



ACTIVE DESIGN

AFFORDABLE DESIGNS
FOR AFFORDABLE HOUSING



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**TABLE OF
CONTENTS**

Executive Summary	005
Chapter 1 Health and Children Living in Low-Income Households	008
Chapter 2 Case Studies	020
Chapter 3 Cost Considerations in Affordable Housing	116
Acknowledgments	126
Photography Credits	128



EXECUTIVE SUMMARY

Rates of childhood and adult obesity have been increasing rapidly for the past 3 decades, reaching epidemic levels in the United States. Children in low-income households are disproportionately affected by health problems like obesity. Low-income neighborhoods are generally less supportive than higher-income neighborhoods of physical activity, a key part of achieving and maintaining good health. There is strong evidence that the physical environment of homes and neighborhoods influences activity and—consequently—obesity rates. In addition to obesity prevention, physical activity is also critical to children's overall physical and mental health.

A growing body of research demonstrates that Active Design—the design of the built environment to support daily physical activity and healthy eating—can have a significant impact in promoting health. By implementing Active Design strategies, architects, planners, and building owners and professionals can help combat the current epidemics of obesity and related chronic diseases, including diabetes, heart disease, strokes, and certain cancers. These design strategies can increase regular physical activity through environmental supports for active transportation, active movement in buildings, and active recreation.

Active Design: Affordable Designs for Affordable Housing is a guide for developers, designers, planners, and other policymakers interested in creating affordable housing developments that improve resident health and well-being. It supplements New York City's *Active Design Guidelines*, which provide a comprehensive manual of architectural and urban design strategies to encourage stair climbing, walking, bicycling, transit use, active recreation, and healthy diet. *Affordable Designs* focuses on feasible, low-cost ways to implement Active Design in affordable housing developments across the United States.

Low-cost housing has long been associated with a variety of social ills, which planners have sought to address, in part, through the design of the built environment. The goals for affordable housing in the United States have changed over time, as some of the most egregious problems—like overcrowding and infectious disease—have been addressed and new issues have emerged. Policymakers have always recognized the needs of families with children, but with the scientific evidence mounting for the importance of the built environment in supporting physical activity, more can be done to provide healthier environments for all age groups.

This publication presents 11 case studies that explore the means and costs of applying Active Design in new family-focused affordable housing developments in 3 cities: New York City, San Antonio, and Atlanta. The cases were selected to encompass a range of multi-residential housing typologies from urban to suburban environments. In each case, a team of designers worked with academics, public health professionals, housing developers, and city and state housing agencies to re-envision a new affordable housing development.

The objective of the new designs was to increase physical activity among children and families, using design strategies that stay within the project budget. The teams proposed both modifications that could be made post-construction and changes that could only have been implemented during the initial design. A cost estimate is provided for each of the suggested changes based on cost data reference guides and historical data.

The study focused on 3 main approaches:

- Shifting costs from sedentary design elements to features that promote activity;
- Enhancing existing features to support physical activity; and
- Adding features that support children’s activity across diverse age groups.

The case studies presented in Chapter 2 illustrate a range of cost differences between the existing designs and the Active Design proposals, from approximately \$128,000 less than the original design to \$280,000 more.

The original developers reviewed the revised designs and provided feedback on the feasibility of the recommended strategies. The Active Design measures employed in the case studies can be grouped into 3 broad categories: cost-neutral to low-cost and immediately implementable; implementable in future projects with little or no additional cost; and more ambitious but possible, if supported by market expectations, financial analysis, or additional outside funding sources.

Cost-neutral or low-cost strategies that are immediately implementable include:

- Provide stair prompt signage at elevator call areas and outside stairwells;
- Co-locate adults’ and children’s physical activity facilities;
- Provide secure bicycle storage;
- Include painted markings in playgrounds or walkways;
- Provide information boards about local physical activity opportunities.

Strategies implementable in future projects with little or no additional cost include:

- Make stairs accessible and visible from building entrances and main paths of travel;
- Provide direct paths between common areas and physical activity facilities;
- Program outdoor spaces to support both physical activity and quiet reflection;
- Provide safe and positive recreational activities for children of all ages;
- Address climatic conditions that may pose barriers to physical activity.

More ambitious but possible strategies include:

- Expand onsite indoor and outdoor facilities to support activities for children, youth, and families;
- Access alternate funding sources such as foundations, government, and mission-driven organizations to support Active Design goals and features.

Given the current lack of safe opportunities for physical activity in many low-income neighborhoods, as well as limitations on time and resources, it is more important than ever to design affordable housing that supports active play and physical activity within the building envelope and site. *Active Design: Affordable Designs for Affordable Housing* provides concrete examples and analysis of how simple, low- to no-cost design changes can help to encourage active living among affordable housing residents of all ages. With thoughtful attention to design, affordable housing developments and communities can play a crucial role in combating obesity and creating healthier, more sustainable communities.



CHAPTER

ONE

HEALTH &

CHILDREN LIVING

IN LOW-INCOME

HOUSEHOLDS



PLAYBOO

WARNING
Play It Safe!

HEALTH & CHILDREN LIVING IN LOW-INCOME HOUSEHOLDS

Nearly 20% of children in the United States live in households with incomes below the federal poverty level of \$22,050 a year for a family of 4. Research shows that the average family needs an income of about twice that amount to cover basic expenses. Households with incomes below \$44,100 for a family of 4 are referred to as “low-income.” In 2008, 41%—or almost 30 million—of the nation’s children lived in low-income households.¹

Children from low-income populations face a disproportionate host of health problems, including those related to obesity. Obesity is the second leading cause of death in the U.S. after tobacco, and physical inactivity is the fifth leading cause. Physical inactivity also contributes to the second, third, and fourth leading causes of death—obesity, high blood pressure, and high blood glucose, respectively.² In a national study, more than 33% of adults who earned less than \$15,000 per year were obese, compared with 24.6% of those who earned at least \$50,000 per year.³ This disparity is even wider among children. Children in households with incomes at or below the federal poverty rate are almost three times more likely to be obese (27.2%) than children in households with incomes four times the federal poverty rate or greater (9.8%).⁴ Moreover, rates of severe obesity are approximately 1.7 times higher among poor children and adolescents.⁵

Nationally, 31.6% percent of children ages 10 to 17 are either overweight or obese; 16.4% are obese. Overweight and obesity rates among children are even higher in many of the historically poorer southern states, reaching as high as 44.4% in Mississippi. More than half (54.8%) of Mississippi children living in households at or below the federal poverty rate are overweight or obese.⁶

Obese children tend to become obese adults at risk for many health problems, including heart disease and certain cancers, as they transition out of childhood. Obesity raises the risk of diabetes, high blood pressure, and high cholesterol in adults as well as in children.

There is strong evidence that physical activity is key to achieving and maintaining good health. The U.S. Department of Health and Human Services’ *Physical Activity Guidelines for Americans* recommend 60 minutes per day of physical activity for children and adolescents.⁷ The benefits of physical activity for children extend far beyond healthy weight and prevention of weight-related chronic diseases. Increased physical activity among children is also associated with improved bone health, cardiorespiratory and muscular fitness, behavior, self-esteem, and academic performance.⁸ Currently, only about 1 in 5 adolescents meets the recommended guidelines for physical activity.⁷

A growing body of research suggests that, independent of physical activity, time spent doing sedentary activities like watching television, sitting at a computer, or playing video games is associated with increased risk for many chronic conditions

and psychological problems.^{9,10,11} Children in the United States spend a large proportion of their waking time—from 6 to 8 hours—in sedentary activities.^{12,13}

Recent research suggests the important role of home and neighborhood environments in shaping the health disparities described above. Studies have shown that environments supportive of physical activity and healthy eating are less prevalent in low-income neighborhoods than in higher-income neighborhoods.¹⁴ In addition to lack of facilities, barriers to physical activity in low-income neighborhoods include crime and perceptions of crime, excessive litter and broken glass, and physical disorder characterized by excessive graffiti, abandoned cars and buildings, and empty lots.¹⁵

Research also shows that building and urban design strategies can increase regular physical activity.¹⁶ For example, a higher number of facilities for physical activity has been associated with lower rates of obesity and increased physical activity in adolescents.¹⁷ Daily active living opportunities like regular stair use can assist in weight control and chronic disease prevention.¹⁸ Increased exposure to green space is associated with higher activity levels and other positive health outcomes, including stress management and improved mental health.^{19,20,21} Because physical activity levels appear to decrease as children age,^{21,12} it is important to consider the needs of older children and adolescents in particular.

Urban and building design strategies for increasing physical activity in daily life—through environmental supports for active transportation, active movement in buildings, and active recreation—have recently been synthesized in the *Active Design Guidelines*, a manual for architects, landscape architects, urban designers and planners, real estate developers, green building professionals, and other professionals responsible for designing, constructing, and operating the built environment.²² Supporting healthy living through residential building design offers a powerful set of opportunities for intervention. Over time, these strategies can help improve children's individual outcomes by establishing healthy habits with lifelong benefits.

THE AFFORDABLE HOUSING ENVIRONMENT

Lack of access to affordable housing has long been recognized as an important social issue. When housing costs consume a large portion of a family's income, there is less money available to meet other basic needs that directly impact children, like food and medical care. Research in New York City, for example, shows that a high housing cost burden is associated with a greater risk of delaying healthcare.²³

Affordable housing goals have changed over time, as some of the most egregious problems of the past have been addressed and new issues have come to the forefront. This shift has resulted in changes in policy and financing as well as in architectural form. Policy makers have historically employed multiple strategies to provide low-cost, affordable housing to low-income households in need. These include both supply-side strategies that create income-targeted units, such as public housing or affordable housing developed with federal Low Income Housing Tax Credits (LIHTC), and demand-side solutions, such as vouchers, that help ensure affordability within private market units. Many of the programs most commonly used today encourage public-private partnerships, in which government assistance supports the development of income-targeted housing by nonprofit or for-profit developers. Many programs encourage mixed-income development that includes both subsidized and non-subsidized units, creating diverse and financially viable communities. Other federal, state, and local programs help support the rehabilitation and preservation of existing low-cost housing.

Multiple strategies have been used to meet the needs of specific populations and geographic regions. Many localities have actively sought to replace older public

Affordable housing in South Side Chicago. These recently-built lower-density homes have private outdoor spaces for residents.



housing structures with mixed-income development through programs like HOPE VI. In other areas, particularly in rural and suburban regions, vouchers serve as the primary means of helping low-income households secure low-cost housing. In large cities like New York, multiple types of subsidized housing and rental assistance are utilized to reach a broader range of incomes and serve the needs of the marketplace.²⁴

Typologies of affordable housing buildings have evolved over time in different communities from high-rise buildings, to lower buildings in the form of courtyard housing, townhouses, and garden apartments. Chicago's Cabrini-Green development is a prime example of the evolution of building forms in affordable housing. The first units, built by the government in 1943, were row houses; mid-rise units were added in 1958; and finally, in 1962, more than 1,000 units were added in high-rise buildings. Many communities have since scaled down the size and height of their affordable housing units. Communities that still depend on high-rise structures have incorporated design solutions to address some of the challenges faced by developments from the '50s and '60s.²⁵ When thoughtfully designed, all different types of developments can provide families with a mix of defensible private space and access to shared community space. They can also provide outdoor play areas for children that can be visually monitored by adults and encourage physical activity in a wide range of age groups.

Today, there is a growing understanding that the built environment can positively affect the health behaviors of residents of all income levels and age groups. By providing safe and compelling outdoor and indoor spaces that encourage active living, housing communities can play a role in curtailing the obesity epidemic and other unhealthy effects of inactive lifestyles.

Given the existing lack of opportunities for safe physical activity in many low-income neighborhoods, as well as limitations on time and money, it is more crucial than ever to design low-income and affordable housing that incorporates opportunities for active play and physical activity within the building envelope and site. Providing opportunities for physical activity can not only help reduce inequalities in children's health, but can also impact their academic achievement. Research has shown a positive association between children's physical activity and fitness and academic outcomes.

Good housing promotes health and well being; living in a secure home that provides opportunities for active play and movement is integral to good health. Incorporating Active Design features into affordable housing can have a dramatic impact on the lives of residents most affected by health disparities and most in need of such opportunities.

With the publication of the *Active Design Guidelines*, progressive developers have shown great interest in designing, constructing, and operating buildings that can improve the health of their residents. Some developers have expressed concern about the potential cost of implementing the Guidelines in affordable housing developments with tight cost margins. This study was conducted to address those concerns by assessing the cost of integrating Active Design measures into several recently built affordable housing typologies.

This publication presents 11 case studies examining strategies and costs for incorporating Active Design guidelines in newly-constructed affordable housing developments across three cities: New York City, New York; San Antonio, Texas; and Atlanta, Georgia. It focuses in particular on those strategies aimed at increasing physical activity among children aged 3 to 18.

The authors partnered with a number of affordable housing developers, who provided details of recent developments (designed and built prior to the publication of the *Active Design Guidelines*) in order to identify opportunities and challenges in designing environments supportive of child- and family-oriented physical activity.

Working with public health professionals, designers from professional practice and academia re-envisioned each project with the objective of increasing opportunities for physical activity among children and their families. The revised designs were otherwise consistent with the original programming of the developments. While all of the developments already had many positive features, opportunities existed in each project for increasing childhood and youth physical activity. The suggested modifications range from minor changes that could easily be implemented to strategies that could only have been implemented during the initial design, such as the location and grouping of buildings on a site. A cost estimate is provided for each of the suggested changes based on cost data reference guides, historical data, and inputs from a professional cost estimator.

The publication concludes with an analysis of feasible opportunities for making affordable housing more supportive of physical activity. The projects' original developers were asked to review and respond to the team's recommended modifications. Chapter 3 includes the developers' perspectives on the suggestions' feasibility, and it communicates their level of enthusiasm for incorporating these evidence-based and best-practice strategies in future projects. By demonstrating the feasibility and affordability of incorporating Active Design into family housing projects, we hope to encourage developers to routinely adopt many of these practices.

Although this Greenwich Village residential courtyard provides residents with an attractive and safe outdoor space, there are opportunities for improving active recreation facilities and encouraging more active uses of the space among adults and children.



ACTIVE DESIGN IN PRACTICE: THE MELODY

This study was inspired by the pioneering initiatives of innovative housing providers who have incorporated Active Design strategies into their residential developments, providing healthier housing options for families with low incomes.

The Melody, a 63-unit apartment building located in the South Bronx, New York, was developed by the Blue Sea Development Company using Active Design strategies. The building includes many facilities that support physical activities, such as a well-appointed indoor fitness room, a bicycle storage space, and an outdoor children's play area and fitness circuit.

The fitness room includes exercise bikes for adults but also some connected to video game machines geared toward teenagers.

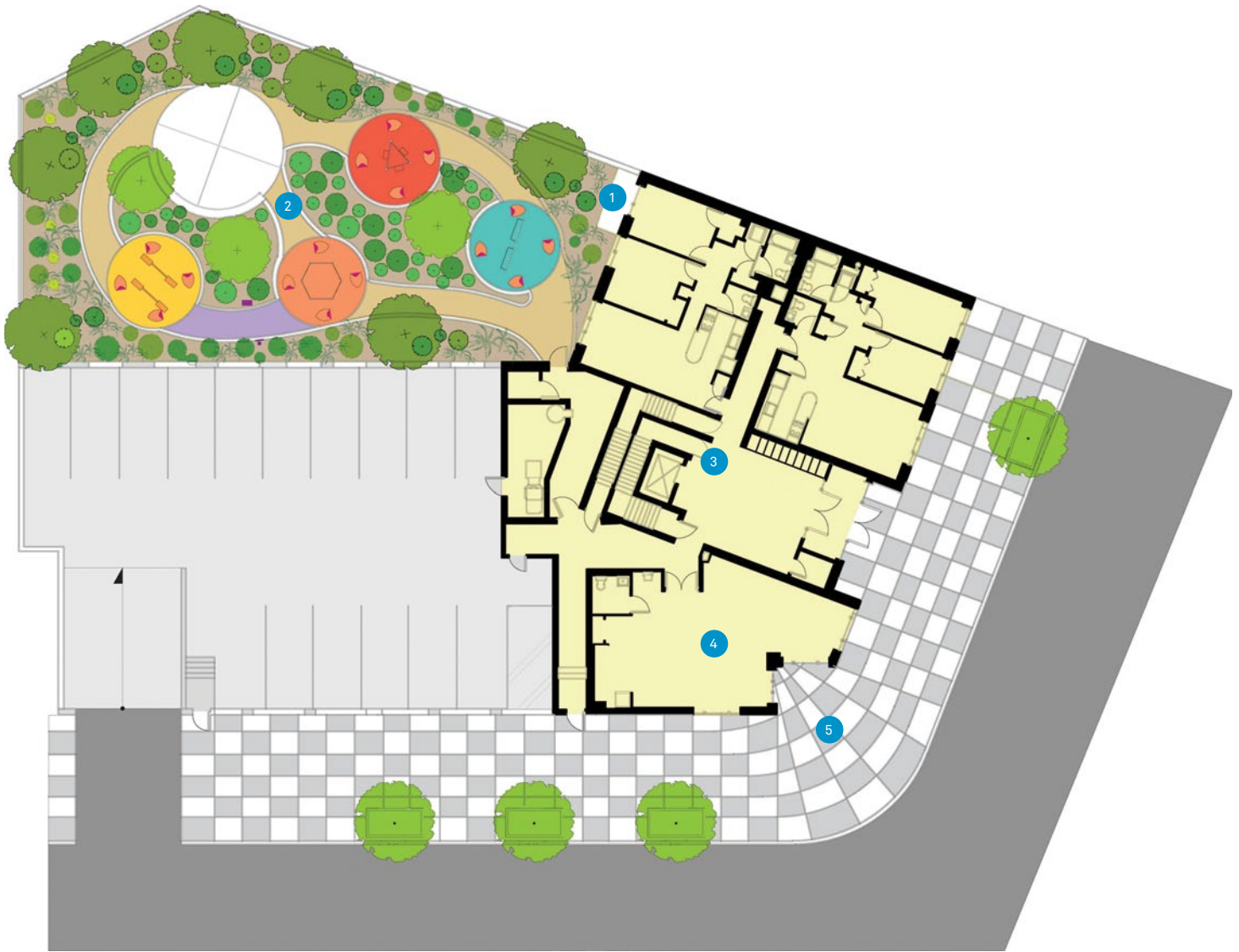
Glazed stair doors encourage residents to use the bright, wide

staircases that also feature artwork and music. The lobby stairs, located adjacent to the building's single elevator and in direct view of the building's entrance doors, offer residents an accessible and healthy option for vertical travel within the building.

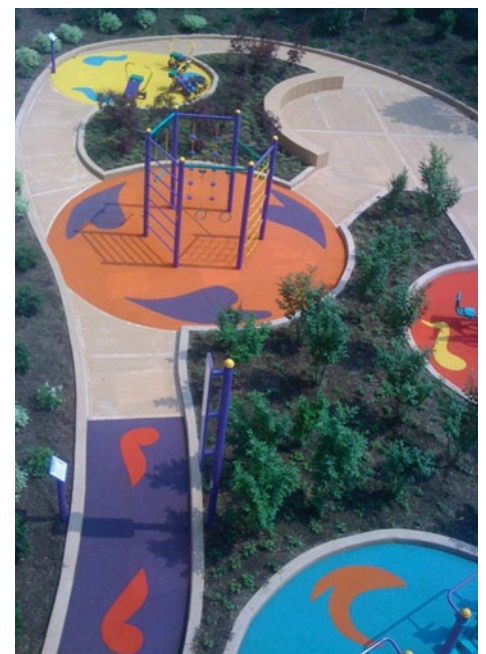
Increasing opportunities for physical activity among building residents through Active Design is one component of a comprehensive set of health-oriented initiatives included in the building's design. The building also has a fully sealed air handling system in each dwelling unit to combat irritants that can trigger asthma, along with many energy-saving measures to address energy and water conservation issues.

A LEED innovation credit for implementing Active Design strategies contributed to the development's earning a LEED Platinum rating.





- 1 Windows and balconies overlooking the active yard increase awareness of activity features.
- 2 Stations within the active yard provide physical activity options for various age groups.
- 3 The lobby stair is presented as a healthy alternative to elevator use for vertical travel.
- 4 A well-appointed fitness center is designed to support use by both older children and adults.
- 5 Placement of the fitness center helps activate the sidewalk environment, making physical activity more visible.



NOTES

According to the U.S. Department of Housing and Urban Development, affordable housing is housing that costs no more than 30% of a family's annual income.

REFERENCES

1. Wight VR; Chau M. Basic Facts About Low-income Children, 2008: Children Under Age 18. New York, NY: National Center for Children in Poverty, Columbia University, Mailman School of Public Health; 2009.
2. Danaei G, Ding EL, Mozaffarian D, Taylor B, Rehm J, Murray CJL, Ezzati M. The Preventable Causes of Death in the United States: Comparative Risk Assessment of Dietary, Lifestyle, and Metabolic Risk Factors. **PLoS Medicine**. 2009(6.4).
3. Hobson K. F as in Fat: How Obesity Threatens America's Future: 2011. Trust for America's Health and the Robert Wood Johnson Foundation, July 2011.
4. U.S. Department of Health and Human Services, Health Resources and Services Administration, Maternal and Child Health Bureau. **Child Health USA: 2010**. Rockville, MD: U.S. Department of Health and Human Services; 2010. <http://www.mchb.hrsa.gov/chusa10/hstat/hsa/desc/21900Vpl.html>. Accessed June 11, 2012.
5. Skelton JA, et al. Prevalence and Trends of Severe Obesity among U.S. Children and Adolescents. **Academic Pediatrics**. September–October 2009(9.5): p. 332–329.
6. National Survey of Children's Health. Data Resource Center for Child & Adolescent Health. <http://www.nschdata.org/content/07obesityreportcards.aspx>. Accessed June 11, 2012.

7. U.S. Department of Health and Human Services. **2008 Physical Activity Guidelines for Americans**. Washington, D.C.: U.S. Department of Health and Human Services; 2008. <http://www.health.gov/paguidelines/guidelines/default.aspx>. Accessed June 11, 2012.
8. Centers For Disease Control And Prevention. Adolescent and School Health: Physical Activity Facts. <http://www.cdc.gov/healthyyouth/physicalactivity/facts.htm>. Accessed June 11, 2012.
9. Tremblay MS, et al. Physiological and Health Implications of the Sedentary Lifestyle. **Applied Physiology, Nutrition, and Metabolism**. December 2010(35.6): p. 725–40.
10. Tremblay MS, et al. Systematic Review of Sedentary Behavior and Health Indicators in School-Aged Children and Youth. **International Journal of Behavioral Nutrition and Physical Activity**. 2011(8.98). <http://www.ijbnpa.org/content/8/1/98>.
11. Matthews C. Amount of Time Spent in Sedentary Behaviors and Cause-specific Mortality in U.S. Adults. **American Journal of Clinical Nutrition**. February 2012(95.2): p. 437–445.
12. Matthews CE, et al. Amount of Time Spent in Sedentary Behaviors in the United States, 2003–2004. **American Journal of Epidemiology**. April 1, 2008;167(7): p. 875–81.
13. Rideout V. Zero To Eight: Children's Media Usage in America. Common Sense Media. October 11, 2011. <http://www.commonsensemedial.org/research/zero-eight-childrens-media-use-america>.
14. Powel LM, et al. Availability of Physical Activity-related Facilities and Neighborhood Demographic and Socioeconomic Characteristics: a National Study. **American Journal of Public Health**. September 2006(96.9): p. 1676–80.
15. Troped PJ. Perceived Built Environment and Physical Activity in U.S. By Women by Sprawl and Region. **American Journal of Preventative Medicine**. November 2011(41.5): p. 473–9.
16. Guide to Community Preventive Services. Environmental and policy approaches to physical activity. www.thecommunityguide.org/pa/environmental-policy/podp.html.
17. Gordon-Larsen P, et al. Inequality in the Built Environment Underlies Key Health Disparities in Physical Activity and Environment. **Pediatrics**. 2006;117: p. 417–424.
18. Zimring C, et al. Influences of Building Design and Site Design on Physical Activity: Research and Intervention Opportunities. **American Journal of Preventive Medicine**. February 2005;28(2.2): p. 186–193.
19. Ellaway A, et al. Graffiti, Greenery, and Obesity in Adults: Secondary Analysis of European Cross Sectional Survey. **BMJ**. September 17, 2005;331(7517): p. 611–2. Epub. August 19, 2005.
20. Wells N, Evans G. Nearby Nature: a Buffer of Life Stress among Rural Children. **Environmental Behavior**. 2003;35: p. 311e30.
21. Mitchell R, Popham F. Effect of exposure to natural environment on health inequalities: an observational population study. **Lancet**. November 2008.
22. City of New York. **Active Design Guidelines: Promoting Physical Activity and Health in Design**. 2010. http://www.nyc.gov/html/ddc/html/design/active_design.shtml. Accessed March 1, 2012.
23. Gaumer E, Lear M. Affordable Housing as Intervention: Impact on Postponement of Medical Treatment. Results from the NYC Housing and Neighborhood Demonstration. 9th International Conference on Urban Health. New York City, 2010.
24. Krieger J, Higgins, DL. Housing and Health: Time Again for Public Health Action. **American Journal of Public Health**. 2002;92(5): p. 758–768. doi: 10.2105/ajph.92.5.758.
25. Salama JJ. The redevelopment of distressed public housing: Early results from HOPE VI projects in Atlanta, Chicago, and San Antonio. **Housing Policy Debate**. 1999;10(1): p. 107.
26. Efrat M. The relationship Between Low-Income and Minority Children's Physical Activity and Academic-related Outcomes: A Review of the Literature. **Health Education & Behavior**. 2011;38 (5): 441–51.
27. Egger JR, Konty KJ, Bartley KF, Benson L, Bellino D, Kerker B. Childhood Obesity is a Serious Concern in New York City: Higher Levels of Fitness Associated with Better Academic Performance. **NYC Vital Signs** 2009;8(1): 1–4.

CHAPTER

TWO

CASE

STUDIES





CASE STUDIES

This chapter presents 11 case studies representing a variety of affordable housing typologies, with different project sizes, urban/suburban contexts, climatic regions, resident income mixes, and demographics. All of these high-quality projects have been created by private developers, housing authorities, and philanthropic foundations with a long and successful history of providing affordable housing and a demonstrated interest in examining and incorporating design and social innovations into their work. At the time of the study, some of the projects were under construction and others were completed.

The case studies were assessed by design teams made up of architects and architecture students who identified the opportunities and challenges inherent in the actual design of each project. Based on these assessments, the design teams established a small set of objectives for each case study for optimizing children's opportunities for physical activity. Such opportunities could be created by enhancing existing features of the projects, reducing the impact of building and site features that discourage physical activity, and adding features that promote children's active play and exercise.

The design teams were asked to re-envision the original projects given the priority of promoting physical activity for children between the ages of 3 and 18. Their goal was to explore ideas about implementing Active Design strategies in the affordable housing context and to propose an Active Design schema for each case study. These strategies focus on low-cost, cost-neutral, and moderate-cost revisions and provision of additional features aimed at supporting recreational activities and active transportation for children, as well as for adults whose involvement would encourage child activity. The design team aimed to address the availability of activities across 3 child age groups (ages 3 to 6, 7 to 12, and 13 to 18 years). These age group designations reflect assumptions about common interests and activities, strength and coordination abilities, and the need for supervision.

Design teams were provided with detailed working drawings for each case study, which were then simplified to replicate architectural schematic plans. Building and site features that did not impact the discussion of Active Design strategies are not included in the drawings.

Based on the schematic plans for both the existing and proposed designs for each case study, quantities have been calculated for the architectural site and building elements altered between the two designs. With the exception of Case Study 7, costs for existing and proposed design elements are based on the proposition that the costs for these items would have been included as part of the entire project construction costs and not considered isolated renovation costs. Case Study 7 is the only preexisting building in the set of case studies; all costs associated with that case study would be additional costs to the existing building.

Cost tables are provided to compare cost differences between the existing design and the proposed design of each case study. The costs presented in these tables represent material and labor costs for the supply and installation of the features described. Unit costs are based on the 2011 RS Means Construction Cost Database or cost information provided by manufacturers and suppliers of items not detailed in this common construction cost reference publication. All costs were verified as reasonable by a professional cost estimator. No overhead and profit values—traditionally added to the cost of construction—are included in the figures presented, due to the high variance in the overhead and profit costs across 3 geographic regions.

Each case study in this chapter is presented in a standard format that includes an introduction, the project's neighborhood and building context, and the objectives that form the basis for re-envisioning the case study as a more child activity-oriented residential development. Annotated schematic plans for the existing and proposed designs are presented for graphic comparison along with designations illustrating how the designers' envisioned features support physical activity by different child age groups. Each case study includes a concise description of selected aspects of the Active Design proposals, as well as a table summarizing the cost difference between the existing and proposed Active Design schemes.

**CASE STUDIES
CONTENTS**

Case Study 1	025
An 8-story, 124-unit residential building, Bronx, New York	
<hr/>	
Case Study 2	035
A 6-story, 51-unit residential building, Bronx, New York	
<hr/>	
Case Study 3	041
An 8-story, 65-unit residential building, Harlem, New York	
<hr/>	
Case Study 4	049
An 8-story, 250-unit residential building, Harlem, New York	
<hr/>	
Case Study 5	059
A 4- and 8-story, 129-unit residential complex, Harlem, New York	
<hr/>	
Case Study 6	067
A 3-story, multiple-building, 129-unit residential complex, San Antonio, Texas	
<hr/>	
Case Study 7	075
A 4-story, 119-unit residential building for seniors, San Antonio, Texas	
<hr/>	
Case Study 8	083
A 4-story, multiple-building, 245-unit residential complex, San Antonio, Texas	
<hr/>	
Case Study 9	091
A 3-story, multiple-building, 648-unit residential complex, Atlanta, Georgia	
<hr/>	
Case Study 10	099
A 3- and 4-story, multiple-building, 194-unit residential complex, Atlanta, Georgia	
<hr/>	
Case Study 11	107
A 2-story, multiple-property, 100-unit residential project, Atlanta, Georgia	

CASE STUDY 1

BRONX, NEW YORK

In Case Study 1, a developer and design team revisited their original project design following the 2009 publication of the *Active Design Guidelines*, and redesigned portions of the building and site to provide increased opportunities for physical activity. This 8-story rental apartment building is located in the Bronx, at the corner of a large postwar-era housing development of 15 high-rise apartment buildings. The building under study contains 100 affordable units designated for tenant households earning 60% or less than the Area Medium Income.

A block-long park across the street from the case study site includes a baseball field, a soccer field, a basketball court, a playground, and a pavilion with restrooms. While the adjacent high-rise housing development features a significant amount of open space between buildings, it provides very limited recreational amenities for children's physical activity. 4 elementary schools, 1 middle school, and 2 high schools are all situated within a half mile of the building. The site is a 12-minute walk to the nearest subway. Cold-weather exercise facilities are limited, and although there is a community center located approximately a half mile from the building, it does not have significant indoor facilities.

The building is L-shaped, with the average floor containing 16 units: 8 units facing directly onto the street, 6 units overlooking a rear courtyard, and 2 street-view units with restricted views of the courtyard. The courtyard is accessible only through the ground floor via a corridor adjacent to the community room and management office. It is constructed over a basement-level parking garage. This greatly limits the ability of the courtyard to incorporate large landscape features like trees or topologically deep features like pools. The building incorporates a unique feature, a commercial greenhouse on the roof, that requires a separate elevator on the south end of the building. There is bicycle storage space in the basement, although the unit layouts and greenhouse elevator configuration require cyclists to access the exterior through either the building elevator and lobby or the parking ramp.

The building elevators, located within the lobby, are highly visible to residents entering the building. By comparison, the nearby stairs are not very visible. They are part of a “scissor stair” design, a configuration where two separate staircases are intertwined. Such stairs are highly efficient in terms of the amount of space they occupy, but are often configured with straight flights from floor to floor. They are typically unappealing to users, as they generally appear to be narrow and require more exertion per flight than stairs that turn at mid-landings. To address this, the developer made the stairs 20% wider than required by the building code.

In an effort to create more physical opportunities for children in this building, this case study will propose revisions to the building layout and site design aimed at the following objectives:

- Promote stair use in the building.
- Increase diverse opportunities for recreational play that incorporate moderate to vigorous physical activity for children aged 3 to 18.
- Increase children's physical activity through the promotion and co-location of parent fitness opportunities alongside children's activity spaces.



CASE STUDY 1

EXISTING MASTER PLAN

1 Initial vision for 10,000-square-foot roof of parking garage deck was for a tranquil landscaped courtyard space.



2 Large community room and adjoining fitness room are assets to resident activities.



3 Elevator to rooftop hydroponic greenhouse.

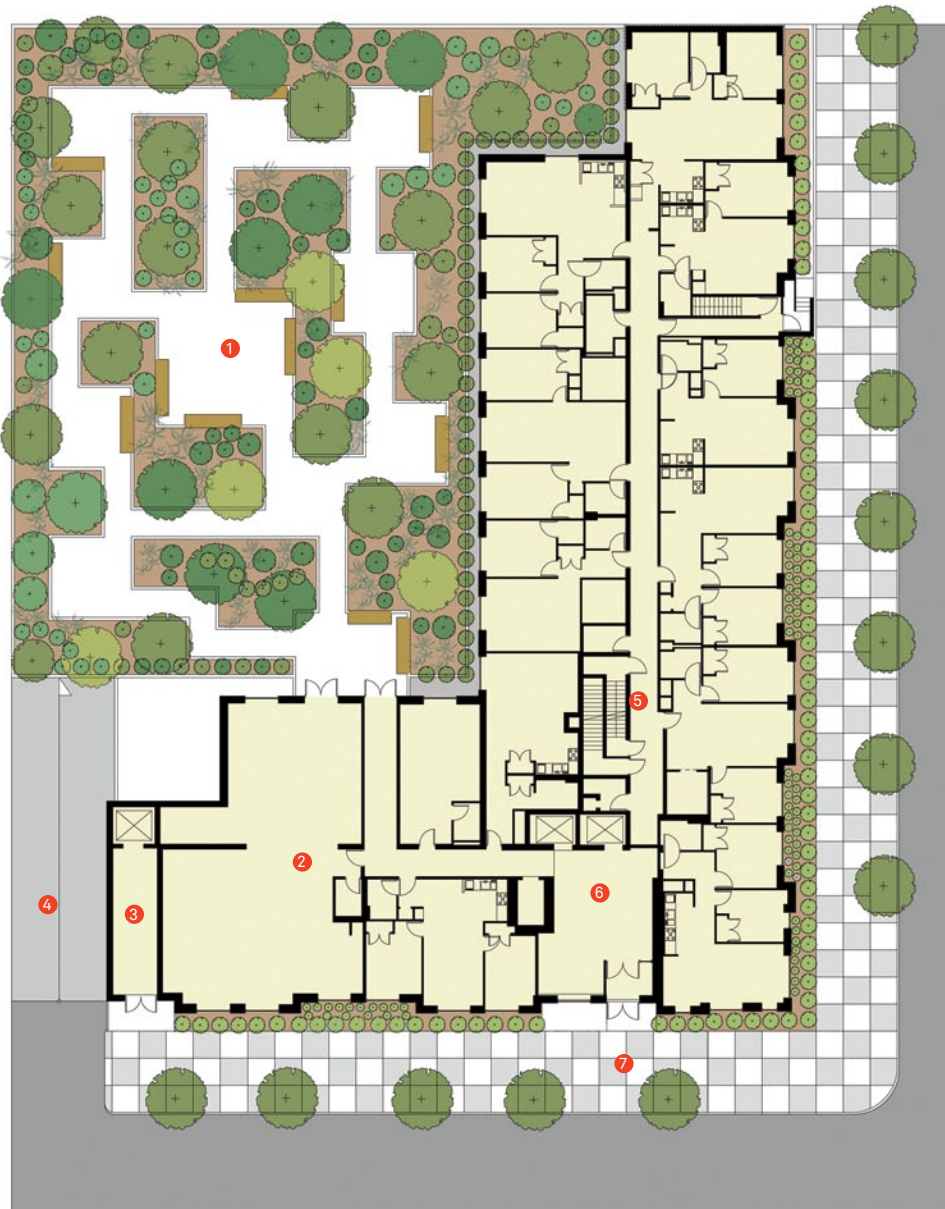
4 Ramp to parking and secured bicycle storage.



