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# Enterprise Green Communities Criteria Project Management Guide

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# TABLE OF CONTENTS

## INTRODUCTION TO THE PROJECT MANAGEMENT GUIDE

Introduction to Enterprise Green Communities Criteria	05
Why this Guide?	05
How to Use This Guide	06

### 1

## FEASIBILITY PHASE

Introduction to the Feasibility Phase	09
Integrative Design during the Feasibility Phase	10
Location and Neighborhood Fabric during the Feasibility Phase	12
Site Improvements during the Feasibility Phase	16
Conclusion to the Feasibility Phase	17
Resources for the Feasibility Phase	18

### 2

## PREDEVELOPMENT PHASE

Introduction to the Predevelopment Phase	20
Integrative Design during the Predevelopment Phase	20
Location and Neighborhood Fabric during the Predevelopment Phase	24
Site Improvements during the Predevelopment Phase	27
Water Conservation during the Predevelopment Phase	30
Energy Efficiency during the Predevelopment Phase	33

---

Materials Beneficial to the Environment during the Predevelopment Phase	37
Healthy Living Environment during the Predevelopment Phase	41
Operations & Maintenance during the Predevelopment Phase	48
Conclusion to the Predevelopment Phase	51
Resources for the Predevelopment Phase	51

---

### 3

## CONSTRUCTION PHASE

---

Introduction and Goals to the Construction Phase	53
Integrative Design during the Construction Phase	53
Location and Neighborhood Fabric during the Construction Phase	54
Site Improvements during the Construction Phase	54
Water Conservation during the Construction Phase	56
Energy Efficiency during the Construction Phase	57
Materials Beneficial to the Environment during the Construction Phase	60
Healthy Living Environment during the Construction Phase	64
Conclusion to the Construction Phase	69
Resources for the Construction Phase	70

---

## 4

### OPERATIONS PHASE

---

Introduction to the Operations Phase	72
Site Improvements during the Operations Phase	72
Water Conservation during the Operations Phase	73
Energy Efficiency during the Operations Phase	74
Materials Beneficial to the Environment during the Operations Phase	77
Healthy Living Environment during the Operations Phase	79
Operations & Maintenance during the Operations Phase	83
Conclusion to the Operations Phase	87
Resources for the Operations Phase	88

# INTRODUCTION TO THE PROJECT MANAGEMENT GUIDE

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## Introduction to Enterprise Green Communities Criteria

In 2004, Enterprise created the Green Communities Criteria (the Criteria) to promote the incorporation of environmentally conscious design elements and the adoption of sustainable practices into the development and rehabilitation of affordable housing. The Criteria are organized into eight criteria categories and measures different aspects of sustainable design based on all project types (single family, low-rise multifamily) and construction types (new construction, moderate rehab, and substantial rehab). Although today there are a number of green rating systems, the Criteria differentiates itself by placing special emphasis on resident health and well-being and also by considering the budget challenges that are inherent to affordable housing. The 2011 Enterprise Green Communities Criteria can be found online at: [www.practitionerresources.org/cache/documents/674/67453.pdf](http://www.practitionerresources.org/cache/documents/674/67453.pdf).

Eight years and 27,000 units of Enterprise Green Communities affordable housing have demonstrated that green affordable housing is synonymous with high quality affordable housing. The focus of the Criteria on thoughtful site selection, carefully designed systems, healthy materials and efficient management practices results in homes that are not just “sustainable” but also terrific places to live. The first generation of Enterprise Green Communities projects are also demonstrates that these advances can be achieved with very modest budget increases – often only 2% more than “standard” affordable housing – and result in significant operational cost savings. This is undoubtedly why 20 states and municipalities have implemented a system modeled on the Criteria, as either threshold or optional requirements, for funding affordable housing. Ultimately, this work has set the stage for 2020Green, a national call to action to bring the benefits of green to all affordable housing by 2020. ([www.EnterpriseCommunity.org/calltoaction](http://www.EnterpriseCommunity.org/calltoaction)).

## Why this Guide?

This Project Management Guide seeks to align and reorganize the 2011 Enterprise Green Communities Criteria categories within the development process. It is meant to be used along with the Criteria, and provide guidance as to which categories of the Criteria are most relevant during each development phase. The Guide also states what aspects of a particular criterion should be considered during a particular development phase – for example, “Water Conservation.” Responding to this category means careful product

# INTRODUCTION TO THE PROJECT MANAGEMENT GUIDE

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specification during Predevelopment, attention to proper installation during Construction and follow-up to ensure proper maintenance during Operations. Ultimately the goal is to guide the affordable housing developer to understand what aspects of each criteria category they should consider during what is often a multiyear development process.

## How to Use This Guide

The exact definitions of the Phases of developing an affordable housing project sometimes vary, but for the purposes of this guide, the phases are described as the following:

- **Feasibility:** This phase includes project conception, site identification, financial analysis, and preliminary consultant team identification. This phase concludes with a “go/no-go” decision to advance a specific project on a specific site.
- **Predevelopment:** This phase includes full identification of the project team, the development of all project documents, and securing all financing and planning approvals to allow the project to move into construction. For the purposes of this guide, this phase is also assumed to include the contractor selection process. This phase typically concludes with a financial closing that allows construction to begin.
- **Construction:** As would be expected, this phase includes the construction of the project and concludes with receiving all approvals necessary to occupy the building.
- **Operations:** This phase is defined by tenants or homeowners taking occupancy of their homes and continues through the ongoing operations of the project.

The following chart delineates these four (4) phases of development in comparison to the following categories by which the Criteria are organized:

- Integrative Design
- Location and Neighborhood Fabric
- Site Improvements
- Water Conservation
- Energy Efficiency
- Materials Beneficial to the Environment
- Healthy Living Environment
- Operations and Maintenance
- Certification

# INTRODUCTION TO THE PROJECT MANAGEMENT GUIDE

Although arguably, almost any category could be considered during a particular development phase, the chart below indicates the critical categories by phase and is the basic diagram for defining the relationship between the standard development phases and the Criteria. The development phases serve as the “chapters” for the guide. The relevant Green Communities Criteria that should be considered in that development phase are listed within each chapter.

CATEGORIES	FEASIBILITY	PREDEVELOPMENT	CONSTRUCTION	OPERATIONS
INTEGRATIVE DESIGN	✓	✓	✓	
LOCATION & NEIGHBORHOOD FABRIC	✓	✓	✓	
SITE IMPROVEMENTS	✓	✓	✓	✓
WATER CONSERVATION		✓	✓	✓
ENERGY EFFICIENCY		✓	✓	✓
MATERIALS BENEFICIAL TO THE ENVIRONMENT	✓	✓	✓	✓
HEALTHY LIVING ENVIRONMENT	✓	✓	✓	✓
OPERATIONS & MAINTENANCE	✓	✓	✓	✓
CERTIFICATION		✓	✓	✓

We hope that this Project Management Guide will serve as a useful roadmap for integrating the Green Communities Criteria into your affordable housing development projects. Although the Criteria may seem daunting at first, once you begin to integrate sustainability thinking into your development process, you will discover that the Criteria are not an “overlay” to the development process but instead represent a holistic “approach” to development. It is an approach that has been proven to result in high-quality, efficient and healthy housing that will bring environmental benefits not only the residents but to the greater community as well.

# FEASIBILITY PHASE

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# 1

## PHASE ONE: FEASIBILITY PHASE

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### Introduction to the Feasibility Phase

#### **Determine the financial and design feasibility of your project.**

The goal of the Feasibility Phase is to locate sites and identify projects that take into consideration green development practices.

During the Feasibility Phase, you will be deciding whether to move forward with a particular site or building, determining the density and program of the project, and identifying the target population. This is often referred to as “design feasibility”. Often times, a particular site is pursued because of familiarity with the community. Other times, you may be looking to build in a new community. In either case, it is pertinent to work with an architect to conduct a site and zoning analysis for the proposed project. The analysis will determine whether the site will accommodate the proposed program, while taking into consideration parking requirements, open space requirements, and building classification restrictions. During this stage, the architect can also provide advice on whether the project would benefit from a zone change, zone variance, or other entitlement process.

In addition to engaging in a design feasibility process, the developer will also need to determine if the proposed project makes financial sense. The type of site that is selected will influence certain budget considerations, including the cost of installing utility and transportation infrastructure, entitlement fees, tenant relocation, and environmental remediation. These particular characteristics of a site are often difficult to change once site control has been obtained. It is also challenging to change the community amenities surrounding your project once the site has been determined.

Taking the design and financial feasibility into consideration, it is recommended that the following steps be taken in conjunction with the Enterprise Green Communities Criteria listed below, particularly within the Integrative Design, Location and Neighborhood Fabric, and Site Improvements categories.

# 1

## FEASIBILITY PHASE

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### ENTERPRISE GREEN COMMUNITIES CRITERIA CATEGORIES:

### Integrative Design During the Feasibility Phase

Integrative Design provides the developer with a highly selective process for the identification of project team members. During feasibility, it is important to select design team members that will help you determine if your project is physically and financially feasible. It is also important to identify the population that will be served by the project in order to start thinking about the particular design needs of the future residents.

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#### 1.1A + 1.1B

#### GREEN DEVELOPMENT PLAN

*An integrative design process facilitates the design and development team's achievement of green objectives throughout the project life cycle.*

- Select an architect who can provide a zoning analysis for your site. This will allow you to determine the density and scale of your proposed project. At this time, you can also determine if you are able to build your proposed project as-of-right, or if you will need to pursue any entitlements or zoning variances.
  - Preliminarily score the project using the 2011 Enterprise Green Communities Criteria Checklist to confirm that it meets the Mandatory requirements.
- 

#### 1.2A + 1.2B

#### UNIVERSAL DESIGN

*Universal design features result in a building that is sensitive to a wide range of resident needs including those who have temporary or permanent disabilities.*

- Determine the target population of your development. If you plan to construct or rehabilitate a building for physically disabled or senior residents, the Universal Design requirements should be prioritized in your design.

# 1

## FEASIBILITY PHASE CASE STUDY

### South Quarter Phase IV – Minneapolis, MN Aeon and Hope Community

For this project, Aeon and Hope Community conducted a series of three workshops composed of a variety of local experts and thought leaders. The last workshop brought community members together with designers and trade professionals into small break-out design groups. Each group used blocks representing one residential unit and arranged them on a site plan to produce a myriad of configurations. These break-out groups gave residents a chance to have their voices heard and work directly with architects, engineers and design trades. Green roofs, photovoltaics, window arrangement, common space, and stairwell location and design were all topics grappled with by residents as they helped design the project. Following the break-out groups, presentations were made and synergies between the proposals were discussed and recorded. Next steps for design strategies and technologies for research were determined and assigned to the project team members. All decisions were made with the residents and the longevity of the buildings in mind. That focus simplified many of the development decisions and led to a successful project.



# 1

## FEASIBILITY PHASE

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### Location and Neighborhood Fabric During the Feasibility Phase

The Location and Neighborhood Fabric criterion allows you to determine if the project site is conducive to green design. Locating your project in the right location is not only beneficial to the affordability of the project, but also to the quality of life that your residents will obtain. These criteria are very difficult, and often impossible, to alter once the Feasibility Phase is complete.

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#### 2.1

##### SENSITIVE SITE SELECTION

*Proper site selection avoids damage to or loss of fragile and scarce environmental resources and reduces the risk of building damage from flooding.*

- Selecting sites within the 100 year floodplain may restrict your building design, by limiting the construction of features such as basements, garages, and the location of mechanical systems.
  - Selecting sites that are outside of the 100 year flood plain will save operating costs related to additional insurance policies required for flood areas. If you are just outside of a flood area, you can request flood insurance coverage as part of your policy without paying additional fees.
  - Sites with slopes greater than 15% may increase construction costs due to the need for retaining walls and re-grading.
  - Sites located on wetlands or unique soil will spend additional construction costs due to the installation of caissons. Additionally, wetlands will limit the ability to include open space and garden amenities for the residents.
  - Talk to your local municipality to determine if there are protected areas near your site where development is limited.
- 

#### 2.2

##### CONNECTION TO EXISTING DEVELOPMENT AND INFRASTRUCTURE

*Locating a project within an existing neighborhood and in close proximity to infrastructure encourages more resource-efficient development of land.*

- Locating a project adjacent to existing roads and utilities will reduce the site work line item in your development budget. It will also shorten your development schedule by reducing the need to solicit EIS statements and site plan approvals from your municipality.

# 1

## FEASIBILITY PHASE

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- Check the capacity of the existing infrastructure to ensure that it will support the needs of your project. For example, does the nearby water line have enough water pressure for your new multifamily project?
  - Ask the utility companies for any related utility connection impact fees, and include these costs in your project budget.
  - Conduct a field survey (i.e. walk the site) to confirm that all the site utilities (light poles, fire hydrants, etc.) are noted on surveys, maps, and plans that have been prepared for the project.
- 

### 2.3–2.4

#### COMPACT DEVELOPMENT

*Compact development encourages more resource-efficient development of land and supports demand for transportation infrastructure and commercial development.*

- Determining the size of your project (e.g. number of units, type/size of units, and height of building) is critical part of determining whether your project is financially feasible. For example, the number and size of your units can greatly affect the amount of debt that the project can carry or whether you need to locate gap financing.
  - A preliminary massing study, in addition to the zoning analysis, may be necessary to determine the number of units that the site can support.
  - Once the size of your project is determined, it is important to work with your architect and local municipality to determine if you need to undergo an entitlement or zone change process to build the type of building that you can finance. Keep in mind that an entitlement process may create additional predevelopment costs and add time to the Predevelopment Phase.
- 

### 2.5

#### PROXIMITY TO SERVICES

*Proximity to services connects residents to their community, while reducing the social services costs carried by project.*

- Proximity to services is one category that can only be achieved during the Feasibility Phase, particularly when the site is being selected. Retail, social services, and community facilities create a dynamic community and provide amenities that will attract residents to your building during the marketing and lease up phase.

# 1

## FEASIBILITY PHASE

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### 2.6-2.7

#### **PRESERVATION OF AND ACCESS TO OPEN SPACE**

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

- Your local municipality may have more specific open space requirements for your site. It is recommended that you work with your architect and local zoning officer to determine what is acceptable in your community.
  - Providing extra open space, recreational space, and play areas is an amenity that will make your project more desirable to potential residents. Including open space is a great way to market your units during lease up.
  - Smart site design can help you to maximize the benefits of the open space on your site.
- 

### 2.8

#### **ACCESS TO PUBLIC TRANSPORTATION**

*Projects located near transit reduce the resident's need to own a car and reduces related emissions of air pollutants and carbon dioxide.*

- Check the cost of transit in your area to ensure that it matches the income level in your building. For example, regional rail lines tend to be more expensive than local lines. Your project and residents will benefit from a variety of public transportation options at a variety of affordability levels.
  - Check hours of operation and frequency of the transit in your area.
- 

### 2.10

#### **SMART SITE LOCATION: PASSIVE SOLAR HEATING/COOLING**

*The utilization of passive solar energy through design minimizes reliance on mechanical heating, lowers the cooling load, and provides more residents with access to daylight.*

- The orientation of the building is another item that needs to be determined during design feasibility. It is very difficult to change the orientation of the building once the project has entered into the construction documents (CD) design phase. As part of this section, take into consideration the surrounding neighborhood and sidewalks for the location of building entrances, garage entrances or driveways, and the climate zone of your location.

