



THE MARIPOSA HEALTHY LIVING INITIATIVE

HEALTHY LIVING TOOLKIT

A COMPREHENSIVE GUIDE



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MITHŪN

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Contents

Executive Summary 4

Mariposa Healthy Living Toolkit..... 6

 Introduction..... 7

 User Guide 8

 Toolkit 12

 Measuring Progress 36

 Methodology 44

 Mariposa Healthy Living Tool History
 & Adaptation 48

 References & Citations..... 50

Appendices 58

 Glossary 59

 Authorship & Sponsor..... 62

 H+T Affordability Index Methods 64

Executive Summary

The Mariposa Healthy Living Initiative is an effort to advance the health and quality of life of residents through redevelopment.

Denver Housing Authority and their partners will redevelop nearly 900 new mixed-income housing units in a community called Mariposa, located in the La Alma/ Lincoln Park neighborhood near downtown Denver.

The Mariposa Healthy Living Initiative began in 2009, when the Denver Housing Authority and its master planning team established physical, mental, and community health as a proxy to understand how redevelopment actions would change the quality of life for residents. The Initiative recognizes that the built environment is a determinant of health outcomes, which ultimately influence the quality and length of life for residents. The Initiative uses a responsive and rigorous approach to address environmental and social determinants of health, which include Healthy Housing, Environmental Stewardship, Sustainable and Safe Transportation, Social Cohesion, Public Infrastructure, and Healthy Economy. The Initiative framework is intended to be a living implementation tool for designers, developers, and practitioners.

In 2009, a rapid Health Impact Assessment was performed that examined the relationship between health and the built environment at the existing South Lincoln Homes, and then established a baseline needs assessment for the public housing residents. As master plan options were developed, a customized version of the Healthy Development Measurement Tool was used to evaluate those options. The Tool was used to confirm that the final redevelopment master plan included strategies to address

Mariposa's priority issues, to: increase physical activity; improve pedestrian and bike opportunities; increase mobility and traffic safety; improve access to healthy foods; increase safety and security; and improve access to health care. The Healthy Development Measurement Tool also resulted in a series of recommended next steps and actions. These steps included redevelopment and services to help to improve health determinants for residents, and policies that incentivize healthy behavior and opportunities.

In the three years since the master plan was adopted, the first phase of construction has been completed and two other sites are now under construction. In 2012, a new effort was launched to further integrate health into every aspect of implementation by monitoring progress, refining recommendations, and developing implementation plans. A progress report has been completed that updates and refines the previously used health indicators and tracks health focused initiatives that have been completed to date. The progress report has informed priority initiatives, that focus on what is important for the health of residents now.

Progress to date

Monitoring has shown positive trends in many of the indicators of a healthy community, such as the total crime rate, which has dropped from 246 per 1,000 people in 2005, to 157 in 2011 for the La Alma/ Lincoln Park and Auraria neighborhoods, or the average transit commute time, which has dropped from 24 minutes in 2010 to 20 minutes in 2012 for the La Alma/ Lincoln Park neighborhood, as compared to 27 minutes in 2010 or 25 minutes in 2012 citywide. In the first phase of development, Tapiz, a 100-unit multi-family building, several elements were incorporated to improve health of residents, such as the 8-story building integrated mural that celebrates the cultural diversity and history of the neighborhood, the community gardens available

to residents to grow their own fresh foods in partnership with Denver Urban Gardens, and Connections@Tapiz, a community facility open to all that hosts a variety of programming through non-profit partners, including entrepreneurship and health classes.

Mariposa Healthy Living Initiative

The Mariposa Healthy Living Initiative includes:

- **Campaigns for Action - A District-wide Healthy Living Strategy:** campaigns with a specific goal and series of effective strategies to improve health. Each campaign is organized by a checklist and work plan. (under separate cover)
- **Get the Facts Evaluation:** a 2009 baseline assessment, a 2012 status update on indicator trends, implementation completed to date, and lessons learned. (under separate cover)
- **Mariposa Healthy Living Toolkit - A Comprehensive Guide:** a comprehensive evaluation tool and implementation guide for practitioners to incorporate health into design, redevelopment, and construction, drawing on health evidence and standards. The Tool is intended to promote cross-sector partnerships, to use a participatory approach that values resident and stakeholder experience, and to provide the best available evidence to decision-makers.

Campaigns for Action

With this Initiative, the Denver Housing Authority is launching five Campaigns for Action to improve health and well-being at Mariposa. These campaigns, which are already underway, provide the structure and framework for DHA staff, property managers, residents, community partners, and others to get involved in health focused initiatives at Mariposa. They include:

1. **Get Connected:** Improve physical, economic, and social connectivity to improve access to services, jobs, education, health care, arts and culture. Promote community engagement and social cohesion, and

celebrate cultural diversity.

2. **Healthy Places:** Create vibrant places that encourage physical activity and increase safety and security. Create living environments that support wellbeing.
3. **Healthy Eating:** Improve access to healthy and locally grown foods, promote healthy eating habits, celebrate cultural diversity, and improve social cohesion.
4. **Healthcare and Wellness:** Improve access to health care and services, support activities and programs to enhance wellbeing, and improve access to recreation facilities.
5. **Lifelong Learning:** Improve access to educational programs for all life stages, improve access to job training and career pathways, and improve financial literacy.

As design and construction moves forward at Mariposa, **now is the time to act on what's important** to improve health for the residents, and catalyze positive change for the broader La Alma/ Lincoln Park neighborhood.

Mariposa has an enormous opportunity to become a leadership community for healthy living, not only in Denver, but across the country.

The Mariposa Healthy Living Initiative, Campaigns for Action, and Toolkit provide the resources and framework for developers, community partners, and residents to be active participants in this continually evolving journey.

MARIPOSA HEALTHY LIVING TOOLKIT



Positive Health Outcomes in Community Redevelopment

Introduction

What is it?

The Mariposa Healthy Living Tool (Tool) is a guide to assess the health conditions of residents and identify opportunities for improvement through the built environment in urban redevelopment projects. This process is similar to a review process called a Health Impact Assessment (HIA), which is typically performed by public health government agencies, community organizations and academic institutions. The Tool was created for practitioners, developers and urban designers to improve health outcomes. The Tool affects health outcomes by advancing evidence-based and effective strategies that improve social and environmental determinants of health - specifically by targeting design, implementation, and construction in redevelopment projects.

It is based on a similar tool originally developed by the San Francisco Department of Public Health called the Healthy Development Measurement Tool (HDMT). In 2009, the Denver Housing Authority sponsored the customization of the HDMT, creating the Denver HDMT for use to identify priority health issues and guide the Mariposa redevelopment. The Mariposa Healthy Living Tool represents an evolution of the Denver HDMT.

Why?

The Mariposa Healthy Living Tool uses a new approach, providing a comprehensive evaluation tool and implementation guide for practitioners to incorporate health into design, redevelopment, and construction. The Tool considers comprehensive health needs in urban development with the ultimate goals of achieving higher quality social and physical environments that advance resident health, and draws on health evidence and standards. The Mariposa Healthy Living Tool focuses on health determinants related to projects and programs that can be shaped by designers and developers. The Mariposa Healthy Living Tool organizes determinants into the following dimensions, or sectors, of a healthy community:

- Healthy Housing
- Sustainable and Safe Transportation
- Environmental Stewardship
- Social Cohesion
- Public Infrastructure (services and amenities)
- Healthy Economy

User Guide

The Mariposa Healthy Living Tool was created to be used by developers, urban designers, architects, design professionals in all disciplines, practitioners, service providers, government organizations, and community groups to guide planning and redevelopment decisions and actions to improve health and health determinants. The Tool is intended to promote cross-sector partnerships, to use a participatory approach that values resident and stakeholder experience, and to provide the best available evidence to decision-makers. The Tool should be used in a timely manner with the best evidence available to effectively inform redevelopment decisions.

The Tool was created to be used for Mariposa redevelopment, and includes objectives, indicators, and strategies relevant to this target community. The

Tool should not be considered an exhaustive resource; however it was created to be used as a template that could be customized for use in other redevelopment efforts. If considered for use elsewhere, it should be customized before application to reflect the influences and characteristics of the particular community*.

The Mariposa Healthy Living Tool can be used in five steps to inform redevelopment decisions. This process is designed to be rigorous and evidence-based, to ensure strategies are responsive to identified needs, and to be tuned to the pace and decision-making process inherent in redevelopment and neighborhood revitalization. The Tool draws from the health impact assessment framework as described by the Center for Disease Control (CDC) and World Health Organization (WHO) and recent practice

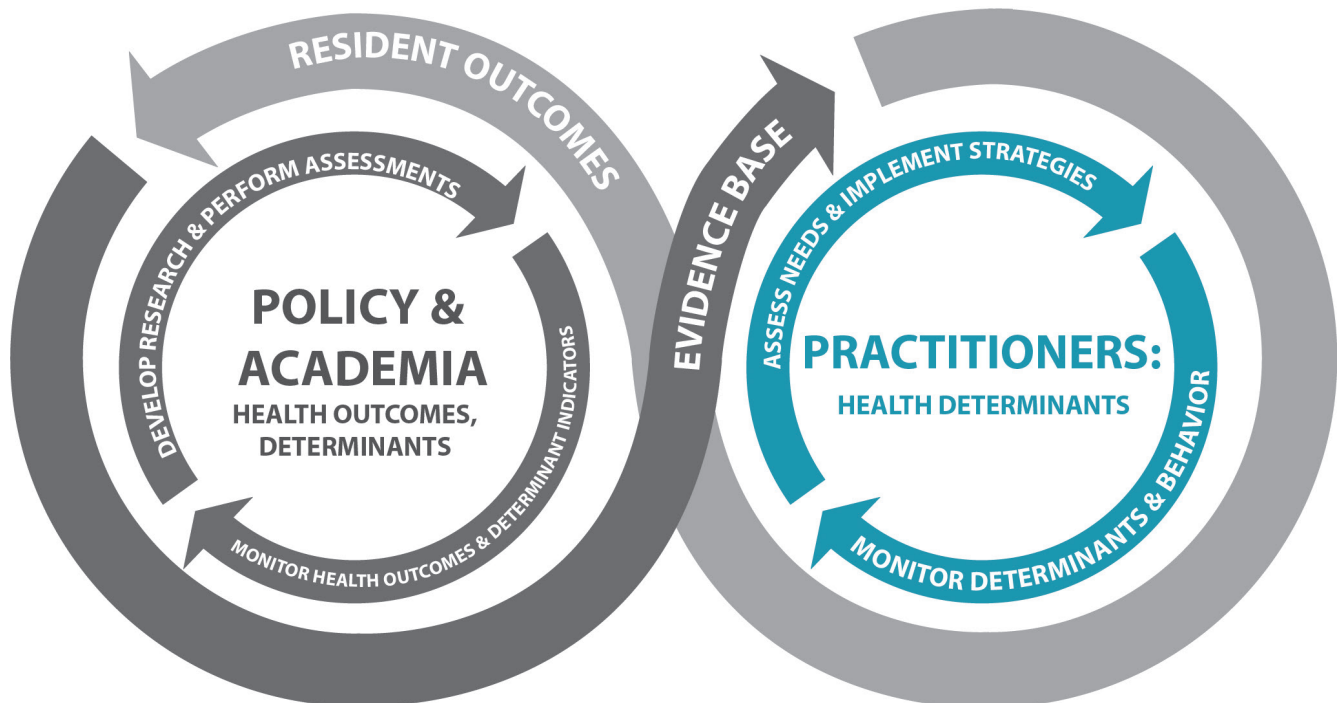


Fig. 5 Cross sector partnerships, review, and monitoring.

standards,¹ as well as the methodology described by The Roadmaps to Health Action Center, which is geared towards community activism and engagement². Using the Mariposa Healthy Living Tool, however, does not constitute completing a Health Impact Assessment.

¹ The Minimum Elements and Practice Standards for Health Impact Assessment, Version 2

² Based at the University of Wisconsin Population Health Institute, and available through the Healthy County program.

*MARIPOSA HEALTHY LIVING TOOL CUSTOMIZATION

The Denver Housing Authority respectfully requests that if you are planning on applying the Mariposa Healthy Living Tool to a development plan or project, that you notify us of your intention to do so. As we share the Mariposa Healthy Living Tool with a range of interested parties, we would like to track how it is being used.



"Application" of the Mariposa Healthy Living Tool means the evaluation of population health and a particular development project against our development targets and making a general assessment of the "healthfulness" of a plan/project. We do not consider the use of the indicator data, research citations, standards, or development targets as reference material in your work or in developing evaluation materials to be an "application."

If you do plan to apply the tool, we would like to be notified. In addition, we would also appreciate receiving materials related to your application – e.g., a description of the project you are evaluating or a completed application. Please note that receipt of any such documents is not the equivalent of an endorsement of your evaluation.

Endorsement Disclaimer: The Mariposa Healthy Living Tool represents a vision for healthy redevelopment at Mariposa that will positively influence the La Alma / Lincoln Park neighborhood. It provides a framework for practitioners to understand positive and negative health impacts of redevelopment, with the goal of recommending strategies to improve health determinants. While the Tool is intended to be useful for other practitioners, use of the Mariposa Healthy Living Tool alone does not constitute an endorsement of that particular redevelopment project.

Using the Mariposa Healthy Living Tool

1. Assess Needs and Resources:

Define the resident population or community of focus. Identify the decision-makers, an assessment team, technical resources, and a community engagement strategy. Using indicators from the Tool, conduct a baseline assessment of needs and resources. Consider conducting a Health Impact Assessment if there is a specific plan/ policy target.

Use the indicators as a guide to determine the status of health determinants in the community and to map existing assets and resources. Seek this information from residents and community stakeholders as well. *Use the Report Card Template to create your baseline, and customize it for your community.*

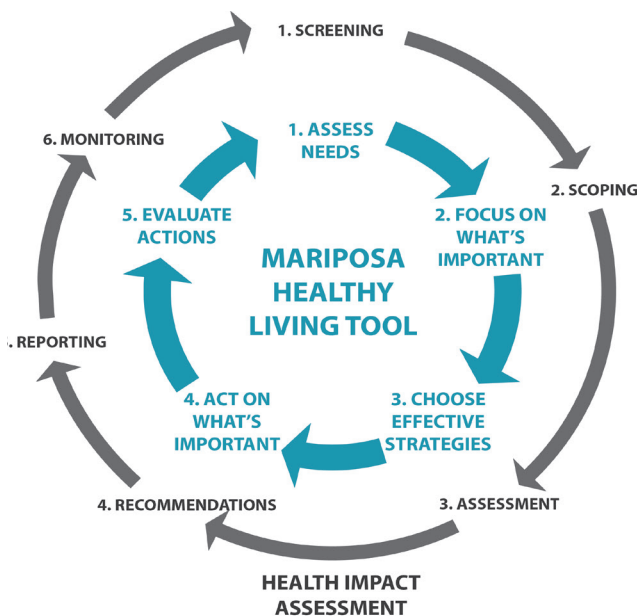


Fig. 6 Relationship between Mariposa Healthy Living Tool and Health Impact Assessment

2. Focus on What's Important:

Based on indicator data, status of health determinants, and map of assets and resources, identify priority issues for the community of focus. Determine areas of concern not yet addressed, and gather qualitative data on the lived experience of residents and community stakeholders through outreach and engagement. Consider which health determinants and characteristics are controlled by decision-makers and can be influenced by the redevelopment project.

Using the baseline indicator data, develop and set targets for how you want those indicators to evolve over time (e.g. decrease, increase) to reflect the desired future of the community. Customize the targets to the specific community if appropriate. Assess areas of concern not yet addressed, and gather feedback from advisory groups, community members and residents, and stakeholders to help inform priorities. Focusing on a single “message” or priority at a time leads to higher levels of success rather than spreading resources across a range of action items.

3. Choose Effective Strategies:

In order to influence the baseline indicators and improve health and health determinants, use the Tool to choose strategies that are relevant to the priority issues and targets. Refer to the evidence base and standards to learn more about whether the particular strategy will be applicable or appropriate to the redevelopment project. To be successful, prioritize a very limited number of strategies.

Report and recommend strategies to promote positive health effects or reduce adverse effects to the decision-makers and stakeholders for consideration.

4. Act on What's Important:

With buy-in from decision-makers and end-users, use the priority strategies to influence change in the redevelopment. Related strategies can be bundled together into campaigns. To create a road map for action, structure the campaigns in a series of steps to build measurable success, improve participation, and foster interest. Use a layers of engagement framework to be clear about who can be involved and how. *Use the Campaign Checklist template from the Mariposa Healthy Living Toolkit to document your campaigns, responsible parties, and timeframes for action.*



5. Evaluate Actions:

Monitor the progress of the redevelopment over time, tracking which recommendations and strategies are implemented. See “Measuring Progress” below for more information and guidance on monitoring. Evaluate the effect of the Tool on redevelopment decisions, and track resident health determinants using the indicators identified in step one to measure progress. Progress on these indicators can also be measured through the use of surveys or validation studies to understand the impact of strategies on resident behavior.

Guidance for indicator tracking and validation studies is available in the Mariposa Healthy Living Toolkit. Periodically, the strategies should be reassessed to identify whether adjustments in implementation or design are needed to better respond to resident experiences and any changing needs. Priority issues can then be readjusted as needed with this process. *Use the Report Card Template to track progress and indicators.*

GET CONNECTED DRAFT

MISSION
Get Connected is a holistic approach to improve neighborhood connectivity and accessibility to services, jobs, and education, and to promote community engagement. Improved connectivity is a crucial indicator across multiple healthy design determinants including Social Cohesion, Sustainable Transport, Public Infrastructure, and Healthy Housing, or across multiple healthy design determinants including Social Cohesion, Sustainable Transport, Public Infrastructure, and Healthy Housing.