5 Building's staircases are located close to the entrance and elevators, but are not very visible.

6 Building's elevators are located directly across the lobby from the entrance door.

7 Building's entrance is located in close proximity to intersection, linking residents to recreation facilities across the street.



CASE STUDY 1

PROPOSED ACTIVE MASTER PLAN

1 Revised courtyard includes 8 activity areas and 3 tranquil areas to provide a diverse mixture of activities for children and adults.



2 Large community room and adjoining fitness room are assets to resident activities.

3 Elevator to rooftop hydroponic greenhouse.



4 Ramp to parking and secured bicycle storage.

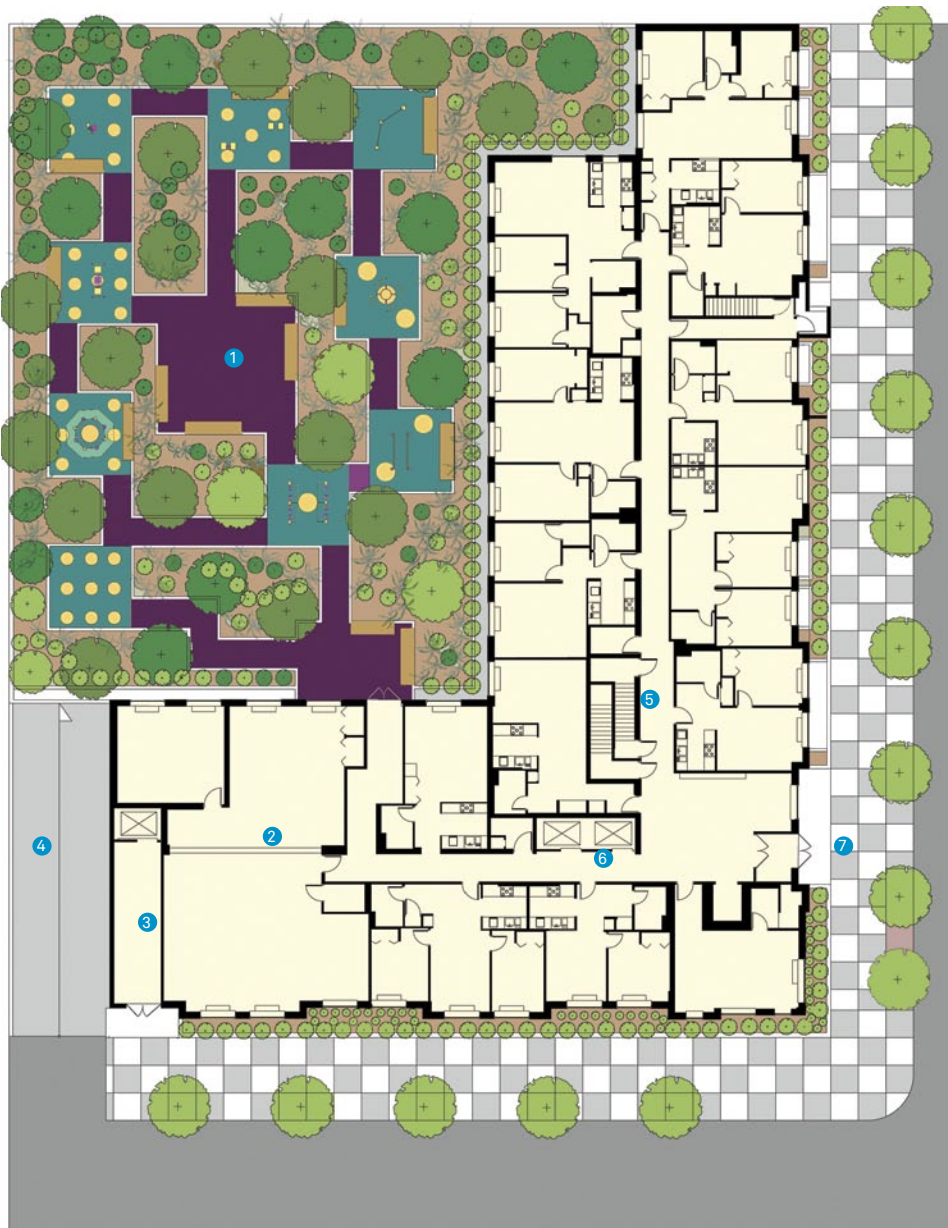


5 New lobby location provides a direct view of the staircases. Glazed panels in the stair doors at all levels increase the stairs' visibility and signal that they are for everyday use.



6 Buildings' elevators are no longer immediately visible from entrance doors, but remain highly accessible for those who need to use them.

7 Building's revised entrance remains located in close proximity to intersection, linking residents to recreation facilities across the street.



ACTIVITY LEVEL

- Ages 3–6 Vigorous Physical Activity
- Ages 3–6 Moderate Physical Activity
- Ages 7–12 Vigorous Physical Activity
- Ages 7–12 Moderate Physical Activity
- Ages 13–18 Vigorous Physical Activity
- Ages 13–18 Moderate Physical Activity
- Adults 18yr+ Vigorous Physical Activity
- Adults 18yr+ Moderate Physical Activity

The original courtyard scheme segmented the large roof deck into a series of quiet, landscaped reflection spaces. The area is re-envisioned to provide a more diverse and comprehensive set of active and passive environments. Activity stations and a poured-in-place rubber playground surface are added within the existing layout of the courtyard to create a more active environment.

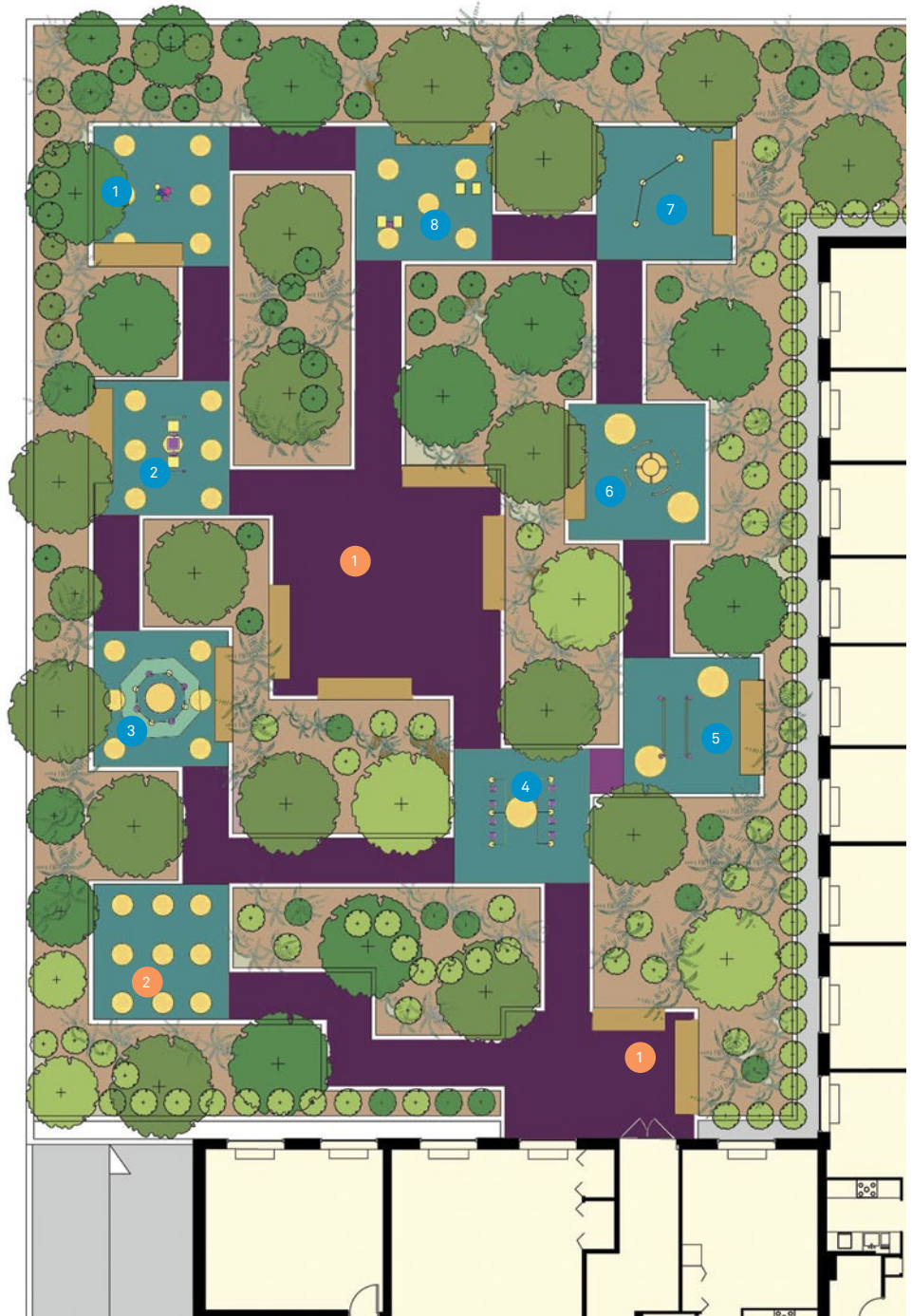
The co-location of activity stations, some more specifically for children and others for adult use, provides diverse opportunities for family-oriented recreation time.

Physical Activity Areas

- 1 Basketball station
- 2 Pommel horse station
- 3 Integrated fitness
- 4 Air walkers
- 5 Parallel bars
- 6 Sitting rotators
- 7 Dual exercise bars
- 8 Back extenders

Sedentary Activity Areas

- 1 Reflection areas
- 2 Chess table



These images illustrate the range of activity apparatus installed to support physical activity for child and adult residents.

(Images courtesy of Outdoor Fitness Equipment Company)



CASE STUDY 1

ACTIVE DESIGN STRATEGIES

OBJECTIVE

Promote stair use in the building.

STRATEGIES

Locate stairs near the building's entrance. Integrate the stair with the principal areas of orientation and travel within the building.

The revised lobby location situates the stairs in closer proximity to the building's entrance.

Design elevators to be less prominent than stairs for people who can use the stairs, while providing elevator access for people with disabilities.

Within the relocated lobby, the building's elevators are no longer immediately and prominently visible to people entering the building. The elevators remain highly accessible for use by people with disabilities.

Design stairs to be more visible, in order to encourage their everyday use.

Replacing the solid stair door with a fire-rated glazed door signals that the stairs are provided for everyday use.

Place stair prompt signage at elevators to encourage stair use.

Point-of-decision signage located adjacent to the elevator and staircases encourages residents to use the stairs for vertical travel.

OBJECTIVE

Increase diverse opportunities for recreational play that incorporate moderate to vigorous physical activity for children aged 3 to 18.

STRATEGIES

Design activity spaces to accommodate a building's various occupant groups.

The building provides a significant amount of shared resident space to support a range of physical activity opportunities for people of different ages and abilities. These include an indoor community and fitness area, active and passive courtyard spaces, and building stairs.

OBJECTIVE

Increase children's physical activity through the promotion and co-location of parent fitness opportunities alongside children's activity spaces.

STRATEGIES

Co-locate parent fitness opportunities alongside children's activity spaces.

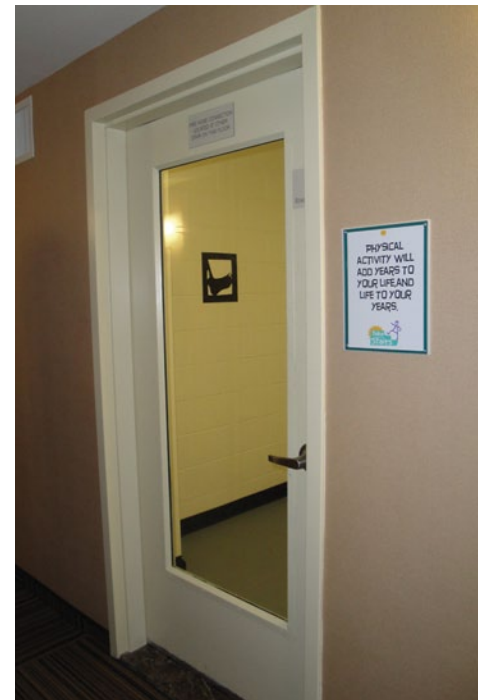
The variety of equipment and activity spaces within the courtyard provides for both adult caregivers and children to be collectively or individually active in many of the station areas. While the landscaped planters provide some separation between the station areas, the height of the planter walls and vegetation does not obstruct the ability of caregivers to supervise children across different stations.

Provide views to the outdoors from physical activity rooms.

The landscaping and activity spaces in the rear courtyard are highly visible through the large windows in the indoor community and fitness rooms, encouraging use of these outdoor spaces.

Stairs can be an accessible venue for physical activity. In this example, the glazed stair door, point-of-decision signage, and interesting graphics within the stair environment help make the stair more apparent to residents as a choice for vertical travel.

The Melody, Bronx, New York



CASE STUDY 1

COST OF IMPLEMENTING ACTIVE

DESIGN STRATEGIES

EXISTING MASTER PLAN				PROPOSED ACTIVE MASTER PLAN			
MATERIAL	QUANTITY	MATERIAL AND LABOR COSTS	EXISTING COST	MATERIAL	QUANTITY	MATERIAL AND LABOR COSTS	PROPOSED COST
Ground floor walls Painted gypsum board on metal studs wall assembly	2,480 sf	\$4.97/sf	\$12,326	Ground floor walls Painted gypsum board on metal studs wall assembly	2,712 sf	\$4.97/sf	\$13,479
Aluminum and glass entrance Entrance and vestibule	1 set	\$2,075/set	\$2,075	Aluminum and glass entrance Entrance and vestibule	1 set	\$2,075/set	\$2,075
Aluminum and glass entrance doors and fixed glazed screens	156 sf	\$44.75/sf	\$6,981	Aluminum and glass entrance doors and fixed glazed screens	156 sf	\$44.75/sf	\$6,981
Hollow metal doors Hollow metal stair doors	20	\$419/unit	\$8,380	Hollow metal doors 1.5-hour fire-rated ceramic glass and steel stair doors	20	\$1,400/door	\$28,000
Floor finishes Lobby tile	460 sf	\$10.75/sf	\$4,945	Floor finishes Lobby tile	442 sf	\$10.75/sf	\$4,751
Resident unit vinyl tile flooring	1,761 sf	\$5/sf	\$8,805	Resident unit vinyl tile flooring	1,883 sf	\$5/sf	\$9,415
Corridor and shared spaces carpet	2,362 sf	\$10.02/sf	\$24,092	Corridor and shared spaces carpet	2,889 sf	\$10.02/sf	\$10,593
				Ground floor additional community space	415 sf	\$125/sf	\$51,875
Courtyard planter Formed concrete planter wall	906 lf	\$22/lf	\$19,932	Courtyard planter Formed concrete planter wall	906 lf	\$22/lf	\$19,932
Soil filter course/insulation and protection board	5,590 sf	\$4.02/sf	\$22,472	Soil filter course/insulation and protection board	5,590 sf	\$4.02/sf	\$22,472
Wooden benches	13 benches	\$350/bench	\$4,550	Wooden benches	13 benches	\$350/bench	\$4,550
Landscaping Small trees planted c/w guides	5	\$300	\$1,500	Landscaping Small trees planted c/w guides	5	\$300	\$1,500
Medium trees planted c/w guides	26	\$500	\$1,300	Medium trees planted c/w guides	26	\$500	\$1,300
Shrubs	125	\$70	\$8,750	Shrubs	125	\$70	\$8,750
Grasses and perennials	4,142	\$20	\$81,840	Grasses and perennials	4,142	\$20	\$81,840
Courtyard pathway surface Concrete pavers over concrete roof deck and waterproof membrane	4,385 sf	10.24/sf	\$43,850	Courtyard activity area surface 2" poured-in-place rubber surface over concrete roof deck and waterproof membrane	3,970 sf	\$22/sf	\$87,340
				Courtyard activity equipment (installed)			
				Dual exercise bars	1	\$842	\$842
				Back extension rotator	2	\$594	\$1,188
				Basketball system	1	\$1,384	\$1,384
				Pommel horse	1	\$1,198	\$1,198
				Parallel bars	1	\$1,384	\$1,384
				Climber	1	\$7,722	\$7,722
				Sitting rotator	1	\$1,978	\$1,978
				Double air walker	2	\$2,584	\$5,168
				Chess table and chairs	1	\$2,000	\$2,000
EXISTING TOTAL:			\$251,798	PROPOSED TOTAL:			\$377,717

The proposed design increases opportunities for physical activity among adult and child residents by strategically reconfiguring the ground floor areas to promote activities like stair use and by enhancing existing facilities like the recreational rear courtyard. The cost of the Active Plan is **\$125,919 more** than the existing development plan. This represents an increase of **less than 0.4%** over the project's original \$35 million development cost.

CASE STUDY 2

BRONX, NEW YORK

This new 6-story building located in the Bronx contains 51 rental units, including studios and 1- and 2-bedroom apartments. The development was created for low-income families, half of which come from the local community and from formerly homeless individuals and families. More than half of the residents earn less than 40% of the Area Median Income. On-site support services are provided by a volunteer group.

The building is located in a remote area of the Bronx, requiring a 15-minute (0.7-mile) walk to the nearest subway station. Public group sports facilities are limited in the immediate neighborhood. There is one public park nearby, but other public parks are located almost a mile away. There are 2 additional playgrounds located a half mile away. Indoor facilities are mostly privately operated and located far from the site. There are 4 public elementary schools, a junior high, and 2 high schools located within a half mile.

To address the lack of nearby and secure activity spaces, the existing plan commendably includes a rear yard with grassy area and well-appointed playground, providing opportunities for play, especially for younger children. The backyard is designed to provide spaces both for activity and reflection.

One major opportunity for this case study is to optimize the original investment made toward promoting physical activity by addressing challenges in the ground floor plan that reduce the visibility and accessibility of the backyard. Access to the backyard and community room is currently far from the primary travel path connecting the entrance and vertical circulation areas. The high visibility of the elevators from the entrance door, and the low visibility of the staircase further along the public corridor, discourage stair use.

This case study focuses on the following goals:

- Increase the use of the outdoor courtyard by providing direct physical and visual access from the lobby.
- Increase stair use by increasing the visibility of the stairs and decreasing the emphasis on the elevators within the building lobby.
- Increase opportunities for moderate to vigorous physical activity for residents of all ages during all seasons.



CASE STUDY 2

EXISTING MASTER PLAN

1 Indoor and outdoor community gathering areas are adjacent to each other.

2 Although laundry room is adjacent to activity areas, its layout diminishes the likelihood that residents will combine their own or their children's use of adjacent activity areas with their use of laundry room.

3 Activity areas on the ground floor are remote from the lobby area.

There is no fitness facility located in the building.



4 Rear yard provides long expanse of grassy area that can accommodate children's play, though limited equipment is provided to support older children's activities.



5 Children's playground with poured-in-place rubber surface is located in the rear corner of the rear yard, adjacent to primarily sedentary recreational spaces.

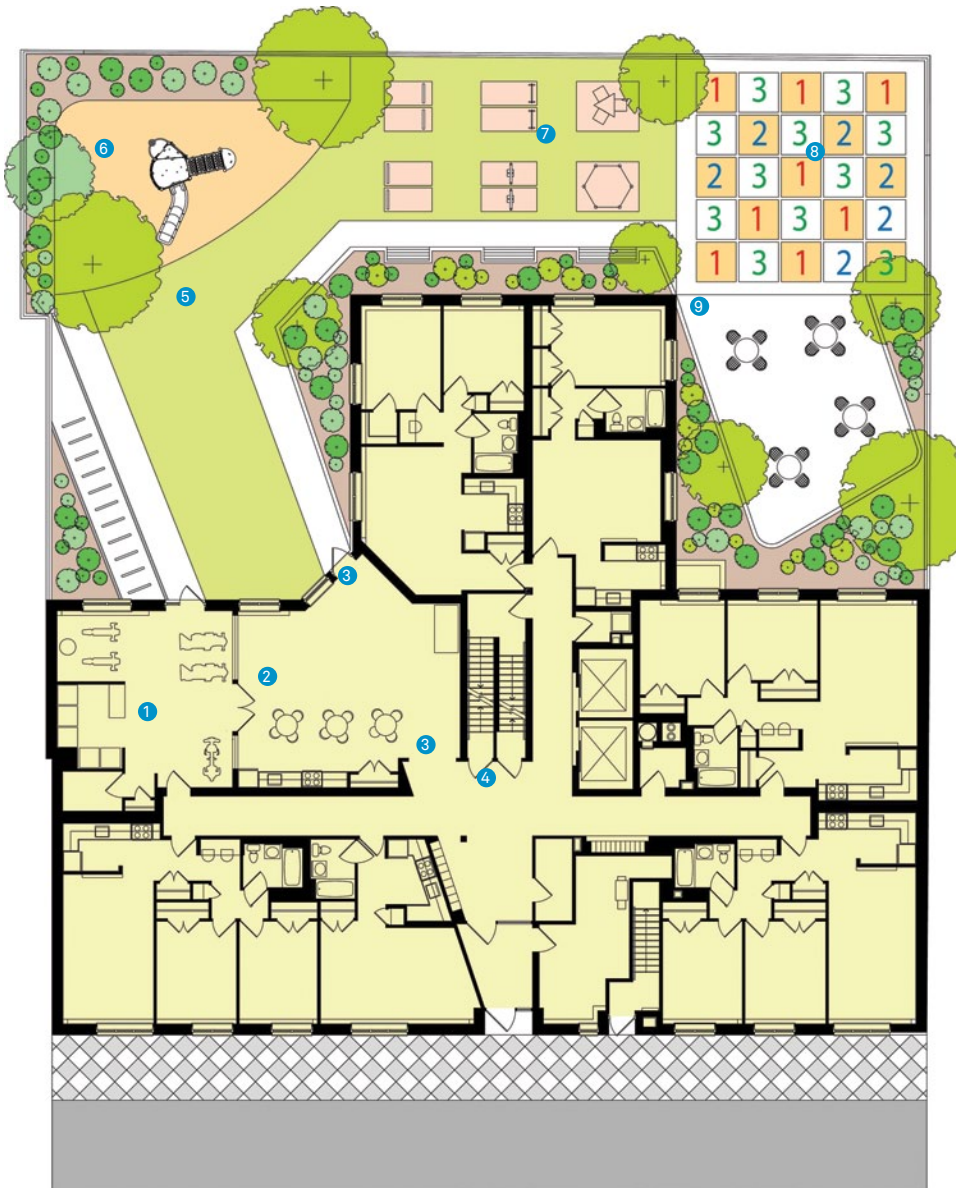


6 Staircases are obstructed from view of the lobby entrance, though one stair is highly visible and in close proximity to the elevators.

CASE STUDY 2

PROPOSED ACTIVE MASTER PLAN

- 1 New fitness room is added, co-located with laundry facilities to promote residents' physical activity while doing laundry tasks. ● ● ●
- 2 Open-access community room provides access to rear yard and accommodates physical activities during poor weather. ● ● ● ●
- 3 Community room and access door to rear yard are highly visible from building entrance. ● ● ● ●
- 4 Stair doors with glazed panels are highly visible from building entrance, promoting stair use. ● ● ● ●
- 5 Open play area and grass surface are bordered by path leading to children's play area and secure bicycle storage space. ● ● ● ● ●



- 6 Children's playground, with poured-in-place rubber surface, is directly visible from lobby, community room, and fitness room. ● ● ● ●
- 7 Fitness area, grass surface with rubber tiles under fitness equipment, and equipment facing kids' play areas organized in pairs to encourage social use. ● ● ● ●
- 8 Hard surface play area, with bold graphics to encourage play. 6-foot wall encourages ball games and blocks view of neighbor's rubble yard at rear. ● ● ● ●
- 9 Access to leisure area requires residents to travel through more active areas of the rear yard. ● ● ● ●



ACTIVITY LEVEL

- Ages 3–6 Vigorous Physical Activity
- Ages 3–6 Moderate Physical Activity
- Ages 7–12 Vigorous Physical Activity
- Ages 7–12 Moderate Physical Activity
- Ages 13–18 Vigorous Physical Activity
- Ages 13–18 Moderate Physical Activity
- Adults 18yr+ Vigorous Physical Activity
- Adults 18yr+ Moderate Physical Activity

This case study considered how the ground floor layout could increase daily opportunities for physical activity among building residents.

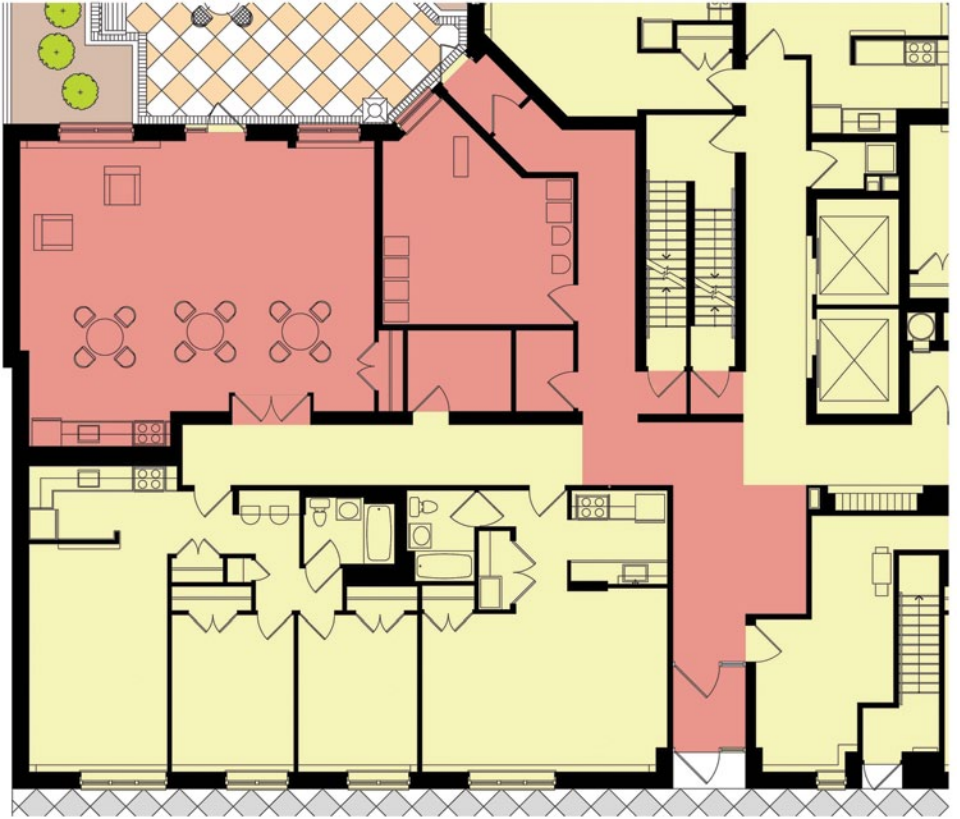
The existing plan provides residents with a community room and laundry room located with a view to the rear yard. While neither of these spaces is generally considered a children's activity space, both provide some view of the children's playground area in the rear yard. The rear yard is accessible to residents via a public corridor that requires several turns along the path of travel from either the building entrance or the elevators. The enclosed community room can accommodate resident gatherings, but its enclosed design suggests that it will be locked while not in use for authorized purposes.

The building's stairs are well-situated to provide a more active vertical circulation alternative to the elevators. However, the placement of a short expanse of wall at the stair's doorways obstructs their visibility from the street entrance doors: the primary orientation point of the building signals to building users that the elevators, which are clearly visible from the entrance doors, are the primary and perhaps only option for vertical travel in the building. Additionally, the location of the mailboxes visually reinforces the primacy of the elevator.

The proposed plan reconsiders the relationships between the shared resident spaces on the ground floor. The community room is relocated and reprogrammed as an open-access lobby/community space, allowing for 24-hour use. The open ground floor area allows the rear yard entrance to be visible to all residents as they enter the building from the street. The area formerly devoted to the public corridor can be repurposed for the addition of a new combined fitness and laundry room, with the expectation that residents may use the fitness equipment or adjacent outdoor activity areas while waiting between laundry loads.

The reorganized lobby area is designed to increase the visibility and accessibility of the building's stairs, providing an active option to residents for vertical travel. Glazed panels within the stair doors make residents aware of the stair environment, while a point-of-decision prompt sign located above the call-button and required exit signage at the elevators encourages residents to use the stairs to improve their health. The new location of the mailboxes helps direct the visual field of a person entering the building from the street to the center and left side of the lobby, where the stair doors, community space, and rear yard door are situated.

Existing ground floor plan
Pink represents revised area



Proposed ground floor plan
Pink represents revised area



CASE STUDY 2

ACTIVE DESIGN STRATEGIES

OBJECTIVE

Increase the use of the outdoor courtyard by providing direct physical and visual access from the lobby.

STRATEGIES

Include **physical activity spaces** in commercial workplaces and residential buildings.

The reprogramming of the ground-floor community room to an open-access community space/lobby eliminates the need for a separate public corridor to the rear yard and provides space to add a fitness area.

Locate **physical activity spaces** in a centrally **visible** location within the building to help increase awareness and use of these spaces.

Activity-promoting spaces, including the playground area, bicycle storage space, and grassy area for play, are directly visible from the new fitness room/laundry area and community space/lobby.

Provide **views to the outdoors** from physical activity rooms.

The proposed plan provides views from the new fitness room with laundry area and the community space/lobby to the rear yard.

Color-coded ground markings can stimulate gross motor play and define play areas.

PS 29, New York City



OBJECTIVE

Increase stair use by increasing the visibility of the stairs and decreasing the emphasis on the elevators within the building lobby.

STRATEGIES

Design stairs to be more visible to encourage their everyday use.

Removing the wall shielding the existing stairs optimizes their visibility, thus encouraging their everyday use. Replacing the solid door at each lobby stair entrance with doors that have fire-rated glazed screens visibly reminds building users that the stairs are provided for everyday use.

Place signage at elevators to encourage stair use.

Signage incorporated into the building's signage plan—located above the required exit signage, near the call buttons for the ground floor elevators—can inexpensively promote stair use for able-bodied residents while maintaining and supporting access to the elevators for those who need them.

OBJECTIVE

Increase opportunities for moderate to vigorous physical activity for residents of all ages during all seasons.

STRATEGIES

Design activity spaces to accommodate a building's various occupant groups.

The proposed plan increases the features and facilities available to residents of diverse age groups. Although the existing plan included a play area for young children with a comprehensive playground apparatus, the provision of a hard surface area and bicycle storage space offers additional features to support physical activity among older children and adults. The revision of the enclosed community room to an open-access space creates shared space for children's play, especially during poor weather conditions.

Co-locate play areas adjacent to an adult exercise space, allowing parents to exercise while watching over their children at play.

The proposed plan provides several adjacencies between adult and child activity spaces and promotes physical and visual accessibility between the community space/lobby, the fitness/laundry area, and the grassy open space and children's play apparatus in the rear yard. In addition, physical activity stations located in the center area of the rear yard allow caregivers to supervise children at play in either the playground or hard surface area while being active themselves.

CASE STUDY 2

COST OF IMPLEMENTING ACTIVE

DESIGN STRATEGIES

EXISTING MASTER PLAN				PROPOSED ACTIVE MASTER PLAN			
MATERIAL	QUANTITY	MATERIAL AND LABOR COSTS	EXISTING COST	MATERIAL	QUANTITY	MATERIAL AND LABOR COSTS	PROPOSED COST
Wall in front of stairs							
8" concrete unit masonry	156 sf	\$11.91/sf	\$1,858				
½" gypsum board on each side	312 sf	\$4.97/sf	\$1,551				
Structural steel lintels at stair, community room entry, and washroom entrance	26 lf	\$23.28/lf	\$605	Structural steel			
				Steel lintels at stairs	29 lf	\$88.98/ lf	\$2,580
				Steel columns at stairs and lobby	36 lf	\$111.79/lf	\$4,024
Lobby, corridor, community room, laundry room, washroom, and storage room	1,224 sf	\$4.97/sf	\$6,083	Lobby, corridor, community room, laundry room, washroom, and storage room	1,139 sf	\$4.97/sf	\$4,886
Painted gypsum board on metal studs wall assembly				Painted gypsum board on metal studs wall assembly			
Aluminum and glass entrance	41.25 sf	\$22.14/sf	\$913	Aluminum and glass entrance			
Fixed glass panels at front openings				Fixed glass panels at front and rear yard entrance and at fitness area	35 sf	\$22.14/sf	\$2,989
				Double door and frame at fitness room	1 unit	\$2,358/unit	\$2,358
Hollow metal and wood doors				Hollow metal and wood doors	2	\$922/unit	\$1844
Hollow metal stair doors	2	\$419/unit	\$838	1.5-hour fire-rated ceramic glass and steel stair doors			
Hollow metal laundry doors	1	\$419/unit	\$419				
Floor finishes				Floor finishes			
Tile in lobby	220 sf	\$10.75/sf	\$2,365	Lobby, stair entry landing	302 sf	\$10.75/sf	\$3,247
Tile in corridor to rear yard	182 sf	\$10.75/sf	\$1,956	Fitness and community rubber flooring	1,116 sf	\$9.14/sf	\$10,200
Tile in community, storage, & laundry rooms	990 sf	\$10.02/sf	\$9,920	Tile in storage room	48 sf	\$10.02/sf	\$481
				Indoor activity equipment			
				Exercise bike	1	\$300	\$300
				Elliptical	2	\$900	\$1,800
				Dumbbells	1	\$550	\$550
				Weights	1	\$500	\$500
				Foam wedge (6'x3'x1.5')	1	\$423	\$423
				Foam cylinder (3'x1.5' diameter)	1	\$249	\$249
				Foam 3-steps	1	\$299	\$299
				High jump mats	2	\$685	\$1,370
Rear yard				Rear yard			
Formed concrete planter wall	426 lf	\$22/lf	\$9,372	Formed concrete planter wall	246 lf	\$22/lf	\$5,412
Soil and filter course	2,452 sf	\$1.02/sf	\$2,452	Soil and filter course	1,680 sf	\$1.02/sf	\$1,680
Trees and landscaping				Trees and landscaping			
Small shrubs	200	\$20/plant	\$4,000	Small shrubs	150	\$20/plant	\$3,000
Medium trees planted c/w guides	5	\$200/tree	\$1,000	Medium trees planted c/w guides	6	\$200/tree	\$1,200
Large trees planted	1	\$400/tree	\$400	Large tree planted	1	\$400/tree	\$400
Wood benches	6	\$250/bench	\$1,500				
Grassy open space	1,790 sf	\$1.31/sf	\$2,345	Grassy open space	2,248 sf	\$1.31/sf	\$2,945
Sod over 4" topsoil				Sod over 4" topsoil			
				Bicycle rack for 12 bikes	1 set	\$700/set	\$700
				Canopy over bicycle racks	150 sf	\$12/sf	\$1,800
Playground equipment	No change			Playground equipment	No change		
Playground surface	700 sf	\$12/sf	\$8,400	Playground surface	629 sf	\$12/sf	\$7,548
3" poured-in-place rubber surface on 3" concrete base				3" poured-in-place rubber surface on 3" concrete base			
				Hard surface play area			
				3" colored concrete pad on 3" granular base	1,090 sf	\$7.10/sf	\$7,739
				Painted markings	200 sf	\$1/sf	\$200
Picnic area				Picnic area			
3" concrete patio on 3" granular base	950 sf	\$6.80/sf	\$6,480	3" concrete patio on 3" granular base	750 sf	\$6.80/sf	\$5,100
Table and chair sets	3 sets	\$600/set	\$1,800	Table and chair sets	4 sets	\$600/set	\$2,400
				Outdoor activity area			
				Rubber ties below equipment	252 sf	\$10.50/sf	\$2,624
				Spring-up bars	2	\$951/unit	\$1,902
				Sit-up bench	2	\$864/unit	\$1,728
				Weights	2	\$1,023/unit	\$2,046
				Leg press	1	\$1,891/unit	\$1,891
				Integrated fitness (hexagon)	1	\$2,013/unit	\$2,013
				Air walker	1	\$993/unit	\$993
EXISTING TOTAL:			\$72,201	PROPOSED TOTAL:			\$91,424

The \$19,223 more in material and labor costs represents less than 0.2% of the \$12 million development cost for the building.