# 1

## FEASIBILITY PHASE

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### 2.11

#### BROWNFIELD OR ADAPTIVE REUSE SITE

*Use of brownfields or adaptive reuse sites reduces pressure on undeveloped land. Reuse of existing structures reduces the need for new materials.*

- A brownfield or adaptive reuse site may create additional costs in your development budget, due to environmental clean up or demolition expenses. In order to avoid surprises, a Phase I Environmental Report should be completed as part of the Feasibility Phase. The Phase I is an historical review of the prior uses on the site.
- If contamination is suspected due to the previous use of the site, the engineer will require that a Phase II Report be completed. The Phase II Report expands on the historical review completed in the Phase I by testing the soil for contaminants using boring samples.
- If you have an existing building on the site, you may need to test for lead, asbestos, and mold. If the existing buildings will be demolished, lead and mold testing may not be required. Discuss your site development plans with your environmental engineer to determine what type of testing is required for your project. Include the cost of testing in your project budget.
- If any of site or building contaminants exist, then a Remedial Action Work Plan should be established to determine the cost of the clean up that should be included in the project's development cost.

### 2.12

#### ACCESS TO FRESH, LOCAL FOODS

*Access to fresh produce offers healthy food options for residents and supports local economic development.*

- Talk to your local municipality about community gardening or CSA programs in your area. It is beneficial to your residents and property managers to expand on the programs that are already successful in your neighborhood.



# 1

## FEASIBILITY PHASE

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### Site Improvements During the Feasibility Phase

The Site Improvements criterion provides the developer with tools that will improve the performance of the site, particularly related to the project's environmental footprint. During Feasibility, it is important to take into consideration the elements of the site that may impact the project budget or otherwise render the site “infeasible”.

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#### 3.1

#### ENVIRONMENTAL REMEDIATION

*The environmental site assessment determines the potential environmental liabilities associated with property acquisition and ownership.*

- Conduct a Phase I Environmental Assessment as part of the due diligence for site control. This will allow you to be prepared for the site work that will need to be included in your development budget and construction contract. It is important to understand the building code and financial implications of building on a brown field site, *before* you purchase the site.

#### Common Misconception: Green Affordable Projects

It is common for organizations that have not developed green projects in the past to believe that green design will increase their development cost. In fact, green projects help to reduce the operating cost of a building by integrating energy and water saving measures. This makes utility costs more affordable to low-income residents and owners. In addition, green design helps to implement healthy living standards that reduce common health problems, such as asthma, in urban areas.

#### Common Misconception: Rural Projects

It is a common belief that the Enterprise Green Communities (EGC) Criteria prioritizes urban infill projects, making it harder for rural projects to score well. To address the unique conditions of sites located in rural, tribal, and small town locations, the Criteria has established separate pathways for the calculation of density, the proximity to services, the preservation of open space, and connections to surrounding neighborhoods. Please follow the methodology in the 2011 Enterprise Green Communities Criteria to ensure that you are properly classifying your neighborhood. The 2011 Enterprise Green Communities Criteria can be found online at: [www.practitionerresources.org/cache/documents/674/67453.pdf](http://www.practitionerresources.org/cache/documents/674/67453.pdf).



# 1

## FEASIBILITY PHASE

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### Conclusion to the Feasibility Phase

At the end of the Feasibility Phase, you should be confident about the success of the project, particularly as it relates to the design, budget, and funding sources that will be pursued during the Predevelopment Phase. At this point, you can decide if you want to move forward with the same design team that completed the site and zoning analysis or if you want to enter into a more competitive selection process. You should also feel confident in being able to locate funding for the site and environmental work that is required.

The Predevelopment Phase is a busy time for developers as the project prepares for construction. This often includes finalizing the project team, obtaining site control and any necessary entitlements, securing financial commitments, developing the project design and negotiating contracts. Each of these tasks relates to decisions that need to be made for the adherence to the Green Communities Criteria. Incorporating the Criteria in the decisions you make during Predevelopment will not only make your project more sustainable, but will provide you with best practices that can be incorporated in all of your development projects. The next chapter will provide with guidance on how to incorporate Green Communities into the Predevelopment Phase.

# 1

## FEASIBILITY PHASE

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### References for the Feasibility Phase

**Integrative Design Grants**, also called Charrette Grants – Enterprise offers grants up to \$5,000 to assist housing developers in integrating green methods, materials and practice in their developments. Go to [www.EnterpriseCommunity.org/greenresources](http://www.EnterpriseCommunity.org/greenresources) and look under Financing for Charette Grants.

**Green Development Plan Template** – Guide for developers to engage in an integrative design process and gain an understanding of what is involved to prepare a Charrette and satisfy the Enterprise Green Communities Criteria. Go to [www.EnterpriseCommunity.org/greentools](http://www.EnterpriseCommunity.org/greentools) and set the filter to Integrative Design.

**Enterprise Green Communities Success of Charrettes Report** – This report highlights the role of a charrette in establishing a green development plan to foster an integrative design process through a project's life-cycle. Go to [www.EnterpriseCommunity.org/greentools](http://www.EnterpriseCommunity.org/greentools) and set the filter to Integrative Design.

**Charrette Toolkit** - These adaptable resources help project teams and facilitators design and implement successful Enterprise Green Communities charrettes. Go to [www.EnterpriseCommunity.org/greentools](http://www.EnterpriseCommunity.org/greentools) and set the filter to Integrative Design.

**Find a Facilitator** – Enterprise's Green Communities team has assembled a public database of the nation's leading green professionals in the affordable housing sector that can assist with the facilitation of a charrette. Go to [www.EnterpriseCommunity.org/greentools](http://www.EnterpriseCommunity.org/greentools) and set the filter to Integrative Design.

# PREDEVELOPMENT PHASE

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# 2

## CHAPTER THREE: PREDEVELOPMENT PHASE

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### Introduction to the Predevelopment Phase

**Secure site control and entitlements, complete architectural plans, and submit funding applications.**

For a developer, the predevelopment phase is the busiest time. This phase typically consists of preparations that will allow for the project's construction. One of the most important tasks to accomplish as the Predevelopment Phase begins is the selection of the project team members. As you will read in this chapter, the quality of team members will become a critical measure of project success. This includes selecting the property management team and including them in discussions surrounding the project's design as early as possible.

During the Predevelopment Phase, you should also establish the project's green goals and put mechanisms into place for ensuring that these goals are met. The following section provides suggestions to consider for each of the Enterprise Green Communities categories.

If you choose to participate in the Enterprise Green Communities Certification program, you will be required to register and submit project information and design. Enterprise Green Communities offers a free, online process for certifying green affordable housing developments through its new online certification portal. You can find more information about the online certification process at [www.EnterpriseCommunity.org/greenportal](http://www.EnterpriseCommunity.org/greenportal)

### Integrative Design During the Predevelopment Phase

Integrative Design provides the developer with a highly selective process during the identification of the project team members. It is critical to choose architects, engineers, contractors and consultants that understand and are committed to the green goals of your project. If this is your first green development, you may consider identifying a third-party consultant who can assist in making well-informed decisions about the project design. This is often the role of the architect or engineer. You may also want to add consultants to your team that were not considered for previous projects, such as a firm that can provide energy modeling, an engineer that will explore HVAC sizing options, or a landscape architect that can design alternative irrigation solutions.

# 2

## PREDEVELOPMENT PHASE

### ENTERPRISE GREEN COMMUNITIES CRITERIA CATEGORIES:

During the Predevelopment Phase, it is also helpful to involve the local residents and stakeholders in deciding which green elements will provide the most benefits to the community. This time is ideal to find out if your local municipality has financing or other incentive programs for green design. The earlier you can get the community involved in the process, the more support you will have for your project through predevelopment, construction, and lease up.

#### 1.1A + 1.1B

#### GREEN DEVELOPMENT PLAN

*An integrative design process facilitates the design and development team's achievement of green objectives throughout the project life cycle.*

- Select a development team committed to the green design goals that are established by the developer, and bring the team together frequently during the design process. First, the developer will score the project using the 2011 Enterprise Green Communities Criteria checklist and determine which optional points are easy to achieve and which points will require input from the team.
- Consider adding a green consultant to your team and look for third-party grant sources that can help defray some of the cost of the consultant.
- Identify a “champion” to lead the project team in the green design goals. The champion can be a staff member, project manager, architect or green consultant.
- Evaluate how the Enterprise Green Communities Criteria tie into other green programs provided by your state, city or local municipality
- It is difficult to change the location of the project and the orientation of the building during later phases of development. To avoid this problem, hold a charrette during schematic design to ensure that the mandatory requirements will be met and to ensure that the Location + Neighborhood Fabric points are being maximized.
- A less technical meeting with existing residents and community stakeholders should also be considered, particularly for moderate rehabilitation projects. It is important to explain how the green design will benefit the community. Other discussion topics could include how the community will be asked to participate in the greening efforts, through recycling or community gardening programs. The earlier that you can get the community involved in the process, the more support you will have for your project through Predevelopment, Construction, and Lease up.

# 2

## PREDEVELOPMENT PHASE

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- Find out which regional green building programs exist in your community and how they can help move the project forward with its green design goals.
  - Create project documents (i.e., a checklist, project list, or schedule) that provide the construction team specific information on what is required to meet the goals of the Green Development Plan, as well as the roles and responsibilities of each development team member.
  - Ensure that all project team members are aware of their responsibilities in achieving the project goals and provide them with the training and tools to succeed, if necessary.
  - An additional team charrette should be held during the Design Development phase to ensure that the building systems are meeting the requirements for the Site Improvements, Water Conservation and Energy Efficiency criteria.
  - A final charrette should be held during the Construction Documents phase to reinforce upon your general contractor the Materials Beneficial to the Environment and Healthy Living Environment criteria. During this time you should also ensure that the Enterprise Green Communities Criteria have been included in the construction specifications and the construction contract.
  - Find out if any of your project funding sources require Enterprise Green Communities Certification.
  - Work with your project attorney or architect to incorporate green standards as an addendum to the construction contract(s).
- 

### 1.2A + 1.2B

#### UNIVERSAL DESIGN

*Universal design features result in a building that is sensitive to a wide range of resident needs including those who have temporary or permanent disabilities.*

- Check with your local municipality or funding sources regarding their design requirements for accessible, pre-adaptable, adaptable, and “visitable” units. Typically the use of federal or state funds will require that you include a minimum percentage of accessible units and/or require that all the units in your building are visitable.
- Work with your architect to determine the federal, state or local code requirements for accessible units.
- Ensure that the Universal Design standards are included in the plans and specifications.

# 2

## PREDEVELOPMENT PHASE CASE STUDY

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### **Nuevo Amanecer – Woodburn, Oregon** **Farmworker Housing Development Corporation**

The Green Communities rehabilitation of this development was a community effort. Residents were vocal stakeholders in the planning charrette, and their needs were carried through in the planning documents and later in implementation on site. This development's driving force in making renovations was to manage moisture in the buildings and site. The effort and care that went into proper site control, landscaping, building envelope construction, and ventilation strategies were instrumental in the site's longevity. The success of this rehabilitation project hinged upon its community focus. All decisions were made with the residents and the building's longevity in mind. That focus simplified many of the development decisions and led to a successful project.





# 2

## PREDEVELOPMENT PHASE

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### Location and Neighborhood Fabric During the Predevelopment Phase

During the Predevelopment Phase you develop the project's design in a way that promotes its green goals. Once the project team is selected, you can begin discussions regarding the orientation of the building, research the building systems that will provide the most energy savings, and coordinate with local community groups. As part of Predevelopment, you are also encouraged to begin conversations with your local community or municipality to understand if there are any building codes or new legislation that will govern your site design.

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#### 2.8

##### ACCESS TO PUBLIC TRANSPORTATION

*Projects located near transit reduce the resident's need to own a car and reduces related emissions of air pollutants and carbon dioxide.*

- If your project is a transit-oriented development (TOD), you may be able to work with your municipality to decrease the parking requirements for your building
  - If you are located adjacent to a rail station or subway stop, consider including some parking spaces for a car share program (such as ZipCar©) that can be used by residents and commuters
- 

#### 2.9

##### WALKABLE NEIGHBORHOODS

*Connections to adjacent development and public open spaces promote walking, biking and other healthy lifestyle activities.*

- Direct your architect to include a site plan in the schematic drawings that includes the parcels located adjacent to the site
- Work with your architect to design building entrances and connecting pathways to the surrounding neighborhood, including access to public transit, public parks, schools and pathways



# 2

## PREDEVELOPMENT PHASE

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### 2.10

#### SMART SITE LOCATION: PASSIVE SOLAR HEATING/COOLING

*The utilization of passive solar energy through design minimizes reliance on mechanical heating, lowers the cooling load, and provides more residents with access to daylight.*

- When considering the incorporation of sun shades, work with your structural engineer to ensure that the building material (concrete, steel, wood frame construction) can incorporate the additional load on the façade.
- 

### 2.11

#### BROWNFIELD OR ADAPTIVE REUSE SITE

*The utilization of passive solar energy through design minimizes reliance on mechanical heating, lowers the cooling load, and provides more residents with access to daylight.*

- In addition to conducting third-party environmental testing during the Feasibility Phase, it is important to contact your local or state Department of Environmental Protection (DEP). Each State DEP has different requirements or legislation that determines the process and reporting for remediation of a site or building. You will need to consider the length of time it will take to complete the reporting process and factor that time into the development schedule for your project.
  - Check with your insurance provider to determine if there is an existing policy on the brownfield site related to the contamination; or, if you will be required to obtain one.
  - Check with your state, city or local municipality for existing funding programs that will provide financial assistance for the remediation of brownfield sites.
- 

### 2.12

#### ACCESS TO FRESH, LOCAL FOODS

*Access to fresh produce offers healthy food options for residents and supports local economic development.*

- Vegetables require plentiful water and sun to grow. It is important to consider the location of your community garden during the schematic design process to ensure that you are providing the proper conditions for a successful garden. In addition, consider how you will meet the mandatory (reduced irrigation) landscape requirement in connection with food production. You may need to consider a drip irrigation system, for example, in order to meet the mandatory requirement.
  - Consider implementing a composting program in your building in connection with the community garden.
-

# 2

## PREDEVELOPMENT PHASE

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- Projects located in urban infill sites often do not have the proper soil for growing vegetables for consumption. Consider installing raised concrete garden planters that will allow you to manage your garden's soil quality. These planters are also great for seniors unable to work at a ground level for prolonged periods.
  - Check with your municipality to determine whether you are able to use gardening areas as part of your open space or storm water management program. If not, you will need to remove the garden plots from the open space or storm water management calculation.
  - Find out if a program exists in your local municipality that provides incentives for having a fresh food market or grocery store as a tenant in your building.
  - Consider using your project site as a future location for a farmers' market or Community-Supported Agriculture (CSA) distribution area.
- 

### 2.13

#### LEED FOR NEIGHBORHOOD DEVELOPMENT CERTIFICATION

*LEED for Neighborhood Development is designed to certify exemplary development projects that perform well in terms of smart growth, urbanism and green building.*

- If your project is located in a LEED ND planning area, consult with the LEED ND administrator to find out if there are any additional green guidelines that you will need to consider.
- During Predevelopment, complete the LEED ND checklist to discover which point criteria you will pursue. Consider including a LEED ND consultant on your project team.
- Work with your architect to ensure the LEED ND point criteria are included in your plans and specifications.
- Include LEED application and review fees in your project budget.
- Contact your local USGBC chapter to discover if there are any funding opportunities for LEED ND projects.