STRATEGY	ACTIONS	TEAM	TIMELINE	SUCCESS
Provide visually appealing environments along paths of travel	1. Plant street trees when possible	DRK, DRL, B, CYCLE	FALL 2015	
	2. Contribute 7% of total construction costs to public art in streetscapes and key public spaces			
	3. Develop landscaping and public art guidelines, detailing regional appropriate scale, detailing regional appropriate scale			
	4. Create universally accessible streets			
Enhance street network and increase multi-modal connectivity	5. Install pedestrian and bicycle pathways where streets are disconnected			
	6.			
Provide a dedicated central space or kiosk to display information and real time information about transit and transportation options	7.			
	8.			
	9.			
	10.			
* Build safe and connected bicycle and pedestrian networks	11. Provide safe, convenient bicycle parking on streets, in parking garages, and in residential buildings			
	12. Improve pedestrian safety through traffic calming, traffic safety enhancement, intersection, roadway and sidewalk design			
	13. Provide secure, covered bicycle parking and changing facilities at workplaces			

Handwritten Notes:

- Top Right:** COORDINATE GROWTH WITH FINDING FROM MARIPOSA TO SANTA FE > METRO DISTRICT? TO MAINTAIN
- Middle Right:** WHO WOULD MAINTAIN? POSSIBLE PARTNER BY MAPS DISTRICT? INCA - KALAMATH - 13th
- Bottom Right:** "THE TASK FORCE" > PROPOSAL TO CITY TO HELP MY STREET IMPROVEMENTS
- Bottom Left:** STOP LIGHT @ 10th + KALAMATH - TRAFFIC CALMING > COORDINATE W/ SAFE ROUTES TO SCHOOL > MAP DESTINATIONS NOW + FUTURE
- Bottom Left:** MITH GROUP

September 2012 Mariposa Healthy Living Tool Advisory Panel Workshops, Credit: Perspective-3



MARIPOSA HEALTHY LIVING TOOLKIT

HEALTHY HOUSING

SUSTAINABLE, SAFE TRANSPORTATION

ENVIRONMENTAL STEWARDSHIP

SOCIAL COHESION

PUBLIC INFRASTRUCTURE

HEALTHY ECONOMY



INDICATORS



STRATEGIES



RESOURCES

The Mariposa Healthy Living Initiative began in 2009, when the Denver Housing Authority and its master planning team established physical, mental, and community health as a proxy to understand how redevelopment actions would change the quality of life for residents. The Initiative recognizes that the built environment is a determinant of health outcomes, which ultimately influence the quality and length of life for residents.

In 2009, a rapid Health Impact Assessment was performed

CAMPAIGN CHECKLIST

CAMPAIGN CHECKLIST TEMPLATE

STRATEGY	ACTIONS	PARTNERS	GOAL	STATUS
Improve access to and provide safe pedestrian routes to health care, providers, and counselors.	a. Improve access, safe pedestrian routes, and transportation to Denver Health. Coordinate a free shuttle to Denver Health.	DHA Resident Community Services (RCS); Denver Health	2014	✓ See "Success Stories," page 49
	b.			

REPORT CARD TEMPLATE

	INDICATOR	RATIONALE	DATA SOURCE (2009/2012)	GEOGRAPHIC SCOPE	CAVEATS & LIMITATIONS
HOUSING	PERCENT OF POPULATION LIVING BELOW POVERTY LEVEL	Poverty limits access to important health-enabling resources, including proper nutrition, good medical care, stable health insurance, and favorable housing ¹¹ .	Census 2000/ ACS 2006-2010	Auraria - Lincoln Park statistical area	The data sourced utilized aggregate the poverty rate for the Auraria and Lincoln Park neighborhoods. Because it is an institutional campus, Auraria has a very low number of residents which may alter the indicator results.
	PERCENT OF HOUSEHOLD INCOME SPENT ON HOUSING	This item can make be the largest expenditures in a household budget, effecting the amount of money available for health related costs ¹² .	Census 2000/ Census 2012	Census block group 19.01.2	
	HOUSING INDOOR ENVIRONMENT (AIR QUALITY, TEMPERATURE, HUMIDITY)	Homes that have inadequate heating or ventilation, can lead to the growth of mold, and dust mites, leading to asthma and respiratory allergies ¹³ .		Site/Building monitoring	Currently, baseline and monitoring data is not available for this indicator. The indicator relies on building evaluation.
TRANSPORTATION	AVERAGE TRANSIT COMMUTE TIME IN MINUTES	Reducing time spent on public transit can help incentivize transit as an alternative to driving. Residents dependent on transit that live in areas that experience higher than average commute times have less time available for physical and leisure activities that promote health and social well-being ¹⁴ .	n/a/ACS estimate	Auraria Lincoln Park statistical area	As is the case with all surveys, statistics from sample surveys are subject to sampling and non-sampling error.
	COST OF TRANSPORTATION AND HOUSING AS % OF AVERAGE INCOME	These two items make up the largest expenditures in a household budget; including transpo costs is more reflective of actual cost of living than just housing costs ¹⁵ .	H-T INDEX 2010/2012, derived from ACS and other datasets	Census block group 19.01.2	H-T Affordability Index methodology uses a model to estimate three dependant variables from independent variables. For the ACS housing cost data, renters paying with vouchers may be excluded.
	NUMBER OF TRAFFIC INJURIES/ COLLISIONS/ FATALITIES	This is an indicator of the safety risk of the street network for road users, including pedestrians, cyclists, drivers and passengers. Traffic collisions involving motor vehicles are one of the leading causes of preventable injury in the nation ¹⁶ .	Denver Police 2009/2012	Auraria - Lincoln Park statistical area	This data is currently being collected from the Denver Police Department.







Why is this a health determinant? Adverse housing environments can be substandard, overcrowded, or undesirably located; high costs may leave fewer resources for food, transportation, health care ¹⁻⁴. Homeownership positively impacts social cohesion and civic participation ⁵.

Desired objectives: Provide a range of housing options: size, tenure, affordability; protect from involuntary displacement; decrease concentrated poverty; ensure access to healthy, quality housing and home environment.












HEALTHY HOUSING INDICATORS

-  Percent of population living below poverty level
-  Housing supply and options Index and match of need
-  Percent of household income spent on housing and transportation
-  Housing health & safety



HEALTHY HOUSING STRATEGIES

-  Support a housing “ladder” in the neighborhood through educational and support programs and by increasing the available range of housing types and affordability levels. Support residents moving from deeply subsidized to middle income housing to homeownership ^a.
-  Install a ventilation system for the dwelling unit capable of providing fresh air per ASHRAE requirements to ensure indoor air quality ^b.
-  Construct energy efficient housing to reduce utility costs and to improve outdoor air quality ^c.
-  Include casual, everyday opportunities for physical activity in indoor spaces as well as in the functionality of commercial workplaces and residential buildings ^{6-7, d}.
-  Implement and enforce a no smoking policy within buildings and 25 feet around all residential buildings ^e.
-  Provide interior daylighting in 90% of common areas and 75% of all areas ^f.
-  Provide access to views of nature in 90% of common areas and 75% of all areas ^f.
-  Within multi-family and mixed-use buildings, provide visually appealing environments along hallways and paths of travel ^g.
-  Design a minimum of 15% of the dwelling units (no fewer than one) in accordance with ICC /ANSI A117.1, Type A, Fully Accessible guidelines ^h.

(#) - See page 108 for reference

(x) - See resources opposing page



Indicates strategies linked to health evidence and academic research.



HEALTHY HOUSING RESOURCES

- a. **LEED ND - NPDc4 - Mixed Income Diverse Communities:** To promote socially equitable and engaging communities by enabling residents from a wide range of economic levels, household sizes, and age groups to live in a community.
- b. **LEED ND- GIBc2: Building Energy Efficiency** - To encourage the design and construction of energy-efficient buildings that reduce air, water, land pollution and adverse environmental effects from energy production and consumption.
- c. **Enterprise Green Communities Criteria 5.1 -5.8 Energy Efficiency:** Improvements in building energy performance result in utility cost savings from more efficient heating, cooling, hot water, lights and appliances, which improves residents' comfort and lowers operating costs.
- d. **NYC Active Design Guidelines - 2.1 Land Use Mix** - When planning urban-scale developments, provide for a mix of uses—for example, residences, offices, schools, retail stores, cultural and community spaces, and recreational facilities.
- e. **Enterprise Green Communities - Criteria 7.16 Smoke Free Building:** Implement and enforce a no-smoking policy in all common and individual living areas, and with a 25-foot perimeter around the exterior of all residential projects. The lease language must prohibit smoking in these locations and specify that it is a violation of the lease to smoke and the restriction applies to all owners, tenants, guests, and service-persons.
- f. **LEED NC- EQc8.1-8.2: Daylight and Views** - To provide building occupants with a connection between indoor spaces and the outdoors through the introduction of daylight and views into the regularly occupied areas of the building.
- g. **NYC Active Design Guidelines 2.9 - Designing Pedestrian Pathways:** Create or orient paths and sidewalks toward interesting views. Research indicates that the provision of attractive open views from a path encourages increased walking.
- h. **Enterprise Green Communities - Criteria 1.2 Universal Design:** Design a minimum of 15% of the dwelling units (no fewer than one) in accordance with ICC /ANSI A117.1, Type A, Fully Accessible guidelines, **LEED ND NPDc11 - Visibility and Universal Design.**







Why is this a health determinant? Quality, safe pedestrian and bicycle environments support an increase in physical activity with benefits including the prevention of obesity, diabetes, and heart disease as well as stress reduction and mental health improvement ¹⁸⁻²¹.

Desired objectives: Reduce VMT; provide accessible, affordable public transportation; create safe, quality environments for walking and biking.














SUSTAINABLE, SAFE TRANSPORTATION INDICATORS

-  Transportation mode split
-  Average transit commute time
-  Cost of transportation and housing as a percentage of average income
-  Number of (pedestrian, bicycle) traffic injuries/ collisions/ fatalities



SUSTAINABLE, SAFE TRANSPORTATION STRATEGIES

-  Improve the pedestrian infrastructure and environment, for all ages and abilities ^{22-25, a}.
-  Implement traffic calming measures as part of street design to address areas of conflict ^{26, b}.
-  Consider ongoing tracking of pedestrian and bicycle counts and accident reporting (Use the Pedestrian Environmental Quality Index (PEQI) or other pedestrian audit tools) ^c.
-  Enhance the bicycle network and infrastructure and improve cyclist safety, and promote bicycle sharing within the neighborhood ^{27-28, d}.
-  Prioritize new development and housing close to high quality public transportation options and in locations with walkable amenities and services ^{29, e}.
-  Enhance the street network and increase multi-modal street connectivity ^{30, a, f}.
-  Provide transit facilities that are safe and close to housing and services, amenities, and destinations ^g.
-  Provide “last mile” options to get from transit to destinations ^h.
-  Provide no-cost or reduced cost shuttles between worksites, homes, health care facilities, and regional public transit ⁱ.
-  Promote carshare/carpooling within neighborhoods ^{h, i}.
-  Implement a Transportation Demand Management (TDM) program. Consider funding a transit pass program, and subsidizing free or discounted passes for income-qualified households ^{h, j}.

(#) - See page 108 for reference

(x) - See resources opposing page



Indicates strategies linked to health evidence and academic research.



SUSTAINABLE, SAFE TRANSPORTATION RESOURCES

- a. **Enterprise Green Communities Criteria 5.1 -5.8 Energy Efficiency:** Improvements in building energy performance result in utility cost savings from more efficient heating, cooling, hot water, lights and appliances, which improves residents' comfort and lowers operating costs.
- b. **NYC Active Design Guidelines - 2.8 Traffic Calming** -Promote walking and improve the overall pedestrian experience through traffic calming measures. Slowing traffic helps to maintain the human scale—and pace—of city streets.
- c. **Pedestrian Environmental Quality Index** draws on published research and work from numerous cities to assess how the physical environment impacts whether people walk in a neighborhood. <http://www.sfphes.org/elements/24-elements/tools/106-pedestrian-environmental-quality-index>
- d. **LEED ND- SSLc4 Bicycle Network and Storage Requirements:** To promote bicycling and transportation efficiency, including reduced vehicle miles traveled (VMT). To support public health by encouraging utilitarian and recreational physical activity.
- e. **LEED ND- SSLc3 - Locations with Reduced Automobile Dependence:** To encourage development in locations shown to have multimodal transportation choices or otherwise reduced motor vehicle use, thereby reducing greenhouse gas emissions, air pollution, and other adverse environmental and public health effects associated with motor vehicle use.
- f. **LEED ND- NPDc1 - Walkable Streets:** To promote transportation efficiency, including reduced VMT. To promote walking by providing safe, appealing, and comfortable street environments that support public health by reducing pedestrian injuries and encouraging physical activity.
- g. **LEED ND- NPDc7 - Transit Facilities:** To encourage transit use and reduce driving by providing safe, convenient, and comfortable transit waiting areas and safe and secure bicycle storage facilities for transit users.
- h. **LEED ND- NPDc5 - Reduced Parking Footprint:** To design parking to increase the pedestrian orientation of projects and minimize the adverse environmental effects of parking facilities.
- i. **LEED ND- NPDc8 - Transportation Demand Management:** To reduce energy consumption, pollution from motor vehicles, and adverse health effects by encouraging multi modal travel.
- j. **Victoria Transport Policy Institute. 2011. Online TDM Encyclopedia.** Available at: <http://www.vtpi.org/tdm/>.



Why is this a health determinant? Access to open space and natural areas with outreach and education can increase the frequency of physical activity by 48% ⁸. Exposure to fine particulate air pollution is associated with cardiovascular risk and increased risk of death ⁹⁻¹⁰. Long term exposure to noise can adversely affect sleep, school and work performance ¹¹.

Desired objectives: Restore, preserve, and enhance natural areas and open space; preserve clean air quality and water quality; maintain safe levels of community noise.



ENVIRONMENTAL STEWARDSHIP INDICATORS

-  Open space/ nearby nature within neighborhood
-  Air quality - particulate matter
-  Vehicle Miles Traveled (VMT) per capita per day
-  Average daytime and nighttime outdoor noise levels



ENVIRONMENTAL STEWARDSHIP STRATEGIES

-  Provide publicly accessible outdoor open space and coordinate maintenance and programming ^{12,a}.
-  Provide, improve, and if possible maintain natural areas, vegetation, and tree canopy to improve air quality issues and mitigate crime ^{13-15, b}.
-  Re-designate truck routes away from residential and sensitive areas.
-  Use dust control measures and emissions technologies for construction equipment to improve air quality during demolition and construction ^c.
-  Mitigate or remediate any contaminated sites or pollution point sources ^d.
-  Design units and buildings exposed to high noise levels to mitigate noise using sound attenuation in the building, and with interior courtyards and patios that open into acoustically protected and shielded areas ^{16,e}.
-  Provide comfortable, healthy indoor environments with good air quality, access to daylight, and views to nature ^{17, f}.
-  Reduce vehicle miles traveled (VMT) to improve air quality ^{17, g}.
-  Design and build the project to a density of at least 15 dwelling units per acre to support mass transit ^h.

(#) - See page108 for reference

(x) - See resources opposing page

 Indicates strategies linked to health evidence and academic research.



ENVIRONMENTAL STEWARDSHIP RESOURCES

a. Enterprise Green Communities-Criteria 2.6-7 Preservation of and Access to Open

Space: Access to open space and natural resources improves quality of life and provides the opportunity to better understand the importance of the natural environment.

b. SITES: Credit 4.7 - Provide outdoor spaces for mental restoration and SITES Credit 4.8 - Provide outdoor spaces for social interaction.

c. SITES: Credit 4.4 - Minimize Soil Disturbance in Design and Construction: Limit disturbance of healthy soil to protect soil horizons and maintain soil structure, existing hydrology, organic matter, and nutrients stored in soils.

d. SITES: Credit 7.3 Restore Soils Disturbed by Previous Development: Restore soil function in areas of previously disturbed topsoils and subsoils to rebuild the site's ability to support healthy plants, biological communities, water storage, and infiltration.

e. SITES: Credit 6.7 - Provide Views of Vegetation and Quiet Outdoor

Spaces for Mental Restoration: Develop and implement a plan to provide views of vegetation and access to quiet outdoor space(s) on site to optimize mental health benefits of site users.

f. Enterprise Green Communities: Criteria #7 - Healthy Living Environment - Optimal ventilation improves indoor air quality and the flow of fresh air throughout the home, contributing to a healthier living environment.

g. Enterprise Green Communities: Criteria #2 Location and Neighborhood Fabric - Locating a project within an existing neighborhood and in close proximity to infrastructure encourages more resource-efficient development of land, reduces development costs, conserves energy, and adds to the vitality of the overall community.

h. Enterprise Green Communities-Criteria 2.4 Compact Development: Design and build the project to the density required for the location type.



Why is this a health determinant? Neighborhood crime strongly influences a willingness to allow children to actively commute (e.g. walk or bike)³¹⁻³³. Group membership and political participation is associated with improved health outcomes³⁴⁻³⁵.

Desired objectives: Promote a socially cohesive community; support a diverse population; promote a safe and secure community; support community gathering and spaces for interaction; support mental health.



