APPENDIX E.ii:
RESIDENTIAL AND MIXED-USE SUSTAINABLE PERFORMANCE GUIDELINES

PART VI

SUSTAINABLE GUIDELINES

VI.1 Overview

VI.1.1 Introduction

Playa Vista is committed to sustainable design. Playa Vista recognizes the compelling economic, environmental, marketing and mitigation rationale for incorporating sustainable principles. The bottom line is that sustainable development makes sense not only for Playa Vista, but development everywhere.

The Village at Playa Vista Residential & Mixed Use Sustainable Guidelines are a key part of Playa Vista's commitment to sustainable development. All residential units in The Village must comply with these Guidelines. The Guidelines have been updated from the Phase I edition, first published in 1998, to reflect regulatory, entitlement and technical changes. They were awarded an Honor Award in the Westside Urban Forum's Westside Prize.

What Is Sustainable Design?

The international definition of sustainability is meeting the needs of the present without compromising the ability of future generations to meet their own needs. The growing adoption of sustainable practices is a response to the depletion of the earth's resources and the pollution and global warming caused by an economy based upon the continued reliance on non-renewable resources.

Sustainably designed buildings are better for both the environment and the occupants. Sustainable design incorporates designs, technologies and practices to significantly improve the efficiency, quality and environmental responsiveness of traditional development. Sustainable design at Playa Vista will result in a number of key benefits:

- Efficiency in the use of energy (15 percent more efficient than required by California's 2005 Title 24 Building Efficiency Standards) and water (both indoor and landscaping). Renewable energy resources will be used, including passive solar design strategies and active pool and spa solar heating systems. Appliances will be both water and energy efficient, as defined by the U.S. Environmental Protection Agency's Energy Star designation. Reclaimed water will be used for all landscaping. Low flow toilets, faucets and showerheads will be installed.
- Improved Indoor Air Quality through ventilation and the use of environmentally friendly, low or non-toxic materials such as low or zero VOC (volatile organic compound) paint, finishes and adhesives.
- Waste Minimization through recycling solid waste during both construction and after occupancy and the use of appropriate materials and construction strategies. Each dwelling unit will have two bins and each high density building will be equipped with two chutes, one for trash and one for recyclables, to make recycling easy for occupants and to conform to the waste minimization policy of the City of Los Angeles. Construction materials including concrete, steel, drywall, insulation, cabinets, and carpet will contain a high percentage of recycled content or be made from certified sustainably grown lumber.
- Enhanced Comfort through appropriate glazing (window) selection, optimized building insulation, natural ventilation and proper space conditioning system sizing.
- Consumer Savings through a reduction in energy and water bills and reduced maintenance costs.

Builder Impacts

- Economics: Sustainable design is cost effective when a total system approach is used. These guidelines minimize the impact on construction costs by offsetting cost increases in some components with decreases in others, in particular the size of space conditioning systems. The result is that Playa Vista's residential buildings will be more environmentally friendly with only a modest, if any, increase in first costs.
- Marketing: Sustainable design gives Playa Vista a market advantage. The sophisticated buyers of Playa Vista will understand the advantages of purchasing or renting a dwelling with sustainable design

features. Playa Vista's buyers may:

1. Qualify for energy efficient mortgages because of lower utility bills.

2. Realize health advantages through cleaner indoor air.

3. Live in units that are both more durable because of the materials utilized and more flexible for remodeling and upgrading to meet quickly changing technology.

- Design and Engineering: To insure success, sustainable strategies need to be incorporated from the earliest design stages. Architects, engineers and landscape architects must work together as a team to integrate a building's systems rather than design an independent series of architectural, structural, mechanical, electrical, plumbing and landscape components.
- Materials Procurement: Builders will purchase materials and products that are efficient, low in toxicity, contain a high percentage of recycled content and, ideally, are purchased from local manufacturers.

Sustainable Mandates

Playa Vista must meet the requirements of both State and City of Los Angeles statutes as well as the specific requirements in The Village at Playa Vista Conditions of Approval and Mitigation Monitoring and Reporting Program. A number of these mandates address sustainable design.

State and City Mandates

- California Building Energy Efficiency Standards (Title 24): Energy efficiency standards for all new buildings. Title 24 is enforced by the local jurisdiction; in Playa Vista's case this is the City of Los Angeles.
- AB 939 (State): The State required that every city reduce its flow of waste to landfills by 50 percent by 2000. The City of Los Angeles has set additional goals of 62 percent by 2010 and 70 percent by 2020.
- Recycling Space Allocation, Ordinance No. 171687 (City): Requires the designation of space for the collection and loading of recyclables.
- Landscaping, Ordinance No. 170978 (City): Requires the design and installation of drought tolerant landscaping, and the planting of one tree for every four surface parking spaces such that these trees will shade 50 percent of the parking lot within 10 years.

The Village at Playa Vista Conditions of Approval and Mitigation Measures

- Construction Waste: Develop and implement a city-approved plan to recycle construction waste.
- Energy: Exceed Title 24 to the extent feasible; employ passive heating and cooling strategies; use Energy Star rated energy efficient appliances; design to accommodate renewable energy systems; and install automatic lighting timers on outdoor lights, charcoal or electronic air filtration systems on central space conditioning units, solar pool and hot tub systems, and double pane windows where a line of site exists to Jefferson Blvd. or Bluff Creek Dr.
- Recycled Building Materials: Incorporate recycled content materials where economically feasible.
- Water Efficiency: Use reclaimed water to irrigate landscaping; install landscaping with at least 50 percent native or drought tolerant plants and irrigation systems that include sprinkler control systems and minimize excess irrigation; and install Energy Star rated dishwashers and clothes washers, and water efficient toilets, showerheads and plumbing fixtures.
- Recycling: Install recycling bins for the commingled collection of metals, glass, cardboard, paper and newspaper and insure their maintenance.
- Air Quality: Use building materials, architectural coatings and cleaning solvents that comply with South Coast Air Quality Management District regulations.

Related Mandates

Sustainable design is a broad topic. There are a number of additional topics with sustainable benefits that are not covered in these Guidelines but that nonetheless must be followed. These topics include, among others:

1. Construction Health and Safety.
2. Fugitive Dust.
3. Handicapped Access.

A number of agencies, including the Federal Safety and Health Administration (OSHA), the South Coast Air Quality Management District and the City of Los Angeles, issue regulations governing these topics.

VI.1.2 Guidelines Summary & Compliance Process

Guidelines Summary

The Village at Playa Vista Residential Sustainable & Mixed Use Guidelines contains over 100 specific measures. There are ten categories, each of which is addressed in a separate chapter:

1. Construction Waste
2. Building Materials
3. Energy
4. Water
5. Recycling & Solid Waste
6. Power, Signal & Control
7. Adaptability
8. Landscape
9. Stormwater Management
10. Transportation

Each chapter has separate sections that detail the guidelines and mandatory and optional measures for that topic. Application details are also included as appropriate.

There are both mandatory and optional measures. The mandatory measures are required by The Village at Playa Vista Conditions of Approval or Environmental Impact Report Mitigation Monitoring and Reporting Program, City of Los Angeles or other regulation, or other Playa Vista standards. The source of each mandate is indicated in the chapters with each measure.

The optional measures also have sustainable value but are less central to meeting the Sustainable Guidelines' goals. Each builder must implement the minimum number of optional measures indicated for each category.

The majority of the measures impact all residential buildings. Some, however, are specifically for high density structures (stacked units equal to or greater than 25 dwelling units per acre), while others are only for low density buildings (on grade units and single family detached homes less than 25 dwelling units per acre). Measures that only impact one of these building types are so labeled.

Each measure is applicable only if the builder has control. If the builder installs appliance or finish packages directly or through buyer options, these must meet the Guidelines requirements. If the occupant independently installs the relevant items, the corresponding measures do not apply.

The Self Certification Form on the following pages summarizes each measure, indicates whether it is mandatory or optional, and identifies those measures applicable only to high or low density buildings. The matrix presents only a summary of each measure. The full language, and therefore the full meaning of each measure, as well as additional explanatory information is in the chapters that follow. Please review these to insure that each measure is understood.

The Sustainable Guidelines can be implemented with the least cost by integrating them into a project's design beginning at the programming phase. Sustainable design is an integrated process and cannot simply be "superimposed" during the final design. Some measures need to be understood by the design team before schematic design even takes place. Playa Vista therefore strongly recommends that each builder and design team review the Guidelines prior to design and develop a compliance strategy.

Compliance Process

Playa Vista has established a self-certification process for the Residential & Mixed Use Sustainable Guidelines. The process has been incorporated into the required Playa Vista design review process.

- As part of the final construction documents submittal for review by the Playa Vista Design Review Committee, each builder must submit a completed Residential & Mixed Use Sustainable Guidelines Self

Certification Form. Indicate the mandatory and optional measures that will be included in the project in the right-hand column. Insure that a sufficient number of optional measures are chosen in each category to meet the minimum number required. Date and sign the matrix where indicated in the box at the top of the first page.

- As a project progresses, development teams may substitute new optional measures for any of those previously selected, so long as the required minimum number of optional measures is still implemented. If this occurs, the builder must submit a revised Self Certification Form. In a cover letter, list the measures deleted and added.
- To obtain a letter from Playa Vista recommending sign-off by the Department of City Planning for a Temporary or Final Certificate of Occupancy, each builder must submit a letter certifying that all measures marked in the most recently submitted Self Certification Form have been installed in the project and certifying compliance with The Village at Playa Vista Residential & Mixed Use Sustainable Guidelines. The letter must refer to the relevant Self Certification Form by date and must be signed by a senior project manager.

PLAYA VISTA

THE VILLAGE AT PLAYA VISTA
RESIDENTIAL & MIXED USE SUSTAINABLE GUIDELINES

SELF CERTIFICATION FORM
(Full language measure in individual chapters)

Project Number: _____	**Firm:** _____
Submitted By: _____	**Title:** _____
Signature: _____	**Date:** _____

CONSTRUCTION WASTE (Chapter 1)
Mandatory Measures
1. Construction materials recycling to Playa Vista plan

Options Measures *(▲ see Notes for requirement)*
1. Prefabricated systems for all walls, floors or roof structural components
2. Out-to-out dimensions on two-foot increments

MATERIALS (Chapter 2)
Mandatory Measures
1. Recycled content insulation
2. Recycled content gypsum board
3. Low VOC paint, finishes & adhesives
4. Manufactured wood product moisture protection on exterior roof & wall surface areas

Optional Measures *(2 required)*
1. Materials manufactured or reprocessed within 500 mile radius
2. Recycled light gauge, rebar & structural steel
3. Rough construction from certified sustainably harvested wood
4. Recycled content roofing materials
5. Finish materials from reclaimed or remilled wood, excluding flooring
6. Kitchen & bathroom cabinets, linen closets & counter blanks of certified sustainably harvested lumber or plywood, OR fiberboard or particle board with no added urea-formaldehyde
7. Recycled content architectural materials, i.e. countertops, glass tile, carpet & carpet pad
8. Rapidly renewable material flooring such as bamboo, cork or linoleum
9. Hardwood flooring from certified sustainably harvested wood
10. Common area carpet system that allows replacing worn sections without removing majority of carpet
11. Zero VOC paint & finishes

ENERGY (Chapter 3)
OVERALL ENERGY REQUIREMENT
Mandatory Measure
1. On whole building performance basis, 15% more efficient than 2005 Title 24

