



Metro Amherst-Buffalo Corridor

CAPITAL COST METHODOLOGY REPORT

Prepared for:

Niagara Frontier Transportation Authority (NFTA)



Prepared by:

AECOM USA, Inc.

October 2014

Table of Contents

- 1. INTRODUCTION 1
 - 1.1. Presentation of Capital Cost Estimates 1
 - 1.2. FTA Standard Cost Categories 1
 - 1.3. Results of the Capital Cost Estimate 1
 - 1.4. General Approach 1
 - 1.4.1. Inflation and Schedule Calculations 1
 - 1.4.2. Subcontracting Mark-Up 2
- 2. DESCRIPTION OF STANDARD COST CATEGORIES 2
 - 2.1. Guideway & Track Elements (SCC 10.0) 2
 - 2.1.1 Guideway 2
 - 2.1.2 Trackwork 2
 - 2.2 Stations, Stops, Terminals, Intermodal (SCC 20.0) 3
 - 2.3 Support Facilities; Yard, Shops, Administration Buildings (SCC 30.00) 4
 - 2.4 Sitework & Special Conditions (SCC 40.00) 4
 - 2.5 Systems (SCC 50.00) 5
 - 2.5.1 Signal System: Train Control for Lines & Stations 5
 - 2.5.2 Electrification: Substations/Power Distribution/Connections 5
 - 2.5.3 Electrification: Catenary/Third Rail 6
 - 2.5.4 Communications 6
 - 2.5.5 Revenue Collection 6
 - 2.5.6 Central Control 6
 - 2.6 Right-of-Way, Land, Existing Improvements (SCC 60.00) 6
 - 2.7 Vehicles (SCC 70.00) 7
 - 2.8 Professional Services (SCC 80.0) 7
 - 2.9 Contingency (Unallocated) (SCC 90.0) 8
 - 2.10 Allocated Contingency 8
 - 2.11 Finance Charges (SCC 100.00 NOT USED) 8
- 3 COST DATA 8
 - 3.1 Sources of Cost Data 8
 - 3.2 Cost Estimating Assumptions 9
 - 3.3 Estimating Procedures 9
 - 3.3.1 Bottom Up Approach 9
 - 3.3.2 Top Down Approach 9



3.4 Organization and Management of Cost Data 9

4 ESTIMATE LIMITATIONS 9

APPENICES

- APPENDIX 1
- APPENDIX 2
- APPENDIX 3
- APPENDIX 4

- ENR CITY COST INDEX
- FTA SCC DEFINITIONS
- FTA RECOMMENDED CONTINGENCY BY ESTIMATING STAGE
- SCC TEMPLATE FORMAT

DRAFT



1. INTRODUCTION

The Niagara Frontier Transportation Authority (NFTA) Metro Amherst-Buffalo Transit Options is conducting an Alternative Analysis Study under auspices of the Federal Transit Administration (FTA).

This report presents the methods, cost data, cost assumptions, schedule, and inflation rates used in the development of the estimate of capital costs for the Study.

1.1. Presentation of Capital Cost Estimates

The following document will be used in advancing the estimate of the probable capital cost for both existing MetroRail extension alternatives (Light Rail Transit (LRT)) and Bus Rapid Transit (BRT) alternatives being investigated. At this point in the development, ~~of~~ the potential capital cost estimates, ~~is~~ are based upon concept level alignments of less than 5% design development.

1.2. FTA Standard Cost Categories

All estimates to be produced as part of this study will follow the current FTA's Standard Cost Categories (SCC). The SCC is structured to include the ten main categories that comprise a capital project:

- 10.00 Guideway and Track Elements
- 20.00 Stations, Stops, Terminals, Intermodals
- 30.00 Support Facilities; Yard, Shops, Administration Buildings
- 40.00 Sitework & Special Conditions
- 50.00 Systems
- 60.00 ROW (Right-of-Way), Land, Existing Improvements
- 70.00 Vehicles
- 80.00 Professional Services
- 90.00 Contingency (Unallocated)
- 100.00 Finance Charges

1.3. Results of the Capital Cost Estimate

The completed conceptual estimates will become the summary of the capital cost estimates comparisons for the different alignment and mode options. Costs for work outside the limits of the options are not incorporated into these estimates.

1.4. General Approach

Cost estimates will be based on the known or expected work outlined as a part of the conceptual alignment designs.

1.4.1. Inflation and Schedule Calculations

In the conceptual estimates, the costs are developed in year 2014 dollars. For the FTA SCC the inflation factor will be 3% per year for future years. Initial cost escalation factors will be based on the Engineering News Record (ENR) City Cost Index (CCI) (see Appendix 1).



Future inflation of 3.00% per year will be added to the mid-point of construction for each SCC cost category. The mid-point of construction for each SCC item will be based on the preliminary Construction Schedule. The Level Zero Summary Table includes escalated costs by category.

The capital expenditure (CAPEX) estimates will assume a Design-Bid-Build contracting scenario with Design beginning January 2016 and Notice to Proceed (NTP) for the Construction to be given by NFTA about January 2018. Construction is estimated to require five years. These dates will be utilized to calculate Year of Expenditure (YOE) costs.

1.4.2. Subcontracting Mark-Up

Subcontracting mark-up is estimated to be 5% of the amount of work subcontracted. Each line item will be estimated as to the amount of work to be subcontracted. The amount of subcontracted work is based on an assumption that the general contractor will perform primarily civil type of work except the specialty work.

2. DESCRIPTION OF STANDARD COST CATEGORIES

2.1. Guideway & Track Elements (SCC 10.0)

Guideway and track elements are portions of the transit system that can be assigned costs at a fairly aggregate level with a certain level of accuracy.