SOCIAL COHESION INDICATORS

- Proportion of population within 1/2 mile to community gathering spaces
- Residential mobility (% residents living at their current residence for less than 1 year)
- Voting Power: Percentage of population of eligible adults who voted
- Perceived safety
- Violent and property crime rate per 1,000 people



SOCIAL COHESION STRATEGIES

- Provide affordable space for nonprofit providers within community^a.
- Provide translation services at meetings intended for community input to encourage diverse participation^b.
- Actively engage with community groups and organizations to assure equitable participation in all planning processes^c.
- Provide meeting areas and community spaces for voting, community meetings, after school programming, mentoring, or other social programs^{36, d}.
- Apply Crime Prevention through Environmental Design (CPTED) principles in public realm and infrastructure design and construction, building design and construction, and infrastructure design and construction^{37-38, e}.
- Support programs and organizations supporting voter registration and civic engagement^f.
- Address barriers to eligibility, provide information about, and address affordability of services and resources related to housing, food, and employment services^{39, g}.
- Encourage the development of neighborhood groups that are involved and active in community issues^h.
- Track and share crime rate and statistics to make information accessible to communityⁱ.

(#) - See page 108 for reference

(x) - See resources opposing page



Indicates strategies linked to health evidence and academic research.



SOCIAL COHESION RESOURCES

- a. **Social Support Measurement and Intervention.** Cohen S, Underwood LG, Gottlieb BH. 2000. Oxford University Press. New York.
- b. **The Evidence Base for Cultural and Linguistic Competency in Health Care,** T. D. Goode, M. C. Dunne, and S. M. Bronheim, The Commonwealth Fund, October 2006
- c. **LEED ND- NPDc12: Community Outreach and Involvement:** To encourage responsiveness to community needs by involving the people who live or work in the community in project design and planning and in decisions about how it should be improved or how it should change over time.
- d. **Social Support Measurement and Intervention.** Cohen S, Underwood LG, Gottlieb BH. 2000. Oxford University Press. New York.
- e. **Effectiveness of crime prevention through environmental design (CPTED) in reducing robberies.** Casteel C, Peek-Asa C. 2000. Am J Prev Med 18:99-115.
- f. **A multilevel analysis of key forms of community- and individual- level social capital as predictors of self-rated health in the United States.** Kim D, Kawachi I. 2006. Journal of Urban Health 83(5):813-826.
- g. **Case Management Society of America. (2010).** (CMSA) Standards of Practice for Case Management. Retrieved April 18, 2010, <http://www.cmsa.org/portals/0/pdf/memberonly/StandardsOfPractice.pdf>
- h. **Crime Prevention Research Review No. 3: Does Neighborhood Watch Reduce Crime?** Holloway, Katy, Trevor Bennett, and David P. Farrington. Washington, D.C.: U.S. Department of Justice Office of Community Oriented Policing Services, 2008
- i. **The Piton Foundation - Community Facts:** a tool developed to make data about the health and well-being of Denver-area families and communities widely accessible. Community Facts provides detailed information about geographical areas related to demographics, education, housing, economics, health, safety, and more. <http://www.piton.org/CommunityFacts>







Why is this a health determinant? Academic performance is related to educational achievement, predicting health outcomes and the effects of education on lifetime earnings ⁴⁰. Access to healthy food choices and neighborhood amenities is directly correlated to obesity and diabetes rates ⁴¹⁻⁴³.

Desired objectives: Promote access to, and affordability of quality public infrastructure: education, child care, public health and recreation facilities, daily goods and services; promote affordable and high-quality food access.



PUBLIC INFRASTRUCTURE INDICATORS

-  Neighborhood Completeness Indicator for public services and retail
-  School performance within neighborhood (include graduation rate as a complementary indicator)
-  % of population within 1/2 mile of retail food, a full service supermarket or grocery store, farmers market, or Community Supported Agriculture drop-off site
-  Public health facility and recreation facility access within ½ mile and by transit



PUBLIC INFRASTRUCTURE STRATEGIES

-  Contribute a percentage of total construction costs to creation of public art, public performance on site, or contribute to public arts fund.
-  Improve the pedestrian-level design of buildings to promote and reinforce cultural vitality ^a.
-  Improve access to healthcare facilities and sources. Address access with a Transportation Management Plan and by encouraging transit density near hospitals and health facilities ^b.
-  Encourage grocery stores and corner stores within walking distance to provide a minimum of 10% shelf space to fresh produce ⁴⁴.
-  Promote small scale, distributed healthy food choices, including new fresh foods markets and healthy restaurants ^{44, c}.
-  Require food vendors to accept food stamps/Electronic Benefits Transfer (EBT) and WIC vouchers (Women, Infants and Children) ^d.
-  Promote transit density near hospitals and other health facilities, to minimize public parking and use of cars ^e.
-  Coordinate with local school districts, parks and recreation facilities, and non-profits to maximize youth programming opportunities during non-school hours ^f.
-  Provide child care and early education facilities in the new development or support development of facilities in the neighborhood ^{h,i}.
-  Support community partnerships that promote continuing education, high quality education and life-long learning ^{a, g}.
-  Improve access to and provide safe pedestrian routes to educational facilities and institutions, including neighborhood schools ^{a,h}.

(#) - See page 108 for reference

(x) - See resources opposing page



Indicates strategies linked to health evidence and academic research.



SOCIAL COHESION RESOURCES

a. LEED ND - NPDc1 - Walkable Streets: To promote transportation efficiency, including reduced VMT. To promote walking by providing safe, appealing, and comfortable street environments that support public health by reducing pedestrian injuries and encouraging physical activity.

b. Enterprise Green Communities Criteria 2.5 Proximity to Services: Locate the project within designated distances from community support facilities.

c. LEED ND NPDc13 - Local Food Production: To promote community-based food production, improve nutrition through increased access to fresh produce, and support local economic development that increases the economic value and production of farmlands and community gardens.

d. Enterprise Green Communities Criteria 2.12 Access to Fresh, Local Foods: Access to fresh produce offers healthy food options for residents.

e. LEED ND - SSLc3 - Locations with Reduced Automobile Dependence: To encourage development in locations shown to have multimodal transportation choices or otherwise reduced motor vehicle use, thereby reducing greenhouse gas emissions, air pollution, and other adverse environmental and public health effects associated with motor vehicle use.

f. LEED ND NPDc10 - Access to Recreation Facilities: To improve physical and mental health and social capital by providing a variety of recreational facilities close to work and home to facilitate physical activity and social networking.

g. Center on School, Family, and Community Partnerships. John Hopkins University. <http://www.csos.jhu.edu/P2000/center.htm>

h. LEED ND NPDc15 - Neighborhood Schools: To promote community interaction and engagement by integrating schools into the neighborhood. To support students' health by encouraging walking and bicycling to school.

i. Including Child Care in Local Planning. Child Care Law Center. 2005. <http://www.ccc-oc.org/Resource/Regulations/Including%20Child%20Care%20in%20Local%20Planning.pdf>









Why is this a health determinant? Income is one of the strongest and most consistent predictors of health and disease in the public health research literature.

Desired objectives: Increase quality, healthy employment opportunities and access for residents; increase equity in income and wealth; promote entrepreneurship, locally and resident owned businesses.




HEALTHY ECONOMY INDICATORS

-  Unemployment, including by race
-  Percent of jobs paying wages equal to or greater than self sufficiency
-  Proportion of jobs available by transit, walking, or bicycle
-  Number of new businesses in area
-  Access to banks and credit unions
-  Percent of population aged 25 and above without a high school education or GED



HEALTHY ECONOMY STRATEGIES

-  Provide Green jobs training and access to Green jobs.
-  Provide and/or support job training programs, especially in sectors that provide self-sufficiency wages and good benefits ^{45-46, a}.
-  Promote the expansion/retention of neighborhood-serving, full-service financial institutions in the neighborhood ^{47, b}.
-  Provide financial literacy education and training (e.g. credit repair, first time homebuyer training) ^{48, c}.
-  Encourage financial institutions to offer Individual Development Accounts which match the savings of debt-free, income-qualified personal accounts with both federal dollars and private donations ^{49, d}.
-  Provide space under favorable terms (e.g. % of sales rent) in the project for new and relocated locally-owned or Section 3 businesses.
-  Increase the quantity and quality of start-up spaces.
-  Provide business management training programs or business support programs ^{50, e}.

(#) - See page 108 for reference

(x) - See resources opposing page



Indicates strategies linked to health evidence and academic research.



HEALTHY ECONOMY RESOURCES

- a. **WOW Congressional Testimony on WIA: Recommendations to Improve the Effectiveness of Job Training.** Hearing on “Workforce Investment Act: Recommendations to Improve the Effectiveness of Job Training” July 26, 2007.
- b. **National Housing Institute “When Your Bank Leaves Town: How Communities Can Fight Back”.** <http://www.nhi.org/online/issues/126/bankclosings.html>
- c. **A. Lusardi, “Household Saving Behavior: The Role of Financial Literacy, Information, and Financial Education Programs,”.** NBER Working Paper No. 13824, February 2008, and forthcoming in “Implications of Behavioral Economics for Economic Policy.”
- d. **CFED Assets and Opportunities Scorecard: Reviewing Individual Development Accounts Benefits and Costs.** http://scorecard2009.cfed.org/financial.php?page=support_ida_programs
- e. **“Local Capitalism, Civic Engagement, and Socioeconomic Well-Being.”** Tolbert, Charles M., Thomas A. Lyson, and Michael D. Irwin. 1998. *Social Forces* 77(2):401–428.



RELEVANT ORGANIZATIONS

Healthy Housing

- **The Denver Housing Authority** is a quasi-municipal corporation with a portfolio of more than 11,000 units and housing choice vouchers, providing affordable housing to more than 26,000 very low, low and middle income individuals representing more than 10,000 families. DHA has transformed public housing in Denver creating vibrant, revitalized, sustainable, transit-oriented, and mixed-income community of choice. www.denverhousing.org
- **The Denver Office of Economic Development (OED)** is committed to the preservation, rehabilitation and development of affordable housing. OED offers programs in quality affordable housing, an enhanced living environment, energy saving options, and expanded economic opportunities to benefit those with low and moderate incomes, tenants with special needs and the low-income elderly. For more information, go to www.denvergov.org/

Sustainable, Safe Transportation

- **Regional Transportation District (RTD)** offers bus, light rail, and "skyride" services within the Metro Denver area. RTD has more than 140 Local, Express, and Regional bus routes serving 10,000 bus stops, five light rail lines (and growing) providing more than 35 miles of light rail service. Go to rtd-denver.com for schedules and information.
- **Denver B-cycle** is a citywide public bike sharing system made for people taking short trips around the city. A member of Denver B-cycle can pick up a bike at any B-station and return it to that station or any other B-station when they are done riding. Memberships

can be purchased at any kiosk or online. Go to denver.bcycle.com for more information.

- **eGo CarShare** is a local non-profit car sharing organization that serves the Denver-Boulder Metro area. Their mission is to provide and promote alternatives to individual car ownership, thereby reducing the environmental and social impacts associated with motor vehicle use. Anyone can become a member and rent a car, go to carshare.org for more information.
- **Bike Denver** is Denver's bicycle advocacy organization and the leading non-profit to promote and encourage bicycling as an energy efficient, non-polluting, healthy and enjoyable transportation alternative in and around Denver. Go to bikedenver.org for more information.
- **Institute of Transportation Engineers** is an international educational and scientific association of transportation professionals who are responsible for meeting mobility and safety needs. ITE facilitates the application of technology and scientific principles to research, planning, functional design, implementation, operation, policy development and management for any mode of ground transportation. Through its products and services, ITE promotes professional development of its members, supports and encourages education, stimulates research, develops public awareness programs and serves as a conduit for the exchange of professional information. Go to <http://www.ite.org/> for more information.

Environmental Stewardship

- **The Trust for Public Land** is a national nonprofit that conserves land for people to enjoy as parks, gardens, historic sites, rural lands and other natural places. The organization works from the inner city

to the wilderness, ensuring livable communities for generations to come. For more information, go to www.tpl.org/

- **The Northwest Earth Institute** helps lead the curious and the motivated to take responsibility for Earth. NEWI offers remote learning in a variety of topics, including the following: Choices for Sustainable Living, A World of Health, Hungry for Change, Reconnecting With Earth, and many more. For more information, go to www.nwei.org
- **The City of Denver's Parks and Recreation** provides more than 200 city and mountain parks for people to enjoy year round. Denver Parks and Recreation's Parks maintains parks, greenhouses, fountains, river and trails, and more. The organization also has a focus on sustainability, especially with water conservation. For more information, go to denvergov.org/parks

Social Cohesion

- **The Denver Police Department**, in partnership with the community, the Denver Police Department endeavors to deliver high quality public safety services so all people may share a safe and healthy environment. For non-emergency help call, 720-913-2000 or go to denvergov.org/police
- **Lincoln Park Neighborhood Association (LPNA):** Denver's Registered Neighborhood Organizations (RNOs) are organizations registered with the City of Denver that are formed by residents and property owners within a neighborhood (or other defined set of boundaries) that meet regularly. The RNO for La Alma/ Lincoln Park is called Lincoln Park Neighborhood Association. RNOs receive notification of proposed zoning amendments, landmark designation applications, planning board and board of adjustment

hearings, liquor and cabaret licenses and other activities occurring in the neighborhood as stipulated in the Revised Municipal Code. For more information, go to <http://www.lincolnparkneighborhood.org/>

- **Denver Health and Hospital Authority** is a comprehensive, integrated organization providing level one care for all, regardless of ability to pay. Twenty-five percent of all Denver residents, or approximately 150,000 individuals, receive their health care at Denver Health. As Colorado's primary safety net institution, Denver Health has provided billions of dollars in uncompensated care. Denver Health is an integrated, efficient, high-quality health care system serving as a model for other safety net institutions across the nation. For more information, go to <http://denverhealth.org>

Public Infrastructure

- **The Auraria Campus** is an educational facility located in Downtown Denver. The campus houses three universities and colleges: (1) The University of Colorado Denver (UCD), (2) Metropolitan State University of Denver, (3) Community College of Denver. For more information, go to <http://www.ahec.edu/>
- **Center for Work, Education and Employment** ("CWEE") assists single parents (mostly single mothers) in reaching self sufficiency. Located across Osage from Lincoln Park, the program is a three month program that participants attend five days per week, from 9AM to 4PM. For more information, go to www.cwee.org/
- **Catholic Charities Child Care Services and Head Start Services'** mission is to promote family and child development through a partnership which involves staff, families, children and the community. Their vision is to provide quality Child Care and



RELEVANT ORGANIZATIONS

early childhood programs by using developmentally appropriate practices in a safe and nurturing environment. By honoring and supporting children and their families, we wish to help them reach their highest potential. For more information, go to www.ccdenver.org

- **The Colorado Child Care Assistance Program (CDHS)**, a Division of Child Care, is the lead agency on the Colorado Child Care Assistance Program (CCCAP). The program provides child care assistance to low-income families that are working, searching for employment or are in training, and families that are enrolled in the Colorado Works Program and need child care services to support their efforts toward self-sufficiency. For more information, go to www.colorado.gov/cs
- **Emily Griffith**, which is a DPS school, is an accredited technical college founded in 1916. It is similar to community college, but offers only career and technical (not general) education. Emily Griffith uses the same course numbering system as the Colorado community colleges and all credits are transferable to community colleges. Courses are offered under nine tracks: the Apprentice Training Division; Business and Technology; Design Industries; Health Sciences, Trades and Industry, the Language Learning Center (ESL), Corporate Training, Emily Griffith High School (for those under 21), and Extended Learning (adult education/GED). EG was founded to educate and care for non-traditional students. For more information, go to www.egos-school.com
- **The Bridge Project's** mission is to provide educational opportunities for children living in Denver's public housing neighborhoods so they graduate from high school and attend college or learn a trade. For more information, go to <http://www.du.edu/bridgeproject/>
- **Boys and Girls Clubs** are places where young people come to learn, do homework, develop social skills, express themselves creatively, and participate in sports. Boys & Girls Clubs of Metro Denver also owns and operates a residential summer camp near Ward, Colorado called Gates Camp. The Clubs are staffed by full-time professionals and located in neighborhoods where they are needed most. For more information, go to <http://www.bgcmd.org/>
- **Childcare Law Center The Child Care Law Center** uses legal expertise to secure good, affordable child care for low-income families and communities. Every day, we break down barriers to child care for working parents because without it they cannot support their families. Every day, we stand up for child care providers because children need good early care and education to thrive. For more information, go to <http://www.childcarelaw.org/>
- **The Center on School, Family, and Community Partnerships's** mission is to conduct and disseminate research, programs, and policy analyses that produce new and useful knowledge and practices that help parents, educators, and members of communities work together to improve schools, strengthen families, and enhance student learning and development. For more information, go to <http://www.csos.jhu.edu/p2000/center.htm>
- **The Healthy Corner Stores Network** supports efforts to increase the availability and sales of healthy, affordable foods through small-scale stores in underserved communities. Because together, we can create better meal alternatives in our communities than just chips and soda. For more information, go to <http://www.healthycornerstores.org/about-us>


Healthy Economy

- **The Rocky Mountain MicroFinance Institute** (RMMFI) is a non-profit organization that provides learning, lending and coaching to grow Community Entrepreneurs who build businesses to advance along the pathway to self-sufficiency and self-worth. RMMFI's brand of microfinance combines affordable and approachable business support services and flexible microloans to help individuals turn a good idea into an income-generating business. For more information, go to www.rmmfi.org/
- **Mi Casa** is a leading career and business development center dedicated to advancing the success of Latino Families in Denver. Mi Casa's Career Development track focuses on high growth industries, short term job training programs that enable people to work as quickly as possible, career paths that offer strong earning potential and jobs that favor bilingual individuals. Focus industries are business and financial operations, healthcare support and construction. Within this tract, Mi Casa offers a pre-apprentice program, with a green energy focus for those interested in construction. The program, offered four times per year, trains 20 people in each class. The financial services program, offered four times per year, trains 15 people in each class. The healthcare program is still under development. CITC and Emily Griffith are training partners for Mi Casa. The Business Development tract helps Latinos start a new business or expand/sustain an existing one, specifically by helping participants develop a business plan, address specific needs, connect with funding sources, and network with other businesses. The Youth and Family Development tract empowers students to succeed and stay in school, while learning about advocacy, college,

career paths and entrepreneurial skills. The Removing Barriers to Success tract offers case management, job placement assistance, ESL, Spanish, GED, Adult Basic Education, Financial Literacy, life skills and seminars. For more information, go to micasadenver.org/


