Appendix Materials

Appendix A. NCCOR Project Participants

* Diana Allen, National Park Service1
* Emiko Atherton, Smart Growth America, Washington, D.C.4
* Torsha Bhattacharya, Rails-to-Trails Conservancy, Washington, DC3,4,5
* Nisha Botchwey, Georgia Institute of Technology, Atlanta, GA3
* Josephine Boyington, National Institutes of Health1
* Tyler Breazeale, International Downtown Association, Washington, D.C.4
* David Buchner, University of Illinois, Urbana-Champaign, Urbana IL,1,2
* Susan Carlson, Centers for Disease Control and Prevention, Atlanta, GA1,2
* Angie Cradock, Harvard T.H. Chan School of Public Health, Boston, MA 1,2
* Cathy Costakis, Retired3
* Andy Dannenberg, University of Washington, Seattle, WA3
* Veronica O. Davis, Nspiregreen LLC, Washington, D.C.4,5
* Heather Devlin, Centers for Disease Control and Prevention, Atlanta, GA 1,2
* Mark Dickie, University of Central Florida, Orlando, FL3
* Seth English-Young, Western Federal Lands Highway Division, Federal Highway Administration, Vancouver, WA3
* Mark Fenton, Tufts University, Friedman School of Nutrition Science and Policy, Boston, MA 2,4,5
* Joanna Frank, Center for Active Design, New York, NY3
* Janet Fulton, Centers for Disease Control and Prevention, Atlanta, GA 1,2
* Anisa Heming, U.S. Green Building Council, Washington, DC3
* Heidi Hertz, Commonwealth of Virginia, Richmond, VA3
* Chris Kochtitzky, Centers for Disease Control and Prevention, Atlanta, GA 1
* Paula Kreissler, Healthy Savannah, Savannah, GA4
* Jeffrey LaMondia, Auburn University, Auburn, AL4
* Shai Lauros, LISC National, New York, NY3,4
* Rene Lavinghouze, Centers for Disease Control and Prevention, Atlanta, GA 1,2
* Megan Lawson, Headwaters Economics, Bozeman, MT2,3,4,5
* Bruce Lee, City University of New York, New York, NY3
* Cathy Lin, International Downtown Association, Washington, DC3
* Rachel MacCleery, Urban Land Institute, Washington, D.C.4
* Brett McIff, Utah Department of Public Health, University of Utah, Salt Lake City, UT3,4
* Jean McMahon, Centers for Disease Control and Prevention, Atlanta, GA 1,2
* Leslie Meehan, Tennessee Department of Health, Nashville, TN3,4,5
* April Oh, National Institutes of Health1.2
* Kevin Mills, Rails-to-Trails Conservancy, Washington, DC3
* Julie M. Mueller, Northern Arizona University, Flagstaff, AZ3
* Toks Omishakin, California Department of Transportation, Sacramento, CA3
* Margo Pedroso, Safe Routes Partnership, Torrington, CT4
* Craig Evan Pollack, Johns Hopkins Bloomberg School of Public Health, Johns Hopkins School of Medicine, Baltimore, MD4
* Melissa Green Parker, National Institutes of Health, Washington, D.C.1,
* Connor Radkey, Centers for Disease Control and Prevention, Atlanta, GA2
* Leslie Richardson, National Park Service1
* Michael Rodriguez, Smart Growth America, Washington, D.C.4
* Jenny Roe, University of Virginia, Charlottesville, VA3
* Ken Rose, Centers for Disease Control and Prevention, Atlanta, GA 1,2
* James Sallis, University of California, San Diego CA, Australian Catholic University, Melbourne, Australia2,3,4,5
* Emily Schweninger, Smart Growth America, Washington, D.C.4
* Giselle Sebag, Bloomberg Associates, New York, NY3
* John V. Thomas, U.S. Environmental Protection Agency, Washington, D.C.3,4,5
* Megan Weir, City of Oakland’s Department of Transportation, Oakland, CA4
* Margo Younger, Centers for Disease Control and Prevention, Atlanta, GA 1
* Hatidza Zaganjor, FHI 360, Atlanta, GA 1,2

1NCCOR Steering Committee members (n=16)

2Workshop Planning Group (n=14)

3Discussion Group Participants (n=21)

4Virtual Workshop Expert Participants (n=19)

5Core Expert Advisors (n=7)

Appendix B. Economic Indicators, Ratings and Primary Audience by Discussion Areas/Domains

Initial domain area definitions and potentially relevant indicators were informed by multiple sources1-3 but were also modified during the project period based on input from stakeholders. Members of the Planning Group identified a single domain and preliminary definition using potential data sources for each indicator for reporting purposes in the main text and tables. However, indicators may have been proposed and discussed by experts in more than one domain area. On average, five experts (range 2-8) completed rating surveys within each domain. The average (mean) rating for quality, feasibility, and influence was calculated. The primary audience with the most votes is listed. In the case of a tie, all top audiences are listed.

