C11. AUSTIN ENERGY GREEN BUILDING PUD WORKSHEET

Instructions for Worksheet (reference AEGB PUD Guidebook)

1. Verify completion of all 8 measures of the Basic Requirements to qualify for any Rating by indicating 'yes'.

2. Signify intent of additional green measures by entering the available points in the Yes, ? (maybe), or No column.

AUSTIN ENERGY GREEN BUILDING

	Category	Requirements	Web Link	Points	Design Team			AEGB		Strategies / Comments	Team Member
					Yes	?	No	Y'd	Final		
	Basic Requirements										
1	Building Systems Commissioning (Cx)	1. design intent 2. document in CD 3. Cx plan 4. verification 5. O&M documentation & training 6. Cx report pecl.org/CxTechnical/Tools_Guides/guides.html		Req'd							
2	Storm Water Runoff & Water Quality Control	Meet current city drainage and water quality standards and ordinances for the project site watershed. ci.austin.tx.us/watershed/ordinance_map.htm		Req'd							
3	Roofing to Reduce Heat Island	Meet current Austin Energy Code roofing requirements with vegetated or reflective roofs (<2:12 pitch: SR ≥ 0.70 or SRI ≥ 78, ≥2:12 pitch: SR ≥ 0.3 or SRI ≥ 29) energystar.gov/ia/products/prod_lists/roof_prods_prod_list.pdf		Req'd							
4	Building Energy Use Efficiency	Exceed current Austin Energy Code Building Interior Lighting and Envelope requirements by 15% each or exceed code building performance model by 15% energycodes.gov/comcheck/		Req'd							
5	Building Water Use Reduction	Reduce planned indoor potable water consumption below the baseline (EPAct) by at least 15%. ci.austin.tx.us/watercon/ Ref: Water Use Reduction Calculator		Req'd							
6	Low VOC Interior Paints and Coatings	Meet standards for Green Seal GS-11, GC-03 for Paints and SCAQMD Rule 1113 for Coatings. greenseal.org/certification/standards/paints.cfm greenseal.org/certification/standards/anti-corrosivepaints.cfm aqmd.gov/rules/reg/reg11/r1113.pdf		Req'd							
7	Storage and Collection of Recyclables	Provide appropriately sized, easily accessible area dedicated to the separation, collection and storage of materials for recycling including at minimum, the top two (four for multi-family >100 units) identified recyclable waste stream items. ci.austin.tx.us/sws/recyclerules.htm		Req'd							
8	Construction Waste Management	Recycle and/or salvage at least 50% by weight non-hazardous construction & demolition waste excluding excavated soil & stone. austinenergy.com/Energy%20Efficiency/Programs/Green%20Building/Sourcebook/constructionWasteManagement.htm Ref: Const. Waste Calculator		Req'd							
	Basic Requirements NOT ACHIEVED										
	Team										
1	Integrated Project Design Team & Sustainable Goals	1. Choose team members early in design phase 2. Document sustainability goals. 3. Hold sustainability team meetings during each phase of design through construction to track progress 4. Include sustainability goals in specifications 5. Incorporate sustainability features proposed certification into pre-construction meeting. wbdg.org/index.php		1							
	Total Points - Team			1	0	0	0	0	0		