Optional Measures *(None)*
BUILDING ENVELOPE
Mandatory Measures
1. Passive heating & cooling

2. Low slope cool roofs ☐
3. Double pane windows in walls with line of site of Jefferson Blvd. & Bluff Creek Dr. ☐

Optional Measures *(None required)*

1. 50% reduction in summer window solar gain ☐
2. Shading or glazing modifications on sliding glass doors ☐
3. 70% light-colored exterior walls ☐

SPACE CONDITIONING

Mandatory Measures

1. Energy efficient mechanical systems ☐
2. Medium efficiency air filtration ☐
3. No equipment on walls, balconies or patios *(high density structures only)* ☐
4. Outside equipment noise minimization & rust protective coatings ☐
5. For subterranean garages, mechanical ventilation with high efficiency fans & carbon monoxide sensors ☐

Optional Measures *(None required)*

1. Water source heat pump system *(high density structures only)* ☐
2. High efficiency pulse boilers *(high density structures only)* ☐
3. High efficiency gas furnaces & cooling equipment or air-to-air heat pumps *(low density structures only)* ☐
4. Cross-ventilation for each dwelling unit ☐
5. Fans to assist natural ventilation ☐
6. Operable inlet air dampers for natural ventilation ☐
7. Premium efficiency electric motors ☐
8. Variable speed motors or drives for pumps & fans ☐
9. Solar space heating system ☐

LIGHTING

Mandatory Measures

1. Energy efficient lighting ☐
2. Super T8 lamps & electronic ballasts ☐
3. Common area fluorescent, hard-wired compact fluorescent or HID lamps ☐
4. Automatic light shutoff in office common spaces ☐
5. Photocell controls on all common area exterior, site & landscape fixtures ☐
6. No exit signs or other lighting with radioactive elements ☐
7. Outdoor lighting and building sign limitations ☐

Optional Measures *(None required)*

1. Porch & patio hard-wired compact fluorescent lamps ☐
2. Residential unit hard-wired compact fluorescent lamps ☐
3. Residential unit exterior fixture photocell & motion controls ☐

WATER HEATING

Mandatory Measure

1. Energy efficient water heating ☐
2. High efficiency plumbing fixtures ☐

Optional Measures *(None required)*

1. Centralized water heating system *(high density structures only)* ☐
2. Waste heat recovery ☐
3. Tankless gas water heaters ☐
4. Heat pump water heaters ☐
5. Condensing water heaters ☐
6. Solar water heating ☐
7. Water efficient appliances ☐

RENEWABLE & ALTERNATIVE ENERGY SOURCES

Mandatory Measures

1. Solar heating for pools & hot tubs ☐
2. Conduit to roof, unobstructed roof areas & roof framing plan for future photovoltaics ☐

Optional Measures *(None required)*

1. Solar heating for domestic hot water ☐

2. Photovoltaic (solar) landscape lighting ☐
3. Photovoltaic (solar) common area lighting ☐
4. Microturbine or fuel cell with waste heat recovery ☐
5. Dedicated space for on-site distributed energy system ☐

CONTROLS & FEEDBACK

Mandatory Measures *(None)*

Optional Measures *(None required)*

1. Enhanced feature setback thermostats ☐
2. On-demand energy & water feedback & control ☐
3. Widow & sliding door sensors ☐
4. Occupancy sensors ☐
5. Daylighting sensors ☐
6. Central system digital controls *(high density structures only)* ☐
7. Remotely readable utility metering ☐
8. Power emergency utility wireless communication ☐

APPLIANCES

Mandatory Measures

1. Energy Star rated dishwashers ☐
2. Energy Star rated refrigerators ☐
3. Energy Star rated clothes washers ☐
4. Energy efficient clothes dryers with automatic shut off ☐

Optional Measures *(None required)*

1. Ducted kitchen exhaust system ☐
2. Make-up air for exhaust fans over 100 CFM ☐

WATER (Chapter 4)

Mandatory Measures

1. Low flow toilets, showerheads & faucets ☐
2. Energy Star rated appliances (see Appliances) ☐
3. Office and retail water faucet automatic shutoff ☐

Optional Measures *(▲ see Notes for requirement)*

1. Low flush toilets ☐
2. Waterless or low flush urinals ☐
3. Hot water demand system ☐

RECYCLING & SOLID WASTE (Chapter 5)

Mandatory Measures

1. Recyclables & trash dual container kitchen system ☐
2. Recyclables & trash dual chute building system & underground bins *(high density structures only)* ☐
3. Recyclables & trash lidded self rolling containers *(low density structures only)* ☐
4. Household hazardous waste disposal ☐

Optional Measures *(▲ see Notes for requirement)*

1. Recycled steel & rubber in recyclables & trash chutes *(high density structures only)* ☐
2. Trash compactors in each unit & smaller self rolling containers *(low density structures only)* ☐

POWER SIGNAL & CONTROL (Chapter 6)

Mandatory Measures

1. Fire detection & signal in each unit, fire dept. automatic call & enunciator panel indicating alarm location ☐
2. Unit wiring to Playa Vista standard ☐
3. Gas service seismic shutoff ☐

Optional Measures *(3 required for high density structures, 2 for low density structures)*

1. Automatic signal to building manager linked to ventilation operation *(high density structures only)* ☐
2. Visual alarm in each unit & common space & unit enunciator ☐
3. Power service sized for expansion ☐

4. Separate lighting & convenience circuits ☐
5. Mounting space for surge protection, power conditioning & battery backup ☐

ADAPTABILITY (Chapter 7)

Mandatory Measures

1. City of Los Angeles disability residential standards ☐

Optional Measures *(4 required)*

1. Reinforced shower & water closet walls for grab bars ☐
2. Accessible door sizes & swings ☐
3. Adequate mechanical & electrical system service access *(high density structures only)* ☐
4. Electronic or written construction, product & system documentation ☐
5. Adjustable kitchen counter heights ☐

LANDSCAPE (Chapter 8)

Mandatory Measures

1. Playa Vista Landscape Guidelines ☐
2. City of Los Angeles water conservation ordinances ☐
3. 50% minimum native or drought tolerant plants ☐
4. Shade producing trees & vines ☐
5. Tree shaded parking lots ☐
6. Reclaimed water for landscape irrigation ☐
7. Drip or soaker-based irrigation to water all plants, including lawns ☐
8. Automatic sprinklers set to irrigate early morning or evening ☐
9. Slow release fertilizers on new landscaping ☐

Optional Measure *(▲ see Notes for requirement)*

1. 75% native or drought tolerant plants ☐
2. Weather-based evapotranspiration (ET) irrigation controllers ☐

STORMWATER MANAGEMENT (Chapter 9)

Mandatory Measures

1. Roof drain biofiltration systems ☐
2. No runoff into underground parking *(high density structures only)* ☐
3. Minimal imperviousness *(low density structures only)* ☐
4. Driveway runoff to adjacent bioswale ☐
5. No roofs or gutters with copper, zinc, tar papers or other petroleum based sealers; inert roofing materials ☐
6. Parking lot filters, porous pavement & swale/biofilters ☐

Optional Measure *(▲ see Notes for requirement)*

1. Walkway or roof runoff to vegetated areas *(low density structures only)* ☐

TRANSPORTATION (Chapter 10)

Mandatory Measures

1. 240 volt circuit capacity & conduit for electric vehicle charging in garage ☐
2. Electric vehicle charging stations if required by regulation ☐
3. Secure bicycle storage *(high density structures only)* ☐

Optional Measures *(None)*

NOTES

▲ = Implement a total of three measures from the five "Optional Measures" lists with this symbol—Construction Waste; Water; Recycling & Solid Waste; Landscape; & Stormwater Management

High density structures = Equal to or greater than 25 dwelling units per acre (stacked units)

Low density structures = Less than 25 dwelling units per acre (on grade units & single family detached homes)

VI.2 Details & Complete Measure Language

VI.2.1 Construction Waste

Guidelines

Construction and demolition waste totals approximately one-third of all solid waste. Reducing construction waste therefore makes a significant contribution towards Los Angeles' waste reduction goals. At Playa Vista, construction and demolition waste recycling has become an important and successful strategy.

Builders can reduce construction waste through a number of strategies, including:

- Selecting appropriate material sizes and quantities and careful attention to purchasing practices.
- Using separate collection bins for each recyclable material to create clean materials ready for marketing.
- Daily cleanup to reduce material loss and clutter.

Mandatory Measure

1. Playa Vista is required to recycle demolition and construction waste according to a plan approved by the City of Los Angeles Department of City Planning and Bureau of Sanitation. The City approved the Playa Vista Construction Materials Recycling Plan in June 1999; all builders are required to recycle construction materials as outlined in the approved Plan.
2. The Plan focuses on complying with California's mandated goal of diverting 50 percent of waste from landfills by the year 2000 and providing builders full reuse, recycling and solid waste services. Playa Vista has greatly exceeded this goal by recycling approximately 92 percent of all demolition and construction waste since construction began in 1998. (Source of mandate: mitigation measures #N(3)-4)

Optional Measures

Minimum number of optional measures required: Three total from the following five categories: Construction Waste; Domestic Water; Recycling & Solid Waste; Landscape; & Stormwater Management.

1. Utilize prefabricated systems such as panelized wall systems, open web floor trusses, roof truss systems and precast floor deck systems for all structural components of the walls, floors, or roofs. Precut dimension lumber or precut engineered wood products that are delivered to the site and field assembled to not qualify as prefabricated assemblies.
2. Design out-to-out dimensions for roof, floor or wall sheathings based on two- foot increments to permit pre-constructed panel & dimensional lumber minimization.

Application

The Playa Vista Construction Materials Recycling Plan's key elements form the core of the construction and demolition waste strategy. These include:

- At a minimum, the reuse and recycling of:

  1. Metal
  2. Wood (which can be given to non-profit groups as a tax-deductible donation)
  3. Dry wall
  4. Corrugated cardboard
  5. Concrete and asphalt

6. Ceramics

7. Glass

- Source separated and commingled waste collection.
- A minimum of two bins at all times at each construction site, one for recoverables and one for waste materials, and extra bins during waste surge periods.
- A single hauler with an on-site coordinator and staging area to maximize recycling and ensure efficient operations.
- Separate processing of any hazardous wastes encountered.
- Builder education. All recycling information, including bin labels, is printed in both English and Spanish.
- Ongoing program monitoring including monthly recovery reports submitted to the City of Los Angeles.
- A public relations effort, including a case study, to promote the program's success and benefits. .

VI.2.2 Building Materials

Guidelines

"Green" building materials have become widely available in response to concerns about human health and the environment. These materials frequently save energy, improve indoor air quality, contain recycled content or are sustainably grown.

When purchasing green materials, it is important to carefully compare products. For example, indoor air quality is more important than recycled content. A product may contain 100 percent post-consumer fibers yet have a higher level of toxic chemicals than a non-toxic product with only 40 percent recycled content.

Use building materials with some or all of the following characteristics:

- Zero or low VOC (volatile organic compounds).
- No or low toxicity.
- Durability.
- High recycled content.
- Certified sustainably grown.
- Rapidly renewable.
- Recyclable.
- Locally manufactured.

Mandatory Measures

1. Recycled content insulation (fiberglass minimum 30 percent, cellulose 85 percent). (Source of mandate: mitigation measure #N(3)-5.)
2. Recycled content gypsum board (wallboard minimum 25 percent, facing paper 100 percent). (Source of mandate: mitigation measure #N(3)-5.)
3. Low VOC paint, finishes and adhesives (less than 250 grams of VOCs/liter). (Source of mandate: mitigation measures #B-5v, B-8.)