- **Denver Public Schools** For more information, go to <http://www.dpsk12.org/>
- **OED's Division of Workforce Development** runs five Work Force Centers throughout the City. The centers assist those seeking jobs in developing career goals, assessing skills, identifying resources (education and training opportunities, and funding assistance) to close knowledge gaps, identifying job opportunities, and applying for job opportunities. Workforce Center Services are free to the public. The main offering for adults is a two week job readiness program that covers basic computer skills, resume writing, interviewing, networking, professional goal setting etc. The Workforce Centers also offer job placement programs for youth ages 14 through 21, including Youth training Academies run in partnership with DHA. Mariposa lies between two work force centers (the Westside Center at 13th and Federal in the Denver Human Services building, and the Speer Workforce Center on 14th and Speer above King Soopers. The Westside Center serves approximately 22,000 people per month, and the Speer Center serves about 11,000 people per month. The Culinary Youth Trades Academy is at South Lincoln (at 1401 Mariposa). Workforce has a TAG Program that focuses on refugees. Certain youth and adult programs have income and other restrictions tied to funding sources. For more information, go to www.denvergov.org/

REPORT CARD TEMPLATE

	INDICATOR	RATIONALE	
HEALTHY HOUSING	PERCENT OF POPULATION LIVING BELOW POVERTY LEVEL	Poverty limits access to important health-enabling resources, including proper nutrition, good medical care, stable health insurance, and favorable housing ⁵¹ .	
	PERCENT OF HOUSEHOLD INCOME SPENT ON HOUSING	This item can make be the largest expenditures in a household budget, effecting the amount of money available for health related costs ⁵² .	
	HOUSING INDOOR ENVIRONMENT (AIR QUALITY, TEMPERATURE, HUMIDITY)	Homes that have inadequate heating or ventilation, can lead to the growth of mold, and dust mites, leading to asthma and respiratory allergies ⁵³ .	
SUSTAINABLE, SAFE TRANSPORTATION	AVERAGE TRANSIT COMMUTE TIME IN MINUTES	Reducing time spent on public transit can help incentivize transit as an alternative to driving. Residents dependent on transit that live in areas that experience higher than average commute times have less time available for physical and leisure activities that promote health and social well-being ⁵⁴ .	
	COST OF TRANSPORTATION AND HOUSING AS % OF AVERAGE INCOME	These two items make up the largest expenditures in a household budget; including transpo costs is more reflective of actual cost of living than just housing costs ⁵⁵ .	
	NUMBER OF TRAFFIC INJURIES/ COLLISIONS/ FATALITIES	This is an indicator of the safety risk of the street network for road users, including pedestrians, cyclists, drivers and passengers. Traffic collisions involving motor vehicles are one of the leading causes of preventable injury in the nation ⁵⁶ .	
ENVIRONMENTAL STEWARDSHIP	PERCENT OF RESIDENTS WITH ACCESS TO OPEN SPACE/ NATURE WITHIN NEIGHBORHOOD	Parks and natural open space areas promote physical activity and social interaction. Areas with natural vegetation also have direct effects on physical and mental health ⁵⁷ .	
	AIR QUALITY - PARTICULATE MATTER	Increased exposure to PM2.5 is associated with detrimental cardiovascular outcomes, including higher blood pressure and heart disease ⁵⁸ .	
	VMT PER CAPITA PER DAY	Traffic related noise and air pollution is associated with cardiovascular and respiratory diseases, including asthma. Traffic also increases chances of injury and fatalities from collisions ⁵⁹ .	

DATA SOURCE (2009/2012)	GEOGRAPHIC SCOPE	MONITORING PERIOD	CAVEATS & LIMITATIONS
Census 2000/ ACS 2006-2010	Auraria - Lincoln Park statistical area	3 years	The data sourced utilized aggregate the poverty rate for the Auraria and Lincoln Park neighborhoods. Because it is an institutional campus, Auraria has a very low number of residents which may alter the indicator results.
Census 2000/ Census 2012	Census block group 19.01.2	1 year	
	Site/Building monitoring	Post-construction and 1 year after occupancy	Currently, baseline and monitoring data is not available for this indicator. The indicator relies on building evaluation.
n/a/ACS estimate	Auraria Lincoln Park statistical area	3 years	As is the case with all surveys, statistics from sample surveys are subject to sampling and non-sampling error.
H+T INDEX 2010/2012, derived from ACS and other datasets	Census block group 19.01.2	1 year	H+T Affordability Index methodology uses a model to estimate three dependant variables from independent variables. For the ACS housing cost data, renters paying with vouchers may be excluded.
Denver Police 2009/2012	Auraria - Lincoln Park statistical area		This data is currently being collected from the Denver Police Department.
Mithun Map Analysis 2009 /2012 (based on SITES)	1/2 mile radius from Mariposa site	1 year	The quality and utility of recreational spaces is influenced by many other factors beyond land area, including the range of facilities, like playgrounds, sports fields/courts, swimming pools, bathrooms, etc., and the safety and cleanliness of the space.
http://http://apcd.state.co.us	Monitoring station located at 2105 Broadway and 14th at Albion St., Denver	1 year	
Census 2000 / n/a	Auraria-Lincoln Park statistical area/baseline and Census block group 19.01.2	1 year	This indicator does not currently capture socio-demographic differences in daily distance travelled in autos for residents. While DRCOG provides modeled VMT estimates, this data was not used for the indicator because data has not been validated.

REPORT CARD TEMPLATE

 INDICATOR		RATIONALE	
SOCIAL COHESION	PROPORTION OF POPULATION WITHIN 1/2 MILE TO COMMUNITY GATHERING SPACES	Social networks and social integration are beneficial to health, including buffering from negative impacts of stress and providing better access to health services and programs ⁶⁰ .	
	TOTAL CRIME RATE PER 1,000 PEOPLE	Concerns about crime strongly influence walking rates and outdoor physical activity participation. Witnessing crime also increases stress, emotional, and behavioral problems ⁶¹ .	
	PERCENTAGE OF ELIGIBLE ADULTS WHO VOTED	Public participation in policy and political process can have diverse impacts on the social and environmental conditions that affect health ⁶² .	
	PERCENTAGE OF POPULATION WHO FEEL SAFE ALONE AT NIGHT IN NEIGHBORHOOD	Residents' feelings about safety can be a disincentive to engage in physical activity outdoors and to engage in social interaction, and a source of chronic stress ⁶³ .	
PUBLIC INFRASTRUCTURE	PROPORTION OF POPULATION WITHIN 1/2 MILE KEY RETAIL	Being within walking distance of neighborhood goods and services promotes physical activity, reduces vehicle trips and miles traveled, and increases neighborhood cohesion and safety ⁶⁴ .	
	NEIGHBORHOOD SCHOOL PERFORMANCE	Academic performance is related to educational achievement, which both predicts positive health outcomes directly as well as the effects of education on lifetime earnings ⁶⁵ .	
	# OF HEALTHY FOOD OUTLETS WITHIN 1/2 MILE OF NEIGHBORHOOD	Access to healthy food choices is directly correlated to obesity and diabetes rates, which occur in higher rates among people living in low-income communities with worse food environments ⁶⁶ .	
HEALTHY ECONOMY	UNEMPLOYMENT RATE	Unemployment has been consistently linked to poor health, ^a and has been associated with higher mortality rates, especially from heart disease and suicide ⁶⁷ .	
	AVERAGE ANNUAL INCOME COMPARED TO THE SELF-SUFFICIENCY WAGE	The relationship between income and health is mediated through nutrition, employment conditions, parenting resources, leisure and recreation, housing adequacy, and neighborhood environmental quality, community violence, and stress ⁶⁸ .	
	NUMBER OF BUSINESSES AND NUMBER OF JOBS IN NEIGHBORHOOD	For working age adults, employment is a fundamental resource for good health. Active commutes, via walking or bicycling, help meet requirements for physical activity, and reduce the environmental consequences of driving ⁶⁹ .	

DATA SOURCE (2009/2012)	GEOGRAPHIC SCOPE	MONITORING PERIOD	CAVEATS & LIMITATIONS
Neighborhood Survey 2009/2012	1/2 mile radius from Mariposa site	1 year	The number of community centers is one among many possible indicators of social cohesion within a neighborhood. Taken alone, the existence of community centers does not necessarily mean that a neighborhood is socially cohesive, and vice versa.
Denver Police Dept 2005/2012	Auraria - Lincoln Park statistical area	1 year	This indicator data includes crimes reported to the Denver Police Department. Reports are dynamic and numbers may vary. Excludes runaways, traffic offenses, unfounded reports and non-criminal activity.
	Neighborhood Surveys	4 years	A voting rate data source was not available for this report. Many interrelated factors impact whether individuals register to vote and participate in elections.
DHA Resident Survey 2009 / tbd	1/2 mile radius from Mariposa site/ baseline; Walkscore used Lincoln Park Neighborhood	3 years	As is the case with all surveys, statistics from sample surveys are subject to sampling and non sampling error.
n/a / Walkscore 2012	n/a	1 year	While this indicator demonstrates the geographic distribution of key retail services, two residents may have very different access to any service, due to the cost, hours of operation, and language and cultural accessibility. Walk Score uses a variety of data sources including Google, Education.com, Open Street Map, and Localeze; however not all data has been verified. Due to the frequent turnover, the actual businesses can change quickly.
n/a / Colorado Department of Ed 2012	Auraria - Lincoln Park statistical area	3 years	Many other factors affect school quality such as: availability of books and resources; actual and perceived safety at the schools; proximity to green space; training and experience of teachers and staff; and involvement of parents in children's education. Performance must be considered within the broader context of neighborhood, social and economic conditions.
Neighborhood Survey 2009/2012	1/2 mile radius from Mariposa site	1 year	Due to the frequent turnover, the actual businesses in the neighborhood can change quickly. Many factors affect access to retail food sources, including cost, hours of operation, the presence of physical barriers, perceived and actual safety, cultural preferences, etc.
Piton 2002/ City Data	Auraria - Lincoln Park statistical area	3 years	Unemployment figures indicate how many are not working for pay but seeking employment for pay. The impacts of the recession upon household incomes today may not be accurately reflected in the data.
Piton 2002, City of Denver / Census 2012, City of Denver	Auraria - Lincoln Park statistical area	3 years	Although the self-sufficiency standard accounts for variation in the costs of living by county and by family type, it does not address differential access to public or private assistance.
tbd, Census via ESRI 2012	Lincoln Park statistical area/ H+T used Census block group 19.01.2	3 years	Jobs are reported by the employer's address, which may not necessarily be where the employee works. Certain types of jobs may be more likely to be accurately represented than others in this dataset.




REFERENCED STANDARDS

- **LEED for Neighborhood Development (LEED-ND) v 2.0**, available at <https://new.usgbc.org/leed/rating-systems>
- **LEED for New Construction (LEED-NC) v 2.0**, available at <https://new.usgbc.org/leed/rating-systems>
- **Enterprise Green Communities Criteria 2012**, available at <http://www.enterprisecommunity.com/solutions-and-innovation/enterprise-green-communities>
- **NYC Active Design Guidelines 2010**, available at http://www.nyc.gov/html/ddc/html/design/active_design.shtml
- **Sustainable Sites Initiative (SITES) 2009**, available at <http://www.sustainablesites.org>

CAMPAIGN CHECKLIST TEMPLATE

CAMPAIGN CHECKLIST TEMPLATE

STRATEGY	ACTIONS	PARTNERS	GOAL	STATUS
<p>Improve access to and provide safe pedestrian routes to health care, providers, and counselors.</p> 	<p>a. Improve access, safe pedestrian routes, and transportation to Denver Health. Coordinate a free shuttle to Denver Health.</p>	<p>DHA Resident Community Services (RCS); Denver Health</p>	<p>2014</p>	<p>✓ See "Success Stories," page 49</p>
	<p>b.</p>			
	<p>a.</p>			
	<p>b.</p>			
	<p>c.</p>			
	<p>a.</p>			
	<p>b.</p>			
	<p>a.</p>			
	<p>b.</p>			
	<p>c.</p>			

Measuring Progress

that examined the relationship between health and the built environment at South Lincoln Homes, and then established a needs assessment and baseline. As master plan options were developed, a customized version of the Healthy Development Measurement Tool was used to evaluate those options and ensure the adopted redevelopment master plan was designed to address priority health issues.

Today, with the first phase of construction completed and two other sites under construction, the goal of this initiative is to integrate health into every aspect of implementation. A progress report has been completed to update health indicators and track efforts completed to date. These have informed what the current priorities are, so that redevelopment and implementation actions can focus on what is important for residents now.

The Mariposa Healthy Living Initiative seeks to create information and tools that are accessible to a wide range of users, and to garner support for a few focused campaigns as we continue to transform Mariposa into a Healthy Living Community.

This effort has been largely shaped and influenced by a wide range of partners, participants, advisors, and experts. In 2012, we worked with a Peer Review team of technical experts and leaders to refine our tools, and with Advisory Panels of residents, community stakeholders, policy experts, and jurisdictional officials, to guide our priorities, incorporate their lived experience, and help identify next steps and actions.

Why Health?

We know that place matters – where you live has a dramatic affect on the length and quality of your life.

Building on the mission of the Denver Housing Authority and the project goals for Mariposa, there is a tremendous

opportunity to improve healthy opportunities, including physical, mental, and social well-being¹ for residents. Figure 2 shows the relationship between health determinants in the built environment and health outcomes. Evidence of health impacts is not always available, due to the complex pathways between the implementation of a project or strategy, and the long-term health outcomes with many contributing factors.

Therefore, the Mariposa Healthy Living Initiative focuses decision-making and action around health determinants, which are known to improve opportunity for better health. Our approach to health in the built environment builds on the research and expertise of public health professionals, and on the premise that there are multiple factors which contribute to health and well being.

To understand these pathways and effective solutions, we studied these areas to define and measure the health goals of the Mariposa Healthy Living Tool.

KEY TERMS

Determinants are conditions that affect the health status of a community, and that can help make people healthy (e.g. access to parks). There is evidence or research showing that some determinants, or specific conditions, do impact intermediate and eventually long-term health outcomes. In the Mariposa Healthy Living Tool, we have grouped determinants into several dimensions (i.e. public infrastructure), that reflect a range of sectors or realms of decision-making.

¹ Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, N.Y., 19-22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948.

Health Outcomes include the health status of a community or an individual, encompassing physical, mental and social well-being (e.g. obesity rates). Health outcomes are long-term and caused by a range of factors, including: 1. Biology and genetics, 2. Individual behavior, 3. Physical environment, 4. Social environment, and 5. Health services² The Mariposa Healthy Living Tool primarily focuses on physical environment and social environment factors.

Indicators are a measure of success related to objectives (e.g. percent of residents within ½ mile walking distance to a public park). The indicators represent the known facts about what helps make people healthy. Each indicator includes a baseline condition that existed prior to redevelopment activities, a target describing the future desired condition, and a 2012 status of current conditions.

Strategies include programs, projects, or policies that will likely positively impact health determinants and can contribute to improved resident health (e.g. build a new pocket park in an under served neighborhood). Strategies are things we can do to improve conditions that make people healthy.

Campaigns are action plans with a specific mission and effective strategies to guide what kind of development is accomplished. Campaigns include “bundles” of strategies that are organized around a theme for the Denver Housing Authority, organizations, residents, and agencies to take action and positively impact health determinants.

² U.S. Department of Health and Human Services, Healthy People 2020 Draft. 2009, U.S. Government Printing Office.

Health Determinants

Determinants of health are influenced by policies, projects, or programs that we can change as developers, designers, and practitioners. We have organized determinants into the following dimensions, or sectors, of a healthy community:

Healthy Housing - Provide a range of housing options: size, tenure, affordability; protect from involuntary displacement; decrease concentrated poverty; ensure access to healthy, quality housing and home environment.

Academic research and scientific evidence shows the following connections with health: High housing costs relative to the income of an individual or household result in one or more outcomes with adverse health consequences: spending a high proportion of income on housing, living in overcrowded housing conditions, accepting lower cost substandard housing, moving to where housing costs are lower, or becoming homeless. Spending a high proportion of income on rent or a mortgage means fewer resources for food, heating, transportation, health care, and child care³. Homes with inadequate heating or ventilation can lead to the growth of mold, and dust mites, leading to asthma and respiratory allergies⁴. Exposure to greenery and the natural world has additional benefits to health. Research shows that living in proximity to green

³ The Healthy Development Measurement Tool, Urban Health and Sustainability Indicators, San Francisco Department of Public Health, <http://www.thehdmtool.org/indicators/view/118>

⁴ Institute of Medicine. Clearing the Air: Asthma and Indoor Air Exposures. National Academy Press. Washington D.C. 2000.

space is associated with reduced self-reported health symptoms, better self-rated health, and higher scores on general health questionnaires^{5,6}. Homeownership positively impacts the social cohesion and civic participation of a neighborhood, which in turn can impact health. A higher rate of homeownership in a neighborhood has been associated with fewer years of life lost due to cardiovascular disease for residents⁷.