CASE STUDY 3

HARLEM, NEW YORK

This case study examines an 8-story, 62,000-square-foot building located in East Harlem, New York. The building contains 65 rental studios and 1-, 2-, or 3-bedroom units. The building is a joint venture between a developer and an addiction rehabilitation foundation, which will have offices on the first floor. Units are a mix of supportive housing for formerly homeless singles and affordable housing for working families who earn 50% or 60% of the Area Median Income.

The building is situated within a moderately remote part of Harlem, with an approximately 10-minute walk to the nearest subway station. There are a number of children's group sports opportunities in the immediate neighborhood, including facilities at a public housing project a block away, a recreation center, and a city park a half mile away. Indoor exercise facilities, typically pay-for-use and adult-oriented, are located .7 to .9 miles away and quite limited. One public school and 3 specialized schools are situated within a half-mile radius of the building.

The existing building design addresses residents' need for safe recreational and contemplative space by providing a courtyard in the rear area of the building site. The existing outdoor courtyard—a good example of an active courtyard—is divided into 3 zones: an outdoor fitness space, a playground, and a quiet, park-like space. The outdoor fitness zone contains several permanent fitness features, including a chin-up station, a horizontal ladder, parallel bars, a step-up station, and spring-up and sit-up stations. While these fitness areas are most appropriate for adults and teenagers, the design of the stations selected for this project poses minimal risks for younger children who might venture into the area to try the equipment or play around it. The adjacent outdoor active play area contains a set of innovative playground structures designed for children between ages 5 and 12, including a hemisphere climber, a unique monkey bar structure, and additional appealing play sets where children can spin, wobble, and climb. The reflective enjoyment zone is divided by a pathway that leads to the street exit. A sheltered bicycle storage space is located in back of this area. The area is bounded by landscaped beds that help buffer the courtyard from the perimeter walls and the ground-floor residential units. Although there is a community room on the ground floor, there is no dedicated activity or fitness room in the building.

While this community has many favorable attributes for healthy living, the following broad-based suggestions have been recommended to increase children's opportunities for physical activity in the complex:

- Increase the use of the outdoor courtyard by providing direct physical and visual access from the lobby.
- Provide opportunities for activity and fitness within the building to address the seasonal limitations of the outdoor courtyard.
- Increase stair use by raising the visibility of the stairway and decreasing the emphasis on the elevator in the building lobby.



CASE STUDY 3

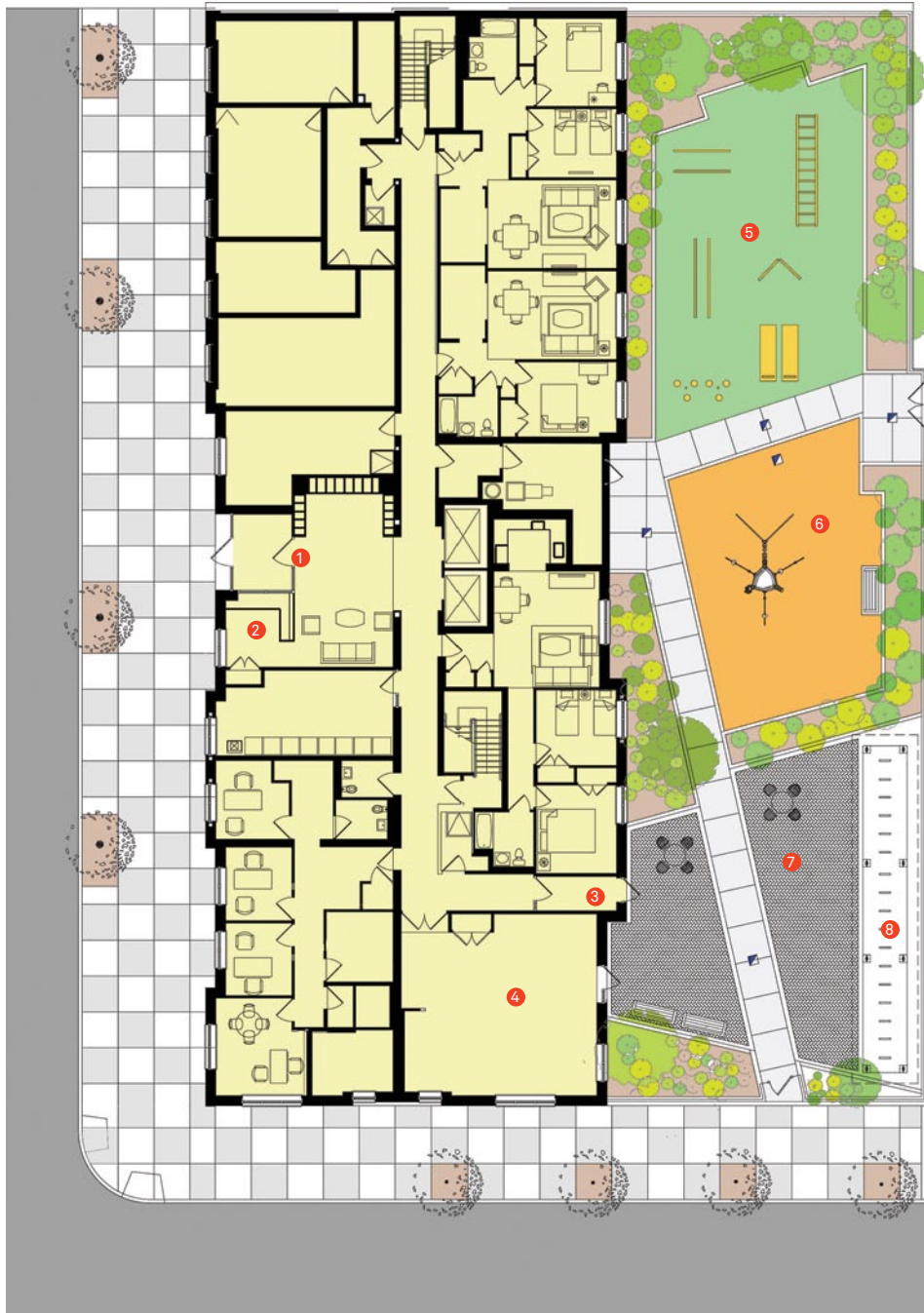
EXISTING MASTER PLAN

1 Building entrance has direct view of building elevators. Enclosed building stairs have no physical or visual presence to people in building lobby.

2 Building has security personnel supervising lobby area.

3 Entrance to outdoor courtyard is remote from main circulation corridor on ground floor.

4 Community room is remote from building lobby.



5 Outdoor fitness zone contains several permanent fitness features, including a chin-up station, parallel bars, a horizontal ladder, and step-up, spring-up, and sit-up stations.



6 Outdoor courtyard playground contains a climber, a monkey bar structure, and play sets where children can spin, wobble, and climb.



7 Outdoor courtyard enjoyment zone is a hard-surface area divided by pathway leading to street.

8 Sheltered, secure bicycle storage racks are provided.



CASE STUDY 3

PROPOSED ACTIVE MASTER PLAN

1 Relocated community room across from security desk provides more opportunities for incorporating children's activity.
● ● ● ● ● ● ● ●

2 Reconfigured lobby provides direct view and accessibility to outdoor courtyard.

3 Co-location of new fitness room directly across from relocated laundry area provides an opportunity to engage in physical activity while completing a commonplace task.
● ● ● ● ● ● ● ●

4 Path around perimeter of courtyard provided to support young children's walking and cycling.
● ●

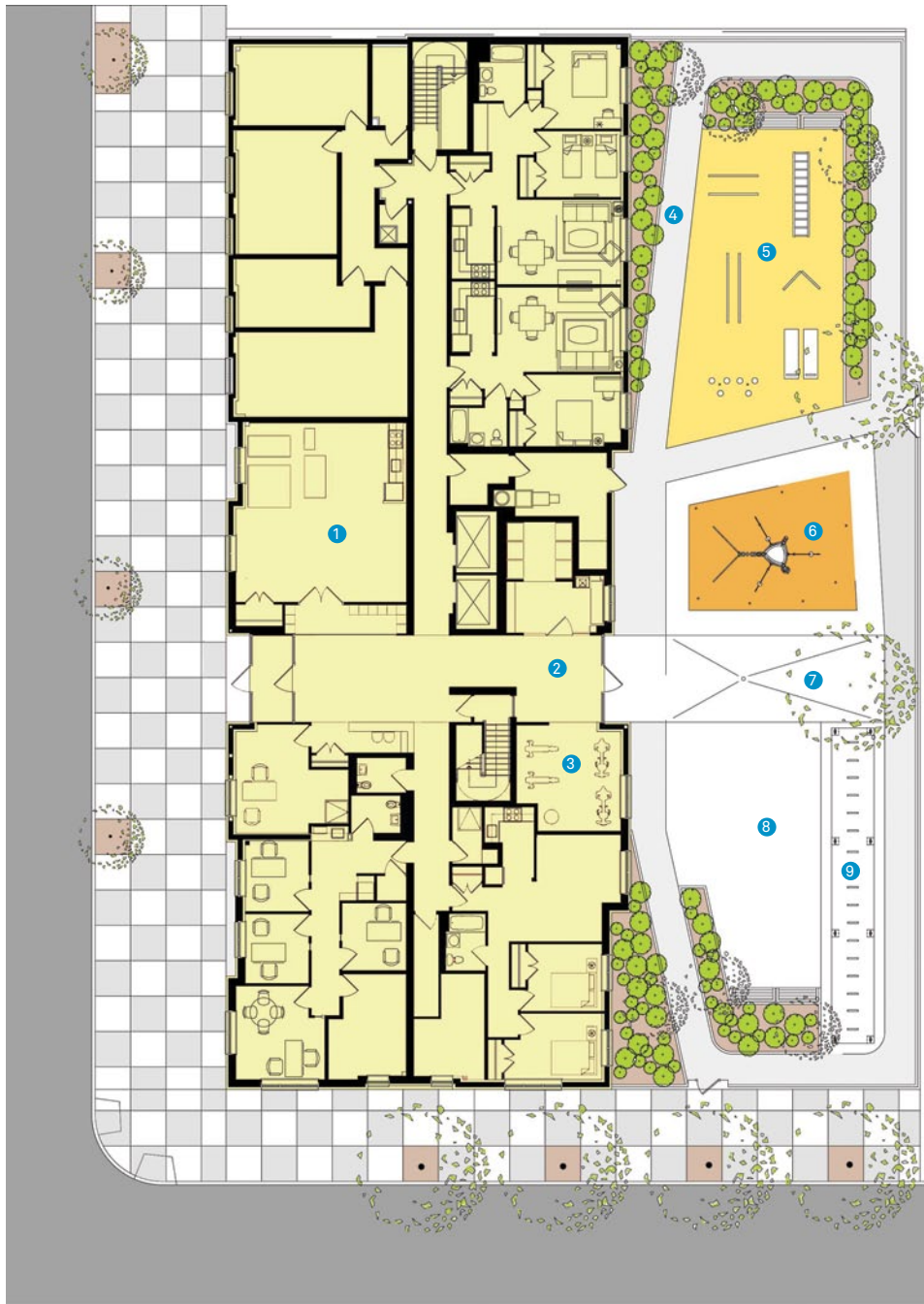
5 The outdoor fitness zone contains several permanent fitness features, including a chin-up station, parallel bars, a horizontal ladder, and step-up, spring-up, and sit-up stations.
● ● ● ● ● ● ● ●

6 Outdoor courtyard playground contains a climber, a monkey bar structure, and play sets where children can spin, wobble, and climb.
● ● ● ● ● ● ● ●

7 Addition of fountain zone serves both as a stimulating visual element to attract the attention of lobby users and a site for water play.
● ● ● ● ● ● ● ●

8 Outdoor courtyard enjoyment zone is a hard-surface area divided by pathway leading to street.
● ● ● ● ● ● ● ●

9 Sheltered, secure bicycle storage racks.
● ● ● ● ● ● ● ●



ACTIVITY LEVEL

- Ages 3–6 Vigorous Physical Activity
- Ages 3–6 Moderate Physical Activity
- Ages 7–12 Vigorous Physical Activity
- Ages 7–12 Moderate Physical Activity
- Ages 13–18 Vigorous Physical Activity
- Ages 13–18 Moderate Physical Activity
- Adults 18yr+ Vigorous Physical Activity
- Adults 18yr+ Moderate Physical Activity

In the original design, the community room and outdoor courtyard, the building's most activity-oriented spaces, are relatively remote from its entrance and from the main circulation spaces serving the ground floor and the rest of the building.

The proposed plan reconfigures the building functions to create a synergy of activity spaces around the building's lobby. By adjusting the size of the laundry area and the superintendent's office, and by incorporating the corridor previously needed to access the courtyard, space can be created for a fitness room overlooking the active courtyard. Additional mats for children's play and exercise bicycles can be added to the community room to allow for co-location of children's play and parent exercise. Mats and exercise bikes can be moved for other community programming.

Existing ground floor plan

Pink represents revised area



Proposed ground floor plan

Pink represents revised area



The proposed Active Design for the building rearranges functions on the ground floor in order to increase the proximity, visibility and accessibility of the outdoor courtyard, the staircase adjacent to the elevators, the community room, and a new fitness area. The illustration of the proposed lobby shows how specific activity-promoting building features can be designed to be more noticeable. The entrance doors and view of the courtyard and the accessible staircase are highly visible from the entrance doors of the building. Although the elevators are immediately adjacent to the lobby area, they are not directly visible from the building entrance. The use of a glazed door and glazed fire-rated window on the opposite wall provides greater visibility from the entrance to the courtyard, fitness area, laundry, and community room for security personnel and people walking through the lobby area.

The building's developer has already made a significant investment in non-traditional playground equipment. The proposed design for the courtyard maintains but relocates this equipment to allow for the addition of a fountain. The fountain provides an inviting focal point from multiple directions, and also a safe children's activity area for hot summer days.

The strong visual presence of the stair and rear yard within the proposed lobby encourages their use.



CASE STUDY 3

ACTIVE DESIGN STRATEGIES

OBJECTIVE

Increase the use of the outdoor courtyard by providing direct physical and visual access from the lobby.

STRATEGIES

Include physical activity spaces in commercial workplaces and residential buildings.

The proposed plan reorganizes the ground floor, making the community room, laundry room, and new fitness room adjacent to the main lobby, with access to the active outdoor courtyard.

Locate physical activity spaces in a centrally visible location within the building to promote their use.

The revised location of the community area is directly visible from the main lobby, security personnel desk, and resident mailboxes. The new fitness room is located directly across the lobby from the laundry room to promote an active option during laundry wait times.

Provide views to the outdoors from physical activity rooms.

The outdoor courtyard is visible from the lobby, laundry room, and fitness room, allowing parents to watch children using the courtyard while they engage in chores like laundry or in adult physical activities like exercise.

OBJECTIVE

Provide opportunities for activity and fitness within the building to address the seasonal limitations of the outdoor courtyard.

STRATEGIES

Design activity spaces to accommodate a building's various occupant groups.

The existing building design provides a good range of outdoor physical activity spaces for children and adults, including exercise stations, play equipment, bicycle racks, and open space. The proposed plan provides additional features for outdoor play and enjoyment in the summer, such as a water feature and a tricycle/walkabout path for children. The relocated community room also provides an activity space that can be used by residents, including children, during the winter months, and can be observed by personnel at the security desk in the lobby.

Locate building functions to encourage brief bouts of walking or travel to commonly used amenities.

The proposed plan encourages and promotes physical activities like walking both inside the building and in the outdoor courtyard, as well as stair use related to use of the building's laundry room, management offices, and mailboxes.

OBJECTIVE

Increase stair use by raising the visibility of the stairway and decreasing the emphasis on the elevator in the building lobby.

STRATEGIES**Locate the stairs near the building's entrance.**

The reorientation of the lobby and the stair situates the lobby stair within 25 feet of the building's main entrance.

Design stairs to be more visible to encourage their everyday use.

The revised lobby stair's distinctive location makes it more visible than the elevators from the building and courtyard entrance doors. The use of fire-rated glazing in the wall and doors of the lobby stair makes the quality of the stair environment more apparent than in traditional opaque stairwell enclosures.

Locate stair prompts where they will be visible.

The stair graphic, placed to prompt stair use, should be situated above the lobby stair door that faces the building entrance and above the glazed screen that faces the doorway connecting the lobby and the outdoor courtyard.

Provide well-lit stairs to encourage use.

The generous glazing and location near the large glazed screen leading to the outdoor courtyard lets natural daylight into the lobby stair.

Installing large play apparatus in an affordable housing development can be a significant expenditure. However, their strong visual impact, which helps attract children to play areas, can make them a cost-effective investment.
(Image courtesy of Landscape Structure)



CASE STUDY 3

COST OF IMPLEMENTING ACTIVE

DESIGN STRATEGIES

EXISTING MASTER PLAN				PROPOSED ACTIVE MASTER PLAN			
MATERIAL	QUANTITY	MATERIAL AND LABOR COSTS	EXISTING COST	MATERIAL	QUANTITY	MATERIAL AND LABOR COSTS	PROPOSED COST
Interior unit masonry walls Concrete masonry unit walls	522 sf	\$11.91/sf	\$6,217	Interior unit masonry walls Concrete masonry unit walls	270 sf	\$11.91/sf	\$3,216
Structural steel lintels at entry, corridors, stair, yard, and kitchen	41.5 lf	\$23.38/lf	\$970	Structural steel lintels at entry, corridors, stair, yard, and kitchen	61 lf	\$23.28/lf	\$1,420
Interior drywall walls Painted gypsum board and metal studs	1,503 sf	\$4.97/sf	\$7,470	Interior drywall walls Painted gypsum board and metal studs	1,548 sf	\$4.57/sf	\$7,074
Glass/aluminum doors and screens Front entrance double doors, with hardware	2 units	\$2,075/door	\$4,150	Glass/aluminum doors and screens Front entrance double doors, with hardware	3 units	\$2,075/door	\$6,225
Fixed glass panels at front entrance	189 sf	\$64.75/sf	\$603	Fixed glass panels at front entrance	189 sf	\$64.75/sf	\$12,238
Single doors and frames with hardware and sidelight rear yard vestibule	2 units	\$1,680/unit	\$3,360	Single doors and frames with hardware and side glazed panels at laundry room	1 unit 35 sf	\$1,680/door \$47.50/sf	\$1,680 \$1,663
Fire-rated hollow metal doors Double hollow metal steel door with glazed panel at community room	1	\$1,220/unit	\$1,220	Fire-rated hollow metal doors Fire-rated ceramic glass and steel stair door	1 door	\$2,220/door	\$2,220
Single hollow metal steel stair door and frame	1	\$464/unit	\$464	Fire-rated ceramic glazed panel in lobby stairwell	21 sf	\$64.75/sf	\$1,360
Floor finishes Front lobby and rear vestibule tile	800 sf	\$10.75/sf	\$8,600	Floor finishes Lobby tile floor	805 sf	\$10.75/sf	\$8,654
Corridor and community room carpet	800 sf	\$3.31/sf	\$2,648	Corridor and community room carpet	700 sf	\$3.31/sf	\$2,317
Laundry room sheet vinyl floor	253 sf	\$5.08/sf	\$2,667	Laundry room sheet vinyl floor	180 sf	\$5.08/sf	\$914
Apartment hardwood floor	775 sf	\$7.10/sf	\$5,521	Apartment hardwood floor	701 sf	\$7.10/sf	\$4,977
				Fitness Room rubber floor	205 sf	\$12.00/sf	\$2,460
				Fitness room equipment Exercise bike	2	\$300	\$600
				Elliptical	2	\$900	\$1,800
				Dumbbell weights and rack	1	\$549	\$549
Security desk Desk millwork	17 lf	\$150/lf	\$2,550	Security desk Desk millwork	13 lf	\$150/lf	\$1,950
Yard planters Formed concrete planter wall	480 lf	\$22/lf	\$10,560	Yard planters Formed concrete planter wall	315 lf	\$22/lf	\$6,930
Soil and filter course	1,705 sf	\$1/sf	\$1,705	Soil and filter course	792 sf	\$1/sf	\$792
Hard surfaces Concrete cross path pavers	480 sf	\$4.01/sf	\$1,925	Hard surfaces Concrete perimeter path pavers	1,723 sf	\$4.01/sf	\$6,909
Concrete children's play area pavers	983 sf	\$4.01/sf	\$3,942	Concrete water feature pavers	616 sf	\$4.01/sf	\$2,270
				Concrete children's play area pavers	792 sf	\$4.01/sf	\$3,176
Soft Surfaces 4"-thick rubber poured-in-place playground surface	905 sf	\$12/sf	\$10,860	Soft Surfaces 4"-thick rubber poured-in-place children's play area surface	696 sf	\$12/sf	\$8,352
Grass over 4" top soil at fitness area surface	1,176 sf	\$1.31/sf	\$1,541	1.5"-thick rubber tiles fitness area surface	1,050 sf	\$10.50/sf	\$11,025
Trees and landscaping Small shrubs	240	\$20/unit	\$4,800	Trees and landscaping Small shrubs	1,760	\$20/unit	\$3,200
Medium trees planted c/w guides	7	\$250/unit	\$1,750	Medium trees planted c/w guides	5	\$250/unit	\$1,250
				Large tree planted	2	\$400/unit	\$800
				Secured bicycle storage Bicycle racks for 16 bikes	4 set	4 set	\$1,600
				Canopy over bicycle racks	240 sf	240 sf	\$2,880
				Water feature (contingency amount)			\$10,000
EXISTING TOTAL:			\$83,523	PROPOSED TOTAL:			\$120,501

The proposed design focuses on increasing opportunities for physical activity among child and adult residents. It strategically reconfigures the ground floor areas to promote exercise on stairs and in the recreational rear courtyard, and adds additional fitness facilities. The cost of the Active Plan is **\$36,978 more** than the existing plan. This represents an increase of **less than 0.22%** over the project's original \$16.7 million development cost.

CASE STUDY 4

HARLEM, NEW YORK

This 8-story building, located in Harlem, New York, contains 250 resident-owned units in 2 parallel towers located above an expansive developer-owned ground floor. The basement contains underground parking and bicycle storage. Half the residential units are market-rate and half the subsidized units are available to households earning 80–120% of the Area Median Income. Subsidized and market-rate units are mixed on each floor and stacked vertically. Apartment sizes are similar for both types of units, but finishes are generally of higher quality in the market-rate residences.

Although situated in the densely populated area of Harlem, the building is located less than a 10-minute walk from Central Park and across the street from a 10-building public housing development surrounded by significant green space. Another community park is located 4 blocks away to the east. The development is located a short, 2-minute walk to the nearest subway station, with 3 additional subway stations within a half mile. Three public elementary schools are located within a half mile, and the middle and high schools are a half mile to one mile away. There are numerous indoor physical activity facilities in the neighborhood, including fitness centers and yoga studios, though all are private facilities oriented towards adult use.

The ground floor contains a cinema and retail and service tenants. The arrangement of tenant areas, along with the presence of a parking ramp, has contributed to the irregular configuration of the building lobby. Its shape contains unutilized niches that could serve as meeting or sitting spaces, and limits resident awareness of the opportunities for engaging in local neighborhood amenities on both sides of the building. Stairs are located adjacent to the lobby space but generally go unnoticed. An open stair originally planned to connect the lobby with the communal resident areas on the second floor was unfortunately left out of the final project. The second floor contains music rooms, a fitness room, and a children’s playroom. A long narrow outdoor rooftop space in the area separating the 2 residential towers is accessible from the second floor. The outdoor space is designed primarily for passive adult enjoyment.

Although the building offers facilities for physical activity for both adults and children, this study suggests possible revisions to the lower floors of the building to increase opportunities for child-oriented physical activity based on the following objectives:

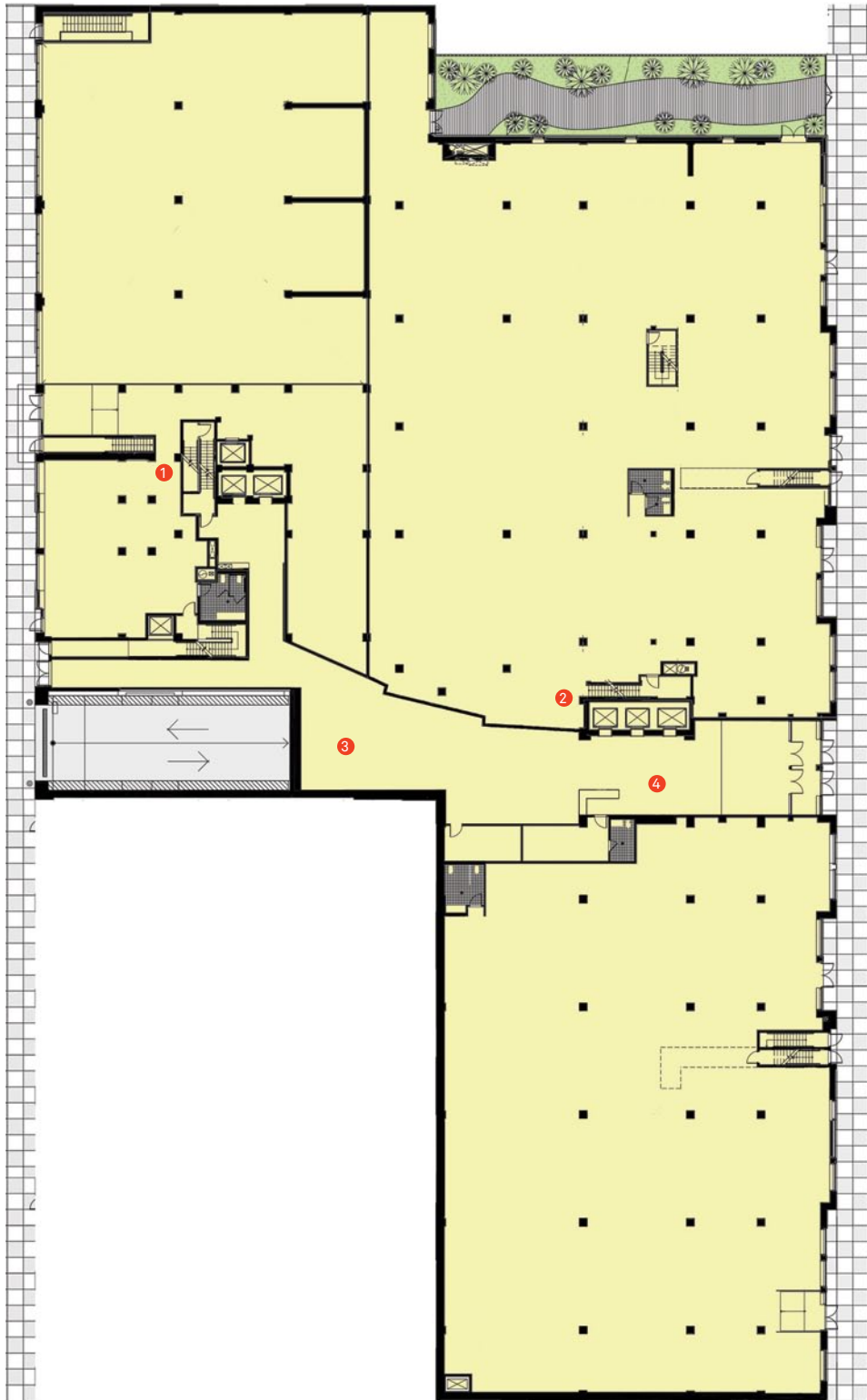
- Encourage walking within the neighborhood and to the community parks located less than a half mile to the east and west of the site.
- Increase opportunities for moderate to vigorous physical activity for children in the building.
- Increase stair use for travel between the ground, second, and basement floors of the building.



CASE STUDY 4**EXISTING GROUND FLOOR PLAN**

1 Stairs adjacent to the west elevators have solid doors and minimal interior finishes, suggesting that they are for emergency exiting only.

2 No stairs are accessible from the lobby at the east elevators for active vertical travel.



3 The meandering configuration of the residential lobby limits resident awareness of activity options.

4 The configuration of the lobby limits the security staff's visual surveillance of the entire lobby.

CASE STUDY 4

PROPOSED ACTIVE GROUND FLOOR PLAN

1 Doors with fire-rated glazed panels and the extension of the lobby's stone floor finish into the stairwell signal that stairs are intended for everyday use.



2 Straight configuration of the lobby visually links and promotes connectivity with streets on each side of the building.



3 New secure storage room for children's strollers, scooters, and tricycles is provided.



4 Security desk personnel can observe both entrance doors, resulting in a safer environment.

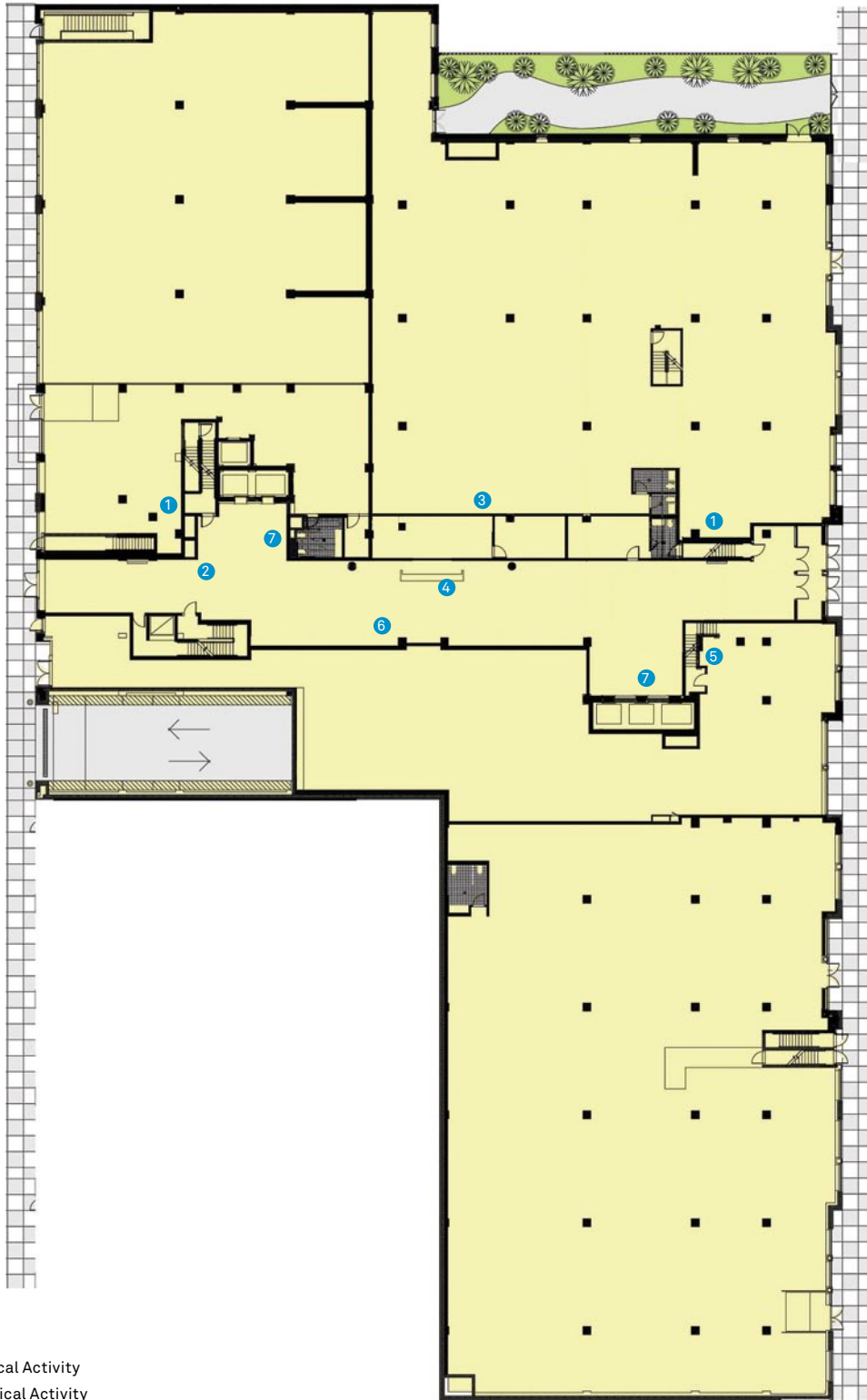
5 New open staircase links lobby to active shared functions on the second floor.



6 Flatscreen monitors are added to provide building and community with information, including walking routes to places of interest.