# 2

## PREDEVELOPMENT PHASE

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### Site Improvements During the Predevelopment Phase

During Predevelopment, you will pursue site control for your project and prepare the land for development. During this time you should work with your project engineers to develop a storm water management plan, advance the environmental remediation process, and design the landscaping features for the site.

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#### 3.1

##### ENVIRONMENTAL REMEDIATION

*The environmental site assessment determines the potential environmental liabilities associated with property acquisition and ownership.*

- As part of feasibility, conduct a Phase I Environmental Assessment before you purchase the site. A Phase I will provide historical data regarding the previous use of the site and any potential uses that may have resulted in soil contamination.
  - If the Phase I presents uses that may have lead to contamination, conduct a Phase II Environmental Assessment. The Phase II will test for any contaminants currently present in the soil.
  - Ask your environmental engineer if a health and safety plan will also be required.
  - If contaminants are present, ask your environmental engineer to prepare a Scope of Work or Remedial Action Work Plan and cost estimate for the cleanup.
  - For a rehab project, ask your environmental engineer if lead, asbestos and mold testing is required on the existing building (particularly if the existing building was built prior to 1978). Request a cost estimate for any required cleanup.
  - Ensure the project budget includes the cost of third-party environmental monitoring, if your environmental engineer deems this necessary.
- 

#### 3.2

##### EROSION AND SEDIMENTATION CONTROL

*Erosion and sedimentation control during site development keeps valuable topsoil on-site and reduces pollution, storm water runoff and sedimentation associated with construction activities into local waterways.*

- Your local municipality may have more stringent requirements regarding Erosion and Sedimentation Control. Work with your architect or engineer to understand the local requirements and include them as part of the project plans and specifications.
- Special permits or approvals may be required as part of the site plan approval.

# 2

## PREDEVELOPMENT PHASE

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### 3.3

#### LOW IMPACT DEVELOPMENT

*Low impact design and development principles minimize the site's environmental footprint.*

- Work with your civil engineer and landscape architect to ensure that slopes are directed away from the building to avoid flooding conditions during large storm events. Include adjacent sites in your land survey to see what the slope conditions are on neighboring properties. You may need to add site features to control storm water flow from these properties.
  - Ensure that large storm water events do not overflow into the drought-tolerant landscape. Flooding in these landscape areas can kill the plants.
  - Work with your civil engineer and landscape architect to determine what type of permeable pavement is compliant with the local code.
  - Your civil engineer or local municipality may require soil infiltration testing to determine if the site is capable of absorbing water properly.
  - Include in your operating budget maintenance costs associated with the selected Low Impact Development measures.
- 

### 3.4

#### LANDSCAPING

*Native and adaptive plants are well suited to the climate and provide excellent erosion, sediment, dust and pollution control.*

- Work with your landscape architect to select native or adaptive species of plants.
- If the soil is not appropriate for your landscaping, you will need to bring in planting soil to the site. In addition, many sites with urban fill may need to locate plantings in planter boxes.

# 2

## PREDEVELOPMENT PHASE

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### 3.5

#### EFFICIENT IRRIGATION AND WATER REUSE

*Accurate delivery of water reduces evaporation and eliminates overspray, while proper scheduling eliminates fluctuations between wet and dry states that stress plants.*

- Discuss the appropriate irrigation system for your project with the property manager and maintenance personnel while you are developing your design.
  - Check with your local municipality for legislation regarding irrigation and water use. For example, if your area is currently experiencing a drought, there may be rules that regulate how to schedule the timer on the irrigation system.
  - Instruct your architect to check the area's health code to determine what type of water reuse can be implemented.
- 

### 3.6

#### SURFACE STORM WATER MANAGEMENT

*Retain, infiltrate, and /or harvest storm water on site. Select one of the following: partial storm water retention or full storm water retention.*

- Encourage your civil engineer to work with the local municipality to determine the storm water calculation for your site. It is important to include this early in the design phase so greening strategies that will support the storm water management can be considered. Strategies can include the incorporation of green roofs, swale trails, retention tanks, blue roofs, rain gardens, pervious pavement and detention planters.
- Your civil engineer or local municipality may require soil infiltration testing to determine your site's capability to absorb water properly.
- Consider potential uses for retained water, such as a cooling tower, irrigation or sidewalk cleaning.
- If one is required, work with a civil engineer to determine the size of the storm water tank.
- Check with your local municipality regarding any credits or financial incentives available for storm water management.
- Include in the operating budget the cost of maintaining your storm water management system.

# 2

## PREDEVELOPMENT PHASE

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### Water Conservation During the Predevelopment Phase

It is not enough to meet with your project team and discuss project goals during the Predevelopment phase. Most of the work being completed at this time is related to finding ways to ensure that the project's green goals are also implemented during the Construction phase. This is true for both water conservation and energy efficiency goals. During the Predevelopment phase, work with your architect to include performance standards in the project's plans and specifications. For water conservation, this includes gallons per minute and gallons per flush requirements, as well as identifying the appropriate fixtures to be installed.

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#### 4.1 - 4.2

#### WATER CONSERVING FIXTURES AND APPLIANCES

*Install or retrofit water conserving fixtures in all units and any common facilities.*

- The appropriate water conserving fixtures are more likely to be installed if model numbers are clearly listed in the project specifications.
- Your particular project may not benefit from standard water fixture designs. For example, if using an instantaneous hot water system, pipes should be properly sized to prevent the resident from running the faucet to wait for hot water.
- After choosing your gallons per flush (GPF) and gallons per minute (GPM) performance goals, consider the usability of each fixture before specification. Refer to the Criteria documents for resources to select the appropriate fixtures for your project.
- Install measures that prevent residents from changing water fixtures. For example, it is best to spend time locating a shower head that meets the GPM requirements, but still provides a comfortable shower.
- Plumbing fixtures that meet the mandatory GPF and GPM thresholds are readily available, and may be able to yield additional points without paying a higher price premium.
- Consider installing submeter technologies to monitor water use in your building. Work with your civil engineer to check the area's water pressure to ensure the low-flow fixtures will perform well.

# 2

## PREDEVELOPMENT PHASE

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### 4.3

#### **WATER REUSE**

*Harvest, treat and reuse rainwater and/or greywater to meet a portion of the project's water needs.*

- Check with your local municipality to ensure water reuse methods are allowed by the building code.
- Research local incentive programs related to these measures that can benefit your project.
- Discuss with your civil engineer and local municipality the rainwater treatment requirements. This is typically determined based on the end use of the gathered rain water.



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## PREDEVELOPMENT PHASE CASE STUDY

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### **Cornerstone Apartment – Cleveland, Ohio** **NRP Group**

Cornerstone Apartments is a multifamily senior project in Cleveland, Ohio located in three buildings. The building is targeted to low income seniors, and consists of all two-bedroom units. The project utilized planning documents to show which green strategies would be attempted, how each would be achieved and who would be responsible for different actions throughout construction. This enabled implementation of the specifications to be verified throughout construction. The project team also verified water flows with a shower and faucet flow measuring bag once fixtures were installed. All of these measures ensured that the green goals set forth by the project team were implemented.





# 2

## PREDEVELOPMENT PHASE

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### Energy Efficiency During the Predevelopment Phase

A project is most successful in meeting its energy efficiency goals when the project team is able to put the proper plan in place during the Predevelopment Phase. At this time, it is important to select an energy consultant who is familiar with the Building Performance Standards in your area. If you have not worked previously with an energy consultant, you can refer to the Green Communities Technical Assistance Provider Database ([www.EnterpriseCommunity.org/tadatabase](http://www.EnterpriseCommunity.org/tadatabase)) to find a local firm. Once the major building systems have been selected, the consultant will prepare a report (often referred to as an energy model) that will determine the energy savings produced by these systems. If you are not meeting your goals with the designed systems, the consultant will provide options for alternative systems that will improve energy savings. Each project is different, so it is important to start this process as early as possible in order to give your architect time for any needed redesign.

Once the project's energy savings measures have been developed, work with your architect to include the Building Performance Standards in the plans and specifications. For energy efficiency, this includes identifying the appropriate fixtures and equipment that should be installed.

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#### 5.1 A – 5.1D

#### BUILDING PERFORMANCE STANDARD

*Certify the project under Energy Star New Homes, EPA's Multifamily High Rise program, or HERS index.*

- The energy model will be more accurate if you work with your engineer to select the building systems early in the project.
  - Make the energy consultant a member of your project team as early as possible during the design process. This will allow the energy model to be used as a tool to make design decisions. The energy consultant can help you meet the project's energy savings goals as the design develops.
- If you do not already have a strong working relationship with an energy consultant, find a
- local consultant through the online Green Communities Technical Assistance Providers Database.
  - When selecting an energy consultant, ensure they use one of the modeling programs listed in the Enterprise Green Communities Criteria.

# 2

## PREDEVELOPMENT PHASE

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- After identification of a targeted energy goal, the energy consultant will be able to offer the project team different energy measures to achieve the desired energy savings. Ensure that the energy consultant includes Energy Star Appliances (5.2) and Energy Efficient Lighting (5.3) in the measures..
  - Include each energy measure in the project plans and specifications so contractors bidding on the job will be fully aware of the project scope.
  - Find out if your local municipality has financing or other incentive programs for energy efficiency.
- 

### 5.2

#### ADDITIONAL REDUCTIONS IN ENERGY

*Improve whole-building energy performance by percentage increment above baseline building performance standard for additional points.*

- Improvements in energy savings in this category can only be achieved by improved building component systems (i.e., not by adding solar panels or wind turbines to your project). Work with your architect to improve the building's energy performance by methods such as improving the type of insulation in the building, finding a more efficient HVAC system or identifying energy leakage areas.
  - The building envelope will heavily contribute to the building's performance, including façade materials, insulation and windows.
- 

### 5.3

#### SIZING OF HEATING AND COOLING

*Heating and cooling equipment should be sized in accordance with the Air Conditioning Contractors of America (ACCA) manuals, Parts J and S, or ASHRAE handbooks.*

- HVAC sizing is largely dependent on the type of air conditioning and heating system chosen. Ask your mechanical engineer to provide a pros and cons list, as well as pricing information, for a variety of systems (i.e., PTAC units vs. Central HVAC).
  - Select a mechanical engineer who is willing to consider a system that will save energy and be properly sized for the building.
  - Find out if any of your funding sources have restrictions or guidelines regarding the type of HVAC system that can be used in your region.
  - Use the energy model as a tool in selecting the heating and cooling systems.
-

# 2

## PREDEVELOPMENT PHASE

### 5.4

#### ENERGY STAR APPLIANCES

*If providing appliances, install Energy Star-labeled clothes washers, dishwashers and refrigerators.*

- All Energy Star appliances provide energy savings, but some perform better than others. Energy guide ratings for appliances will present their energy usage in kWhs per year. A lower number represents a more efficient product. Review appliance specifications and compare their energy ratings to find the product that will produce the most savings.
- Energy performance in appliances is rapidly improving, and it is important to reassess your appliance selection for each new project.

### 5.5A - 5.5C

#### EFFICIENT LIGHTING

*Install Energy Star-qualified fixtures and lamps, as appropriate for the project type.*

- Include specific interior and exterior fixtures that meet EnergyStar requirements and include them in the project plans and specifications.
- There are many options to choose from when specifying energy efficient lighting. The most common is compact-fluorescent light bulbs (CFL), but LED lighting has become more available at affordable prices.
- Ensure the selected light bulb is paired with an appropriate EnergyStar fixture.
- Lighting sensors in common areas will contribute to energy savings in the building. Be sure to include the location of lighting sensors in the project specifications.
- Consider dual-level lighting in hallways and stairways in combination with lighting sensors.
- Day-lighting systems (such as windows or skylights in hallways and stairways) can significantly reduce your electrical lighting requirements.

### 5.6A - 5.6 B

#### ELECTRICITY METER

*Install individual or sub-metered electric meters in all dwelling units.*

- Include electrical sub meters or direct individual meters in project plans and specifications.
- Include the electric utility cost in resident utility allowance calculations for funding, as necessary.
- In addition to residential sub meters or direct individual meters, include separate meters for each retail tenant, office space and community facilities.

# 2

## PREDEVELOPMENT PHASE

### 5.7A - 5.7B

#### PHOTOVOLTAIC/SOLAR HOT WATER READY

*Install or design for the future installation of photovoltaic panels, wind turbines, or other electric-generating renewable energy sources to provide a specified percentage of the project's energy demand.*

- Work with your architect to review the local zoning code for requirements related to the installation of renewable energy infrastructure. Some municipalities may have height or load restrictions for systems that are constructed on top of a building structure.
- Check for local financing and incentive programs for the installation of renewable energy sources. Review the design requirements for each program and incorporate them into the project plans and specifications.
- If system cost is a concern, consider designing the building to be solar panel ready so installation can occur in the future when funding is available.
- Not all electrical engineers will include a renewable system in their scope. A third-party engineer will most likely need to be hired to design and install the system.
- Make space in the electrical room for additional equipment related to renewable energy products.
- Consider including a tracking/display system and maintenance as part of the engineer's scope. This is often omitted unless requested.
- Work with the structural engineer to determine if a need exists to design for additional roof load.
- Check the roof warranty if the project uses a roof-penetrating racking system.
- If a large system will be installed, consider a power purchase agreement.

# 2

## PREDEVELOPMENT PHASE

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### 5.8

#### **ADVANCED METERING INFRASTRUCTURE**

*Accommodate the installation of smart meters and/or be able to interface with smart grid systems in the future.*

- Smart meters allow for tracking the usage rates of the building's gas, water and electric utilities. Work with your utility company to include smart meters, with remote reading technology, in your plans and specifications.
- Ensure that the cost of the smart meters is included in your construction contract.
- Work with your management company to develop resident release forms on utility usage, if necessary.
- Check with your local utility company to discover if smart meter technology is available in your area. Smart meters will also help to meet the requirements for Criteria 8.4 Project Data Collection and Monitoring System.
- Include the cost of smart meter technology in your project budget.