4. Manufactured wood product moisture protection on exterior roof and wall surface areas. Protect joints and rough openings with joint filler and surface areas with a waterproof coating. (Source of mandate: Playa Vista standard.)

Optional Measures

Minimum number of optional measures required: Two.

1. A minimum of 15 percent of architectural building materials manufactured or reprocessed within 500 air miles of the building site to reduce shipping costs, pollution and energy consumption. Calculated by total materials cost, exclusive of costs for concrete, mechanical, electrical, plumbing systems, labor, overhead and fees.
2. A minimum of 25 percent of total building materials from recycled light gauge, rebar or structural steel. Calculated by total materials cost, exclusive of costs for mechanical, electrical, plumbing systems, labor, overhead and fees.
3. A minimum of 20 percent of total building materials and 70 percent of rough construction wood from certified sustainably harvested products. Wood product shall originate in forests that are certified well managed by an agency accredited by the Forest Stewardship Council (FSC). Calculated by total materials cost, exclusive of costs for mechanical, electrical, plumbing systems, labor, overhead and fees.
4. Recycled content roofing materials. Seventy percent of primary roofing material (not including felt underlayment) shall incorporate at least 10 percent recycled content. Material options include but are not limited to metal (steel and aluminum), composite materials (plastic and rubber, wood and plastic), rubber and fluid applied roofing. Typical recycled content: metal (minimum 30 percent), wood (25 percent) and rubber pad (25 percent). Calculated by total materials cost, exclusive of costs for mechanical, electrical, plumbing systems, labor, overhead and fees.
5. A minimum of 5 percent of finish materials (inside face of drywall) from reclaimed or remilled wood, excluding flooring. Calculated by total materials cost, exclusive of costs for mechanical, electrical, plumbing systems, labor, overhead and fees.
6. Kitchen and bathroom cabinets, linen closets and counter blanks made of Forest Stewardship Council (FSC) certified sustainably harvested lumber and plywood or fiberboard or particleboard with no added urea-formaldehyde.
7. A minimum of 20 percent of architectural materials, i.e. countertops, glass tile, carpet & carpet pad, that contain at least 20 percent post-consumer recycled content or a minimum of 40 percent post-industrial recycled content. Calculated by total materials cost, exclusive of costs for mechanical, electrical, plumbing systems, labor, overhead and fees.
8. Rapidly renewable material flooring such as bamboo, cork or linoleum.
9. Hardwood flooring from FSC certified sustainably harvested wood.
10. Common area carpet system that allows replacing of worn sections without removal of the majority of the carpet.
11. Zero VOC paint and finishes.

Application

Hundreds of products are made from recycled or renewable materials and have good indoor air quality characteristics; more such products are being released all the time. The following discussion focuses on those materials that will be used in the largest volumes at Playa Vista.

Concepts

Recycled Content includes two sub categories: Post-industrial waste is industrial waste or finished material that is not marketed. Post-consumer wastes are products at the end of their intended use such as plastic and glass bottles, newspapers and corrugated cardboard.

Framing

Recycled Steel contains a minimum 25 percent recycled content and is itself recyclable. Its high thermal conductivity requires unique insulating measures to minimize heat transfer through exterior walls.

Forest Stewardship Council certification ensures that lumber is harvested from well-managed forests that ensure regeneration of desired species

so that, over the long, term timber growth equals or exceeds harvesting rates in both quantity and quality. FSC certified engineered wood products (EWPs) use less wood for equal or greater load bearing characteristics. Examples include glulams, laminated trusses, I-joists, laminated veneer lumber and oriented strand board.

Insulation

Cellulose insulation made with recycled paper can achieve a high R-value in walls as it fills the entire cavity. State law mandates that fiberglass insulation have a minimum of 30 percent post-consumer glass. Other insulation options include cotton fiber and soy-based polyurethane foam.

Roofing Materials

Metal roofing alternatives include sheet metal, metal shingles, shakes and tile made from post-consumer aluminum and steel. Copper and zinc roofs, downspouts and gutters are prohibited (see 9. Stormwater Management for details). Cement composites contain recovered materials such as fly ash and wood fiber. Concrete-based materials can have a significant recycled content and can be recycled. Other options include shingles made from post-consumer rubber, plastic or glass, roofing mats (walkway pads) and roof membranes made from post-consumer plastic, and roofing felt paper from post-consumer paper.

Paints, Finishes and Adhesives

Paints, finishes and adhesives must meet the South Coast Air Quality Management District low VOC standard. The current standard is 250 grams/liter (2.08 pounds/ gallon). Low VOC adhesives are less toxic and include acrylic latex glues, contact cements and vinyl tile and sheet flooring adhesives. These adhesives are competitively priced and widely available.

Finish Materials

Urea formaldehyde-free medium density fiberboard or particleboard prevents indoor air pollution and can be used to manufacture countertops, cabinets and other applications requiring flat, paintable, machineable panels.

Bamboo is very durable and is a renewable resource as it grows to maturity in four to five years. Cork is combined with linseed oil and other natural materials to make flooring tile, and is harvested on an ongoing basis without harming the tree. Linoleum is also manufactured from renewable resources. Ceramic and glazed tile can be purchased with up to 70 percent recycled glass. Carpet is available with recycled wool, scrap yarn, nylon or plastic bottles.

VI.2.3 Energy

Guidelines

California residential energy use is divided into four categories: space conditioning (heating and cooling), water heating, lighting and appliances. Energy efficiency strategies can reduce resident's utility bills and lessen the impact on the environment.

Incorporating energy efficiency increases comfort, lowers energy use, reduces maintenance costs and can improve aesthetics and indoor acoustics. These benefits add value. Just as importantly, careful energy efficiency choices can frequently lead to first cost savings. Any additional costs that do result are typically quickly recovered through lower utility bills.

A whole-building or integrated design approach is recommended. Under this- approach, the entire design team works closely together to capitalize on synergies and optimize the finished project.

To illustrate the whole-building approach, consider windows: typical window placement and selection is primarily based on aesthetics and window costs, with minimal thought to the heating, cooling and lighting impacts. However, building performance can be substantially improved and result in increased winter passive heating, minimized summer heat gains, optimized daylighting and facilitated natural ventilation through the following strategies:

- Paying attention to window placement, size and architectural/ landscape shading elements.
- Specifying high performance windows to better control heat gains and losses.
- Minimizing air infiltration through careful installation.

Increased investment in windows might be more than paid for by the dollars saved through downsizing the space conditioning system. Furthermore, the consumer benefits through reduced utility bills, improved daylighting and increased comfort.

(a) Overall Energy Requirement

Guidelines

One of the key goals for the Playa Vista Residential & Mixed Use Sustainable Guidelines was to establish an overall energy requirement. The objective was to design the most energy efficient residential buildings possible while minimizing first cost impacts. The original performance goals were established through detailed engineering analysis and modeling of prototypical high and low density buildings. These goals have been modified for this update to reflect the increased efficiency requirements of the 2005 Title 24 Building Energy Efficiency Standards. The current energy performance requirement is 15 percent more efficient than 2005 Title 24 for air-conditioned buildings, and 5 percent more efficient for non air-conditioned buildings. Both of these performance goals are exclusive of exterior lighting use.

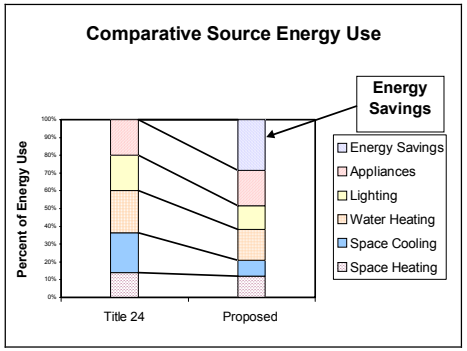


Figure VI-1 Comparative Source Energy Use

Because of the energy performance requirement, builders do not have to implement any energy-related optional measures. However, optional measures are offered that will help meet the energy performance threshold.

The key recommendations are:

- Optimize building envelopes, glazing orientation, shading and natural ventilation prior to specifying mechanical systems. An efficient envelope can result in the installation of lower capacity, and therefore less expensive, HVAC systems.

- Consider central and shared component systems such as central domestic water heating systems in multi-unit buildings.
- Consider both first-cost and operating savings at the "whole building" level.

Mandatory Measure

1. Overall energy use must be 15 percent more efficient than the 2005 California Energy Efficiency Standards (Title 24) for air conditioned buildings and 5 percent more efficient than the 2005 Title 24 for non air conditioned buildings. The lower goal for non air-conditioned buildings reflects the fact that many of the energy savings opportunities outlined in the guidelines are related to space cooling. The savings must be calculated on a whole building performance basis from a combined measurement of building envelope, heating and cooling, water heating and interior lighting. The required savings is measured on an ownership basis: for apartments, the target must be achieved for the building as a whole; for condominiums, the target must be achieved for each individual unit. Appliances and parking built below concrete slabs are not part of Title 24 and therefore are not part of the overall energy requirement. (Source of mandate: mitigation measures #B-7b, M-1, M-6.)

Optional Measures (None)

(b) Building Envelope

Guidelines

In Playa Vista's mild coastal climate, optimizing the building envelope poses unique challenges. Improving insulation (R-values) alone provides only minimal savings. A whole building approach must be taken that also factors in building mass (increasing interior "thermal mass" can shift peak cooling loads to later in the evening and help address electricity shortages), window location, window shading, roof and exterior wall solar reflectivity, ventilation and other factors. Optimal designs require good engineering and computer building energy simulation modeling.

Natural ventilation can provide comfort when outside air conditions and architecture permit and can minimize or eliminate the need for mechanically assisted heating and cooling. Well designed building envelopes play an important role in facilitating natural ventilation through thoughtful window placement that, among other benefits, allows cross ventilation and catches prevailing winds. Conversely, poor envelope designs preclude effective natural ventilation and often necessitate mechanical cooling, even on mild days.

Windows should be designed to allow ambient daylight to enter a space while limiting unwanted heat gain from direct sunlight. East and west facing windows should be minimized as it is difficult to control morning and afternoon solar heat gains. Vertical louvers or side fins can be installed to reduce incoming solar radiation on these exposures, but their effectiveness is often limited. Windows on northern exposures receive minimal direct solar radiation and can be effective sources of daylighting. Larger northern glazing areas are therefore suitable. Although southern exposures receive the most direct light, windows with well designed horizontal overhangs and other shading elements can provide seasonally effective shading that minimizes direct solar gains in summer while allowing direct solar radiation in the winter for passive solar heating when the sun is low in the sky. Low emissivity glazing also reduces solar heat gain, making larger windows possible.

Light colored or "cool" roofs save cooling energy by reducing heat gain through roofs, and diffusely reflecting materials prevent undesirable reflective glare from impacting neighboring buildings.

Mandatory Measures

1. Employ passive heating and cooling design strategies. Possible strategies include building orientation; natural ventilation; high insulation values; increased interior thermal mass; energy efficient windows; cool roofs; and window shading and landscaping that provide seasonal shading, especially of south and west exposures. (Source of mandate: mitigation measures #B-7g, M-1, M-2, M-10.)
2. Install cool roofs on all low-slope roofs (less than 2:12) by using a roofing product listed by the Cool Roofs Rating Council (www.coolroofs.org). This is the same roof type required for all commercial buildings by Section 118(i) of the 2005 Title 24 Building Energy Efficiency Standards. (Source of mandate: mitigation measure #M-2.)