7 Point-of-decision signage at elevators encourages residents to use stairs.



ACTIVITY LEVEL

- Ages 3–6 Vigorous Physical Activity
- Ages 3–6 Moderate Physical Activity
- Ages 7–12 Vigorous Physical Activity
- Ages 7–12 Moderate Physical Activity
- Ages 13–18 Vigorous Physical Activity
- Ages 13–18 Moderate Physical Activity
- Adults 18yr+ Vigorous Physical Activity
- Adults 18yr+ Moderate Physical Activity

CASE STUDY 4

EXISTING SECOND FLOOR PLAN

1 Elongated rooftop deck provides walking opportunities and sedentary reflection spaces.
 ●●●●●

2 Two large community rooms are provided for resident use.
 ●●●●●●●●

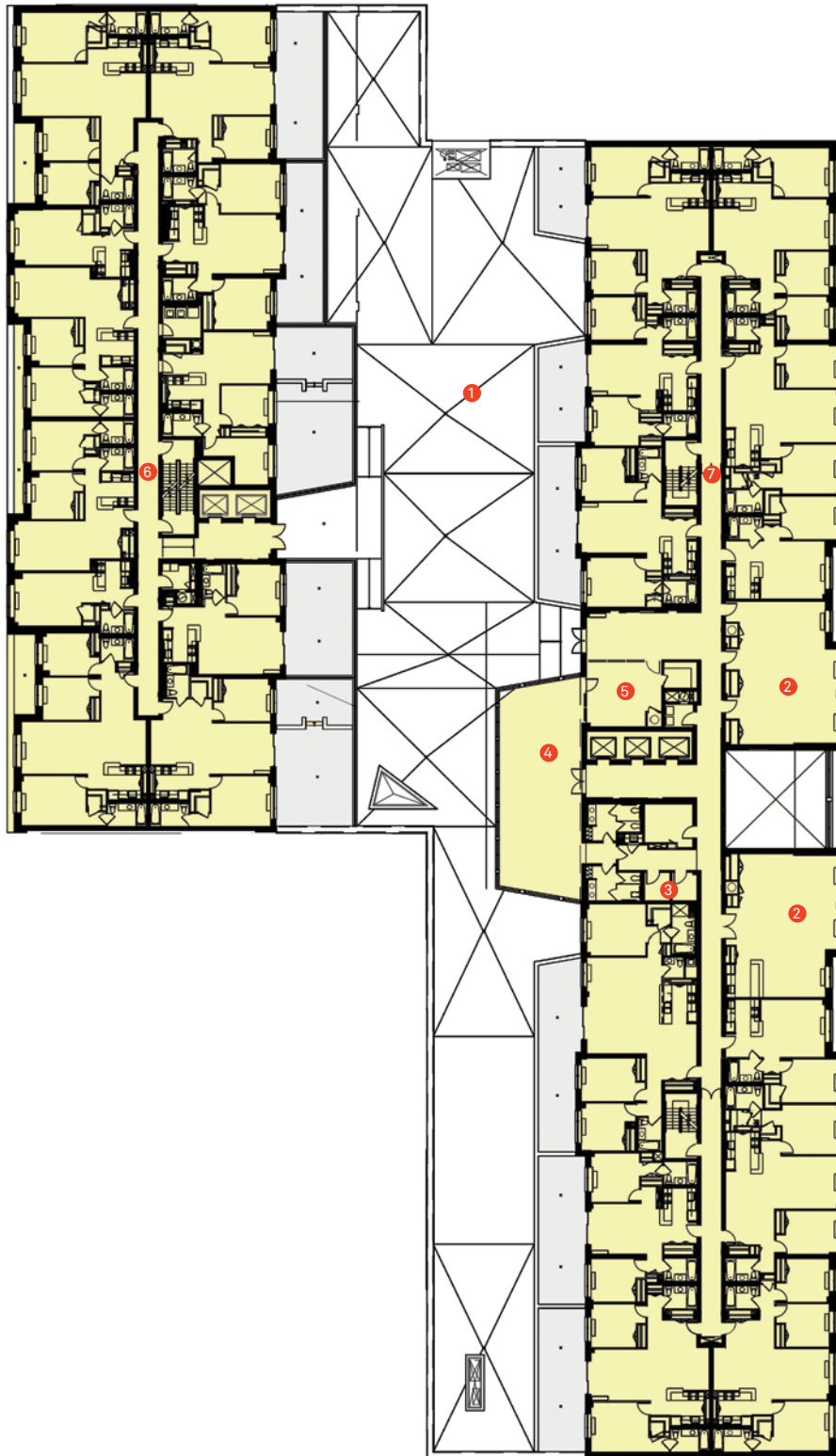
3 Two small music rooms are provided for resident use.

4 Large fitness room provides views into the adjacent children's playroom and outdoor rooftop deck.
 ●●●●●

5 Children's playroom is located adjacent to fitness room. Rooms are visually linked by a large glazed screen.
 ●●●●●

6 Stair adjacent to west elevator provides an active option for vertical travel to roof deck or shared active spaces.
 ●●●●●

7 Stair is located remotely from east elevators, discouraging use of the stairs to access shared active spaces.



CASE STUDY 4

PROPOSED ACTIVE SECOND FLOOR PLAN

1 Elongated rooftop deck includes an active challenge path to supplement walking and reflection spaces.



2 Two large community rooms are realigned to allow for expanded and potentially more active use. One room is refitted to accommodate a dance studio with resilient flooring, wall mirrors, and a ballet bar.



3 Two small music rooms are relocated.

4 Large fitness room has view into adjacent children's playroom and outdoor rooftop deck.



5 Children's playroom is expanded, with large visual connection to fitness room.



6 Stair adjacent to west elevator provides an active option for vertical travel to roof deck or shared active spaces.



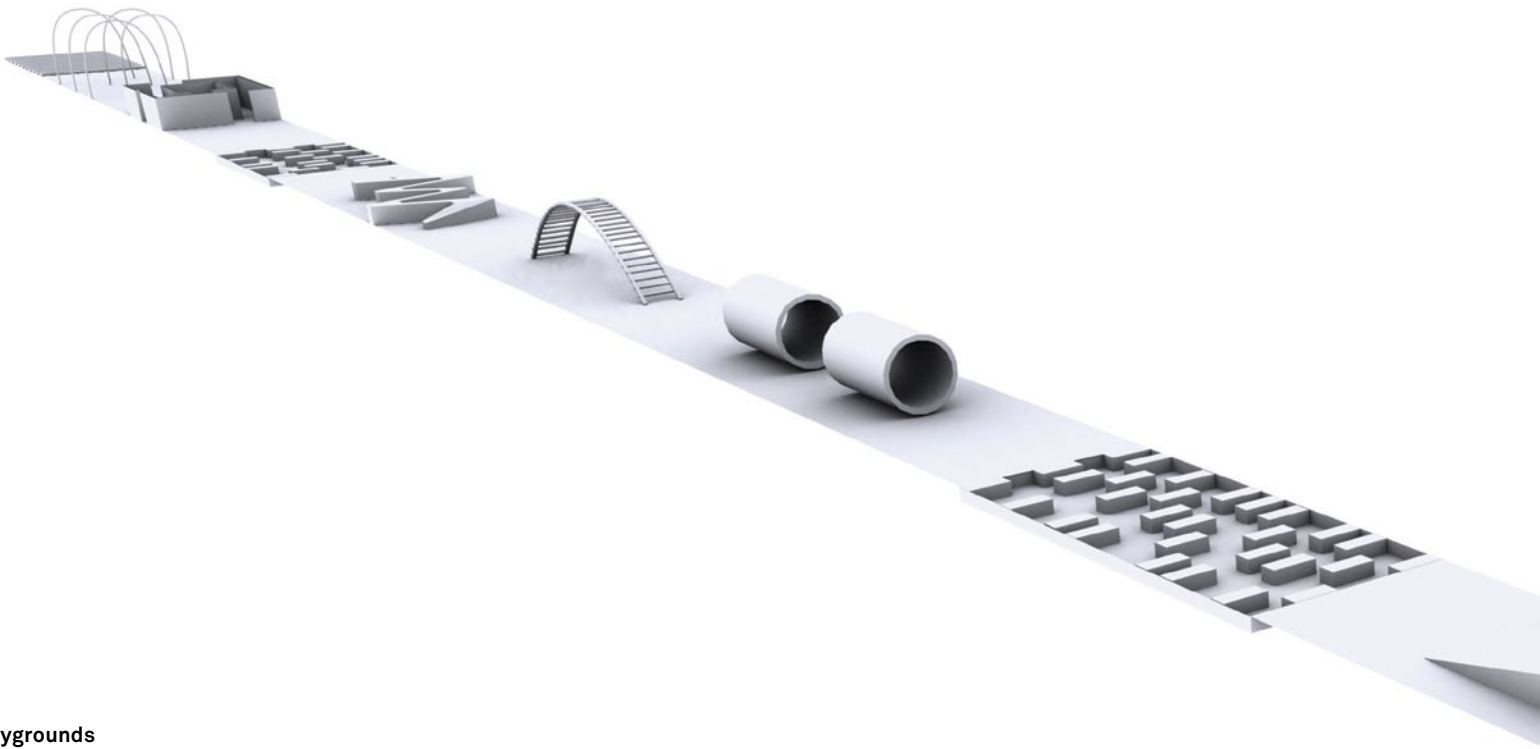
7 New open stair linking lobby with second floor provides an active option for vertical travel to shared active spaces. Open floor area provides daylighting to entrances to active spaces within the second floor lobby.



ACTIVITY LEVEL

- Ages 3–6 Vigorous Physical Activity
- Ages 3–6 Moderate Physical Activity
- Ages 7–12 Vigorous Physical Activity
- Ages 7–12 Moderate Physical Activity
- Ages 13–18 Vigorous Physical Activity
- Ages 13–18 Moderate Physical Activity
- Adults 18yr+ Vigorous Physical Activity
- Adults 18yr+ Moderate Physical Activity

Conceptual perspective of challenge path



Playgrounds intended for children between ages 3 and 12 should provide opportunities for each of the following types of physical movement:

MANIPULATIVE MOVEMENT

Develops fine-motor skills and coordination and involves controlled use of the hands and feet. Examples of manipulative movement include:

- 1 Grasping
- 2 Throwing and catching
- 3 Ball footwork

NON-LOCOMOTOR MOVEMENT

Develops balance and coordination skills and focuses on the relationship of the body to a place or object. Examples of non-locomotor skills include:

- 1 Balancing
- 2 Pushing and pulling
- 3 Twisting
- 4 Sitting and rising

LOCOMOTOR MOVEMENT

Develops gross motor skills and constitutes any movement of the body from place to place. Examples of this type of movement include:

- 1 Crawling
- 2 Walking
- 3 Running
- 4 Stepping
- 5 Skipping and jumping
- 6 Climbing

Conceptual plan of challenge path

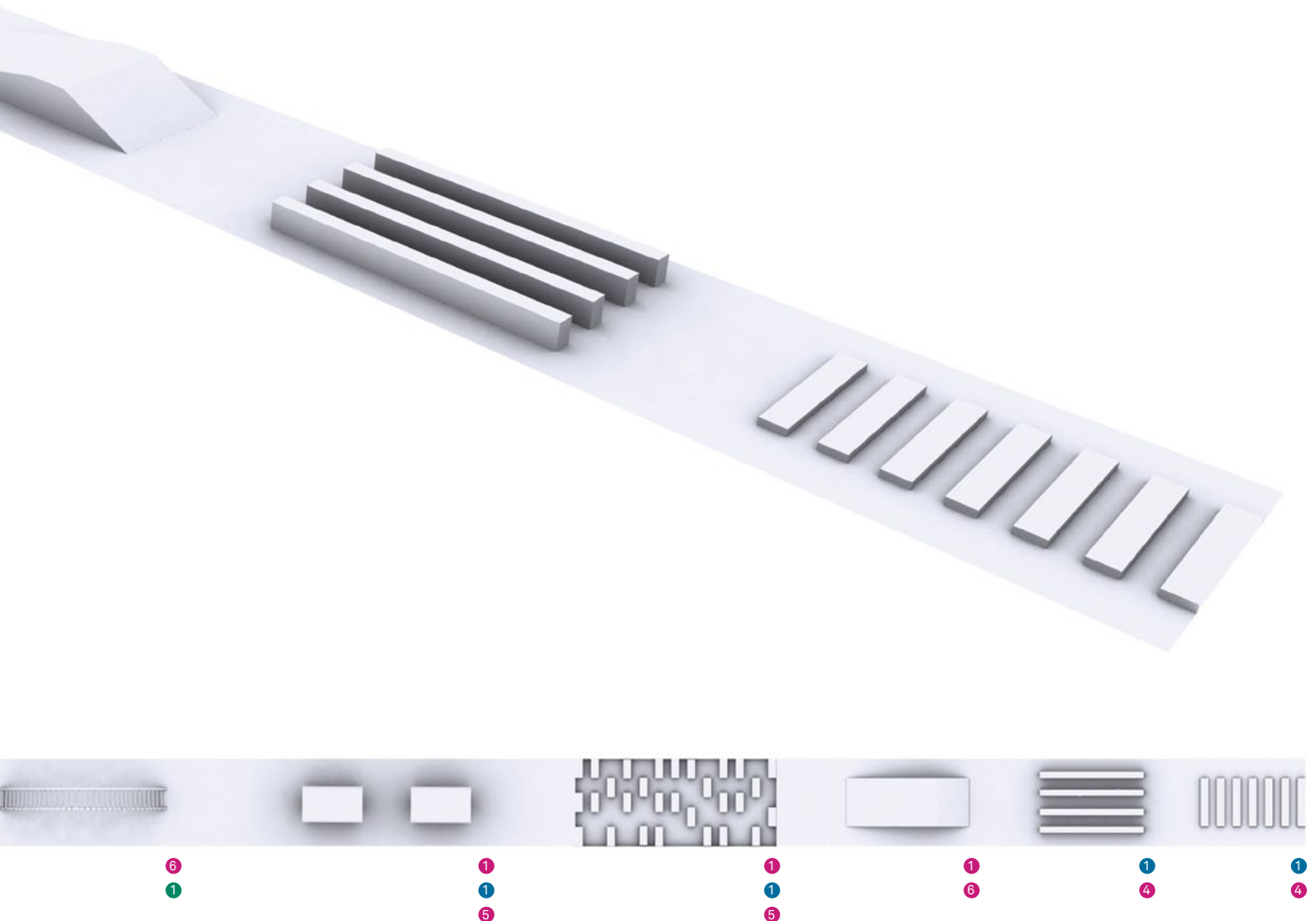


The rooftop area separating the 2 residential towers on the site is a long, narrow space. The dimensional attributes of the space tend to make activities difficult to program, resulting in a passive or underutilized space.

The proposed plan for this space includes a challenge path that promotes the development of psychomotor skills in small children and adolescents.

The challenge path provides a linear arrangement of activity stations promoting moderate physical activities like balancing, climbing, stepping, and crawling, as well as more vigorous physical activities like jumping, skipping, and maneuvering around obstacles.

The stations are constructed with lightweight wood, plastic, or metal components over a soft rubber play surface anchored to the roof structure.



CASE STUDY 4

ACTIVE DESIGN STRATEGIES

OBJECTIVE

Encourage walking within the neighborhood and to community parks located less than a half mile to the east and west of the site.

STRATEGIES

Provide visually appealing environments along paths of travel.

The existing lobby is designed with high quality, attractive finishes. The configuration of the proposed lobby makes both streets visible to almost all residents, encouraging travel in both directions across the lobby area.

Provide multiple entries and maximum visibility along the street level to help enliven pedestrian movement.

The proposed plan provides a direct visual connection between the two entrances on either side of the building. This lobby configuration optimizes resident awareness of pedestrian routes to the east and west of the building and provides high visibility to both entrances from the security desk.

Provide information boards and signage about facilities, services, and groups related to physical activity.

Flat-screen monitors in the lobby provide information about local, public, and private facilities and services related to physical activity and community engagement. Monitors can display information about walking routes to physical activity facilities and other places of interest.

OBJECTIVE

Increase opportunities for moderate to vigorous physical activity for children in the building.

STRATEGIES

Consider locating shared functions adjacent to staircases or ramps.

This design situates shared activity spaces—including the fitness room, children’s playroom, music rooms, and the community room—on the second floor of the building. The open stair connecting the ground floor lobby and second-floor shared functions provides an alternative to the building’s elevators for access to these spaces.

When arranging a building’s program, consider the capacities and ages of the inhabitants.

The existing building provided a more diverse range of shared activity spaces than most affordable housing developments. The proposed plan further enhances residents’ use of the indoor second-floor spaces by carefully co-locating child and adult activity spaces to promote simultaneous use of the facilities by family members. The addition of the challenge path provides a unique physical activity area for children in a previously underutilized space.

Design courtyards, gardens, terraces, and roofs that can serve as outdoor spaces for children’s play.

The proposed challenge path on the second-floor roof provides a child-oriented play space in an area that would otherwise be underutilized.

OBJECTIVE

Increase stair use for travel between the ground, second, and basement floors of the building.

STRATEGIES**Locate stairs near the building's entrance.**

The new open stair connecting the lobby with the second floor activity spaces is more visible and closer to the entrance than the building elevators.

Design stair to be more visible to encourage everyday use.

In addition to the provision of a new open stair near the west entrance, the stair doors next to the east elevator feature fire-rated glass to make the interior environment of the stairs more visible.

Provide visually appealing stairwell interior finishes.

The slate stone material used for the lobby floor is extended into the ground-floor and second-floor staircase landings. Adding fire-rated glazing in the stair doors and upgraded flooring on the lowest two levels of the enclosed staircases adjacent to the lobby is a relatively inexpensive way to highlight the stairs as an option for travel to the public levels of the building.

Windows located between the public corridor, children's playroom, and fitness room promote residents' awareness of these facilities and allow adults to visually oversee their children's play while exercising.



CASE STUDY 4

COST OF IMPLEMENTING ACTIVE

DESIGN STRATEGIES

EXISTING MASTER PLAN				PROPOSED ACTIVE MASTER PLAN			
MATERIAL	QUANTITY	MATERIAL AND LABOR COSTS	EXISTING COST	MATERIAL	QUANTITY	MATERIAL AND LABOR COSTS	PROPOSED COST
Lobby Hollow metal fire-rated doors at stair entrance	3	\$419/unit	\$1,257	Lobby Hollow metal fire-rated ceramic glass and steel door	3	\$2,220/unit	\$6,600
				Open stair to second floor Shop-fabricated steel, 3.5-foot-wide with picket wall railings on both sides and landing	27 risers 34 sf of landing	\$319/riser 63/sf of landing	\$8,600 \$2,128
Stone tile flooring	2,820 sf	\$22.07/sf	\$62,237	Stone tile flooring	2,680 sf	\$22.07/sf	\$59,148
6" x 12'-high concrete block with Painted 5/8" gypsum board on metal furring	5,016 sf 1,816 sf	\$5.80/sf \$3.03/sf	\$29,093 \$5,502	6" x 12'-high concrete block with Painted 5/8" gypsum board on metal furring	4,260 sf 1,060 sf	\$5.80/sf \$3.03/sf	\$24,708 \$3,212
Wood panels	3,200 sf	\$4.38/sf	\$14,016	Wood panels	3,200 sf	\$4.38/sf	\$14,016
1/2" painted gypsum suspended ceiling	2,820 sf	\$4.32/sf	\$12,182	1/2" painted gypsum suspended ceiling	2,680 sf	\$4.32/sf	\$11,578
				Stone tiles in stairwell at ground and second floor	168 sf floor and 63 sf landings	\$22.07/sf	\$5,098
				Stroller/bicycle storage room 5/8" painted gypsum board walls and ceiling, Vinyl tile flooring, Double hollow metal door and frame	840 sf wall 420 sf ceiling 420 sf v.tile f 1	\$1.97/sf \$1.33/sf \$1.58/sf \$1200/unit	\$1,655 \$589 \$666 \$1,200
Security desk computer	2	\$445/unit	\$890	Display monitors Connections and computer	2 2	\$1486/unit \$445/unit	\$2,972 \$890
				Wayfinding and point-of-decision prompt signage at 2 elevators and 3 stairs on basement, ground and 2nd floors	15	\$40/sign	\$600
Second-floor community room				Second-floor dance studio			
Resilient flooring	1,000 sf	\$3.88/sf	\$3,880	Resilient flooring	1,300 sf	\$14.30/sf	\$18,590
Aluminum and glass doors	1	\$1,292/unit	\$1,292	Windows in steel frames	32.2 sf	\$26.20/sf	\$835
				Safety glass mirror	280 sf	\$17.43/sf	\$4,880
				1.5"-diameter ballet rail	20 lf	\$48/lf	\$960
Music rooms				Music rooms			
8'-high gypsum wall and ceiling	60 lf 200 sf	\$24.50/lf \$4.80/sf	\$1,470 \$960	8'-high gypsum wall and ceiling	60 lf 200 sf	\$24.50/lf \$4.80/sf	\$1,470 \$960
Acoustic insulation	440 sf	\$1.67/sf	\$735	Acoustic insulation	440 sf	\$1.67/sf	\$735
Hollow metal door and frame	2 unit	\$390/unit	\$780	Hollow metal door and frame	2	\$390/unit	\$780
Children's playroom	272 sf	\$6.08/sf	\$1,654	Children's playroom	525 sf	\$6.08/sf	\$3,880
Vinyl flooring				Rubber resilient flooring			
				Whiteboard paint on walls	198 sf	\$3.02/sf	\$598
				Play equipment			
				1.5 x 3-foot foam logs	2	\$125/unit	\$250
				5 x 7 x 1-foot wedges	2	\$265/unit	\$530
				2 x 4 x 1-foot wedges	2	\$190/unit	\$380
				Balls	4	\$25/unit	\$100
Window screens facing lobby guardrail at window	84 sf 12 lf	\$19.74/sf \$67.20/lf	\$1,658 \$806	Guardrails at slab opening	54 lf	\$67.20/lf	\$3,964
Second floor roof deck	2,438 sf	\$10/sf	\$24,380	Second floor roof challenge path	2,438 sf	\$10/sf	\$24,380
Concrete pavers (placed over roof membrane and protection board, insulation)				4" unitary rubber playground surface (over roof membrane and protection board)			
Freestanding resin planters	6 planters	\$150/unit	\$900	Challenge stations			
Trees	6 medium	\$200/unit	\$1,200	Climbing bars	1	\$1,381/unit	\$1,500
Prepared planting mix, filter cloth and draining course	9 cy	\$60/cy	\$540	Metal arches	10	\$120/unit	\$1,200
				Plastic tunnels	2	\$540/unit	\$1,080
				Balance stations: 18 x 12'-high lightweight precast concrete	146 lf	\$12/lf	\$1,752
				Maze: plastic and metal components	15 panels	\$100/panel	\$1,500
				Freeform station: resin	1	\$1,000/unit	\$1,000
EXISTING TOTAL:			\$165,432	PROPOSED TOTAL:			\$214,284

The cost of the Active Plan is **\$48,852 more** than the existing development plan. This represents an increase of **less than 0.01%** over the project's original \$106 million development cost.

CASE STUDY 5

HARLEM, NEW YORK

This case study examines a 129-unit development in Harlem, New York. The building houses mixed-income residents, with a third of the units available at market rate and two thirds of the units designated for households earning 80 to 120% of the Area Median Income for New York City.

The building is located in a well-connected neighborhood of Harlem, within a 4-minute walk (0.2 miles) to the nearest subway. There are several group activity and sports facilities nearby, including a public pool, a skating rink, and areas for walking, bicycling, and running in Central Park, which is less than a 10-minute walk from the building. There are 9 commercial indoor fitness facilities within a half mile of the building, including a fitness club located on the ground floor of the building itself and adjacent to the lobby. There are 3 public elementary schools and one middle school within a half mile of the building.

The development is U-shaped, with building blocks located close to the street and a private courtyard available to all residents. The developer maintains ownership of the ground floor, which contains commercial rental units. A 4-story block on the east side of the complex that houses the only market-rate triplexes in the development. These units have access to the building's courtyard directly from on-grade patios and stairs that link the upper floors to the courtyard. The rest of the building contains both affordable and market-rate units. Residents in this portion of the building primarily access the courtyard from the lobby via the elevators. The building contains space on the ground floor designated for community and meeting rooms that the residents elected to lease out for commercial use. The courtyard is designed primarily as a quiet reflective space, with substantial planted areas, sculptures, and a water feature. A long strip of grass provides the only space within the development that would promote children's activities.

The design study re-envisioned the building's lobby and courtyard spaces to enhance opportunities for children's physical activity based on the following objectives:

- Increase opportunities for moderate to vigorous physical activity for residents of all ages during all seasons.
- Increase stair use in the building.



CASE STUDY 5

EXISTING MASTER PLAN

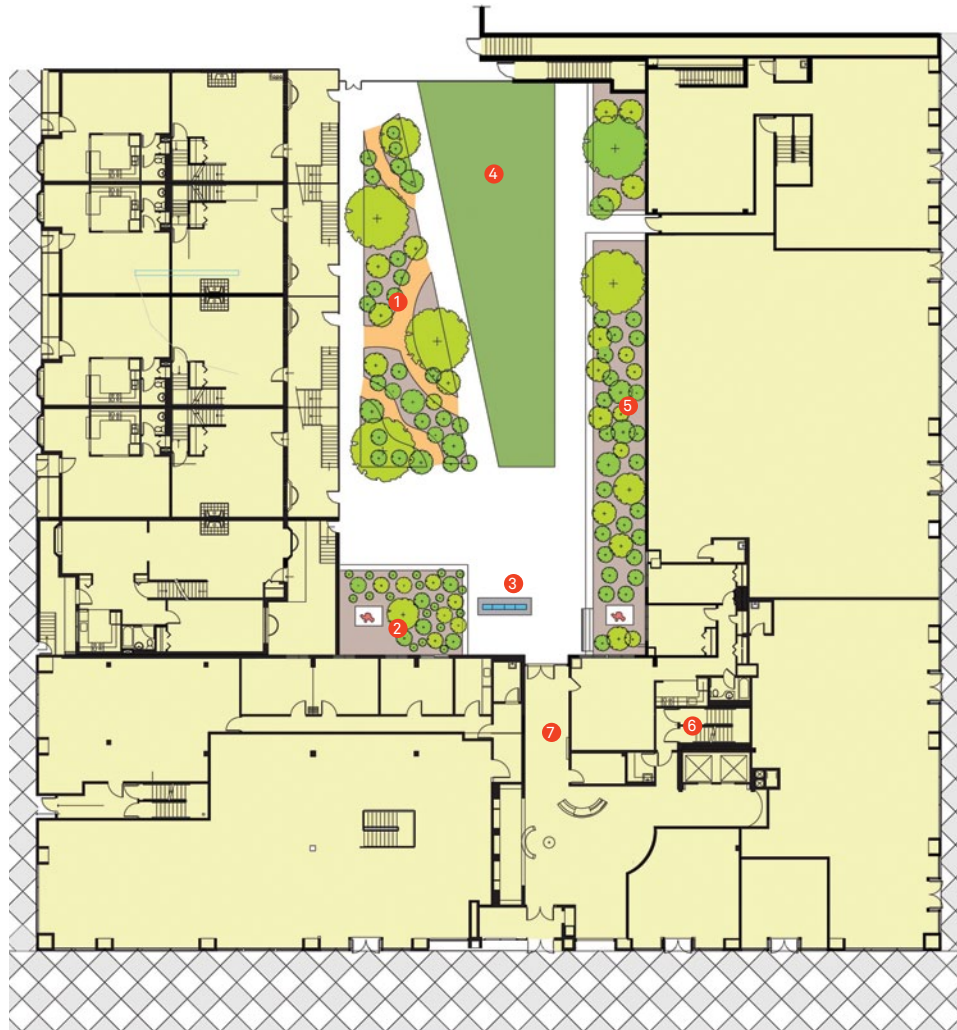
1 Mulch paths within the natural landscape area might encourage children's unstructured play.

2 Formal raised planters and sculptures adjacent to the building provide privacy from the commercial space for residents using the courtyard.

3 Tall water fountain wall provides privacy from the commercial space for residents using the courtyard, but is not sufficiently visible from the lobby to optimize its potential to entice residents to use the courtyard.

4 Grass lawn in the courtyard provides an opportunity for children's play, but its formal aesthetic does not signify that play is encouraged.

No specific spaces in the building are provided for children's play.



5 Formal raised planters adjacent to the blank wall of the ground-floor commercial space provide a reflective adult-oriented environment within the courtyard.

6 Stairs are hidden from building users, leaving elevators as the only visible option for vertical travel.

7 There is a direct line of view between the street and the courtyard entrance door, though the narrow passageway to the courtyard restricts its visual presence from the lobby.

CASE STUDY 5

PROPOSED ACTIVE MASTER PLAN

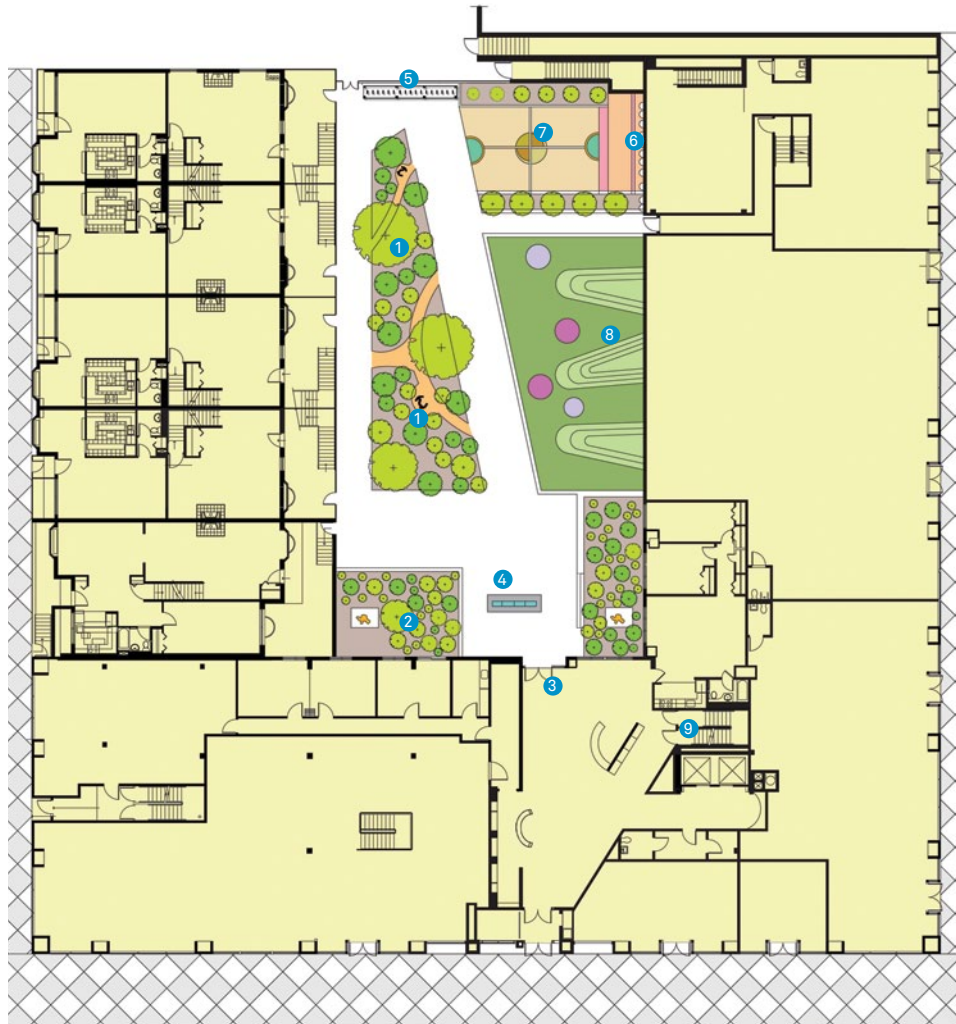
1 2 exercise stations are placed along mulch paths to encourage use by children, and adults supervising children's play in adjacent spaces.



2 Formal raised planters and sculptures adjacent to the building provide privacy from the commercial space for residents using the courtyard.

3 Expanded glazed area in lobby increases the visual presence of the more active courtyard within the building.

4 Tall water fountain wall provides privacy from the commercial space and visually entices residents to use the courtyard.



5 Secured bicycle racks are located at the rear of the courtyard.



6 8'-high climbing wall with cushioned safety surface is installed against the blank wall of the ground floor commercial space.



7 Multi-purpose hard surface area with ground markings is added.



8 Grassy mounds and play circles are located within the grass area, now extended to the wall of the ground-floor commercial space.