#### **Materials Beneficial to the Environment During the Predevelopment Phase**

The selection, handling and installation of building materials have a large impact on the building's long-term maintenance. During Predevelopment, it is important to be as specific as possible when identifying the following types of products. This will ensure that the proper steps are taken during the Construction phase.

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### 6.1

#### **LOW/NO VOC PAINTS AND PRIMERS**

*All interior paints and primers must be less than or equal to the prescribed VOC levels.*

- Include specific paint and primer options and alternatives in project specifications to ensure that the definition of "low" VOC is identical to what will be used in the building materials.
- Work with your architect to locate a low/no VOC paint that also provides high-quality coverage. It may be worthwhile to use more expensive high-quality paint, thus saving the contractor time by using fewer coats.
- Research available paint and primer brands for each project, as new options continue to be available.

# 2

## PREDEVELOPMENT PHASE

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### 6.2

#### LOW/NO VOC ADHESIVES AND SEALANTS

*All adhesives must comply with Rule 1169 of the South Coast Air Quality Management District. All caulks and sealants must comply with regulation 8, rule 51, of the Bay Area Air Quality Management District.*

- The use of low/no VOC adhesives and sealants provides a safer environment for both construction workers and residents. Work with your architect to include specific product names for adhesives and sealants in the project specifications.
  - Consider using products that do not require adhesives and sealants to be applied in the field. For example, consider using products that have low/no VOC sealants that are applied by the manufacturer offsite.
  - Research available adhesive and sealant brands for each project, as new options continue to be available.
- 

### 6.3 - 6.4

#### CONSTRUCTION WASTE MANAGEMENT

*Commit to a waste management plan that reduces non-hazardous construction and demolition waste by at least 25% by weight.*

- During the contractor selection process, request a copy of each company's Construction Waste Management Plan. If a contractor does not have a plan already in place, it may be difficult for them to learn how to implement one for your project.
- Check your local municipality and contractor for construction recycling opportunities and incentives available in your area.

# 2

## PREDEVELOPMENT PHASE

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### 6.5

#### RECYCLING STORAGE FOR MULTIFAMILY PROJECT

*Provide one or more easily accessible, permanent areas in your building for the collection and storage of materials for recycling.*

- Consider integrating waste management in the design. For example, include two trash chutes in the building, one labeled for trash and one labeled for recyclables, to make it more user-friendly for residents.
  - Include a designated recycling area within each residential unit and include recycling storage containers in your budget for furniture, fixtures, and equipment (FF&E).
  - Ensure that the trash room on each floor of the building is properly sized for recycling collection and sorting of recycling material.
  - Discuss with your local recycling center and/or private hauler their regulations on sorting, compacting, and other treatment for recycled material.
- 

### 6.6

#### RECYCLED CONTENT MATERIAL

*Incorporate building materials that are composed of at least 25% post-consumer recycled content or at least 50% post-industrial recycled content.*

- Many building materials include recycled content material during the manufacturing process (e.g., concrete). Consult with your architect to select building materials of this nature.
  - Work with local manufacturers to determine if their materials include recycled content material.
- 

### 6.7

#### REGIONAL MATERIAL SELECTION

*Use products that were extracted, processed and manufactured within 500 miles of the building for a minimum 50% of the building material value.*

- Work with your architect and contractor to identify suppliers and subcontractors that are regionally based.
- Take this into consideration as part of your Section 3 Local Hiring requirements.



# 2

## PREDEVELOPMENT PHASE

### 6.8

#### CERTIFIED, SALVAGED, AND ENGINEERED WOOD PRODUCTS

*Commit to using wood products and materials of at least 25% that are FSC certified, salvaged products, or engineered framing materials without urea-formaldehyde binders.*

- Take this into consideration as part of your cost analysis when determining the structural system for your building (wood frame, concrete, steel).
- For rehab projects, include building reuse opportunities in your Capital Needs Assessment.
- Costs associated with this criterion can change with market demand. Re-evaluate the cost of these products with each new project.
- Consider including certified, salvaged, and engineered wood products as an add-alternate in the construction contract, in order to provide the opportunity to evaluate the affordability of these products as you get closer to construction.

### 6.9A - 6.9B

#### REDUCED HEAT ISLAND EFFECT

*Use EnergyStar-compliant roofing or install a “green” vegetated roof for at least 50% of the roof area. Use high albedo materials or open grid pavement for at least 50% of the hardscape.*

##### *“Green” Vegetated Roofs*

- Work with your structural engineer to determine if the “green” vegetated roof creates additional structural loads on the building.
- During your cost analysis, determine if you will install an intensive, extensive, or tray based green roof system, and identify local suppliers.
- You may need to place an order with the local supplier early in the process, so there is time to grow the plant material before installation.
- Determine whether irrigation is needed for the roofing system. Even drought-resistant plants need water for a few months after planting to establish their growth and maturity. Consider installing a hose bib or rain barrel on the green roof for use during this time. Work with your local municipality to determine how the green roof system can be used as part of storm water management.  
Green roofs are a great tenant amenity that can also serve as quality outdoor space.
- Consider pairing your green roof with a patio area that can be used by residents. Your roof can be a combination of a vegetated roof and a high reflective TPO membrane to achieve this credit.
- Design an access path through the green roof to allow for maintenance, weeding and watering while the plants are being established. (This is typically required during the first two years of operations.)

# 2

## PREDEVELOPMENT PHASE

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### *Paving Materials*

- There are many innovative materials that can be used as paving materials. Work with your landscape architect to determine the best paving based on how the paved areas are programmed (e.g., parking lot, sidewalk or public plaza).
- Work with your architect to determine if your local municipality will consider hardscape when calculating your storm water requirement. Find out if permeable pavement will contribute to your infiltration requirements.
- Work with your local municipality to find innovative materials for sidewalks and other public right-of-ways that may be located outside of the property line, but still a part of your project area.

### **Healthy Living Environment During the Predevelopment Phase**

The healthy living environment that residents experience in your building is important to the project's success. It is particularly important to consider the items in this section if your project is providing a residence to special needs populations, such as senior households. During the Predevelopment phase, work with your architect to specify green products that promote clean air, appropriate ventilation techniques and preventative maintenance practices.

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#### **7.1**

#### **COMPOSITE WOOD PRODUCTS**

*Use certified composite wood that is compliant with California 93120 or seal edges of composite wood with low-VOC sealants.*

- It is common for kitchen and bathroom cabinets, office furniture, and lobby furniture to be made of composite wood materials. When specifying these items, check the product information to ensure that all composite wood items are formaldehyde-free.
- If providing furnished apartments, consider formaldehyde-free composite wood material or avoid composite wood altogether.
- It may be difficult to find formaldehyde-free countertop materials in your budget range. Keep in mind that countertops may require sealing if formaldehyde is present.

# 2

## PREDEVELOPMENT PHASE

### 7.2 - 7.3

#### ENVIRONMENTALLY PREFERABLE FLOORING

*Use carpets, carpet pads and carpet adhesives that have been certified Green Label or Green Label Plus. Do not install carpets in bathrooms, kitchens, utility rooms or basements. Use ceramic, hardwood or other flooring materials in compliance with the Floorscore program criteria.*

- Often times, environmentally preferable products come from remote locations. Try to find local providers if possible.
- Find out what type of flooring is preferred within your local residential market, or if your funding sources have restrictions on the type of flooring that can be installed in the building. The use of carpet flooring is highly discouraged. Non-use will contribute to improved indoor air quality.
- Linoleum now comes in a variety of sheet and tile products, and may be a feasible alternative to the VCT flooring commonly used in affordable housing buildings.
- Consider the design of appropriate subflooring for hard floor materials, particularly for the sound proofing of your building. Find out if your local municipality has other restrictions or design considerations related to your flooring selection.

### 7.4A - 7.4B

#### EXHAUST FANS: BATHROOMS

*Install EnergyStar-labeled bathroom fans that exhaust to the outdoors, are connected to a light switch, and are equipped with a humidistat sensor, timer or other control.*

- Specify a fan that is Energy Star-labeled and consider a CFM rating that is approximately 20 CFM higher than the Green Communities Criteria to allow for on-site conditions. Doing so will ensure that the CFM passes if you are seeking verification.
- Ensure that the fan control mechanism is also specified (i.e., connected to a light switch, equipped with a humidistat or timer or operating continuously).
- Work with your mechanical engineer to determine how the ventilation to the exterior will occur. Explore options for horizontal or vertical ventilation from each unit, depending on the building's design configuration.
- Your architect or mechanical engineer should check with the local municipality to determine if there are code rules or guidelines regarding proper ventilation of bathrooms to the building's exterior. Rules may exist regarding the location of the vents or whether the exhaust duct can be combined with the kitchen exhaust.
- Consider the façade design when determining the location of the exhaust duct and grills.

# 2

## PREDEVELOPMENT PHASE

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### 7.5A - 7.5B

#### EXHAUST FANS: KITCHENS

*Install power vented fans or range hoods that exhaust to the exterior at the appropriate CFM rate, per ASHRAE 62.2 or install a central ventilation system.*

- It is often insufficient to have recirculating hoods for the kitchen ventilation. Work with your mechanical engineer to determine how the ventilation to the exterior will occur.
  - Explore options for horizontal or vertical ventilation from each unit, depending on the building's design configuration and rules for your municipality.
  - Your mechanical engineer must determine the control system for the kitchen exhaust (e.g., switch or operate continuously).
  - Your architect or mechanical engineer should check with the local municipality to determine if there are code rules or guidelines regarding proper ventilation of bathrooms to the building's exterior. Rules may exist regarding the location of the vents or whether the exhaust duct can be combined with the bathroom exhaust.
  - Consider the façade design when determining the location of the exhaust duct and grills.
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### 7.6A - 7.6B

#### VENTILATION

*Install a ventilation system for the dwelling unit that is capable of providing adequate fresh air per the ASHRAE requirements for the building type.*

- Determine an appropriate ventilation system (supply, exhaust, or balanced) and installation method with a reputable energy rater or engineer, and the HVAC contractor during the design stage. Include these instructions in the project drawings and specifications.
- Consider installing a unitized ventilation system (often achieved through the use of trickle vents) which allows each unit to be vented individually and prevents the transfer of air from common hallways. This often eliminates air and odors passing from one apartment to another. Work with your engineer to design the appropriate unitized system such as ones that may work with a MagicPak HVAC unit or other system that draws in outside air.

# 2

## PREDEVELOPMENT PHASE

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### 7.7

#### CLOTHES DRYER EXHAUST

*Clothes dryers must be exhausted directly to the outdoors using rigid-type duct work.*

- Work with your engineer to explore ventless or condensing dryer options which will not require venting to the exterior.
  - Consider exhaust options based on the location of the laundry for the residents. A building that has laundry capability in each unit will have different considerations than a building with a laundry room in a centralized location.
- 

### 7.8

#### COMBUSTION EQUIPMENT

*Specify power-vented or closed-combustion equipment when installing new space heating and water heating equipment.*

- Coordinate the ventilation requirements for combustion equipment with your architect. If horizontal ventilation is under consideration, it is important to understand how this affects the façade design.
  - Consult your local municipality for ventilation code requirements. For example, combustion equipment ventilation often needs to be located a certain distance from operable windows and/or air intakes.
- 

### 7.9A - 7.9C

#### MOLD PREVENTION

*Use non-paper-faced backing materials such as cement board, fiber cement board or equivalent in bathrooms.*

- Consider tankless water heaters which use less space in each unit and reduce the occurrence of mold due to leakage or overflow.
- Consider locating water heaters intended for individual units in a location that has public access for maintenance staff. For example, access to water heater closets can be located in an area that faces the common hallway rather than requiring staff to enter a unit.
- Consider surface materials that are easy to clean, and include proper installation instructions in the project specifications.
- Explore a variety of materials that can be used in the shower or tub enclosure that may prevent mold build-up.

# 2

## PREDEVELOPMENT PHASE

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- Consult the property manager and maintenance team for recommendations for materials that are easy to maintain.
  - In a renovation project that increases the building's insulation "tightness", consider installing additional ventilation to prevent mold growth in basements.
  - Specify mold-resistant finish materials in basements, as additional moisture can accumulate in these areas.
  - Use mold-resistant flooring materials in rooms and closets that contain clothes washers. Consider installing drip pans, drains, and water stop valves to control leaks from clothes washers.
- 

### 7.10

#### VAPOR BARRIER

*Install vapor barriers that meet specified criteria appropriate for the foundation type.*

- Work with your architect to design a vapor barrier system that is appropriate for your project. For example, a project with a basement may have a different strategy than one without a basement.
- 

### 7.11

#### RADON MITIGATION

*For new construction in EPA Zone 1 and 2, install passive radon-resistant features below the slab or for rehab, test for the presence of radon and mitigate, if necessary.*

- Provide proper flashing details for window and door openings in the project plans and specifications.
- Determine the EPA Zone during the Predevelopment phase and include radon mitigation costs in your development budget early in the process. Inform your architect of the requirement to install radon mitigation measures if your project is located in Zone 1 or Zone 2.
- Passive radon systems may be used to assist with waterproofing in conjunction with the vapor barrier system in Criteria 7.10.

# 2

## PREDEVELOPMENT PHASE

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### 7.12

#### **WATER DRAINAGE**

*Provide drainage of water away from windows, walls and foundations by implementing a list of techniques.*

- Request a topographic survey and look for slopes that may move water towards your building. Share this information with your architect during schematic design.
  - Work with your landscape architect to understand how rain water will move through the landscaped area. Drought-resistant plants are jeopardized if the topography creates flooding in landscaped areas.
- 

### 7.13

#### **GARAGE ISOLATION**

*If a garage is present, provide a continuous air barrier between the conditioned living space and any garage space and install a CO alarm inside the room adjacent to the garage and outside all sleeping areas.*

- Consider the cost implications of a naturally vented versus mechanically vented garage.
  - During the design process, discuss with your architect the location of the garage ventilation as it relates to residents and the surrounding community. For example, consider whether the garage exhaust will have a negative effect on the experience of pedestrians walking on the sidewalk adjacent to the building.
- 

### 7.14

#### **INTEGRATED PEST MANAGEMENT**

*Seal all wall, floor and joint penetrations with low-VOC caulking or other appropriate sealing methods to prevent pest entry.*

- Determine if your local municipality has Integrated Pest Management (IPM) Measures that can be referenced.
- Collaborate with your property management company to develop the IPM plan and include it in your project specifications.
- Cellulose insulation contains borate, which provides a Class A fire rating and resistance to mold and pests. Consider using this product if your budget allows.