Sustainable and Safe Transportation Reduce vehicle miles traveled (VMT); provide accessible, affordable public transportation; create safe, quality environments for walking and biking.

Academic research and scientific evidence shows the following connections with health: Environments that support walking, biking and transit trips as an alternative to driving have multiple potential positive health impacts. Quality, safe pedestrian and bicycle environments support a decreased risk of motor vehicle collisions and an increase in physical activity and social cohesion with benefits including the prevention of obesity, diabetes, and heart disease as well as stress reduction and mental health improvements that promote individual and community health⁸. Physical

activity among children is higher when they have access to sidewalks, desirable destinations to walk to, and when children face fewer traffic hazards⁹. Encouraging and facilitating active transportation – walking or cycling - as a form of travel for utilitarian trips is a key strategy for increasing daily physical activity¹⁰. Motor vehicle emissions contribute to predominant sources of fine particulate air pollution (PM_{2.5}), which is associated with detrimental cardiovascular outcomes, including increased risk of death from ischemic heart disease, higher blood pressure, and coronary artery calcification¹¹.

Environmental Stewardship - Restore, preserve, and protect natural areas and open space; preserve clean air quality and water quality; maintain safe levels of community noise.

Academic research and scientific evidence shows the following connections with health: Open space and natural areas have direct effects on physical and mental health. One review of studies showed that access to places for physical activity combined with outreach and education can produce a 48% increase in the frequency of physical

5 Vries S, de Verheij RA, Groenewegen PP, Spreeuwenberg P. Natural environments - healthy environments? An exploratory analysis of the relationship between green space and health. *Environment and Planning A*. 2003;35(10):1717-1731.

6 Parks for People: Why America Needs more City Parks and Open Space. San Francisco: The Trust for Public Land, 2003.

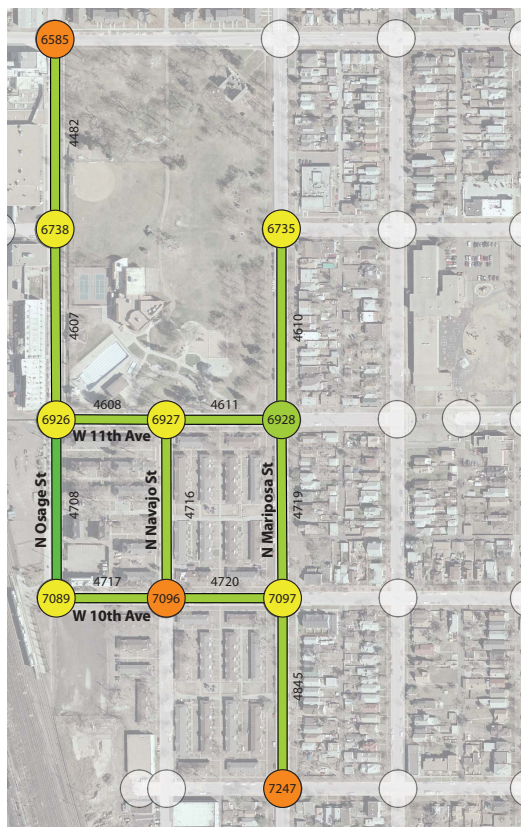
7 Franzini L, Spears W. Contributions of social context to inequalities in years of life lost to heart disease in Texas, USA. *Soc Sci Med*. 2003;57(10):1847-1861.

8 The Healthy Development Measurement Tool, Urban Health and Sustainability Indicators, San Francisco Department of Public Health, <http://www.thehdmtool.org/indicators/view/43>

9 Bauman A, Bull F. *Environmental Correlates of Physical Activity and Walking in Adults and Children: A Review of Reviews*. London: National Institute of Health and Clinical Excellence; 2007.

10 Transportation Research Board, Institute of Medicine of the National Academies: Committee on Physical Activity, Health, Transportation, and Land Use. 2005. Does the built environment influence physical activity?: Examining the evidence. Special report 282. Washington, DC: Transportation Research Board.

11 Simkhovich BZ, Kleinman MT, Kloner RA. Air Pollution and Cardiovascular Injury: Epidemiology, Toxicology, and Mechanisms. *J Am Coll Cardiol*. 2008; 52(9):719-26.



PEQI Intersection and Street Scores

●	0 - 20	Environment not suitable for pedestrians
●	21 - 40	Poor pedestrian conditions
●	41 - 60	Basic pedestrian conditions
●	61 - 80	Reasonable pedestrian conditions
●	81 - 100	Ideal pedestrian conditions



Pedestrian Environmental Quality Index observational survey analysis results, 2009. Conducted by Boys and Girls Club teens and analysis performed by Mithun.

activity¹². Evidence also shows that contact or views of the natural environment can improve functioning in children with Attention Deficit and Hyperactivity Disorder (ADHD) and problem solving and cognitive function in people living in public housing¹³. Noise levels of 55 decibels outdoors and 45 decibels indoors are identified as preventing activity interference and annoyance. Long term exposure to moderate levels of environmental noise can adversely affect sleep, school and work performance, and cardiovascular disease¹⁴. Several large-scale studies demonstrate that increased exposure to PM2.5 is associated with detrimental cardiovascular outcomes, including increased risk of death

12 Kahn EB. The effectiveness of interventions to increase physical activity. *Am J Prev Med.* 2002;22(4):73-107.

13 Kuo FE. Coping With Poverty Impacts of Environment and Attention in the Inner City. *Environment and Behavior.* 2001;33(1):5-34.

14 Dora C, Phillips M, eds. *Transport, environment and health.* WHO Regional Publications, European Series, No. 89. 1999. <http://www.euro.who.int/document/e72015.pdf>

from ischemic heart disease, higher blood pressure, and coronary artery calcification¹⁵. Additionally, in June 2012, the International Agency for Research on Cancer updated their classification of diesel engine exhaust to a human carcinogen, based on sufficient evidence that exposure can increase the risk of developing lung cancer and is positively associated with an increased risk of bladder cancer¹⁶.

Social Cohesion - Promote a socially cohesive community; support a diverse population; promote a safe and secure community; support community gathering and spaces for interaction; support mental health.

15 Simkhovich BZ, Kleinman MT, Kloner RA. Air Pollution and Cardiovascular Injury: Epidemiology, Toxicology, and Mechanisms. *J Am Coll Cardiol.* 2008; 52(9):719-26.

16 International Agency for Research on Cancer. Diesel Engine Exhaust Carcinogenic. 12 June 2012. World Health Organization Press Release No. 213. Available at: http://press.iarc.fr/pr213_E.pdf

MONITORING AND COMMUNICATION SCHEDULE

ELEMENT	DATA COLLECTION FREQUENCY	REPORT TO CAMPAIGN TEAM AND DECISION-MAKERS	REPORT TO RESIDENTS AND PUBLIC
Report Card Indicators	Three to five years	Three to five years	Three to five years, coordinate with annual report
Campaigns and Implementation	Quarterly or bi-annually	Bi-annually	Annually
Resident Behavior and Health Status: Baseline Assessment	Upon move-in	Coordinate with Campaign report bi-annually	Coordinate with annual report
Resident Behavior and Health Status: Ongoing Assessment	Annually or established basis	Annually	Annually
Decision-Making	Annually	Annually	Annually

Academic research and scientific evidence shows the following connections with health: Parental concerns about neighborhood crime strongly influence their willingness to allow their children to actively commute (e.g. walk or bike) to school, influencing children's levels of physical activity¹⁷. In a study about neighborhood environment, if political engagement was low, people had 52% higher odds of reporting poor health¹⁸. Group membership and political participation is associated with improved human health outcomes. For example, for one standard deviation increase in group membership in a community, mortality was illustrated to decrease by 83.2 individuals per 100,000¹⁹. Witnessing and experiencing community violence causes longer term behavioral and emotional problems in youth^{20,21}. There is a link between performing arts attendance and positive community engagement, and visual arts and music have been found to reduce stress and blood pressure²².

17 Kerr J, Rosenberg D, Sallis JF, et al. Active commuting to school: Associations with environment and parental concerns. *Med Sci Sports Exerc.* 2006; 38(4):787-79

18 Cummins S, Stafford M, MacIntyre S, Marmot M, Ellaway A. 2005. Neighborhood environment and its associations with self-rated health: evidence from Scotland and England. *Journal of Epidemiology and Community Health* 59:207-213.

19 Kreuter MW, Lezin N. 2002. Social Capital Theory: Implications for Community-Based Health Promotion. In *Emerging Theories in Health Promotion Practice and Research*. Eds. DiClemente RJ, Crosby RA, Kegler MC. San Francisco, CA: Jossey-Bass.

20 Perez-Smith AM, Albus KE, Weist MD. 2001. Exposure to violence and neighborhood affiliation among inner-city youth. *J Clin Child Psychol* 30(4):464-72

21 Ozer EJ, McDonald KL. 2006. Exposure to violence and mental health among Chinese American urban adolescents. *J Adolesc Health* 39(1):73-9.

22 Hill Strategies Research, *Social Effects of Culture: Exploratory Statistical Evidence*, 2008. P. 7-8

Public Infrastructure - Promote access to, and affordability of quality public infrastructure: education, child care, public health and recreation facilities, daily goods and services; promote affordable and high-quality food access.

Academic research and scientific evidence shows the following connections with health: Academic performance is related to educational achievement, which both predicts positive health outcomes directly as well as the effects of education on lifetime earnings²³. Children with low neighborhood amenities or those lacking neighborhood access to sidewalks or walking paths, parks or playgrounds, or recreation or community centers had 20 to 45 percent higher odds of obesity and overweight, compared with children who had access to these amenities²⁴. The impact of the built environment was particularly strong for younger children (ages 10 to 11) and for girls. Girls, ages 10 to 11, living in neighborhoods with the fewest amenities had 121 to 276% higher adjusted odds of obesity, compared with children who had access to these amenities²⁵. Access to healthy food choices is directly correlated to obesity

23 Backlund E, Sorlie PD, Johnson NJ. A comparison of the relationships of education and income with mortality: the National Longitudinal Mortality Study. *Soc Sci Med.* 1999; 49(10):1373-84.

24 Gopal K. Singh, M. Siahpush, M. D. Kogan. Neighborhood Socioeconomic Conditions, Built Environments, and Childhood Obesity. *Health Affairs.* 2010; 29, no. 3: 503-512.

25 Gopal K. Singh, M. Siahpush, M. D. Kogan. Neighborhood Socioeconomic Conditions, Built Environments, and Childhood Obesity. *Health Affairs.* 2010; 29, no. 3: 503-512.

and diabetes rates, which occur in higher rates among people living in low-income communities with worse food environments²⁶.

Healthy Economy - Increase quality, healthy employment opportunities and access for residents; Increase equity in income and wealth; promote entrepreneurship, locally and resident owned businesses.

Academic research and scientific evidence shows the following connections with health: Income is one of the strongest and most consistent predictors of health and disease in the public health research literature. Nationally, individuals with average family incomes of \$15-20,000 are three times more likely to die prematurely as those with family incomes greater than \$70,000²⁷. The average household income in the Auraria/Lincoln Park neighborhood in 2009 was \$38,480 and \$20,703 in La Alma in 2012^{28,29}. A higher level of education not only

26 Regents of the University of California, PolicyLink, and the California Center for Public Health Advocacy. *Designed for Disease: The Link Between Local Food Environments and Obesity and Diabetes.* April 2008. <http://www.policylink.org/documents/DesignedforDisease.pdf>.

27 Sorlie PD, Backlund E, Keller JB. US mortality by economic, demographic, and social characteristics: the National Longitudinal Mortality Study. *Am J Pub Health.* 1995; 85(7):949-56.

28 Piton Foundation for Auraria/Lincoln Park

29 <http://htaindex.cnt.org/map/>

benefits one's health but also that of family members^{30,31}. Completing more years of education is associated with better health outcomes³², and independent of income, education level is associated with improved health outcomes: each additional year in school is associated with increased life expectancy³³. The relationship between income and health is mediated through nutrition, employment conditions, parenting resources, leisure and recreation, housing adequacy, and neighborhood environmental quality, community violence, and stress^{34,35}.

30 Egeland GM, Tverdal A, Meyer HE, Selmer R. 2002. A man's heart and a wife's education: 12 year coronary heart disease mortality follow-up in Norwegian men. *International Journal of Epidemiology* 31: 799-805.

31 Lamerz A, Kuepper-Nybelen J, Wehle C, Bruning N, Trost-Brinkhues G, Brenner H, Hebebrand J, Herpertz-Dahlmann B. 2005. Social class, parental education, and obesity prevalence in a study of six-year-old children in Germany 29(4): 373-380.

32 Sanchez-Vaznaugh EV, Kawachi I, Subramanian SV, Sánchez BN, Acevedo-Garcia D. 2009. Do Socioeconomic Gradients in Body Mass Index Vary by Race/Ethnicity, Gender, and Birthplace? *American Journal of Epidemiology* 169(9): 1102-1112.

33 Lleras-Muney A. 2005. The relationship between education and adult mortality in the United States. *Review of Economics Studies* 72: 189-221.

34 Duncan GJ, Yeung WJ, Brooks-Gunn J, Smith JR. How much does childhood poverty affect the life chances of children? *American Sociological Review* 1998; 63: 406-423.

35 Morris JN, Donkin AJ, Wonderling D, Wilkinson P, Dowler EA. A minimum income for healthy living. *J Epidemiol Community Health*. 2000; 54(12):885-9.

Methodology

The Mariposa Healthy Living Tool draws from a variety of data sources to measure progress, identify priorities and make recommendations. Spatial data sources vary in geographic scope, and data can also vary in quality depending on collection methods, level of accuracy, and other factors. Therefore, various indicators cannot always be used in direct comparison. Where spatial data has been used, it was collected at the lowest geography possible. The Auraria-Lincoln Park statistical area is referenced in many of the data used for indicators. This statistical area is a City of Denver planning area, also utilized by the Piton Foundation, and includes: Auraria (block group/tract – 1902) and Lincoln Park (block group/tracts 19011, 19012, 18002, and 18001). Figure 7 provides additional information on geographic scope.

Data sources used for this document include:

- US Census- Data was used from the 2000 census, as well as the 2010 census when available.
- American Community Survey – The ACS was used when complete census data was not available for a particular indicator. In several cases, ACS data projections were used in lieu of actual data summaries for 2012. ACS data are typically estimates.
- The Piton Foundation was responsible for the collection and synthesis of census data specifically for Lincoln Park neighborhood which is comprised of two tracts.
- Denver Police Department can provide data on crime, and pedestrian/traffic accidents. This information is typically not available online; therefore a direct data request is required.
- DHA Neighborhood Surveys 2009/2012- The Denver Housing Authority completed a resident survey in 2009 for the original HDMT report, which was funded by the Denver Office of Economic Development and

the Colorado Department of Public Health. Another survey was completed by the Environment, Office of Health Disparities in 2007. An additional on-the-ground survey will be needed for the 2012 update, and periodically needed in the future.

- ESRI modeling- Data was also collected from ESRI GIS maps that were generated from projected census figures.
- Colorado Department of Education publishes data on school performance, including an overall performance score, for each school in the state of Colorado.
- In order to calculate VMT per capita per day, we obtained VMT per household from the Center for Neighborhood Sustainability's (CNT) "Housing and Transportation Index" and divided that by average household size, also obtained from CNT. These data was obtained from <http://htaindex.cnt.org>
- Two sources were used to measure "Proportion of population within 1/2 mile of key retail." The 2010 baseline used the Neighborhood Completeness Indicator, per the San Francisco Department of Public Health method. <http://www.sfphes.org/elements/24-elements/tools/104-neighborhood-completeness-indicator>. For the 2012 status update, Walkscore was used. <http://www.walkscore.com/>
- To calculate "Total Crime Rate per 1,000 people" total crimes reported to the Denver Police Department in Lincoln Park neighborhood were divided by the population of that neighborhood. The neighborhood population data was obtained from the Piton Foundation.

While not ideal, projected or modeled data may be the best placeholder until more complete and accurate data is released from the 2010 census.

Data analysis used for indicators includes:

- Map Analysis- The distance from all major building entrances to open space was measured using aerial

maps. The minimum size of public open space was derived from SITES and LEED for Neighborhood Development, which states that they should provide seating for five percent of possible users, and be at least 1/6 of an acre. This analysis was used for the indicator: "Percent of residents with access to open space/nature with neighborhood."

- Visual verification: Neighborhood gathering spaces and healthy food retail were mapped through an on-the-ground visual verification of the neighborhood on 10-4-12, conducted by Urban Ventures staff, for indicators: "Number of Healthy Food Outlets within a Half Mile of the Neighborhood" and "Proportion of

Population within a Half Mile of Community Gathering Spaces." Healthy food outlets were defined per criteria used in the HDMT, as retail outlets with at least 10% of shelf space devoted to fresh produce.

Recommended for further study:

- Indoor air quality baseline data is not available, however consider post-construction commissioning and monitoring.
- The most relevant way to measure outdoor air quality, such as particulate matter concentration, is by on-site measurement.
- Voting patterns are typically not analyzed in the census at the neighborhood scale. Therefore, neighborhood



Fig. 7 La Alma/Lincoln Park Study Area & Geographic Data Sources

surveys will be required to establish and baseline and then effectively monitor change.

- The “Percentage of people who feel safe alone at night” is a key indicator of a healthy neighborhood and is best measured by a neighborhood scale survey. This survey is recommended as a funding priority, and could be coordinated with other future neighborhood surveys or with BRFSS.