	Category	Requirements	Web Link	Points	Design Team			AEGB		Strategies / Comments	Team Member
					Yes	?	No	Y'd	Final		
	Site										
1a	Site Selection - Environmental Sensitivity	Site is not located in the Drinking Water Protected Zone. Site is not a greenfield.		2							
1b	Site Selection - Desired Development Area	Site located within the Urban Watershed Desired Development Zone. Coagis1.ci.austin.tx.us/website/COAViewer dev/viewer.htm		4							
2	Diverse, Walkable Communities	Building(s) connects with neighboring properties with pedestrian and/or bicycle only paths (shading preferred) that are separate from vehicular traffic. Project includes or is located within 1/2 mile walking distance of residences and at least 10 Basic Services which are accessible via a safe route intended for use by pedestrians that does not require crossing a road more than 5 lanes wide or 35 miles per hour. ci.austin.tx.us/development/downloads/final.pdf walkscore.com/index.shtml oregon.gov/ODOT/HWY/BIKEPED/planproc.shtml		1							
3	Brownfield Redevelopment	Rehabilitate contaminated site. epa.gov/region09/waste/sfund/prg/index.html		1							
4	Site Characteristics Study	Document existing site characteristics, map all potential natural hazards (including traffic and pollution sources). Plan to maintain or restore existing site features. Site building to minimize impact and to utilize natural characteristics.		1							
5a	Transportation Alternatives - Public Transportation	Locate building within 1/4 mile of at least 2 bus stops or within 1/2 mile of a rail stop (or future rail stop with proposed completion within 5 years). capmetro.org/riding/trip_info.asp		1							
5b	Transportation Alternatives - Bicycle Use	Bicycle securing areas and shower/changing facilities for 10% or more of the building occupants. One bicycle parking space per rider, one shower per 25 riders. Safe routing on property. ci.austin.tx.us/bicycle/		1							
5c	Transportation Alternatives - Parking Capacity	Parking does not exceed minimum local zoning requirements. Preferred parking for carpools for 5% (min.) of building occupants. www.amlegal.com/austin_nxt/gateway.dll/Texas/austin/title25landdevelopment/chapter25-6transportation?f=templates$fn=altmain-nf.htm$3.0#JD_25-6471		1							
6a	Site Development - Protect or Restore Open Areas	Limit disturbance to 40 ft beyond building perimeter; 10 ft beyond walkways, patios, surface parking; 15 ft beyond roadways & utility trenches; 25 feet beyond any pervious areas that require additional staging. Previously developed sites: At least 50% of the post-development open area (site area minus building footprint) is vegetated using native/adapted plants. Vegetated roof areas may be included in open area calculations, if plants meet the definition of native/adapted.		1							
6b	Site Development - Maximize Vegetated Open Area	Provide vegetated open area* using native/adapted plants equal to 20% of the project site area. *May include vegetated roof areas, if plants meet the definition of native/adapted. ci.austin.tx.us/growgreen/plants.htm		1							

	Category	Requirements	Web Link	Points	Design Team			AEGB		Strategies / Comments	Team Member
					Yes	?	No	√'d	Final		
7a	Additional Heat Island Reduction - Site	1. 50% of site hardscape any combination of: Vegetative open grid paving (at least 50% pervious), paving materials with SRI 29 min., vegetative shading planted over non-roof impervious surfaces within 5 years. OR 2. Locate 50% of parking underground or in structured parking with top deck surface of SRI 29 min. http://eetd.lbl.gov/HeatIsland/		1							
7b	Additional Heat Island Reduction - Roofing	Install any combination of vegetated and reflective roofs (<2:12 pitch: SR ≥ 0.75 or SRI ≥ 85, ≥2:12 pitch: SR ≥ 0.45 or SRI ≥ 35) coolroofs.org/aboutthecrrc_owners.html		1							
8	Light Pollution Reduction	Exterior lighting meets COA Code-Chpt.25-2, E, Art. 2.5; IESNA RP-33 Light Trespass; and Illuminance levels at specific facilities. ci.austin.tx.us/development/downloads/final.pdf		1							
9	Integrated Pest Management (IPM)	Implement IPM plan to minimize environmental impact and use least toxic practices for site and building management. ci.austin.tx.us/watershed/ipm.htm		1							
10	Outdoor Environmental Quality	Shaded seating for minimum of 10% of building occupants. http://solardat.uoregon.edu/SunChartProgram.html		1							
	Total Points - Site			**19**	0	**0**	**0**	**0**	0		

	Category	Requirements	Web Link	Points	Design Team			AEGB		Strategies / Comments	Team Member
					Yes	?	No	√ d	Final		
	Energy										
1	Additional Energy Use Efficiency	Exceed current code building by 17.5% or better using the ASHRAE 90.1-2004 App. G Performance Rating Method. **Point Allocation:** 17.5% = 1 pt. 22.5% = 3 pts. 25% = 4 pts, 27.5% = 5pts, 30% = 6 pts, 32.5% = 7 pts, 35% = 8 pts, 37.5% = 9 pts, 40% = 10 pts, 42.5% = 11 pts, 45% = 12 pts. www.realread.com/prst/pageview/browse.cgi?book=1931862664		12							
2	Green Energy	GreenChoice® commercial agreement. If GreenChoice® unavailable, 2-year contract for Texas or Green-e certified National RECs for 100% of building's annual electricity use. austinenergy.com/Energy%20Efficiency/Programs/Green%20Choice/		1							
3a	Renewables 2%	On site renewable energy system for 2% of energy needs. nrel.gov/		1							
3b	Renewables 5%	On site renewable energy system for 5% of energy needs. austinenergy.com/Energy%20Efficiency/Programs/Rebates/Solar%20Rebates/guidelines.htm		1							
4	Additional Commissioning (Cx)	1. Cx agent design review < 50% CD's. 2. Demonstrate bldg. systems operate in accordance w/ design intent 3. Demonstrate bldg. structure & envelope performance in accordance w/ design intent. 4. Seasonal re-Cx through warranty period. 5. Cx report peci.org/CxTechnical/Tools_Guides/guides.htm		1							
5	District Cooling	Tie into Austin's district cooling and heating loop for all HVAC energy needs. austinenergy.com/Commercial/Other%20Services/On-Site%20Energy%20Systems/districtcooling.htm		1							
	Total Points - Energy			17	0	0	0	0	0		

