

# Scottsdale's Transition to Green Construction Codes

By Anthony C. Floyd, AIA, LEED AP

Scottsdale, Ariz., has proven it takes an informed citizenry, coupled with long-term thinking, to protect and enhance the desert amid an urban development. From its early storm water management practices to its environmentally sensitive land ordinance, Scottsdale consistently has created planning policies, ordinances and design guidelines that protect and enhance the character of the Sonoran Desert. With its recent adoption of the *International Green Construction Code*™ (IgCC), Scottsdale is continuing to move closer to establishing a framework for a sustainable urban desert community.

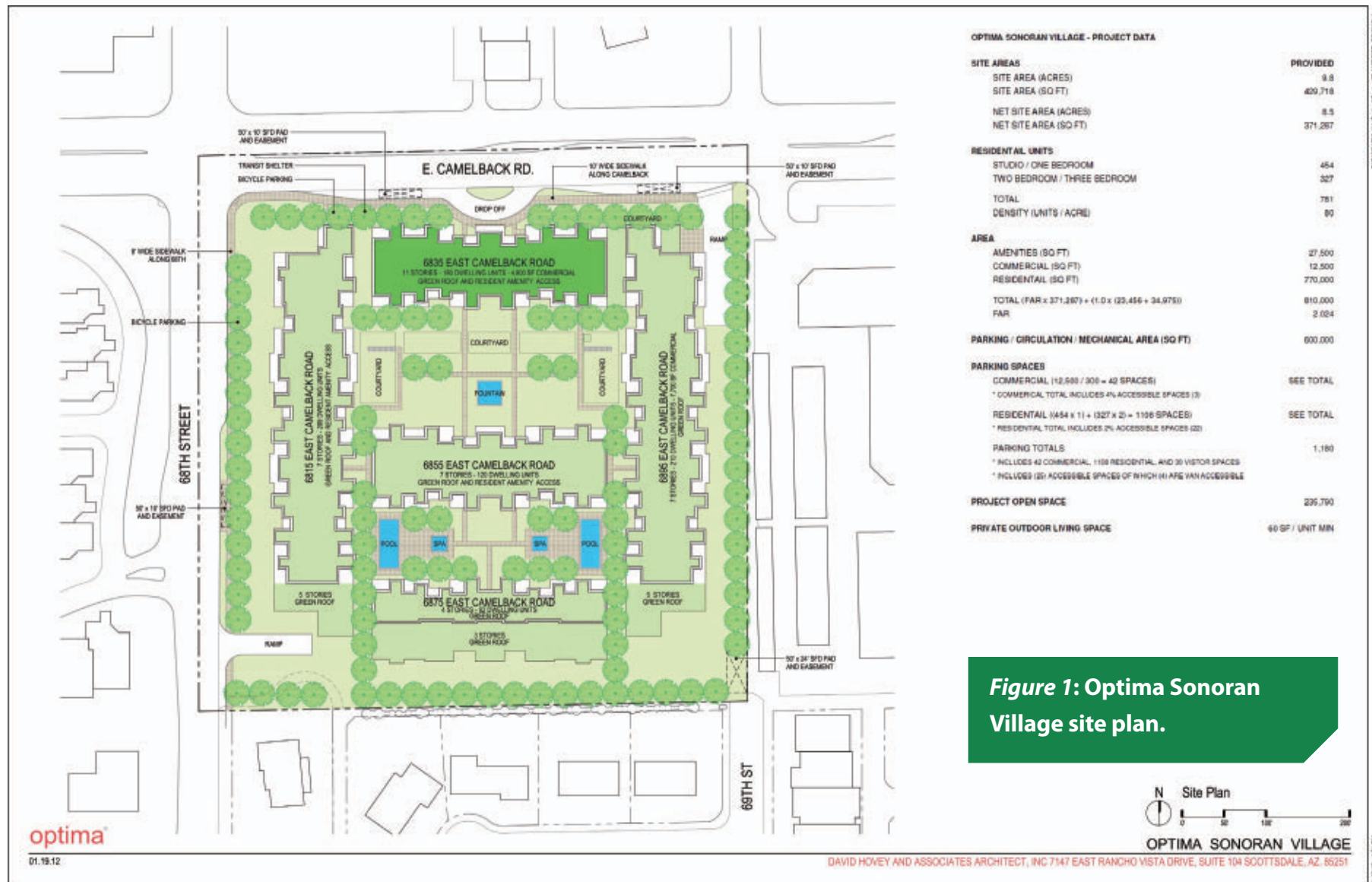


## Scottsdale's Path Toward Green Codes

Scottsdale's residential [Green Building Program](#) was established in 1998 to encourage environmentally responsible building in the Sonoran Desert region by incorporating healthy, resource- and energy-efficient materials and methods in the design and construction of homes. Since 1998, the city has issued more than 1,300 green building permits. City officials use an integrated plan review and inspection process, culminating with a green [Certificate of Occupancy](#). The city established a commercial green building component in 2001. In 2005, the city adopted the nation's first LEED® Gold green building policy for newly constructed and renovated city facilities. LEED is a national multi-level green building rating program developed by the [U.S. Green Building Council \(USGBC\)](#) to help ensure objectivity with third-party verification for public facilities. The city currently has nine LEED-certified projects, including four Platinum-certified buildings.