2.1.1 Guideway

The capital cost estimates in the FTA format use the SCC guideway categories. These categories will include all of the foundational construction elements up to the point where trackwork begins. The guideway cost estimates are based on parametric unit cost and/or crew-based cost information specifically developed for each category. Guideway costs through the stations will be included in the Guideway category. Maintenance of Traffic and Sediment and Erosion costs will be included in the SCC 40.01 sections. Generally, each of the guideway cost estimates includes work identified in the SCC Definitions.

The composite unit costs for specific guideway segments will also include allowances for items of work that cannot be quantified to any reasonable degree. Examples of allowance items are traffic control, phasing, staging and other items.

Busway roadwork will be included in the SCC 10 Guideway categories.

2.1.2 Trackwork

The capital cost estimates in the FTA format use three of the SCC trackwork categories. These categories are:

- Track: Direct Fixation (DF)(track fixed onto a structural concrete slab, used in aerial or /tunnel construction)
- Track: Embedded (reinforced concrete slab with booted track; used for in-street or mixed use alignment sections)
- Track: Ballasted (used in at-grade construction and retained cut or fill)
- Track: Special (switches, turnouts, and pocket track)



The standard rail for ballasted and direct-fixation track is continuous welded 115RE rail. The cost of constructing the supporting subgrade, subballast, ballast or aerial structure will be included in the guideway cost.

The ballasted trackwork unit cost will include rail, concrete ties, rail welding, rail fasteners, and rail anchors. Ballast costs are included in the Guideway category.

For aerial structures, the estimate is based on the rail attached to a second-pour concrete plinth pad with a direct fixation rail fastener, constructed in a top-down procedure.

The costs for special trackwork are based on mainline construction and are either ballasted or direct-fixation construction as required. Special trackwork includes single and double turnouts, crossovers, wyes, pocket tracks, and rail crossing diamonds. The costs for special trackwork will be applied on a per unit basis at specific locations.

The trackwork cost for the yards and shops will be included in category 30.05, Yard and Yard Track.

2.2 Stations, Stops, Terminals, Intermodal (SCC 20.0)

The capital cost estimates in the FTA format use four of the SCC sub-categories:

- At-Grade Platform
- Aerial Platform
- Parking Structure (assumed to be provided as Private-Public-Partnerships (PPP))
- Elevators and Escalators

Metro Amherst Buffalo Corridor station costs will represent the fixed facilities and amenities. The passenger station cost estimates will be based on parametric unit prices and/or crew-based costs developed for each type of station, which include at-grade, elevated and underground. Also included in this cost category will be pedestrian overpasses and “touch-down” pavilions that are adjacent to or part of the at-grade or underground station if applicable. Station sitework associated with parking, bus, kiss-and-ride and access will be included in 40.06 and 40.07. Generally, all the parametric station cost estimates consist of the following:

- Platforms
- Site work, including excavation and foundations
- Grading, borrow fill, and soil stabilization
- Concrete footings, walls, platform slab and roof
- Architectural finishes of all station elements; i.e., platform, mezzanine, canopies/weather protection, ancillary rooms and pavilions
- Allowance for signs, and other furnishings
- Stairs (Escalators and elevators are in SCC 20.07 Systems) This estimate will be based on the American Public Transportation Association’s (APTA) heavy duty elevator and escalator criteria using current pricing of equipment and crew-based installation costs.
- Equipment and ancillary rooms
- Lighting, electrical, and mechanical allowances
- Equipment rooms for train control and communication equipment
- Ventilation and emergency access shafts (underground station)



- Fare collection is in SCC 50.06
- Parking lots and landscape is in SCC 40.06 and 40.07
- The Public Art cost estimate will be based on 0.5% of station costs as recommended by the FTA standards and is included in this item.

2.3 Support Facilities; Yard, Shops, Administration Buildings (SCC 30.00)

This cost category will include site development, parking, storm water management; site excavation, landscaping, personnel facilities, vehicle storage and maintenance buildings, trackwork for storage of rail or for bus vehicles, office support areas, maintenance of way facilities, and shop equipment.

Trackwork, special trackwork, communications, train control and traction power for the Yard and the Yard Track will be included in this item.

This estimate will assume existing yards or shops are generally adequate for the expansion and an allowance will be assigned for some presently unknown expansion allowance.

2.4 Sitework & Special Conditions (SCC 40.00)

The capital cost estimates in the FTA format use eight of the SCC sub-categories. Special conditions include items that cannot be adequately represented by a typical section because of complexity, uncertain alignment, special site conditions, or other unique circumstances. Special condition elements include:

- **Demolition, Clearing, Earthwork** - In the re-arrangement of individual cost elements from the categories of the FTA standard cost categories, some of these cost elements remain with guideways and station categories. This cost element will include the cost for the demolition of special features such as buildings (if not included as part of right-of-way), large structures (bridges or retaining walls), or other existing unusual features. Project clearing and grubbing not included in the stations, yard or the guideway is included in this item based on parametric unit rates.
- **Site Utilities Utility Relocation** - One of the cost elements within this cost category will be the relocation of existing utilities within the guideway corridor. These relocations will include both public and private utilities, subject to any agreements that may apply to franchised utilities that exist within public rights-of-way. The power transmission line ductbanks and connections to each of the substations, stations, and the yard will be included in this item. Stormwater Management costs are included in this category except for the Yard and Shop areas.
- **Hazardous Material, Contaminated Soil Removal/Mitigation, and Ground Water Treatments** - Hazardous material, contaminated soil mitigation and ground water treatment costs will be in this section.
- **Environmental Mitigation, e.g. Wetlands, Historic/Archeological, Parks** - Special environmental mitigation costs, such as wetlands mitigation, noise or vibration control, and related items will be included in this category.
- **Site Structures Including Retaining Walls, Sound Walls** – Included with this category will be Retaining Walls, Sound Walls, etc. (except for sound walls incorporated into the guideway structures) - Major structures, such as retaining walls that are not included in the guideway, station or yard costs, will be included in this category.



