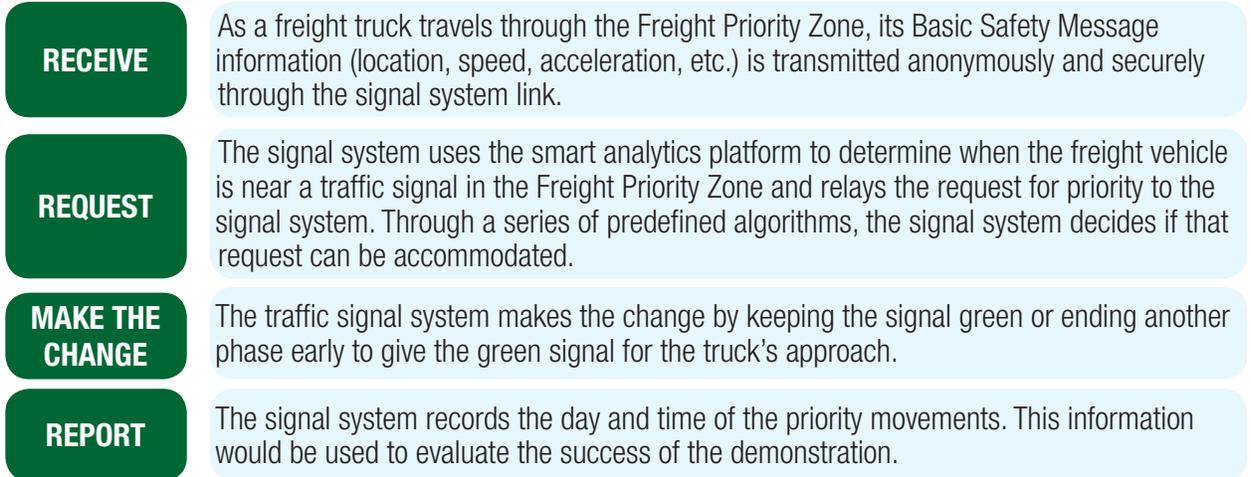


“...use Infrastructure to Vehicle (I2V) technology to enable freight signal priority.”

of building a solution between CATS and our signal system software that will enable signal priority at most signalized intersections.

We have already begun conversations with our Carolina Council of Governments (CCOG) and several local freight distribution partners regarding the pilot project for freight signal priority. These partnerships will enable us to use Infrastructure to Vehicle (I2V) technology to enable freight signal priority. We will first work with our partners whose trucks are already equipped with AVL systems, then develop a program to equip other partners to take part in the Freight Priority Zones.

The concept for freight movement would mirror the transit signal priority approach. The process works like this:



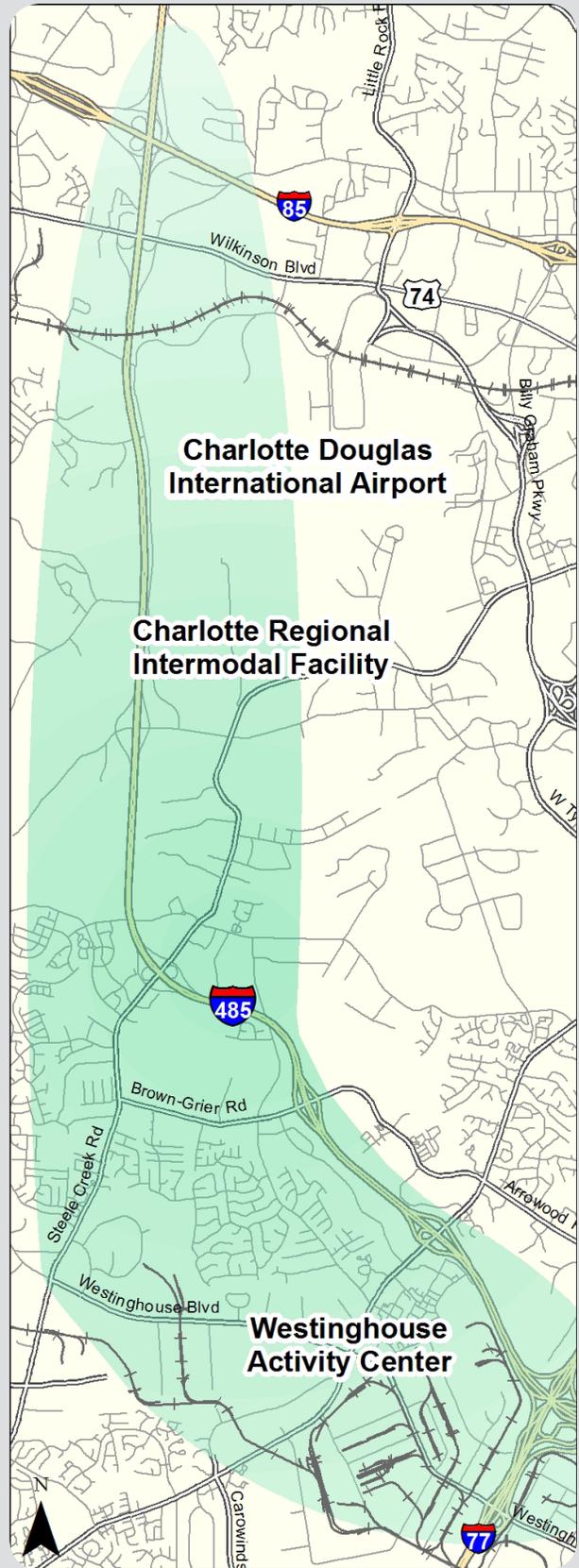
Did You Know?

The Intermodal Facility is expected to generate \$7.6 billion in regional economic development throughout the next 20 years. It also promises to create more than 7,000 jobs in Charlotte and the surrounding region by 2030.

The facility, which is capable of 200,000 lifts annually, transfers containers between trucks and trains.

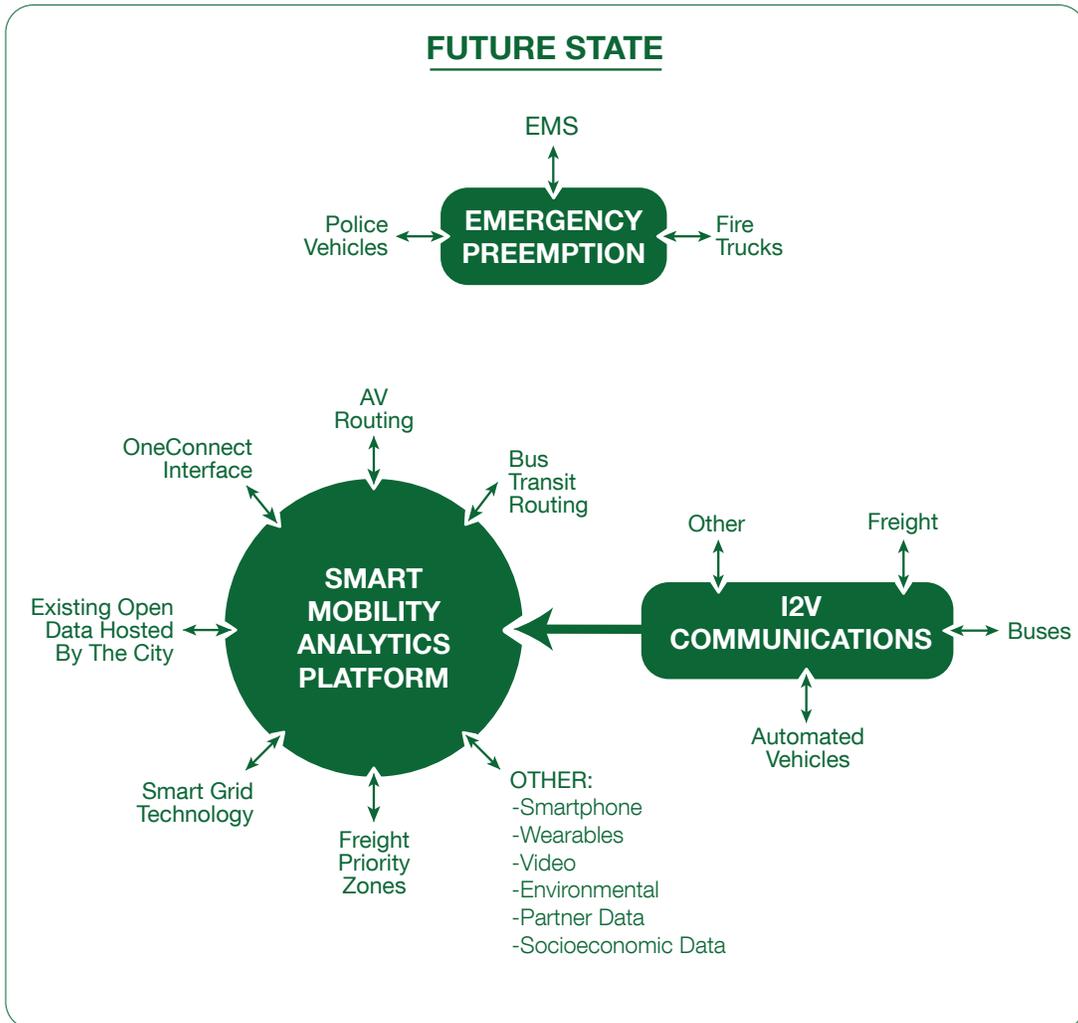
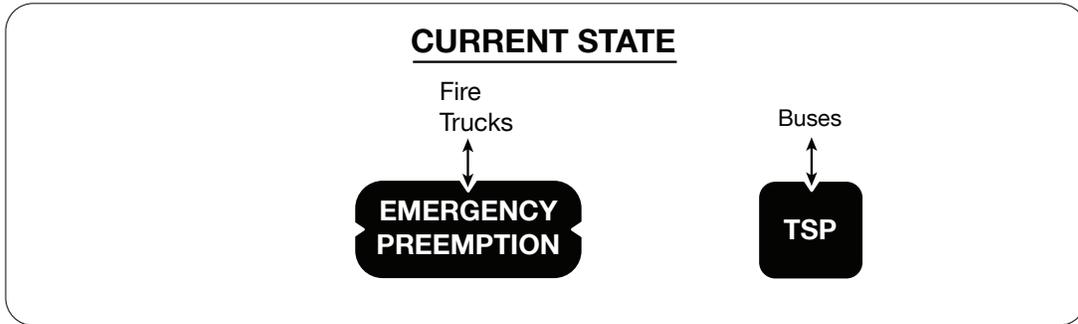
The \$92 million facility was constructed with the assistance of \$15.7 million in federal funding and additional financial support from the State of North Carolina.