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| **Indicator** | **Quality Rating** | **Feasibility Rating** | **Influence Rating** | **Mean****Rating** | **Primary Audiences** |
| **Equity** |
| Walkability Scorea,b | 4.8 | 4.8 | 4.2 | 4.6 | Urban planners Transportation sector/departments General public  |
| Bikeability Scoreb | 4.5 | 4.5 | 4 | 4.3 | Transportation sector/departments General public  |
| Life expectancya,b | 4.8 | 4.8 | 4.3 | 4.6 | Public health/medical sector  |
| Average personal transportation costs per average incomeb | 4 | 4.2 | 4 | 4.1 | Transportation sector/departments |
| Equitable access to essential services by subgroups of community residents | 3.8 | 3 | 3.8 | 3.5 | Public health/medical sector  |
| Diversity indexes | 3.8 | 3 | 3.2 | 3.3 | General public |
| Upward economic mobility | 4.2 | 3.2 | 4.2 | 3.9 | Elected officials/government administrators  |
| Objective indicators of community security | 3.2 | 2.5 | 3.7 | 3.1 | Elected officials/government administrators  |
| **Indicator** | **Quality Rating** | **Feasibility Rating** | **Influence Rating** | **Mean****Rating** | **Primary Audiences** |
| **Livability** |
| Percent of personal injuries from motor vehicle collisions by type | 4.3 | 3.8 | 2.7 | 3.6 | Transportation sector/departments  |
| Housing affordability (in metropolitan areas) a | 4.5 | 4.7 | 4.3 | 4.5 | Elected officials/government administrators General public Urban planners  |
| Sales tax revenue per business square foot by type of tax | 3.8 | 3.5 | 3.7 | 3.7 | Elected officials/government administrators  |
| Average personal transportation costs on purchased local transportation per average income | 3.5 | 2.8 | 3.2 | 3.2 | Transportation sector/departments  |
| Access to essential services | 4 | 3.5 | 3.5 | 3.7 | Transportation sector/departments  |
| Access to public transit  | 4.3 | 4.3 | 3.7 | 4.1 | Transportation sector/departments   |
| Access to public spaces | 4 | 4.2 | 3.5 | 3.9 | Parks and recreation sector/departments  |
| Use of tax incentives to encourage private sector to build affordable housing | 3.5 | 3 | 3.3 | 3.3 | Elected officials/government administrators  |
| **Indicator** | **Quality Rating** | **Feasibility Rating** | **Influence Rating** | **Mean****Rating** | **Primary Audiences** |
| **Housing and Real Estate** |
| Real estate property tax revenuea | 4.7 | 4.8 | 4.5 | 4.7 | Elected officials/government administrators  |
| Housing turnover in high risk groups | 3.2 | 3 | 4 | 3.4 | Public health/medical sector  |
| Inflow and outflow in owner-occupied housing | 3 | 3 | 3.7 | 3.2 | Urban planners  |
| Average rent for an apartment or house | 4.3 | 4.7 | 4.3 | 4.4 | General public  |
| Average mortgage rate | 4.2 | 4.3 | 3.2 | 3.9 | General public  |
| Rates of home ownership categorized by demographic subgroups | 3.7 | 3.5 | 4.3 | 3.8 | Elected officials/government administrators Researchers/evaluators  |
| Percent of community housing of each type/style available in the community | 4 | 4.2 | 3.8 | 4.0 | Elected officials/government administrators  |
| Vacancy rates (residential)a | 4.7 | 4.3 | 4.5 | 4.5 | Elected officials/government administrators  |
| **Indicator** | **Quality Rating** | **Feasibility Rating** | **Influence Rating** | **Mean****Rating** | **Primary Audiences** |
| **Tourism**  |
| Counts of non-residents using amenities designed to attract tourists | 4.3 | 3.8 | 4.8 | 4.3 | Elected officials/government administrators  |
| Spending by non-residents using amenities designed to attract tourists | 4.3 | 3.8 | 4.8 | 4.3 | Elected officials/government administrators  |
| Counts of residents using amenities designed to attract tourists | 4 | 3.8 | 3.5 | 3.8 | Parks and recreation sector/departments  |
| Revenue Per Available Room Index (RevPAR index) | 4.3 | 4.3 | 4 | 4.2 | Urban planners Elected officials/government administrators Transportation sector/departments  |
| Number of hotel rooms | 4.3 | 4.5 | 3 | 3.9 | Parks and recreation sector/departments Elected officials/government administrators  |
| Collection of resort/visitor tax | 4.3 | 4.8 | 4.3 | 4.47 | Elected officials/government administrators  |
| **Indicator** | **Quality Rating** | **Feasibility Rating** | **Influence Rating** | **Mean****Rating** | **Primary Audiences** |
| **Employment and Workforce** |
| Travel distance between worksite and residence | 4 | 4.5 | 4 | 4.2 | Transportation sector/departments  |
| Average wage per new job | 4.5 | 3.8 | 4.5 | 4.3 | Elected officials/government administrators  |
| Number of employees earning minimum wage | 3.3 | 3.5 | 3.5 | 3.4 | Elected officials/government administrators  |
| Pay parityb | 3.8 | 3.3 | 3.8 | 3.6 | Elected officials/government administrators  |
| Percentage of workers who work part-time and full-time | 3.7 | 4 | 3.5 | 3.7 | Elected officials/government administrators  |
| Total number of jobs and total number of employed adultsa | 5 | 5 | 4.8 | 4.9 | Elected officials/government administrators  |