Wherever possible, references were integrated into the report and the Mariposa Healthy Living Tool. In the Mariposa Healthy Living Tool, references can be found in the Why is this a health determinant? section, as well as the Strategies section. Each strategy has both an endnote and a reference to practical information that can support the implementation of the strategy. In the Mariposa Healthy Living Tool Report Card Template, baseline and current data sources are listed for all the indicators included in the tool.

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Mariposa Healthy Living Tool History & Adaptation Before Redevelopment

The redevelopment of South Lincoln Homes in the historic La Alma/Lincoln Park neighborhood in Denver presents an opportunity for redesign into a mixed-income, mixed-use community that will enhance overall resident health. Built in 1953 and owned by the Denver Housing Authority (DHA), South Lincoln Homes epitomized the “old thinking” of housing the poor: deeply concentrated in obscure locations that are generally isolated from social and economic opportunities. Time has revealed the consequences of these outdated practices.

When the South Lincoln Redevelopment Master Plan was drafted in 2009, it was done so to help alter some startling statistics: 700 individuals, the majority of which lived in poverty, had few options for upward mobility. Ninety-four percent had incomes of 0-30% of the Area Median Income (AMI)³⁶. Only 1% of the population had a college degree, and 40% has less than a high school diploma³⁷.

While stagnant economically, South Lincoln Homes also portrayed a disturbing health portrait:

- Over 55% of the residents were overweight or obese³⁸.
- More than 38% indicated a health condition (such as asthma, diabetes and heart problems) that kept them

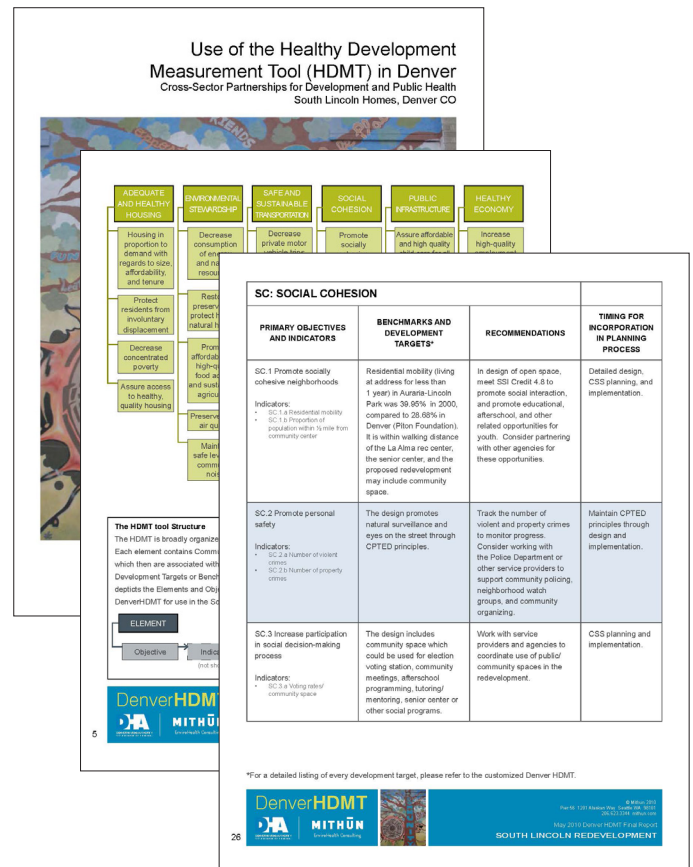
from working³⁹.

The detriments of South Lincoln Homes had also spilled into the neighborhood – La Alma had about 6,400 14% for the City of Denver⁴⁰. There were 51% of children living below the poverty line (compared to 21% in Denver)⁴¹. Greater than 96% of students were receiving free and

39 “Resident Community Services Survey”. HOPE VI Assessment of South Lincoln Residents. Denver Housing Authority. May 8, 2009

40 2000, U.S. Census Bureau

41 2000, U.S. Census Bureau



36 2000, U.S. Census Bureau and DRCOG

37 2000, U.S. Census Bureau

38 Denver Health South Lincoln Neighborhood Survey. “Denver Health South Lincoln Neighborhood Survey”.

reduced lunch, compared to 66% for Denver overall ⁴².

The redevelopment of South Lincoln Homes into the Mariposa community will contain 800-900 units with approximately 1,300 residents at build out. A variety of construction types will include senior housing, townhomes, multi-family buildings, community serving facilities and commercial spaces. The eight-phase redevelopment will create the new Mariposa community, and has attracted more than \$30 million in federal funds, including ARRA/ Stimulus and HOPE VI, which is leveraging more than \$100m in total project investments . Phase I construction, Tapiz at Mariposa, was recently completed and includes 100 units of senior/disabled housing, all affordable to 30% of a resident's income and 7,000 sf of ground floor related office and community facility space. Phase II construction began in March 2012, Phase III began in September 2012 and Phase IV design is currently underway.

The development is already seen as a holistically sustainable national model for a mixed-income, mixed-use, transit oriented community. The Mariposa Healthy Living Initiative will demonstrate how resident health can be improved through the built environment at Mariposa.

Mariposa Priority Health Issues

Based on a Health Impact Assessment conducted in 2009, and feedback from the community, these issues were identified as priorities for the South Lincoln Homes residents who will return to the Mariposa community. More information on health indicators baseline and progress is available in Chapter 3, *Get the Facts*.

2009 Baseline data: South Lincoln Homes and La Alma/ Lincoln Park Neighborhood

- 1. Increase physical activity:** 55% of community is obese or overweight; 78% had above normal blood

⁴² Denver Public Schools, Piton Foundation for Auraria/Lincoln Park

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10. International Agency for Research on Cancer. Diesel Engine Exhaust Carcinogenic. 12 June 2012. World Health Organization Press Release No. 213. Available at: http://press.iarc.fr/pr213_E.pdf
11. Dora C, Phillips M, eds. Transport, environment and health. WHO Regional Publications, European Series, No. 89. 1999. <http://www.euro.who.int/document/e72015.pdf>
12. NYCADG: People with nearby access to parks are more likely to attain higher levels of physical activity. Exposure to greenery and the natural world has additional benefits to health.

More generally, living in proximity to green space is associated with reduced self-reported health symptoms, better self-rated health, and higher scores on general health questionnaires: Vries S, de Verheij RA, Groenewegen PP, Spreeuwenberg P. Natural environments - healthy environments? An exploratory analysis of the relationship between green space and health. *Environment and Planning A*. 2003;35(10):1717-1731.
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14. Trees and green space also improve the physical environment by removing air pollution from the air and mitigating the urban heat island effect produced by concrete and glass: Parks for People: Why America Needs more City Parks and Open Space. San Francisco: The Trust for Public Land, 2003.
15. ADGNYC: The presence of trees has been associated with higher rates of walking to school among children. Trees and other landscape elements contribute to more appealing sidewalks and streets, provide shade in the summer, and can be used to help separate pedestrians from vehicular traffic. Trees provide natural cooling through the shading of streets and buildings thereby reducing exposure to UV radiation and the risk of skin cancer, as well as energy demand and consumption. Trees also capture air pollution, reduce carbon dioxide, increase oxygen, and help capture storm-water runoff, filtering water to reduce the amount of mercury, oil, and lead going into the Bay. Trees can also serve as buffers to traffic, reducing pedestrian injuries. Several studies show that the presence of forests, trees and other vegetation improves adult recovery from mental fatigue, leading to a reduction in socially unacceptable behavior and crime, as well as fewer behavior problems among children.

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23. ADGNYC: Try to provide pedestrians with the most direct possible routes between destinations and with a choice of routes. Avoid long, continuous blocks. Maintain dedicated pedestrian and bicycle paths on dead-end streets to provide access even where cars cannot pass. Research indicates that sidewalk coverage and continuity are associated with increased walking. Research indicates that the provision of attractive open views from a path encourages increased walking.
24. ADGNYC: A number of environmental design factors have been shown to increase leisure-time activity among people with disabilities, including the quality of the path, the provision of targeted signage, and the accessibility of destinations and transportation along the path.
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26. ADGNYC: Incorporate street additions that have been shown to effectively calm traffic, such as curb extensions, medians, and raised speed reducers. Minimize road width to reduce traffic speeds and pedestrian crossing distances.
27. ADGNYC: Strive to link high-bicycling-demand areas into a cohesive network. Connect bikeways to transit stops, add additional bicycle parking by these stops, and provide adequate sidewalk space to accommodate bicycle parking. On bikeways, include signposts providing bicyclists with directions, distances, and times to various destinations. Use on-street markings or signage to visually reinforce the separation of areas for bicyclists and motorists. Strategies can include markings, painting bike lanes onto the road surface, or creating a printed buffer between the bike and traffic lanes. Adding a buffer between bicyclists and cars increases riders' confidence in biking as a safe and comfortable transportation choice. Bicycle paths can also be located between a sidewalk curb and a parking lane.
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Appendices

Glossary

Authorship and Sponsor

2012 Advisory Panels Workshop Minutes

Housing and Transportation Affordability Index Methods

Glossary

CPTED. Crime Prevention Through Environmental Design is an approach to deterring criminal behavior through environmental design. The three most common built environment strategies are natural surveillance, natural access control and natural territorial reinforcement.

CSA. Community Supported Agriculture consists of a community of individuals who pledge support to a farm operation, with the growers and consumers providing mutual support and sharing the risks and benefits of food production. Typically, members or “share-holders” pledge in advance to cover the anticipated costs. In return, they receive shares in the farm’s bounty throughout the growing season. By direct sales to community members, who have provided the farmer with working capital in advance, growers receive better prices for their crops, gain some financial security, and are relieved of much of the burden of marketing.

CSS. Community and Supportive Services are required by the HUD HOPE VI program in conjunction with the physical redevelopment of a public housing project. Each HOPE VI grantee must submit and implement a CSS Plan, with the key principles of: services to help residents make progress toward self-sufficiency, services designed to address the needs of individual families, linkage to relocation with informed choice, community building in which residents work together to provide mutual support, achieve common ends, and build joint capacity, and management monitoring and evaluation.

ECE. Early Childhood Education regards education in one of the most vulnerable stages in life, from birth to age eight. In July 2009, HUD announced that they are encouraging public housing authorities (PHA) to incorporate early childhood education components into the HOPE VI planning process.

Green Communities. A certification developed collaboratively by Enterprise and a number of leading national organizations and experts for the purpose of providing a clear, cost-effective framework for affordable housing. The Green Communities criteria are aligned with the LEED® (Leadership in Energy and Environmental Design) Green Building Rating System, and are linked to potential funding and grants through the Enterprise Foundation.

GHG. Greenhouse Gas includes gases that trap heat in the earth’s atmosphere. The principal greenhouse gases due to human activity include Carbon Dioxide (CO₂), Methane (CH₄), Nitrous Oxide (N₂O), and Fluorinated Gases. GHG emissions are commonly quantified in million metric tons carbon dioxide equivalent (MMTCO₂e).

HDMT. The Healthy Development Measurement Tool (HDMT) is a comprehensive evaluation metric that supports the inclusion and consideration of health needs in urban land use plans and projects. The HDMT is comprised of a “community health indicator system” to evaluate community health objectives and baseline neighborhood conditions, a “healthy development checklist” that is used to evaluate land use plans and projects, and a “menu of policy and design strategies.”

HIA. Health impact assessment (HIA) is commonly defined as “a combination of procedures, methods, and tools by which a policy, program, or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population.”

HOPE VI. HOPE VI is a major HUD plan meant to revitalize the worst public housing projects into mixed-income developments. The program began in 1992, with formal recognition in law in 1998. As of 2005, the program had distributed \$5.8 billion through 446 federal block grants to cities for the developments, with the highest individual grant being \$50 million.

LEED-ND. The LEED for Neighborhood Development Rating System integrates the principles of smart growth, urbanism and green building into the first national system for neighborhood design, developed in collaboration among USGBC, Congress for the New Urbanism, and the Natural Resources Defense Council.

Neighborhood Completeness Factor. The Neighborhood Completeness Factor is referenced in the HDMT and measures the proximity of residents to daily goods and services in their neighborhoods. Included are 11 key public and 12 key retail services necessary to meet the daily needs of neighborhood residents and to promote increased social interaction, walking and biking. Neighborhood public services include: childcare/daycare, community garden, hospital and public health clinic, library, open spaces, neighborhood or regional parks of 1/2 acre or more, performance/cultural space, post office, public art, recreational facility, and public school. Neighborhood serving retail includes: auto repair, banks/credit unions, beauty salon/barber shop, bike repair, dry cleaner, eating establishments, gym/fitness center, hardware store, laundromat, pharmacy, retail food market (including supermarket, produce store, and other retail food stores), entertainment (i.e. video store or movie theater).

PEQI. Pedestrian Environmental Quality Index. The Pedestrian Environmental Quality Index (PEQI) is an observational survey which quantifies street and intersection environmental factors empirically known to affect people’s travel behaviors. PEQI includes five main pedestrian categories which embody important physical environmental factors: traffic, sidewalks, land use, intersections and safety.

PTC The Prevention Training Center is a partnership with the public health department of Denver Health to provide training for key members of the Mariposa community at the Prevention Training Center.

Section 3. The Section 3 program requires that recipients of certain HUD financial assistance, to the greatest extent possible, provide job training, employment, and contract opportunities for low- or very-low income residents in connection with projects and activities in their neighborhoods.

Self-sufficiency standard. The Self-Sufficiency Standard defines the amount of income necessary to meet basic needs (including taxes) without public subsidies (e.g., public housing, food stamps, Medicaid or child care) and without private/informal assistance (e.g., free babysitting by a relative or friend, food provided by churches or local food banks, or shared housing). The family types for which a Standard is calculated range from one adult with no children, to one adult with one infant, one adult with one preschooler, and so forth, up to two-adult families with three teenagers. In Denver in 2008, the Self

Sufficiency Standard was \$40,892, and in 2011, the Self Sufficiency Standard was \$42,245 for one adult and one preschool child.

SES. Socio-economic status. SES is usually measured by determining education, income, occupation or a combination of these factors (Winkleby, 1992).

Simpson Diversity Index. is a mathematical measure that characterizes diversity in a community. It is used in LEED-ND to determine diversity of housing types.

Social cohesion. A term used in social policy, sociology and political science to describe the bonds or “glue” that bring people together in society, particularly in the context of cultural diversity.

SITES. The Sustainable Sites Initiative was created to promote sustainable land development and management practices that can apply to sites with and without buildings. SITES will provide tools for those who influence land development and management practices and can address increasingly urgent global concerns such as climate change, loss of biodiversity, and resource depletion. They can be used by those who design, construct, operate and maintain landscapes, including but not limited to planners, landscape architects, engineers, developers, builders, maintenance crews, horticulturists, governments, land stewards and organizations offering building standards.

Tenure. In housing, tenure refers to the financial arrangements under which someone has the right to live in a house or apartment. The most frequent forms are tenancy, in which rent is paid to a landlord, and owner occupancy.

TDM. Transportation Demand Management is the application of strategies and policies to reduce automobile travel demand.

VMT. Vehicle Miles Traveled, a measure that is commonly used to describe automobile use on a daily or annual basis. It incorporates both the number of vehicle trips and the length of those trips. Factors affecting the number of vehicle trips made each day include age, income, population and household size, workers per household, auto ownership, and access to transit. VMT is typically modeled, rather than directly observed.

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Sponsor

This report was sponsored by the Denver Housing Authority in September 2012. Building on the success of the 2009 Denver HDMT customization and cross-sector partnerships effort that was published in 2010, “Use of the Healthy Development Measurement Tool (HDMT) in Denver, Cross-Sector Partnerships for Development and Public Health, South Lincoln Homes, Denver CO”, the Denver Housing Authority has sponsored the Denver Healthy Living Initiative to expand on the use of the HDMT. The purpose of the Mariposa Healthy Living Initiative is to take the HDMT from its status as a written report of recommendations and baseline data trends to a working tool that implements Health into the Built Environment at Mariposa, addressing priority health issues for the affected residents. The Denver Healthy Living Initiative also leverages lessons learned from the first phase of development, Tapiz at Mariposa, and other pre-development activities, including Resident Community Services, which have been completed since the publication of recommendations in 2010. The scope of this effort focuses on the Mariposa redevelopment and Denver Housing Authority residents at this site, but also is relevant to the broader La Alma/ Lincoln Park neighborhood. The assessment of actions completed to date and indicator update was completed by project team members other than the Denver Housing Authority staff; and by team members who have not been actively involved in the redevelopment efforts since the completion of the South Lincoln Redevelopment Master Plan. The project team did collect and gather information on status from DHA staff and redevelopment team members. This was done in an effort to minimize conflict of interest wherever possible.



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Memorandum

<p>To: Mariposa Healthy Living Initiative/HDMT Advisory Panels</p> <p>From: Kimball Crangle, Denver Housing Authority; Erin Christensen, Mithun; Lisa Langer, Perspective3</p> <p>Re: 09/24/12 Mariposa Healthy Living Initiative/HDMT Advisory Panel Workshops</p>	<p>Date: October 1, 2012</p> <p>Project #: 12253.00</p> <p>Project:</p>
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Mariposa Healthy Living Initiative/HDMT



Workshop Meeting Notes

Session 1: Social Cohesion/ Public Infrastructure

Group 1 Team: KC, EC/ Jan McIntosh(Catholic Charities), Laurie Grosselfinger (Greenlee Elem.), Elva Chavez (Tapiz Resident), Mark Raeburn (Art District at Santa Fe), Katie McCrimmon (HealthPolicySolutions.org)



Erin Christensen of Mithun gives an overview of the Mariposa Healthy Living Initiative.