The Westinghouse Activity Center is the second largest employment center in Mecklenburg County behind Uptown Charlotte and the largest industrial employment concentration in North Carolina.



Analytics Platform

Our proposed Freight Priority Zones will expand the use of signal priority to include freight and other vehicles. The new system will incorporate a smart mobility analytics platform that uses algorithms and multiple data sources to improve traffic flow.



Did You Know?

KEY EXISTING ITS FEATURES

The autonomous all-electric driverless transit vehicles discussed in this section and the Connecting Communities section listed previously will build upon key existing infrastructure in Charlotte, including:

- 300 miles of City-owned communication infrastructure with a 10 GigE backbone
- 755 signals controlled by a central signal system each with ethernet communications that may be leveraged as communications access points to support Smart City Applications
- More than 356 cameras controlled by a central signal system that integrates directly with the Charlotte Mecklenburg Police Department (CMPD) video management platform
- Remote Weather Information System (RWIS)
- Collocated Traffic Management Center and CMPD real-time crime center
- CATS buses equipped with Computer Aided Dispatch (CAD), AVL, and APC systems
- A signal system that is currently being integrated with the Transit AVL system to enable transit signal priority for the entire transit fleet
- A city-wide ITS and Communications Master Plan and Regional ITS Architecture to guide integrated systems deployment.



Uptown Charlotte signalized intersection

How does this impact the lives of people?

Improving the speed and efficiency of freight traffic in the Freight Priority Zones will provide significant benefits to both the public and private sector. This system demonstrates a public-private partnership with multiple freight transportation providers. Both public and private sectors will receive the following benefits:

- Improved safety.
- Improved travel time reliability.
- Increased productivity.
- Reduced maintenance costs (pavement and traffic markings and vehicle wear and tear).
- Improved air quality due to less idling.
- Increased global competitiveness that enables Charlotte to remain and grow as a leading freight distribution hub.

Distribution and logistics is Charlotte's largest employment sector. The implementation of Freight Priority Zones will bolster our growth strategies for

the Westinghouse Activity Center and airport areas, two of its major employment centers. Economic growth in these areas will create additional higher wage, quality jobs, increasing economic opportunity and economic mobility for existing and future residents of Charlotte. Truck drivers like Joe will witness the positive impact that freight signal priority deployment will have on his daily schedule. He will be able to make an informed route decision for the safest, most efficient delivery of goods. Similarly, Sarah will have more confidence promising her customers a certain delivery time, knowing that her drivers will be able to stay on schedule.



Freight truck on Rozzelles Ferry Road

Fulfillment of Smart City Challenge Goals



IMPROVE SAFETY

The integration of AVL data with the signal system will create a synthesized network so that freight can interact more smoothly with other traffic. Accelerating and monitoring freight movements creates order on the roads, allowing cyclists, pedestrians, and other drivers to travel with bolstered confidence.



ENHANCE MOBILITY

Freight signal priority represents a revolutionary fusion of technologies: signal systems and real-time truck AVL data. Moving trucks quickly through intersections translates to less time that they are sitting in traffic; freight signal priority will reduce congestion and facilitate smoother access for our distribution industry. As Charlotte becomes an increasingly attractive distribution hub, the addition of new industry partners will boost our economy and create new employment opportunities.



ADDRESS CLIMATE CHANGE

The establishment of Freight Priority Zones is a major stride towards addressing climate change in Charlotte. When trucks have to stop and idle at signalized intersections, they generate significantly greater volumes of greenhouse gases than they would if their trips were uninterrupted. Freight signal priority will give our residents cleaner air to breathe and a healthier daily lifestyle as they leave home to take advantage of many transportation choices citywide.

IMPLEMENTATION APPROACH

Our vision for Charlotte as a smart city will be realized by a coalition of team members and stakeholders through a strategic implementation plan. The following sections outline the required components of the vision narrative:

- Program Management Approach
- Team Partners and Key Stakeholders
- Data Commitment
- Risk Mitigation
- Performance Management
- Capacity and Commitment
- Cost Share Resources

PROGRAM MANAGEMENT APPROACH

Our commitment to completing a Smart City Challenge implementation that would be used for other smart cities to replicate is unwavering. This commitment begins with our city's leadership from the Mayor and City Council and extends to our executive management and staff, as shown by their letters of support found in the Appendix to this document. The Project Management team will be accountable to the Executive Leadership team and will provide programmatic oversight and direction using a plan in accordance with the Project Management Body of Knowledge. The project management plan will cover these areas:

- **Scope Management:** describes what services are advisable to achieve successful project outcomes and documents how the advisable services will be completed. The project team will use a work breakdown structure to define the scopes as smaller, manageable tasks with achievable deliverables and will monitor progress both individually and on an overall project level as multiple team leaders will be completing work concurrently.
- **Requirements Management:** involves collecting and synthesizing specific input on project requirements and related assumptions from project stakeholders. The project team will identify the

best methodology to collect/analyze the competing requirements, balancing them against the project objectives and competing demands of scope, time, cost, quality, resources, and risk.

- **Schedule Management:** describes the schedule, who will be responsible for the schedule, how it will be managed, including the frequency and communication of updates. The project team will develop a schedule management plan that is closely integrated with the scope of the identified project tasks and underlying activities that need to be accomplished and when those tasks need to be accomplished within the life of the project.
- **Financial Management:** involves estimating project costs, determining a budget, and controlling costs during project execution. The project team will develop a financial management plan that supports the objectives through a fiscally-sound budget that is closely monitored with progress reports.
- **Quality Management:** involves creating and following policies and procedures to ensure that a project meets the defined needs it was intended to meet. The project team will develop a plan that outlines metrics for measuring quality and how quality corrections will be implemented.
- **Resource Management:** involves identifying the members of the project management team and clearly outlining appropriate roles and responsibilities.
- **Communication Management:** involves identifying methods and frequency of communication with project stakeholders.
- **Risk Management:** involves anticipating obstacles and developing strategies to mitigate risk as outlined in the Risk Mitigation section.
- **Procurement Management:** involves methods that will be used to conduct, administer, and close-out procurements that are in accordance with USDOT's Code of Federal Regulations.