	Category	Requirements	Web Link	Points	Design Team			AEGB		Strategies / Comments	Team Member
					Yes	?	No	√'d	Final		
	Water										
1a	Irrigation Water Reduction 50%	Use high efficiency irrigation, rainwater catchment, and/or climate appropriate plant materials. Reduce by 50% over baseline. Ref: Irrigation Water Use Reduction Calculator ci.austin.tx.us/watercon/		1							
1b	Irrigation Water Reduction 75%	Reduce by 75% over baseline. Ref: Water Use Reduction Calculator www.ci.austin.tx.us/growgreen/		1							
1c	Irrigation Water Reduction 100%	Reduce by 100% over baseline. Ref: Water Use Reduction Calculator		1							
2a	Indoor Potable Water Use Reduction 25%	Use low-flow fixtures. Reduce by 25% over baseline. Ref: Water Use Reduction Calculator ci.austin.tx.us/watercon/		1							
2b	Indoor Potable Water Use Reduction 35%	Reduce by 35% over baseline. Ref: Water Use Reduction Calculator energystar.gov/index.cfm?c=appliances.pr_appliances		1							
2c	Indoor Potable Water Use Reduction 45%	Reduce by 45% over baseline. Ref: Water Use Reduction Calculator www.epa.gov/watersense		1							
2d	Indoor Potable Water Use Reduction 55%	Reduce by 55% over baseline. Ref: Water Use Reduction Calculator		1							
3	Stormwater Management	Manage by infiltration 25% of the water quality volume (WQV) for sites ≥ 50% existing IC or 50% of the WQV for sites < 50% existing IC. Ref: ECM 1.6.7 www.amlegal.com/austin_nd2/gateway.dll?f=templates&fn=default.htm&vid=amlegal:austin_env ironment		1							
	Total Points - Water			8	0	0	0	0	0		

	Category	Requirements	Web Link	Points	Design Team			AEGB		Strategies / Comments	Team Member
					Yes	?	No	...d	Final		
	Indoor Environmental Quality (IEQ)										
1	Indoor Air Quality Monitoring	Install permanent carbon dioxide monitoring system that provides feedback in a useable form to make adjustments for ventilation system. Commission all systems to the preferred parameters for optimal performance. epa.gov/iaq/index.html		1							
2	Indoor Chemical & Pollutant Sources	Identify and ventilate areas of point source pollutants (i.e. copy machines, print shops, janitors closets, labs) 1. Provide ventilation directly to the outside of the building. 2. Construct a full height deck to deck partition or a hard lid ceiling enclosure between these areas and occupied spaces. 3.Operate at negative pressure relative to surrounding areas under all operating conditions by testing. www.epa.gov/iaq/largebldgs/i-beam/index.html		1							
3	Daylighting	Provide adequate daylighting and integrate daylighting systems with electric lighting systems and controls. eere.energy.gov/buildings/info/design/integratedbuilding/passivedaylighting.html		1							
4	Views to Outside	Glazing systems and interior partitions allow for a minimum of 75% of regularly occupied spaces a view of vision glazing (between 2'-6" and 7'-6" above finish floor) and a view of the outdoors.		1							
5	Thermal Comfort	Install mechanical systems (thermal, ventilation and dehumidification) and monitoring system so ensure optimal parameter for thermal comfort for all operating conditions according to ASHRAE 55-2004.		1							
6	Individual Controllability	Install and commission systems for individual occupant controllability for thermal comfort for 75% of the occupants. http://newbuildings.org/		1							
7a	Low-Emitting Materials - Adhesives and Sealants	All installed sealants and adhesives meet South Coast Air Quality Management District (SCAQMD) standards. Ref: Low VOC Calculator aqmd.gov/rules/reg/reg11/r1168.pdf		1							
7b	Low-Emitting Materials - Flooring Systems	All flooring systems meet IEQ 7a reqmts. All installed carpet meets CRI Green Label Plus min. standard. All carpet pads meet CRI Green Label min. std. All resilient flooring is FloorScore certified. Ref: Low VOC Calculator carpet-rug.org/dnll_down_2.cfm?page=8&sub=17&requesttimeout=350 scscertified.com/iaq/floorscore 1.html		1							
7c	Low-Emitting Materials - Composite Wood	All installed composite wood has no added urea-formaldehyde. Ref: Low VOC Calculator greenseal.org/resources/reports/CGR_particleboard.pdf		1							
7d	Low-Emitting Materials - Insulation	All installed insulation (excluding piping) contains no added urea-formaldehyde. Ref: Low VOC Calculator www.chps.net/manual/item_table.htm		1							