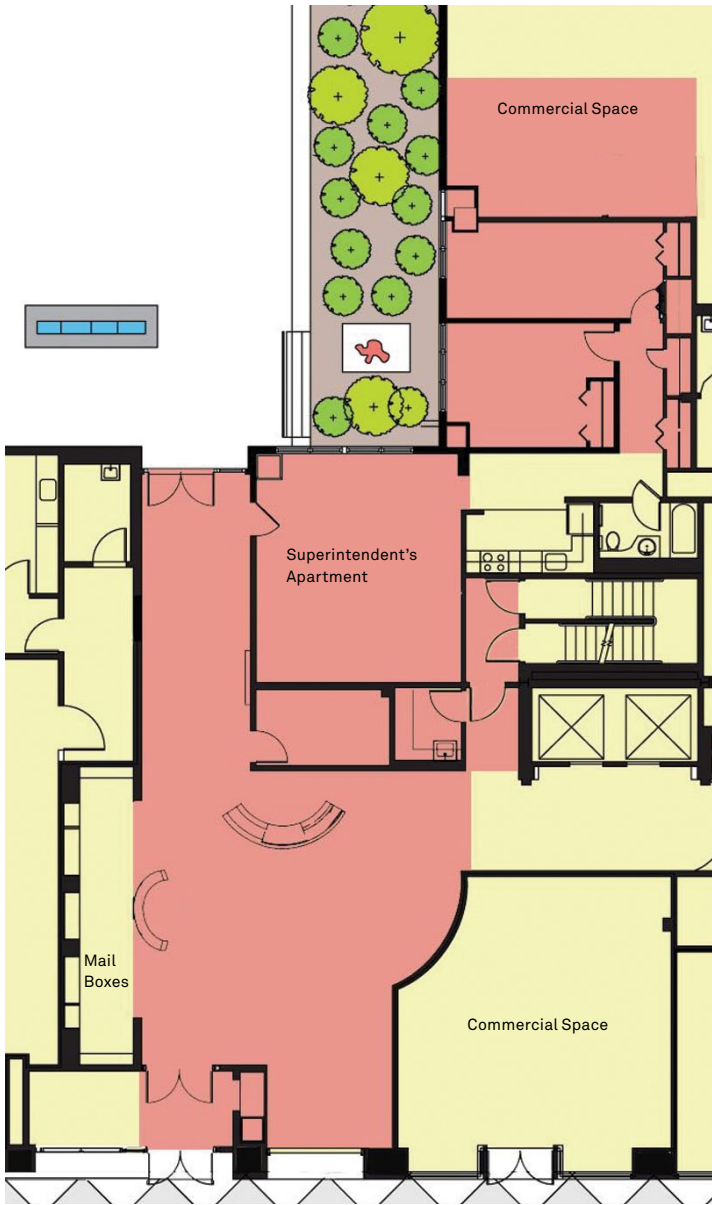


9 Stairs are now located in the lobby area and visible from both the street and the courtyard entrance doors.



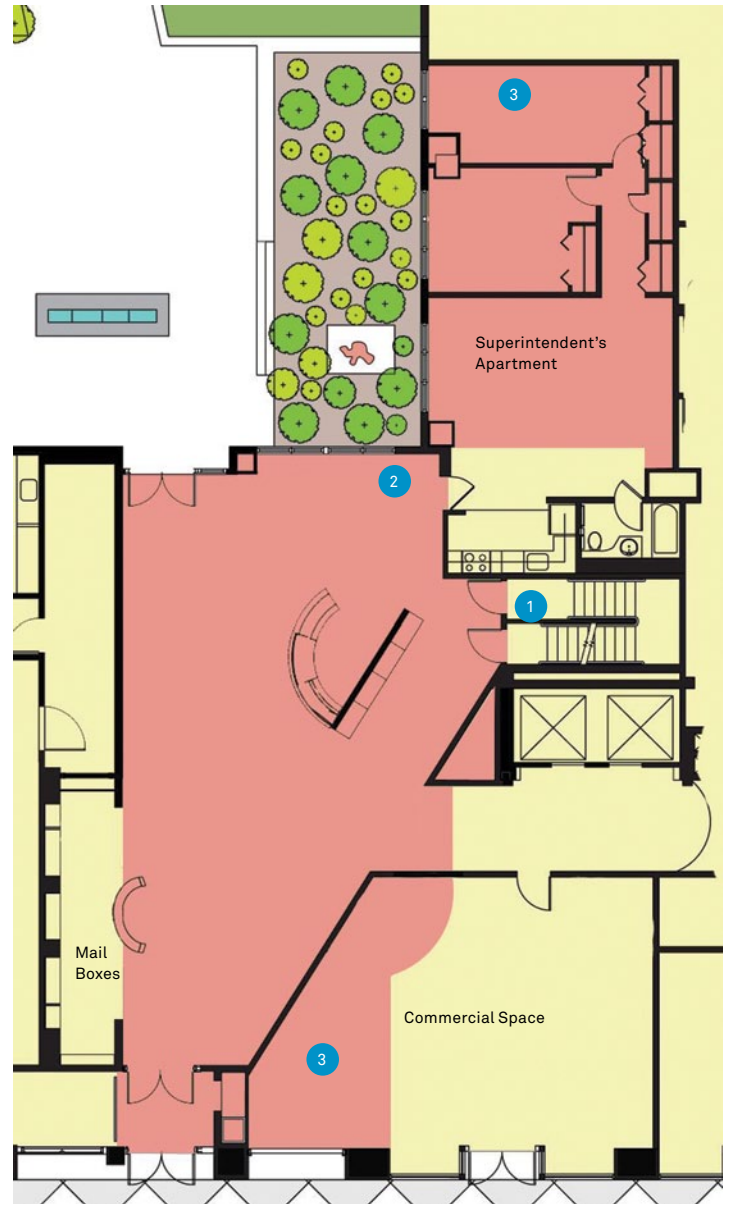
ACTIVITY LEVEL

- Ages 3–6 Vigorous Physical Activity
- Ages 3–6 Moderate Physical Activity
- Ages 7–12 Vigorous Physical Activity
- Ages 7–12 Moderate Physical Activity
- Ages 13–18 Vigorous Physical Activity
- Ages 13–18 Moderate Physical Activity
- Adults 18yr+ Vigorous Physical Activity
- Adults 18yr+ Moderate Physical Activity



Existing ground floor plan

Pink represents revised area

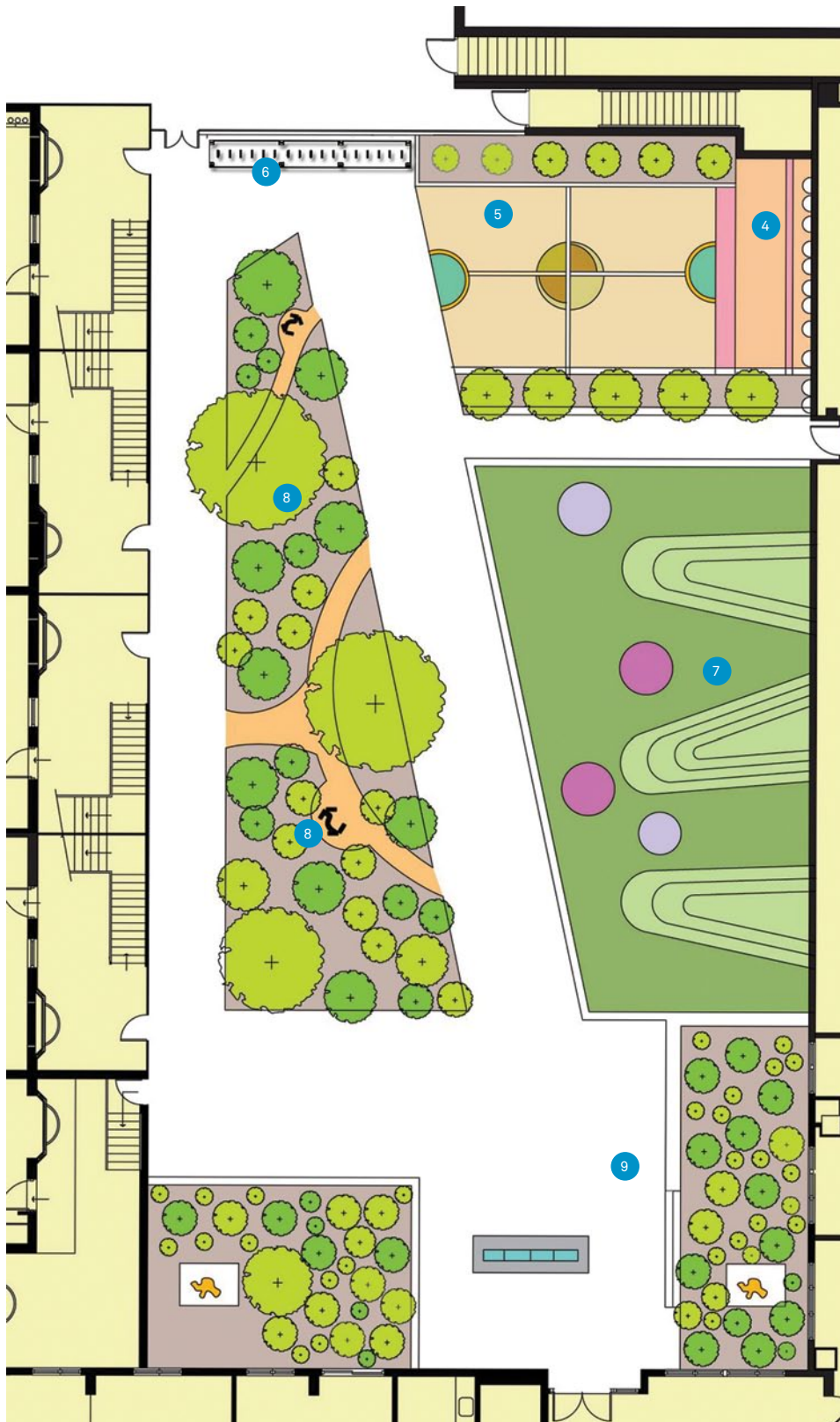


Proposed ground floor plan

Pink represents revised area

An assessment of the building's existing lobby plan identified opportunities to decrease the emphasis on elevator travel, especially for residents on the lower floor levels, and to increase awareness of the lobby stairs and courtyard as spaces for engaging in everyday physical activities.

- 1 Without changing the location of the staircases, the proposed plan reconfigures the lobby to provide a direct visual sightline to the stairs from the building's entrance door and the door leading from the rear courtyard. Stair doors include vision panels that make the staircase more visible and signal that the stairs are provided for residents' use.
- 2 In addition to enabling a direct view of the stairs, the proposed plan extends the visual presence of the building's courtyard by widening the lobby area. The relocated security desk supports safety in both the lobby area and the courtyard.
- 3 The wider area in the rear lobby was created by trading the locations of the commercial space and the superintendent's apartment. In the proposed plan, the superintendent's apartment is moved into the commercial space at the rear of the ground floor. The same area of commercial space is moved to the streetfront of the building, a more desirable location for income generation.



The proposed plan adapts several features of the existing courtyard plan to create a space that provides opportunities for family physical activities.

- 4 A climbing wall is located on the solid rear wall of the ground-floor commercial space. Configuration of the climbing wall limits climbing height to 8 feet but encourages lateral movement along its 30' length. A 6.5"-deep poured-in-place rubber cushioned surface, designed for a critical height of 12', is located directly below the climbing wall.
- 5 A multipurpose hard surface area is provided to accommodate ball play and other activities for children aged 3 to 18.
- 6 Secured, covered bicycle racks are provided at the rear of the courtyard, in a visible location for security purposes, and close to the rear gate to avoid the need to move bicycles through the building's lobby.
- 7 The addition of grass-covered mounds along the solid rear wall of the ground-floor commercial space encourages non-sports-related use of the grass area. Also in the grassy area are colorful play circles, designed to encourage unstructured play.
- 8 Two exercise stations along the mulched walking paths within the garden zone provide opportunities for adults or teenagers to be active while supervising younger children.
- 9 Areas for reflective and quiet enjoyment are located to the east and rear of the courtyard, farthest from the more active areas.

CASE STUDY 5

ACTIVE DESIGN STRATEGIES

OBJECTIVE

Increase opportunities for moderate to vigorous physical activity for residents of all ages during all seasons.

STRATEGIES

Design activity spaces to accommodate a building's various occupant groups.

The proposed courtyard adds several features for promoting physical activity among children of different ages and genders. A grass area with mounds and play circles is provided to attract younger children, while the hard-surface play area and climbing wall are provided for all age groups.

Preserve or create green areas in children's outdoor play areas.

Acclimation to the physical and cognitive demands of play in green areas is an important component of a child's development. In urban locations where natural terrain is not available, creating landscaped areas with changes in topography or landscape elements like mulch paths within the garden area can provide children with some diversity within their play environment.

Co-locate play areas adjacent to an adult exercise space, allowing parents to exercise while watching their children play.

Two exercise stations will be located along the mulch paths of the garden area near the hard-surface play space and grass area.

In designing parks and playgrounds, create a variety of climate environments to facilitate activity in different seasons and weather conditions.

Several features of the courtyard can accommodate activity during all seasons. The courtyard mounds can accommodate rolling and movement within the terrain during seasons when it is grass-covered, and activities involving sleds and snow-related games during the winter months.

Provide adequate facilities for bicycles to park along their route or at their final destination.

The proposed plan offers secured covered bicycle parking at the rear of the courtyard. This area is easily accessible from the rear gate and encourages residents to use their bicycles while avoiding the need to move bicycles through the building's lobby.

OBJECTIVE

Increase stair use within the building.

STRATEGIES

Encourage the use of all stairways in a building, whether in the form of a grand staircase or a fire stair that can also serve as a principal means of travel.

In the proposed plan, fire stairs that would otherwise be difficult to find are made more visible to encourage residents, especially those who live on lower floors, to use the stairs as a convenient alternative to the elevator. The proposed plan incorporates the existing fire stairwell in the lobby area.

Design stairways to be more visible to encourage everyday use.

In addition to the strategies mentioned above, the proposed plan recommends fire-rated glazing panels in the stairwell doors to visually signal the availability of the stairs for everyday use.

Many young children enjoy adventurous play. Climbing walls designed for adventure and safety provide a good alternative to building and site features unintended for climbing.

Pier 25 Play Area,
Hudson River Park,
New York City



CASE STUDY 5

COST OF IMPLEMENTING ACTIVE

DESIGN STRATEGIES

EXISTING MASTER PLAN				PROPOSED ACTIVE MASTER PLAN			
MATERIAL	QUANTITY	MATERIAL AND LABOR COSTS	EXISTING COST	MATERIAL	QUANTITY	MATERIAL AND LABOR COSTS	PROPOSED COST
Ground floor walls Painted gypsum board on metal studs wall assembly	1,976 sf	\$4.97/sf	\$9,821	Ground floor walls Painted gypsum board on metal studs wall assembly	1,576 sf	\$4.97/sf	\$7,833
Metal doors Hollow metal doors and frames	3 units	\$419/unit	\$1,257	Metal doors Hollow metal door and frame	1 unit	\$419	\$419
Steel door and frame	1 unit	\$545/unit	\$545				
Floor finishes Lobby floor	1,354 sf	\$10.75/sf	\$14,556	Floor finishes Lobby floor	1,896 sf	\$10.75/sf	\$18,232
Exterior windows 8 x 4' prefinished aluminum operable windows	2 units	\$2,500/unit	\$5,000	Exterior windows 8 x 4' prefinished aluminum operable windows	3 units	\$2,500/unit	\$7,500
Janitor's closet	no change in quantities			Janitor's closet (relocated)	no change in quantities		
Residential unit flooring 3/8" hardwood	1,060 sf	\$7.50	\$7,958	Residential unit flooring 3/8" hardwood	1,060 sf	\$7.50	\$7,958
Security desk	1 unit	\$5,000/unit	\$5,000	Security desk 8'-high parcel storage units	1 unit 12 lf	\$5,000/unit \$167/lf	\$5,000 \$2,000
Grassy open space Sod over 4" top soil	1,560 sf	\$1.31/sf	\$2,043	Grassy open space Sod over 4" top soil Compacted earth berms Colored concrete activity pads	2,248 sf 21 cy 150 sf	\$1.31/sf \$97/cy \$8.10/sf	\$2,945 \$2,037 \$1,215
Pathways 3'-deep concrete paths on 2" compacted granular base	2,863 sf	\$4.80/sf	\$13,742	Pathways 3'-deep concrete paths on 2" compacted granular base	2,956 sf	\$4.80/sf	\$14,189
Planters Formed concrete planter wall	166 lf	\$22/lf	\$3,650	Planters Formed concrete planter wall	115 lf	\$22/lf	\$2,530
Soil and filter course	2,313 sf	\$1/sf	\$2,313	Soil and filter course	1,934 sf	\$1/sf	\$1,934
Commercial space wall (at proposed climbing wall) 8" masonry wall	480 sf	\$4.42/sf	\$2,121	Climbing wall Engineered masonry wall Sprayed concrete rock texture over metal mesh	480 sf 480 sf 300 holds	\$9.60/sf \$8.50/sf \$10/hold	\$4,060 \$4,080 \$3,000
Insulated stucco finish	480 sf	\$3.15/sf	\$1,512	Climbing holds, installed 6" poured-in-place rubber fall zone surface over 4" granular base	320 sf	\$12/sf	\$3,480
				Hard surface play area 4" colored concrete pad on 3" granular base Painted markings	664 sf 150 sf	\$8.10/sf \$1/sf	\$5,378 \$150
Trees and landscaping Small shrubs	140	\$20/unit	\$2,800	Trees and landscaping Small shrubs	80	\$20/unit	\$1,600
Medium trees planted c/w guides	10	\$250/unit	\$2,500	Medium trees planted c/w guides	4	\$250/unit	\$1,000
Large trees planted	6	\$400/unit	\$2,400	Large tree planted	1	\$400/unit	\$400
Soil area	22 cy	\$97/cy	\$2,134	Soil area	22 cy	\$97/cy	\$2,134
6'-deep mulch path	388 sf	\$.50/sf	\$194	6'-deep mulch path with exercise areas	488 sf	\$.50/sf	\$244
				Secured Bicycle Storage Bicycle rack for 12 bikes Canopy over bicycle racks	1 set 150 sf	\$700/set \$12/sf	\$700 \$1,800
				Exercise Stations Stationary push, pull or stretch equipment in mulch path area	2 items per station	\$600/station	\$1,200
Courtyard Art Features Water fountain and sculpture elements	No change			Courtyard Art Features Water fountain and sculpture elements	No change		
EXISTING TOTAL:			\$79,546	PROPOSED TOTAL:			\$102,118

The proposed design focuses on increasing opportunities for physical activity among adult and child residents by enhancing the visibility of active spaces from the lobby, and by adding active features to the recreational courtyard. The cost of the Active Plan is **\$22,572 more** than the existing development plan. This represents an increase of **less than 0.06%** over the project's original \$40 million development cost.

CASE STUDY 6

SAN ANTONIO, TEXAS

This case study examines a portion of a new housing revitalization project that replaced a 1940s-era public housing complex in the Lavaca district of San Antonio, Texas. Lavaca, the oldest existing neighborhood in San Antonio, is characterized by the small, one-story Victorian-style houses facing its streets and alleyways. These homes were built in the early 1900s for working-class families of Germanic, Polish, Hispanic, and African-American descent. In later years, the area was surrounded by developments adjacent to the site, including the 1968 World's Fair grounds, Interstate 37, the Alamodome, and nearby commercial properties. The section of Lavaca under study consists of 245 units, including 49 public housing units and 12 affordable (tax-credit) units. The public housing units include 26 2-bedroom units and 9 3-bedroom units.

The complex's downtown location and layout present both challenges and opportunities for physical activity. Its location, on the edge of a neighborhood adjacent to a major arterial street and highway, limits the desirability of walking and cycling on the north side of the property. However, the grid-like street layout of the Lavaca neighborhood to the south provides significant opportunities for children to walk and cycle—though, due to the age of the neighborhood, its sidewalk and street infrastructure is relatively poor. The local elementary, middle, and high schools are located 0.3 miles and 0.7 miles from the development, respectively, but children who walk are required to travel across 2 busy commercial streets to reach them. There is a local park nearby (approximately a 4-minute walk), but the complex and the park are separated by potentially dangerous vacant and unkempt property. The park's amenities include basic swing sets, climbers, a slide, and a picnic table. It is designed for a limited age group of children.

The complex consists of 8 4-story buildings that wrap around 2 parking garages. These garages provide drive-up access to each level of the buildings. The apartment units are accessed through open-air public corridors that lead from either the adjacent parking levels or the ground level via an elevator or open stairs. The main activity space includes an outdoor swimming pool, which has a shallow section for supervised children's use and is located between the two major buildings. The second activity space is a fitness center that primarily serves adults and is located on the ground level near the management office. There are 3 grass courtyards on the north side of the complex with concrete pads for picnic tables and a public barbecue grill. There are no areas within the complex designed expressly for children.

This study provides several suggestions for improving children's opportunities for physical activity within the complex:

- Increase children's physical activity through the inclusion of play spaces oriented to children of various ages.
- Increase opportunities for physical activity that address the challenges of extremely hot weather conditions.
- Increase visibility of physical activity opportunities for children within the development and surrounding neighborhood.



CASE STUDY 6

EXISTING MASTER PLAN

1 The swimming pool is the only outdoor activity space for children.
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2 There is no crosswalk near the development entrance helping children travel to school or the future park to the south.

3 The development's layout underutilizes its potential relationship with townhouses across street, which are home to other families with children.



4 The parking lot allows residents to drive up to the level of their residential unit, limiting the amount of physical activity necessitated by walking or climbing stairs.

5 Barbeque and picnic tables are situated in the center of the recreational courtyards, leaving limited areas of grass next to units for play space.
 ● ● ● ● ● ● ● ●

6 Most of the 3-bedroom units that would cater to families with children face a busy arterial roadway.

CASE STUDY 6

PROPOSED ACTIVE MASTER PLAN

1 Extended pedestrian crossing markings, speed bumps, and pedestrian bulbs are provided for pedestrian safety.



2 Barbeque stations are co-located adjacent to the grassy area and recreation center to encourage family-oriented activities.



3 Courtyard is relocated near the family-oriented units to provide playground space for families with children aged 3 to 10.



4 Placement of an exercise station near the stair in the large lobby provides additional exercise support for teenagers and adults.



The revised plan differentiates between adult-only and more family-oriented units within the complex and supports child-oriented features closer to where children live.



5 A basketball net and a half-court basketball area is provided for teenage residents.



ACTIVITY LEVEL

- Ages 3–6 Vigorous Physical Activity
- Ages 3–6 Moderate Physical Activity
- Ages 7–12 Vigorous Physical Activity
- Ages 7–12 Moderate Physical Activity
- Ages 13–18 Vigorous Physical Activity
- Ages 13–18 Moderate Physical Activity
- Adults 18yr+ Vigorous Physical Activity
- Adults 18yr+ Moderate Physical Activity

CASE STUDY 6

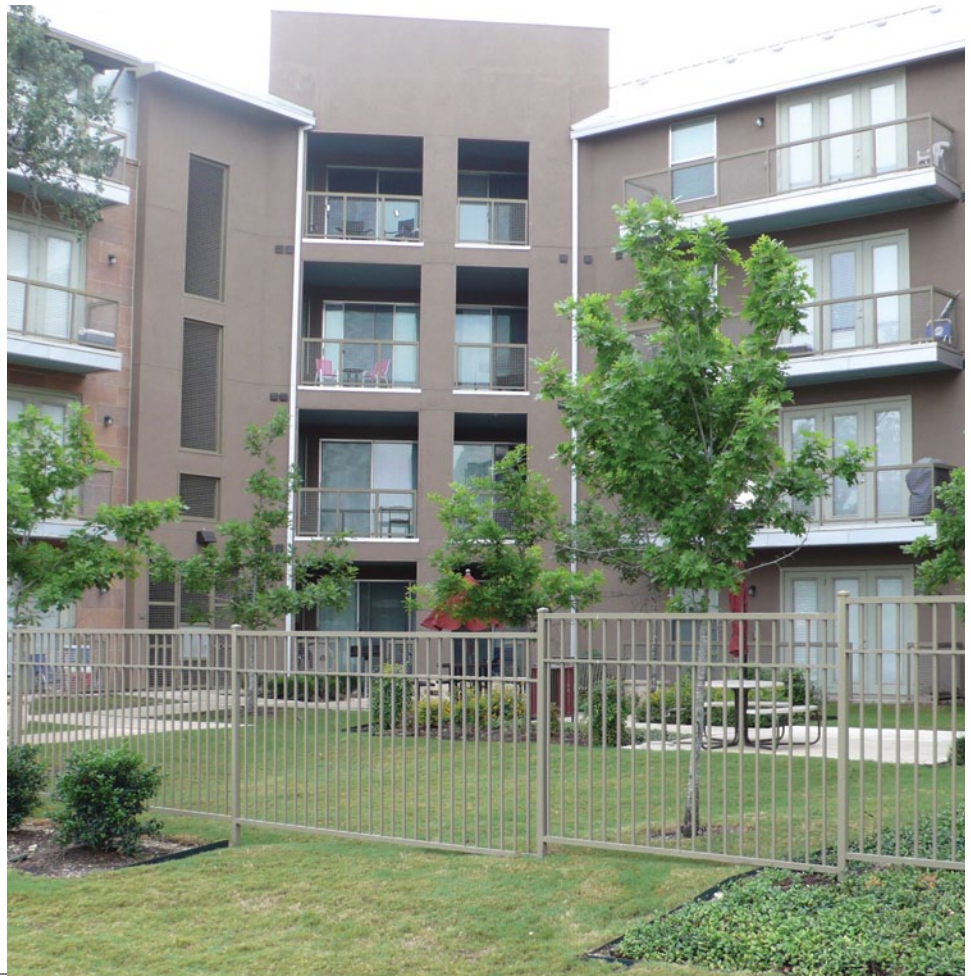
ACTIVE DESIGN STRATEGIES

In this downtown development, the majority of market-rate 1- and 2-bedroom units will likely be rented to singles and adult 2-person households. Subsidized 2- and 3-bedroom units and market-rate 3-bedroom units are more likely to serve families with children.

The proposed plan envisions family-oriented apartment units on the east side of the site, with most 3-bedroom units on the quieter street to the south. This can be accomplished by flipping the orientation of the units on the east side surrounding the parking garage, and moving the courtyard, formerly located next to a busy arterial roadway, to the quieter street across from the family townhouses. The courtyard is surrounded by family units, making supervision of children's play possible even from balconies, and restricting any resulting noise to the family area of the development. The east side of the building, surrounded by building mass on three sides, also provides the courtyard with extensive periods of shade. Shade prevents the surfaces of play equipment from becoming dangerously hot during the summer.

Open-air public walkways tend to break up large spaces and minimize their potential to support physical activity. Open corridors can provide a sheltered, defined loop for outdoor walking in hot weather. Staining the concrete floor with decorative patterns can encourage young children to skip and jump along with the pattern, and distance markers can be added to corridors to encourage safe, supervised walking with young children.

The existing enclosed courtyard provides a secure and shaded space for family-oriented activities. Glass balcony railings facilitate surveillance of children's activities within the courtyard.

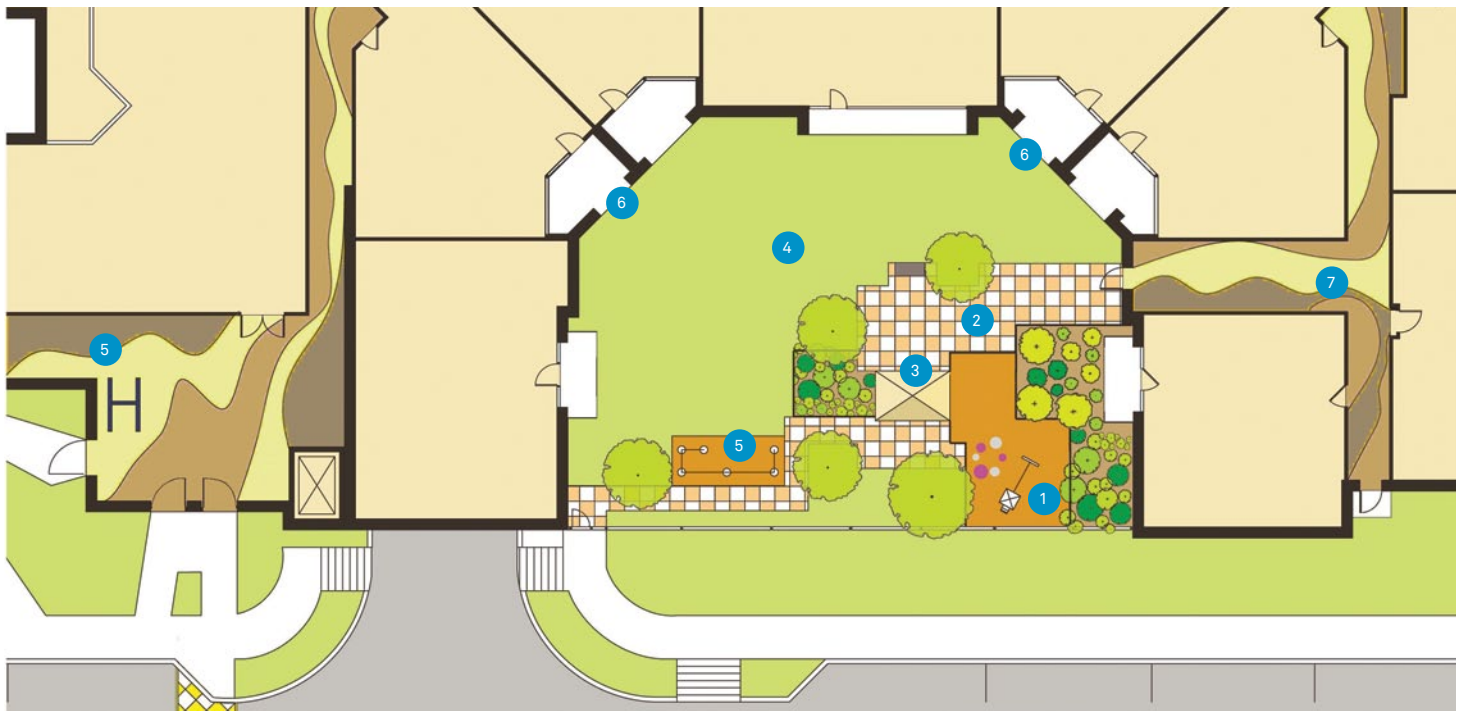


Developments located in dense downtown areas rarely provide facilities for vigorous exercise other than fitness rooms. The existing plan of this development, however, provides a generously large lobby area adjacent to the central elevator lobby on the property's south side.

With the reconfiguration of the east side of the site to accommodate family units surrounding a child-oriented courtyard, it would be possible to relocate an access stairway in close proximity to the elevator lobby. The co-location of the stair and elevator supports the use of motivational or informational point-of-decision signage encouraging stair use.

In conjunction with the prompting concept, this plan would place simple exercise stations in the corner of the large lobby space. These stations, intended primarily for teenagers and adults, encourage physical activity in several ways, including:

- Signage at each station to provide health information and encourage the use of stairs between floors and the exercise stations on each floor.
- Encouraging exercise during time spent waiting for the elevator.
- Increasing awareness of the pool facilities, which the stations overlook.



1 Play area with swing set and climbing and balance features

2 Patio and barbeque area

3 Gazebo

4 Grass area

5 Exercise stations

6 Glass balcony railings allowing observation of play areas

7 Stained concrete pattern to promote movement toward active features like the stairs and courtyard

CASE STUDY 6

ACTIVE DESIGN STRATEGIES

OBJECTIVE

Increase children's physical activity through the inclusion of play spaces oriented to children of various ages.

STRATEGIES

Design activity spaces to accommodate a building's **various occupant groups.**

To supplement the swimming pool, which is the only existing child-oriented feature, the proposed design adds features that promote both moderate and vigorous activity among youths and adolescents. These include a basketball court, a child-oriented courtyard with play equipment, and a colorful pattern in the public corridors signalling that playful activities are allowed in the public areas of the building. Teenagers and adults can use the basketball pad and the exercise route linking exercise stations with the building staircase.

Provide for **enhanced pedestrian crossings both at mid-block and at intersections.**

Providing enhanced crosswalk markings at the street that leads to neighborhood parks and schools expands residents' access to child-oriented physical activity facilities offsite.

Although not inexpensive, swimming pools such as this one can effectively promote physical activity during hot summer months, when engagement in other vigorous activities tends to be limited.



OBJECTIVE

Increase opportunities for physical activity that address the challenges of extremely hot weather.

STRATEGIES

Design **building massing to enhance nearby parks, plazas, and open spaces.**

Revising the building layout to relocate family-focused 2- and 3-bedroom apartments around a child-oriented courtyard creates a safe and contained play space for children. The building mass provides shade and wind protection within the courtyard for most of the day. The courtyard's location, across from the family-focused townhouses, provides incentives for neighborhood friends to visit and engage in active play.

OBJECTIVE

Increase visibility of physical activity opportunities for children within the development and surrounding neighborhood.

STRATEGIES

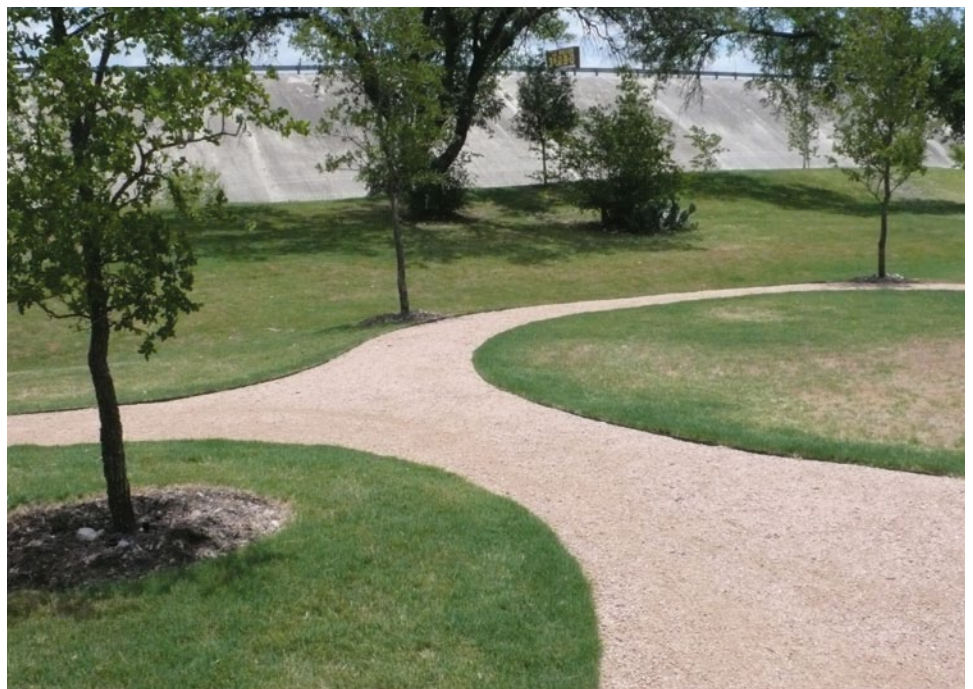
Locate physical **activity spaces in centrally **visible** parts of the building to help increase residents' awareness and use.**

The proposed activity spaces are highly visible within the complex—especially on the east side of the building, where most family-oriented units are located. Locating activity areas on the east side of buildings in hot climates provides protection from direct sunlight during late afternoon and evening play in the hot summer months.

Provide **outdoor views from physical activity rooms and spaces.**

Although a well-equipped fitness center is located in the development, it is visually separated from the paths most residents use in the building. This case study proposes the provision of exercise stations in the elevator lobby area, situated to overlook the swimming pool area for visual interest and to promote use of the pool by teenagers and adult residents.

Providing pathways to and around open areas can lead to the incorporation of new activity features—like the basketball court recommended in this case study—when funding becomes available.



CASE STUDY 6

COST OF IMPLEMENTING ACTIVE

DESIGN STRATEGIES

EXISTING MASTER PLAN				PROPOSED ACTIVE MASTER PLAN			
MATERIAL	QUANTITY	MATERIAL AND LABOR COSTS	EXISTING COST	MATERIAL	QUANTITY	MATERIAL AND LABOR COSTS	PROPOSED COST
				East wing residential units and parking relocation	No change in quantities		
				Stained and sealed patterned concrete finish (West wing only)	8,100 sf	\$1/sf	\$8,100
				Lobby exercise stations (1 station per floor x 4 floors in west wing elevator lobby)	4 units	\$450/unit	\$1,800
				Informational signage Signage for fitness route at elevator lobbies and stairs in west wing	8 signs	\$100/sign	\$800
East courtyard grassy open space Sodded bent grass on 4" topsoil	2,465 sf	\$1.31/sf	\$3,229	East courtyard grassy open space Sodded bent grass on 4" topsoil	2,395 sf	\$1.31/sf	\$3,137
Trees and landscaping				Trees and landscaping			
Shrubs	60	\$20/shrub	\$1,200	Shrubs	60	\$20/shrub	\$1,200
Medium trees	5	\$250/tree	\$2,500	Medium trees	5	\$250/tree	\$2,500
12"-deep soil	685 sf	\$1/sf	\$685	12"-deep soil	380 sf	\$1/sf	\$380
4"-deep hardwood mulch	685 sf	\$4.80/sf	\$3,288	4"-deep hardwood mulch	380 sf	\$4.80/sf	\$1,824
Hard surface concrete pavers on 2" compacted granular base	885 sf	\$4.61/sf	\$4,080	Hard surface concrete pavers on 2" compacted granular base	716 sf	\$4.61/sf	\$3,301
Charcoal barbecues	2 sets	\$300/set	\$600	Charcoal barbecues	2 sets	\$300/set	\$600
Picnic tables	2 sets	\$500/set	\$1,000	Picnic tables	2 sets	\$500/set	\$1,000
				Playground equipment			
				Swing and climber set	1 unit	\$1,500/unit	\$1,500
				Spring pod bouncers	3 units	\$175/unit	\$525
				Playground surface			
				6"-deep rubber mulch surface installed	335 sf	\$7.3/sf	\$2,373
				Gazebo			
				Wood gazebo with asphalt shingle roofing	80 sf	\$45/sf	\$3,600
Courtyard Fencing 5'-high painted wrought fencing and gate	93 lf	\$42.67/lf	\$3,968	Courtyard Fencing 5'-high painted wrought fencing and gate	93 lf	\$42.67/lf	\$3,968
				Outdoor exercise stations (1 station) 8 x 15' area with 6"-deep rubber mulch surface installed	120 sf	\$7.3/sf	\$876
				Metal stationary equipment Stationary push, pull, or stretch equipment	2 per station	\$500/unit	\$1,000
Mulch Path 2"-deep hardwood mulch	4,100sf	\$1.80/sf	\$11,480	Mulch path 2"-deep hardwood mulch	5,150 sf	\$1.80/sf	\$9,270
				Basketball court			
				Colored concrete court pad	2,830 sf	\$8/sf	\$15,600
				Pavement markings	310 lf	\$1/lf	\$310
				Net apparatus	2 nets	\$350/net	\$700
				Pedestrian crossing areas Painted markings at pedestrian crossings	990 sf	\$1/sf	\$990
EXISTING TOTAL:			\$32,030	PROPOSED TOTAL:			\$65,354

The proposed design reorients the layout of the west portion of the development to provide a more family-oriented courtyard in a residential neighborhood context. Adding features to existing facilities like play equipment in the courtyard or a basketball area along the path enhances physical activity opportunities in a cost-effective manner. The cost of the Active Plan is **\$33,324 more** than the existing development plan. This represents an increase of **less than 0.1%** over the project's original \$36 million development cost.

CASE STUDY 7

SAN ANTONIO, TEXAS

This case study examines a public housing property that caters to seniors. It has been included as an example of the ways in which senior housing can incorporate family-focused activity spaces. This building is located in a residential area of San Antonio, Texas, with a stable population predominantly of Hispanic heritage. Seniors living in this building often have family, including grandchildren, in the general area, and visits from family members should be expected and supported. The facility has recently undergone extensive renovations to upgrade building elements, finishes, and services, including achieving LEED certification.

The 4-story brick building was built in 1973 and contains 119 apartments, mostly bachelor and single-bedroom units. Most units have balconies extending along the width of the unit. As San Antonio is an automobile-oriented community, the site provides gated parking for approximately a third of its residents, as well as 22 parking spaces for staff and guests. The building is located close to major highways and directly along a bus route.