# 2

## PREDEVELOPMENT PHASE

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### 7.15

#### LEAD SAFE WORK PRACTICES

*For properties built before 1978, use lead-safe work practices consistent with the EPA's Renovation, Repair, and Painting Regulation and applicable HUD requirements.*

- Conduct environmental testing in existing buildings for lead, asbestos and mold. Develop a budget to address the remediation of these items.
  - Check with your local municipality to ensure that your contractor abides by the local requirements for remediation.
  - Obtain contractor's cost estimates for this work early in the process. This will provide an opportunity to complete the remediation work during the Predevelopment phase.
  - Consider site control options. You may be able to negotiate with the original owner to complete this work prior to the transfer of the property. If not, you may need to consider closing on the site control during Predevelopment to allow the remediation be completed prior to Construction.
  - If your project is a resident-in-place rehabilitation, it may be necessary to factor in temporary relocation costs for existing residents while the remediation takes place.
- 

### 7.16

#### SMOKE FREE BUILDING

*Implement and enforce a no smoking policy in all common, individual living areas, and with a 25-foot perimeter around the exterior of all residential buildings.*

- Find out if your local municipality or funding agency has smoke-free building practices or regulations that help with enforcement of this criterion.
- Work with your attorney to develop an acceptable smoke-free policy that can be included in your resident lease form.
- Include smoke-free signage in your design plan so that it harmonizes with other building signage.
- Work with your landscape architect to locate an area 20 feet from your building that can serve as a designated smoking area. Planning ahead for this location will result in a more easily enforceable smoking policy in the future.

# 2

## PREDEVELOPMENT PHASE

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### Operations & Maintenance during the Predevelopment Phase

The knowledge and experience of the property manager and maintenance staff is often overlooked during the Predevelopment phase. If you have management and maintenance personnel on staff, it is important to include them in your design meetings. If you do not have these personnel on staff, consider hiring a third-party management company that can provide input on the performance, maintenance, and cost implications of the project design and materials.

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#### 8.1

##### **BUILDING MAINTENANCE MANUAL**

*Provide a building maintenance manual that addresses maintenance schedules and other specific instructions related to the building's green features.*

- To ensure that the Building Operations and Maintenance Manual is top-quality, plan to complete these documents early.
  - During the design phase, keep a running list of how maintenance and landscaping teams may need to be involved with the building in order to ensure that it will perform as intended.
  - Once the project team has reviewed all the Criteria, amend templates of the Building Operations and Maintenance Manual with project-specific information. By working in this manner, your O&M documents will be informed by the development process and completed at the same time that the project is ready for occupancy.
- 

#### 8.2

##### **RESIDENT MANUAL**

*Provide a guide for homeowners and renters that explains the intent, benefits, use and maintenance of your project's green building features.*

- Include the cost of printing copies of the Resident Manual in your project's marketing budget.

# 2

## PREDEVELOPMENT PHASE

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### 8.3

#### RESIDENT AND PROPERTY MANAGER ORIENTATION

*Provide a comprehensive walk-through and orientation for residents and property managers using the appropriate building operations and maintenance or residents manual.*

- Include the property management team in the design process, so they can begin to understand the building systems.
- 

### 8.4

#### PROJECT DATA COLLECTION AND MONITORING SYSTEM

*Collect and monitor project performance data on energy, water, and if possible, healthy living environments for a minimum of five years.*

- Work with your local utility company to understand the process for obtaining resident usage data.
- Consider incorporating smart meter technology in the building which will allow access to usage data directly from sub meters. Include your property manager in this discussion.
- Include the Enterprise Utility Release Form in your draft residential lease.
- Check with your local utility company to discover if smart meter technology is available in your area.
- Include the cost of smart meter technology in your project budget.

# 2

## PREDEVELOPMENT PHASE

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### **Common Misconception: Residential Buildings Near Transit**

While transit-oriented development (TOD) projects are becoming recognized as beneficial to communities, it is common for local representatives, planning officials and residents to be misinformed about their benefits. These groups often have concerns about the increase in density or the noise produced from passing trains. Be mindful of this during the project's schematic design. There are many design techniques that eliminate the sound transmission from train tracks, including the installation of sound walls, double-paned windows and mature landscaping. Also consider orienting the building in a direction that prevents units from facing directly onto the tracks. TOD projects are a great way to make transportation affordable to low-income residents, as well as providing linkages to jobs, schools and community resources.

### **Common Misconception: Energy Performance**

It is a well-known fact that using energy efficient appliances and light bulbs will contribute to improved energy performance of a dwelling. However, the energy performance of your building is more greatly affected by the construction strategies that are implemented during the Predevelopment phase. The decisions concerning energy affect the entire project team, particularly the owner; architect; mechanical, electrical, and plumbing engineer; energy consultant; and general contractor. It is imperative the team work in concert through an integrated design process to select major building systems, such as the type of HVAC unit, hot water heater, boiler, insulation strategy and even window type. Each region will have different considerations when selecting these items based on availability, market trend and cost. However, keep in mind that you are not obligated to select the first system recommended by your engineer. The energy consultant may present different systems or strategies that will result in higher energy performance of your building, based on a prescribed energy efficiency program standard (such as ASHRAE 90.1).

During the Construction phase, your general contractor will need to monitor the installation of the systems selected during Predevelopment. If you are using innovative systems or materials that are not regularly used by the contractors in your area, the contractor may be unfamiliar with the proper installation. Therefore, be prepared to conduct preconstruction meetings with your framer, insulator, HVAC, and other subcontractors before they begin work. This will ensure that your building systems perform at or above their designed energy efficiency level.

# 2

## PREDEVELOPMENT PHASE

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### Conclusion to the Predevelopment Phase

At the end of the Predevelopment phase, your development team should be ready to begin construction on the proposed project. This includes completing the construction financing closing and obtaining all entitlements and building permits.

During the Construction phase, the developer's focus shifts from that of planning to implementation. This often includes attendance at construction meetings, responding to design problems that occur in the field, and reporting to lenders on the progress of the project. The next chapter will provide guidance on how to ensure that the green goals identified in the Predevelopment phase are implemented in the Construction phase.

### Resources for the Predevelopment Phase

**Enterprise Green Communities Criteria** – The Enterprise Green Communities Criteria are the first national framework for green affordable housing. The Criteria provide developers of all types of affordable housing projects with a proven, cost-effective roadmap and reference standard for creating healthy, efficient and environmental responsible homes. Find the criteria at [www.EnterpriseCommunity.org/greencriteria](http://www.EnterpriseCommunity.org/greencriteria).

**Enterprise Green Communities Certification Pathway** – Enterprise offers an online process for certifying green affordable housing developments. The process is available at no cost for affordable housing developers that can demonstrate their qualifications to successfully complete their proposed project. Find the certification pathway at [www.EnterpriseCommunity.org/certification](http://www.EnterpriseCommunity.org/certification).

**Green Multifamily Rehabilitation Specifications** – This document is a compilation of model specifications used to integrate green building strategies in multifamily rehabilitation projects. The specifications are designed to meet the Enterprise Green Communities Criteria. Find these specifications at [www.EnterpriseCommunity.org/retrofit](http://www.EnterpriseCommunity.org/retrofit).

**Green Single Family Rehabilitation Specifications** – This document is a compilation of model specifications used to integrate green building strategies in single family rehabilitation projects. The specifications are designed to meet the Enterprise Green Communities Criteria. Go to [www.EnterpriseCommunity.org/greentools](http://www.EnterpriseCommunity.org/greentools) and set the filter to Green Specification Model Documents.

# CONSTRUCTION PHASE

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# 3

## CHAPTER THREE: CONSTRUCTION PHASE

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### Introduction and Goals to the Construction Phase

#### **Finalize financing and complete construction of the site.**

During the Construction phase, it is important to ensure that the green goals selected by the project team are well implemented. If the general contractor has completed prior green developments, it is likely they are familiar with the construction standards and submittals typically required. This is an ideal situation for any green affordable project. Generally speaking, the developer will work with the design team to ensure the project is being built according to the plans and specifications developed during the Predevelopment phase. You may also choose to work with your energy consultant or mechanical engineer to test the efficiency of certain systems as they are installed. The following chapter provides guidance on areas that may require special attention during the Construction phase, particularly in the categories of Integrative Design, Location and Neighborhood Fabric, Site Improvements, Water Conservation, Energy Efficiency, Materials Beneficial to the Environment, and Health Living Environment.

### Integrative Design During the Construction Phase

During the Construction phase, ensure the green development plan has been properly communicated to the construction team and that a team member, most likely the architect, has been charged with enforcing the requirements.

ENTERPRISE  
GREEN  
COMMUNITIES  
CRITERIA  
CATEGORIES:

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#### 1.1A + 1.1B

#### **GREEN DEVELOPMENT PLAN**

An integrative design process facilitates the design and development team's achievement of green objectives throughout the project life cycle.

- Hold a preconstruction meeting with your general contractor to review the Green Development Plan, and the roles of each team member during the Construction phase.
- Ensure that the plans and specifications provided for each subcontract include the Enterprise Green Communities Criteria.
- If needed, refer to the plans and specifications to obligate the general contractor's commitment to green design.



# 3

## CONSTRUCTION PHASE

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### Location and Neighborhood Fabric During the Construction Phase

The Location and Neighborhood Fabric section is generally in place by the time the project reaches the Construction phase; however, ensure the project continues to meet the requirements for the LEED ND certification, if applicable.

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#### 2.13

#### LEED FOR NEIGHBORHOOD DEVELOPMENT CERTIFICATION

LEED for Neighborhood Development is designed to certify exemplary development projects that perform well in terms of smart growth, urbanism, and green building.

- Work with your architect and LEED ND consultant to upload required documentation to LEED online.

### Site Improvements During the Construction Phase

The site work is one of the first tasks to occur during the Construction process. It can also be the most risky if your project includes soil remediation or is located on an urban infill site. The site investigation that occurs during the Predevelopment phase is often times a “best guess” of what exists on the site, based on historical information and test borings. There may still be some unknowns that will only be uncovered when the site work begins. This is a common occurrence, and it will most likely be a topic of discussion with your contractor during the first few months of construction.

---

#### 3.1

#### ENVIRONMENTAL REMEDIATION

*The environmental site assessment determines the potential environmental liabilities associated with property acquisition and ownership.*

- Confirm the disposal rates for contaminated and non-contaminated classified soil. The testing of the soil removed in the field may indicate that previously assumed contaminated soil can be disposed of in a facility that would classify it as “uncontaminated”, based on the level of toxins found in the soil.
- After remediation is complete, your environmental consultant may need to submit a final report to the city, state, or local environmental agency. Ensure this report is completed in a timely manner. Don’t forget to consider the time it might take for this agency to complete its review.

# 3

## CONSTRUCTION PHASE

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### 3.2

#### EROSION AND SEDIMENTATION CONTROL

*Erosion and sedimentation control during site development keeps valuable topsoil on site and reduces pollution, stormwater runoff and sedimentation associated with construction activities into local waterways.*

- The local municipality or applicable jurisdiction may require that Erosion and Sedimentation Control measures are in place prior to construction. If necessary, schedule a preconstruction meeting with the agency and the general contractor to ensure these measures are properly placed.
  - Work with your contractor to ensure these measures are being enforced during rain events that occur during construction. Generally speaking, this includes placing sand bags along the perimeter of the site and around stormwater inlets.
  - Ensure the contractor is cleaning any dirt or debris washed into the public street or right-of-way. It is common for the contractor to receive a citation from the local municipality if this is not properly completed. Any related fines are contractor's responsibility and should not be paid by the owner.
- 

### 3.3

#### LOW IMPACT DEVELOPMENT

*Low impact design and development principles minimize the site's environmental footprint.*

- If swales, retention basins or permeable pavement measures will be used, the construction period is a useful time to confirm that the soil in these areas is infiltrating water well.
  - Ensure areas to be used for infiltration are not overly compacted by construction machines and trucks passing through the site.
- 

### 3.4

#### LANDSCAPING

*Native and adaptive plants are well suited to the climate and provide excellent erosion, sediment, dust and pollution control.*

- During construction, it may be helpful to visit the nursery that your trees are coming from to pick out your selection. Ensure the trees you select are placed "on hold".
- Some landscaping will need to be planted at certain times of the year in order to thrive (typically during the Fall season). Be mindful of this because your construction completion may occur outside the planting season. If so, the landscape may need to be planted during the Operations phase.

# 3

## CONSTRUCTION PHASE

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### 3.5

#### EFFICIENT IRRIGATION AND WATER REUSE

*Accurate delivery of water reduces evaporation and eliminates overspray, while proper scheduling eliminates fluctuations between wet and dry states that stress plants.*

- A temporary irrigation system may be needed in order to establish the plants.
  - Include the irrigation system in commissioning to ensure proper operation of the system.
  - Your contractor should provide training on the proper use of the irrigation system to the property manager and maintenance staff.
- 

### 3.6

#### SURFACE STORMWATER MANAGEMENT

*Retain, infiltrate and /or harvest stormwater on site. Select one of the following: partial stormwater retention or full stormwater retention.*

- As construction begins, pay attention to the site's permeability during large rain events. This will provide a first-hand look at how well your site will infiltrate water during the Operations phase.
- If large portions of the site will be excavated due to underground retention, work with your contractor to use the excavated soil to re-grade other parts of the site. This will save money on unnecessary disposal fees.
- Ensure areas to be used for infiltration are not overly compacted by construction machines and trucks passing through the site.

### Water Conservation During the Construction Phase

The role of the owner during construction is to ensure that the contractor is properly installing the equipment and fixtures that were specified during the Predevelopment phase. We encourage you to work with your architect to review the shop drawings submitted by the contractor during construction, to verify that the contractor is ordering water-conserving materials according to the specifications.

# 3

## CONSTRUCTION PHASE

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### 4.1 – 4.2

#### WATER CONSERVING FIXTURES AND APPLIANCES

*Install or retrofit water-conserving fixtures and appliances in all units and any common facilities.*

- During construction, have a process in place to ensure the water-conserving fixtures you specified are the ones being installed.
  - Monitor installation of fixtures to ensure the water-saving measures are installed properly.
  - Verify the performance of faucets and showerheads with a water meter bag. Adjust the site water pressure or add aerators to fixtures that do not meet your project goals.
  - Install measures that prevent residents from changing water fixtures.
  - During construction, check for upgrades to appliances and fixtures stated in your specifications. Manufacturers often release a more efficient product between the drafting of project specification and the time that your contractor will make purchases.
- 

### 4.3

#### WATER REUSE

*Harvest, treat, and reuse rainwater and /or greywater to meet a portion of the project's water needs.*

- Ensure rainwater is being collected as designed, and that rainwater is not inappropriately entering into the building or basement.

#### Energy Efficiency in the Construction Phase

The energy efficiency measures selected during the Predevelopment phase will only perform well if the appropriate fixtures and appliances are installed by the contractor. During construction, work with your architect to review the shop drawings provided by your contractor for the fixtures and equipment. These should match the items listed in your project specifications or provide an equivalent energy rating. You may also consider engaging an energy consultant to test the efficiency of equipment after it is installed in the building and/or take photos as equipment is being installed. Construction photos are particularly helpful for equipment that will be located behind a wall after installation is complete. Be prepared to correct your contractor as needed.