## Adopting the IgCC

In July 2011, Scottsdale adopted Public Version 2.0 of the IgCC as a core component of its voluntary commercial Green Building Program. The IgCC is required when the city grants zoning entitlements in designated planning zones, such as downtown. Developers can receive



**Figure 1: Optima Sonoran Village site plan.**



**Figure 2: Optima Sonoran Village, Phase I.**



**Figure 3: Optima Sonoran Village rendering.**



**Figure 4: Optima Sonoran Village construction.**

**Table 1 — Optima Sonoran Village IgCC Attributes**

**Site Development and Land Use**

- Mixed-use development located within ¼ mile of a shopping mall, entertainment and commercial offices consisting of more than 10 diverse services (elective).
- Public courtyards with pedestrian connectivity to public sidewalks, direct access to street bus stop, bicycle parking with access to designated bicycle lanes, 100 percent underground vehicular parking (elective).
- Vegetated terraces and roofs, native and drought-tolerant vegetation contribute to a tempered microclimate, air pollutant absorption and storm water management.
- Heat island mitigation is provided for 80 to 90 percent of hardscape and 100 percent of roof surface through shading, reflective surfaces, vegetated terraces/roofs (IgCC requires at least 50 percent of hardscape and 75 percent of roof).

**Material Resource Conservation and Efficiency**

- Major building elements consist of 95 percent local and recycled content materials. Materials include concrete structure (see *Figure 4*, page 37), masonry walls, aluminum curtain wall, glazing and interior metal framing. (IgCC requires at least 55 percent).
- Diverting 69 percent of construction waste from landfill (IgCC requires at least 50 percent).

**Energy Conservation, Efficiency and CO<sub>2</sub>e Emission Reduction**

- zEPI (zero energy performance index) score of 47 (IgCC requires a zEPI ≤ 51), where 100 represents an energy code compliant building in the year 2000, and 0 represents a net zero energy building. Building uses 19 percent less energy than a code compliant building based on ASHRAE 90.1 2004 and will save an estimated \$79,706 in annual utility costs.
- Project has been stipulated to incorporate on-site solar PV system into Phase 2 of the project.

**Water Resource Conservation, Quality and Efficiency**

- Indoor water use is reduced by 21 percent compared to baseline plumbing fixture flush and flow rates (IgCC requires at least 20 percent).

**Indoor Environmental Quality and Material Emissions**

- Typical living unit receives effective daylight in 50 to 90 percent of floor area of habitable rooms with an effective aperture (EA) of 26.7. IgCC requires an EA of at least 14 (Arizona) in not less than 50 percent of floor area in regularly occupied spaces. Exterior shade louvers and perforated screen panels reduce glare and heat gain.
- Ninety-eight percent of flooring and site-applied interior paints, coatings, adhesives and sealants comply with IgCC VOC content limits (IgCC requires at least 85 percent).

additional considerations — including increases in building height or density, where appropriate — if they agree to provide a host of prescribed community benefits, including IgCC compliance. Scottsdale amended the IgCC to account for Sonoran Desert conditions, city planning objectives and environmental priorities. The IgCC allows regional variability, while providing regulatory consistency among adopting jurisdictions.

**Scottsdale IgCC Projects**

Scottsdale has four IgCC projects at various stages of development: a 781-unit, multi-family, mixed-use development; an office building renovation; an office tenant improvement; and a city trailhead facility. Two of the projects are completed, and the other two are under construction. Two of the projects are highlighted below.

**Optima Sonoran Village (IgCC)**

*Optima Sonoran Village* is a new multi-family, mixed-use project being constructed on a 10-acre infill site in downtown Scottsdale. Phase 1 consists of one building with 210 residential units and 7,700 square feet of commercial space that includes a resident fitness center and 100 percent underground parking. When complete, the project will include a total of five buildings containing 781 residential units and 12,500 square feet of commer-



cial/retail and amenity space (see *Figure 1*, page 37). The buildings vary in height from four to 11 stories, with an undulating building façade (see *Figure 2*, page 37).