TEAM PARTNERS AND KEY STAKEHOLDERS

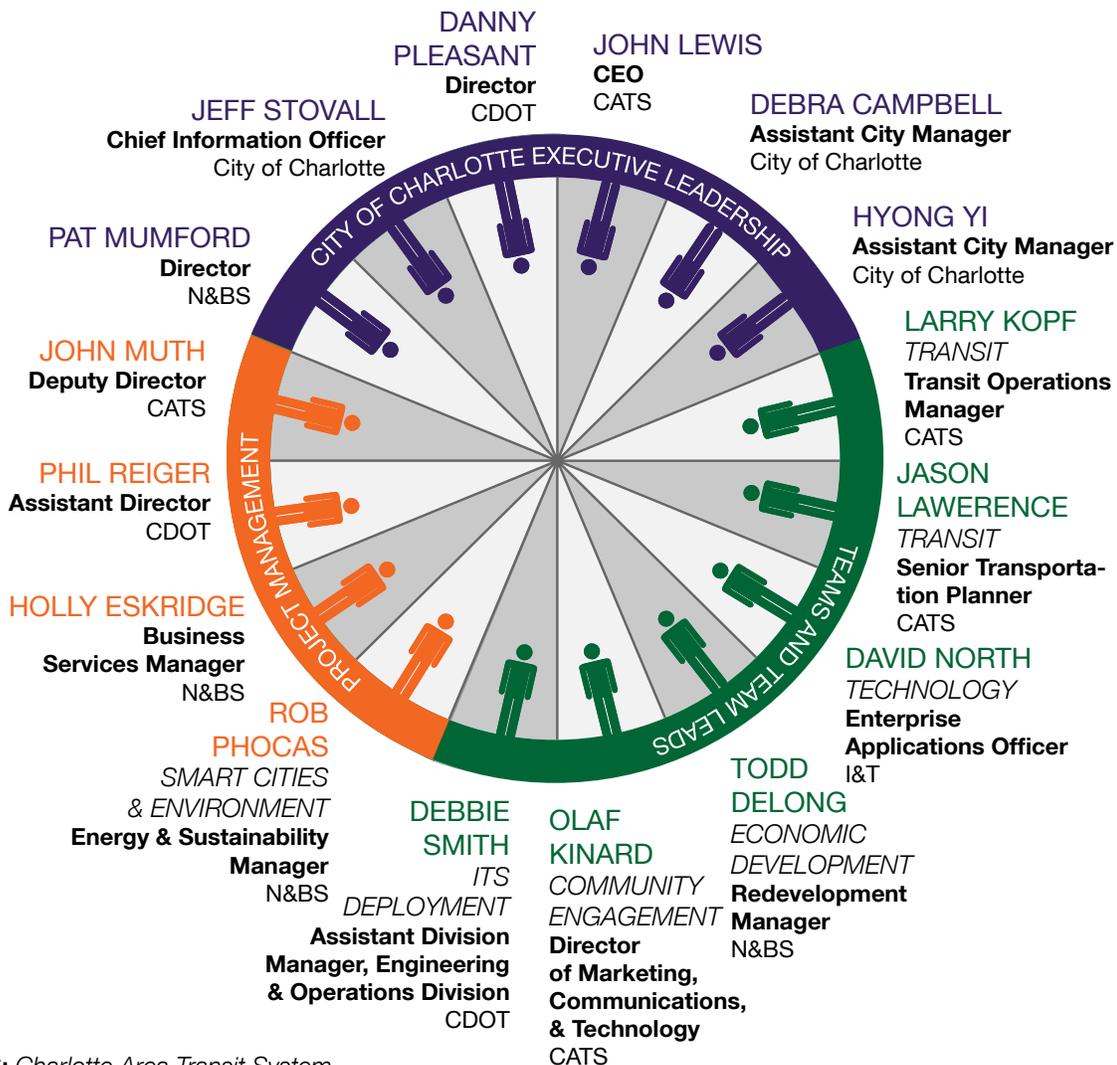
Charlotte boasts a robust team of planners, engineers, project managers, and technical specialists that have and are continuing to deliver a host of forward-thinking, high-complexity, and large-scale projects and programs.

Executive Leadership

Debra Campbell, Assistant City Manager: Debra Campbell provides technical and managerial support to Planning, Transportation and the Charlotte Area Transit departments. Prior to assuming this role, she served as the director of a joint City-County

Planning agency that provides planning services to the City of Charlotte and the unincorporated portion of Mecklenburg County. Her work centers on the goal of helping to develop and implement public policy that makes Charlotte-Mecklenburg an eminently livable, economically vibrant, and memorable urban community.

Hyong Yi, Assistant City Manager: Hyong Yi provides managerial support for 311, Charlotte Water, Engineering & Property Management, Innovation & Technology, and Solid Waste Services as well as serves as the staff resource for the Charlotte City Council Environment Committee. He leads the City's environmental sustainability and smart city efforts.



CATS: Charlotte Area Transit System
CDOT: Charlotte Department of Transportation
I&T: Innovation and Technology
N&BS: Neighborhood and Business Services



John Lewis, CATS Chief Executive Officer:

John Lewis arrived in September 2015 and is leading CATS through a significant stage of growth to construct the LYNX Blue Line Extension, expand existing light rail platforms to accept three car trains, and advance the CityLYNX Gold Line Phase 2 (streetcar) through final design and into construction. Lewis brings a wealth of transit knowledge and experience to Charlotte, having previously served as CEO of the Central Florida Regional Transit Authority (LYNX) where he provided strategic leadership to Central Florida's primary mass transit system.

Danny Pleasant, AICP, Transportation Director:

Danny Pleasant is responsible for the full spectrum of planning, designing, building, operating and maintaining city streets for walkers, bicyclists, transit riders and motorists. His department provides staffing for a three-county metropolitan planning organization and a twelve-county air quality planning region. With his background as a professional planner, Danny is dedicated to building quality communities using thoughtful transportation planning and urban design strategies. Danny joined the City of Charlotte in 2002, after serving 14 years as Transportation Planning Bureau Chief for the City of Orlando, Florida.

Jeff Stovall, Chief Information Officer: Jeff Stovall joined the City of Charlotte as its first Chief Information Officer in 2008 and is responsible for leading the City's Innovation and Technology department. In his tenure, he directed the City's technology preparations for the successful 2012 Democratic National Convention, consolidated divisional IT organizations into a new City department, implemented a significant modernization of legacy applications and infrastructure, and moved the City to use mobile, social and cloud-based systems. Prior to the City of Charlotte, Mr. Stovall was the director of IT merger integration planning for Sprint Nextel, responsible for leading multiple post-acquisition technology integration efforts.

Patrick T. Mumford, Neighborhood & Business Services Director: As Director for the City of Charlotte's Neighborhood & Business Services unit, Patrick T. Mumford is responsible for the strategic direction and implementation of housing, neighborhood, economic development and code

enforcement policies and programs, overseeing a staff of approximately 150. The unit was established to maximize the City's efforts and resources in neighborhoods and business corridors and its priorities include using existing local resources to the fullest, expanding code enforcement, implementing accountability and compliance procedures for City partnerships and supporting the City's youth initiatives. Mumford was named to the new post in March 2009.

Project Management**Phil Reiger, Charlotte Department of**

Transportation Assistant Director: Phil Reiger shares the responsibility for the CDOT's 400+ employees dedicated to "Connecting Charlotte" by enhancing the driving, bicycling and walking experience. CDOT delivers a broad range of services such as managing more than 2,400 miles of city streets and 700 signalized intersections, 1,600 miles of sidewalk, 150 miles of bikeways, and a \$200 million capital improvement program. Most recently, he led efforts to attract Google Fiber to deploy its ultra-high speed internet services within the Charlotte city limits.

John Muth, CATS: Under John M. Muth, Deputy Director for Development and Chief Development Officer, the Development Division of CATS has the lead in planning for and creating Charlotte's rapid transit system. Now in the early stages of a 25-year, \$3 billion development effort, the rapid transit system will include bus rapid transit guideways, light rail transit, streetcar lines, and commuter rail services, and will be an integral part of an overall transit system that will serve over four times as many transit riders as the system did in 2001.

Holly Eskridge, Business Services Manager:

Holly Eskridge has more than 15 years of project management experience that focuses largely on brownfield and greyfield redevelopment. She has managed more than \$100 million in grant funding and has extensive experience in public policy advocacy and economic development. Holly also works closely with increasing environments that support innovation and entrepreneurship in Charlotte.

Rob Phocas, Energy & Sustainability

Manager: Serving an organization of 7,000+ staff and a city of nearly 800,000 people, Rob Phocas supports a variety of internal and external programs in the energy, sustainability, and smart city spaces. Examples of internal initiatives include the implementation and continued evolution of Charlotte's Internal Environmental Operations Plan, which sets goals, tracks, measures, and reports the organization's environmental footprint. Externally, Rob works very closely with Envision Charlotte and other community entities to advance Charlotte's goals.

Team Leaders**Jason Lawrence, Charlotte Area Transportation System (CATS) Senior Transportation Planner:**

Jason Lawrence is responsible for CATS Major Investment Studies and Draft/Final Environmental Impact Statements for transit corridors identified in the 2025 Transit/Land Use Plan and the 2030 Transit System Plan. Jason has performed bus service planning, conducted alternative analyses, completed population/ridership forecasting, and implemented the Sprinter Airport Enhanced Bus service. Jason is a member of the LYNX Blue Line Extension (BLE) Light Rail Team where he authored and designed the LYNX BLE Bus/Rail integration plan.

Larry Kopf, Chief Operations Planning Officer, Assistant Director of Public Transit:

Larry Kopf leads the Bus Operation division responsible for bus service, transit service for the disabled, and vanpool services. With a focus on customer service, staff in this division provides over 20 million rides each year to residents of Charlotte and the surrounding counties. Responsibilities include short-range planning projects, such as the Countywide Transit Services Plan, designed to adjust services as appropriate to meet the changing needs of the population. Operations staff also handles fleet planning and maintenance, bus and light rail scheduling, and coordinates with other divisions in long range planning.

Debbie Smith, CDOT Assistant Division

Manager: Debbie Smith assists the Engineering & Operations Division Manager with day-to-day operations of about 80 engineers, technicians, and field staff. Smith also assists with budget preparation,

program/process improvements, and leads several special program projects. Smith was formerly the Traffic Safety and Intelligent Transportation Section Manager for five years, managing a staff of seven engineers and technicians.