3. Install double pane windows having a line of sight (300 measured from the horizontal plane) of Jefferson Blvd. and Bluff Creek Dr. The design must provide an airborne sound insulation system achieving a Sound Transmission Class of 50 (45 if field tested) as defined in the American Standard Test Methods E90 and E413. (Source of mandate: mitigation measure E-4, condition of approval 2.)

Optional Measures

Minimum number of optional measures required: Not applicable.

1. Provide a 50 percent reduction in summer window solar gain by limiting aperture area (e.g.,15 percent of floor area) or through the use of fins, insets and overhangs.
2. Provide shading or glazing modifications on sliding glass doors.
3. Use 70 percent light-colored exterior walls. High reflectivity, high emissivity paints and paint additives can further reduce exterior solar heat gains.

Application

Energy Use

The following chart shows the heating and cooling energy for a typical Playa Vista high density building with and without efficient glazing. The dramatically reduced need for cooling energy more than offsets the small increase in heating energy.

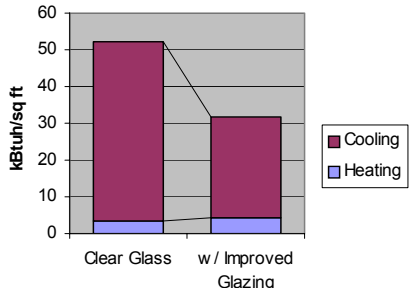
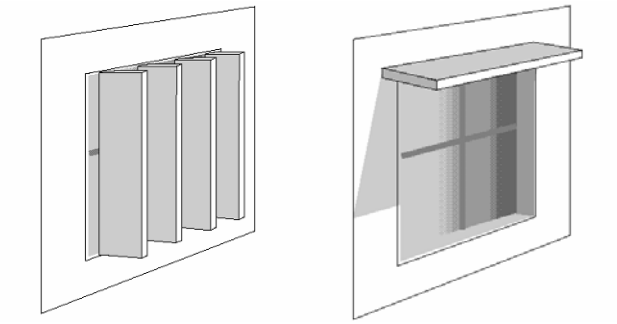


Figure VI-2 Heating and Cooling Energy Use

Shading

A variety of different shading devices can be used to minimize solar heat gain. The sun's path makes vertical louvers or side fins effective on east and west facades, while overhangs are more effective on south façades.



Variations on typical overhangs allow for space constraints or structural limitations that prohibit larger overhangs.

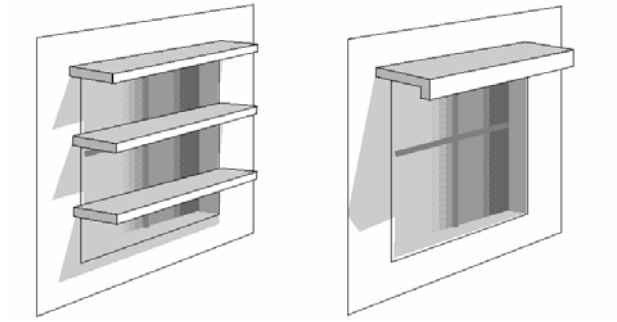


Figure VI-3 Shading Devices

(c) Space Conditioning

Guidelines

Thirty percent of all energy consumed by California households is used to provide space heating and cooling. Occupant comfort is affected by both the quality (e.g. odors, stale air), temperature and velocity of the indoor air. Regulations set minimum ventilation levels to protect occupant health. Natural ventilation is a low energy-consuming alternative that can reduce or eliminate air conditioning needs at Playa Vista during much of the year.

In high density buildings, a whole-building systems approach to the design and selection of equipment can help optimize space conditioning systems and facilitate consideration of shared equipment. Using a central heating and cooling system, or heating and water heating system, can be more cost-effective than installing separate pieces of equipment to provide the same functions. For example, a water loop heat pump system may be effective and can lead to significant construction and energy cost savings. Centralized systems can also facilitate cost effective heat recovery systems or supplemental solar water heating.

A centralized system addresses a number of design issues including:

- Minimizing mechanical equipment space requirements in units.
- Eliminating balcony and roof clutter.
- Reducing the impacts of salt air on condensing coils.

Low density housing lends itself to individual space conditioning units. High efficiency gas furnaces and high efficiency air conditioning systems are therefore recommended.

Mandatory Measures

1. Utilize energy efficient mechanical systems. Possible residential strategies include fans to assist natural ventilation; centralized space and water conditioning systems; high efficiency individual heating and cooling units; and automatic setback thermostats. Possible commercial strategies include variable air volume systems; air economizer cycles that utilize 100% outside air when appropriate; under floor air distribution; and building control systems for lighting, HVAC and other systems. (Source of mandate: mitigation measure #M-3.)
2. Provide medium efficiency (average of 25 to 30 percent per ASHRAE Test Standard 52) air filtration. All air conditioning units must include a charcoal or electronic air filtration system. (Source of mandate: condition of approval #63.)
3. For high density homes, do not locate any equipment on walls, balconies or patios. (Source of mandate: Playa Vista standard.)
4. For any outside equipment, eliminate or minimize noise and provide corrosion protective coatings. (Source of mandate: mitigation measure E-5, Playa Vista standard.)
5. For subterranean garages where ventilation is required, ventilate using high-efficiency fans and incorporate carbon monoxide (CO) sensors to control fan operation. Fans with a motor size over 5 horsepower must be at least 70 percent efficient at the design air flow and pressure, and be certified by ACMA (Air Movement and Control Association, http://www.amca.org). Motors must have efficiencies greater than those listed as "Energy Efficient" in NEMA standard MG 1, Table 12-10. See the Best Practices website at http://www.oit.doe.gov/bestpractices/ for more information. (Source of mandate: mitigation measure #M-3.)

Optional Measures

Minimum number of optional measures required: Not applicable.

1. For high density structures, install water source heat pump system or equivalent to supply heating and cooling at the unit level via a centralized tempered water distribution system.
2. For high density structures, install high efficiency pulse boilers or equivalent to provide heated water for the centralized water source heat pump system.

3. For low density homes, utilize high efficiency forced-air gas furnaces (AFUE greater than 80 percent) and air conditioners (SEER greater than 12), or use high efficiency air-to-air heat pumps for both heating and cooling.
4. Design in cross-ventilation for each dwelling unit to allow the opportunity for natural ventilation with operable openings other than doors.
5. Use fans to assist natural ventilation in all units. Include the use of operable dampers and thermostatic controls.
6. Install operable inlet air dampers for natural ventilation.
7. Install premium efficiency electric motors, as defined in the table below.

PREMIUM EFFICIENCY MOTOR TABLE		
Rated Horsepower	**Minimum Efficiency @ 1800 rpm**	**Options**
Less than 1/4	Exempt	
1/4	67%	75% @ 1200 rpm
1/3	71%	
1/2	75%	
3/4	77%	
1.0	85%	
1.5	86%	
2.0	86%	
3.0	89%	
5.0	90%	
7.5	91.5%	
10.0	91.7%	
Greater than 10	92%	

Figure VI-4 Premium Efficiency Motor Table

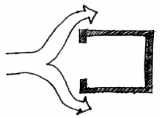
8. Install variable-speed motors or variable speed drives for pumps and fans wherever feasible.
9. Install a solar water heating system to provide at least 60% of the space heating requirements (see chapter 3.6, Renewable & Alternate Energy Sources).

Application

Ventilation

Natural or mechanically-assisted ventilation can reduce air conditioning and heating costs and improve indoor air quality. The proper design of building openings allows the effective use of natural ventilation. The increased air movement extends the upper limit of the temperature at which a person feels comfortable.

When outdoor air temperatures are below 80°F, windows can be opened or a whole house fan turned on to allow outside air to circulate through a home. When outdoor air temperatures exceed 82°F, minimize infiltration during the day and ventilate at night.

PLAN WITH GOOD CROSS VENTILATION	PLAN WITH POOR CROSS VENTILATION
 *Air flow through the unit provides excellent ventilation opportunities. Overheated air and odors are flushed from the space.*	 *Air fails to adequately flow through the unit. Overheated air and odors tend to stay inside.*

For buildings where design, security or privacy constraints restrict the optimum placement of openings, mechanically assisted ventilation with whole-house fans with operable dampers can be used. These can be as effective as natural ventilation. Stack ventilation can be used where

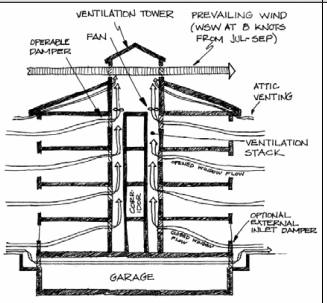
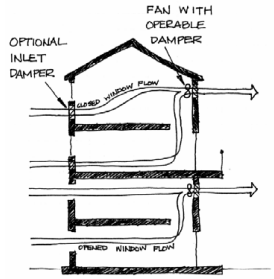
DOUBLE LOADED CORRIDOR CROSS VENTILATION SCHEME	MULTI-STORY UNIT CROSS VENTILATION SCHEME
	
• *Ventilation shafts & tower allow cross-ventilation.* • *Operable dampers control ventilation.* • *Subterranean garages require dedicated ventilation fans.* • *When windows are closed, inlet dampers allow automatic cross ventilation .*	• *Operable dampers control ventilation.* • *When windows are closed, inlet dampers allow automatic cross ventilation.*

Figure VI-5 Ventilation

openings are difficult to provide. Fans can operate when a homeowner is not home, or if the homeowner forgets or prefers not to open windows or doors.

Ventilation fans such as whole house fans should include automatic controls to control their use based on interior and exterior temperatures. If a building requires cooling and outdoor conditions discourage the use of the fan, then the air conditioning system is turned on.

Underground parking garage ventilation fans are another major energy consumer. Mechanical ventilation systems should include high-efficiency fans and carbon monoxide (CO) sensors to control fan operation. Variable speed drives should be provided for parking garage ventilation fans and garage ductwork should be designed to minimize static pressure drop.

Water-Source Heat Pumps

In high density buildings in climates with moderate space heating and cooling needs, water-source heat pumps offer an energy efficient and cost effective alternative to furnaces and air-cooled air conditioners. The diagrams below illustrate how heat pumps work.

There are two water source heat pump installation strategies. Vertical installations in closets or utility rooms have small footprints, typically less than three feet square. Horizontal installations concealed above ceilings typically have a low profile of less than two feet.

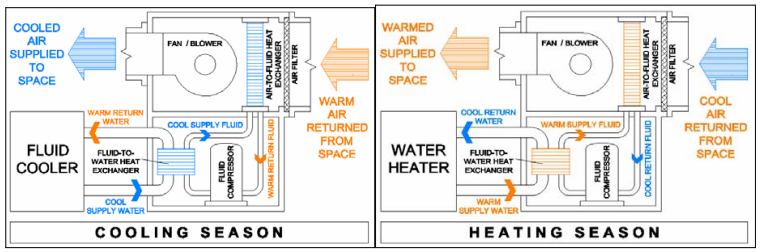


Figure VI-6 Heat Pump

(d) Lighting

Guidelines

Lighting efficiency is important because lighting is one of the largest residential energy consumers. Incandescent lamps, though inexpensive and readily available, are the least efficient light source, last a relatively short time, cost more over time and generate a significant amount of heat, increasing the need for air conditioning. Many fluorescent lamps have similar light qualities to incandescent while being three times as efficient and lasting 10 times as long.