	Category	Requirements	Web Link	Points	Design Team			AEGB		Strategies / Comments	Team Member
					Yes	?	No	√'d	Final		
8	Moisture Prevention	1 No vinyl wall coverings or vapor barriers for surface treatments on interior of exterior wall (also include in tenant agreements.) 2. Install building envelope drainage plane systems, including flashing and overhang systems. 3. Document building will be pressurized.		1							
9	Acoustic Quality	1. Define appropriate background sound levels, reverberation decay times, speech intelligibility, & sound isolation. Identify spaces where impact noises are likely & address potential problems. 2. Mechanical & duct systems designed to meet guideline RC, NC or NCB of ASHRAE Applications Design Guidelines for HVAC Sound & Vibration Control Chpt. 3. Appropriate vibration isolation for mounted equipment. 4. Select non-"tonal" equipment. 5. Specify surface finishes and/or masking systems to provide appropriate sound intelligibility & privacy. 6. Specify partitions, ceilings, floor/ceiling assemblies, building layouts, & vestibules to provide adequate sound isolation between spaces. 7. Mitigate intermittent noise sources, e.g. footfall & loading dock noise. www.acoustics.com/		1							
10	Outdoor Pollutant Sources	Entrances, operable windows, and fresh air intakes shall be located a minimum 30 feet away from designated smoking areas & air intakes shall meet the min. separation distance requirements of ASHRAE STD. 62.1-2004, Table 5-1. Install signage designating smoking and no-smoking areas. Install entryway systems (grills, grates, mats) at least 6 feet long. Mitigate air borne contaminates from outdoor air pollutant sources. www.epa.gov/iaq/largebldgs/i-beam/text/		1							
11	Construction Indoor Air Quality	Implement SMACNA Guidelines for Occupied Buildings Under Construction, or similar plan. Plan should include key areas of IAQ protection: Scheduling, Source Control, HVAC Protection, Pathway Interruption and Housekeeping. Protect absorptive materials (stored or installed) from moisture damage. For permanently installed air handlers used during construction, use MERV 8 (min.) filters in each return grill and replace all filters immediately prior to occupancy. www.smacna.org/bookstore/		1							
	Total Points - Indoor Environmental Quality			14	0	0	0	0	0		