Unlike the other case studies in this publication, increasing opportunities for youthful physical activity in this facility must address the child as a visitor to—rather than a resident in—the building. Child-friendly activities should be compatible with the physical limitations of the residents to avoid safety risks. Since residents' often limited mobility restricts walking with children within the adjacent neighborhood, this case study focuses on opportunities for activity within the facility. Play that is too energetic, such as aggressive ball play or unrestrained running, can pose a danger to senior residents. As such, suggestions for increasing physical activity will focus primarily on opportunities for moderate activity that can be achieved with grandparent participation or supervision. The site provides very limited spatial opportunities for incorporating active areas. Suggestions should also respect residents' right to calm, safe spaces for quieter enjoyment.

The objective of this case study is to incorporate opportunities for visitors to engage in moderate physical activities compatible with the abilities of senior residents, including:

- Promoting stair use by adult and child visitors to the building.
- Providing space appropriate for small children to play while visiting senior residents.
- Providing activity spaces that accommodate both senior residents and children.



CASE STUDY 7

EXISTING MASTER PLAN

1 The existing garden's narrow paths restrict use to slow-speed walking and limit children's playful movement.

2 Even with an effort to encourage physical activity within the building, residents need a secure and controlled space for quiet, sedentary enjoyment.

3 The facility has installed a secure fence to protect both residents and nonresidents from potential harm from building infrastructure like an electrical transformer.

4 Existing sidewalk tends to be underutilized due to its adjacency to perpendicular parking spaces and its distance to the main circulation paths around building.



5 The building lobby provides a direct path from the entrance to the elevators, promoting elevator use by all building users.

6 The green spaces are small and underutilized as potential activity spaces or walking destinations for residents and child visitors.

7 Most of the building units have full-length balconies that could be utilized for moderate resident/child play activities.

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8 The parking area creates a heat island that is unpleasant for casual walking around the site, especially in hot summer weather.

CASE STUDY 7

PROPOSED ACTIVE MASTER PLAN

1 An activity garden provides an outdoor environment for moderate physical engagement between senior residents and child visitors.



2 Strategic positioning of the lobby furniture directs visitors to travel near the stairs before coming to the elevator.



3 Added point-of-decision prompts promote stair use by able-bodied visitors and staff.



4 The design relocates pedestrian paths away from moving traffic to provide a safer walking environment for seniors and children.



5 A fenced-in dog run provides a secure space for children, seniors, and pets to interact.



6 Painted markings are added to the concrete path linking the activity garden, building entrance, and trellised garden to demarcate a safe, short-duration walking path for children and residents.



7 The new trellis-protected raised garden beds provide opportunities for children and senior residents to engage in an outdoor activity.



ACTIVITY LEVEL

- Ages 3–6 Vigorous Physical Activity
- Ages 3–6 Moderate Physical Activity
- Ages 7–12 Vigorous Physical Activity
- Ages 7–12 Moderate Physical Activity
- Ages 13–18 Vigorous Physical Activity
- Ages 13–18 Moderate Physical Activity
- Adults 18yr+ Vigorous Physical Activity
- Adults 18yr+ Moderate Physical Activity

The proposed plan for this site includes the addition of 3 activity spaces in which children can engage with grandparent residents.

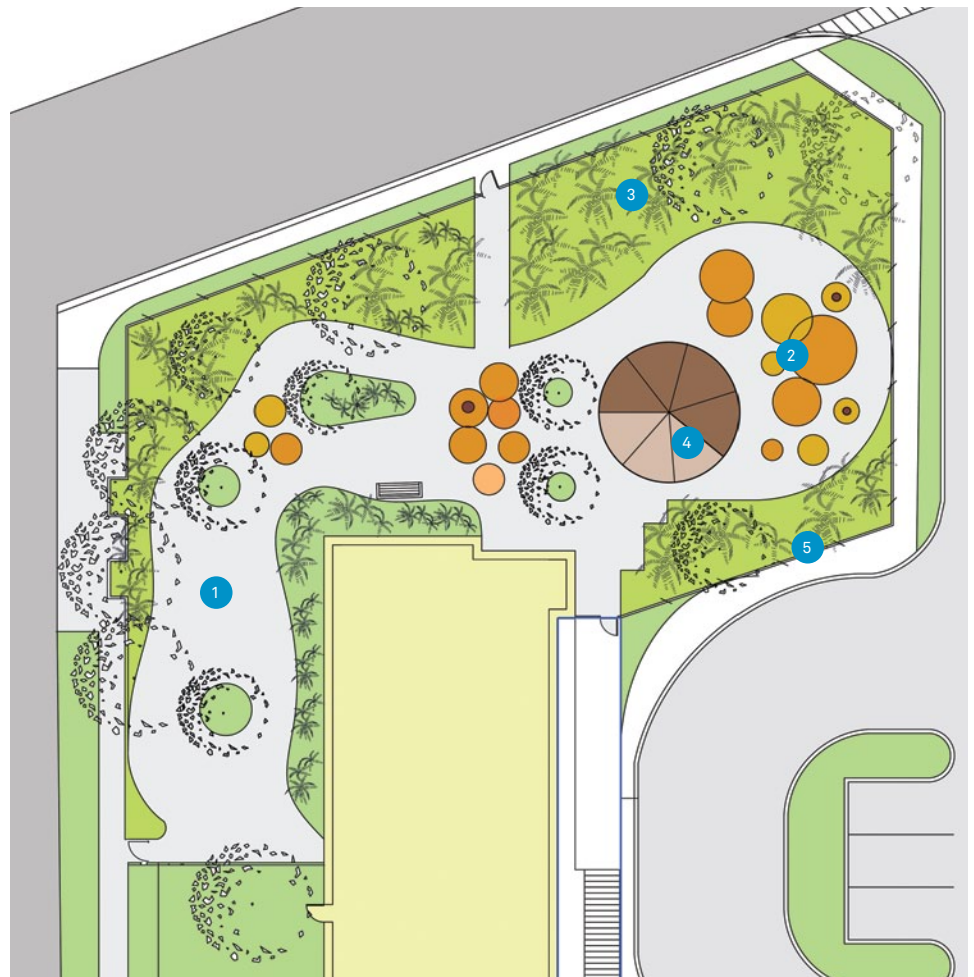
An activity area has been provided at the northeast corner of the site near the building's main entrance, where walking paths were formerly located. The new area provides a large, flat surface surrounded by a landscaped garden. This area is fenced for the safety of the residents and children. Seating and shaded areas near trees and an existing gazebo support activity during summer months. A polymer-based pavement resists heat absorption and allows for a colored pattern that children can use for games like hopscotch.

A vegetable and flower gardening space has been created along the resident parking area. The garden area includes a trellis, which provides a measure of shade. The garden serves a program where residents and their grandchildren or local school children partner to tend plants and vegetables through the growing cycle. Providing an activity that requires moderate physical activity on a regular basis benefits both the residents and visiting children.

A small, fenced dog run has been located under trees adjacent to visitor parking, but away from the most active areas of the site. Providing space for secure and supervised engagement between family dogs, residents, and their child visitors can have both physical and psychological benefits for the elderly and the young.

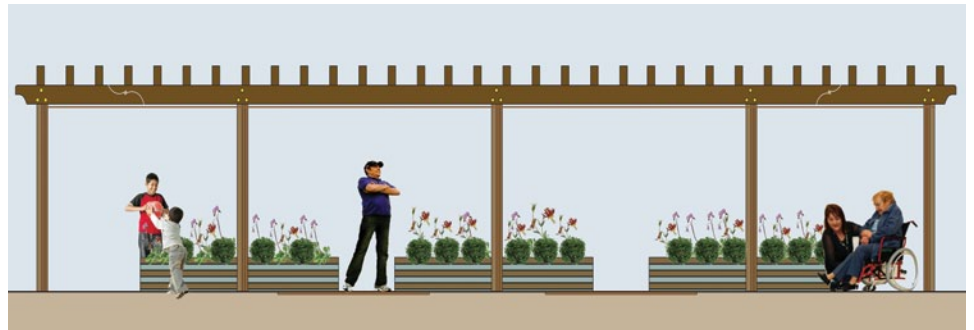
The proposed activity garden provides a secure area for senior residents to interact with young visitors. The design encourages children to engage in moderate-level physical activities that senior adults can choose to join or observe.

- 1 Heat-reflecting pavement supports use in hot weather.
- 2 Activity dot pattern in pavement encourages play in specific areas, in games like hopscotch, rather than unstructured play like running.
- 3 A lush landscape attracts users to walk around the area.
- 4 A gazebo in the middle of the activity dot pattern provides a shady place for residents to sit while their grandchildren play.
- 5 A 5-foot-high metal fence with a self-closing gate and handrail is placed along the driveway to direct seniors and children



Elevator accessibility is a fundamental criterion for the design of ADA-compliant buildings, including senior housing. Many residents will need to use assistive devices such as canes, walkers, and wheelchairs for movement throughout the building. Accommodating residents with mobility devices can result in spatially overburdened elevators, especially when visitors arrive, requiring people to wait for a later elevator. Even in a seniors' residence, able-bodied visitors and staff should be encouraged to use the stairs when not travelling with a resident. An enclosed stair located in the lobby encourages stair use by families visiting residents. In order to promote use of this stairway, this study proposes that a graphic depicting a family with children ascending a staircase be placed on the lobby-side wall of the staircase. Murals would serve as both decision-prompts and decorative elements. Within the staircase, framed photos of local parks and activity areas would be a cost-effective means of improving the stair environment's aesthetic quality.

A trellised planter can be a venue for intergenerational activity for senior residents and visiting grandchildren, or for a programmed activity connecting residents with local school children.



The blue sidewalk zone designates a visible, level, and safe route for adults and children with cognitive and physical disabilities to walk within the building's property.



CASE STUDY 7

ACTIVE DESIGN STRATEGIES

OBJECTIVE

Promote stair use by adult and child visitors to the building.

STRATEGIES

Design elevators to be less prominent than the stairs to encourage stair use, while providing elevator access for people with disabilities.

Lobby furniture is arranged to make the stairs the first-presented and most-visible means of inter-floor movement for able-bodied visitors and staff. Visitors are more likely to use the stairs when not traveling with senior residents, making it easier for seniors with mobility disabilities and devices to use the elevator.

Use signage at the elevators and stairs to encourage stair use.

A mural painted on the lobby-side wall of the stair provides an innovative stair-use prompt consistent with the building's interior decor. Inexpensive signage adjacent to the elevators and stairs at each floor level can also help to prompt stair use.

Provide visually appealing interior finishes.

A decorative mural at the lobby stair entrance and framed artwork depicting inter-generational family activities and interests within the local community make the existing staircase more appealing.

Design stairs to be more visible to encourage their everyday use.

Expand the visual presence of the stair door by painting it a distinctive color complementary to the adjacent mural, and post the stair prompt sign on the adjacent column. These measures can increase the visibility of the stair for people traveling through the lobby and elevator waiting areas on each floor.

Simple and inexpensive renovations like painting stair risers, stringers, nosings, and handrails distinctive colors and installing non-combustible art in the staircases can promote the use of previously underutilized fire exit stairs.



OBJECTIVE

Provide space appropriate for small children to play while visiting senior residents.

STRATEGIES

Design courtyards, gardens, terraces, and roofs that can serve as outdoor spaces for children's play.

An activity garden provides a tree-sheltered area for playful but moderate movement. A trellis-sheltered vegetable and flower garden and a fenced-in dog run provide a variety of outdoor areas appropriate for intergenerational activities stimulating to senior residents and children alike.

When designing playgrounds, include ground markings indicating dedicated areas for sports, play, and other uses.

The pattern of colored circles set in the pavement of the outdoor activity area is designed to support spontaneous, unstructured play for young children and adolescents. It encourages play that incorporates stepping and jumping between circles. This child-oriented activity space serves as a dedicated area for the spontaneous, unpredictable movement of young children within an

OBJECTIVE

Provide activity spaces that accommodate both senior residents and children.

STRATEGIES

Create a buffer separating pedestrians from moving vehicles using street furniture, trees, and other sidewalk infrastructure.

Relocating paths and adding a handrail on the fence adjacent to the driveway helps separate seniors and children from driveways and moving vehicles.

Create partnerships with organizations to sponsor and maintain green spaces and gardens on building sites.

Partnering with neighborhood groups, horticulture organizations, or school programs interested in community engagement or sponsorships can reduce the costs of maintaining green areas.

Provide marked, measured walking paths on sites as part of a wayfinding system targeted to pedestrians.

Ground markings placed on the existing concrete walkway linking the activity garden, main entrance, and trellised garden provide a safe and accessible path where senior residents and their child visitors can walk.

CASE STUDY 7

COST OF IMPLEMENTING ACTIVE

DESIGN STRATEGIES

EXISTING MASTER PLAN				PROPOSED ACTIVE MASTER PLAN			
MATERIAL	QUANTITY	MATERIAL & LABOR COSTS	EXISTING COST	MATERIAL	QUANTITY	MATERIAL & LABOR COSTS	PROPOSED COST
Sidewalks/concrete 2"-deep concrete sidewalks, paths and curbs, 2" compacted granular base	2,285 sf	\$4.80/sf	\$10,968	Sidewalks Demolition of existing 2"-deep concrete sidewalks, paths and curbs, 2" compacted granular base	2,285 sf	\$4.50/sf	\$10,283
				New 2"-deep concrete sidewalks, paths and curbs, 2" compacted granular base	2,310 sf	\$4.80/sf	\$11,088
Asphalt driveway and parking entrance Existing 6" asphalt paving over 6" granular base and curbs	1,250 sf	\$11/sf	\$13,750	Asphalt driveway and parking entrance Demolition of 6" asphalt paving over 6" granular base and curbs	1,250 sf	\$2/sf	\$2,500
				New 6" asphalt paving over 6" granular base and curbs	1,200 sf	\$11/sf	\$13,200
				Demarcated walking path New concrete-colored coating over existing concrete.	2,950 sf	\$4.00/sf	\$11,800
				Activity garden colored concrete surface 2" colored reinforced concrete paving over 4" granular base	4,150 sf	\$7.30/sf	\$30,295
				Metal bench	1	\$600/bench	\$600
Gazebo New decorative concrete gazebo	1	\$10,000	\$10,000	Gazebo New decorative concrete gazebo (location dif- fers from existing gazebo)	1	\$10,000	\$10,000
Trees				Trees	Existing to remain		
					9 sm. trees	\$120/tree	\$1,080
					8 md. trees	\$200/tree	\$1,600
				Activity garden landscaping			
				4" topsoil	15 cy	\$70/cy	\$1,050
				Assorted shrubs	25 sm.	\$20/plant	\$500
					60 md.	\$27/plant	\$1,620
				Activity garden fencing			
				5-foot-high coated aluminum fencing and gate,	380 lf	\$45.53lf	\$17,301
				handrail along driveway	2 gates	\$390/gate	\$780
					42 lf	\$8/lf	\$336
				Trellis/planter area			
				9'-high wood trellis with 2 x 12 x 16" oc with wood supports	1,400 sf	\$8.50/sf	\$11,900
				Planter			
				6 x 6" wood ties with planter	4 planters	\$250/ea	\$1,000
				Fencing for dog run			
				4'-high plastic coated chain link fencing with 3'-wide entry gate	180 lf	\$12.00/lf	\$2,160
					1 gate	\$225.00	\$225
				Lobby stair improvements			
				7 x 7" mural	1 mural	\$3,000	\$3,000
				Painting stair risers, stringers, and handrails	4 flights		
				Non-combustible framed art for staircase walls, 2 framed pictures at each mid-flight landing	6 large framed pictures	\$120/picture	\$720
Lobby stair doors Existing hollow metal fire-rated door	4 doors	\$419/door	\$1,676	Lobby stair doors Hollow metal fire-rated ceramic glass and steel door	4 doors	\$1,080/door	\$4,320
				Informational signage Interior point-of-decision prompt signage to encourage stair use	8 signs	\$45/sign	\$360
EXISTING TOTAL:			\$36,394	PROPOSED TOTAL:			\$137,018

The proposed design supports child visitors to this senior's residence by providing intergenerational opportunities for moderate level physical activities. The cost of the Active Plan is **\$100,624 more** than the existing development plan. This represents an additional investment of **less than 1.5%** to the cost of this \$7 million renovation.

CASE STUDY 8

SAN ANTONIO, TEXAS

This case study examines a new residential community built on the site of a demolished 1950s public housing development. This high-quality gated community, composed of 194 units within 11 residential buildings, is the result of a partnership between the San Antonio Housing Authority and a private developer. The development includes 49 public housing units, 137 affordable (tax credit) units, and 8 market-rate units.

Located along an interstate highway and accessible via a one-way service road, the development is somewhat remote from neighborhood services. There are no schools, workplaces, groceries, or retail stores within walking distance. The automobile-oriented design has ample and variable provisions for parking, including sheltered and unsheltered surface parking space and garages. The residential buildings are 3 stories high, with walk-up access through exterior public corridors that transect the buildings and serve primarily to link the units to the parking area. Sidewalks are mostly located adjacent to this area. A public park, located across a local street to the west of the site, includes a recreation building, outdoor baseball diamond, and basketball court. Despite its relative proximity, the development's layout does not emphasize the park's accessibility to its young residents.

In southern climates, providing recreational facilities that can be used in extreme summer heat is a key challenge in attempting to increase children's engagement in physical activity. Several facilities that support physical activity are spread across the site. The community building, located near the site's north entrance, contains a business center, a 24-hour laundry room, an adult fitness room, and a children's playroom. A green space, located on the west side of the site, includes a playground and barbecue pavilions. This large green area could potentially host child-oriented activities, though most of the development's residents must cross roadways that are very hot in the summer months to access this feature. The large community pool near the center of the development is the only specific feature offered for children over playground age.

This case study will propose strategies for providing additional physical activity opportunities within the development by addressing the following objectives:

- Increase the convenience, appeal, and support for recreational walking and cycling in the development.
- Increase the visual and physical access to green recreation spaces within the complex while maintaining parking requirements.
- Increase opportunities for moderate to vigorous physical activity for residents of all ages during all seasons.



CASE STUDY 8

EXISTING MASTER PLAN

1 The location of sidewalks tightly adjacent to parking areas limits their appeal for recreational walking and cycling.

2 Parking shelters protect parked cars from intense summer heat.

3 Barbeque shelters protect barbeque areas from intense summer heat.

4 Well-equipped playground is provided in the green space, although its use in the summer is compromised by intense summer heat.

5 Unique community art features are located in the green space near the playground and barbeque areas.

6 The placement of road access and parking areas between housing units and green space creates a potential barrier and safety issue for young children using the green space.

7 The community building provides an adult fitness center and children's recreation room. The small green space partially contained by the L-shape of building is underutilized.

8 The pool is located within a large hard-surface area with limited protection from intense summer heat.



CASE STUDY 8

PROPOSED ACTIVE MASTER PLAN

1 Pathways for walking and cycling are added in green areas between buildings to provide safe, appealing routes around the development.

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2 Extended pedestrian crossing markings, speed bumps, and pedestrian bulbs are provided for pedestrian safety.

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3 Exercise stations are co-located with barbecue stations and playgrounds to encourage family-oriented activities.

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4 Neighborhood layout is adjusted to relocate housing units directly adjacent to green space.

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5 Bicycle racks are provided under one staircase in each ground floor entry corridor.

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6 The enclosed green area adjacent to the community building provides a safe, contained space for young children to play while caregivers use the facilities within the building.

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7 Shelter is provided at the pool area for protection from the sun and to extend the play space.

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8 Extended parking shelters provide shade over sidewalks along the route to the pool and community building.

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9 A chalk art space is provided around the art feature.

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10 A fenced, leash-free dog area is provided.

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11 The waste bin shelter is relocated to make the route to the community building more appealing.

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12 Portable soccer nets are provided in the open green space.

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ACTIVITY LEVEL

- Ages 3–6 Vigorous Physical Activity
- Ages 3–6 Moderate Physical Activity
- Ages 7–12 Vigorous Physical Activity
- Ages 7–12 Moderate Physical Activity
- Ages 13–18 Vigorous Physical Activity
- Ages 13–18 Moderate Physical Activity
- Adults 18yr+ Vigorous Physical Activity
- Adults 18yr+ Moderate Physical Activity

While communities in the southern region of the United States enjoy pleasant weather that supports engagement in outdoor physical activities for most of the year, extreme heat during the summer months can make even short durations of physical activity uncomfortable and potentially dangerous. The proposed design for this case study focuses on providing protection for children's physical activities during summer months.

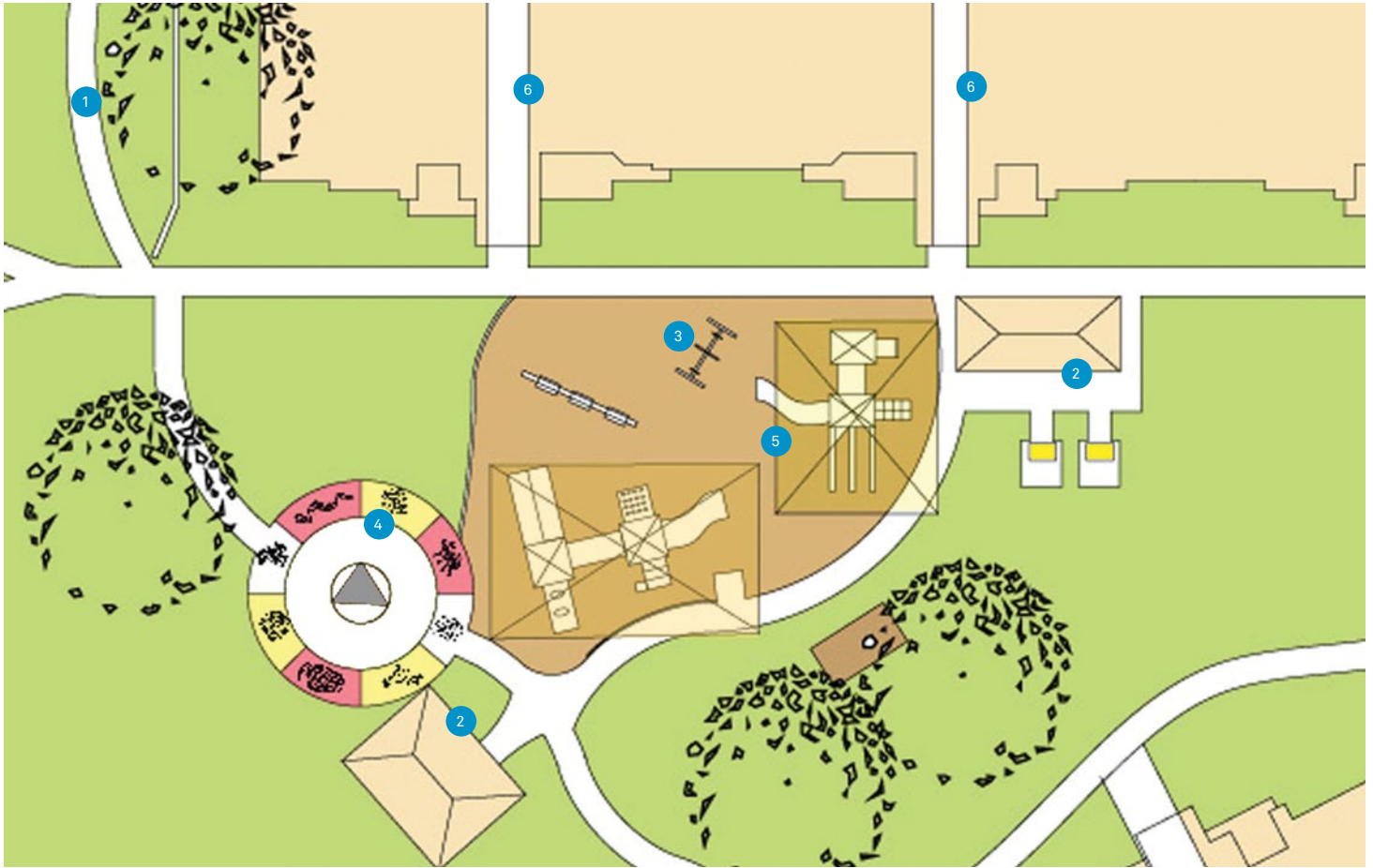
Sun shelters also provide opportunities to lessen the absorption of heat through sidewalk and play surfaces while offering protection from the adverse effects of overexposure to the sun. The existing design provides shelter only for parking and sedentary activities, such as outdoor seating.

The proposed design protects children from potentially harmful overheated plastic playground equipment by providing a fabric shelter. A roofed shelter was also added to the pool area to extend the duration of pool use during the summer months by protecting pool users from overexposure to the sun.

The roof of the parking shelters can be extended over the adjacent sidewalks to provide protection for pedestrians during extreme heat and rainy weather. This study recommends extending the roof area over the sidewalk routes connecting the community building, pool, and green space to provide a cost-effective improvement to the development's pedestrian experience.

The roof line of the parking structure could be extended to shelter sidewalks that lead to activity areas from excessive heat absorption.





Open space activity area.

- 1 New paths between buildings link residential units to the north to the recreation area within the green space.
- 2 Barbeque and picnic pavilions
- 3 Exercise station
- 4 Chalk art space located around the art feature
- 5 Fabric shelter over playground equipment
- 6 Secured bicycle racks under stairs

A shelter was installed over playground apparatus to allow for play during the hot summer months.



CASE STUDY 8

ACTIVE DESIGN STRATEGIES

OBJECTIVE

Increase the convenience, appeal, and support for recreational walking and cycling in the development.

STRATEGIES

Create and orient paths and sidewalks toward interesting views.

The proposed plan increases the number of paths and sidewalks located within green pedestrian-oriented environments. The expanded path around the green space provides a route for walking and cycling.

Provide secure, sheltered, and accessible bicycle storage, preferably on the ground floor.

Secure bicycle storage racks are provided in an unutilized space under the stairs in the apartment-access corridors. A bicycle rack is also provided at the recreation facility.

Locate building and site functions along routes that encourage brief bouts of walking or travel to community amenities.

The separation of recreational facilities from the community building, pool, recreational area within the green space, and leash-free dog run will encourage residents to walk. The extension of shelters over the concrete sidewalks and new paths between buildings leading to the green space will enhance the pedestrian experience on routes between functional areas.

OBJECTIVE

Increase visual and physical access to functional areas of green space within the complex while maintaining parking requirements.

STRATEGIES

Provide and preserve natural terrain and dedicated open green area for outdoor sports and other outdoor play.

The proposed site plan reorganizes the location of residential buildings and parking to the south of the green space and adds a pathway loop to the west of the playground area. This reconfiguration better defines and improves access to open green space that can accommodate pick-up field games, running, and other unstructured play.

OBJECTIVE

Increase opportunities for moderate to vigorous physical activity for residents of all ages during all seasons.

STRATEGIES

Design activity spaces to accommodate opportunities for recreational play for children of all age groups.

The proposed plan adds various play zones for different age and gender groups, including a basketball half-court, ground markings demarcating a tetherball area on outdoor slab next to the management office, and spaces for jump-rope and ground chalk. Two existing playgrounds are combined into one large play area that can accommodate parent supervision of children of different ages.

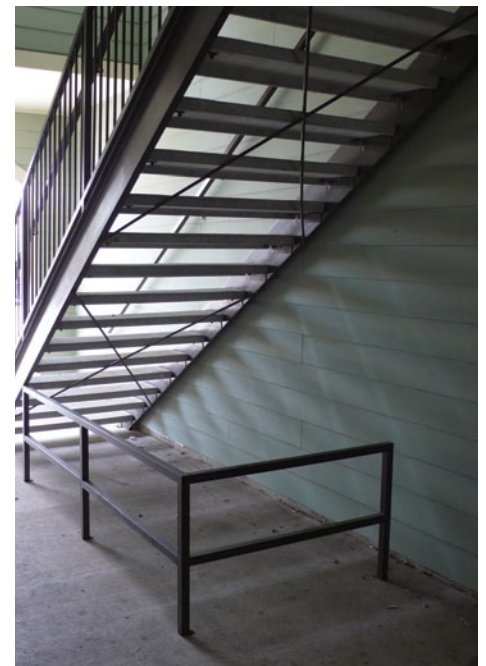
Locate physical activity spaces in centrally visible locations to increase awareness and use by residents.

Brightly colored fabric shelters, ground markings, and playground equipment within the recreational area of the green space draw attention to these centrally located recreation facilities.

Co-locate play areas with an adult exercise space, allowing parents to watch their children play while they exercise.

A new exercise station is located adjacent to the playground and new chalk art space. The proximity of the adult- and child-oriented features in this area supports opportunities for all members of the family to be active at the same time.

This image illustrates a common condition for walk-up-type apartment buildings. The space under the staircase is often fenced for safety or to serve as a garbage collection area. This area can alternatively be used as a sheltered and convenient location for bicycle racks.



CASE STUDY 8

COST OF IMPLEMENTING ACTIVE

DESIGN STRATEGIES

EXISTING MASTER PLAN				PROPOSED ACTIVE MASTER PLAN			
MATERIAL	QUANTITY	MATERIAL AND LABOR COSTS	EXISTING COST	MATERIAL	QUANTITY	MATERIAL AND LABOR COSTS	PROPOSED COST
Sidewalks 4'-wide x 2"-deep concrete sidewalks, paths, and curbs, 2" compacted granular base	24,900 sf	\$4.80/sf	\$119,520	Sidewalks 4'-wide x 2"-deep concrete sidewalks, paths, and curbs, 2" compacted granular base	30,700 sf	\$4.80/sf	\$147,360
Asphalt roads and parking areas 6" asphalt paving over 6" granular base	186,200 sf	\$11/sf	\$2,048,200	Asphalt roads and parking areas 6" asphalt paving over 6" granular base	191,700 sf	\$11/sf	\$2,108,700
Painted markings at pedestrian crossings	4,700 sf	\$1/sf	\$4,700	Painted markings at pedestrian crossings	5,200 sf	\$1/sf	\$5,200
				Fencing for area adjacent to community building 4'-high plastic coated chain link fencing with 3'-wide entry gate	115 lf 1 gate	\$12.00/lf \$225.00	\$1,380 \$225
Carport shelter without sidewalk extensions Metal sheeting over steel frame and structure into concrete foundation	16,800 sf	\$5.25/sf	\$88,200	Carport shelter with sidewalk extensions Metal sheeting over steel frame and structure into concrete foundation. Includes 1,170 sf of 4' sun overhang over sidewalk	17,970 sf	\$5.25/sf	\$94,343
				Swimming deck shelter 30 x 35' fabric and steel structure	1,050 sf	\$15/sf	\$15,750
Swimming pool deck 3"-deep concrete surround	3,600 sf	\$5.20/sf	\$18,720	Swimming pool deck 3"-deep concrete surround	3,950 sf	\$5.20/sf	\$20,540
Swimming fencing 5'-high coated aluminum fencing around pool area and gates	300 lf 2 gates	\$45.53/lf \$390/gate	\$13,659 \$780	Swimming pool fencing 5'-high coated aluminum fencing around pool area and gates	355 lf 2 gates	\$45.53/lf \$390/gate	\$16,163 \$780
Grassy open space Sodded bent grass on 4" topsoil	465,700 sf	\$1.31/sf	\$610,067	Grassy open space Sodded bent grass on 4" topsoil	454,400 sf	\$1.31/sf	\$595,264
				Portable soccer nets	Set of 2 nets	\$1,200/set	\$1,200
Trees	Existing on site			Trees and landscaping Additional new trees	3	\$400/tree	\$1,200
				Playground shelters 2 40 x 35' fabric and steel structures over play structures	2,800 sf	\$15/sf	\$42,000
Playground Equipment	No change in quantity			Playground equipment	No change in quantity		
Playground Surface Hardwood mulch over 4" compacted granular base	3,200 sf	\$4.24/sf	\$13,568	Playground surface Rubberized mulch over 4" granular compacted base	3,200 sf	\$7.3/sf	\$23,360
				Chalk drawing area 4'-wide x 2"-deep concrete pad, 2" compacted granular base and chalk dispenser	580 sf 1 disp.	\$4.80/sf \$50	\$278 \$50
				Exercise stations (1 station) 12 x 20' area with 6"-deep rubberized mulch surface	240 sf	\$7.3/sf	\$120
				Metal stationary equipment Stationary push, pull, or stretch equipment	2 per station	\$500/equipment	\$1000
				Fencing for dog run 4'-high plastic coated chain link fencing with 3'-wide entry gate	235 lf 1 gate	\$12.00/lf \$225.00	\$2,820 \$225
EXISTING TOTAL:			\$2,797,894	PROPOSED TOTAL:			\$3,077,958

The proposed design focuses on supporting the pedestrian experience with activity spaces that engage children and adults of various ages. The cost of the Active Plan is **\$280,064 more** than the existing development plan. This represents an increase of **less than 1.1%** over the project's original \$24.4 million development cost.

CASE STUDY 9

ATLANTA, GEORGIA

This case study examines a new residential community in an area undergoing urban renewal adjacent to downtown Atlanta. The development, which still has stages under construction, is the result of the convergence of several formerly individual properties. The new community is a high-quality gated development, with family and senior housing in separate 3- and 4- story buildings. Residences are a mixture of market-rate and rent-g geared-to-income units.

The location of the development presents both opportunities and challenges for physical activity. There has been a significant investment in sidewalks throughout the property, most of which are immediately adjacent to automobile traffic or parking. The development is located within walking distance of a MARTA subway station and across the street from a row of new and renovated mixed-use developments that feature shops along the street front. Most of the residential buildings are located at the edge of the property, enhancing access to shops and other businesses along the southern arterial street. However, grade differentials along the east and west streets require substantial retaining walls that reduce the effectiveness of direct street placement. There is a public park to the west of the community.

An important feature of the development is the placement of multi-story residential buildings along the street edge. The site's shortcomings include its location next to a major highway under which children must travel to access the local school. In addition, until further construction is completed in the area, the development is somewhat isolated from the surrounding community.

The development's design mixes some features of suburban automobile-oriented housing with a more compact design suited to an urban setting. The northeast section of the complex includes 3 senior-housing apartment buildings. These buildings are serviced by elevators and have outdoor gardens for recreational walking. The remainder of the housing units are mid-rise 3- or 4-story buildings, with walk-up access through exterior public corridors from the pathways along the street or from the ample onsite parking area.

A community building is located adjacent to the principle access road transecting the complex. The building contains management offices, a business center, fitness facilities, and a community pool. There are two separate, well-appointed children's playgrounds located some distance from the community building. While the community offers many features that support healthy living, there are no specific features for older children besides the swimming pool. The following broad-based suggestions have been recommended to improve opportunities for physical activity for children living in the complex:

- Increase the convenience, appeal, and support for recreational walking and cycling within the community and active transportation to school.
- Increase visual and physical access to exercise-friendly green spaces in the complex while maintaining parking requirements.
- Increase opportunities for moderate to vigorous physical activity for all ages in all seasons.



CASE STUDY 9

EXISTING MASTER PLAN

1 The large parking area creates heat islands that are unpleasant to traverse in hot summer months.

2 Small recreational spaces are not very visible to residents and too close to highway noise, leading to their underutilization.

3 Access to the community recreation center requires half of residents to cross a busy street.

4 The children's playground is remote from many residents and activities.



5 The location of sidewalks tightly adjacent to the parking area causes carfronts to encroach on pedestrian space.

6 The processional vehicular route isolates green space that could otherwise be used for resident physical activity.

7 The community buildings and pool provide fitness and recreation space for residents. However, facilities for use by preteen and teenage residents, especially in cool weather, are limited.