David North, Enterprise Application Manager:

David North has a broad background in applications development and service delivery with over 30 years in the business. His unique blend of business and technical experience, across multiple industries, and on a global as well as a local level, has allowed him to make significant contributions to his business partners. In addition, his professional experience as a developer, systems architect, project and program manager, product manager, managing consultant and IT executive give him a very broad background in the applications world.

Olaf Kinard, Director of Marketing & Communications, Assistant Director of

Public Transit: Olaf Kinard heads up the division responsible for Marketing, Communications and Technology, which promotes community relations, develops communications, and marketing programs to increase ridership for CATS and for information technology planning and implementation. The division manages all of CATS' customer service activities, including all pass sales and customer information needs at the transit center, conducts extensive market research to ensure CATS' ability to meet customer needs, manages public involvement and community relations activities, and coordinates media relations for CATS.

Todd DeLong, Redevelopment Manager: As the Redevelopment Manager for the City of Charlotte, Todd oversees the City's redevelopment initiatives such as public private partnerships, economic development strategic planning, and business matching grant programs. Prior to joining the City of Charlotte in July 2014 Todd was a Senior Associate for a real estate and economics advisory services firm in Florida where he served as an advisor to local governments, developers, and institutions throughout the U.S. on a variety of engagements related to market feasibility, public private partnerships, special taxing districts, economic and fiscal impacts, and economic development strategies.

Stakeholders

Led by the City Manager’s Office, we have assembled a diverse group of stakeholders that reflects our previous smart city experiences to help create our vision as a smart city and the strategies to achieve it. This group also will help oversee, evaluate, and report on the demonstration project.

We have received 32 letters of support for our smart city proposal which are provided in the **Appendix**. In addition to senior leadership and staff from the City, key stakeholders include:

| ACADEMIA | NONPROFIT | PRIVATE |
|---|-----------------------------------|----------------|
| Central Piedmont Community College | AARP | ABB |
| Johnson C. Smith University | Advocations | AT&T |
| Queens University | Centralina Council of Governments | Bosch |
| The University of North Carolina at Charlotte | Charlotte Center City Partners | Cisco |
| | Charlotte Chamber of Commerce | Duke Energy |
| | Code for Charlotte | Econolite |
| | Crisis Assistance Ministry | Ericsson |
| | Envision Charlotte | ESRI |
| | Foundation for the Carolinas | Ford |
| | Queen City Forward | General Motors |
| | Centralina Council of Governments | IBM |
| | | Lyft |
| | | Microsoft |
| | | MIT Labs |
| | | OSI Soft |
| | | Proterra |
| | | SAS |
| | Sidewalk Laboratories | |
| | Supernormal | |
| | Trane | |
| | Trinity Partners | |
| | Uber | |
| | Via Transportation | |
| | Vincent Enterprises | |

DATA COMMITMENT

We have an [Open Data Policy](#) that was signed by the City Manager on January 1, 2015. The Innovation & Technology Department is responsible for oversight of the Policy, for maintenance of our [Open Data Portal](#), and for working with departments on open data-related projects. The Policy encourages city departments to provide open data through the city's portal to promote transparency and accountability, civic engagement, and ability of third parties to leverage government data through application and service development. The Open Data Portal currently has 66 datasets, made public in a convenient, machine readable, open format, and available for use, reuse, and redistribution. Our engagement with What Works Cities is designed to accelerate our work around open data, increasing the timeliness, quality, accessibility, and number of datasets available through the Open Data Portal.

RISK MITIGATION

A formal risk management plan initiated during the planning phase will be used throughout the project. This process will be based on Project Management Institute and technology deployment best practices. The following section highlights some of the specific risks and mitigations.

Regulatory Risks

With the implementation of cutting edge technologies like autonomous vehicles, any agency runs the risk of encountering state and local policies that may limit their use. Fortunately, this grant is concurrent with a project in which the North Carolina Department of Transportation (NCDOT) is proactively reviewing the state's readiness for automated vehicles from a policy perspective. We will have the opportunity to provide input to the process as a stakeholder to further the readiness of the state for the proposed last mile connections. A statewide legislative readiness plan will be prepared in the near term, and special legislation will be produced as needed to remove regulatory barriers.

Safety Risks

Safety hazards associated with the Smart City Challenge implementation include injury or property damage that may occur from the testing of autonomous vehicles. We will draw from the lessons learned and methodologies developed by other autonomous vehicle test beds to establish a protected testing environment.

Schedule Risks

We will collaborate with technical experts for the development of smart phone apps, digital kiosks, and freight signal priority. Collaboration can incur the risk of schedule delays. To mitigate this risk, we will identify technical team leaders to enhance communication and keep critical path tasks on schedule during implementation.

Internal Communication Risks

Similar schedule delays can sometimes result from a reliance on the maintenance of private partnerships. Luckily, we are a city built on cooperation, collaboration and partnership, especially public-private-plus partnerships. No matter the issue, if it is for the betterment of the community, all hands come together for the greater good. Be it planning and hosting the Democratic National Convention, responding to a natural disaster or addressing the lack of economic mobility in the city, we bring together public, private, academic, and nonprofit entities to solve problems together.

External Communication Risks

We have anticipated the possibility that citizens will have concerns with how demonstration areas were chosen. "Why not our neighborhood?" could be a common question because every neighborhood has room for transportation improvements. With a public education initiative, we will clearly communicate the benefits of demonstrations in limited geographies. We will clarify that the ultimate goal is to expand if demonstrations are successful.

PERFORMANCE MANAGEMENT

We have developed a list of performance metrics and specific goals to measure the success of the Smart City Challenge implementation. Specific metrics that will be measured in our focus areas include:

- Travel time
- User accessibility
- Health outcomes
- Cost
- Crash frequency/severity
- Economic mobility
- Transit ridership
- Vehicle miles traveled

The Smart Mobility Board of Directors will develop a plan to assess performance metrics at regular intervals throughout the process. Following is an example of the type of reporting we see being used to measure success.

What if...?

- Households took one less car trip per day.
- Lower income or zero car households reduced travel time to major employment/retail opportunities by 50 percent.
- Household transportation costs could be reduced by 7 percent.
- Emissions from vehicles were reduced by 20 percent.
- Crash rates were reduced by 50 percent.

CAPACITY AND COMMITMENT

Our leadership has a reputation for executing forward-thinking initiatives and a track record of success when it comes to advancing our status as a smart city. From the Mayor and City Council members to the City Manager and the Executive Leadership team, being actively “smart” in policy and operations has been a constant priority.

We have demonstrated capacity managing large scale projects with complex funding streams making it an ideal candidate for Smart City Challenge funding. These types of projects include:

- **Transit Investments:** We were the grantee for \$878,989,999 in federal funds to construct the Blue Line light rail and Gold Line streetcar systems.
- **American Recovery and Reinvestment Grant:** We have administered more than \$10 million in American Recovery and Reinvestment Grant funds, which resulted in installation of fiber optic cable for the transportation system and deployment of a multi-departmental digital video platform among other infrastructure.
- **Capital Improvement Program (CIP):** We manage our own 10-year, \$800 million capital improvement program.
- **Democratic National Convention:** We managed a multi-dimensional project to host the DNC in which \$50 million in federal funding was received.
- **Ladders of Opportunity Transportation Empowerment Pilot:** The City of Charlotte is one of seven cities selected by USDOT to participate in their Ladders of Opportunity Transportation Empowerment Pilot focusing on community transportation projects that revitalize, connect, and provide access to opportunity in priority transit corridors. The City of Charlotte is engaged with federal, state, and local partners in capital, neighborhood redevelopment, and safety improvements along the WestEnd of the City

LYNX Gold Line Phase II. At its foundation, this collaborative effort includes,

- Improving economically distressed neighborhoods and supporting economic development
- Connecting people to safe, reliable transportation options, and promoting public health
- Providing people access to economic opportunity and supporting social mobility

In addition, we have a broad base of partnerships to leverage for the implementation of the Smart City Challenge. We have on-call contracts already in place to obtain the technical support that the project will require.

We are a global leader in the smart city space as a result of the public-private-plus partnership we established to launch www.EnvisionCharlotte.com and its sister program www.EnvisionAmerica.org.

We recognize that one of the keys to a successful smart city is constant, honest communication. Banks, municipalities, energy companies, academics all work together on Envision Charlotte to make Charlotte's urban core the most environmentally sustainable urban core in the country, and to replicate Envision's success across the country with Envision America. The Envision experience has even spread to Holland, Italy, and Indonesia as part of the Global Smart City and Community Coalition.

COST SHARE RESOURCES

Several existing opportunities allow us to use additional resources to support federal funding for the Smart City Challenge implementation. In addition to more than \$370 million in local funds committed to the Gold Line and Blue Line transit systems, other investments that can be leveraged to support the success of the Smart City program include:

- \$28 million in local funds allocated for infrastructure improvements in the Applied Innovation Corridor.
- Expansion of our extensive fiber optic infrastructure to support new technology
- Selection by What Works Cities to advance innovations in data collection and open data platforms
- Funding by the Knight Foundation for a staff person assigned to work with neighborhoods in the project area on advancing economic opportunity
- \$299 million committed by NCDOT to support the Blue Line Extension project
- \$15.5 million in CIP funds allocated for Research Drive to J.W. Clay Connector over I-85
- \$15 million in CIP funds allocated for University Pointe Connector from IBM Drive to Ikea Boulevard
- \$5 million in CIP funding allocated for West Trade/Rozzelles Ferry Road infrastructure improvements

As the project begins implementation, public and private partners will come to the table with additional resources to leverage any federal funds received.