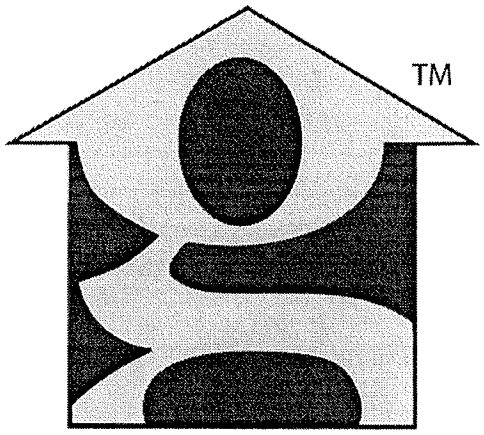
	Category	Requirements	Web Link	Points	Design Team			AEGB		Strategies / Comments	Team Member
					Yes	?	No	√'d	Final		
	Materials and Resources										
1	Additional Construction Waste Management	Recycle and/or Salvage at least 75% by weight of construction and demolition waste excluding excavated soil and stone. Ref: Const. Waste Calculator austinenergy.com/Energy%20Efficiency/Programs/Green%20Building/Sourcebook/constructionWasteManagement.htm		1							
2a	Building Reuse - Envelope and Structure 40%	Incorporate at least 40% (surface area) of existing building envelope and structure. Ref: Bldg. Reuse Calculator		1							
2aa	Building Reuse - Envelope and Structure 80%	Incorporate at least 80% (surface area) of existing building envelope and structure. Ref: Bldg. Reuse Calculator		1							
2b	Building Reuse - Interior Non-Structural Elements	Incorporate at least 50% (surface area) of interior non-structural elements. Ref: Bldg. Reuse Calculator		1							
3a	Salvaged Materials 5%	Use salvaged or refurbished materials for 5% ($ value) of project building materials. Ref: Bldg. Materials Calculator ubma.org/		1							
3b	Salvaged Materials 10%	Use salvaged or refurbished materials for 10% ($ value) of project building materials. Ref: Bldg. Materials Calculator re-store.com/		1							
4a	Recycled Content 10%	Use Recycle Content materials for 10% ($ value) of project building materials. Recycled Content = 100% post-consumer + 50% post-industrial Ref: Bldg. Materials Calculator epa.gov/cpg/		1							
4b	Recycled Content 20%	20% ($ value) of project building materials have Recycled Content. Ref: Bldg. Materials Calculator www.cleantexas.org/index.cfm?fuseaction=public.resources_texasrecycle		1							
5a	Texas Sourced Materials 30%	Building materials and products extracted or manufactured regionally within Texas for at least: 30% ($ value) of project building materials. Ref: Bldg. Materials Calculator cleantexas.org/index.cfm?fuseaction=public.resources_texasrecycle		1							
5b	Texas Sourced Materials 50%	50% ($ value) of project building materials meet requirements above. Ref: Bldg. Materials Calculator austinenergy.com/Energy%20Efficiency/Programs/Green%20Building/Sourcebook/materials.htm		1							
6	Certified Wood	Use Certified Wood (FSC) for at least 50% ($ value) of project wood-based materials. Ref: Certified Wood Calculator certifiedwoodsearch.org		1							
7	Low VOC Paints, Coatings, Adhesives, Sealants	Exterior paints meet Green Seal standards; exterior sealants, coatings, and adhesives meet SCAQMD standards for 100% ($ value) of these material costs. Ref: Low VOC Calculator greenseal.org/certification/standards/paints.cfm greenseal.org/certification/standards/anti-corrosivepaints.cfm aqmd.gov/rules/reg/reg11/r1113.pdf aqmd.gov/rules/reg/reg11/r1168.pdf		1							
	Total Points - Materials & Resources			12	0	0	0	0	0		

	Category	Requirements	Web Link	Points	Design Team			AEGB		Strategies / Comments	Team Member
					Yes	?	No	Y'd	Final		
	Education										
1	Educational Outreach	Provide at least 2 services to include: comprehensive signage, case study, and/or outreach program (ex guided tours).		1							
	Total Points - Education			1	0	0	0	0	0		
	Innovation										
1				1							
2				1							
3				1							
4				1							
5				1							
	Total Points - Innovation			5	0	0	0	0	0		
	Total Points - Voluntary Measures			77	0	0	0	0	0	BASIC REQUIREMENTS NOT ACHIEVED.	

Point Requirements for Star Ratings

★	Basic Requirements
★★	30-36 points
★★★	37-43 points
★★★★	44-58 points
★★★★★	59 or more points

C12. AUSTIN ENERGY GREEN BUILDING PROGRAM



AUSTIN ENERGY GREEN BUILDING

COMMERCIAL GUIDEBOOK

v.1.2008

Table of Contents

Introduction

The Green Building Process

Great buildings don't just happen- They're planned green from the start.
Austin Energy Green Building (AEGB) promotes an integrated team approach to design which results in a better product. The building is better because it's healthier, it's more efficient and it's more environmentally friendly. Getting started early ensures that you take full advantage of our consulting services. On your end, participation in AEGB Commercial entails:

At Your Earliest Convenience:

- Complete the first two tabs of the Rating Packet. These two tabs contain information about the project that we require for our files. You may not have made all of the team selections at this time, feel free to leave fields blank; come back and fill the fields in as you know more about the project. The preferred method of keeping up with the rating as the project progresses is to post the Rating Packet on an FTP site. Provide access to AEGB, the design team members, as well as the contractor. Any outstanding issues that need attention can be posted in real time. When updates to the Rating Packet or to any of the calculators are made, just let the project team know, and we can all respond quickly.
- When zoning or other City of Austin criteria requires an AEGB Rating, please execute and return the AEGB Letter of Intent. **Upon receipt of the populated first two tabs of the Rating Packet, we will sign and return the LOI. You will need to present the completed LOI to Land Use Review in order to receive a Site Development Permit.**
- Provide AEGB with a copy of the project schedule, including the major deadlines. This is important information you can provide to help us stay abreast with your project.
- During this planning phase we request a face to face meeting with the entire design team. This will provide an opportunity to introduce features of AEGB Commercial you might not be familiar with and provide an opportunity to answer any questions you may have about the Rating Packet. This meeting is a great way to set the tone for a successful project.