| **Indicator** | **Quality Rating** | **Feasibility Rating** | **Influence Rating** | **Mean****Rating** | **Primary Audiences** |
| **Local Economic Development** |
| Number of locally owned businesses | 4 | 3.9 | 4.5 | 4.1 | Elected officials/government administrators  |
| Number of small businessesa | 4.3 | 4.8 | 4.4 | 4.5 | Elected officials/government administrators  |
| Number of expansions of small businesses | 3.4 | 3.4 | 4 | 3.6 | Elected officials/government administrators  |
| Vacancy rates (business) | 4 | 4.4 | 4.5 | 4.3 | Elected officials/government administrators  |
| Retail sales per square foota | 4.4 | 4.7 | 4.6 | 4.6 | Elected officials/government administrators   |
| Pay parityb | 3.3 | 2.5 | 3.8 | 3.2 | Elected officials/government administrators Researchers/evaluators   |
| **Indicator** | **Quality Rating** | **Feasibility Rating** | **Influence Rating** | **Mean****Rating** | **Primary Audiences** |
| **Transportation** |
| Indicators from HEAT | 4 | 3.9 | 3.4 | 3.8 | Public health/medical sector  |
| Investment in on-demand transit services and associated mobility enhancements | 3.3 | 3.4 | 3 | 3.2 | Transportation sector/departments  |
| Traffic congestion costs | 4.1 | 3.9 | 4.1 | 4.0 | Transportation sector/departments  |
| Travel time | 4.5 | 4.4 | 4.5 | 4.47 | Transportation sector/departments  |
| Trail connectivity | 3.4 | 3.8 | 3.1 | 3.4 | Parks and recreation sector/departments  |
| Multimodal access | 3.3 | 3.4 | 3.1 | 3.3 | Transportation sector/departments  |
| **Indicator** | **Quality Rating** | **Feasibility Rating** | **Influence Rating** | **Mean****Rating** | **Primary Audiences** |
| **Safety/Security** |
| Costs of motor vehicle collisions | 4.3 | 4.7 | 3.7 | 4.2 | Transportation sector/departments  |
| Cost of personal injuries from motor vehicle collisions by type | 4.3 | 4.7 | 3.7 | 4.2 | Transportation sector/departments  |
| Average personal expenditures by pedestrian and cyclists on personal and community safety | 3 | 2 | 2.5 | 2.5 | Transportation sector/departments  |
| Subjective indicators of community safety and personal security | 3.3 | 2.3 | 3.3 | 3.0 | Transportation sector/departments Elected officials/government administrators General public  |
| **Indicator** | **Quality Rating** | **Feasibility Rating** | **Influence Rating** | **Mean****Rating** | **Primary Audiences** |
| **Sustainability/Livability** |
| Health care costs of personal injuries from motor vehicle collisions by speed | 3.1 | 3.6 | 3 | 3.2 | Transportation sector/departments  |
| Health care costs of air pollution from motor vehicle emissions | 3 | 3.3 | 3 | 3.1 | Transportation sector/departments  |
| Walkability Scorea,b | 4.4 | 4.5 | 4 | 4.3 | Urban planners   |
| Bikeability Scoreb | 4 | 4.3 | 3.9 | 4.1 | Urban planners   |
| Transit Scoreb | 4.3 | 4.4 | 3.9 | 4.2 | Urban planners   |
| Person-miles traveled by mode | 4.6 | 4.8 | 3.9 | 4.4 | Transportation sector/departments  |
| Vehicle miles traveled (VMT) per capitaa | 4.9 | 4.8 | 4 | 4.6 | Transportation sector/departments  |
| Amount and cost of fossil fuel used in motor vehicles | 3.6 | 4.3 | 3.9 | 3.9 | Transportation sector/departments  |
| Investment in policies promoting sustainable planning/design | 3.3 | 3 | 3.4 | 3.2 | Elected officials/government administrators Urban planners  |
| Impervious surface coverage | 3 | 3 | 2.5 | 2.8 | Urban planners  |
| STAR + LEED for Cities (STAR community ratings; LEED Neighborhood Design) | 3.9 | 3.7 | 3.1 | 3.6 | Urban planners  |
| **Indicator** | **Quality Rating** | **Feasibility Rating** | **Influence Rating** | **Mean****Rating** | **Primary Audiences** |
| **Public Health** |
| Costs of absenteeism from work associated with physical inactivity | 3.2 | 3 | 3.6 | 3.3 | Elected officials/government administrators  |
| Health care costs associated with inactivity | 4 | 4.2 | 4 | 4.1 | Public health/medical sector |
| Life expectancya,b | 4.2 | 4.8 | 4.4 | 4.5 | Public health/medical sector  |
| Costs of premature death associated with physical inactivity | 4.2 | 4.4 | 4.25 | 4.3 | Public health/medical sector |
| Total personal transportation costsb | 4.4 | 4.2 | 4 | 4.2 | Elected officials/government administrators  |
| **Indicator** | **Quality Rating** | **Feasibility Rating** | **Influence Rating** | **Mean****Rating** | **Primary Audiences** |
| **Environmental Health** |
| Walkability Scorea,b | 5 | 5 | 4 | 4.7 | Transportation sector/departments  |
| Waterfront community assets | 3.5 | 4.5 | 4 | 4.0 | Parks and recreation sector/departments  |
| Tree canopy | 3.5 | 4.5 | 3.5 | 3.8 | Parks and recreation sector/departments Public health/medical sector  |
| Distribution of parks and greenspace | 3.5 | 4.5 | 4 | 4.0 | Parks and recreation sector/departments  |
| Air Qualitya | 4 | 4.5 | 5 | 4.5 | Transportation sector/departments Elected officials/government administrators  |