Mariposa Healthy Living/HDMT Initiative
Page 1 of 12

10.01.12

SEATTLE / SAN FRANCISCO

Education

- Education of parents is important; need adult ed. classes – Laurie Grosselfinger
 - vocabulary improvement
 - track to community college flowing GED
 - Moms need a path to continue education
 - **Valued by Moms = valued by kids
 - Cultural assimilation: do some cultures not see the value of 4yr. degree?
 - Microfinance opportunities- education leads to jobs to self-sufficiency. They want to help their families through extra money. This supports the diverse population that exists in Alma and people want to buy diverse products.
 - Can be informal classes too-doesn't have to be GED or Comm.College, but classes and opportunity are very important.
 - Greenlee is like a mini-United Nations – native translator available for Somali moms
 - Parent volunteers could be more helpful
 - Parents- learning how to help their kids AND how they relate to their peers. “Parent and Teacher Teams” (P-A-T)
 - “tons” of services available for the kids in this neighborhood
- Head Start – Jan McIntosh
 - We see people who come with the family members to ask for access to other services that their extended families need.
 - Are there opportunities to volunteer in the community?
 - Bring elders to help with services
 - Is there a need to help elders in age in place?
 - Microfinance opportunities?
- Education for residents – Elva
 - Nutrition class- in it and loves it, learning a lot
 - Market – vegetables are needed to be touted and available
 - Latino healthy eating
 - Interview and appt. help – clothes, etc.

Getting Connected – worksheet notes

- Strategy: Provide visually appealing environments along paths of travel
 - Coordinate signage and way finding from Mariposa to Santa Fe – Metro District to maintain?
 - Focus on 10th Avenue
 - Beautify 10th and Osage LTR to be more appealing
- Strategy: Provide a dedicated central space or kiosk...
 - Who would maintain? Possible partner with art district? Inca > Kalamath > 13th, TIF?
 - 2 improvement districts on Santa Fe currently

- Strategy: Build safe and connected bicycle and pedestrian networks
 - Stoplight at 10th and Kalamath and traffic calming
 - Coordinate with Safe Routes to school
 - Map destinations, now and future
 - Security at school not an issue, but walking to and from through La Alma Park feels unsafe
 - **La Alma Park** –is sketchy- homeless and drunk people; needs more security, more eyes on it; doesn't feel safe
 - Neighborhood watch in the park? **Need more safety in the park!**
 - **"The TASK Force"** advocacy to city to help w. street improvements
 - **Connectivity to Santa Fe is critical** – people who live at Mariposa don't go to Santa Fe for any of their entertainment; Business owners don't interact with Mariposa and don't use the LTR station now; Need to encourage flyers, education, information exchange, so residents know what is going on
- Strategy: Provide community spaces for social and cultural programs
 - **Info. About Santa Fe** First Friday – organize a 3rd Friday group?
- Strategy: Design buildings and neighborhoods with mitigation to reduce excessive noise
 - Windows in Tapiz keep all noise at bay. Noise in the park not of concern.
 - New construction: handling it pretty well
- Strategy: Ensure safe Streets and common areas
 - **La Alma Park** –is sketchy- homeless and drunk people; needs more security, more eyes on it; doesn't feel safe
 - Neighborhood watch in the park? **Need more safety in the park!**
 - Pool opening

Session 1: Social Cohesion/ Public Infrastructure

Group 2 Team: RMS, DF, LL, Lynne / Erin Brown(Denver parks and Rec.), Narada Golden (YRG), Macy Dorf(Art District at Santa Fe), Ronald Fields (Tapiz Resident) , Adam Anderson (UC Denver), Jami Duffy (flobots.org),

What are your impressions of Health at Mariposa?

Mental health connections

- Macy- The community sessions make a personal impact; **feels good to be a part of the process**; this has been good for the health of those displaced
- Ronald- first time living at 1099 and in this type of atmosphere; concerned that there is **too much isolation**; smoking is a big issue; it isolates residents but need education that 2nd hand smoke is bad
- Lynne- 1099 Tapiz= 20% residents from the neighborhood, 35% elderly, 65% disabled; needs for disabled and seniors are very different

Mariposa Healthy Living/HDMT Initiative
Page 3 of 12

10.01.12

SEATTLE / SAN FRANCISCO

- Erin – when resident’s needs are so different the connection is not there, it is a tough challenge; initial steps toward health focus are in place
- Narada- this framework that is being developed in the HDMT will be critical

Getting people out-Are Arts and Culture the answer?

- Jami – **arts and culture are critical**, and have been successful already; the kids programs have a lot of involvement, create places where they don’t even know they are participating- ex. Benches made in a way that if hit in different places make different “music”; **they get activity and knowledge without knowing it** (computer music programs=music + computer literacy)
- Can programs be expanded to be **multi-generational?** (flobots is only for up to age 20)
- Need to generate motivation to get out of their units and participate
- Erin Brown- parks and getting to **exercise resources requires a comfort level (going to the rec ctr. Or park)**; City working with youth to bring fitness models home can help the parents be more comfortable; develop a family fitness model?
- Is there a conflict with having only facilities in the rec. center? It makes the residents get out and go there – but it is not comfortable to do that for most? (New buildings are not supposed to provide duplicate services like this)
- **Santa Fe** needs to feel connected – set up a group that goes over for a gallery walking tour together – comfort in numbers?
- **Information helps comfort level** – provide focal points/kiosk at Tapiz, 10th plaza; kiosks should be in old and new technologies –touch screen info, and paper flyers
- **Tours, events, connecting people**- outreach/education; social events; coffee clutch groups; engaging the resident
- **Eliminate isolation** - connect people to one another, to their community, to activities
- Motivational tool needed to get people to rec. ctr
- Flobots and Jolt doing walking tours now
- Flobots partnering with DPS/Kaiser for Healthy living study going on now**- **healthy knowledge, decisions and patterns**
- Erin Brown-the La Alma community comes together in times of struggle – i.e. to save the Recreation Center- then melts down. **How do we keep that passion for permanent change?**
- 2 health classes now at Tapiz- Health and Nutrition- high blood pressure

Key thoughts:

- Expand “Get connected” to **socially connected, and people connected to people** (this addresses the isolation and need to engage residents in their community)
- Connect people to information
- Utilize social arts and cultural events to connect people to one another...i.e. an outdoor dance gets people out, they dance, they meet, they engage in art, they enjoy their community

- **Health education** leads to address healthy knowledge, decisions, habits, patterns. This could be leveraged to specific grant funds and programs
- Senior housing options to **help isolation** problem: daytime talks, book group, events to fill the day = engage
- **Central place:** what's happening in the community? A place where multi-generations come together. ...Activities such as coffee clutches, sharing of expertise, special topic exploration
- **Information kiosk or hub-** at LTR? Keep info updated- who does that?
- Senior communities elsewhere may have ideas that can be borrowed to get people out of their units and into activities

Session 2: Health Policy/ Environment/ Transportation

Group 1 Team: KC, EC- Peip van Heuven (Bike Denver), Monica Buhlig (Kaiser), Gretchen Armijo (CO Health), Jaclyn King (DHHA), Adam Anderson (UC Denver)

Transportation:

- **Access to bike** and equipment – Piep
 - Need U-locks, lights, where to park it- basic equipment, derailleur
 - Interior secure parking is key
 - **Education-** how to lock your bike, how to fix your bike, where can I take my bike to?, where is bike friendly? Why do I need a helmet?
 - What is in it for me?- cheaper, easy, healthy, fun
 - Storage- bike room? Bike depot?
 - City bike map posted in buildings, at kiosks
 - Make it easier to bike than drive
 - **Signage,** signage, signage!
 - **Bike routes-** bike routes are a system- connect the signage and routes
 - **Garden tour on trikes- get to know the hood**
 - **Bike library- check out bikes; check out equip.; information**
 - **A ride along program with bike cops?**
- **If people can bike or walk safely they will be healthier ;** it needs to be easy and safe- Monica/Jaclyn
 - **Walking School Bus** – plan a route as if you are a bus, pick up kids along the way, it will be safer and community building
 - Denver Enviro. Health has all of these data points
 - **Lighting for safety** to destination
 - **Graffiti** and perception of graffiti- feeling safe vs. being safe
 - Transit stops- **lighting, seating, safety**
 - **Transit Alliance Group** – trend now is people moving to Denver to be healthy

- **Millennial shift** to sexy, healthy, neighbor- desire to be healthy too

Environment:

- **Air quality** – Tim
 - Bikes improve air quality in the summertime
 - Environment is critical to this-biking is healthier and requires less energy etc.
 - Air quality is critical- have on-site air monitoring is a great idea- ozone and particulate monitoring-(show the good results and educate)
 - Community gardens should be in all phases of development
- **Data-** Gretchen
 - **Assessment and connectivity** to destinations- conditions of sidewalks; audit tools are available; schools have students available to do this
 - **School planning project?** –GIS mapping, graffiti to DPD grid
 - Transit stops/ comfort, access, and use

Policy:

- **DATA collection: don't recreate- use what is there**
 - **Data:** minutes of physical activity per day- goes to neighborhood level or census tract level-how many trips are you taking?
Updated yearly
 - Tracked by **CO health dept.**, Behavioral Risk Factor Health Assessment- can submit your questions to them, done every year
 - Bicycle tracks- date for trips, calories, gas savings
 - Measure car-sharing
 - Study done on utilization of bicycle
 - Over sampling- 3-5 years assess population
 - **Bundling approach for source of data...air quality + transport**
 - **Community Health Assessment –DHHA; Be Healthy Reports**
 - **Bundle indicators too**
- **Safety/Transportation**
 - **Safety/ Violence-** prevention institute different funding
 - **Community Activism-**
 - To bring resources for traffic calming, etc.



- City council use as advocacy
- Transportation subcommittee

Session 2: Health Policy/ Environment/ Transportation

Group 2 Team: RMS, DF, LL- Otto van Geet (NREL), Julie George (Live Well), Max Gibson(UC Denver), Narada Golden (YRG) , Mark Raeburn(Art District at Santa Fe)

What is keeping Mariposa from being healthy?

Policy/Environment:

- **Live Well** – policy needed to keep vending machine choices healthy
- Help small groups find **sense of community**, then bring those groups together
- **Partnerships**, New Center Active Design and City
- **Park safety**- La Alma is not safe now= not healthy, possible opportunity to **partner** with Trust for Public lands for funding for lighting etc.?
 - **Park safety** will bring community functions or vice versa? Markets, music
 - Need for community to **take back the park**, and have sense of ownership to keep eyes on the park
 - Have **community plantings**- garden beds, shrubs, Arbor Day, to give sense of nurture, pride, ownership
- **Urban Ag education**- garden to table events? Small business ed. Grow and sell food
- **Access** to healthy food- work with 7-eleven, convenience store on choices of products
 - but need to foster a market for healthy food in the community through education and outreach (Live well type programs)
- **Worksite wellness programs**- track incentives for healthy behavior, Live Well at work, Dallas company is applying this
- Youth sports teams- build community- teams offered through rec. ctr. for reduced rate
- Rec. center access- free to residents?
 - **Incentive Programs could be made to be informative and fun with the existing utility monitoring system**- show residents what they are using/saving. Have incentive awards. Post the information to be accessed easily
 - Real time building utilities reports
 - LEED education for community
- Kids are important to the Health and Sustainability ongoing education
- University buys in-be active in this community, metro-more community involvement
- **Live Well communities**- look at Westwood, Park Hill
- **UC Denver Students**- Health and planning students are **BRIDGE to future healthy living** and planning

- **Does Rec. Center effectively serve all residents?** Partner with City to change that
- **Why is the park a barrier and not an amenity? Safety is the issue**

Key thoughts:

- Team addressed Health deterrents that will be present: people not feeling that they belong (inclusion), access to healthy food, smoking, low income is often paired with low empowerment, not a lot of community members feeling confident enough to share ideas
- Exercise knowledge and opportunities should be introduced to residents so they can meet one another and carry on those habits (walking teams, yoga etc).
- Senior communities elsewhere may have ideas that can be borrowed to get people out of their units and into activities
- Mariposa's proximity to Auraria campus provides the University's/Colleges a chance to have some ownership and community service in the neighborhood
- A healthy and affordable restaurant would be a great addition to the neighborhood

Session 3: Healthy Economy

Group 1 Team: KC, EC, DF- Councilwoman Judy Montero, Annie Dowding, Ledy Garcia-Eckstein, Amanda Gonzalez

Healthy Economy:

- **Youth Programs- Ledy**
 - **Expand Health Industry Academy**
 - More people and further progress, to take them **further along their path to self-sufficiency?**
 - **Health care = middle income job opportunities**, 800,000 in CO people will get health care because of new law
 - Classroom space for Community College would be great **pre-requisite**
 - **Shared resources and shared space**
- **Youth Programs – Annie**
 - **Café and Kitchen- Educate** the community on healthy eating habits that are **feasible** and within reach
 - Baby steps, using fresh ingredients from garden as resources, bake vs. fry, etc.
 - Within budget, easy, accessible are critical
 - Eat healthy within their means

Mariposa Healthy Living/HDMT Initiative
Page 8 of 12

10.01.12

SEATTLE / SAN FRANCISCO

- Educate youth to educate families
- An overall learning tool
- Ex. 6 week class, 13 youth/class, 10 adult/class- healthy eating class/web discovery, building social cohesion as well
- **Cultural Competence is important – Amanda**
 - **Social cohesion in the classes-** kids come from all over the city, meet for first time at class and know each other by the end of the class
 - **Zumba classes** – promote social cohesion + exercise +cultural (multi lingual, \$1, offer daycare)
 - **Historic barriers in cooking** – lard in Latino cooking, make change to olive oil, etc.
- **Community Activism – Councilwoman Judy Montero**
 - **La Alma used to be ground zero for activism in 60's and 70's** which lead to assets like the rec. center, park, pool
 - Locals needed to be **threaded together by community relevancy / sense of community**
 - Affinity for what it means for the community
 - Keep **adding amenities and bolstering** what is here
 - Allow the community to push the envelope and **identify aspirations of the people**
 - **Strong community attracts people**
 - **Name of neighborhoods is important –La Alma/ Lincoln Park Neighborhood – “the soul”- important to past, present, and future**
 - **LEADERSHIP** is plentiful in la Alma – very passionate. Setting goals and following through on them. Commitment to the course being charted.
 - **Follow lead** of people that live here
- **Jobs/Generational Community/ Education - group**
 - **Senior housing + college + ECE**
 - **Job readiness-** more than high school diploma, stackable credentials allow people to go at their own pace and walk away with credential
 - **Career pathways-** (ex. State of Washington) Build up > Pace 1 yr. tech classes/Comm. college to move from poverty level
 - **Really low paying jobs are what we have** – don't have manufacturing in Denver to support middle income jobs
 - **Apprentice opportunities are great** – make \$ while learning
 - **West High School** now has **4 schools** on one campus: **1) West HS, 2) Vocational, 3) Leadership Academy, 4) West Generation**
 - **West HS-** doing assessments with students to identify “what they want to be” and finding their path and job
 - **Placement starting in 9th grade!**
 - **Skill trades** –being on track/ taught/identified in high school so there is a certificate at graduation
 - **Aurora Lights Program** – concurrent credit

- **Connecting to Auraria Campus**
 - **Colfax crossing**- residents still feel “unwelcoming” attending Auraria. This connection needs to be bolstered. Auraria need to do **more outreach and career pathways**
 - **Community College of Denver** – Latino serving institution, can there be even more connection and outreach?
 - **Metro State**- targeting local population- goal to reach 25% Latino student population, CCD already there
 - **CVA** opening on Santa Fe, helping bridge gaps/ art camps
 - **Auraria ball fields**- put bike lane on 13th to connect fields to Auraria/ Sun Valley
 - **Running trail** around fields so the residents can use the space as well
 - **YCA/ Metro** connection
 - When Auraria was built, demo, not for us (sp?)
 - **Light Rail**- merits – show the community!
 - **Metro Hotel Mgmt.** – possible connections to Café and Annie
- **Strategy – Enhance street network...**
 - **Denver Complete Streets Policy**

Session 3: Healthy Economy

Group 2 Team: RMS, LL – Narada, Bill Sadler, Rob smith, Amanda Sandaval

Healthy Economy: What are the lessons learned?