Mandatory Measures

1. Energy efficient lighting that exceeds the Title 24 Energy Efficiency Standards to the extent feasible.(Source of mandate: mitigation measures #B-7c, M-6)
2. T5 high output or super T8 lamps and electronic ballasts in all linear (straight tube) fluorescent fixtures. (Source of mandate: mitigation measures #B-7c, M-6)
3. Fluorescent or high intensity discharge (HID) lighting in all common areas such as interior and exterior corridors, stairways and parking structures, including hard-wired compact fluorescent lamps with electronic ballasts in all common area recessed can fixtures. In recessed cans, both the lamp and ballast must be replaceable, the lamp cannot extend below the bottom of the fixture and parabolic diffusers shall be installed. Care shall be taken to not expose light sources directly to public rights-of-way. (Source of mandate: mitigation measure # B-7c, B-7d, M-6, M-7.)
4. Automatic devices to turn off lights when they are not needed in office common spaces such as conference rooms and bathrooms. (Source of mandate: mitigation measures: #B-7c, M-6.)
5. Photocell controls for all common-area exterior, site and landscape lighting. (Source of mandate: mitigation measures #B-7d, M-7.)
6. No exit signs or other lighting component with radioactive elements for illumination. Radioactive elements are those materials defined

as such by the California Department of Health Services Chemical Detection Limits for Purposes of Reporting (DLRs) and include Tritium. (Source of mandate: mitigation measures #B-7c, M-6.)

7. Outdoor lighting, other than signs, limited to those required for safety, security, low level exterior architectural illumination and landscaping. Animated building signs prohibited. Illuminated residential building signs not permitted above first level. (Source of mandate: mitigation measures F(2)-1, F(2)-2; condition of approval 5.)

Optional Measures

Minimum number of optional measures required: Not applicable.

1. Porch and patio lighting with hard-wired compact fluorescent fixtures with electronic ballasts.
2. Hard-wired electronic ballasts for all compact fluorescent lamps in residential units.
3. Photocell and motion controls on porch and patio light fixtures with user override.

Application

The photo below depicts the components of a hard-wired compact fluorescent fixture. Note that both the lamps and ballast are replaceable, the lamp does not extend below the bottom of the fixture and the fixture includes an integral reflector to diffuse the light and improve distribution.

Figure VI-7 Fluorescent Lamp
Hard-wired compact fluorescent lamp in recessed fixture
Image source: Nora lighting

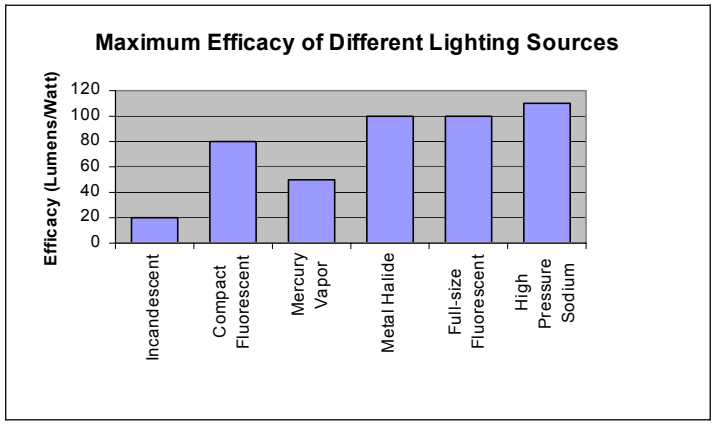


Figure VI-8 Maximum Efficiency of Different Light Sources

Efficacy is a measure of a lamp's efficiency, and is the ratio of light output (in Lumens) to electricity use (Watts). Higher efficacies are better. The following graph shows the maximum efficacy for a variety of light sources. Incandescent lamps are the least efficient and should be avoided.

While compact fluorescent lamps are available that can be screwed into standard incandescent sockets, they should be avoided in new construction. Instead, hard-wired compact fluorescent fixtures should be used because they typically are higher quality and have more efficient and longer-lived electronic ballasts. Furthermore, consumers can not replace the lamps with incandescent lamps, ensuring continued electricity savings.

The use of radioactive elements for illumination should be avoided. Exit signs using Tritium are the most common application for these radioactive materials are often disposed of improperly after their 5 to 20 year life.

(e) Water Heating

Guidelines

Thirteen percent of all energy consumed by California's households is used to heat water. Savings can be realized through the use of high efficiency plumbing fixtures and efficient heating equipment.

High quality water efficient plumbing fixtures and water-efficient appliances should be used to reduce hot water demand (see chapter 3.8 Appliances). For builders, lowering water heating demand may permit the installation of smaller capacity water heaters that are both less costly and, depending on the unit, more efficient.

Once demand has been minimized, high efficiency water heating equipment should be installed. The most appropriate equipment selection depends on many factors. The options include:

- Centralized systems in high density buildings: Centralized systems can take advantage of high efficiency condensing boilers or water loop heat pump systems; cogeneration, or combined heat and power systems; heat recovery from chillers; or a centralized solar water heating system. They may also be more space-effective than individual systems. A centralized system may, however, present challenges and extra costs for submetering hot water, which should be installed. Failure to submeter hot water usage and bill residents directly often leads to excessive consumption since there is no perceived "cost" for the extra use.
- Tankless water heaters: These water heaters require very little space and eliminate the standby heat loss that occurs from maintaining a large tank of hot water at high temperature 24 hours per day. These losses can consume up to 40 percent of water heating energy use. Generally, natural gas fired instantaneous heaters should be used, and care taken to ensure the heater is appropriately sized to meet maximum hot water loads. Electric water heaters should be avoided due to large electric demands and the corresponding large conductor sizing required to handle the high currents.
- Condensing water heaters: Normal water heaters only have efficiencies of about 85 percent because they allow significant energy to escape through the flue in the form of water vapor formed during combustion. Condensing heaters capture this energy by allowing lowering flue temperatures and efficiencies are around 95 percent. Some manufacturers provide combined water and space heating systems. Condensing water is acidic and requires special considerations to minimize corrosion.
- Traditional tank-type storage heaters: Efficient models should be specified as there are significant variations. Water heater energy efficiency is measured by the "Energy Factor" (EF), which is the ratio of energy output (heated water) to the energy input (gas or electricity). EF includes recovery efficiency (how efficiently the heat from the energy source is transferred to the water), standby losses (the percentage of heat lost per hour from the stored water compared to the heat content of the water) and cycling losses. The following table summarizes the range of EFs for natural gas tank-type water storage heaters and the Federal Energy Management Program (FEMP)'s recommendation. For more information, see FEMP's "How to Buy an Energy-Efficient Gas Water Heater" at http://www.eere.energy.gov/femp/technologies/eep_gas_waterheaters.cfm#techoptions.

Recommended Natural Gas Tank-Type Storage Water Heater Efficiency Factor (EF)

Water Heater Type	Base EF	FEMP Recommended EF	Best Available EF
Gas, storage	0.59	0.62	0.85

Mandatory Measures

1. Install energy efficient water heating systems. At a minimum, install tank-type water heaters or boiler systems that meet or exceed the Federal Energy Management Program's (FEMP) recommended Efficiency Factors (EFs) (Source of mandate: mitigation measure M-3.)

2. Use high efficiency plumbing fixtures to minimize hot water demand. (see section 4.0, Domestic Water. Source of mandate: mitigation measure #N(1)-2).

Optional Measures

Minimum number of optional measures required: Not applicable.

1. In high density structures, use condensing boilers or other high-efficiency centralized water heating systems.
2. Utilize waste heat recovery. Centralized systems in high density structures lend themselves well to heat recovery from, for example, chillers and microturbines.
3. Utilize high efficiency tankless gas water heaters with an equivalent EF of 0.70.
4. Utilize heat-pump water heaters coupled to a water-loop heat-pump space heating system.
5. Use residential condensing water heaters or combined water/space heating condensing heaters.
6. Install solar water heating. (see section 3.6, Renewable & Alternate Energy Sources).
7. Install Energy Star rated dishwashers and horizontal-axis clothes washers to minimize hot water demand. (see chapter 3.8 Appliances).

(f) Renewable & Alternate Energy Sources

Guidelines

The use of renewable and alternative energy is a key component of sustainable design. The options include:

- Pool and spa heating: Unglazed, low-temperature polymer pool heating collectors are the simplest and lowest cost solar systems and are well established with numerous vendors and manufacturers.
- Domestic hot water and space heating: Traditional "flat plate" collectors with one or two glass covers are the most common. They can heat water to 180°F and higher and be coupled to a storage tank mounted on the roof directly above the collector, thus allowing natural convection to circulate water through the collector without pumps (a thermosiphon system), or to a traditional storage tank located in the building with pumps to circulate the water. There are a number of variations, including an "integral collector-storage system," essentially a water preheater, and high performance evacuated tube collectors. System choice will depend on the application, cost, available roof space, aesthetics and roof strength.
- Photovoltaic (PV) systems: PV systems convert solar radiation to direct current (DC) electricity that, when inverted, provides electricity to meet standard alternating current (AC) needs. Significant government and utility incentives are available. PV panels are typically installed on rooftops. Excess electricity generation is fed back through the meter and into the electricity grid. Net metering laws enable the electricity meter to be effectively spun backwards to reduce consumers' utility bills. Battery storage is therefore not required, although appropriate electrical protective gear must be installed per code.
- Microturbines: These units generate electricity and can achieve high efficiencies if the waste heat is recovered to assist in meeting thermal requirements or produce chilled water from absorption (heat driven) chillers. Recent innovations are making these options more economically attractive. Typically natural gas and around 60 kW in size, microturbines can be centrally located to serve multiple households. Some vendors offer integrated systems that generate electricity, heat and chilled water.

- Fuel cells: Fuel cells, currently being commercialized, convert natural gas to electricity through thermochemical reactions without combustion. The costs are currently high compared to other systems. Fuel cells are typically larger than microturbines. Technologies vying for success in this promising market include phosphoric acid (PAFC), molten carbonate (MCFC), hybrid solid oxide (HSOFC) and proton exchange membrane (PEMFC).

Mandatory Measures

1. Utilize solar heating for swimming pools and spas to provide 50 percent or more of their heating requirements 80 percent of the time. (Source of mandate: mitigation measure #M-4; condition of approval #4.)

2. Make each building photovoltaic-ready (source of mandate: mitigation measures B-7h, M-11.)

- For high density buildings, install and cap a 1½" minimum diameter electric conduit from the roof to the electric panel that serves the common area load. It is assumed that the inverter will be placed on the roof and that any photovoltaic system will serve common area load. Provide the roof framing plan. Design and construct the roof to create as large an unobstructed area as possible and to group any rooftop equipment and vents toward the north end.
- For low density buildings, install and cap a 1¼" minimum diameter electric conduit from the largest south or southwest-facing portion of the roof to the electric meter of each unit. Provide mounting space for an inverter near the meter either on the wall (3' by 3') or on the ground (1' by 3'). Provide the roof framing plan. Design and construct the south-facing roofs to create as large an unobstructed area as possible.

Optional Measures

Minimum number of optional measures required: Not applicable.