# 3

## CONSTRUCTION PHASE

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### 5.1A – 5.1D

#### BUILDING PERFORMANCE STANDARD

*Certify the project under ENERGY STAR New Home or EPA's Multifamily High-Rise program (MFHR) using either the prescriptive or the performance pathway or Home Energy Rating System (HERS) Index or ASHRAE 90.1-2007.*

- Ensure the trades are implementing all the energy measures your team selected.
- Your energy consultant will need to update the energy model to reflect how the building was constructed and ensure the project still complies with the Enterprise Green Communities requirements.

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### 5.3

#### SIZING OF HEATING AND COOLING

*Heating and cooling equipment should be sized in accordance with the Air Conditioning Contractors of America (ACCA) manuals , Parts J and S, or ASHRAE handbooks.*

- Ensure all ducts are properly sealed and insulated (if specified) to prevent system leaks.

---

### 5.4

#### ENERGY STAR APPLIANCES

*If providing appliances, install Energy Star-labeled clothes washers, dishwashers and refrigerators.*

- During construction, check for upgrades to appliances and fixtures listed in the project specifications. Manufacturers often release more efficient products by the time your contractor makes purchases.

---

### 5.5A – 5.5C

#### EFFICIENT LIGHTING

*Install Energy Star-qualified fixtures and lamps, as appropriate for the project type.*

- Ensure energy efficient lighting and fixtures are being installed as per the project specifications.

# 3

## CONSTRUCTION PHASE

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### 5.6A + 5.6B

#### ELECTRICITY METER

*Install individual or sub-metered electric meters in all dwelling units.*

- Contact your local utility company to schedule installation of the appropriate electricity meter(s) for your project. Service typically cannot begin until the meters are installed.
- Ensure the utility company or electric subcontractor provides separate meters for retail, residential, and common areas, so that bills can be properly attributed to each owner when the building opens.

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### 5.7A + 5.7B

#### PHOTOVOLTAIC/SOLAR HOT WATER READY

*Install or design for the future installation of photovoltaic panels, wind turbines, or other electric-generating renewable energy sources to provide a specified percentage of the project's energy demand.*

- Submit all paperwork required by your roof manufacturer to make certain the installation of the photovoltaic system does not void the roof warranty.
- Submit paperwork for any local incentive programs that may provide a rebate or financial incentive for the installation of your system.
- Contact your local electric utility company to guarantee the proper meter will be installed for your system and that you will receive any available electric use credit. The system may not be activated until the proper metering system is in place.

---

### 5.8

#### ADVANCED METERING INFRASTRUCTURE

*Accommodate the installation of smart meters and/or be able to interface with smart grid systems in the future.*

- Work with your local utility company for the proper installation of advanced metering infrastructure.
- Work with your architect to ensure the smart readers are included in the electrical subcontract.
- Contract with your local utility company or smart metering company to obtain electric, gas and water usage information during the Operations phase.

# 3

## CONSTRUCTION PHASE

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### Materials Beneficial to the Environment in the Construction Phase

The materials in your building are its most visible feature and the part that residents will interact with the most. It is important the contractor abide by the VOC regulations included in the specifications, as this will greatly impact the building's air quality. During construction, it is vital that the contractor keep a "clean" site by disposing of garbage (from lunch time), as well as construction waste, every day. If the owner regularly visits the site, remind the contractor to keep the construction site "presentable". Site visits are also an ideal time to collect receipts or tickets required to prove that the materials are being ordered accordingly.

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#### 6.1 LOW/NO VOC PAINTS AND PRIMERS

*All interior paints and primers must be less than or equal to the prescribed VOC levels.*

- Ensure contractors are using the low/no VOC paints and primers as per the project specifications.
  - Request receipts and invoices that reflect the VOC level for the paints and primers used on the project.
  - Ask your architect to include in the project specifications the proper brushes and rollers required for low/no VOC paint.
  - Request that the contractor provide submittals for the low/no VOC products.
  - Conduct regular site visits during the Construction phase and take photos of products being used on site.
  - Request copies of receipts and labels of low/no VOC products to confirm they are being used.
- 

#### 6.2 LOW/NO VOC ADHESIVES AND SEALANTS

*All adhesives must comply with Rule 1169 of the South Coast Air Quality Management District. All caulks and sealants must comply with regulation 8, rule 51 of the Bay Area Air Quality Management District.*

- Ensure contractors are using the low/no VOC adhesive and sealants as per the project specifications.
  - Request receipts and invoices that reflect the VOC level for the adhesives and sealants used on the project.
-



# 3

## CONSTRUCTION PHASE

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- Ask your architect to include the proper application procedure in the project specifications.
  - Request that the contractor provide submittals for the low/no VOC products.
  - Conduct regular site visits during the Construction phase and take photos of products being used on site.
  - Request copies of receipts and labels of low/no VOC products to confirm they are being used.
- 

### 6.3 + 6.4

#### CONSTRUCTION WASTE MANAGEMENT

*Commit to a waste management plan that reduces non-hazardous construction and demolition wasted by at least 25% by weight.*

- Ensure your contractor is properly sorting and disposing of construction waste. Sorting may occur on- or off-site.
  - Work with your contractor to locate material recycling facilities, if needed.
  - Request that your contractor provide multiple dumpsters for proper sorting of construction waste on-site. The dumpsters should be labeled in various languages to accommodate the diversity of your construction team.
  - Request construction waste manifests from your contractor for the disposal and off-site sorting of construction waste.
- 

### 6.5

#### RECYCLING STORAGE FOR MULTIFAMILY PROJECT

*Provide one or more easily accessible, permanent areas for the collection and storage of materials for recycling.*

- If recycling storage units were not included in the construction contract, be sure to provide this to each unit from your FF&E budget line item.
- 

### 6.6

#### RECYCLED CONTENT MATERIAL

*Incorporate building materials that are composed of at least 25% post-consumer recycled content or at least 50% post-industrial recycled content.*

- Request manufacturing information from your contractor for recycled content building materials.

# 3

## CONSTRUCTION PHASE

- Ensure the contractor is notifying all subcontractors of the recycled content material requirements by including forms and specifications in each subcontractor bid request.
- Ensure submittals from the contractor include recycled content material and methodologies for achieving this credit.

### 6.7

#### REGIONAL MATERIAL SELECTION

*Use products that were extracted, processed, and manufactured within 500 miles of the building for a minimum 50% of the building material value.*

- Instruct your contractor to calculate the percentage of regional materials that were extracted, processed, and manufactured within 500 miles of the project.
- Request invoices and receipts for regional materials that prove they are manufactured locally.

### 6.8

#### CERTIFIED, SALVAGED, AND ENGINEERED WOOD PRODUCTS

*Commit to using wood products and materials of at least 25% that are FSC certified, salvaged products, or engineered framing materials without urea-formaldehyde binders.*

- Instruct your contractor to calculate the percentage of certified, salvaged and engineered wood products for your project.
- Request receipts and certificates for certified, salvaged and engineered wood products.

### 6.9A + 6.9B

#### REDUCED HEAT ISLAND EFFECT

*Use Energy Star-compliant roofing or install a “green” vegetated roof for at least 50% of the roof area. Use high albedo materials or open grid pavement for at least 50% of the hardscape.*

- Work with your roof manufacturer to ensure the installation of any vegetated roof material will not affect the roof warranty.
- During construction, it is advised to visit the nursery providing the vegetated roof material to ensure plants are being properly established.
- Ensure that a temporary irrigation system (i.e. hose bib) is set up on the roof for establishing the vegetated roof after it is planted.

# 3

## CONSTRUCTION PHASE CASE STUDY

### **Serviam Gardens – Bronx, NY** **Fordham Bedford Housing Corporation**

Of all the Green Communities developments that we have assessed, the planning documents and Green Development Plan at Serviam Gardens are among the most thorough. Planning documents showed which criteria would or would not be attempted and who would be responsible for different actions throughout construction. Implementation of the specs was also verified throughout construction. Part of the project's success may be attributed to many of the Green Communities Criteria being the norm for the developer, Fordham Bedford Housing Corporation. The project team was already familiar with green building and clearly invested in the success of the development. Two people oversaw implementation of the Green Communities criteria into all phases of construction, and they also worked closely with the each building's maintenance supervisor, all of whom had previous green experience.

Serviam Gardens also performed well on site. The vast majority of the Criteria were implemented, and the feedback the project team provided on implementation techniques demonstrated their commitment to internalizing the best way for their team

to implement the Green Communities Criteria. For instance, they found that while the painters enjoyed using the thick, low-VOC wall paint, the low-VOC latex-based paint used on the floor of the boiler room soon peeled off of the floor due to the high relative humidity. The maintenance staff found that not all of the green cleaning products were in fact useful (floor wax). Also, one of the dual-flush toilet models initially installed had malfunctioned for residents, requiring the superintendent to devise a way to adjust them to work properly.

From the thoughtful planning documents and specifications to the Criteria verification during the construction process, and sensitivity to resident population cultural norms, Serviam Gardens is a fine example of a Green Communities development. The thoughtful planning, implementation and trouble-shooting is evidence of a project team that is committed to program success and carrying forth lessons learned.



# 3

## CONSTRUCTION PHASE

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### Healthy Living Environment in the Construction Phase

The materials used to create a healthy living environment will greatly affect the quality of life provided to your future residents. During construction, it is vital to ensure these materials are installed correctly, so that the building systems will perform at their highest capacity. Consider hiring a third-party inspector to provide systems testing, particularly as it relates to ventilation and exhaust. Proper performance of these systems provides long-term benefits to the building's durability by preventing the formation of mold, blocking the intrusion of pests, and isolating harmful fumes.

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#### 7.1

#### COMPOSITE WOOD PRODUCTS

*Use certified composite wood that is compliant with California 93120 or seal edges of composite wood with low-VOC sealants.*

- If composite wood products do not arrive at the site with the proper sealing, ensure this is completed with a low/no-VOC sealant before installation.
- 

#### 7.2 + 7.3

#### ENVIRONMENTALLY PREFERABLE FLOORING

*Use carpets, carpet pad and carpet adhesives that have been certified Green Label or Green Label Plus. Do not install carpets in bathrooms, kitchens, utility rooms or basements. Use ceramic or hardwood floors or flooring materials in compliance with the Floorscore program criteria.*

- Ensure the subfloor is properly prepared prior to flooring installation. For example, if flooring will be applied to a concrete plank or foundation, ensure that the concrete is properly cured before installation.
- 

#### 7.4A + 7.4B

#### EXHAUST FANS: BATHROOMS

*Install EnergyStar-labeled bathroom fans that exhaust to the outdoors, are connected to a light switch, and are equipped with humidistat sensor, timer or other control.*

- Conduct testing to ensure all fans are producing the CFM that was listed in the project specifications. Make adjustments on site, if needed.
-

# 3

## CONSTRUCTION PHASE

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### 7.5A + 7.5B

#### EXHAUST FANS: KITCHENS

*Install power-vented fans or range hoods that exhaust to the exterior at the appropriate CFM rate, per ASHRAE 62.2 or install a central ventilation system.*

- Ensure all fans exhaust to the outside.
- Test the CFM performance to ensure it meets the requirements in the project specifications.

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### 7.6A + 7.6B

#### VENTILATION

*Install a ventilation system for the dwelling unit capable of providing adequate fresh air per ASHRAE requirements for the building type.*

- Even if a premium product is purchased for the ventilation system, the systems are not often installed well and, therefore, tend to perform very poorly. Refer to the best practice installation guides while installing these systems, which require contractors to verify their performance after they are installed.

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### 7.7

#### CLOTHES DRYER EXHAUST

*Clothes dryers must be exhausted directly to the outdoors using rigid-type duct work.*

- If a clothes dryer that requires exhaust is to be installed, ensure the system exhausts to the exterior and there are no leaks in the exhaust equipment.

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### 7.8

#### COMBUSTION EQUIPMENT

*Specify power-vented or closed-combustion equipment when installing new space and water heating equipment.*

- Ensure all of the CO alarm systems in the building are installed with the proper battery and are ready to use upon resident move in.

# 3

## CONSTRUCTION PHASE

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### 7.9A – 7.9C

#### MOLD PREVENTION

*Use non-paper-faced backing materials such as cement board, fiber cement board or equivalent in bathrooms.*

- Ensure all water heaters with tanks have catch pans or drains properly installed.
- Check for the proper sealing of surfaces in bathroom, kitchen and laundry rooms.

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### 7.10

#### VAPOR BARRIER

*Install vapor barriers that meet specified criteria appropriate for the foundation type.*

- Ensure the vapor barrier is properly installed, as per the plans and specifications.

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### 7.11

#### RADON MITIGATION

*For new construction in EPA Zone 1 and 2, install passive radon-resistant features below the slab or for rehab, test for the presence of radon and mitigate, if necessary.*

- If you have not done so already, sign a contract for the long-term monitoring of your radon system, if necessary, for your project.

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### 7.12

#### WATER DRAINAGE

*Provide drainage of water away from windows, walls and foundations by implementing a list of techniques.*

- Test water drainage on the building and site after measures are installed. Also, test for leaks or slopes that lead toward the building that may not have been caught during design.

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### 7.13

#### GARAGE ISOLATION

*If a garage is present, provide a continuous air barrier between the conditioned living space and any garage space and install a CO alarm inside the room adjacent to the garage and outside all sleeping areas.*

- Ensure all of the CO alarm systems in the building are installed with the proper battery and are ready to use upon resident move in.

# 3

## CONSTRUCTION PHASE

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### 7.14

#### INTEGRATED PEST MANAGEMENT

*Seal all wall, floor and joint penetrations with low-VOC caulking or other appropriate sealing methods to prevent pest entry.*

- Work with your property manager to create an integrated pest management plan that will be implemented during building operations.
  - Work with your property manager to develop guidance materials for residents that can reduce pest problems in the building.
  - Request proposals from pest control companies for the long-term maintenance of the building. Ask the companies if they have a green approach to pest management or use pesticide-free products.
- 

### 7.15

#### LEAD SAFE WORK PRACTICES

*For properties built before 1978, use lead-safe work practices consistent with the EPA's Renovation, Repair, and Painting Regulation and applicable HUD requirements.*

- Request final remediation report and certification of the removal of lead-based paint in the building. This may be required before the general contractor can continue work in the building.
  - File the report and certification with the applicable approving agency, if required.
  - Notice to local authorities (such as your building department) may be needed prior to remediation, so that they can verify the remediation was properly completed.
- 

### 7.16

#### SMOKE FREE BUILDING

*Implement and enforce a no-smoking policy in all common, individual living areas, and with a 25-foot perimeter around the exterior of all residential buildings.*

- Order signs that delineate the smoking policy (i.e. no smoking or designated smoking areas) for posting during construction.
- Work with your property manager to include the smoking policy in the residential lease documents.