- **Pedestrian/Bike Access and Accommodation, Landscaping** – This item includes landscaping and bike accommodations for this project.
- **Automobile, Bus, Van Accessways Including Roads, Parking Lots** – This item includes existing pavement removal in the guideway and at the stations, new pavement in the guideway area and at the stations, sidewalks, curbs, Traction Power Substations (TPSS) and Tie Breaker Stations (TBS) station access roads, and parking lot surfaces (also assumed to be Private-Public Partnership (PPP)).
- **Temporary Facilities and Other Indirect Costs During Construction** –
 - This item will include overtime and additional supervision if required to meet any proposed schedule. Overtime costs will be based on the typical labor classification rate multiplied by a prorated additional payroll factor based on the projected overtime costs. An inefficiency factor for extended seven-day work days will also be added where appropriate in order to meet the projected Substantial Completion Date.
 - This item includes the costs to relocate any parking area or other existing facilities not included in the Right-of-Way (ROW) cost category to allow construction of the project.
 - Indirect costs will include contractor General Conditions including their on-site project management, construction support, and construction support staff. These costs will be based on project duration and crew-based costs.
 - Profit is assumed to be 15% and is included in their respective SCC line items.
 - Project bond costs will be included in this item.

2.5 Systems (SCC 50.00)

The capital cost estimates in the FTA format use the SCC system sub-categories. These categories are:

2.5.1 Signal System: Train Control for Lines & Stations

The train control systems cost will include the signaling and control systems required for safe and efficient Metro Amherst Buffalo Corridor operations. They will include automatic wayside signals, automatic train stop circuitry in the track and vehicles, and block supervision. The unit costs will include an allowance for testing, training, and startup for the contractor personnel. Agency personnel testing and training is listed separately in Item 80.08. Traffic control interface with the train control will also be included.

Traffic control for the bus options will be included in this category.

2.5.2 Electrification: Substations/Power Distribution/Connections

The electrification system provides the direct current electrical power for Metro Amherst Buffalo Corridor operations. It consists primarily of substations, mainline track power distribution, transformers, switchgear, tie breaker stations, power connections, and other elements. Signal and communication power needs will also be included in the traction power costs. Power supply or distribution for buildings associated with the service in the shops and yard or power for passenger stations is not included in this cost category, rather it is included under their respective cost categories. The unit costs will include an allowance for testing, training, and startup by the contractor personnel.



2.5.3 Electrification: Catenary/Third Rail

The third rail electrification costs will include the bonding, third rail itself, feeders, cover plate, conduit elbows, and other related items or Overhead Contact System (OCS) for the Light Rail options. The unit costs will also include an allowance for testing, training, and startup.

2.5.4 Communications

The communications system provides the necessary subsystems to support the total operational requirements of NFTA Connecting Corridor. The communications system costs will provide for the following subsystems and/or functions:

- Supervisory and control and data acquisition subsystems (SCADA) to enable the remote monitoring and control of vehicle/train operations, guideway/track conditions, substations, and station support facilities from Central Control.
- Communications subsystems consisting of two-way radio, public address (PA), closed circuit television (CCTV) surveillance equipment, PABX (digital switch) telephone equipment, and variable message signs (VMS) and as specified in the preliminary design
- Interface to the fare collection and ticket vending equipment
- Equipment for the hearing-impaired, reader boards, and associated wiring, as well as an allowance for testing, training, and startup will be included in the unit costs for the communications elements.

2.5.5 Revenue Collection

Costs for elements in this category cover the fare collection equipment at Metro Amherst Buffalo Corridor stations. Smart Card collection equipment costs will be based on Metro's current fare collection equipment and any proposed new upgrades. The number of fare collection units at each station will be based on the projected passenger volumes during peak hours. The unit cost for fare collection will include all equipment costs, and installation costs. The hardware will include provisions for fare vending facilities and access for the physically handicapped. The unit costs will include an allowance for testing, training, and startup for the contractor personnel.

No future ridership expansion fare collection costs are included in this estimate.

2.5.6 Central Control

This includes an interface with the existing Central Control Center. This interface includes new monitor stations at the current operations center, integration of the new signals into the existing operations, and testing the rail extension or bus system.

2.6 Right-of-Way, Land, Existing Improvements (SCC 60.00)

This cost category covers all land acquisition and acquisition-related costs required to obtain various real property needed for the construction, operation, and maintenance of the different alignments.

The right-of-way costs will include the fee acquisition of permanent and temporary easements, relocation costs, legal fees, business damages and other miscellaneous costs. Right-of-way cost estimates will be based on a \$1.5M per acre value with factors for the above costs of the properties being considered. Metro Amherst Buffalo Corridor property will be assumed to have no costs to the project. The highway median costs will be assumed to be at no cost.



2.7 Vehicles (SCC 70.00)

The costs for revenue vehicles (rail cars and/or buses) will include soft costs, spare parts, shipping / delivery and testing by the supplier. Non-revenue vehicles (where non-revenue vehicles include maintenance-of-way vehicles, as well as agency trucks and automobiles) will include hi-rail and highway maintenance vehicles and maintenance personnel vehicles will be assumed to be existing for this estimate.

This item also will include spare parts for the vehicles, stations, trackwork and for the systems for the testing period. Spare parts for use beyond the Revenue Service Date are not included.