The project scores high marks for site development, including reduced heat island mitigation, pedestrian connectivity, tempered microclimate, integrated open space, access to alternative modes of transportation and cleaner air as a result of vegetated terraces (see *Figure 3*, page 37). Energy performance was challenging, due to an exterior glass curtain wall system, but the project compensated with high-performance glazing, overhangs, building configurations and exterior shading devices, which has resulted in a zero energy performance index (zEPI) of 47 (IgCC requires a zEPI ≤ 51). The project excels in building material selection, daylighting and indoor environmental quality. See *Table 1*, page 38 for a summary of IgCC attributes.

### Douglas Architecture Office (Scottsdale Green Building Rating and IgCC)

The *Douglas Architecture Office* is a major renovation of office space located on an infill lot in downtown Scottsdale. The project involved a reconfiguration of a 1,614-square-foot, two-story structure into a 2,382-square-foot, two-story building (see *Figure 5*, page 40).



**Table 2 — Douglas Architecture Office IgCC Attributes**

**Site Development and Land Use**

- Site is located within ¼ mile of at least two bus routes, ¼ mile of more than 10 diverse services and within ¼ mile of designated bicycle lanes (elective).
- Landscape improvements chosen from native species and other drought-tolerant plant material appropriate to the desert southwest with smart irrigation controller (see *Figure 6*, page 40).
- Project provides 90 percent of site hardscape with shading and 100 percent roof with solar reflective index and roof deck shading (IgCC requires at least 50 percent hardscape and 75 percent roof protection).

**Material Resource Conservation and Efficiency**

- Sixty-eight percent of major existing building elements were reused (see *Figure 7*, page 40). IgCC requires a minimum of 55 percent to be local, used, recycled content, recyclable or bio-based.
- Ninety-five percent of reconstruction material waste (metal, cardboard, glass, lighting fixtures, cabinets, doors) was diverted from the landfill.

**Energy Conservation, Efficiency and CO<sub>2</sub>e Emission Reduction**

- zEPI (zero energy performance index) score of 32 (IgCC requires ≤ 51). The building is projected to use 42.3 percent less energy than a code compliant building based on ASHRAE 90.1 2004 and will save an estimated \$1,340 in annual utility costs.
- Project includes a 2.46kW solar photovoltaic system that supplies 25 percent of annual electric energy consumption.

**Water Resource Conservation, Quality and Efficiency**

- Indoor water use is reduced by 21 percent compared to baseline plumbing fixture flush and flow rates (IgCC requires at least 20 percent).

**Indoor Environmental Quality and Material Emissions**

- Second-floor studio represents 50 percent of the regularly occupied spaces with an effective aperture (EA) of 32. The IgCC requires an EA of at least 14 (Arizona) in not less than 50 percent of floor area in regularly occupied spaces. An exterior operable blind system reduces morning glare and heat gain (see *Figure 8*, page 40).
- All flooring and site-applied interior paints, coatings, adhesives and sealants comply with IgCC VOC content limits (IgCC requires at least 85 percent).



**Figure 5: Douglas Architecture Office.**



**Figure 6: Douglas Architecture Office drought-tolerant landscape.**



**Figure 7: Douglas Architecture Office reconstruction.**



**Figure 8: Douglas Architecture Office shading and daylighting.**

The project initially was submitted and certified under Scottsdale’s commercial Green Building Program. With funding from the city awarded through an Energy Efficiency and Conservation Block Grant, the Douglas Architecture Office was able to receive a post-occupancy performance evaluation. The assessment was used to help certify the building under the IgCC.

The Douglas Architecture Office project reuses 68 percent of building materials, reduces annual energy costs by 42.3 percent, supplies 25 percent of annual electric energy consumption with an on-site solar PV system, provides for daylighting in at least 50 percent of regularly occupied spaces and reduces indoor water use by 21 percent. See *Table 2*, page 39 for a summary of IgCC attributes.

### Summary

Buildings are “machines for living in” more today than they were when 20th century Modernist Swiss Architect Le Corbusier said this during the modernist architecture movement. With the recent arrival of smart technologies and advanced HVAC and lighting control systems, building system commissioning is more important now than ever. The IgCC is expected to help bridge the abyss between expected and actual outcomes. This is the only way to effectively achieve green buildings and, ultimately, sustainable communities.

Scottsdale will use its experience in implementing the IgCC with local developers, architects and engineers toward adoption of the 2012 IgCC and *International Energy Conservation Code*® (IECC). Officials will take measures to improve the building performance verification process with a goal to make green development a simple and straightforward process. By adopting the 2012 suite of *I-Codes*, Scottsdale will be able to achieve greater participation from developers, while advancing significantly toward an environmentally sensitive, resource-efficient and healthy built environment. **bsj**

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 Architect — David Hovey and Associates Architect  
 General Contractor — Optima Construction

**Douglas Architecture Office**  
 Architect — John Douglas Architects  
 General Contractor — Kitchell Perez

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