# 3

## CONSTRUCTION PHASE CASE STUDY

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### **New San Marco – Duluth, Minnesota Center City Housing Corp**

It seemed as though this development, designed to serve a very specific population, was conceived of, designed, and constructed with teamwork and great competence. This was not only true in the early stages of the project, but post-construction follow through was apparent as well. The team at New San Marco not only hired an energy modeling company to conduct a preliminary report to inform their design decisions, but the Weidt group also performed a post-construction assessment of the building to verify their earlier assumptions and suggestions. The homeowner manual and the maintenance guide for New San Marco are also terrific. Both are specific, clear, and easy to read, and describe the intent of the building features as well as how residents and the maintenance staff should interact with them. While simultaneously managing to care for groups of people with different needs in one structure and fitting into the neighborhood after initial community resistance, New San Marco also met the Green Communities requirements with ease. The specifications were clear with regard to low-VOC adhesives, sealants, primers, and cabinet material; The building sits on the corner of a city block with several entrances connecting to sidewalks leading downtown; it has simple, climate-appropriate landscaping; each unit tested well beneath the envelope tightness standard; the unit bath ventilation fan was tied to the bath light and/or a timer; and other measures were taken towards green above and beyond Green Communities, including construction waste management and a pre-occupancy building flush out.



The New San Marco specifications also contain great Quality Control (QC) tidbits, including mandating that a sign be posted throughout construction notifying workers that they are constructing a healthy building and that un-approved substitutions for certain materials are prohibited. While this, and the others included, may seem trivial, notes such as these are rare and to be commended. New San Marco's signage throughout the development informed subcontractors of the requirement to submit written approval for any product or material changes from the specifications to ensure that healthy building materials are installed.



# 3

## CONSTRUCTION PHASE

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### **Common Misconception – Ventilation Systems**

Creating a ventilation strategy that works as a whole building system is more complicated than simply installing exhaust fans in the bathroom and kitchen that vent to the exterior. Fan installation in individual residential units – in conjunction with balancing the air flow through the hallways and public corridors – is critical to improving your building's air quality. The first step to ensuring that a fan will ventilate the space in which it is installed is specifying and purchasing a fan with the proper CFM rating, Energy Star designation and control system. During construction, the owner and general contractor should monitor the installation of each fan in order to maximize their efficiency. This includes sealing any gaps that may be left between the bath fan housing and the drywall of the bathroom to prevent airflow from entering the building cavity, rather than the duct system. Proper sealing will guarantee that the fan operates at its designed CFM.

### **Conclusion to the Construction Phase**

As the project nears the end of the Construction phase, more attention will be paid to the marketing and lease up of the building. This will include re-engaging the property manager and developing the building manuals that will be distributed during the Operations phase. All steps will be taken to prepare the building for its new residents and make certain that the staff is ready to create the healthy community that was intended. The next chapter will focus on preparing for building maintenance and the establishment of the residential community.

# 3

## CONSTRUCTION PHASE

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### Resources for the Construction Phase

**Green Leader Toolkit** – Green Leaders inform their neighbors through a series of educational workshops and events that address: energy, water, recycling and healthy living, called the “Green & Healthy Living” program. This toolkit provides easy step-by-step instructions for a series of fun workshops and events on green living and the proper care and maintenance of homes. Go to [www.EnterpriseCommunity.org/residentengagement](http://www.EnterpriseCommunity.org/residentengagement) and scroll down to the Green Leader Toolkit

**Sustainable, Affordable, Doable** – This report collects firsthand experiences and lessons from participants in eight Enterprise Green Communities developments. Go to [www.EnterpriseCommunity.org/greentools](http://www.EnterpriseCommunity.org/greentools) and set the filter to Research.

**Best Practices Series** – In 2011, Bank of America sponsored an Enterprise Live Online Events (LOEs) series highlighting some of the best practices in green affordable housing. In six separate sessions, experts from across the country shared their experiences with behavioral change and green living, integrative design, health impact assessments, fresh food access, high performance building trends and carbon emissions reductions. Go to [www.EnterpriseCommunity.org/greenresources](http://www.EnterpriseCommunity.org/greenresources) and look under Training & Technical Assistance for the Bank of America Best Practices Series.

# OPERATIONS PHASE

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# 4

## CHAPTER FOUR: OPERATIONS PHASE

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### Introduction to the Operations Phase

#### **Close on permanent financing and complete marketing and lease up.**

The green design process doesn't end when construction is complete. The Operations phase is an important time for the owner and residents of the development to familiarize themselves with the new building materials and mechanical systems that have been put into place. It is important to work closely with your contractor and property management staff to ensure everyone understands the proper way to maintain the healthy living environment that has been created. This will include the creation of a regular maintenance schedule, the solicitation of maintenance contracts, and the education of the residents. The following chapter will provide recommendations that will make this transition from planning and construction to the long-term operation of the building a little easier, particularly as it relates to the Site Improvements, Water Conservation, Energy Efficiency, Materials Beneficial to the Environment, and Health Living Environment, and Operations & Maintenance categories.

### Site Improvements During the Operations Phase

Following construction, the maintenance and upkeep of the site improvement measures will be the responsibility of the property management team. It is important to ensure the operations staff is fully trained in all systems and have an operations and maintenance plan in place.

ENTERPRISE  
GREEN  
COMMUNITIES  
CRITERIA  
CATEGORIES:

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#### 3.4

##### **LANDSCAPING**

- Construction warranties may cover plants that die within the first year.
- Drought-resistant plants may require watering during the first year of planting to establish their growth.

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#### 3.5

##### **EFFICIENT IRRIGATION AND WATER REUSE**

- Provide your maintenance staff with the proper operating instructions for the irrigation and water reuse systems.
- Work with the landscape architect to develop an irrigation schedule for the different types of plants that were included in the project.
- After the building has been constructed and landscaped, ensure that your staff and/or contracted landscape caretaker has a specific and appropriate irrigation plan in place. The best intentions for the project at the design stage will be lost if your team is not careful and specific about developing and implementing an irrigation plan.

# 4

## OPERATIONS PHASE

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### 3.6

#### **SURFACE STORMWATER MANAGEMENT**

- Train your maintenance staff in the proper cleaning procedures for the stormwater management systems that have been installed.
- Consult with your architect or engineer to determine if the local municipality will require regular inspections of the system.

#### **Water Conservation During the Operations Phase**

- During operations, the property manager and maintenance staff will need to make certain that the building is being maintained in a way that maximizes the water-conserving methods that were put into place during Predevelopment and Construction. The staff should work with the residents to provide training on water conservation techniques. Also,
  - confirm that the maintenance staff understands the guidelines for proper irrigation of the drought-resistant plantings and green roof materials.
- 

### 4.1 – 4.2

#### **WATER CONSERVING FIXTURES AND APPLIANCES**

*Install or retrofit water-conserving fixtures in all units and any common facilities*

- As part of a unit turn-over, ensure that the original fixtures and water-conserving mechanisms are still installed and operate well.  
Ensure that residents do not remove water-saving measures installed in the fixtures.
- 

### 4.3

#### **WATER REUSE**

*Harvest, treat and reuse rainwater and/or greywater to meet a portion of the project's water needs.*

- Provide maintenance training of water reuse systems to your building staff.
- Work with your building staff to ensure they are properly maintaining the water reuse systems. This may include regular cleaning or flushing of the systems.
- Schedule regular inspections of the systems, if required.

# 4

## OPERATIONS PHASE

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### Energy Efficiency During the Operations Phase

During construction, the contractor implemented the energy-saving techniques that were designed by the architect and energy modeler. It is the property management and maintenance staff's responsibility to maintain these systems and enforce energy-conserving measures. Residents should be trained in energy conservation techniques, and staff should ensure the building infrastructure continues to perform at its highest level. This includes preparing maintenance schedules, but also keeping items such as CFL bulbs on hand for replacement.

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#### 5.1A – 5.1D

#### BUILDING PERFORMANCE STANDARD

*Certify the project under Energy Star New Homes, EPA's Multifamily High Rise program, HERS index.*

- If you have an Energy Star project, you will need to work with your architect or energy modeler to finalize the certification. This may include providing evidence of the actual energy performance.
  - If you are using CFL light bulbs for energy efficiency, be aware these light bulbs contain mercury and will need to be disposed of properly. CFLs cannot be placed in the regular trash as they will contaminate landfill soil.
- 

#### 5.2

#### ADDITIONAL REDUCTIONS IN ENERGY USE

*Improve whole-building energy performance by percentage increment above baseline building performance standard for additional points.*

- Work with your architect or energy modeler to confirm the energy performance of your building during operations.
- Consider using thermographic technology to locate areas where the building may be losing heat or is “leaking energy”.
- Conduct a post-construction energy model to confirm your building's energy performance, and then explore ways to make improvements, if necessary.

# 4

## OPERATIONS PHASE

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### 5.3

#### SIZING OF HEATING AND COOLING

*Size heating and cooling equipment in accordance with the Air Conditioning Contractors of America (ACCA) manuals, Parts J and S, or ASHRAE handbooks.*

- After construction, it may be necessary to confirm that the HVAC is properly balanced. For example, you may find that certain areas get colder than others when the air conditioner is operating.
- Train the staff on how to set the thermostat in the common areas.
- As part of the resident orientation, provide training to residents on the use of the programmable thermostats in their unit. Consider pre-setting the thermostats before residents move in.
- Consider using thermographic technology to locate areas where the building may be losing heat or is “leaking energy”.

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### 5.4

#### ENERGY STAR APPLIANCES

*If providing appliances, install Energy Star-labeled clothes washers, dishwashers and refrigerators.*

- Preset appliances to their most efficient setting before the residents move in.

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### 5.5A – 5.5C

#### EFFICIENT LIGHTING

*Install Energy Star-qualified fixtures and lamps as appropriate for the project type.*

- Ensure replacement bulbs or fixtures are provided to the maintenance staff.
- Inform residents that maintenance of lights is available in order to maintain efficiency during operations.
- Ensure lighting sensors are regularly cleaned so they continue to operate properly.

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### 5.6A + 5.6B

#### ELECTRICITY METER

*Install individual or sub-metered electric meters in all dwelling units.*

- Include utility disclosure forms in the resident lease agreements which will allow you to obtain new information when apartments turn over. Work with the property manager to obtain this information.
- Consider providing incentives to residents to provide their utility account numbers in order to obtain information on the building’s energy usage (i.e., request a deposit that will be returned when the account number is provided).

# 4

## OPERATIONS PHASE

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### 5.7A + 5.7B

#### PHOTOVOLTAIC/SOLAR HOT WATER READY

*Install or design for the future installation of photovoltaic panels, wind turbines or other electric-generating renewable energy sources to provide a specified percentage of the project's energy demand.*

- Before the solar panels can be connected, the utility company may need to visit the site and confirm the proper installation of the electric meter that is connected to the PV system.
  - The PV panel installer should train your maintenance staff on system care and maintenance.
  - Ask your PV installer if they operate a website that can track the energy created by your PV system. If so, consider tapping into this resource and displaying the usage in a public area.
  - Restrict access to these systems so that only trained staff can occupy the roof area and mechanical rooms.
  - If your state, city or local municipality has incentive programs for the production of green energy, complete the appropriate forms to receive the proper credit. This is typically completed after the system is fully installed.
- 

### 5.8

#### ADVANCED METERING INFRASTRUCTURE

*Accommodate the installation of smart meters and/or be able to interface with smart grid systems in the future.*

- Work with your utility company or smart meter program to gather electric, water and gas usage information.
- Request monthly reports on usage.
- Consider opportunities for sharing the usage information with your residents as an opportunity for conservation education.
- Smart meters can be beneficial to your project by detecting water leaks in residential units or by helping to monitor temperature variations in the building.
- Consider creating a monitoring plan that will advise the management staff on how the utility data can be used to benefit the operation of the building.



# 4

## OPERATIONS PHASE

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### Materials Beneficial to the Environment During the Operations Phase

The materials installed in the building during construction will only continue to benefit the residents if those materials continue to be used during the building's operation. It is vital for the property management staff to encourage beneficial residential habits by providing education on recycling practices. These habits will be easier to enforce if the building staff leads by example, through the continual use of low/no-VOC paints, primers, adhesives and sealants. Staff should also be trained in how to maintain areas visible to the residents, such as the green roof or open grid pavement.

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#### 6.1 LOW/NO VOC PAINTS AND PRIMERS

*All interior paints and primers must be less than or equal to the prescribed VOC levels.*

- Ensure the maintenance manual includes the brand and type of paint and primer that were used during construction.
  - Instruct maintenance staff that re-painting should be done using low- or no-VOC paint.
- 

#### 6.2 LOW/NO VOC ADHESIVES AND SEALANTS

*All adhesives must comply with Rule 1169 of the South Coast Air Quality Management District. All caulks and sealants must comply with regulation 8, rule 51, of the Bay Area Air Quality Management District.*

- Ensure the maintenance manual includes the brand and type of adhesives and sealants that were used during construction.
  - Instruct maintenance staff to use low- or no-VOC adhesives and sealants.
- 

#### 6.5 RECYCLING STORAGE FOR MULTIFAMILY PROJECT

*Provide one or more easily accessible, permanent areas for the collection and storage of materials for recycling.*

- Train residents and staff in the proper disposal of recycled materials.
  - Ensure the recycle bins in the trash rooms and public areas are clearly labeled in multiple languages to accommodate a diverse resident population.
  - Provide information for on-site and off-site recycling in the resident manuals.
-

# 4

## OPERATIONS PHASE

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- Use your resident portal or publicly located bulletin boards to encourage residents to sell used furniture, clothing and household goods to each other to reduce waste in the building.
  - If your property manager or maintenance staff has concerns about residents using the trash chutes correctly, consider locking the recycling chute so that the maintenance staff can control the sorting and proper disposal of the recyclable material.
- 

### 6.6

#### RECYCLED CONTENT MATERIAL

*Incorporate building materials that are composed of at least 25% post-consumer recycled content or at least 50% post-industrial recycled content.*

- Continue to use recycled content material products during building operation. This may apply to office supplies (i.e., recycled printer paper), disposal paper products (paper plates and cups for parties) or furnishings.
- 

### 6.7

#### REGIONAL MATERIAL SELECTION

*Use products that were extracted, processed and manufactured within 500 miles of the building for a minimum 50% of the building material value.*

- Provide your property manager with regional material suppliers so that replacement materials can be ordered if necessary.
  - Continue to use regional materials during building operation. This may apply to office supplies, furniture or cleaning/maintenance supplies.
- 

### 6.9A – 6.9B

#### REDUCED HEAT ISLAND EFFECT

*Use Energy Star-compliant roofing or install a “green” vegetated roof for at least 50% of the roof area. Use high albedo materials or open grid pavement for at least 50% of the hardscape.*

- Train your maintenance staff in proper green roof care if applicable to your project. Most green roofs will require little to no watering once they are established.
- During the first two years of operations, the green roofs may require additional maintenance for weeding and watering until they are fully grown.

# 4

## OPERATIONS PHASE

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### Healthy Living Environment During the Operations Phase

A healthy living environment can only occur if the property management and maintenance staff continue to operate the building according to the green practices submitted in the Green Development Plan. This includes using green cleaning products in public areas in order to eliminate additional air contaminants. It is also vital the property management enforces building rules such as a no-smoking policy and provides education on use of bathroom and kitchen fans, if these are not continuous systems. If this is one of your first green developments, there will most likely be a learning curve with the property management and maintenance staff. Encourage them to gain knowledge of how the building performs and make adjustments as needed. There is always room for innovative suggestions when it comes to the maintenance of a green building.