CASE STUDY 9

PROPOSED ACTIVE MASTER PLAN

1 Inverting the location of buildings and parking spaces creates a large grass area with tree-lined bicycle and/or walking paths for shade in hot weather.

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2 Extended pedestrian crossing markings, speed bumps, and pedestrian bulbs are provided for pedestrian safety.

3 A basketball net and half-court basketball area are provided for use by teenage residents.

● ●

4 Co-locating barbecue stations with the grassy area and the recreation center encourages family-oriented activities.

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5 The installation of transit bus stops at the edge of the development is recommended.

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6 Eliminating the vehicular procession way makes the development more pedestrian-friendly.

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7 A "Safe walk to school" station is recommended. Resident children can travel to school together, escorted under the highway by resident volunteers.

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8 Added crossing markings emphasize a vehicle-free safety zone and improve residents' access to the recreation center.

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9 New design provides more variation and co-location of opportunities for physical activity within the development.

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ACTIVITY LEVEL

- Ages 3–6 Vigorous Physical Activity
- Ages 3–6 Moderate Physical Activity
- Ages 7–12 Vigorous Physical Activity
- Ages 7–12 Moderate Physical Activity
- Ages 13–18 Vigorous Physical Activity
- Ages 13–18 Moderate Physical Activity
- Adults 18yr+ Vigorous Physical Activity
- Adults 18yr+ Moderate Physical Activity



Existing plan provides a sidewalk network closely associated with parking.



Proposed plan provides significantly more pedestrian-oriented pathways than the original.

- Paths adjacent to parking space or streets
- Paths located in green spaces

Multi-building housing developments on large tracts of land provide community-scale opportunities for improving children's physical activities. This case study focused on enhancing children's opportunities for walking, cycling, and recreation within the community and immediate development.

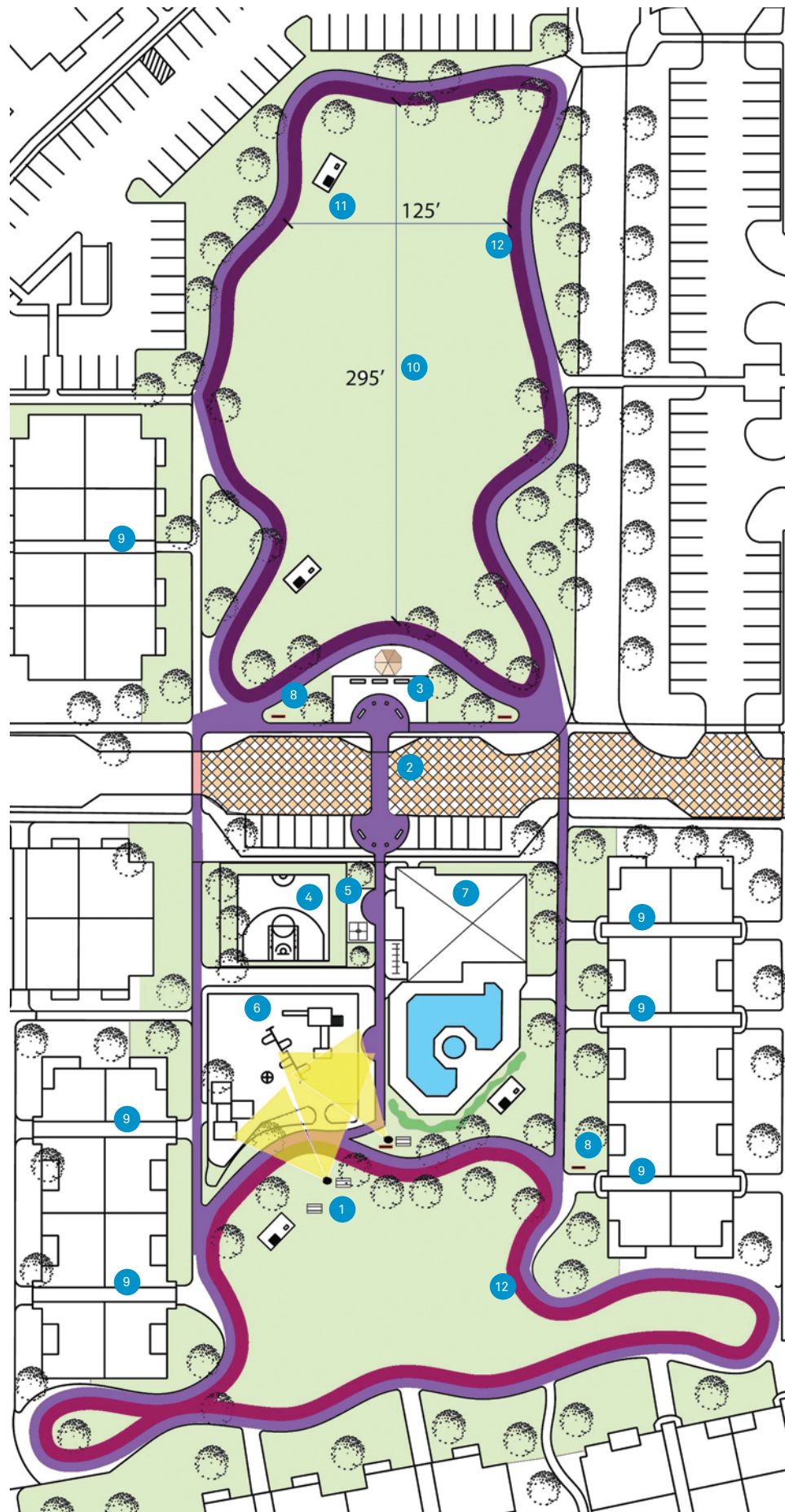
The existing community provides an extensive network of sidewalks (see plan, top left), located primarily next to parking spaces except in small areas adjacent to the seniors' housing and playground areas. However, the sidewalk's proximity to the parking area negatively impacts its appeal for walkers. Perpendicular parking often causes automobiles to encroach on portions of the adjacent sidewalk, limiting sidewalk widths for walking or bicycling by young children or family groups.

The proposed activity-oriented plan restructures the development layout to encourage more walking and cycling activities for families with young children. While maintaining the same number of housing units and parking spaces, the active plan consolidates the amount of road and grass surfaces to provide more walking environments associated with green recreation spaces (see plan, bottom left). This plan actually decreases the overall amount of sidewalk space, but increases the length of sidewalks or pathways that can better support recreational walking and children's cycling. The proposed plan provides alternative looped paths enclosing green spaces to serve the northern and southern portions of the development. These form part of a larger looped pathway that is almost entirely separated from automobile traffic. The plan also provides safe crossings between the recreational area to the south and the green space and access to residences in the north portion of the development.

The path system is scaled to encourage use by children. While an adult could walk the combined loop in 6 minutes at a moderate speed of 4 miles per hour, children, whose walking is more likely to be interrupted by other impromptu activities, are likely to travel more slowly, completing the same route in 12 minutes at about 2 miles per hour. Children can also ride bicycles along the 2 short routes while remaining visible to caregivers in the green space. It is recommended that bicycle racks be installed in the recreation area and on the ground floor near the access corridors of the apartment units.

This activity-focused plan combines the 2 playgrounds and their equipment to make supervision of young children easier. Barbeque grills, picnic tables, and an exercise station would be located next to the playgrounds to encourage parental activity while children play. By co-locating child- and adult-compatible activities like picnicking and exercise with the playgrounds or green space, the plan promotes full-family physical activity. To discourage parents from not providing direct supervision of children in the pool area, the pool is not visible from the picnic tables (due to landscaping).

The proposed plan provides additional environments that support physical activity among teens. The north green space adds a basketball half-court and other facilities to support various types of ball-oriented play.



Pedestrian activity zone offers numerous opportunities for child activity.

- 1 Barbeque and picnic tables positioned to provide a view of the playgrounds and south green space
 - 2 Colored asphalt with paint marking pedestrian crossing zone (15 mph speed limit)
 - 3 Walking and school bus gathering place
 - 4 Basketball half-court
 - 5 Concrete slab for tetherball and chalk drawings
 - 6 Playground to accommodate ages 3 to 10
 - 7 Management office with a fitness center overlooking the pool area
 - 8 Signage denoting pathway options and providing route distance information
 - 9 Bicycle racks under staircases in apartment entry corridors
 - 10 North green space with a large, open grassy area that can accommodate ball-oriented play
 - 11 Exercise stations located adjacent to the pedestrian path
 - 12 Flat-level, ADA-compliant walking paths, tree-lined for shade in hot weather and separated from automobile routes and parking spaces
- █ North route
█ South route
█ Combined route

CASE STUDY 9

ACTIVE DESIGN STRATEGIES

OBJECTIVE

Increase the convenience, appeal, and support for recreational walking and cycling within the community and active transportation to school.

STRATEGIES

Create paths and sidewalks oriented toward interesting views.

Proposed plan increases the number of paths and sidewalks located within green, pedestrian-oriented (non-automobile) environments.

Support physical activity among people with disabilities by making streets and paths universally accessible.

Pedestrian paths are smooth, have curb cuts at crossings, and are 5 feet wide to accommodate the turning radius of a wheelchair. These features are equally supportive of strollers and walkers. The primary crossing zone between the north and south portions of the development is demarcated with colored concrete, painted markings, and 15 mph signage. Other crossing areas have painted markings.

Provide secure, sheltered, and accessible bicycle storage, preferably on the ground floor.

Secure bicycle storage racks are provided in previously unutilized space under stairs in apartment access corridors. A bicycle rack is also provided at the recreation facility.

In multi-unit housing facilities, designate an area or spot as a walking and cycling school bus station.

Bench seating and informational signage located next to the pedestrian crossing zone create a safe and accessible gathering place for children walking to school.

Locate building functions to encourage brief bouts of walking or travel to community amenities.

Place functional spaces like community and recreational facilities a pleasant but significant walking distance from individual residences and building entrances to encourage daily bouts of walking and stair-climbing.

The need to accommodate surface parking often adversely affects sidewalks' appeal for recreational activities. Creating pedestrian paths onsite, or links to pathways in nearby public parks, supports multiple healthy activities like walking, running, and dog-walking.



OBJECTIVE

Increase visual and physical access to activity-friendly green spaces in the complex while maintaining parking requirements.

STRATEGIES

Provide and preserve natural terrain and dedicated open green area for outdoor sports and other outdoor play.

The proposed plan reorganizes the locations of buildings and parking areas to create two new zones of open green space that can accommodate field games, running, and unstructured play.

Co-locate adult and child activities that encourage adults to engage in physical activity while supervising or watching children's play.

The proposed plan relocates the existing barbeque and picnic tables to provide a direct view of the children's playground and south grassy open space. Exercise stations are provided next to open spaces.

OBJECTIVE

Increase opportunities for moderate to vigorous physical activity for all ages in all seasons.

STRATEGIES

Design activity spaces to provide opportunities for recreational play for all age groups.

Play zones for different age and gender groups are added, including a basketball half-court and ground markings on the outdoor slab next to the management office to demarcate areas for tetherball, jump-rope, and ground chalk. 2 existing playgrounds are combined into one large play area that can also accommodate parent supervision.

Locate physical activity spaces in centrally visible locations within the building to help increase residents' use and awareness.

The central location of physical activity features within the development and community building reinforces their availability to residents.

Co-locate play areas with an adult exercise space, allowing parents to exercise while watching their children play.

4 new exercise stations are located along pedestrian pathways, with 2 each along the north and south loops. Barbeque and picnic facilities are located adjacent to the playground and south green space to encourage outdoor family activities.

Exercise stations located along a pathway in a neighborhood park.
Villages at Carver,
Atlanta



CASE STUDY 9

COST OF IMPLEMENTING ACTIVE

DESIGN STRATEGIES

EXISTING MASTER PLAN				PROPOSED ACTIVE MASTER PLAN			
MATERIAL	QUANTITY	MATERIAL AND LABOR COSTS	EXISTING COST	MATERIAL	QUANTITY	MATERIAL AND LABOR COSTS	PROPOSED COST
Sidewalks 4'-wide x 2'-deep concrete sidewalks, paths, and curbs; 2" compacted granular base	81,360 sf	\$4.80/sf	\$390,528	Sidewalks 4'-wide (5' wide in green space) x 2'-deep concrete sidewalks, paths, and curbs; 2" compacted granular base	91,780 sf	\$4.80/sf	\$440,544
Asphalt roads and parking areas	312,600 sf	\$11/sf	\$3,438,600	Asphalt roads and parking areas 6" asphalt paving over 6" granular base	283,923 sf	\$11/sf	\$3,123,153
				Pedestrian crossing areas 6" colored reinforced concrete paving over 4" granular base at crossing zone	1,600 sf	\$12/sf	\$19,200
				Painted Markings at pedestrian crossings	1,800 sf	\$1/sf	\$1,800
				Informational signage to provide walking and cycling information	4	\$750/sign	\$3,000
				Walking school bus station 4" concrete pavement and curbing on 4" granular base	2500 sf	\$10/sf	\$25,000
				Metal benches	3	\$600/bench	\$1,800
Gazebo Brick and wood octagonal gazebo with asphalt shingle roofing	1	\$15,000	\$15,000	Gazebo Brick and wood octagonal gazebo with asphalt shingle roofing	1	\$15,000	\$15,000
Grassy open space Sodded bent grass on 4" topsoil	369,600 sf	\$1.31/sf	\$484,176	Grassy open space Sodded area on 4" topsoil	426,400 sf	\$1.31/sf	\$558,584
Trees and landscaping	No change in quantity			Trees and landscaping	No change in quantity		
Barbeque areas Charcoal barbeque and picnic table	2 sets	\$600/set	\$1,200	Barbeque spaces Charcoal barbeque and picnic tables	3 sets	\$600/set	\$1,800
Playground equipment	No change in quantity		\$67,480	Playground equipment	No change in quantity		\$67,480
Playground surface Hardwood mulch over 4" compacted granular base	3,200 sf	\$4.24/sf	\$13,760	Playground surface Rubberized mulch over 4" compacted granular base	2,600 sf	\$7.3/sf	\$18,980
Playground fencing 6'-high coated aluminum fencing around 2 playgrounds and pool area	810 lf	\$52.47/lf	\$42,500	Playground fencing 6'-high coated aluminum fencing around combined playground and pool area	570 lf	\$52.47/lf	\$29,900
				Exercise stations (4 stations) 12 x 20' area with 6"-deep hardwood mulch surface installed	960 sf	\$.5/sf	\$480
				Metal stationary equipment Stationary push, pull, or stretch equipment	2 per station = 8 pieces	\$500/equipment	\$4000
				Basketball court Colored concrete basket court, pavement markings, and net apparatus	2350 sf 320 lf 1 net	\$8/sf \$1/lf \$350/net	\$18,850 \$320 \$350
				Tetherball court and chalk drawing area Concrete pad on 4" granular base, markings, pole, and equipment	580 sf	\$4.80/sf	\$2,784
				Bicycle racks 42"-wide racks for under stairs 60" rack at community building	19 1	\$500/rack \$600/rack	\$9,500 \$600
EXISTING TOTAL:			\$4,641,244	PROPOSED TOTAL:			\$4,333,025

The proposed design focuses on pedestrian experiences and activity spaces that engage adults and children of various ages. While new features were added to the development to support children's play and activities, their costs could be balanced by greater efficiencies in the parking and roadway surfaces. The cost of the Active Plan is **\$128,219 less** than the existing development plan. This represents a **savings of 0.5%** of the project's original **\$26.4 million** development cost.

CASE STUDY 10

ATLANTA, GEORGIA

This case study examines a gated enclave of 3- and 4-story multi-family residential buildings in suburban Atlanta. The enclave is a phase of a larger development next to a pre-1945 community of single-family houses. The larger development has benefited from a considerable investment in new roads, sidewalks, and sewers, as well as a 15-acre linear park to the east of the case study property. It currently includes 750 mixed-income, multi-family rental apartments and a 90-unit independent senior living residence. The case study covers a total of 165 units, including 49 1-bedroom units, 101 2-bedroom units, and 15 3-bedroom units.

The topography varies significantly across the development. The rolling terrain, which falls in elevation from the west to the east, has been addressed in the design by the addition of large retaining walls that organize the enclave into multiple plateaus. The building on the west side of the site is situated at the highest plateau and has a C-shaped layout, with a playground in the open space. The 2 buildings to the immediate east and north are on the medium plateau, and the remainder of the buildings, including the community building and outdoor pool to the east, are on the lowest plateau. There are noteworthy destinations within walking distance, including an elementary and middle school, a YMCA facility, a community park that provides numerous playing fields for baseball and softball, tennis courts, and an indoor swimming pool. However, due to the neighborhood's rolling terrain and warped-grid layout of gated enclaves, these facilities are generally more likely to be accessed by automobile.

Another important feature of the case study development is the provision of units for the physically disabled and visually or hearing impaired in approximately 25% of the ground floor apartment units. The existing plan provides generously wide, smooth concrete pathways with curb cuts and turning radii adequate for wheelchairs. A fenced playground is located within the open grass courtyard at the medium-level plateau. Perhaps due to the proximity to other recreational facilities a short distance away, there are very limited facilities for children older than playground age.

In response to the provision of residential units for families with physical, visual, or hearing disabilities, this case study focuses on one primary objective:

- Increase opportunities for moderate to vigorous physical activity for residents of all ages and all levels of ability.



CASE STUDY 10

EXISTING MASTER PLAN

1 The fenced playground contains large multiple-activity play apparatus for physically able children but provides limited options for children with physical disabilities.

2 Most residents need to cross a vehicular driveway to access the central recreation court.

3 Walking paths adjacent to parking areas limit opportunities for enjoyment of green space.

4 The community building containing the neighborhood fitness center is located adjacent to the gated enclave.

5 A large community pool is located next to the development.

6 A community green space park is located directly across the street from the development.



CASE STUDY 10

PROPOSED ACTIVE MASTER PLAN

1 A disability-supportive crossing is provided, including marked crossing, handrail, signage, button-activated audible beaoning, and light beaoning.



2 An inclusive playground is designed to accommodate children and caregivers of all abilities.

3 A circular walking path links and defines the three recreational areas in the central recreation court.



4 A sensory garden is added within the defined circular zone and gazebo.



5 Open green space is provided.



6 Pavement markings delineate a multi-purpose recreational court in the overflow parking area that is available during non-peak parking hours.



7 A community building containing the neighborhood fitness center is located next to the development.



8 A large community pool is located next to the development.



9 A community green space park is located directly across the street from the development.



ACTIVITY LEVEL

- Ages 3–6 Vigorous Physical Activity
- Ages 3–6 Moderate Physical Activity
- Ages 7–12 Vigorous Physical Activity
- Ages 7–12 Moderate Physical Activity
- Ages 13–18 Vigorous Physical Activity
- Ages 13–18 Moderate Physical Activity
- Adults 18yr+ Vigorous Physical Activity
- Adults 18yr+ Moderate Physical Activity

■ 25% of ground-floor apartments are constructed to accommodate households with physical, hearing, or visual disabilities.



Inclusive Play Zone

- 1 Fenced playground
 - 2 Sensory garden within the defined circular zone and gazebo
 - 3 Green open space
- 4 Circular path network that links and defines the three recreational areas
 - 5 Enhanced pedestrian crossing with auditory signals

Play is a very important component of interpersonal, affective, and psychometric human development. Playgrounds should provide a variety of physical challenges for children of a wide range of ages and abilities. Physical challenges should include opportunities for jumping, skipping, climbing, rocking, swinging, spinning, and sliding. Playgrounds should also allow children to role-play and engage in intellectual challenges through decision-making within play activities. While the proposed plan recommends the provision of playground environments that support vigorous physical activity, there is also a need to provide quieter environments for the more reflective activities and interim rest periods that help to prolong the overall duration of play. As such, playgrounds should be designed inclusively to be appealing, stimulating, physically and intellectually challenging, and safe, with comfortable and quiet areas for both children and their caregivers.

The design standards for accessible play areas are typically defined by applicable legislation like the American with Disabilities Act (ADA) or by requirements of housing authorities or state tax-credit eligibility rules. These design standards dictate or recommend the range of play types, percent of elevated play components that must be accessible by ramp and accessible route, dimensional requirements for accessible paths, transfer areas for maneuvering between mobility devices and play apparatus, slopes for accessible routes and ramps, and reach distances to play components.

The proposed plan re-envisioned the central recreational area as an inclusive play zone with 3 primary play areas:

- A fenced playground with a patterned, soft surface and comprehensive play structure, with slide, climbers, elevated platforms accessible by ramp and ladder, and a ground-level platform area, tabletop sandbox, balance station, and bouncing seating. The design utilizes the existing mature trees to provide shade in this activity-focused zone.
- A sensory garden for moderate and reflective activities, defined by the circular organization of the garden beds and pathways. A gazebo located at the center of this zone provides shelter and a place for role-playing activities.
- An open grass area between the playground and sensory garden to provide a space that can accommodate unstructured play activities and moderate-intensity, sports-related play for young children unlikely to use the adjacent community park.

The 3 activity areas are linked by a circular network of paths that defines the areas and provides an attractive route for young children making multiple walking, running, or cycling laps.

CASE STUDY 10

ACTIVE DESIGN STRATEGIES

OBJECTIVE

Increase opportunities for moderate to vigorous physical activity for residents of all ages and all levels of ability.

STRATEGIES

Support physical activity among people with disabilities by making streets and paths **universally accessible.**

Resident units provided for tenants with mobility, hearing, or vision disabilities are clustered closer to the more activity-inclusive central recreational area. Accessibility to the sensory garden and playground area within the central recreational area and along pathways within the enclave is further augmented by enhanced pedestrian crossings with auditory signals.

Support physical activity among children with disabilities by making **parks and playground features accessible for both children and their caregivers.**

The proposed plan provides 3 activity areas with a variety of recreational equipment and environments for moderate and vigorous play for children with a broad range of abilities. The colorful surface pattern of the outdoor activity area is designed to support the playful movements of young children and adolescents. The pattern stimulates children to try a variety of activities beyond the choices presented by the specialized play equipment. The sensory garden offers a defined space for children who can be visually stimulated by its botanical features, and includes a non-themed area for a wide range of child and adult activity. The grassy space between the 2 areas is small but well-sized to accommodate unstructured play by children aged 3 to 12. The areas are linked by a smooth path with a maximum slope of 1:16 for safe and comfortable access for children and adults with mobility disabilities.

Consider playground equipment that provides sensory stimulation and flexible or alternative access for play activities. Provide playground surfaces that soften impact but provide support for mobility devices.

Morgan's Wonderland,
San Antonio, TX



CASE STUDY 10

COST OF IMPLEMENTING ACTIVE

DESIGN STRATEGIES

EXISTING MASTER PLAN				PROPOSED ACTIVE MASTER PLAN			
MATERIAL	QUANTITY	MATERIAL AND LABOR COSTS	EXISTING COST	MATERIAL	QUANTITY	MATERIAL AND LABOR COSTS	PROPOSED COST
Sidewalks in central courtyard 4'-wide, 2"-deep concrete sidewalks, paths, and curbs; 2" compacted granular base	7,400 sf	\$4.80/sf	\$35,520	Sidewalks in central courtyard 4'-wide, 2"-deep concrete sidewalks, paths, and curbs; 2" compacted granular base	8,000 sf	\$4.80/sf	\$38,400
				Ramps in central courtyard Ramps with 4'-wide concrete curbs and 2"-diameter metal painted guardrail	110 lf	\$21.50/lf	\$2,365
Modular block retaining wall adjacent to central courtyard	No change in quantity of wall			Modular block retaining wall adjacent to central courtyard	No change in quantity of wall		
Central courtyard Grassy open space	23,400 sf			Central courtyard Grassy open space	22,100 sf		
Trees and landscaping				Trees and landscaping			
Small shrubs	28	\$20/plant	\$560	Small shrubs	58	\$20/plant	\$1,160
Small trees planted c/w guides	21	\$120/tree	\$2,520	Small trees planted c/w guides	21	\$120/tree	\$2,520
Medium trees planted c/w guides	10	\$200/tree	\$2,000	Medium trees planted c/w guides	4	\$200/tree	\$800
Large trees planted	6	\$400/tree	\$2,400	Large trees planted	1	\$400/tree	\$400
Gazebo	1	\$8,000	\$8,000	Gazebo	1	\$8,000	\$8,000
Metal benches	1	\$600/bench	\$600	Metal benches	3	\$800/bench	\$2,400
Playground fencing 5'-high wrought iron fencing around playground	220 lf	\$52.47/lf	\$11,543	Playground fencing 5'-high wrought iron fencing around combined playground and pool area	300 lf	\$45.53/lf	\$13,659
Playground surface 12" hardwood mulch over 4" compacted granular base	2,500 sf	\$7.53/sf	\$18,825	Rubber play surface 4" multi-color rubber surface over 4" granular base	5,625 sf	\$16/sf	\$90,000
Playground equipment Playground structure			\$42,100	Playground equipment Playground structure	1		\$42,100
				Sand box table	1		\$500
				Teeter-totter	1		\$950
				Sensory panels	1		\$800
				Swing	1		\$1,200
				Balance beam	1		\$600
Asphalt driveway at pedestrian crossing near disabled suites	400 sf	\$11/sf	\$4,400	Painted markings at pedestrian crossings on site	5,800 sf	\$1/sf	\$5,800
				Painted markings at pedestrian crossings on adjacent streets	8,500 sf	\$1/sf	\$8,500
				Multi-purpose court with painted ground markings	1,500 sf	\$1/sf	\$1,500
				Basketball net	1	\$330	\$330
				Access control between parking/bollard court and chain	2 bollards 25 ft chain	\$250/unit \$10/lf	\$500 \$250
				Disability-supportive crossing includes marked crossing, handrail, signage, button-activated audible beaconing, and light beaconing			\$20,000
EXISTING TOTAL:			\$98,900	PROPOSED TOTAL:			\$166,744

The proposed design focuses on increasing opportunities for physical activity among residents of all ages and abilities. The cost of the Active Plan is **\$67,844 more** than the existing development plan. This represents an increase of less than **0.6% over** the project's original \$12 million development cost.

CASE STUDY 11

ATLANTA, GEORGIA

This case study examines an infill housing project in a neighborhood of primarily single-family homes in suburban Atlanta. The development, created through a public-private partnership between state and municipal government agencies, a philanthropic organization, and a private developer, is a major revitalization project for a neighborhood that has experienced many foreclosures and abandonments of residential and commercial properties in previous decades. Its 100 rental townhouse units replace a neglected, 175-unit apartment building and several dilapidated houses on 4 separate land parcels. All townhouses in this development are earmarked for families earning below 60% of the Area Median Income.

The development is well-situated within walking distance of neighborhood amenities. A MARTA transit station, a retail center, a community park, and public elementary and middle schools are all within a 10-minute walk of the properties. Local high schools are located more than a mile from the property. The community park provides facilities for a number of sports, including baseball, basketball, tennis, and soccer, as well as a large, well-appointed playground.

The design of the new townhouse units is consistent with many features of New Urbanism, including placement of the townhouses close to the street, with parking to the rear, and large front porches and windows offering views of the front yard and street. The compact layout of the townhouses and green spaces puts a greater emphasis on the sidewalk environment in front of the residential units, accommodating child activities not supported by the nearby local community park. With this in mind, the re-envisioned plan focuses on enhancing aspects of the development that would provide community-accessible areas for unstructured play. The case study reassesses such site features as the location of the community building and the number and placement of activity-related facilities both within and beyond the development site. This includes re-examining the design of public spaces, especially sidewalk space, in providing physical activity opportunities to townhouse residents and neighborhood children.

This case study focuses on supporting family-oriented events and unstructured play activities by addressing the following objectives:

- Provide opportunities for non-sports activities within the development through environmental changes that enhance the convenience, appeal, and support for recreational walking, active transportation to school, and unstructured play activities.
- Increase the accessibility, availability, and visibility of features that support moderate to vigorous physical activity for residents of all ages.



CASE STUDY 11

EXISTING MASTER PLAN

1 Residential parking is located to the rear of the site, allowing the front yard to be more pedestrian-focused.

2 Units have large front porches and windows that enhance the safety of the development by providing "eyes on the street."



3 Community building offers a business center, library, indoor fitness room, and adjacent playground area.

4 An attractive horticultural garden makes visiting facilities at the management office more appealing.



5 A higher density of primarily single-family housing increases the value of providing common-use features.



6 The advantages of the community building are lessened for north and east parcels due to lack of visibility from these units.

7 Barbeque pavilion and picnic tables



8 Children's playground



CASE STUDY 11

PROPOSED ACTIVE MASTER PLAN

1 A linear park is provided in the front-yard green space between the sidewalk at street level and the access paths to townhouse units.



2 The community building and associated garden and playgrounds are relocated to the intersection to make them more visible to residents of townhouses on other parcels.



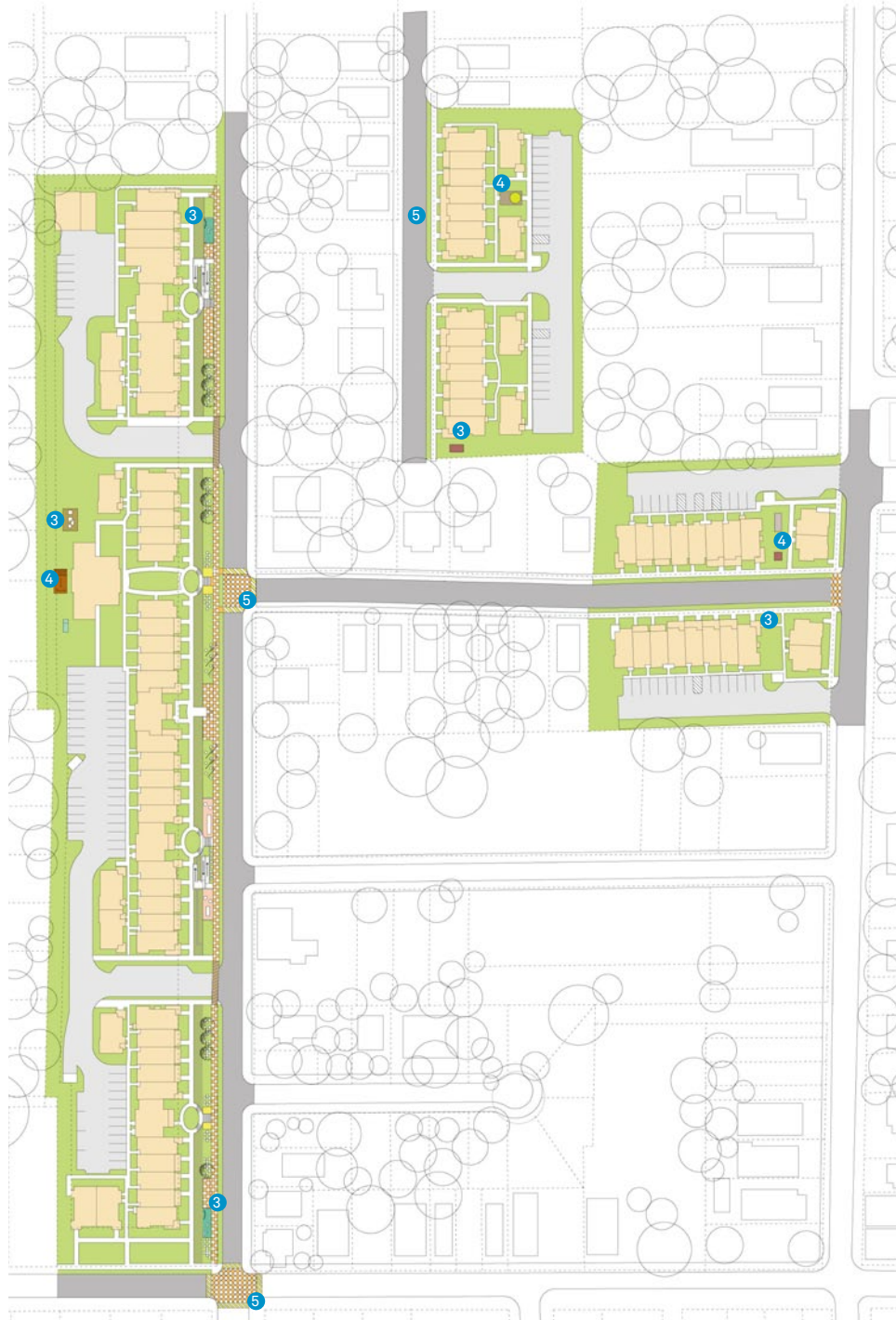
3 Exercise stations located on each parcel complement other opportunities for vigorous physical activity routines.



4 The barbeque pavilion and picnic tables are co-located with children's equipment.



5 Crossing markings are added to emphasize a non-vehicular safety zone and improve access to the recreation center for townhouse residents.



ACTIVITY LEVEL

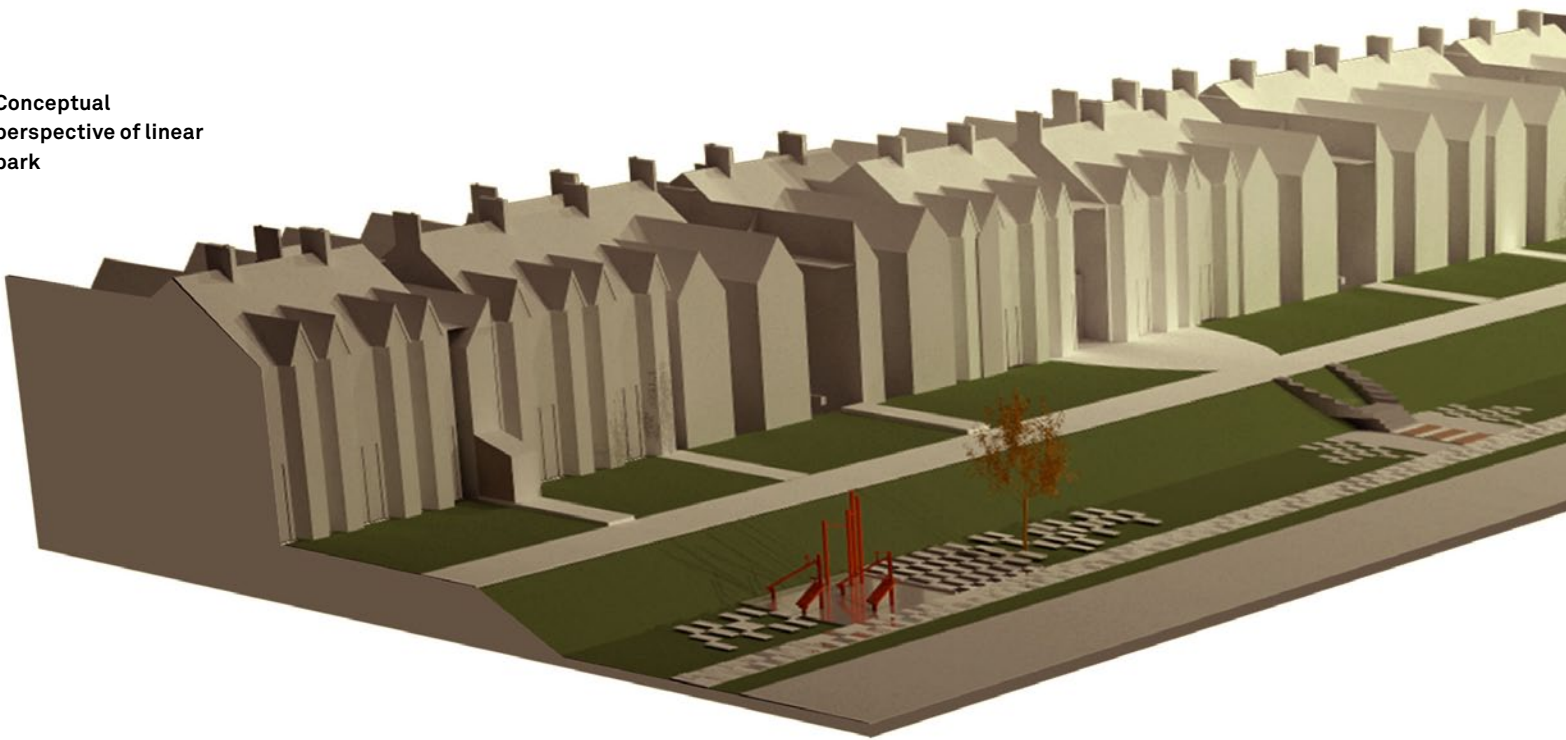
- Ages 3–6 Vigorous Physical Activity
- Ages 3–6 Moderate Physical Activity
- Ages 7–12 Vigorous Physical Activity
- Ages 7–12 Moderate Physical Activity
- Ages 13–18 Vigorous Physical Activity
- Ages 13–18 Moderate Physical Activity
- Adults 18yr+ Vigorous Physical Activity
- Adults 18yr+ Moderate Physical Activity

The proposed design focuses on the creation of a public plaza from the underutilized space at the base of a natural slope at the front edge of the development property and public sidewalk.