1. Provide a solar hot water heating system to supplement mechanical water heating.
2. Install photovoltaic (solar) powered landscape lighting. Energy must be stored centrally and used to power a substantial percentage (50 percent) of the landscape lighting.
3. Install a photovoltaic (solar electric) system to serve building common area lighting loads. Building integrated photovoltaics should be considered.
4. Install microturbines or fuel cells with waste heat recovery. Swimming pools and spas make a suitable heat sink for either low- or high-temperature waste heat from on-site generation.
5. Provide a space dedicated to the future installation of on-site distributed energy systems to supply at least twenty percent (20 percent) of the building's installed electrical capacity. Locate the dedicated space at the building perimeter where it can be easily enclosed and exhaust flues, combustion air, and gas and electric services can be easily supplied. Size the space to allow for installation and servicing of the systems. Future energy systems could be installed by the building owner or a third party energy provider.

Application

Solar water heating, and specifically pool heating, is the most common solar energy application. Thermal systems usually operate at higher efficiencies than photovoltaic systems and require less roof space for equivalent energy capture. Photovoltaic arrays can be integrated directly into roofs (see photo below), walls, windows, parking shades and other architectural features.

Figure VI-9 Photovoltaic System

(g) Controls & Feedback

Guidelines

Sophisticated digital HVAC controls, digital communications, wireless networks and web based applications are quickly penetrating the residential market and provide ever expanding opportunities for increased energy efficiency, improved control and opportunities for better energy management. Energy and water management features are integrated into most "smart-home" systems that include security, building system control, lighting and many other features. Utilities are also using digital and wireless technology for everything from automated meter reading to shedding non-essential loads during power emergencies.

Mandatory Measures (None)

Optional Measures

Minimum number of optional measures required: Not applicable.

1. Install enhanced feature setback HVAC thermostats. Title 24 requires setback thermostats. In addition to the ability to program in setpoints for use during unoccupied periods, include:

- Battery backup (or non-volatile memory) of program schedule.
- Automatic adjustment for daylight savings time.
- Start/stop time optimization that turns on the system as late as possible to achieve setpoint by the specified time and turns off the system as early as possible while maintaining comfort until the shut-off time.

2. Provide on-demand feedback and control of energy and water use via a touchscreen or computer.
3. Install window and sliding door sensors that turn off air conditioning when natural ventilation is in use.
4. Install occupancy sensors that set back temperature setpoints when a residence is unoccupied.
5. Install daylighting sensors that automatically reduce light output when adequate daylight is available.
6. In high density structures, install a digital control system for central systems such as a water source heat pump loop or domestic hot water system.
7. Provide remotely readable utility metering for gas, water and electricity for both individual units and common areas.
8. Provide wireless communication interfaces that the utility can use to turn off air-conditioners and other non-essential loads during power emergencies. Rebates and special tariffs may be available for these and similar systems.

(h) Appliances

Guidelines

Home appliances for refrigeration, cooking, dishwashing and laundry have a substantial impact on energy and water usage. Nationally, appliances are responsible for about 20 percent of total residential energy use. Playa Vista's percentage is higher because the mild climate reduces heating and cooling requirements.

Generally, the higher initial cost of energy and water-efficient appliances will be recovered several times over during the life of the appliance through reduced utility bills.

Playa Vista builders typically offer optional appliance packages that can be included in a home's purchase price. These packages present an excellent opportunity to promote energy and water conserving equipment while allowing homeowners to avoid the out-of-pocket expense of purchasing these new appliances. Including the cost in mortgages allows homeowners to reduce monthly energy and water bills at minimal cost.

The focus at Playa Vista is on Energy Star rated appliances, as designated by this logo. The yellow Energy Guide labels that are placed on all appliances and compare energy consumption and operating costs for "similar models" can be misleading because they typically use a number of rating scales for the same appliance and may not always take into account the varying capacity of different models.

Mandatory Measures

1. Provide low water consumption and energy efficient Energy Star-rated dishwashers. (Source of mandate: mitigation measures #B-7a, M-5, N(1)-2.)
2. Provide energy efficient Energy Star-rated refrigerators if builder installed or part of builder-offered upgrade. (Source of mandate: mitigation measures #B-7a, M-5, N(1)-2.)
3. Provide low water consumption and energy efficient Energy Star compliant clothes washers in common areas and in-home laundry facilities if builder installed or part of builder-offered upgrade. (Source of mandate: mitigation measures #B-7a, M-5, N(1)-2.)
4. Provide energy efficient clothes dryers with automatic shut off using tub moisture sensor (most efficient) or exhaust-mounted temperature sensor in common area and in-home laundry facilities if builder installed or part of builder-offered upgrade. Clothes dryers are not Energy Star rated. (Source of mandate: mitigation measures # B-7a, M-5, N(1)-2.)

Optional Measures

Minimum number of optional measures required: Not applicable.

1. Install a duct from the range exhaust to the outdoors, instead of using a less effective "ductless" system.
2. Provide make-up air for exhaust fans over 100 cfm (range hood and dryer).

VI.2.4 Water

Guidelines

Playa Vista conserves water by both reducing domestic water and landscape consumption and utilizing reclaimed water for landscaping and for non-potable uses in commercial buildings. (See chapter 8. Landscape for details on landscape measures.) The domestic water strategies include low flow faucets, showerheads and toilets, and water efficient dishwashers and clothes washers. These fixtures and appliances not only conserve water, but also lower energy costs by reducing the use of hot water.

Another opportunity is to reduce the amount of water wasted when a user waits for hot water to reach faucets, showerheads and hot water appliances. While waiting, potable water pours down the drain. Insulating hot water supply pipes and reducing the length of supply runs mitigates this problem. An additional strategy is to install return lines from hot water fixtures to reclaim the water in water heaters. This supply/return loop also enables hot water to reach fixtures and appliances quickly, further saving water. These systems have been documented to save over 10,000 gallons per dwelling unit per year. A timer can control the loop pump so that hot water is only circulated when occupants need it, such as mornings and evenings.

Lastly, residents can be made conscious of their water use habits (see chapter 3.7 Controls & Feedback).

Mandatory Measures

1. Use reduced water consumption fixtures. (Source of mandate: mitigation measure #N(1)-2.)

- Toilets: 1.6 gallons per flush.
- Urinals: 1.0 gallons per flush.
- Kitchen faucets: 2.0 gallons per minute.*
- Bathroom faucets: 2.0 gallons per minute.*
- Showerheads: 2.0 gallons per minute.*

* These flow rates apply at 80 PSIG (pounds per square inch gauge). The plumbing system should be designed and balanced to achieve a water pressure of 70 +/- 10 PSIG at all fixtures.

2. Use water conserving Energy Star-rated appliances (see chapter 3.8 Appliances). (Source of mandate: mitigation measures #B-7a, M-5.)
3. In office, retail and other public buildings, install water faucets with activators that automatically shut off water flow when the faucet is not in use. (Source of mandate: mitigation measure #N(1)-3.)

Optional Measures

Minimum number of optional measures required: Three total from the following five categories: Construction Waste; Water; Recycling & Solid Waste; Landscape; and Stormwater Management.

1. Install low flush toilets: 1 gallon per flush pressure-assisted tank-type toilets (e.g., Sloan Flushmate IV equipped fixtures); 0.8 – 1 gallon per flush (liquids)/1.6 gallon per flush (solids) “dual-flush” tank-type toilets (e.g., Caroma fixtures); or 1 gallon per flush (liquids)/1.6 gallon per flush (solids) “dual-flush” flush-valve toilets (e.g., Sloan dual-flush flushometers).
2. Install low flush urinals: waterless (if legalized by City of Los Angeles) or 0.5 gallons per flush.
3. Provide a hot water demand system that recirculates the hot water supply to a remote fixture (usually at the farthest fixture from the main hot water supply to the dwelling) when there is a demand for hot water at that fixture.

VI.2.5 Recycling & Solid Waste

Application

Low Flow Appliances

Low flow appliances greatly reduce water consumption. The following graphs show the typical amount of household water use and then the lower amount used with low flow appliances. The third chart shows the percentage savings.

These calculations assumed 1.6 gallon per flush toilets, 2.2 gallon per minute faucets, 2.5 gallon per minute showerheads and a tumbler-style closes washer. Playa Vista will utilize 2.0 gallon per minute or less faucets and showerheads and water conserving appliances, so even greater water conservation will be achieved.

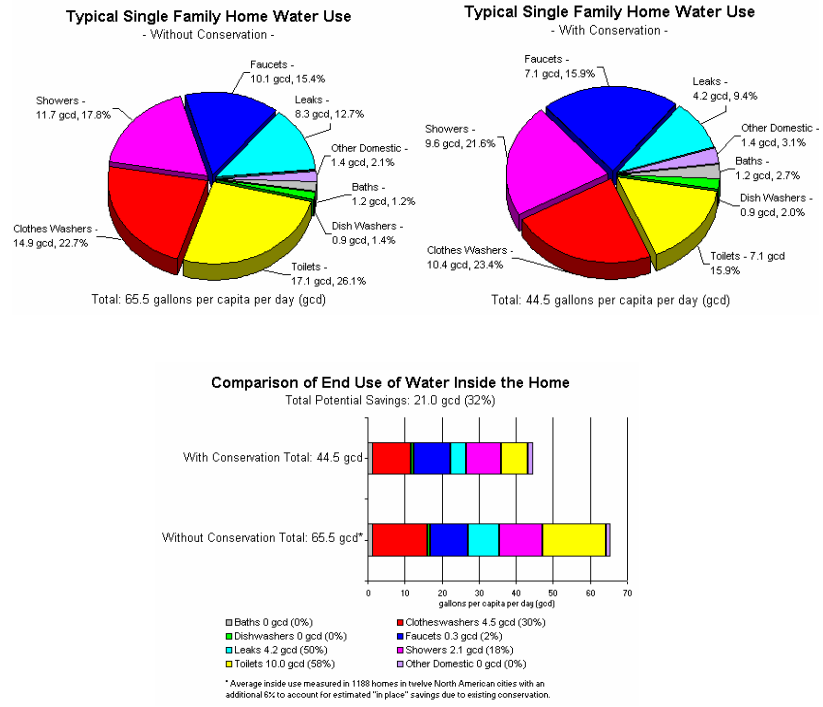


Figure VI-10 Household Water Use

Guidelines

Playa Vista's goal is to meet and exceed with the state mandate to reduce solid waste by 50 percent. The City of Los Angeles has established additional waste reduction goals of 62 percent by 2010 and 70 percent by 2020. To reach these goals, the City has implemented a commingled recycling collection process that combines the collection of clean paper (if it tears, it can be recycled), glass, plastic bottles and cans. To match this system, Playa Vista requires the installation of dual bins in every unit and dual chutes in all high density buildings.

Under State and local laws, the disposal of household hazardous waste in the solid waste stream, streets or sewage system is prohibited. To assist its residents, Playa Vista is required to provide a site for the City of Los Angeles' mobile household hazardous drop-off program.

Mandatory Measures

1. Install a dual-bin kitchen system for recyclables and trash. One bin should be designated for recyclable materials, the other bin for non-recyclable trash. Install instructional decals (see diagram below). (Source of mandate: mitigation measures #C(2)-3, N(3)-1, N(3)-2.)
2. For high density housing, provide underground recyclable and garbage areas, and install a dual-chute system for recyclables and trash. Install instructional decals on trash and recyclable chutes explaining what materials should be placed in which chute. The decals should also instruct residents as to the proper disposal of household hazardous waste. (Source of mandate: mitigation measures #C(2)-3, N(3)-1, N(3)-2; condition of approval 6.)
3. For low density housing, locate two 60 gallon self-rolling containers with lids (one each for recyclables and trash) in the garage or a dedicated outside enclosed area. Green waste bins will be provided at a central location. (Source of mandate: mitigation measures #C(2)-3, N(3)-1, N(3)-2; condition of approval 6.)
4. Comply with all applicable existing and future regulations for the

collection and disposal of household hazardous waste. (Source of mandate: mitigation measure #N(3)-3.)