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#### 7.2 + 7.3

#### ENVIRONMENTALLY PREFERABLE FLOORING

*Use carpets, carpet pads and carpet adhesives that have been certified Green Label or Green Label Plus. Do not install carpets in bathrooms, kitchens, utility rooms or basements. Use ceramic or hardwood floors or flooring materials in compliance with the Floorscore program criteria.*

- Work with your contractor to train the maintenance staff on how to properly clean the building's installed flooring. They may not achieve the desired results from conventional mopping and waxing. For example, marmoleum flooring does not produce the "shine" that a more conventional VCT tile would have. In some cases, the care may be less strenuous than your staff is accustomed to.
  - Consider providing new residents with a welcome basket that includes the proper cleaning supplies for their environmentally preferable flooring to encourage proper care. For example, bamboo flooring may benefit from using cleaning supplies with less harsh chemicals.
- 

#### 7.4A – 7.4B

#### EXHAUST FANS: BATHROOMS

*Install EnergyStar-labeled bathroom fans that exhaust to the outdoors, are connected to a light switch, and are equipped with humidistat sensor, timer or other control.*

- At unit turnover, ensure the bathroom exhaust fan works properly and vents remain open.
  - The maintenance staff should routinely clean the vents to remove accumulated dust or debris.
-

# 4

## OPERATIONS PHASE

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### 7.5A – 7.5B

#### EXHAUST FANS: KITCHENS

*Install power-vented fans or range hoods that exhaust to the exterior at the appropriate CFM rate, per ASHRAE 62.2 or install a central ventilation system.*

- At unit turnover, ensure that the bathroom exhaust fan works properly and vents remain open.
- The maintenance staff should routinely clean the vents to remove accumulated dust or debris.

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### 7.6A – 7.6B

#### VENTILATION

*Install a ventilation system for the dwelling unit capable of providing adequate fresh air per ASHRAE requirements for the building type.*

- The general contractor should train the maintenance staff on the care of the ventilation system.
- Include instructions in the building maintenance manual for the proper care of the ventilation system.

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### 7.7

#### CLOTHES DRYER EXHAUST

*Clothes dryers must be exhausted directly to the outdoors using rigid-type duct work.*

- Instruct the maintenance staff to keep the clothes dryer exhaust clear of debris and other obstructions. For example, it is common for birds to nest in dryer vents.
- In order to prevent debris and obstructions, install a protective screen on the outside of the dryer vent if this measure was not included during construction.

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### 7.8

#### COMBUSTION EQUIPMENT

*Specify power-vented or closed-combustion equipment when installing new space and water heating equipment.*

- The general contractor should train the maintenance staff on the regular care of all combustion equipment in the building.
- Include the instructions for proper care of combustion equipment in the maintenance manual.

# 4

## OPERATIONS PHASE

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### 7.9A – 7.9C

#### MOLD PREVENTION

*Use non-paper-faced building materials such as cement board, fiber cement board or equivalent in bathrooms.*

- Within the resident manual, provide guidance on appropriate cleaning procedures for bathroom and kitchen surfaces, and recommendations on green cleaning supplies.
- At unit turnover, ensure the caulking and sealing around bathroom and kitchen surfaces are maintained. Fix or replace any cracked surfaces.
- Install drip pans and automatic shut-off valves to washers, water heaters and boilers as necessary. If a drain appears in any of these areas, ensure the maintenance staff is maintaining them. This may require removing dirt and debris from the drain or providing regular “flushing” so the drains do not dry out and clog.

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### 7.11

#### RADON MITIGATION

*For new construction in EPA Zone 1 and 2, install passive radon-resistant features below the slab or for rehab, test for the presence of radon and mitigate, if necessary.*

- Engage in a contract for regular long-term inspections of the radon system, as necessary.
- Inspection services can typically be provided by the environmental engineer used during predevelopment; or you can request competitive pricing from other firms for the long-term contract.
- Ensure your property manager or maintenance supervisor schedules regular monitoring of your radon system, as required.

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### 7.12

#### WATER DRAINAGE

*Provide drainage of water away from windows, walls and foundations by implementing a list of techniques.*

- Ensure water continues to drain away from the building during large rain events.
- Provide regular maintenance to keep the drainage system clear of obstructions that may cause flooding or overflow.

# 4

## OPERATIONS PHASE

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### 7.13

#### **GARAGE ISOLATION**

*If a garage is present, provide a continuous air barrier between the conditioned living space and any garage space, and install a carbon monoxide (CO) alarm inside the room adjacent to the garage and outside all sleeping areas.*

- Provide regular maintenance and change batteries in all CO alarms.
  - Conduct regular tests on the CO alarms to guarantee they are working properly.
  - Restrict long-term idling of vehicles in the garage in order to reduce the amount of CO released.
- 

### 7.14

#### **INTEGRATED PEST MANAGEMENT**

*Seal all wall, floor and joint penetrations with low-VOC caulking or other appropriate sealing methods to prevent pest entry.*

- Engage in a contract with a pest management company, preferably one that uses environmentally friendly products.
  - Conduct regular inspections to ensure building openings continue to be properly caulked and sealed.
- 

### 7.16

#### **SMOKE FREE BUILDING**

*Implement and enforce a no-smoking policy in all common, individual living areas, and with a 25-foot perimeter around the exterior of all residential buildings.*

- Ask residents to monitor and enforce the building's smoke-free policy.
- Clearly mark smoke-free areas and designated smoking areas.
- Include the smoke-free policy in the resident lease and verbally inform residents of the policy during the lease signing.

# 4

## OPERATIONS PHASE

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### Operations & Maintenance During the Operations Phase

Education and training is one of the most important components of operating a green building. More importantly, ongoing education guarantees that your residents and staff will continually benefit from the green building practices you put into place. The operations period is the ideal time to advertise your building's green features in order to gain public recognition for your project, and also to attract residents during the lease-up process. Including the green features of your development in marketing materials will not only benefit the residents, but will also educate the community about the benefits of green design. This is your time to shine!

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#### 8.1

#### **BUILDING MAINTENANCE MANUAL**

*Provide a building maintenance manual that addresses maintenance schedules and other specific instructions related to the building's green features.*

- The manual should include information on building system warranties and maintenance contracts. These items should be provided by the general contractor.
- Provide a copy to your maintenance staff and keep a copy in the manager's office or at the front desk.
- Collaborate with your general contractor to create the building maintenance manual. This should include any warranties or maintenance agreements associated with building systems.
- The maintenance plan should include information about all of the Healthy Living Environment criteria, so that when equipment is replaced, the building will perform as intended.

# 4

## OPERATIONS PHASE

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### 8.2

#### RESIDENT MANUAL

*Provide a guide for homeowners and renters that explains the intent, benefits, use and maintenance of green building features.*

- Bill the manual's printing costs to your marketing and lease-up budget. Include the cost for additional printing in the annual operations budget.
  - As new residents move in, ensure that the resident manual is provided at the lease signing. Keep extra copies in the manager's office or at the front desk.
  - Consider translating the manual into different languages as determined by your resident population.
  - Include photos in the manual that accurately reflect the building's systems. Avoid using generic photos to describe the project.
  - Include information on the local services and events available to your residents. For example, provide the location of nearby farmers' markets or health fairs that can benefit residents.
  - Provide residents with maps of the transit system, bike paths and hiking trails in the area.
- 

### 8.3

#### RESIDENT AND PROPERTY MANUAL

*Provide a comprehensive walk-through and orientation for residents and property managers using the appropriate building maintenance or resident manual.*

- Walk through the building with your general contractor and property manager to understand the green building features in your project and any maintenance requirements.
- After initial lease-up, hold a community meeting informing residents of the green building features and providing suggestions for cleaning supplies.
- Consider posting flyers or pamphlets that remind residents of the green building features and healthy living practices.
- Consider providing new residents with welcome baskets that include green cleaning supplies.
- Consider educating a selection of residents on the building systems and then scheduling regular resident-led forums, which can be a more successful way of communicating the material.



# 4

## OPERATIONS PHASE

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### 8.4

#### PROJECT DATA COLLECTION AND MONITORING SYSTEM

*Collect and monitor project performance data on energy, water, and if possible, healthy living environments for a minimum of five years.*

- Work with your PV installer and local utility companies to obtain the building's usage information. Request monthly reports on usage.
- Consider installing a monitor in a public area of the building (lobby or community room) that displays the usage information being collected.
- If information is being collected in bundles (i.e., by floor), consider instituting competitions that encourage energy and water use conservation. Consider offering awards and prizes to contest winners.
- Consider opportunities for sharing the usage information with your residents as an opportunity for conservation education.
- Smart meters can be beneficial to your project by detecting water leaks in residential units or by helping to monitor temperature variations in the building.
- Consider creating a monitoring plan that will advise the management staff on how the utility data can be used to benefit the operation of the building.
- Consider providing incentives to residents to provide their utility account numbers in order to obtain information on the building's energy usage (i.e., request a deposit that will be returned when the account number is provided).

# 4

## OPERATIONS PHASE CASE STUDY

### **The Greens at Rolling Road – Catonsville, MD** **Enterprise Homes**

The Greens at Rolling Road is a newly constructed community of 83 units of quality, affordable rental housing for seniors. The three-story building consists of 65 one-bedroom and 18 two-bedroom units. Designed with steep sloping roofs and stone cladding, the building complements the early 20th century historic residences located in the community. The varying roof lines are in keeping with the residential feel of the surrounding neighborhoods. The scale, placement and appearance of the building are also consistent with neighboring commercial developments.

The Greens at Rolling Road is designed with several features to increase energy efficiency and conservation of raw materials. Double-pane, low-E windows; water-conserving plumbing fixtures; Energy Star appliances; energy-saving light fixtures; and Green Label carpeting throughout contribute to a healthy, sustainable living environment.

This project demonstrated that a well organized resident education manual and maintenance guide can ensure the longevity of green practices in a building. It is important the manuals include content that is specific, clear, easy-to-read, and

describe the intent of the building's features as well as how residents and the maintenance staff should interact with them.



# 4

## OPERATIONS PHASE

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### **Common Misconception: Building Maintenance**

It is a common misconception that the maintenance considerations of a building will be the same for any project. As a result, some projects have considered the resident and staff training that is outlined in the Enterprise Green Communities Criteria to be unnecessary. It is easier to complete these final steps if you work with your property management team during the Construction phase to draft the documents and begin training of systems, while the general contractor and subcontractors are on the site. This will allow for a smooth transition to operations.

### **Conclusion to the Operations Phase**

The Operations phase is the time to celebrate the efforts and accomplishments made by the development team to create an efficient and healthy residence for the community. Do not forget that the integrated design process does not end when the construction is complete. The property manager and resident service coordinators play a large and important role in the proper maintenance of the green building systems and enforcement of a healthy living environment. The practices that you learned during this process should become an educational opportunity, not only for your residents, but for the community as a whole. Celebrate your accomplishments each year, and track your own “lessons learned” as you embark on your next Enterprise Green Communities development!

# 4

## OPERATIONS PHASE

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### Resources for the Operations Phase

**Resident Education Cards** – Property managers and resident service coordinators can customize these cards to provide tips to residents on green and healthy living practices. Go to [www.EnterpriseCommunity.org/greentools](http://www.EnterpriseCommunity.org/greentools) and set the filter to Resident Engagement.

**Training in a Box** – Resident Engagement – These education modules provide trainers with the resources they need to empower residents with the principals and practices of healthy living. Go to [www.EnterpriseCommunity.org/residentengagement](http://www.EnterpriseCommunity.org/residentengagement) and scroll down to find the Resident Engagement Training in a Box.

**Template for Healthy Home Guide for Residents** – This template version of the Healthy Homes Guide is based on the guide written for residents of The Plaza Apartments. Go to [www.EnterpriseCommunity.org/greentools](http://www.EnterpriseCommunity.org/greentools) and set the filter to Operations and Maintenance.

**Green Operations & Maintenance Training in a Box** – These tools are designed for property owners and facilities management staff members and property managers working to increase residents' knowledge about and practice of green behaviors. Go to [www.EnterpriseCommunity.org/greentools](http://www.EnterpriseCommunity.org/greentools) and set the filter to Operations and Maintenance.

**Green Operations & Maintenance Manual for the New San Marco Apartments** – Created for the residents of New San Marco, a green affordable housing development in Duluth, Minn., this manual can be used as a model or sample for other green developers and owners. Go to [www.EnterpriseCommunity.org/greentools](http://www.EnterpriseCommunity.org/greentools) and set the filter to Operations and Maintenance.

**Guide to Green Living for Homeowners Manual** – Sample homeowners manual focused on single-family homes. Go to [www.EnterpriseCommunity.org/greentools](http://www.EnterpriseCommunity.org/greentools) and set the filter to Operations and Maintenance.

**Sustainability Training Grants** – Grants of up to \$5,000 support training for residents and building operations staff to help them understand how best to maintain the green benefits of the housing. Go to [www.EnterpriseCommunity.org/greenresources](http://www.EnterpriseCommunity.org/greenresources) and look under Financing for Sustainability Training Grants.

**Enterprise Green Communities, Building Maintenance Manual Templates** – Go to [www.EnterpriseCommunity.org/greentools](http://www.EnterpriseCommunity.org/greentools) and set the filter to Operations and Maintenance.

# CREDITS

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## About Enterprise Green Communities

Enterprise Green Communities is the first national green building program focused entirely on affordable housing. Launched by Enterprise in fall 2004, Green Communities is designed to help developers, investors, builders and policymakers make the transition to a greener future for affordable housing. Visit [www.EnterpriseCommunity.org/green](http://www.EnterpriseCommunity.org/green) to learn more about Enterprise Green Communities.



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## About Enterprise

Enterprise is a leading provider of the development capital and expertise it takes to create decent, affordable homes and rebuild communities. For more than 30 years, Enterprise has introduced neighborhood solutions through public-private partnerships with financial institutions, governments, community organizations and others that share our vision. Enterprise has raised and invested more than \$11.5 billion in equity, grants and loans to help build or preserve nearly 300,000 affordable rental and for-sale homes to create vital communities. Enterprise is currently investing in communities at a rate of more than \$1 billion a year. Visit [www.EnterpriseCommunity.org](http://www.EnterpriseCommunity.org) to learn more about Enterprise's efforts to build communities and opportunity.

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## Jonathan Rose Companies

Jonathan Rose Companies is a national real estate firm currently managing over \$1.3 billion of projects across four integrated business lines: investment management, development, project management and planning. Founded by Jonathan F.P. Rose in 1989, the firm has a distinguished track record of transforming communities through practical, hands-on real estate strategies and innovative green solutions. The firm's mission is to build value for our clients and investors, and the neighborhoods in which we work, by developing resilient communities of opportunity that foster economic, social and environmental wellbeing. We are headquartered in New York City and have offices in New England, the Rocky Mountains, the Southwest and the Pacific Northwest.



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