2.8 Professional Services (SCC 80.0)

The soft costs in the FTA format use ten of the SCC sub-categories. These allowances are computed by applying a percentage to the total construction cost estimated for each cost category (excluding right-of-way and vehicles) or as otherwise described. Table 2-1 provides a list of the percentage multipliers that will be applied to the total construction costs to cover these items:

Table 2-1: Professional Services Percentages

Soft Costs	Percentage for LRT Options	Percentage for Bus Options
Project Development	3.5%	3.0%
Engineering	9.5%	8.0%
Project Management for ATD Force Account and Administration	9.00%	8.50%
Construction Administration & Management	8.00%	7.50%
Professional Liability and other non Construction Insurance	3.50%	3.50%
Legal; Permits; Review Fees by other agencies, cities, etc.	2.00%	2.00%
Surveys, Testing, Investigation, Inspection	1.50%	1.00%
Start-up* (Safety Certification Activation Plan)	1.00%	0.50%
TOTAL Soft Costs	38.00%	34.00%

*Includes only the training and start-up for the agency personnel. Contractor related costs are included in their respective line item estimates.

Soft cost categories include the following:

- **Project Development** – This cost will include preliminary engineering up to final funding.
- **Engineering** – This cost will include final design including design services during construction.
- **Project Management for Design and Construction** - An estimated Professional Services percentage will be used for Metro Amherst Buffalo Corridor PM staff for administration and force account work.
- **Construction Administration & Management** - This sub-category will cover the costs of construction administration of the following:



- Consultant that provides construction management services (CM)
- **Professional Liability and Other Non-Construction Insurance** - Project insurance includes all premium costs to provide “wrap-up” insurance coverage through a Contractor Controlled Insurance Program (CCIP). This category will include professional liability, comprehensive general liability, builder’s risk, worker’s compensation and employer’s liability, construction equipment loss or damage, and automobile insurance.
- **Legal; Permits; Review Fees by Other Agencies, Cities, etc.** – Includes legal fees (except real estate legal fees), permitting fees, and review fees by other entities.
- **Surveys, Testing, Investigation, Inspection** – This item includes independent testing, third party surveying during construction to confirm progressed work, investigations of contractor claims or differing site conditions, and special inspections required by Metro Amherst Buffalo Corridor, or the local building authorities.
- **Start-Up** - This sub-category will include the ATD costs in training transit personnel and testing of the new systems. This includes safety certification and activation plan.

2.9 Contingency (Unallocated) (SCC 90.0)

The unallocated contingency will be applied to cover the costs of changes in scope, uncertainty in the present design or changed conditions that occur during construction for all SCC line items.

2.10 Allocated Contingency

This allocated contingency amount is based on each of the estimate items per their respective costs and a level of certainty judgment assigned contingency based on the estimate and design progress detail. For example, trackwork may have a contingency of 10% versus 35% for the underground tunneling. Each SCC item total will be applied its specific allocated contingency and then the contingencies will be totaled for the total contingency based on a weighted average. The contingency levels will generally decrease with design progression due to increased detail in the estimate. For example, Traction Power (50.03) might decrease from 25% in the Conceptual Estimate to 15% in the progressive design.

2.11 Finance Charges (SCC 100.00 NOT USED)

3 COST DATA

Cost data will be developed using several resources. Work items that are typical for transit projects will be identified. Unit costs for these work items will be estimated using various cost references and historical cost data.

All unit costs include the contractor’s direct construction cost plus all taxes, general expenses, overhead and profit. The unit costs do not include items such as soft costs and contingency. These costs are included as percentage add-ons to the cost estimate under SCC 80.0 and 90.0.

3.1 Sources of Cost Data

Unit costs will be derived from multiple resources, including the New York Department of Transportation (NYDOT), Metro Amherst Buffalo Corridor, specialized vendor quotations, and other transit systems throughout the United States. Any cost data that was used from a geographic location other than the Buffalo area will be adjusted by location factors as published



in R.S. Means Heavy Construction Cost Data. All cost resources will be adjusted to reflect local Buffalo Davis-Bacon rates and conditions. All sources will be referenced in the Estimate.

3.2 Cost Estimating Assumptions

The basic assumptions and criteria used in developing the cost data will be as follows:

- The estimates are to be prepared using year 2014 dollars.
- No premium time on labor costs will be included (unless noted).
- Adequate experienced craft labor will be available.
- Adequate specialized equipment will be available.
- Normal productivity rates as historically experienced will be utilized.
- Compatible trade agreements will exist in the region.
- No strike impacts will be experienced by the project.
- There will be sufficient experienced contractors available to perform the work.
- There will be normal Buffalo area weather impacts to construction schedule and costs.
- Existing state of the art construction technology will be utilized.

3.3 Estimating Procedures

Capital costs are developed for each category by utilizing both “bottom up” and “top down” estimating approaches. Each approach is described in the following sections.

3.3.1 Bottom Up Approach

The composite unit costs utilized for the capital cost estimates will be developed based on a “bottom up” approach to the greatest extent possible based on the level of completion of the design documents. Quantities will be taken-off from the conceptual design plans. Unit prices are developed and combined with the estimated quantities to determine the costs for each major category of work.

3.3.2 Top Down Approach

In the “top down” approach method, a parametric cost is determined, usually derived from data from similar projects, and this cost is used directly or converted to some unit of measure (such as route feet) and applied as a unit cost. This method will be used when insufficient data is available within the conceptual design documents.

3.4 Organization and Management of Cost Data

All capital cost estimates will be prepared using Microsoft Excel software. The organization of the cost data into a cost stream format will enable a thorough review and checking of the data with respect to the conceptual design drawings.

4 ESTIMATE LIMITATIONS

A reoccurring issue in the estimation of capital cost during the design phase of a project is the evaluation and treatment of uncertainty. Uncertainty can result in a “difference” between the



estimated cost of a project as defined during the concept phase and the actual cost of the project that is ultimately implemented. Four potential sources of uncertainty are generally recognized. These are:


- Changes in Project Scope
- Changes in Design or Operating Standards
- Incorrect Unit Cost/Quantity Assumptions
- Unforeseen Issues in Implementation

As the conceptual design documents are not advanced to a detail level of completion, the individual work sheets associated with the various cost elements in the Conceptual Estimate will provide further documentation on the assumptions used in developing the costs.