Optional Measures

Minimum number of optional measures required: Three total from the following five categories: Construction Waste; Domestic Water; Recycling & Solid Waste; Landscape; and Stormwater Management.

1. For high density housing, use recycled steel for the trash and recycling chutes, and recycled rubber baffles inside the chutes to comply with Playa Vista's goal of using sustainable building materials. The rubber baffles keep recyclables and broken glass from flaring out of the bin.
2. In low density housing, install a trash compactor in each unit's kitchen. This action reduces the required size of the trash bin to 35 gallons.

Application

Kitchen Dual-Bin System

To optimize kitchen space, a pantry, cupboard or other area can be used to enclose the recycling and trash containers.

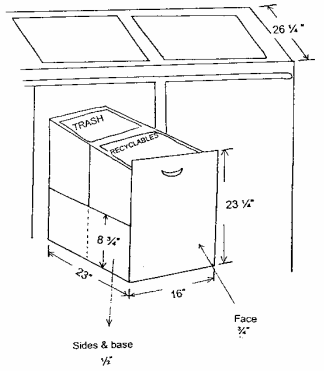


Figure VI-11 Dual-Bin System

Recycling Trash Chutes & Centralized Recycling & Trash Collection

The City permits chute sizes up to 9 square feet. Recycling and trash chutes need to be the same size. In high density housing, use three cubic yard collection bins.

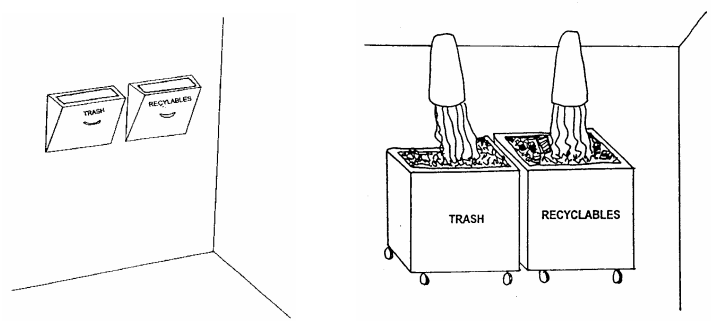


Figure VI-12 Trash chutes

The City requires the following minimum recycling square footage for high density residential buildings:

- For 20 or fewer dwelling units, 30 square feet.
- For 21 to 50 units, 60 square feet.
- For 51 or more units, 100 square feet.
- A minimum vertical clearance of 8 feet.

The recycling area shall accommodate the collection of all recyclable material without overflowing or forcing significant amounts of recyclables to be discarded as general refuse. It not, the Department of Building and Safety shall require a larger space, even if the dedicated area exceeds the minimum requirements. These requirements are subject to change.

Trash areas must be separated by an occupancy separation with the same fire resistance required for the shaft enclosure, but not less than a one-hour rating. Openings into chute termination rooms shall not be located in exit corridors or stairways.

VI.2.6 Power Signal & Control

Guidelines

Playa Vista's units are designed to encourage access to the ever-expanding electronic media and communications options. To ensure that each unit can readily be modified as needed, it is important to provide easy and serviceable connections in every residence, ensure the reliability of these connections, and provide for power conditioning and interruption protection. It is also recommended that extra service center capacity be provided and that lighting and utility circuits be separated. Design decisions should not limit resident's future options.

Additional issues include:

- Power: There is an increasing need for clean and reliable power for security, emergency lighting, elevators, computers and parking ventilation fans. Photovoltaic systems with battery storage are one possible response for backup power. Gas or diesel powered generators could also be utilized.
- Signal: The keys to accommodating future signal needs are to install high quality wiring and provide chase and access space for future technologies. Playa Vista has established standards to meet these needs.
- Control: Control systems include security, fire alarm, thermostats and control wires from utility meters, doorbells and water heaters. Connecting these systems to the network hub allows for the addition of smart devices.

Mandatory Measures

1. Install fire detection and signal in each unit, automatic call to fire department and an enunciator panel that indicates which unit is generating the alarm signal in the building. (Source of mandate: City ordinance.)
2. Wire each unit to Playa Vista structured wiring standards. (Source of mandate: Playa Vista standard.)
3. Provide seismic gas line shut-off valves. (Source of mandate: City ordinance.)

Optional Measures

Minimum number of optional measures required: Three in high density developments; two in low density buildings.

1. For high density buildings, provide automatic call to building manager (if applicable) and link fire detection to central corridor depressurization ventilation system (if applicable).
2. Provide visual fire alarm in each unit and in common means of egress.
3. Provide feeder and main circuit breaker 25 percent larger than the calculated diversified load for the unit. The diversified load shall be calculated in accordance with NEC section 220-30.
4. Separate lighting circuits from convenience circuits.
5. Provide mounting space inside the electric panel for surge protection, power conditioning and battery backup for each unit. Space must include power and phone line access.

VI.2.7 Adaptability

Application

Local Networks

The photograph below shows an example of a network hub. The hub connects units to security systems, fire alarms, building managers, control/ feedback systems from utilities and other services. The hubs have the capacity to expand as future technology requires.

Figure VI-13 Network Hub

Guidelines

All Playa Vista residences should both meet the diverse accessibility needs of the disabled and be easily adapted as families grow, technology advances and lifestyles change.

Homes at Playa Vista must meet all City of Los Angeles disability standards, including door and hallway openings, egress systems, kitchen and bathroom turn around space and appropriate fixture and countertop heights. Additional health and safety considerations include material finishes (see 2. Building Materials), entrances and landscape design (see Playa Vista Landscape Guidelines).

Bathroom showers and water closet walls should be framed so that grab bars can be easily installed at a later date. Likewise, all doors should be either 2'10" wide or framed so that wider doors can be easily installed. By keeping the rough doorway opening between king studs 3'1" wide, 2"10" doors can be installed without major remodeling. Smaller doors should swing outward to be wheelchair accessible; another option is sliding and pocket doors.

Kitchens should include a central work surface so users can reach many appliances from one location. Drawers and cabinets should be designed to help bring storage to users instead of them having to reach for items. Cabinetry and countertops should be adjustable in height and provide leg space for wheelchair accessibility, including under sinks and food preparation areas. There should be good lighting and color rendition.

Figure VI-14 Prototypical Kitchen
Image Source: IBACOS

The photo here shows a prototypical kitchen demonstrating adaptable design using standard builder grade cabinetry.

Note the raised dishwasher to alleviate back strain and the lowered kitchen sink with open space below to allow access for wheelchair users.

Chases and conduits should be large enough to accept future technology upgrades and be accessible from the building utility zone. Similarly, residents should have access for all maintenance and repairs, especially in high density buildings. The lowest cost strategy is careful specification of equipment and integration of cleanouts for all otherwise inaccessible traps such as bathtubs and showers.

Complete system and product documentation should be provided to occupants and building managers in both written and electronic form .

Mandatory Measure

1. Conform to all City of Los Angeles disability residential standards. (Source of mandate: City ordinance.)

Optional Measures

Minimum number of optional measures required: Four.

1. Reinforce bath walls for grab bars in all areas around showers and water closets. For low density structures, reinforce the downstairs powder room and one bedroom/full bath.
2. Provide accessible door sizes and swings by installing doors at 2'10" width or framing roughed to allow simple change, and installing out-swinging doors, sliding doors or pocket doors to small rooms. For each low density structure, provide accessible door sizes and swings for the downstairs powder room and one bedroom/full bath.
3. In high density housing, provide adequate access for servicing all trunk lines located within common area corridors and individual units, including water, domestic hot water, sanitary sewer, space conditioning, solar roof access, and telecommunications and major power feed. Adequate access means the ability to, without demolition, access all traps for cleaning, balancing, maintaining filters, upgrading cabling, and servicing bath and shower valves.

   Acceptable access includes doors, access panels, escutcheon plates, cleanouts, removable floor segments and ceiling access. Access within individual units can be satisfied by incorporating shower and bath valves that can be rebuilt by removal of the escutcheon ring, and providing cleanouts to allow for remote clearing of traps and drain lines. In addition, identify the specific paths of supply and waste plumbing lines, building hot water and/or heat pump loops, and electrical and communication services. Acceptable documentation includes electronic and/or paper records in the possession of the resident or landlord.
4. Provide electronic (CD ROM or Web addresses) or written construction, product and system documentation to all residents and building managers.
5. Design kitchens to allow counter height adjustment.

VI.2.8 Landscape

Guidelines

The selection of landscape materials has a significant impact on water consumption and maintenance requirements, helps determine indoor and exterior comfort, and contributes to the attractiveness of a home and community.

Playa Vista is utilizing a series of strategies to minimize the need for landscape water use:

- All landscape must be irrigated with reclaimed water.
- At least 50 percent of plant materials must be native or drought resistant.
- Plants should be selected that produce little organic waste.
- Waste should be composted and returned to the ground as topsoil, or simply left in place through the use of mulching mowers.
- Irrigation controllers should irrigate at appropriate times and in the proper amount.
- Drip irrigation should be utilized to slowly supply water directly to root systems.
- Pervious pavement should be used where appropriate to enable rainwater to soak into the ground rather than drain to the ocean.

Mandatory Measures

1. Comply with The Village at Playa Vista Landscape Guidelines. (Source of mandate: mitigation measure D-2.)
2. Comply with all applicable water conservation standards, including City ordinance 170,978. (Source of mandate: mitigation measure #N(1)-5.)
3. Use at least 50 percent native or drought resistant plants as defined by the City of Los Angeles Landscape Ordinance. All non-native vegetation shall be non-invasive. The ordinance references two documents that identify native plants and native plant communities: 1) for a native plants list (pre-European settlement) see James Hickman's "The Jepson Manual," and 2) for a native plant community list (environmentally similar to native plants) use Robert F. Holland's "Preliminary Descriptions of the Terrestrial Natural Communities of California." (Source of mandate: mitigation measure #C(2)-3.)
4. Plant shade producing trees. (Source of mandate: mitigation measures #B-7f, M-1, M-2, M-9.)
5. Plant at least one tree for every four surface parking spaces such that at least 50 percent of surface parking areas are shaded within ten years. (Source of mandate: City ordinance.)
6. Use reclaimed water for all landscape irrigation, including lawns and raised beds on podiums. Certain restrictions must be followed including: watering at night, i.e. between 10 p.m. and 6 a.m., and no ponding or spraying. All landscape plans (schematics are sufficient) must be submitted to the Los Angeles Department of Water and Power Reclaimed Water Coordinator for approval by LADWP and the Los Angeles County Health Department. (Source of mandate: mitigation measure #N(1)-4.)
7. Use drip or soaker-based irrigation to water all plants (including lawns) slowly and reduce runoff, evaporation and water waste. (Source of mandate: mitigation measure #C(2)-3.)
8. Use automatic controls for irrigation systems, including rain sensors to avoid irrigating after rain and timers to irrigate at night in specific amounts as plants require. (Source of mandate: mitigation measure #N(1)-6.)
9. To establish vegetation, use only slow-release fertilizers that are applied directly to the soil. Do not apply during or with 72 hours of a forecasted rain event. (Source of mandate: mitigation measure #C(2)-3.)