City of Charlotte skyline

ACT III

EPILOGUE – YEAR 2026

ANITA

After the AV transit system to the Blue Line was launched, Anita halved her commute time and devoted those precious extra hours to her Paralegal studies and her family. She still commutes using the light rail, but now it's from her home in NoDa to her job with a commercial real estate company. Anita and her teenagers love the freedom and the safety that Charlotte's OneConnect provides them to move around their community.

TONY

Yearning to foster bike culture in Charlotte, Tony built an iPhone app that connects seasoned bikers and those new to town. He gained a complete mastery of Charlotte's extensive public transport options and sold his car to someone in Atlanta. He now feels like his lifestyle aligns with his environmental values.

JOE AND SARAH

Joe stuck with his job and makes more money than ever now that he can reliably deliver more loads. The smart infrastructure installed in his truck and on his routes has limited the potential for expensive and time-consuming accidents. Sarah's company shaved at least three minutes off of every truck every single day, saving money and jobs, including Sarah's.



Multimodal travel in Charlotte

DOCUMENT MATRIX

The Narrative Elements table provides a point of reference for how our vision aligns with the goals for the Smart City Challenge. The Vision Elements table provides more detail about how our proposal fulfills the expectation of the Smart City Challenge.

NARRATIVE ELEMENTS

| NUMBER | ELEMENT | PAGE # |
|--------|---|--------------------|
| 1 | Vision | 3-29 |
| 2 | Population Characteristics | 2 |
| 3 | Smart City Characteristics | 8, 14, 19, 26, 27 |
| 4 | Site Map | 5 |
| 5 | Vision Element Alignment | See adjacent table |
| 6 | Risk Assessment | 26 |
| 7 | Key Team Partners/ Stakeholders | 22-25 |
| 8 | Existing Infrastructure and System | 8, 19 |
| 9 | Define Data | 6, 7, 26 |
| 10 | Approach for using Existing Standards, Architectures, and Certification Processes | 19 |
| 11 | Measurable Goals and Objectives for the Vision | 10, 15, 20, 27 |
| 12 | Capacity to take on a Project of this Magnitude | 27, 28 |
| 13 | Opportunities to Leverage Federal Resources | 28 |

VISION ELEMENTS

| ELEMENT | PAGE # |
|--|----------|
|  1. URBAN AUTOMATION | 11 |
|  2. CONNECTED VEHICLES | 11, 16 |
|  3. INTELLIGENT SENSOR-BASED INFRASTRUCTURE | 6 |
|  4. USER-FOCUSED MOBILITY SERVICES AND CHOICES | 7, 14 |
|  5. URBAN ANALYTICS | 7, 8, 14 |
|  6. URBAN DELIVERY AND LOGISTICS | 16 |
|  7. STRATEGIC BUSINESS MODELS AND PARTNERING | 9 |
|  8. SMART GRID, ROADWAY, ELECTRIFICATION, AND EVS | 11 |
|  9. CONNECTED, INVOLVED CITIZENS | 6 |
|  10. ARCHITECTURE AND STANDARDS | 19 |
|  11. LOW-COST, EFFICIENT, SECURE, RESILIENT ICT | 19 |
|  12. SMART LAND USE | 11 |

Budget Committee

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COMMITTEE AGENDA TOPICS

- I. Budget Committee Work Plan Update
- II. Budget Process Calendar
- III. FY2016 Budget Outlook Report Content
- IV. FY2017-FY2021 Community Investment Plan Overview
- V. General Fund-Fund Balance Policy

COMMITTEE INFORMATION

Present: CM Phipps, CM Driggs, CM Kinsey, CM Lyles, CM Mayfield
Time: 1:30 p.m. – 2:45 p.m.

ATTACHMENTS

1. [Fall Budget Committee Work Plan](#)
2. [Budget Workshop Planning Calendar](#)
3. [Budget Outlook Report Content](#)
4. [General Community Investment Plan Overview](#)
5. [General Fund-Fund Balance Presentation](#)

DISCUSSION BRIEFING

I. Budget Committee Work Plan Update

Kim Eagle, Management & Financial Services' Director of Strategy & Budget

Committee questions included

- Lyles: What does "discussion and feedback" mean in Attachment 1? Will the Budget Committee be more involved in substantively guiding what goes to full Council in Budget Workshops?
 - Eagle: Providing meaningful content would be helpful from a staff perspective for preparing for workshops.

II. Budget Process Calendar

Kim Eagle, Management & Financial Services' Director of Strategy & Budget

Committee questions/comments included:

- Phipps: At the workshops, can staff capture what decisions have been made so that after discussing a topic, we can reach some finality?
 - Eagle: Staff plans to roll-out a decision matrix which was previewed at the end of last budget season.
- Driggs: A lot depends on what key issues come up in the budget development process. We should be clear on what we have to do on routine stuff and identify the

Budget Committee

Meeting Summary for January 11, 2016

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real decision points.

- Phipps: Inasmuch as you've been having regular meetings with the County, do you feel better about the projections that will be provided?
 - Eagle: I feel good about the fact that we have a regular audience and we've had an opportunity to be clear about expectations and timelines.

Committee decisions included:

- Phipps/Driggs: Straw Vote process did not work well last year. We need to give clear direction on what the steps are and when we progress from one step to the next.
- Driggs: The Budget Committee ought to propose to Council some rules for the road.
 - Eagle: For context, the idea of rules has come up in the discussion around the Council Retreat. So there may be an opportunity to discuss this topic with full Council in the upcoming retreat.

III. FY2016 Budget Outlook Report Content

Kim Eagle, Management & Financial Services' Director of Strategy & Budget

Committee questions/comments included:

- Lyles: How much time will Council have at the retreat and what will be included from the Budget Committee? Last year there were issues with revenue projections and the information provided by the County.
 - Eagle: The County Tax Assessor will be presenting the same information to Council at the Retreat that he will have presented to the County Commissioners the day before at their retreat.
- Driggs: There were a certain number of pending reassessments that might result in revisions to the estimates. Are you confident that the variations in that number are a small amount?
 - Robert Campbell: We've set aside \$17 million in contingency, accrued \$8 million and have additional reserves available above fund balance. We have enough reserves to accommodate any adjustments.
- Driggs: You would make a one-time balance sheet adjustment, and wouldn't have an impact on operating, correct?
 - Randy Harrington: That's correct. The total projection is \$25 million and we have \$27 million available.
- Phipps: We don't expect any surprises like we had last year, right?
 - Campbell: The County won't be complete with their work until June, so it's still an estimate. However, we should have enough set aside to cover any potential refunds from the Pierson review process.
- Driggs: It looks like we've identified a tension between needs in public safety and the tax rate. In order to tackle that early, we should know what kind of revenue increases we're expecting (sales tax, property taxes and fees), and what latitude we have to make discretionary judgments about compensation increases, PAYGO, etc. What I see is a smaller orbit than we had last year of tradeoffs we had to contemplate. The ask is going to be a big number. We've been hearing about a fire truck and 125 officers. Unless you tell us otherwise, that's where the action is on this.
 - Ron Carlee: The only question mark that is concerning us this year is what will happen in the General Assembly and another effort at sales tax redistribution.

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IV. FY2017-FY2021 Community Investment Plan Overview

Bill Parks, Management & Financial Services' Capital Budget Manager

Committee questions/comments included:

- Kinsey: Regarding Criteria A, if we go back to citizens and say that we aren't going to do something that we'd earlier said we were going to do, that could be problematic. We need to be careful and let citizens know what's going on and why we're doing it.
 - Parks: We've developed a robust community engagement plan and we're working to keep groups informed.
- Kinsey: Are you sending the Council Members the same information that's going to the community groups? If not, could you?
 - Parks: Information goes out in Council-Manager Memos.
 - Eagle: We'll go back and see what outreach is being done and how we can tailor that process. We'll see how accessible the information is.
- Driggs: Is the magnitude of changes that could occur related to the policy more than 1 or 2 percent?
 - Parks: Not knowing exactly where we are with potential needs to be identified, it's hard to say exactly what percentage of the total we are changing. However, we do feel that we are tweaking and not reinventing.
 - Eagle: Typically if we're identifying an increase in one area, we'll decrease somewhere else. There may be a timeline adjustment related to those changes.
- Phipps: What's been our experience with the 2014 bonds? Have there been any changes?
 - Parks: Those projects are in motion without changes.
- Phipps: I know that we have some funding requests in Washington related to the Applied Innovation Corridor. What impact would the federal money we're requesting have on our current CIP?
 - Parks: That would be an example of leveraging public/private partnerships. We have identified funding to address the innovation corridor, but leveraging additional dollars would be funding on top of these projects.
- Lyles: When we're at the retreat, Council ought to talk about needs in each individual district as were identified by the District Representatives. Can we talk about those needs that may have been identified by the community and Council that staff may not necessarily be included in our CNIP meetings? We should begin to discuss how to maintain quality of life throughout the City with sidewalks, biking, workforce housing, etc.
- Driggs: Can we take on the notion that there is no white space on the map in terms of where investments are occurring? There should be some recognition of who pays the taxes.
 - Mayfield: In this last budget cycle, we approved the CIP through 2020. Where does the question of where investments are made come in?
 - Carlee: When we do the next CIP it will be through 2022. You would do that as a part of the 2018 review.
 - Mayfield: So, the answer to Mr. Driggs is the next time major changes can be made to the CIP is in 2018.