DRAFT

APPENDICES

Appendix 1: ENR City Cost Index, Cleveland 2014 (ENR does not publish CCI for Buffalo. Cleveland is the closest ENR CCI monitored city)



Text size: [A](#) [A](#)

The building and construction cost indexes for ENR's individual cities use the same components and weighting as those for the 20-city national indexes. The city indexes use local prices for portland cement and 2 X 4 lumber and the national average price for structural steel. The city's BCI uses local union wages, plus fringes, for carpenters, bricklayers and iron workers. The city's CCI uses the same union wages for laborers.

ENR COST INDEXES IN CLEVELAND (1978-2014)					
YEAR	MONTH	BCI	%CHG	CCI	%CHG
2014	Aug	5442.61	6.6	11860.43	6.1
2014	Jul	5442.61	6.1	11860.43	5.9
2014	Jun	5444.61	6.2	11862.43	5.9
2014	May	5440.66	6.3	11858.66	6.0
2014	Apr	5439.66	6.7	11756.66	5.3
2014	Mar	5161.28	1.6	11233.66	4.4
2014	Feb	5152.36	1.4	11224.76	4.3
2014	Jan	5154.11	2.5	11226.51	4.5
2013	Dec	5146.73	2.7	11218.13	4.6
2013	Nov	5147.98	2.7	11220.38	4.6
2013	Oct	5134.22	2.4	11206.62	4.5
2013	Sep	5107.94	2.2	11180.33	4.4
2013	Aug	5106.69	1.9	11179.08	4.3
2013	Jul	5131.20	2.7	11203.59	4.4
2013	Jun	5125.00	2.7	11197.40	4.5
2013	May	5118.41	2.5	11190.80	4.4
2013	Apr	5097.78	2.4	11170.17	4.3
2013	Mar	5081.65	2.4	10760.04	0.6
2013	Feb	5082.65	2.6	10761.04	6.0
2013	Jan	5029.33	1.9	10741.91	5.7
2012	Dec	5012.70	2.5	10725.28	5.6
2012	Nov	5013.07	2.5	10725.65	5.6
2012	Oct	5014.07	2.4	10726.65	5.5
2012	Sep	5000.19	2.3	10712.77	5.5
2012	Aug	5010.69	2.7	10723.27	5.5
2012	Jul	4998.85	2.7	10727.39	5.6
2012	Jun	4991.97	2.6	10720.51	5.6
2012	May	4992.19	2.7	10720.73	5.6
2012	May	4992.19	2.7	10720.73	5.6

(note; Years 2012 to 1978 are omitted for clarity purposes)



Appendix 2: FTA SCC Definitions

<p>Standard Cost Categories for Small Starts Projects DEFINITIONS</p> <p>(Rev.15, August, 2013)</p>		<p>NOTE: The SCC cost breakdown is based on a traditional Design Bid Build model. If your project is Design Build, to the best of your ability, separate construction costs from design, administration, testing, etc. Put all construction costs in 10 through 50. Put design, administration, testing, etc. in <i>80 Professional Services</i>.</p>
<p>10 GUIDEWAY & TRACK ELEMENTS (route miles)</p>		<p>Include guideway and track costs for all transit modes (heavy rail, light rail, commuter rail, BRT, rapid bus, bus, monorail, cable car, etc.) The unit of measure is route miles of guideway, regardless of width. As associated with the guideway, include costs for rough grading, excavation, and concrete base for guideway where applicable. Include all construction materials and labor regardless of whom is performing the work.</p> <p>In your written description of the scope, and in supporting graphic diagrams, indicate whether busway or rail track is single, double, triple, relocated, etc. Put guideway and track elements associated with yards in <i>30 Support Facilities</i> below.</p>
10.01	Guideway: At-grade exclusive right-of-way	
10.02	Guideway: At-grade semi-exclusive (allows cross-traffic)	
10.03	Guideway: At-grade in mixed traffic	
10.04	Guideway: Aerial structure	Include foundation excavation; guideway structures including caissons, columns, bridges, viaducts, cross-overs, fly-overs.
10.05	Guideway: Built-up fill	Include construction of earthen berms.
10.06	Guideway: Underground cut & cover	Include excavation, retaining walls, backfill, underground guideway structure and finishes.



10.07	Guideway: Underground tunnel	Include tunneling by means of a tunnel boring machine, drill blasting, mining, and immersed tube tunneling; tunnel structure and finishes.
10.08	Guideway: Retained cut or fill	Include excavation, retaining walls, backfill, underground guideway structure and finishes.
10.09	Track: Direct fixation	Include rails, connectors.
10.10	Track: Embedded	Include rails, ties; ballast where applicable
10.11	Track: Ballasted	Include rails, ties and ballast.
10.12	Track: Special (switches, turnouts)	Include transitional curves.
10.13	Track: Vibration and noise dampening	Include upcharge for vib/noise dampening to any track condition above.
20 STATIONS, STOPS, TERMINALS, INTERMODAL (number)		As associated with stations, include costs for rough grading, excavation, station structures, enclosures, finishes, equipment; mechanical and electrical components including HVAC, ventilation shafts and equipment, station power, lighting, public address/customer information system, safety systems such as fire detection and prevention, security surveillance, access control, life safety systems, etc. Include all construction materials and labor regardless of whom is performing the work. NOTE: Count paired inbound/outbound boarding platforms as one station - do not report the total number of boarding platforms.
		Put guideway and track associated with stations in <i>10 Guideway & Track Elements</i> above.
20.01	At-grade station, stop, shelter, mall, terminal, platform	
20.02	Aerial station, stop, shelter, mall, terminal, platform	Include station structures including caissons, columns, platforms, superstructures, etc.
20.03	Underground station, stop, shelter, mall, terminal, platform	Include retaining walls, backfill, structure.
20.04	Other stations, landings, terminals: Intermodal, ferry, trolley, etc.	