Optional Measures

Minimum number of optional measures required: Three total from the following five categories: Construction Waste; Domestic Water; Recycling & Solid Waste; Landscape; and Stormwater Management.

1. Use at least 75 percent native or drought tolerant plants. See first mandatory measure above for definition of native plants and native plant communities.
2. Use weather-based "evapotranspiration" (ET) irrigation controllers that automatically adjust water supply to meet changing climatic conditions and plant water requirements.

Application

Drought tolerant landscaping

Drought tolerant landscaping utilizes native and other drought resistant plants to conserve water and regional ecosystems. Water thirsty plants are often imported to beautify the landscape. However, with proper planning and skillful design, landscapes can be beautified using native and drought tolerant species.

Microclimates

Landscaping and pavement selections greatly affect the microclimates surrounding a building. Large, flat areas of exposed pavement become extremely hot on the sunny afternoons that abound in Los Angeles. This pavement creates heat islands (pictured below) that are uncomfortable even to walk through and which can strain building cooling systems. This problem can be alleviated by planting trees and other vegetation that shades parking areas, pavement and buildings. Moreover, shade and transpiration (the natural evaporative cooling provided by plants) create comfortable outdoor environments. The second drawing illustrates the use of shade trees to cool parking areas and walkways, and the use of vines to shade windows.

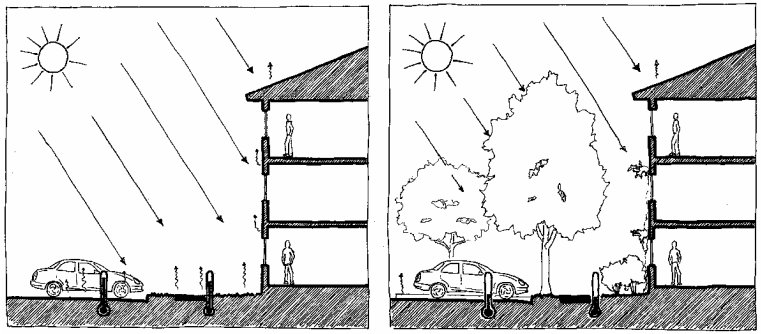


Figure VI-15 Microclimates

Weather-Based Evapotranspiration (ET) Irrigation Controllers

Traditional timer-based irrigation controllers automatically apply water on a preset schedule regardless of climatic conditions and actual plant water requirements. Studies show that consumers are very unlikely to seasonally adjust their timers and that timers are usually set to supply water for worst-case conditions. A study by the Irvine Ranch Water District (IRWD) concluded that, on average, timer-based sprinkler controllers provide 44% more water than plants need.

Weather-based evapotranspiration (ET) controllers are an exciting emerging technology for residential applications. These controllers use a daily or weekly "evapotranspiration" parameter to automatically adjust sprinklers to supply just the amount of water plants require. On hot, windy days more water is supplied, and on milder days less water. Research has shown that ET controllers can reduce irrigation water use by 25% or more. Once limited to agricultural applications, larger commercial landscapes and golf courses, several manufacturers now offer convenient residential systems. The Metropolitan Water District, in conjunction with local water utilities, offers an ET controller rebate program to promote their use.

Another benefit of ET controllers is that they reduce stormwater runoff. The "Residential Runoff Reduction Study," available online at www.irwd.com, reports that ET controllers achieve a 71 percent runoff reduction compared to non-ET systems.

VI.2.9 Stormwater Management

Guidelines

One of the foundations of Playa Vista is the improvement of the water quality of the Ballona Wetlands, Ballona Creek and Santa Monica Bay through the creation of the riparian corridor and freshwater marsh. The corridor and marsh improve the quality of Playa Vista and upstream stormwater runoff and provide significant ecological habitat. The Consolidated Storm Water Pollution Prevention Program, Playa Vista Project (SWPPP), both responds to the increasingly strict stormwater regulations and protects both the site and downstream resources. It details both construction and post-construction requirements. (See 5. Recycling & Solid Waste and 8. Landscape for related measures on these topics.)

Stormwater or "urban runoff" contains pollutants that can lead to the deterioration of downstream "receiving waters." Rainwater scrubs pollutants from the air and picks up additional pollutants as it runs over streets, roofs and landscaped areas. Typical urban pollutants include heavy metals from brake pads and zinc downspouts; petroleum products from cars; fertilizers and pesticides from landscaped areas; and PCBs and mercury washed from the air. These pollutants can cause toxic reactions in aquatic life, including fish. In addition, bacteria and viruses in urban runoff can cause human illnesses from direct contact, inhalation or the drinking of runoff.

The quantity of urban runoff is also a concern because hardened surfaces increase runoff by reducing the area through which rainfall can soak into the ground. Imperviousness (i.e., paved surface) increases the frequency, rate and volume of stormwater runoff. This in turn increases the amount of pollution and the frequency of polluted conditions downstream. Urbanization can also increase the amount of dry weather runoff and therefore pollutants from such sources as pavement washing, car washing and irrigation.

During construction, erosion control measures must be implemented. Examples include gravel bags, straw wattles and silt fences and conducting grading activities during the dry season. Each contractor must submit a Contractor/Builder SWPPP for approval. A copy can be obtained from the project's stormwater program monitors. In addition, to protect post construction resources, permanent "best management practices" (BMPs) must be incorporated into each individual project.

Mandatory Measures

1. Install a roof drain biofiltration system in setback areas that receives and filters runoff. (Source of mandate: mitigation measures #C(2)-1, C(2)-2.)
2. For high density housing, do not allow any runoff to enter underground parking. If there are above ground parking lots, treat runoff before it enters the storm drain system. (Source of mandate: Los Angeles County Standard Urban Stormwater Mitigation Plan (SUSMP).)
3. For low density housing, minimize imperviousness through a reduction in impervious area and/or the use of permeable material by doing one of the following. (Source of mandate: SUSMP; SWPPP section 5.1.6.)

- Minimize impervious parking lot areas (use underground parking and minimum parking lot dimensions for space and lane widths, etc.) and motor court and driveway widths (use the minimum widths allowed by City Code for longer driveways with adjacent landscaping).
- Install sufficient bioretention (swales) without curbs or with curb notches in parking lot islands and other landscape areas adjacent to or near parking lots and motor courts to increase vegetation and allow runoff to enter. Allow for treatment of ¾ inches of runoff or 0.2 inches per hour from the parking lot and tributary areas.
- Use permeable materials for a minimum of 50 percent of driveways, parking areas, walkways and patios when these uses are not over underground parking.

4. Route any driveway runoff to a roadside or driveway adjacent bioswale. (Source of mandate: Playa Vista standard.)

5. Do not use copper or zinc for roofing, downspouts, gutters or other exposed surfaces, and do not use roofing materials with tar papers or other petroleum-based sealers. Use roof materials that are inert, such as tile. (Source of mandate: EIR Section IV.C.(2), Water Quality, Section 3.3.)
6. Install porous pavement, swales, biofilters and parking lot filters, as required by Playa Vista standards. (Source of mandate: SWPPP sections 5.1.4, 5.1.6, 5.1.7.)

Optional Measure

Minimum number of optional measures required: Three total from the following five categories: Construction Waste; Domestic Water; Recycling & Solid Waste; Landscape; and Stormwater Management.

1. For low density buildings, route walkway and/or roof runoff to vegetated areas (bioretention or bioswale).

Application

Best Management Practices

BMPs can be employed to:

- Slow the rate of runoff by extending the detention times of runoff on site to encourage the settling of particles, the sorption (attachment) of pollutants onto particles, or nutrient (phosphorus and nitrogen) uptake by vegetation.
- Increase infiltration (soaking into soils and planters to filter and reduce runoff) and/or evapotranspiration (plant and soil evaporation to reduce runoff).
- Filter runoff using targeted filter media or vegetation that traps or breaks down many contaminants.
- Prevent pollutants from being picked up and transported by stormwater.
- Reduce or eliminate dry weather flows (irrigation overrun, pavement washing, etc.).
- Improve the site's aesthetics and increase water conservation.

Freshwater Marsh

Playa Vista's 26-acre freshwater marsh serves as a regional BMP and represents an innovative approach to stormwater quality and related issues. The freshwater marsh improves water quality by slowing down the flow of stormwater, thereby allowing pollutants to come into contact with vegetation, organic matter and soils that together act like a natural filtration system. "Pretreatment areas" at each marsh stormwater entry capture the majority of pollution by spreading and slowing the flow of water so that sedimentation and filtering occurs. The system is predicted to result in water quality that has approximately 80 percent fewer stormwater pollutants than the typical untreated site.

BMPs Common to all Land Use Types

Bioretention (depressed landscaped areas; see photo below left) can be used in surface parking lots and road medians to capture stormwater and allow it to slowly drain or soak in. Excess runoff drains to the storm drain system via a vertical intake pipe.

Swales (shallow side-sloped grass lined channels with gentle longitudinal slopes; see photo above right) and bioswales (swales with vegetation, usually allowing for temporary ponding and increased infiltration) can channel stormwater from impervious areas into the storm drain system while allowing for some infiltration, filtration and pollutant binding by soils and uptake by plants.

Underground parking can stop pollutants from contacting stormwater.

Figure VI-16 Bioretention & Swales

VI.2.10 Transportation

Guidelines

One of the basic concepts of Playa Vista's mixed-use design is to minimize the need to drive. While both walking and biking are addressed through Playa Vista's urban design; biking must be supported by convenient storage in each building. In addition, the project needs to be ready for a future that may include alternative fueled vehicles.

The engine and fuel of choice for automobiles and other vehicles is competitive for the first time in a hundred years. Hybrid and other clean burning engines and alternative fuels are both more efficient and the key to Los Angeles meeting Federally-mandated clean air goals.

Vehicles utilizing electricity, natural gas, propane, ethanol and methanol are or recently have been on the market. Hybrids, which combine electric drive trains and small engines are, by consensus, the most likely long-term future. It is unclear, however, what type of engine hybrids will use. The choices include fuel cells (which could be powered by hydrogen, methanol or natural gas); gasoline, diesel or natural gas internal combustion engines; or natural gas turbines.

As regulations and demand dictate, electric vehicle charging will be provided in individual buildings whether for neighborhood electric vehicles (NEVs) that require 110 volts, or full size vehicles which require 220 volts. Natural gas fueling may also be provided at a central fueling station, much like a gasoline station.

Mandatory Measures

1. Install 240 volt circuit capacity and conduit for electric vehicle charging in the garage. (Source of mandate: mitigation measure #B-7e, M-8.)
2. Install electric vehicle charging if required by the California Air Resources Board (CARB). (Source of mandate: mitigation measures #B-7e, M-8.)
3. In high density or other shared-garage housing, provide secure bicycle storage sufficient for one bike for every three residential units. Round to the nearest whole number. (Source of mandate: Playa Vista standard.)

Optional Measures (None)

Application

Electric Vehicle Charging

Main house panels and building circuits should have excess capacity to accommodate an added circuit breaker for future electric vehicle load. Electric vehicle chargers typically require one circuit, single phase 208V/240V and an additional panel capacity of 400 Amps. Four vehicles, for example, would require 160A if all are expected to be charged simultaneously, which is a fair assumption as most residential charging takes place at night.