aIndicators are regarded as highest-rated indicators

bIndicators were proposed, considered, and rated by experts within multiple groups. When more than one group of experts rated an indicator, the mean ratings across all groups were used.

Appendix C. Example of measurement properties and their definitions from the on-line survey

These on-line survey items were adapted from existing measures.

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| **Quality4** – the extent that an indicator may (1) have a reliable and valid measurement method(s), (2) bereplicable and appropriate for comparisons over time (e.g. year over year), (3) is well-accepted when used in scientific publications and in evaluations of built-environment interventions. If the indicator is commonly calculated by a statistical model, quality refers to the how well such models work. The following graphic presents a sample from the email survey collecting ratings for “quality.”  |
|  |
| **Feasibility** – the difficulty in collecting and analyzing data on the indicator. Features associated with higher feasibility may include: (1) data for a relatively small geographic area (community or neighborhood) can be extracted easily from a large existing dataset (e.g. state, county, or city level), AND/OR there are no major challenges to primary data collection; (2) no restrictions on use of data (e.g., data is not proprietary nor confidential); (3) low cost of obtaining data; (4) data analysis does not require complicated data reduction and/or advance statistical methods. |
| **Influence** – the extent that an indicator is important to stakeholders and easily understood by them. In this context, stakeholder refers to groups who are involved in decisions about built environment projects at the community level. Features associated with higher influence of an indicator may include: (1) good “face validity;” (2) influences a broad range of stakeholder groups; (3) commonly arises in deliberations about whether a built environment projects should be funded and completed. |

1. Property Working Group of the United Nations Environment Programme Finance Initiative. *Sustainability Metrics: Translation and Impact on Property Investment and Management.* Geneva: United Nations Environment Programme;2014.

2. WHO Regional Office for Europe, OECD. Economic cost of the health impact of air polution in Europe: Clean air, health, and wealth. In. Copenhagen: WHO Regional Office for Europe; 2015:66.

3. Seiff C, Weissman D. Putting Active Transportation Performance Measures into Practice. *ITE Journal.* 2016;86:28-33. <http://cdn.coverstand.com/19175/292025/3ace92fc8c2cb1b91dec718d4a81e7539c91f17c.9.pdf>.

4. Starr G, Rogers T, Schooley M, Porter S, Wiesen E, Jamison N. *Key Outcome Indicator for Evaluating Comprehensive Tobacco Control Programs.* Atlanta, GA: Centers for Disease Control and Prevention;2005.