20.05	Joint development	Per FTA's Joint Development Guidance, "Joint development is any income-producing activity with a transit nexus related to a real estate asset in which FTA has an interest. ...Joint development projects are commercial, residential, industrial, or mixed-use developments that are induced by or enhance the effectiveness of transit projects. . ."
20.06	Automobile parking multi-story structure	Include retaining walls, backfill, structure.
20.07	Elevators, escalators	
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS		As associated with support facilities, include costs for rough grading, excavation, support structures, enclosures, finishes, equipment; mechanical and electrical components including HVAC, ventilation shafts and equipment, facility power, lighting, public address system, safety systems such as fire detection and prevention, security surveillance, access control, life safety systems, etc. Include fueling stations. Include all construction materials and labor regardless of whom is performing the work.
		Where a support facility shares the structure with a station, its cost may be included with station cost. Identify this with a note.
		Except for guideway and track associated with a yard, include all guideway and track costs associated with support facilities in <i>10 Guideway & Track Elements</i> above.
30.01	Administration Building: Office, sales, storage, revenue counting	
30.02	Light Maintenance Facility	Include service, inspection, and storage facilities and equipment.
30.03	Heavy Maintenance Facility	Include heavy maintenance and overhaul facilities and equipment.
30.04	Storage or Maintenance of Way Building	
30.05	Yard and Yard Track	Include yard construction, guideway and track associated with yard.

40 SITEWORK & SPECIAL CONDITIONS		Include all construction materials and labor regardless of whom is performing the work.
40.01	Demolition, Clearing, Earthwork	Include project-wide clearing, demolition and fine grading.
40.02	Site Utilities, Utility Relocation	Include all site utilities - storm, sewer, water, gas, electric.
40.03	Haz. mat'l, contam'd soil removal/mitigation, ground water treatments	Include underground storage tanks, fuel tanks, other hazardous materials and treatments, etc.
40.04	Environmental mitigation, e.g. wetlands, historic/archeologic, parks	Include other environmental mitigation not listed.
40.05	Site structures including retaining walls, sound walls	
40.06	Pedestrian / bike access and accommodation, landscaping	Include sidewalks, paths, plazas, landscape, site and station furniture, site lighting, signage, public artwork, bike facilities, permanent fencing.
40.07	Automobile, bus, van accessways including roads, parking lots	Include all on-grade paving.
40.08	Temporary Facilities and other indirect costs during construction	As a general rule and to the extent possible, appropriately allocate indirect costs among the construction costs in Categories 10 through 50. Where that is not possible, include in <i>40.08 Temporary Facilities</i> costs for mobilization, demobilization, phasing; time and temporary construction associated with weather (heat, rain, freezing, etc.); temporary power and facilities; temporary construction, easements, and barriers for storm water pollution prevention, temporary access and to mitigate construction impacts; project and construction supervision; general conditions, overhead, profit. NOTE: Include contractor's general liability and other insurance related to construction such as builder's risk in Cats. 10 - 50, not in 80 Professional Services below.
50 SYSTEMS		Include all construction materials and labor regardless of whom is performing the work.
50.01	Train control and signals	

50.02	Traffic signals and crossing protection	Include signal prioritization at intersections.
50.03	Traction power supply: substations	
50.04	Traction power distribution: catenary and third rail	
50.05	Communications	Include passenger information systems at stations and on vehicles (real time travel information; static maps and schedules). Include equipment to allow communications among vehicles and with central control.
50.06	Fare collection system and equipment	Include fare sales and swipe machines, fare counting equipment.
50.07	Central Control	
Construction Subtotal (10 - 50)		
60 ROW, LAND, EXISTING IMPROVEMENTS		Include professional services associated with the real estate component of the project. These costs may include agency staff oversight and administration, real estate and relocation consultants, legal counsel, court expenses, insurance, etc.
60.01	Purchase or lease of real estate	If the value of right-of-way, land, and existing improvements is to be used as local match to the Federal funding of the project, include the total cost on this line item. In backup documentation, separate cost for land from cost for improvements. Identify whether items are leased, purchased or acquired through payment or for free. Include the costs for permanent surface and subsurface easements, trackage rights, etc.
60.02	Relocation of existing households and businesses	In compliance with Uniform Relocation Act.
70 VEHICLES (number)		Include professional services associated with the vehicle component of the project. These costs may include agency staff oversight and administration, vehicle consultants, design and manufacturing contractors, legal counsel, warranty and insurance costs, etc.