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- Driggs: Even small gestures to acknowledge the districts would be helpful. There's an ongoing list of recognized needs, and we need to be transparent about how that list is evolving. The operating budget decisions may impact where we can go on that needs list.

V. General Fund-Fund Balance Policy

Robert Campbell, Management & Financial Services' Director of Finance

Committee questions/comments included:

- Driggs: When you say the unassigned fund balance is not spendable, is it because of debt covenants or set asides. What's the ratio between that and the free fund balance?
 - Campbell: Set asides like inventory and fees restricted by state statute. They want us to be very conservative in fund balance numbers we present. We subtract accounts payable, deferred liabilities and encumbrances. They make us pull a piece of fund balance and show it as restricted by state statute.
- Driggs: Roughly what is the amount of those versus the free fund balance?
 - Teresa Smith: The total is \$176 million and the reserve by state statute which is the largest contract is \$63 million. The inventory is a small piece at \$1.4 million
 - Campbell: The undesignated is \$109 million, but we pull out \$14 million for capital above the 16% for capital purpose. That brings it back down to 95.3.
- Mayfield: We have challenges related to redistribution of sales tax. I have a question about permitting and fees for permitting. Currently, we don't charge a fee for 410A federally mandated refrigerant related to new air conditioning units. We don't require people to pull permits for this, but we should because it's a major public safety concern. Licensed contractors should need to pull a permit to install each new air conditioning unit. We need a permitting process that tracks this and it's a revenue sources that is being left on the table.
 - Carlee: This would likely be a County permitting process; however, we can look into it.
 - Driggs: Last year we had a conversation about user fees, and we need to determine the appropriate level of cost recovery once we determine who is actually providing the service.
 - Harrington: The Economic Development & Global Competitiveness Committee is prepared to take up the permitting piece next time they meet.
- Driggs: Based on what you've presented, it looks like we are where we need to be with our fund balance. Where did this question regarding changes to the Fund Balance
- Policy come from?
 - Carlee: It was the belief of the former mayor that the reserve was too high.
- Phipps: Did the rating agencies factor in all for the reserves of different fund?
 - Campbell: Yes, but those are kept separately. You can't divert revenues from one fund to another.
- Phipps: When did we adopt the 16% policy?
 - Campbell: During the 1999 budget process for FY2000, and it was phased in in 2% increments. We were worried about economic downturn and the state taking revenues.
- Phipps: Did we use these funds during Hurricane Hugo?

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- Lyles: No, we actually made money on Hurricane Hugo which led to a change in federal policy.
- Campbell: We did use some money and then got money back from the feds.
- Campbell: For rating agencies, you can dip below the 16% but they want to see you have a plan to get back there.
- Harrington: It's hard to say what those opportunities and challenges might be. Take for example the flooding in Columbia. If that storm came 150 miles north, what would have happened to us? It's hard to predict what the potential scenarios are, but you want to be prepared for it.
- Lyles: There's some information available on how often these types of events have happened over the last 20 or 50 years. There's some prediction and trend analysis that can be done to add to this conversation.
- Driggs: I look at the trade-off between \$100,000 a year and a \$5.8 million change in the level, which strikes me as pretty cheap insurance. I'm assuming that's a cost to carry type of calculation where you have these funds deposited somewhere and you're paying the net borrowing cost, right?
 - Carlee: That's correct. If you went from 16% to 15%, that's \$5.8 million in one-time money. That is such a low order of magnitude that we wound up taking it off the table in terms of budget balancing exercises.

Committee decisions included:

- Lyles: As you look at the fund balance and reserves in place, the question would be for considerations for potential change. What is the right number? I would like to continue this discussion and get a little more information about it. When I see all of those reserves and hear you say manage the cash flow, we should look at these things beyond how we've always done them. I don't know what would be considered responding to an unexpected challenge or opportunity. If we had potholes all over the city, would that be an unexpected challenge? We have 16% for every enterprise fund in addition to the general fund that we're discussing now. I need more information before I land on a decision. I'm asking for more information on the rationale for the 16% while having funds available for potential opportunities and uncertainties. After having additional information we could then decide whether to bring it to Council. I'm not ready to say if what we have works. We need to be rigorous on why 16% is the right number.
 - Eagle: We'll add that back to your work plan.

Budget Committee Work Plan Update

| <i>Meeting Date</i> | <i>Item</i> | <i>Description</i> | <i>Discussion/Decision Points Future Action Requested</i> |
|---|--|--|---|
| Monday, September 28; 2:00 – 3:30 pm – Room 280 | Storm Water Ordinance (referred on July 28) | Review of funding approaches - General Fund/property tax base for large projects, etc. | Committee voted to recommend Staff's amendment to the Ordinance (passed unanimously) |
| | Threshold for Agenda Placement (referred on July 28) | Discuss placement of items on Council Business Agenda (Consent vs. Business) | Committee discussed different alternatives and recommended leaving current process in place |
| | Pay Plan for Non-exempt Employees | Overview of current process and reasons for modification to City pay plan for non-exempt City employees | Committee discussed need for modifications to hourly pay plan and supported concept for changes |
| | Follow up from FY2016 Budget Process and Committee Work Plan | Discuss items from FY2016 Budget process & provide a list of future Committee topics | Committee discussed project list and determined the following projects would not be revisited by Committee during current Budget cycle: <ul style="list-style-type: none"> • Take home vehicles • Water meter upgrade (include as part of Charlotte Water CIP) • Asset Sales Leaseback (to be reviewed by PCAC) |
| Monday, January 11; 1:30 – 3:00 pm – Room CH-14 | Budget Committee Work Plan Update | Discuss Budget Committee work plan through Council Budget Workshops | Review |
| | Budget Process Calendar | Review of Budget Process Calendar | Review |
| | FY2016 Budget Outlook Report Content | Review Budget Outlook Report Content for Annual Council Retreat | Discussion & Feedback |

| <i>Meeting Date</i> | <i>Item</i> | <i>Description</i> | <i>Discussion/Decision Points Future Action Requested</i> |
|--|---|---|--|
| | FY2017-FY2021 Community Investment Plan Overview | Discuss current outlook of General Community Investment Plan | Discussion & Feedback |
| | General Fund-Fund Balance Policy | Update on City Fund Balance Policy and impact of potential modifications | Discussion & Feedback |
| Monday, February 8; 12:00 – 1:30 pm – Room 280 | CATS Budget | Preview of CATS Operating & CIP Budget | Discussion & Feedback |
| | Storm Water Budget | Preview of Storm Water Operating Budget & Overview of current Storm Water Capital Program | Discussion & Feedback |
| | Solid Waste Services Service Delivery and Cost Model (primary referral is to Environment Committee) | Process status update | Discussion & Feedback |
| | Pay Plan for non-exempt employees (2) Discuss potential changes associated with revised City pay plan for non-exempt City employees | Discuss proposed modifications to City pay plan for non-exempt City employees | Discussion & Recommendation |
| | February 24 Council Budget Workshop Agenda | Review and Approve agenda for Council Budget Workshop | Discussion & Recommendation |

| Meeting Date | Item | Description | Discussion/Decision Points Future Action Requested |
|--|---|--|---|
| Monday, February 29; 1:30 – 3:00 pm – Room 280 | General Fund Update | Discuss Preliminary General Fund Revenues and Expenditures | Discussion & Feedback |
| | Community Safety strategic needs including Fire companies, in-fill Fire stations, Police patrol services and Police stations location planning (joint referral to the Community Safety Committee) | Community Safety Committee to discuss and determine relative priority within each area, not funding recommendation. Budget Committee to discuss funding. | Discussion & Feedback |
| | Compensation & Benefits | Review Draft Compensation & Benefits Information | Discussion & Feedback |
| | Community Investment Plan | Review Draft Community Investment Plan | Discussion & Feedback |
| | March 16 Council Budget Workshop Agenda | Review and Approve agenda for Council Budget Workshop | Discussion & Recommendation |
| Monday, March 21; 1:30 – 3:00 pm – Room 280 | Aviation Budget | Preview of Aviation Operating & CIP Budget | Discussion & Feedback |
| | Storm Water Budget* | 2 nd Review of Storm Water Operating & Capital Program | Discussion & Feedback |
| | Charlotte Water Budget | Preview of Charlotte Water Operating & CIP Budget | Discussion & Feedback |
| | Charlotte Water Assessment of Capital Funding Model | Overview of capital funding model used by Charlotte Water | Discussion & Feedback |
| | Financial Partner Recommendations | Preview of Financial Partner Recommendations | Discussion & Feedback |

| <i>Meeting Date</i> | <i>Item</i> | <i>Description</i> | <i>Discussion/Decision Points Future Action Requested</i> |
|----------------------------|--|---|--|
| | Community Investment Plan* | 2 nd of Review Draft Community Investment Plan | Discussion & Feedback |
| | April 6 Council Budget Workshop Agenda | Review and Approve agenda for Council Budget Workshop | Discussion & Recommendation |