Schematic Design: As you enter Schematic Design, provide AEGB with:

- Updated Rating Packet.

This will provide an opportunity to see how ideas from the planning meeting are developing.

50% Design Development: As you approach 50% Design Development, provide to AEGB:

- ½ size set of drawings,
- Project Specifications, if available, and
- Updated Rating Packet.

This will enable our team to perform a review to ensure that recommendations are being interpreted correctly and showing up on the plans.

100% Design Development: At the 100% Design Development phase, provide to AEGB:

- ½ size set of drawings,
- Project Specifications, if available, and
- Updated Rating Packet.

50% Construction Documents: At the 50% Construction Document phase, provide to AEGB:

- ½ size set of the drawings,
- Project Specifications,
- a first pass at the ComChecks for lighting and envelope or alternatively, a first pass at the energy modeling, and

- Updated Rating Packet, with a first pass at the water calculator.

Building Permit Set: As you complete the building permit set, please provide:

- ½ size set of the drawings,
- Project Specifications,
- Updated Rating Packet with the water calculator complete,
- Commissioning (Cx) Plan draft, and
- Final ComCheck for lighting and envelope, or final energy model.

Upon satisfactory review of these documents, AEGB will issue Conditional Approval. When zoning or other City of Austin criteria require an AEGB Rating, the **AEGB Conditional Approval letter must be attached to the front of the building permit set *at the time of intake* with WPDR.**

Pre-Construction: As you prepare for construction, provide:

- Updated Rating Packet,
- Construction Waste Management Plan, and
- Commissioning (Cx) Plan.

The Commissioning Plan and the Construction Waste Management Plan are two imperative components of participation in the AEGB Commercial, therefore we require these plans are in place before construction begins.

Construction: During Construction, provide monthly updates of:

- Building materials information,
- Rating Packet,
- Construction Waste Management Calculations, and
- Submittals *upon request only*.
- In addition, our program consultants would like to perform regular site visits. Please coordinate access to the building site with your AEGB contacts as necessary.

Substantial Completion: Once the project has reached substantial completion, provide:

- Updated Rating Packet, and
- Cx Report draft including pre-functional test results and all supporting documentation.

Upon satisfactory review, AEGB will issue a preliminary rating. When zoning or other City of Austin criteria require an AEGB Rating, this **preliminary rating may be necessary to acquire a Certificate of Occupancy.**

Post Construction: As construction wraps up, provide:

- Final Rating Packet, including all the finalized calculators, and
- Final Commissioning (Cx) Report.
- Design team meeting to generate a project case study.

This will enable our team to generate your project's final rating, and issue rating certificates.

If you have any questions regarding any of these deliverables, please feel free to contact your AEGB contacts. They are here to help you through every step in the process. You will be receiving feedback at every step, letting you know how your building is being rated.

We ask that all packages be made deliverable to:
Sarah Talkington
Austin Energy Green Building
Physical Address: 811 Barton Springs Road, 3rd Floor
Austin, TX 78704
(512) 482-5393
fax (512) 482-5441

About the Guidebook

The Austin Energy Green Building Rating is organized into eight categories: Basic Requirements, Team, Site, Energy, Water, Indoor Environmental Quality, Materials and Resources, and Education. An additional category, Innovation, addresses sustainable building measures not covered in the eight primary categories. This Guidebook is a supporting document to the AEGB Rating. It is intended to assist the project team in understanding the purpose or intent of each sustainable building measure and the requirements and documentation needed for compliance to earn point(s). The following template is applied to each measure.

Intent – The purpose of the measure and the benefits
Requirements – Criteria to earn point(s)
Required Documentation – Documentation required for an AEGB Rating
References – Supporting resources

The title line for each measure includes the number of points awarded for achieving the measure as well as any rebate, indicated by a $, through Austin Energy. Additional information specifically addressing rebates and general information about green building is referenced in the Appendix.