- **Community Gardens/schools - Amanda**
 - **Gardens educate**, they provide a place for participation and social cohesion, health is the final product
 - Important for residents to know what to do with fresh veggies, how to clean prepare, cook
 - We need to teach this next generation, they can’t learn it at home- parents don’t know
 - Schools- need to partner with for sense of ownership and pride in healthy eating habits programs
 - Talk about healthy options
 - “Opt Out” programs, everyone participates, take this reverse approach then student don’t have to return a form from home to “opt-in”
 - Jefferson County Schools –weekend free food program, student get weekend bag of 14 items, they come back on Monday ready to learn having eaten over the weekend
- **Barriers – Bill**
 - Food access is barrier
 - Connections to jobs is barrier
 - Access to jobs = elevated income = health

Mariposa Healthy Living/HDMT Initiative
Page 10 of 12

10.01.12

SEATTLE / SAN FRANCISCO

- **Other projects to look at – Rob /group**
 - **21-1, St. Louis** –community became their own advocates
 - **Justine Peterson Program** –focuses on personal needs, ex. If your refrigerator breaks down, there some available to loan so the resident doesn't start the habit of buying fast food
 - **Healthy Food Initiative** –incentive, but still a business, part time subsidy in the meant time while trying to build the market; ex. Getting small store to sell fresh fruit- they won't stock it if there is not a market, therefore you need to build the market first before they buy into it.
 - **Equitable access** – there is still a floor and bottom line that has to be met in microfinance opportunities
 - **Other TOD projects to look at:** Bay Area-Fruitvale; Seattle –SE Line; Twin Cities –Central Corridor, did studies with a focus on economics and HIA from an economic standpoint, Pennsylvania –Reading Terminal
 - **Evaluate and learn from**, what are the reasons a business fails?
 - **Mentorship**
 - **Celebrating the cultural heritage**, sometimes businesses get “gentrified” out
 - **What are the needs and what is the market? DHA has data on needs?**
 - **Better Block** project in Denver?
 - **West HS – Generations Program** – entrepreneurship

Key thoughts:

- **Important for Residents to have a part of the Opportunities created by Mariposa Development**
 - **TOD's need to allow residents the opportunity for small business so the see that “redevelopment is for me”** –provide places for shared business space, office share, etc.
 - Provide incubator sites in redevelopment – Green Spaces, plus education and childcare
 - **Rocky Mountain Microfinance Institute** serves low income residents, people have great ideas that can be feasible, **they provide a market place incubator to launch** multiple businesses which allows for testing the business plan; if one fails there are still the others at the market place, don't let one failure take the “message” down
 - **Business development education** will be important b/c businesses will fail and will have to adapt to market demand
- DHA knows their community and knows the needs: can they help to identify business opportunities...i.e. the need for certain spices, goods that are in demand (that residents travel far to)
- **To bring together the Mariposa with Art and Business community on Santa Fe:**
 - Invite Mariposa residents (personally); help them to know how the First Friday's work, create a role

- Maybe set up a temporary art exhibit for a 'mini First Friday' to familiarize the community with an art walk
- Include healthy food
- Resident art?
- Invite artists/businesses from Santa Fe

H+T INDEX

The Center for Neighborhood Technology's Housing + Transportation (H+T[®]) Affordability Index is an innovative tool that measures the true affordability of housing by calculating the transportation costs associated with a home's location. Planners, lenders, and most consumers traditionally measure housing affordability as 30 percent or less of income. The H+T Index proposes expanding the definition of housing affordability to include transportation costs to better reflect the true cost of households' location choices. Based on research in metro areas ranging from large cities with extensive transit to small metro areas with extremely limited transit options, CNT has found 15 percent of income to be an attainable goal for transportation affordability. By combining this 15 percent level with the 30 percent housing affordability standard, the H+T Index recommends a new view of affordability, one defined as combined housing and transportation costs consuming no more than 45 percent of household income.

The H+T Index was constructed to estimate three dependent variables (auto ownership, auto use, and transit use) as functions of 11 independent variables (median income, per capita income, average household size, average commuters per household, residential density, gross density, average block size, intersection density, transit connectivity, transit access shed, and employment access). To hone in on the built environment's influence on transportation costs, the independent household variables (income, household size, and commuters per household) are set at fixed values to control for any variation they might cause. By establishing and running the model for a "typical household," (one defined as earning the regional area median income, having the regional average household size, and having the regional average number of commuters per household) any variation observed in transportation costs is due to place and location, not household characteristics.

See below for detailed information on the H+T Index methods.

GEOGRAPHIC LEVEL AND DATA AVAILABILITY

The H+T Index was constructed at the Census block group level. The H+T Index currently covers the Metropolitan and Micropolitan Areas in the United States, or the Core Based Statistical Areas (CBSAs), as defined by the Office of Management and Budget (OMB). The 2009 American Community Survey 5-year estimates serve as the primary dataset, thereby dictating the use of the 953 CBSAs as defined in 2008.

However, due to data limitations, multiple CBSAs were excluded from the Index. Due to incompatible and insufficient data, all regions in Puerto Rico (13) were excluded. Also, in 19 counties in eight states, the Census identified geographic code and definition problems, making block groups within these counties unusable

(http://www.census.gov/acs/www/data_documentation/2009_geography_release_notes/). This resulted in the exclusion of four CBSAs where no usable data were available.

Data availability due to data suppression also presented difficulties. Regions where necessary variables were available for less than 80 percent of the regional households were also excluded. This resulted in the exclusion of 59 CBSAs.



Feb

In total, 76 regions were excluded due to data limitations, bringing the total Index coverage from 953 to 877 regions.

HOUSING COSTS

To calculate the H in the H+T Index, housing costs are derived directly from nationally available datasets. Median Selected Monthly Owner Costs and Median Gross Rent, both from the 2000 American Community Survey 5-year Estimates (ACS), are averaged and weighted by the ratio of owner- to renter-occupied housing units from the Tenure variable for every block group in the CBSAs.

TRANSPORTATION COST MODEL

While housing costs are derived directly from ACS data, transportation costs, the T in the H+T Index, are modeled as three components of transportation behavior—auto ownership, auto use, and transit use—which are combined to estimate the cost of transportation.

BASIC STRUCTURE

The household transportation model is based on a multidimensional regression analysis, in which formulae describe the relationships between three dependent variables (auto ownership, auto use, and transit use) and independent household and local environment variables. Neighborhood-level (Census block group) data on household income (both median and per capita), household size, household commuters per household, household density (both residential and gross), street connectivity (measured using average block size and intersection density), transit access, and employment density were utilized as the independent or predictor variables.

To construct the regression equations, each predictor variable was tested separately; first to determine the distribution of the sample and second to test the strength of the relationship to the criterion variables. For this research, the regression analysis was conducted in a comprehensive manner, thus ignoring the distinction between the local environment variables and the household variables, in order to obtain the best fit possible from all of the independent variables. The predicted results from each model were multiplied by the appropriate price for each unit—autos, miles, and transit use—to obtain the cost of that aspect of transportation. Total transportation costs were calculated as the sum of the three cost components as follows:

$$\text{Household T Costs} = [C_{AO} * F_{AO}(X)] + [C_{AU} * F_{AU}(X)] + [C_{TU} * F_{TU}(X)]$$

Where

C = cost factor (i.e. dollars per mile)

F = function of the independent variables (F_{AO} is auto ownership, F_{AU} is auto use, and F_{TU} is transit use)



February 2012

INDEPENDENT VARIABLES: NEIGHBORHOOD CHARACTERISTICS

The 2009 American Community Survey 5-year estimates (ACS) at the block group level serve as the primary data source for the independent variables.

Household Density

Household density has been found to be one of the largest factors in explaining the variation in all three dependent variables. Various definitions of density have been constructed and tested, and the following two are utilized in the final transportation models.

Residential Density:

Residential Density represents household density of residential areas, in contrast to population density on land area. Total households are obtained at the block level from the 2010 US Census, and TIGER/Line files are used to define blocks. Blocks are selected on the criteria that gross density (households per land acre) must be greater than one. From these selected blocks, land acres are aggregated to calculate the total acres of residential blocks at the block group level. The count of households from the ACS is then scaled by the ratio of households in residential blocks to total households, and is then divided by the residential land area to calculate the block group level residential density.

Gross Density:

Gross Density is calculated as total households (from the ACS) divided by total land acres (as calculated using TIGER/Line files).

Street Connectivity and Walkability

Measures of street connectivity have been found to be good proxies for pedestrian friendliness and walkability. Greater connectivity created from numerous streets and intersections creates smaller blocks and tends to lead to more frequent walking and biking trips, as well as shorter average trips. While other factors clearly have an impact on the pedestrian environment (e.g., crime), two measures of street connectivity have been found to be important drivers of auto ownership, auto use, and transit use.

Average Block Size:

Census TIGER/Line files are used to calculate average block size (in acres) as the total block group land area divided by the number of blocks within the block group.

Intersection Density:

To determine intersection density, Census TIGER/Line files are used to identify every street intersection. All streets in the TIGER/Line files are included (e.g., alleys, interstates, etc.). For each block group, the sum of all intersections (including those on the borders) is calculated and divided by the total land area of the block group.



February 2012

Transit Access

Transit access is measured through General Transit Feed Specification (GTFS) data collected and created by CNT. In addition to the publicly available GTFS data provided by a small number of transit agencies, CNT has created GTFS structured datasets utilizing online transit maps and schedules. In many cases, CNT has directly contacted transit agencies to obtain more specific information on stop locations and schedules. All GTFS data is merged into a proprietary dataset known as AllTransit™. AllTransit is an online tool that facilitates the collection, normalization, aggregation, and analysis of GTFS data to determine fixed-route transit service. To date, CNT has compiled station and stop data for bus, rail, and ferry service for more than 75 percent of all metropolitan and micropolitan areas in the country.

Transit Connectivity Index:

The Transit Connectivity Index (TCI) is a measure of transit access that CNT has developed specifically for use in this household transportation cost model.

To calculate this measure, a buffer was constructed around each transit access point (¼ mile radius for bus stops and ½ mile radius for rail stations and all other access points). Next, five concentric annuluses were constructed, each with the width of the initial buffer. These six access areas were then assigned a service frequency value (total trips per week) for the transit access point they surround.

Next, at the block group level, six access values were calculated. These were calculated as:

$$\frac{\text{land area of the access area intersecting the block group} * \text{service frequency value} * \text{weighting multiplier}}{\text{total block group land area}}$$

The weighting multiplier identified in the above equation is calculated using regression analysis. Measured values of autos per household and percent journey to work by transit were each regressed against the six access values as defined above to obtain the optimal weighting multiplier for each. Therefore, two weighting multipliers are identified for each access area (one from the autos per household regression and one from the percent journey to work by transit regression). The rounded average of the two is used, and the six access values are summed for each block group in the final TCI calculation.

Transit Access Shed:

The Transit Access Shed is defined as the optimal accessible area from any block group within 30 minutes by public transportation scaled by the frequency of service. This measure was derived from the GTFS schedules discussed above. For each transit stop, all stops that can be reached within 30 minutes were identified. One transfer within 600 meters of a stop was allowed, and all transfers were padded with 10 minutes of walking and/or waiting. The stops reachable within 30 minutes were all based on the minimum travel time between the two stops, allowing the inclusion of more distant stops that are reachable within 30 minutes via express service. For each origination stop, a quarter mile buffer was created around the destination stops. Based on the location of the originating stop, the access shed was then aggregated for each stop to the block group and multiplied by the frequency of service (trips per week). Finally, the accessible area was derived and called the Transit Access Shed.



February 2012

Employment Access Index

Employment numbers are calculated using OnTheMap Version 5 which provides Local Employment Dynamics (LED) data at the Census block level. These data are currently unavailable in New Hampshire, Massachusetts, and the District of Columbia. CNT created an alternative dataset for these areas using 2000 Census tract level data from the Census Transportation Planning Package (CTPP), scaled to 2007 using county level employment estimates from the Bureau of Labor Statistics (BLS). Utilizing a constant share method, the tract level variation from the 2000 CTPP data is preserved, while the 2007 county level BLS data enables updating to the appropriate time period. The estimates for New Hampshire, Massachusetts, and the District of Columbia are then combined with the more compressive LED data available for all other states.

The Employment Access Index was determined using a gravity model, which considered both the quantity of and distance to all employment destinations, relative to any given block group. Using an inverse-square law, an employment index was calculated by summing the total number of jobs divided by the square of the distance to those jobs. This quantity allows us to examine both the existence of jobs and the accessibility of these jobs for a given census block group. Because a gravity model enables consideration of jobs both directly and not directly in a given block group, the employment access index gives a better measure of job opportunity, and thus a better understanding of job access than a simple employment density measure.

The Employment Access Index is calculated as:

$$E \equiv \sum_{i=1}^n \frac{p_i}{r_i^2}$$

Where E is the Employment Access for a given Census block group, n is the total number of Census blocks, p_i is the number of jobs in the i^{th} Census block, and r_i is the distance (in miles) from the center of the given Census block group to the center of the i^{th} Census block.

Because it was not feasible to include *all* jobs nationally in the calculation of employment access, jobs within 63 mile radius of a given block group were included. This cutoff was used as it represents the 90th percentile of commute distances nationally in the LED data.



February 2012

INDEPENDENT VARIABLES: HOUSEHOLD CHARACTERISTICS

The 2009 American Community Survey 5-year estimates (ACS) at the block group level serve as the primary data source for the independent variables pertaining to household characteristics.

Household Income

Median Income:

Median household income is obtained directly from the ACS.

Per Capita Income:

Per capita income was calculated as median household income divided by average household size.

Average Household Size

Average household size was calculated using Total Population in Occupied Housing Units by Tenure and Tenure to define the universe of Occupied Housing Units.

Average Commuters per Household

Average commuters per household was calculated using the total workers 16 years and over who do not work at home from Means of Transportation to Work and Tenure to define Occupied Housing Units. Because Means of Transportation to Work includes workers not living in occupied housing units (i.e. those living in group quarters), the ratio of Total Population in Occupied Housing Units to Total Population was used to scale the count of commuters to better represent those living in households.

DEPENDENT VARIABLES*Auto Ownership*

For the dependent variable of auto ownership, the regression analysis was fit using measured data on auto ownership obtained from the ACS. Aggregate Number of Vehicles Available by Tenure defined the total number of vehicles, and Tenure defined the universe of Occupied Housing Units. Average vehicles per occupied housing unit were calculated at the block group level.

Auto Use

For the dependent variable of auto use, the regression analysis was fit using measured data representing the total amount that households drive their autos, or vehicle miles traveled (VMT) per automobile. In order to determine the amount that households drive their autos, odometer readings were used. Odometer readings for 2005 through 2007 were obtained from the Massachusetts Department of Transportation for the entire state at a 250 meter grid cell level. A similar dataset for the greater Chicago area was analyzed at the zip code level and compared with the Massachusetts dataset, resulting in similar findings. Due to the finer geographic scale of the Massachusetts dataset, the regression analysis is fit using these data.

Transit Use

Because no direct measure of transit use was available at the block group level, a proxy was utilized for the measured data representing the dependent variable of transit use. From the ACS, Means of Transportation to Work was used to calculate a percent of commuters utilizing public transit.



February 2012

REGRESSION ANALYSIS

A rational function, a ratio of third order polynomials, was utilized as the functional form to regress each dependent variable:

$$R(x) \equiv \frac{a_1 \times x + a_3 \times x^2 + a_5 \times x^3}{1 + a_2 \times x + a_4 \times x^2 + a_6 \times x^3}$$

Because the GTFS data used to calculate the independent variables of transit access were not available in all regions, two regressions were fit and two models constructed for each dependent variable: one for regions with transit data (669 regions) and one for all regions excluding transit data to be used in regions without data available (208 regions).

Due to small samples sizes in the ACS, many block groups have missing data for various variables. The regressions were fit only where all independent and the given dependent variable were available. The models were ultimately run everywhere all independent variables were available.

For the vehicle miles traveled regressions, due to limitations in measured data, the analyses were only conducted for the state of Massachusetts. The resulting coefficients or models were then run for all regions in the country.

TRANSPORTATION COST CALCULATION

As discussed, the transportation model in the H+T® Affordability Index estimates three components of travel behavior: auto ownership, auto use, and transit use. To calculate total transportation costs, each of these modeled outputs is multiplied by a cost per unit (e.g., cost per mile) and then summed to provide average values for each block group.

Auto Ownership Costs

The 2007 edition of the America Automobile Association's (AAA) Your Driving Costs report serves as the basis for the auto ownership cost component. AAA reports an average ownership cost per year composed of full-coverage insurance, license, registration and taxes, depreciation, and finance charges.

Auto Use Costs

The 2007 Your Driving Costs report also serves as the basis for the auto use cost component. AAA reports an average operating cost per mile (composed of gas, maintenance, and tires). The gas component of AAA's operating costs is subtracted and replaced with regional fuel costs from the Energy Information Administration (EIA) to account for regional variation in gas prices.

Transit Use Costs

The 2007 National Transit Database (NTD) served as the source for transit cost data. Specifically, directly operated and purchased transportation revenue were used (demand response revenue was not factored into this analysis). The transit revenue was assigned to each of the transit agencies where GTFS data were collected. The allocation of transit revenue to the metropolitan level was then based on the percentage of each transit agencies' bus and rail stations within the primary versus surrounding metropolitan areas. For example, if a transit agency had a total of 500 bus stops and



February 2012

425 of those stops were located in the primary metropolitan area and 75 stops extended into a neighboring metropolitan area, the primary metropolitan area received 85 percent of the transit revenue and the neighboring metropolitan area received 15 percent. The allocation of the transit revenue was then applied to the block group level based on the percentage of transit commuters and household commuter counts within each block group from the ACS, to estimate the average household transit costs.

There were a number of metropolitan areas for which GTFS data were not available and/or there was no revenue listed in the NTD. In these cases, the national transit cost average from the allocation calculation described in the previous paragraph was used for these metropolitan areas. The average transit costs were then allocated to the block group level based on the percentage of transit commuters and household commuter counts. The end result was an average household transit cost at the block group level.

CONSTRUCTING AN INDEX

Because the H+T Index was constructed to estimate the three dependent variables (auto ownership, auto use, and transit use) as functions of independent variables, any set of independent variables can be altered to see how the outputs are affected. As a way to focus on the built environment, the independent household variables (income, household size, and commuters per household) were set at fixed values. This controls for any variation in the dependent variables that is a function of household characteristics, leaving the remaining variation a sole function of the built environment. In other words, by establishing and running the model for a “typical household,” (one defined as earning the regional area median income, having the regional average household size, and having the regional average number of commuters per household) any variation observed in transportation costs is due to place and location, not household characteristics.

MODEL FINDINGS

As discussed above, a rational function, a ratio of third order polynomials, was utilized as the functional form to regress each dependent variable:

$$R(x) \equiv \frac{a_1 \times x + a_3 \times x^2 + a_5 \times x^3}{1 + a_2 \times x + a_4 \times x^2 + a_6 \times x^3}$$

Each independent variable was normalized by a factor of 10 to eliminate very large and small values, and Table 1 below shows the coefficients, normalization values, and resulting R-squared values from each of the six regression analyses.



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