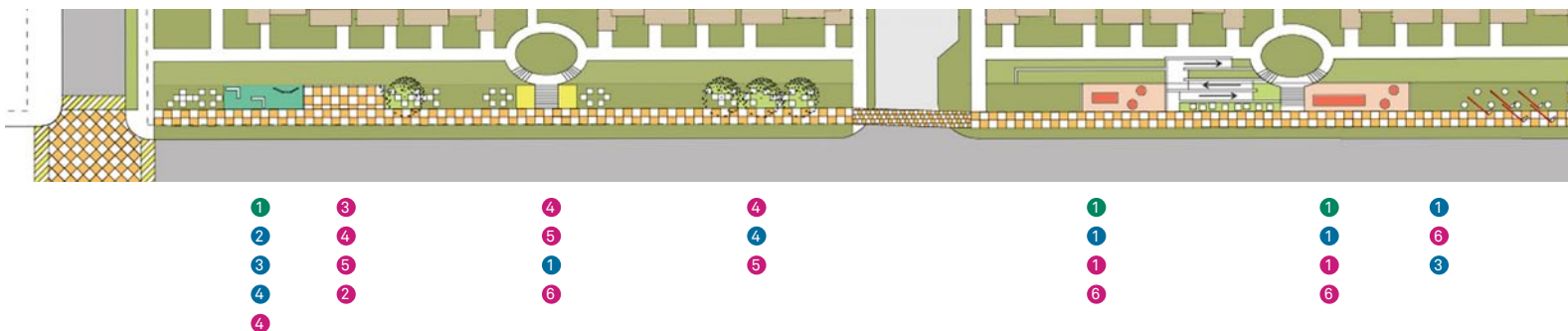
The study presents a conceptual design for this street-level linear plaza. It provides a linear composition of spaces and objects that support imaginative and unstructured play rather than being programmed for specific activities. Because of the location of the driveway entrances and formal stairs leading to the townhouse buildings, the plan is broken up to reflect a segmented design of various lengths of activity space.

Visually, the features within the plaza are more stimulating than the architectural style within the development, but use of materials and colors common to the townhouses makes the proposed objects and patterns sympathetic with the neighborhood’s urban design.

Conceptual perspective of linear park



Conceptual plan of linear park



The existing design of the townhouse development is based on New Urbanist and sustainable design strategies synergistic with Active Design strategies. As such, only minor, no-cost suggestions are made to increase opportunities for children’s physical activity. The principal recommendation is the relocation of the community building to the intersection of the 2 roads linking the east and west parcels of the development. This improves the visibility of the community building and its activity-oriented facilities from the other townhouses and enhances its presence within the community.

The linear park is designed to provide opportunities for a wide range of physical movement.

While the existing design provides play and barbeque areas dispersed across the different parcels, it is suggested that family-oriented facilities such as barbeque and picnic areas be co-located with playgrounds and exercise stations.



MANIPULATIVE MOVEMENT

Develops fine-motor skills and coordination; involves controlled use of the hands and feet. Examples of manipulative movement include:

- 1 Grasping
- 2 Throwing and catching
- 3 Ball footwork

NON-LOCOMOTOR MOVEMENT

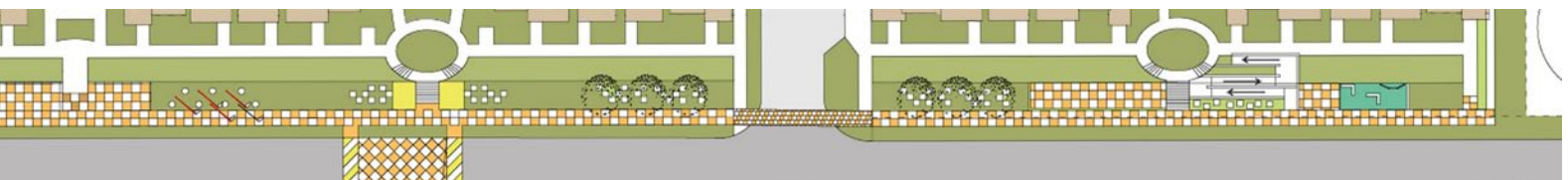
Develops balance and coordination skills and focus on the body’s relationship to a place or object. Examples of non-locomotor skills include:

- 1 Balancing
- 2 Pushing and pulling
- 3 Twisting
- 4 Sitting and rising

LOCOMOTOR MOVEMENT

Develops gross motor skills; comprises any movement of the body from place to place. Examples of this type of movement include:

- 1 Crawling
- 2 Walking
- 3 Running
- 4 Stepping
- 5 Skipping and jumping
- 6 Climbing



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CASE STUDY 11

ACTIVE DESIGN STRATEGIES

OBJECTIVE

Provide opportunities for non-sports activities within the development through environmental changes that enhance the convenience, appeal, and support for recreational walking, active transportation to school, and unstructured play activities.

STRATEGIES

Design plazas along popular pedestrian streets that allow for diverse functions.

The proposed plan reconfigures the sloped area of the front yards of the largest strip of townhouses to provide a wider flat area along the street level. This creates a linear plaza with several areas for play and physical activity.

Preserve and maintain natural terrain in children's outdoor play area.

There is a natural slope in the terrain from the townhouses down to the street level. Incorporating this slope into the linear plaza encourages climbing and rolling activities that facilitate motor skill development.

Provide for enhanced pedestrian crossings both at mid-block and at intersections.

Crosswalk markings are provided at the key intersections, linking walking routes to and from the elementary and middle schools with the development's facilities, including the plaza and community building.

Provide stairs and ramps to accommodate diverse uses; locate appealing visible stairs directly on the site's principal paths of travel.

The appealing formal stairs provided in the existing design, which link the street level to the townhouse entry level, remain an important feature of the new linear plaza. Two ramps located next to the stairs are added to support residents with mobility disabilities.

Provide visually appealing environments along paths of travel.

The townhouse development design already provides an appealing traditional architecture and landscape design sympathetic to the scale and architectural heritage of the neighborhood. The linear plaza is designed to complement the development's themes while providing a more playful setting for children.

The sloped terrain of this housing development creates a strip of land next to the sidewalk. This modified photo illustrates a potential linear plaza, created through a private/public partnership, supportive of physical activity opportunities for neighborhood children.



OBJECTIVE

Increase the accessibility, availability, and visibility of features that support moderate to vigorous physical activity for residents of all ages.

STRATEGIES

Design spaces to accommodate recreational play for all children's age groups.

Spaces along the linear plaza are designed with special surface patterns and objects that inspire non-programmed, imaginative play while still providing areas suitable for traditional unstructured games like tag, skipping, and skateboarding.

When planning a new development, aggregate open space in one large area rather than dispersing it into smaller pieces.

This new development provides an opportunity to aggregate the underutilized land at the base of the sloped site along the front property line and public sidewalk, creating a unified plaza with a segmented arrangement of open and designed areas for children's play.

In general, create plazas that are level with the sidewalk so that they are clearly visible to pedestrians and safely connected to the street.

The new public plaza, located at street level, is designed to attract neighborhood children. The vertical separation between the plaza and the townhouses preserves the privacy of the townhouse units.

Co-locate play areas adjacent to an adult exercise space, allowing parents to exercise while watching their children at play.

Four new exercise stations are selectively located along possible walking or running routes that link the separate parcels in close proximity to areas where children can play. Barbeque and picnic facilities are located next to playground equipment at each parcel to encourage outdoor family activity time.

Simple features like poles, or nature-inspired play features like this rock and hollow log play apparatus, can provide diverse play environments that complement landscaped public spaces.



CASE STUDY 11

COST OF IMPLEMENTING ACTIVE

DESIGN STRATEGIES

EXISTING TOWNHOUSE PROPERTY PLAN				PROPOSED ACTIVE TOWNHOUSE PROPERTY PLAN			
MATERIAL	QUANTITY	MATERIAL AND LABOR COSTS	EXISTING COST	MATERIAL	QUANTITY	MATERIAL AND LABOR COSTS	PROPOSED COST
Picnic area				Picnic area			
Pavilion	2	\$10,000	\$20,000	Pavilion	3	\$10,000	\$30,000
Barbeque stations	4	\$200	\$800	Barbeque stations	6	\$200	\$1,200
Picnic tables	4	\$1,100	\$4,400	Picnic tables	6	\$1,100	\$6,600
Play area apparatus				Play area apparatus			
Rock climber	1	\$3,400	\$3,400	Rock climber	3	\$3,400	\$10,200
Log tunnel	1	\$3,800	\$3,800	Log tunnel	7	\$3,800	\$11,400
Stump steppers	5	\$800	\$4,000	Stump steppers	20	\$800	\$16,000
Rubber play surface	450 sf	\$20/sf	\$9,000	Rubber play surface	1,350 sf	\$20/sf	\$27,000
Rubber surface over 4" reinforced concrete over 4" granular base				Rubber surface over 4" reinforced concrete over 4" granular base			
				Exercise stations (2 stations)	720 sf	\$7.3/sf	\$5,256
				12 x 20' area with 4" rubber mulch surface			
				Metal stationary equipment	6 units	\$500/unit	\$3,000
				Stationary push, pull, or stretch equipment (2 units per station)			
				Ramps linking upper pathway to sidewalk			
				5'-wide concrete ramps with 12-inch-high concrete curbs	1,826 sf	21.50/sf	\$39,259
				2'-diameter painted metal guardrail	172 lf	\$64.75/lf	\$11,137
EXISTING TOTAL:			\$45,400	PROPOSED TOTAL:			\$161,052

The **\$115,652** difference in costs provides each parcel with outdoor play, exercise, and picnic facilities. Including the cost of the linear park indicated below, the active plan represents an increase of **1.6%** over the project's original \$10 million development cost.

EXISTING SIDEWALK/PROPERTY EDGE PLAN				PROPOSED LINEAR PLAZA PLAN			
MATERIAL	QUANTITY	MATERIAL AND LABOR COSTS	EXISTING COST	MATERIAL	QUANTITY	MATERIAL AND LABOR COSTS	PROPOSED COST
Sidewalks	7,000 sf	\$4.80/sf	\$33,600	Sidewalks	5,600 sf	\$4.80/sf	\$26,880
7'-wide colored concrete sidewalks (one color)				5'-wide colored concrete sidewalks (2 colors, some variable width)			
				Concrete pavers	14 units	\$10/unit	\$140
				Round 2'-diameter paver	120 units	\$10/unit	\$1,200
				2'-square concrete paver			
Sidewalk level grass area	5,200 sf	\$1.31/sf	\$6,810	Sidewalk level grass area	6,800 sf	\$1.31/sf	\$8,908
Sodded bent grass on 4" topsoil				Sodded bent grass on 4" topsoil			
Driveway crossings	450 sf	\$18/sf	\$8,100	Driveway crossings	450 sf	\$18/sf	\$8,100
Cobblestone pattern landscape concrete pavers on 6" concrete				Checkerboard pattern landscape concrete pavers on 6" concrete			
				Linear plaza play equipment			
				Rock climber	2	\$3,400/unit	\$6,800
				Log tunnel	2	\$3,800/unit	\$7,200
				Stump and mushroom steppers	5	\$800/unit	\$4,000
				8'-high play poles in concrete foundation	10	\$250/unit	\$2,500
				Rubber play surface	1,350 sf	\$20/sf	\$27,000
				Rubber surface over 4" reinforced concrete over 4" granular base			
				Exercise stations (2 stations)	480 sf	\$7.3sf	\$3504
				12 x 20' area, 4"-deep rubber mulch surface			
				Metal stationary equipment	4 units	\$500/unit	\$2,000
				Stationary push, pull, or stretch equipment (2 units per station)			
				Painted crosswalk markings at the 2 main intersections	4,300 sf	\$1/sf	\$4,300
Trees and landscaping	No change in quantity			Trees and landscaping	No change in quantity		
EXISTING SIDEWALK/PROPERTY EDGE TOTAL:			\$48,510	PROPOSED LINEAR PLAZA TOTAL:			\$102,532

A relatively modest investment of **\$54,022** can optimize underutilized land along the property edge at the sidewalk for fitness and play.

CHAPTER SUMMARY

CASE STUDY COST COMPARISONS

CASE STUDIES	DEVELOPMENT COSTS	DIFFERENCE IN COST BETWEEN ORIGINAL AND ACTIVE DESIGN	PERCENTAGE DIFFERENCE IN DEVELOPMENT COSTS	COST DIFFERENCE PER RESIDENTIAL UNIT
Case Study 1 124 units, Bronx, New York	\$35 million	\$125,919	0.4%	\$1,015
Case Study 2 51 units, Bronx, New York	\$12 million	\$19,223	0.2%	\$377
Case Study 3 65 units, Harlem, New York	\$16.7 million	\$36,978	0.22%	\$569
Case Study 4 250 units, Harlem, New York	\$106 million	\$48,852	0.01%	\$195
Case Study 5 129 units, Harlem, New York	\$40 million	\$22,572	0.6%	\$175
Case Study 6 129 units, San Antonio, Texas	\$36 million	\$33,324	0.1%	\$258
Case Study 7 119 units, San Antonio, Texas	\$7 million	\$100,624	1.5%	\$846
Case Study 8 245 units, San Antonio, Texas	\$24.4 million	\$280,064	1.1%	\$1,143
Case Study 9 648 units, Atlanta, Georgia	\$26.4 million	-\$128,219	-0.5%	-\$198
Case Study 10 194 units, Atlanta, Georgia	\$12 million	\$67,844	0.6%	\$350
Case Study 11 100 units, Atlanta, Georgia	\$10 million	\$169,674	1.6%	\$1,697

These 11 case studies illustrate the implementation of Active Design strategies within a range of existing affordable housing typologies. A collective comparison of existing and proposed costs demonstrates that providing environments that support children's engagement in healthy physical activity within their home environment can be achieved with nominal difference in cost. The cost difference for the case studies ranged from **\$128,219 less to \$280,064 more than the original development cost** for the project. The average cost difference between the existing and active designs was **\$584 per residential unit**.

CHAPTER

THREE

ACTIVE DESIGN

COST

CONSIDERATIONS

IN AFFORDABLE

HOUSING





COST CONSIDERATIONS IN AFFORDABLE HOUSING

Marketability

The previous chapter presents 11 case studies by prominent housing providers exploring opportunities for implementing Active Design strategies in existing affordable housing typologies. In each case study, the housing providers supplied their own design and construction documentation. Design teams identified and assessed the challenges and opportunities in fostering child-oriented physical activity within and adjacent to the existing developments. The teams then suggested low-cost alternative configurations and additional features that would increase opportunities for physical activity among residents aged 3 to 18. The proposed designs maintain as many of the key program aspects of each development as possible, including the number of units, parking and programmed spaces, and quality of building construction. The design process incorporated strategies presented in the Active Design Guidelines. Housing providers were asked to focus their feedback on the proposed designs and on the feasibility of implementing the suggested revisions within their budgets, operations, and company practices, as well as in the current marketplace. In some cases, the designs were revised in response to feedback from the housing providers' initial reviews, to address concerns of practicality or previously unidentified restrictions on the site or building program. In other cases, the housing providers themselves implemented Active Design interventions in their projects during the re-envisioning period. These new features were incorporated into the case studies' proposed plans.

Initial Construction Cost

In an effort to increase opportunities for physical activity in a cost-effective way, the designers focused on these 3 basic strategies:

- Redistributing expenditures from elements supporting sedentary behavior to those promoting physical activity across different age groups.
- Enhancing existing features to support physical activity with only minor differences in cost.
- Adding features that support child activity and address the lack of opportunities for specific age groups.

The cost differences between the original and active designs ranged from a savings of \$128,219 (a 0.5% savings in development costs in Case Study 9) to an increase of \$280,064 (0.4% of total development costs in Case Study 8). Six of the 10 case studies that added significant physical activity opportunities for residents resulted in an increase in project costs of less than \$600 per unit. Case Study 9 actually realized cost savings by redistributing the area of asphalt driveways while

maintaining the same number of parking spaces, with small grassy areas dispersed around the site to provide open green space and fewer but more appealing and well connected sidewalks and pathways. Case Studies 2 and 3 provide space for new fitness areas by reducing the total areas of the public corridor and laundry room. These studies propose laundry facilities with alternative spaces for waiting, including new fitness facilities.

Synergies with Active Design

One of the design teams' central strategies was to look for synergies with other existing development features—to increase opportunities for physical activity by enhancing existing design elements at a modest cost difference. Several case studies, for example, enhance the visibility of the required emergency exit stairs to promote their use by residents travelling between the lower levels of the building (see Case Studies 1, 2, 3, 4, and 6). When designed from the start, better stair placement in relation to the building entrance and elevators can have no additional costs at all. Many of the strategies to make stairs more visible can be applied at a reasonably low cost. These include adding fire-rated glazing to the doors or walls, extending the lobby floor finish into the stairwell, and providing appealing artwork or graphics within the staircase. In Case Study 10, inexpensive playground markings are added to an overflow parking area, allowing it to be used as a multi-purpose court when parking needs are low. In Case Study 8, designers suggest extending the roof of several existing parking shelters to provide shade over the sidewalks. This would improve the comfort level of pedestrians traveling to recreational destinations within the development during the hot Texas summer.

Since a building's construction costs can often escalate between the preliminary design and the final construction, it is important to prioritize cost expenditures for every project. It is not uncommon for design elements to be eliminated or revised to reduce costs during the design development process. As such, Active Design features should add value to a development to avoid being considered dispensable luxury amenities. Finding synergies between Active Design features and other essential program requirements can ensure that they are not eliminated during value-engineering exercises aimed at reducing construction costs. Incorporating inherently simple, inexpensive features, such as stained concrete patterns in public corridors instead of more expensive tile or carpeting (see Case Study 6), or more dramatic but possibly cost-neutral actions, such as flipping the orientation of a building's entrance or adjusting its location on the site to optimize unit proximity to recreational space (see Case Studies 6, 8, and 9), can be a means of retaining Active Design elements while maintaining cost neutrality.

A host of competing issues must be addressed in the design of affordable housing developments, including unique site conditions, regulatory requirements, maintenance, social program support, local market expectations, accessibility requirements, and sustainability. When practiced in combination with other human-centered design approaches, Active Design supports outcomes that focus on comprehensive healthy environments. For example, large sites might utilize soft structures like landscaped ponds for storm water management, which can accommodate recreational uses, instead of hard structures, which must often be separated from spaces for human activity. Active Design and Universal Design both support accessibility to recreational and active transportation features that benefit people of all ages and physical capacities. Mixed-income and mixed-use affordable housing developments financed, built, and operated through public-private partnerships have proven successful components of their neighborhoods' economic renewal. In addition, the provision of common facilities to support active lifestyles can be an important marketing feature for market-rate units.

Finally, Case Study 7 demonstrates how a changing perspective about aging can inspire designers to create more opportunities for active senior living, including building facilities that allow senior residents to enjoy their visits with children more actively.

Economic Priorities

Affordable housing budgets must address the many program and regulatory requirements established by municipal housing authorities, state and federal standards, lending institutions, tax credit programs, accessibility regulations, and zoning and building codes. The size, number, and type of units in each development are carefully planned to ensure that building financing and rental income cover development, operations, and maintenance costs. Current regulations, standards, and funding programs for affordable housing developments address Active Design strategies only minimally. For example, most tax-credit approved developments offer “tot lots” for young children thanks to tax-credit program scoring protocols that focus on providing play spaces for young children. However, such tax credits do not support onsite recreational facilities for adolescents. The housing providers in this study expressed interest in implementing Active Design features for a broader age group that could be supported through zoning and financing incentives.

Most construction budgets, especially for affordable housing, are very lean, but they typically include contingency funds to cover the cost of changes and features not present during a project's early stages, or to address unexpected occurrences during construction. In some instances, when these funds have not been exhausted by the end of construction, housing providers have the opportunity to provide additional features or reincorporate items removed during value engineering. Case Study 8 provides an example of the use of such contingency funds to support Active Design. To reduce the risk of injury from overheated metal and plastic playground surfaces during the hot Texas summer, contingency funds remaining at the end of construction were used to erect fabric structures to shade the playground apparatus and a section of the swimming pool deck.

Established Practice

Housing providers and designers establish their own standards of practice through an iterative process that repeats design decisions with successful outcomes and finds alternatives for those with negative consequences. As such, most housing providers and designers cultivate their own building typologies and practices for the design and operation of their housing developments. Many providers have established design conventions like number of units, unit dimensions and layouts, structural bay sizes, and exterior and interior materials. With the growing evidence base for and awareness of the ways in which Active Design supports tenant health, introducing these strategies into corporate practice will be a process of implementing carefully considered changes over several project cycles. Based on discussions with the housing providers featured in this study, the issues of cost and feasible design are important considerations in implementing changes in corporate practice.

The housing providers in this study identified the following Active Design strategies as low-cost, immediately implementable, and requiring minimal change to existing building typologies:

- Making required exit stairs more accessible and visible by using stair prompt signage near the elevator and stairs to encourage stair use by able-bodied residents.

- Co-locating activity features for adults, such as outdoor fitness stations, next to child play areas to encourage physical activity as a family value.
- Providing secure bicycle storage in a visible and convenient location on or near the ground level.
- Providing playground markings on underutilized asphalt or concrete surfaces to encourage play activities.
- Providing dispensers or storage for consumable low-cost play gear such as sidewalk chalk, utility balls, and buckets and shovels if the development includes a sandbox.
- Providing information on community boards about nearby physical activity destinations, walking paths, and route distances to assist residents in accessing additional exercise amenities.

Housing providers identified the following Active Design strategies as implementable in their next developments with no or minor cost and in existing building typologies with modest changes:

- Making required exit stairs more accessible, visible from the entrance lobby and public corridor, and appealing for travel by:
 - Locating the stairs near the main building entrance as well as elevators.
 - Encouraging stair use between the lobby and shared facilities on the second floor.
 - Providing fire-rated glazing in stair doors.
 - Extending lobby or public corridor floor finishes into the stairs on the most-used floors.
 - Adding non-combustible art or graphics to stairwell walls.
- Providing safer, visible, and more direct paths between residential units and physical activity facilities.
- Locating ground-floor fitness facilities with direct views of children's play spaces to encourage caregivers with young children to be active while supervising their children.
- Organizing building lobbies to enable clear views of the developments' active recreational and fitness-oriented spaces.
- Judiciously using small outdoor activity spaces like courtyards to improve residents' access to outdoor physical activities while providing a number of quieter, more reflective spaces.
- Providing facilities that can accommodate safe and positive recreational activities for children as well as adolescents, including chalk art spaces, tetherball and jump-rope areas, and computer-enabled dance and other active games in community rooms.
- Addressing the climatic restrictions on physical activity within developments by maintaining the utility and accessibility of outdoor areas during snowy winter conditions in northern climates and hot summer conditions in southern climates.

Housing providers identified the following Active Design strategies as more challenging but still achievable, especially if supported by market-rate tenant expectations, operational budgets, and municipal policies:

- Expanding indoor physical activity facilities beyond fitness apparatus to accommodate play space and apparatus for children aged 3 to 18, and making this space visible to parents, supervising adults, security, or management personnel.
- Expanding outdoor recreational facilities to enable adolescents to engage in more diverse physical activities. Expanded facilities might provide multi-purpose hard-surface areas for basketball, volleyball, hockey, or soccer in developments with large, grassy, open spaces.
- Negotiating development expenditures to support nearby public physical activity facilities that would benefit the development's residents.

Liability Issues

Housing providers identified liability issues as a key concern in providing equipment and environments for physical activity. Liability issues are particularly challenging for children's play spaces within housing developments, as children can use equipment and environments in unintended and unpredictable ways. Perhaps the key advantage to programming active spaces into a housing development is that such spaces can be designed to manage the risks that children are likely to take.

The Public Playground Safety Handbook¹ addresses important considerations for play space design. These include the potential for falls from and impact with equipment, the need for impact-attenuating protective surfacing under and around equipment, the size of openings with the potential for head entrapment, equipment scale and other design features related to user age and equipment layout on playgrounds, installation and maintenance procedures, and hazards presented by protrusions, sharp edges, and crush or shear points. This useful reference guide identifies 6 key safety factors in a playground's layout:

- Accessibility: addressing access for children of all capacities to play.
- Age separation: providing distinctions or buffers between equipment for different age groups.
- Conflicting activities: addressing separations between active and non-active areas and structured and non-structured play spaces.
- Sight lines: allowing caregivers to keep track of children as they move throughout the playground environment.
- Signage and/or labelling: providing information or guidance on the appropriateness of specific equipment for children of different ages.
- Supervision: ensuring that caregivers or development personnel know the function of play equipment and have the authority to intervene for the sake of children's safety.

Because falls are the most common source of playground-related injuries, the construction and maintenance of protective surfacing under and around all equipment is crucial in preventing severe injuries. Several standards address the performance of playground components, mostly focusing on playground surfacing (see Notes at the end of the chapter). It is important that designers specify—and building managers maintain—the depth and performance of playground surfaces appropriate for the height of potential falls from the equipment.

**TABLE 1: PLAYGROUND SURFACE DEPTHS
RELATIVE TO CRITICAL FALL HEIGHTS¹**

	WOOD CHIPS	LOOSE FILL	FINE SAND	PEA GRAVEL
Equipment Height	**Uncompressed Depths of Materials In Fall Zone			
5 feet or less	6 inches	6 inches	6 inches	6 inches
6 feet	6 inches	6 inches	12 inches	6 inches
7 feet	6 inches	6 inches	12 inches	9 inches
8 feet	9 inches	6 inches	12 inches	12 inches
9 Feet	9 inches	6 inches	12 inches	12 inches
10 Feet	9 inches	6 inches	N/A	12 inches

Maintenance and Operations Cost

Activity-oriented environments can affect maintenance and operational costs. While providing activity equipment and environments can require additional costs for operation and maintenance, supplying spaces that engage children and teens in positive activities can potentially reduce expenditures for negative outcomes like graffiti or vandalism. For example, encouraging adolescents to express themselves through constructive physical activity can potentially reduce other negative activities on the property. Providing secure bicycle storage facilities can reduce bicycle theft as well as damage to interior finishes by residents storing bicycles inside their units. Employing crime prevention principles through environmental design (CPTED)², such as locating compatible activity areas within view of residents and management personnel, can limit the potential occurrence of undesirable activities. While only a couple of the case studies used onsite security, its presence in areas adjacent to activity spaces provided physical surveillance and reassurance that these spaces were monitored and safe.

The choice of materials and equipment supporting physical activity can affect a development's operating and maintenance costs. While some of the materials suggested in the case studies are consumable or have relatively short service life, like the sidewalk chalk or mulch ground surface on paths or exercise stations, they are generally considered inexpensive and easy to refresh at low cost. Other specified materials can have higher initial costs but a long service life and minimal maintenance costs. Material selection of assemblies, components, and equipment supporting active use should include a careful analysis of initial and operating costs, product quality and potential for damage, expected service life, and level of expected use. For example, several case studies incorporated exercise stations with non-moving apparatus that enabled stretching and strength-training as stops along a pathway. Due to their lack of moving parts, these stations may require less maintenance over the course of their service life than apparatus with moving parts. For optimal tenant health, it is important to combine the opportunities for physical activity that this equipment provides with exercise stations promoting cardiovascular fitness. Housing providers should assess the possible material and equipment options for activity areas using quantitative measurements like initial cost, maintenance and operating costs, repair and replacement costs (if the service life is less than the expected period of use), and qualitative costs like the risk of injury or misuse, risks and adverse outcomes from downtime, marketability, and compatibility with an organization's sustainability initiatives. Table 2 illustrates various quantitative and qualitative factors for 5 playground surface options.

TABLE 2: PLAYGROUND SURFACE SELECTION**MATRIX FOR 6 FOOT CRITICAL FALL HEIGHT**

	Depth for 6-foot critical fall height	COST ISSUES					PERFORMANCE			SAFETY	
		Initial cost (based on 500 sf)	Service life	Maintenance and replacement costs per year	Maintenance and replacement costs over 15 years	Total 15-year cost	Ease of maintenance to critical fall height depth, minor repairs	Durability to climatic conditions like freeze thaw, heat, wind, drainage	Accessibility for persons with disability devices	Attractive to animals, conceal animal excrement, trash, sharp objects	Risk of causing injury (abrasive, blown or thrown into children's eyes)
WOOD CHIPS	9"	\$1,000	50% replaced every year	\$1,000	\$15,000	\$16,000	high	low	poor	High (attracts animals)	yes
SHREDDED RUBBER MULCH	12"	\$4,200	50% replaced every 3 years	\$700	\$10,500	\$16,500	medium	medium	medium	medium	yes
PEA GRAVEL	12"	\$5,500	50% replaced every 5 years	\$550	\$8,250	\$13,750	medium	high	poor	medium	no
SAND	12"	\$5,500	50% replaced every 2 years	\$1,375	\$20,625	\$26,125	high	high	poor	High (attracts animals)	yes
UNITARY RUBBER SURFACE	6"	\$11,000	Replaced every 15 years	\$200	\$2,400	\$13,400	low	high	good	low	no

Marketability

The majority of the case studies featured in this publication focus on mixed-income housing developments. These projects have become a new business model for the development of new housing properties and the redevelopment of decommissioned public housing properties around the United States. They are often designed to provide affordable housing units of similar size and quality to market-rate units within the same development. In many cases there are no or minor differences in floor plans between these units and their market-rate counterparts, although the latter may have higher-quality finishes to meet the demands of their target income group. The provision of shared amenities is influenced both by market expectations and by budget. In general, tenants in subsidized or geared-to-income units have benefited by having access to a broader range and quantity of amenities in mixed-income developments, as housing providers must offer the amenities and property upkeep required to attract market-rate tenants. Current market trends tend to influence design and budget decisions. Granite countertops, upgraded appliances, in-suite storage and laundry rooms, and other non-Active Design features compete with shared amenities like community and fitness rooms and outdoor areas for budgetary space. Housing providers are currently facing new and shifting tenant markets: the numbers of older adults and baby boomers leaving the suburbs for urban settings is increasing, while many new immigrants are settling in suburban locations. Media attention to the crisis of obesity has influenced some segments of the population to choose housing that supports healthy lifestyles. Housing selection criteria may include residents' access to walking or public transit routes, access to local parks and recreation areas, and children's ability to walk to school, as well as the provision of active play and fitness facilities within the home environment.

Tenant Stability

Tenant stability is an important component of the long-term success of any housing development. There tends to be a high demand for public and subsidized housing—with waiting lists for prospective tenants—which increases the general tenant stability of such housing. Longitudinal tracking by the New York City

Department of Housing Preservation and Development shows that retention rates tend to be high in public and subsidized housing in New York City. Still, some of the developers in this study have identified further potential advantages to tenant stability in improving tenants health. Though tenant demand for affordable housing is high, and there is no shortage of tenants waiting to be accommodated, stability for individual tenants who already live within a development may be increased by improving or maintaining their health. For example, tenants whose health is supported by their housing and neighborhood environments may miss fewer days of work and have decreased health care-related costs, affecting their total income and available spending funds. In this way, supporting better health outcomes through the low-cost and cost-neutral interventions presented in this report may confer additional advantages in the long-term while incurring little to no additional costs in design and construction.

Conclusion

There are many benefits to providing opportunities for physical activity in our built environment. This is especially important for children living in low-income households and neighborhoods, who may have limited opportunities to engage in recommended levels of physical activity. Collectively, the case studies presented in this publication illustrate the feasibility and affordability of implementing a broad assortment of Active Design strategies that aim to promote physical activity opportunities within the affordable housing context for children aged 3 to 18. While affordable housing providers and designers must address a multitude of programmatic and economic factors influencing the design, cost of construction, and operations of affordable housing developments, there are many low-cost means of incorporating Active Design features within current housing typologies. These include examining the spatial relationship between shared spaces promoting awareness of and access to activity areas, and the addition of new activity features, sometimes enabled by decreasing the number of features promoting sedentary behavior. As a result, construction cost differences between the original and proposed active designs can be very modest. Given the current epidemics of obesity and childhood obesity, and the many health and social benefits of regular physical activity, these low-cost strategies for supporting physical activity among tenants in affordable housing environments can make an important impact.

NOTES

The following ASTM standards apply to the design of playground environments and features:

- A.** ASTM F1951: Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment
- B.** ASTM F1487: Standard Consumer Safety Performance Specification for Playground Equipment for Public Use
- C.** ASTM F2373: Standard Consumer Safety Performance Specification for Public Use Play Equipment for Children 6 Months

- through 23 Months
- D.** ASTM F1292: Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment
- E.** ASTM F2075: Standard Specification for Engineered Wood Fiber for Use as a Playground Safety Surface Under and Around Playground Equipment
- F.** ASTM F2223: Standard Guide for ASTM Standards on Playground Surfacing
- G.** ASTM F2479: Standard Guide for Specification, Purchase, Installation and Maintenance of Poured-In-Place Playground Surfacing

REFERENCES

- 1.** U.S. Consumer Product Safety Commission (CPSC). Public Playground Safety Handbook. 2010. <http://www.cpsc.gov/cpscpub/pubs/325.pdf>.
- 2.** Newman O. Creating Defensible Space. U.S. Department of Housing and Urban Development Office of Policy Development and Research. 1996. <http://www.huduser.org/publications/pdf/def.pdf>.

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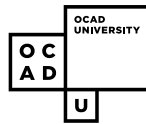
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LIMITATIONS

Several limitations in the study should be acknowledged. The designs for the existing and proposed housing developments have been simplified to remove features that the design teams considered irrelevant to the Active Design focus of the study. These features include some site services, unique geological or landscape features, and mechanical/electrical building services. While an effort was made to maintain the key program requirements of the original housing project designs, some of the proposed plans would impact tenant arrangements to such a degree that some of the existing project's current tenants could not be accommodated. Some of the case studies indicate detailed layouts for residential units that may not

conform to housing authority standards in all jurisdictions. The case studies do not factor in the associated costs of maintaining and operating upgrades like indoor and outdoor fitness centers, along with possible insurance liabilities. Cost values for featured elements are based on material and labor costs provided in the 2011 RS Means Construction Cost Database. Cost values for items not listed in this reference were obtained from historic data from housing providers or product suppliers. They do not include exceptional costs for long-distance delivery, site preparation, or custom features. The authors advise that cost values change over time and due to economic conditions, and the costs provided are for discussion and comparison purposes only.



SKATING WITHOUT A
HELMET CAN BEAT
UP SKATING HARD