BASIC REQUIREMENTS

1. Building Systems Commissioning

Intent
A commissioning authority with documented commissioning experience on at least two other building projects will verify and ensure that mechanical and electrical systems are installed and calibrated to operate according to the design intent and the owner's operational needs. This reduces operating costs by keeping mechanical and electrical building systems compliant with warrantees and operating as designed resulting in a comfortable environment for building occupants.

Requirements
Develop design intent and basis of design documentation.
Include commissioning requirements in the construction documents.
Develop and utilize a commissioning plan.
Verify installation, functional performance, and training for maintenance staff.
Provide O&M documentation.
Complete a commissioning report.

Required Documentation
- Design Intent.
- Basis of Design Document.
- Commissioning Plan.
- Commissioning Report.
- O & M Documentation.

References
Commissioning Site and Functional Testing and Design Guides - Portland Energy Conservation, Inc.:
www.peci.org/commissioning.htm
www.peci.org/ftguide/
Commissioning guidance and procurement - Energy Design Resources:
www.energydesignresources.com/category/commissioning/
Association of Certified Commissioning Authorities AABC Commissioning Group (ACG):
www.commissioning.org
"The Commissioning Process." ASHRAE Guideline 0-2005: ISSN 1049-894X.
National Institute of Building Sciences - Whole Building Design Guide:
www.wbdg.org/index.php

2. Stormwater Run-off & Water Quality Control

Intent
Effective management of stormwater run-off and water quality control is imperative to reducing the impact of run-off on stormwater infrastructure, flooding, erosion and water pollution.

Requirements
Meet current city drainage and water quality standards and ordinances for the project site watershed.

Required Documentation
- Approved Water Quality Control Plan.

References
For Run-off: Environmental Criteria Manual – Section 1.9.0
For Water Quality: Environmental Criteria Manual – Land Development Code [LDC 25-8-211]

Land Development Code - City of Austin:
www.amlegal.com/austin_nxt/gateway.dll/?f=templates$fn=altmain-nf.htm$vid=amlegal%3Aaustin_tx$3.0
Watershed Ordinance Summary Map - City of Austin:
www.ci.austin.tx.us/watershed/ordinance_map.htm
Edwards Aquifer Recharge Zone Map:
www.tceq.state.tx.us/compliance/field_ops/eapp/mapdisclaimer.html
Drainage Criteria Manual - City of Austin:
www.amlegal.com/austin_nxt2/gateway.dll?f=templates&fn=default.htm&vid=amlegal:austin_drainage
Environmental Criteria Manual - City of Austin:
www.amlegal.com/austin_nxt2/gateway.dll?f=templates&fn=default.htm&vid=amlegal:austin_environment
Watershed Ordinances Regulations Summary Table - City of Austin:
www.ci.austin.tx.us/watershed/ordinance_table.htm

3. Roofing to Reduce Heat Island

Intent
Urban Heat Islands are characterized by increased temperatures which affect the formation of ground-level ozone or smog, local weather patterns and the performance of air conditioning and refrigeration equipment. High reflectance roofing and vegetated roofing reduces the urban heat island effect and contributes to lower building energy operating costs. Additionally, vegetative roofs reduce rate and quantity of storm water runoff.

Requirements
The Energy Code establishes minimum reflectance requirements for roof surfaces corresponding to ASTM E903-96, ASTM 1918-97 or ASTM 1549-04. [Ordinance No. 20071018-088 Section 502.7]

Roof Type	Slope	Solar Reflectance	OR	SRI
Low-Sloped Roof	< 2:12	0.70		78
Steep-Sloped Roof	≥ 2:12	0.35		29

Meet or exceed these requirements with any combination of qualified roofing material and vegetated roofing for the *total roof area**

**Total Roof Area* excludes pools, patios, parapets, ancillary installations (e.g., HVAC equipment, water heaters, photovoltaic and solar thermal panels), and integrated photovoltaic systems.

Required Documentation

- Product specifications.
- Roof plans.
- Roofing material submittals showing Energy Code compliance.

References

City of Austin Energy Code Ordinance and Amendments:
http://www.cityofaustin.org/edims/document.cfm?id=109740
Energy Star Roof Products:
www.energystar.gov/ia/products/prod_lists/roof_prods_prod_list.pdf
Energy Star Roof Savings Calculator:
roofcalc.cadmusdev.com/RoofCalcBuildingInput.aspx
Green Roof Directory:
www.greenroofs.com

4. Building Energy Use Efficiency $

Intent

The Energy Code establishes minimum regulations for energy-efficient buildings. Exceeding these standards further reduces building energy consumption and load and contributes to the reduction of conventional power plant construction, green house gas emissions, and building operating costs.