70.01	Light Rail	Include light rail and streetcar rail using electric, diesel or other power supply.
70.02	Heavy Rail	
70.03	Commuter Rail	Include locomotives (diesel, electric, or other), trailer cars, self-propelled multiple units (EMU electric or DMU diesel, or other power supply)
70.04	Bus	Includes "rubber-tired" buses and trolleys including new, used, historic replica, articulated, using electric, diesel, dual-power, or other power supply.
70.05	Other	Include Vans, Sedan/Station Wagon, Cable Car, People Mover, Monorail, Car/Inclined Railway, Ferry Boat, Transferred Vehicle
70.06	Non-revenue vehicles	
70.07	Spare parts	
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)		<p>Cat. 80 applies to Cats. 10-50. Cat. 80 includes all professional, technical and management services related to the design and construction of fixed infrastructure (Cats. 10 - 50) during the project development and construction phases of the project. This includes environmental work, design, engineering and architectural services; specialty services such as safety or security analyses; value engineering, risk assessment, cost estimating, scheduling, ridership modeling and analyses, auditing, legal services, administration and management, etc. by agency staff or outside consultants.</p> <p>Include professional liability insurance and other non-construction insurance on 80.05 unless insurance for the agency and its consultants is already included in other lines.</p> <p>Include costs associated with professional services related to real estate and vehicles in Cats. 60 and 70.</p> <p><i>(Note that costs for planning activities and NEPA work done before FTA approval to enter project development (PD), regardless of funding source, are not included in an SSGA and therefore, should not be included in the Standard Cost Category worksheets. For example, on one and the same grant, costs incurred prior to FTA approval to enter</i></p>
80.01	Project Development	
80.02	Engineering (not applicable to Small Starts)	
80.03	Project Management for Design and Construction	
80.04	Construction Administration & Management	
80.05	Professional Liability and other Non-Construction Insurance	
80.06	Legal; Permits; Review Fees by other agencies, cities, etc.	
80.07	Surveys, Testing, Investigation, Inspection	



		<i>PD should be omitted from these worksheets whereas costs incurred after FTA approval to enter PD should be included.)</i>
80.08	Start up	Include start up and training. Include in Cats. 10 - 50 above access and protection work by agency staff or outside contractors.
Subtotal (10 - 80)		
90 UNALLOCATED CONTINGENCY		Includes unallocated contingency, project reserves. Document allocated contingencies for individual line items on the BUILD Main worksheet.
Subtotal (10 - 90)		
100 FINANCE CHARGES		Include finance charges expected to be paid by the project sponsor/grantee prior to either the completion of the project or the fulfillment of the Small Starts funding commitment, whichever occurs later in time. Finance charges incurred after this date should not be included in Total Project Cost. (See FFGA Circular FTA C5200.1A Chapter III for additional information.) Derive finance charges from the Small Starts project's financial plan, based on an analysis of the sources and uses of funds. The amount and type of debt financing required and revenues available determine the finance charges. By year, compute finance charges in year-of-expenditure (YOE) dollars. On the Inflation worksheet enter the finance charges for the appropriate years.
Total Project Cost (10 - 100)		



Appendix 3: FTA Recommended Contingency by Estimating Stage

Appendix A – Cost Estimation Methodology

Table A-1. Recommended Contingency by Estimating Stage

Estimate Stage	Probable Accuracy ¹	Design Stage	Purpose	Information Available	Estimate Methods	Contingency Guideline
Order of Magnitude (conceptual)	50% - 30%	Preliminary	Evaluation of projects or alternatives	100-scale alignment, facility descriptions, sketches, study reports	<i>Parametric</i> – Cost of a similar facility is adjusted to represent the new facility. Includes costing by SF, LF, or CF. <i>Model</i> – A typical design is used to develop quantities and costs for elements.	20% or higher
Preliminary (budget)	15% - 30%	Preliminary Design Report (25%)	Establish Control Budget	40-scale alignment, facility descriptions, sketches, study reports, cross sections, profiles, elevations, geotechnical data, staging plans, schedule, definition of temporary work	Quantity development of major commodities, pricing by database, manuals, quotes, bid results, or experience which may be adjusted for the conditions of the specific package. Rough estimates or allowances developed for immeasurable items.	10% - 20%
Definitive	15% - 5%	75% to 100% complete	Detailed Control Budget, Cost Control, and Reporting	Progress Plans and Specifications, working construction schedule	Takeoff of quantities from plans, representative pricing by database, manuals, quotes, bid results, or experience adjusted for the conditions of the specific package. Crewed approach to labor and equipment, percent approach to general conditions, overhead and profit, contingency, and escalation. Some allowances carried for immeasurable items.	5% - 15%
Detailed (engineer's estimate)	± 5%	PS&E	Check Estimate for Bids, Commit Funds	Complete Plans and Specifications for Bidding, Detailed Construction Schedule, Contract Terms and Conditions	Detailed takeoff of all measurable items, detailed review of specifications, detailed pricing including price quotes, crewed approach to labor and equipment, detailed estimate of general conditions, overhead & profit, and escalation. Consideration of construction schedule, work restrictions, shift requirements, and risk.	0% - 10%

¹ Probable Accuracy as stated by the Association for the Advancement of Cost Engineering International (AACE)