* If necessary

FY2017 Council Budget Workshops and Proposed Topics

| Budget Workshop Date (1:30-4:30) | Budget Committee Meeting | Proposed Topics for Workshops (subject to change) |
|---|--|---|
| | January 11 (1:30 p.m.) (Monday) | |
| Feb. 24, 2016 (Wednesday) | February 8 (12:00 p.m.) (Monday) | <ul style="list-style-type: none"> • CATS budget • Storm Water budget • Financial Partner requests • Solid Waste Services |
| March 16, 2016 (Wednesday) | February 29 (1:30 p.m.) (Monday) | <ul style="list-style-type: none"> • General Fund update <ol style="list-style-type: none"> 1. Revenues 2. Expenditures • Draft General Community Investment Plan • Compensation and Benefits |
| April 6, 2016 (Wednesday) | March 21 (1:30 p.m.) (Monday) | <ul style="list-style-type: none"> • Aviation budget • Storm Water budget II[*] • Charlotte Water budget • Financial Partner Recommendations • Draft General Community Investment Plan II[*] |
| (Optional) April 20, 2016 (Wednesday) | April 11 (1:30 p.m.) (Monday) | <ul style="list-style-type: none"> • TBD • TBD |

^{*} If necessary

- I. Introduction**
- II. Economic Update**
- III. FY2016 Mid-Year Report**
 - Overview
 - General Fund Revenues
 - General Fund Expenditures
 - General Fund Summary Table.....
 - Enterprise Funds.....
- IV. FY2017 to FY2020 General Fund Projections**
 - Overview
 - General Fund Revenue Projections
 - Four-year General Fund Operating Budget Projection Tables.....
 - General Fund Base Budget Expenditure Projections and Assumptions
 - General Fund Operating Budget Growth History
 - General Fund Operating Budget Issues
 - Summary – General Fund Projected Revenues to Expenditures
- V. Enterprise Funds**
 - Potential Operating Budget Considerations for FY2017.....
- VI. Capital Budget**
 - Overview
 - Debt Capacity.....
 - Capital Project Balances.....
 - Capital Reserves
 - FY2017-FY2021 General Community Investment Plan Biennial Review Criteria and Process for Adjustments
- VII. Appendix**
 - Appendix 1 - City of Charlotte Property Tax Rate History
 - Appendix 2 – Budget and Financial Indicators.....
 - Appendix 3 – Five-Year Historical Trends for Utility Fees

Attachment 4
**City Council Approved Allocation of Bonds and Certificates of Participation
For General Community Investment Plan**

| | 2014 | 2016 | 2018 | 2020 | Total |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| PROJECTS FUNDED WITH GENERAL OBLIGATION BONDS (Requires Bond Referendum Vote) | | | | | |
| Airport/West Corridor | \$ - | \$ 31,200,000 | \$ 13,520,000 | \$ - | \$ 44,720,000 |
| Spine Dixie Berryhill Infrastructure (New Garrison Road) | | 31,200,000 | | | 31,200,000 |
| Southern Dixie Berryhill Infrastructure (Widen Dixie River Road) | | | 13,520,000 | | 13,520,000 |
| East/Southeast Corridor | \$ 12,500,000 | \$ 26,580,000 | \$ 22,320,000 | \$ 6,160,000 | \$ 67,560,000 |
| Land Acquisition and Street Connections | 12,500,000 | 12,500,000 | | | 25,000,000 |
| Monroe Road Streetscape | | 2,080,000 | 8,320,000 | | 10,400,000 |
| Public/Private Redevelopment Opportunities | | 10,000,000 | 10,000,000 | | 20,000,000 |
| Idlewild Road/Monroe Road Intersection | | | | 4,160,000 | 4,160,000 |
| Sidewalk and Bikeway Improvements | | 2,000,000 | 4,000,000 | 2,000,000 | 8,000,000 |
| Northeast Corridor | \$ 47,200,000 | \$ 43,080,000 | \$ 48,540,000 | \$ 27,300,000 | \$ 166,120,000 |
| Research Drive - J.W. Clay Connector over I-85 (North Bridge) | 3,000,000 | | 12,480,000 | | 15,480,000 |
| University Pointe Connection - IBM Dr. to Ikea Blvd (South Bridge) | 15,080,000 | | | | 15,080,000 |
| Northeast Corridor Infrastructure (NECI) | 16,640,000 | 35,360,000 | 27,300,000 | 27,300,000 | 106,600,000 |
| Applied Innovation Corridor | 12,480,000 | 7,720,000 | 8,760,000 | | 28,960,000 |
| Road/Infrastructure Projects | \$ 17,264,000 | \$ 8,632,000 | \$ - | \$ - | \$ 25,896,000 |
| Neighborhood Transportation Programs | 5,200,000 | | | | 5,200,000 |
| Eastern Circumferential | 12,064,000 | | | | 12,064,000 |
| Park South Drive Extension | | 8,632,000 | | | 8,632,000 |
| Cross Charlotte Multi-Use Trail | \$ 5,000,000 | \$ 30,000,000 | | | \$ 35,000,000 |
| Sidewalks and Pedestrian Safety | \$ 15,000,000 | \$ 15,000,000 | \$ 15,000,000 | \$ 15,000,000 | \$ 60,000,000 |
| Traffic Control and Bridges | \$ 14,000,000 | \$ 10,000,000 | \$ 10,000,000 | \$ 14,000,000 | \$ 48,000,000 |
| Upgrade Traffic Signal System Coordination | 3,000,000 | 3,000,000 | 3,000,000 | 6,000,000 | 15,000,000 |
| Upgrade Traffic Control devices | 7,000,000 | 4,000,000 | 4,000,000 | 4,000,000 | 19,000,000 |
| Repair and Replace Bridges | 4,000,000 | 3,000,000 | 3,000,000 | 4,000,000 | 14,000,000 |
| Housing Diversity | \$ 15,000,000 | \$ 15,000,000 | \$ 15,000,000 | \$ 15,000,000 | \$ 60,000,000 |
| Comprehensive Neighborhood Improvement Program (CNIP) | \$ 20,000,000 | \$ 40,000,000 | \$ 40,000,000 | \$ 20,000,000 | \$ 120,000,000 |
| Total General Obligation Bonds | \$ 145,964,000 | \$ 219,492,000 | \$ 164,380,000 | \$ 97,460,000 | \$ 627,296,000 |
| PROJECTS FUNDED WITH CERTIFICATES OF PARTICIPATION (Does Not Require Voter Approval) | | | | | |
| East/Southeast Corridor | \$ 25,000,000 | \$ - | \$ - | \$ - | \$ 25,000,000 |
| Bojangles/Ovens Area Redevelopment | 25,000,000 | | | | 25,000,000 |
| Public Safety Facilities | \$ 78,500,000 | \$ 22,750,000 | \$ 21,900,000 | \$ 9,750,000 | \$ 132,900,000 |
| Joint Communications Center | 68,000,000 | | | | 68,000,000 |
| 6 Police Division Stations | 10,500,000 | 18,750,000 | 21,900,000 | 9,750,000 | 60,900,000 |
| Land Purchase for Future Fire Stations | | 4,000,000 | | | 4,000,000 |
| Maintenance Facilities/Custom Service | \$ - | \$ 2,080,000 | \$ 9,620,000 | \$ 19,500,000 | \$ 31,200,000 |
| Sweden Road Maintenance Yard Replacement | | | 3,120,000 | 19,500,000 | 22,620,000 |
| Northeast Equipment Maintenance Facility | | 2,080,000 | 6,500,000 | | 8,580,000 |
| Total Certificates of Participation | \$ 103,500,000 | \$ 24,830,000 | \$ 31,520,000 | \$ 29,250,000 | \$ 189,100,000 |
| Total All Projects | \$ 249,464,000 | \$ 244,322,000 | \$ 195,900,000 | \$ 126,710,000 | \$ 816,396,000 |

GENERAL COMMUNITY INVESTMENT PLAN
Biennial Review for FY2017 – FY2021
Criteria & Process Guidelines for Staff-Recommended Adjustments

ADJUSTMENTS TO COMMUNITY INVESTMENT PLAN

It is anticipated that updates to the Community Investment Plan (CIP) will be made on a biennial basis. Example reasons for adjusting the CIP include: 1) adjust the timing of the planned project to better leverage private or other public investments, 2) adjust cost or scope due to new information, 3) delete projects where the priority need has decreased, or 4) add projects based on new priorities. In order for adjustments to be considered, submittals must meet general criteria, be evaluated by the CIP Steering Committee^{*}, and proceed through the established CIP budget process as described below.