FTA Project and Construction Management Guidelines
Final May 2003

2003 Update
Page A-4



Appendix 4: SCC Template Format

MAIN WORKSHEET-BUILD ALTERNATIVE (Rev.15, August, 2013)								
Insert Project Sponsor's Name here						Today's Date		8/15/13
Insert Project Name and Location						Yr of Base Year \$		2013
Insert Current Phase (e.g. Applic. for Engineering, Engineering, Applic. for FFGA, Construction, Rev Ops)						Yr of Revenue Ops		2020
	Quantity	Base Year Dollars w/o Contingency (X000)	Base Year Dollars Allocated Contingency (X000)	Base Year Dollars TOTAL (X000)	Base Year Dollars Unit Cost (X000)	Base Year Dollars Percentage of Construction Cost	Base Year Dollars Percentage of Total Project Cost	YOE Dollars Total (X000)
10 GUIDEWAY & TRACK ELEMENTS (route miles)	10.00	80,000	20,000	100,000	\$10,000	45%	25%	104,780
10.01 Guideway: At-grade exclusive right-of-way	10.00	80,000	20,000	100,000	\$10,000			104,780
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)				0				0
10.03 Guideway: At-grade in mixed traffic				0				0
10.04 Guideway: Aerial structure				0				0
10.05 Guideway: Built-up fill				0				0
10.06 Guideway: Underground cut & cover				0				0
10.07 Guideway: Underground tunnel				0				0
10.08 Guideway: Retained cut or fill				0				0
10.09 Track: Direct fixation				0				0
10.10 Track: Embedded				0				0
10.11 Track: Ballasted				0				0
10.12 Track: Special (switches, turnouts)				0				0
10.13 Track: Vibration and noise dampening				0				0
20 STATIONS, STOPS, TERMINALS, INTERMODAL (number)	20	28,000	2,000	30,000	\$1,500	13%	8%	32,149
20.01 At-grade station, stop, shelter, mall, terminal, platform	20	28,000	2,000	30,000	\$1,500			32,149
20.02 Aerial station, stop, shelter, mall, terminal, platform				0				0
20.03 Underground station, stop, shelter, mall, terminal, platform				0				0
20.04 Other stations, landings, terminals: Intermodal, ferry, trolley, etc.				0				0
20.05 Joint development				0				0
20.06 Automobile parking multi-story structure				0				0
20.07 Elevators, escalators				0				0
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS	10.00	8,000	2,000	10,000	\$1,000	4%	3%	10,531
30.01 Administration Building: Office, sales, storage, revenue counting				0				0
30.02 Light Maintenance Facility		8,000	2,000	10,000				10,531
30.03 Heavy Maintenance Facility				0				0
30.04 Storage or Maintenance of Way Building				0				0
30.05 Yard and Yard Track				0				0
40 SITEWORK & SPECIAL CONDITIONS	10.00	44,350	9,000	53,350	\$5,335	24%	14%	54,167
40.01 Demolition, Clearing, Earthwork		9,000	1,800	10,800				10,965
40.02 Site Utilities, Utility Relocation		18,000	3,600	21,600				21,931
40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments				0				0
40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks		9,000	1,800	10,800				10,965
40.05 Site structures including retaining walls, sound walls				0				0
40.06 Pedestrian / bike access and accommodation, landscaping		8,350	1,800	10,150				10,305
40.07 Automobile, bus, van accessways including roads, parking lots				0				0
40.08 Temporary Facilities and other indirect costs during construction				0				0
50 SYSTEMS	10.00	25,000	5,000	30,000	\$3,000	13%	8%	32,149
50.01 Train control and signals		9,000	1,000	10,000				10,716
50.02 Traffic signals and crossing protection		2,000	500	2,500				2,679
50.03 Traction power supply: substations		4,000	1,000	5,000				5,358
50.04 Traction power distribution: catenary and third rail		4,000	1,000	5,000				5,358
50.05 Communications		4,000	1,000	5,000				5,358
50.06 Fare collection system and equipment		2,000	500	2,500				2,679
50.07 Central Control				0				0
Construction Subtotal (10 - 50)	10.00	185,350	38,000	223,350	\$22,335	100%	57%	233,777
60 ROW, LAND, EXISTING IMPROVEMENTS	10.00	30,175	5,000	35,175	\$3,518		9%	35,350
60.01 Purchase or lease of real estate		30,175	5,000	35,175				35,350
60.02 Relocation of existing households and businesses				0				0
70 VEHICLES (number)	15	27,000	3,000	30,000	\$2,000		8%	31,593
70.01 Light Rail	15	27,000	3,000	30,000	\$2,000			31,593
70.02 Heavy Rail				0				0
70.03 Commuter Rail				0				0
70.04 Bus				0				0
70.05 Other				0				0
70.06 Non-revenue vehicles				0				0
70.07 Spare parts				0				0
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	10.00	70,000	7,168	77,168	\$7,717	35%	20%	77,424
80.01 Project Development		5,000	668	5,668				5,667
80.02 Engineering		20,000	2,000	22,000				22,073
80.03 Project Management for Design and Construction		5,000	500	5,500				5,518
80.04 Construction Administration & Management		20,000	2,000	22,000				22,073
80.05 Professional Liability and other Non-Construction Insurance		5,000	500	5,500				5,518
80.06 Legal: Permits: Review Fees by other agencies, cities, etc.		5,000	500	5,500				5,518
80.07 Surveys, Testing, Investigation, Inspection		5,000	500	5,500				5,518
80.08 Start up		5,000	500	5,500				5,518
Subtotal (10 - 80)	10.00	312,525	53,168	365,693	\$36,569		93%	378,144
90 UNALLOCATED CONTINGENCY				20,000			5%	21,075
Subtotal (10 - 90)	10.00			385,693	\$38,569		98%	399,219
100 FINANCE CHARGES				7,878			2%	10,000
Total Project Cost (10 - 100)	10.00			393,571	\$39,357		100%	409,219
Allocated Contingency as % of Base Yr Dollars w/o Contingency				17.01%				\$23,378
Unallocated Contingency as % of Base Yr Dollars w/o Contingency				6.40%				\$37,763
Total Contingency as % of Base Yr Dollars w/o Contingency				23.41%				\$40,922
Unallocated Contingency as % of Subtotal (10 - 80)				5.47%				
YOE Construction Cost per Mile (X000)								
YOE Total Project Cost per Mile Not Including Vehicles (X000)								
YOE Total Project Cost per Mile (X000)								

Year of Base Year Dollars should match the year in "Today's Date."

YOE Dollars automatically arrive from Inflation Worksheet.

YOE costs for individual line items within a Category are derived as a percentage of the YOE cost of the Category.

Preparing for bid: For each separate contract package generate a Main Worksheet and an Inflation Worksheet.

In the Special Conditions of the Contract, require the construction contractor to update these worksheets and submit them with the monthly pay application.

This should make it easy to track costs in the SCC format throughout construction, and make it easy to submit the final costs to FTA at contract closeout and at the two-year post-rev ops date required by the Before and After Study.

Enter finance charges on Inflation Worksheet.