General Criteria for Making CIP Adjustments

The following generalized criteria would warrant consideration of adjustments to the existing program:

- a. Economic Development activity in and around a project area that could be encouraged or better leveraged by changing the timing or scope of a CIP project
- b. Opportunity to better coordinate with other public capital projects by changing the timing or scope of a City project (example: Moved \$5M of project funding for Cross Charlotte Trail from 2016 Bond to 2014 Bond)
- c. Unexpected critical needs that arise (example: Funded CMPD Central Division Station in FY2016)
- d. In addition to the above, the CIP Steering Committee, in its professional judgment, can recommend any adjustments the Committee believes would make the General Community Investment Plan more effective

Note:

It is likely that most potential adjustments to the current plan will focus more on changing the timing of projects than consideration of adding funding to a particular project, but it is important that a recommended adjustment be cost neutral:

– if recommending moving a project from the 2020 Bond referendum to the 2016 Bond Referendum for example, a recommendation to delay a project or projects in 2016 for one or two bonds would need to be identified. Moreover, each year it is possible that additional debt capacity could be identified. If adjustments to existing projects can be made without affecting the current debt model, more flexibility will exist to use any additional capacity on new projects.

^{*}The CIP Steering Team provides executive level leadership of the implementation of the Community Investment Plan. Membership of the CIP Steering Committee is comprised of members of the City Manager’s Executive Team, the Director of the Office of Strategy & Budget, and Directors of City departments with significant capital program responsibilities, including Engineering & Property Management, Transportation, Planning, Neighborhood & Business Services, CATS, Charlotte Water, Aviation, Police, and Fire.



General Fund-Fund Balance

January 11, 2016

Budget Committee Meeting



Policy Decision

- **Policy Decision:**
 - Is the City's current 16% target for General Fund-Fund Balance Policy still the appropriate level?
- **Background:**
 - City Council referred question to the Budget Committee during FY2016 budget process.
- **Budget Impact:**
 - A 1% decrease in the City's Fund Balance Policy would result in \$5.8 million for a one time expense and \$100,000 annually for capital expenses.

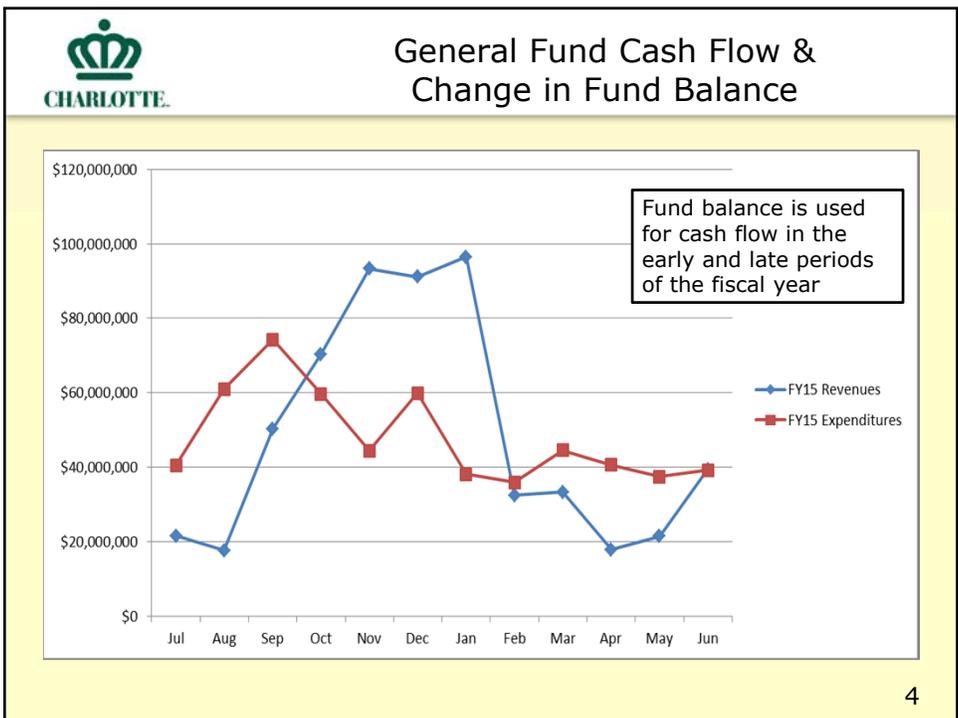
2



Fund Balance

- Fund balance = assets - liabilities
- Fund balance represents the amount that revenues has exceed expenditures over time
- Importance of adequate fund balance:
 - Allows the City to manage its cash flows throughout the year
 - Provides the City with short-term flexibility to respond to potential State action and economic shocks
 - Allows the City to respond quickly to unexpected emergencies and opportunities
 - It is a critical factor for rating agencies when rating the City's debt
- Unassigned fund balance is the amount available for appropriation

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City's General Fund- Fund Balance Policy

- Maintain 16% of the following years' operating budget in reserve
 - Unassigned balance at the end of FY2015: \$109.7 million (18.4%)
 - Based on the FY2015 operating budget the required 16% fund balance equated to \$95.3 million
- Fund balance above 16% at the end of the fiscal year can be transferred to PAYGO, or any other one-time use as approved by City Council
 - For 2015, \$14.4 million was above 16% (\$109.7 million – \$95.3 million)
 - \$12.4 million available for PAYGO
 - \$2.0 million reserved for potential additional property tax refunds due to the revaluation

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Fund Balance – State Requirements

- The North Carolina Budget and Fiscal Control Act sets standards for budgeting and finance for local governments
 - Act does not set a minimum fund balance requirement
 - The NC Local Government Commission (LGC), a division of the Department of the State Treasurer, provides oversight and establishes rules and regulations over public finance
- LGC Fund Balance Minimum: 8%
 - The LGC does not allow local governments with fund balance below 8% to issue new debt
 - The 8% requirement has been in place for many years and is below levels maintained by well-rated North Carolina cities

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Rating Agency Guidelines

- Rating agencies consider many different factors to determine a city's credit rating (e.g., economy, debt levels, management, etc.)
- All three major rating agencies now place an increased focus on fund balance and available cash, which is now weighted as the second largest factor in assigning ratings
- Moody's established the following guideline for evaluating fund balance (evaluated in relation to other credit rating factors):
 - Aaa rating - Fund Balance over 30% of operating revenues
 - Aa rating - Fund Balance 16% to 30% of operating revenues

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Credit Risk Areas Expressed by Rating Agencies

| Rating Agency | General Obligation & Transit Debt |
|---------------|--|
| Moody's | What could change the rating down (or revise the outlook to negative): Declines in liquidity and/or fund balances to levels that exceed [Moody's] current expectations |
| S&P | The city's sizable capital needs and debt burden , which we believe are managed successfully with officials' detailed capital planning and debt affordability analysis |
| Fitch | Key debt metrics are moderately high ; however, current issuance plans are manageable and the city's ongoing commitment to pay-as-you-go capital |

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Credit Strength Areas Expressed by Rating Agencies

| Rating Agency | General Obligation & Transit Debt |
|---------------|---|
| Moody's | Charlotte's financial operations are expected to continue to be well-managed, characterized by considerable operating flexibility, a trend of ample reserves and a strong cash position. The city has a formal policy to maintain operating fund balances at 16% of the current year expenditures |
| S&P | Charlotte's budgetary flexibility is very strong, with available reserves at 17.6% of expenditures, equivalent to \$96 million. The city has a policy to maintain reserves at 16% of expenditures and has done so historically, and projections are in line with this pattern. Therefore, we do not expect reserves to weaken |
| Fitch | The city has a long history of favorable financial operations and maintenance of high reserves that provide a cushion against unforeseen budgetary challenges or emergencies. The city's diverse revenue base is led by property taxes, and tax rates are regionally competitive and well within the statutory cap |
| Fitch | The city has a sound unrestricted fund balance policy equal to two months or 16% of spending |

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Comparison to Peers and Professional Organizations

- The Government Finance Officers Association (GFOA) recommends governments maintain unrestricted fund balance in their general fund of no less than two months (16.6%)
- Moody's median for Aaa rated cities over 400,000 is 15.2%
- The average fund balance maintained by the five largest North Carolina Aaa cities for 2014 was 15.4% (per Moody's calculation)

| City | Fund Balance % |
|---------------|----------------|
| Charlotte | 16.3 |
| Raleigh | 19.0 |
| Greensboro | 9.3 |
| Winston-Salem | 15.2 |
| Durham | 17.1 |

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Policy Considerations

- **Considerations for Potential Change to Fund Balance Policy:**
 - Ability to manage cash flow during the year
 - Rating agency criteria and potential impact to the City's credit rating
 - Flexibility for legislative changes that impact local revenues
 - Ability to respond to unanticipated opportunities and challenges
 - Consistency with recommendations of professional organizations
 - Comparability to fund balance levels of other highly rated local governments

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Policy Questions

- **Policy Questions:**
 - Is the City's current 16% target for General Fund-Fund Balance Policy still the appropriate level?
 - Does lowering the City's Fund Balance Policy by 1% to create \$5.8 million for one-time expenses and \$100,000 provide a sufficient business case to continue evaluation?
 - If the City Council is interested in considering a different policy, what should be the parameters for a new policy?

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General Fund-Fund Balance

January 11, 2016
Budget Committee Meeting