Requirements

OPTION 1 - Exceed current City of Austin building envelope and interior lighting requirements by 15% each.

OPTION 2 - Exceed the ASHRAE/IESNA 90.1-2004 Appendix G Building Performance Rating Method code building by 15%.

Required Documentation

- COM*check*™ Envelope and Interior Lighting Code Compliance Certificates for Option 1.

OR

- Energy model inputs and results demonstrating building design performance over Energy Code baseline using a Building Energy Hourly Simulation and Load Program such as: Energy Plus[1], Carrier HAP[1], Trane Trace[1], EnergyGauge Summit[1], Energy 10, eQUEST, DOE-2 for Option 2.

References

COM*check*™:
www.energycodes.gov/comcheck/

Energy Code Ordinance and Amendments - City of Austin:
http://www.cityofaustin.org/edims/document.cfm?id=109740
ASHRAE/IESNA 90.1-2004, *Energy Standard for Buildings Except for Low-Rise Residential Buildings:*
www.realread.com/prst/pageview/browse.cgi?book=1931862664
[1]IRS Qualified Energy Modeling Software List for Energy Efficiency Tax Deduction:
http://www.eere.energy.gov/buildings/info/qualified_software/

5. Building Water Use Reduction $

Intent
High efficiency plumbing fixtures reduce consumption of water for indoor use thus lessening the impact on the water supply and treatment facilities and reducing building operating costs by saving water and associated energy use.

Requirements
Reduce planned indoor potable water consumption below the baseline by 15%. The volume and flow rates for standard plumbing fixtures used to establish the baseline are set by the current Energy Policy Act.

Required Documentation
- Plumbing fixture specifications and submittals
- AEGB Building Water Use Reduction Calculator.

References
Plumbing fixtures and performance requirements - Water Conservation Department, City of Austin:
www.ci.austin.tx.us/watercon/

6. Low VOC Interior Paints and Coatings

Intent
Low VOC (volatile organic compound) interior paints and coatings reduce toxic pollution and waste thus conserving natural resources and habitats and minimizing global warming and ozone depletion, in addition to contributing to good indoor air quality for the benefit of the health and productivity of building occupants.

Requirements
All paint used in the interior of the building must not exceed the VOC limit of Green Seal Environmental Standard GS-11 and GC-03 for anti-corrosive paints as shown below. All coatings used in the interior of the building must not exceed the VOC limit of SCAQMD Rule 1113.

I. **All paints and primers** used in the interior of the building (applied on-site) must not exceed the VOC limit of Green Seal Environmental Standard GS-11 and GC-03 for anti-corrosive paints.

A. **Topcoat Paints and Primers:** Green Seal Standard **GS-11**
The Green Seal GS-11 Limits for interior paints and primers are:

Paint Type	VOC Limit (g/L)*
Non-flat	150
Flat	50

B. **Anti-Corrosive & Anti-Rust Paints:** Green Seal Standard **GC-03**
For application on ferrous metal substrates:

Paint Type	VOC Limit (g/L)*
Gloss	250
Semi-gloss	250
Flat	250

II. Coatings used in the interior of the building must not exceed the VOC limit of SCAQMD Rule 1113 for clear wood finishes, floor coatings, stains, sealers and shellacs applied to interior elements on-site.

Required Documentation
- Product specifications and submittals.
- Tabulation using the AEGB Low VOC Materials Form.

References
Green Seal GS-11, Paints:
www.greenseal.org/certification/standards/paints.cfm
Green Seal GC-03, Anti-Corrosive Paints:
www.greenseal.org/certification/standards/anti-corrosivepaints.cfm
SCAQMD Rule 1113, Coatings:
www.aqmd.gov/rules/reg/reg11/r1113.pdf

7. Storage and Collection of Recyclables

Intent
The collection of recyclables reduces waste generated by building occupants and building operations that is directed to the landfill extending the life of the landfill and saving energy and resources through the recycling process.

Requirements
Provide an easily accessible area, that serves the entire facility, dedicated to the separation, collection, and storage of materials for recycling including, at a minimum, the top two (four is required for multi-family/apartments with 100 units or more) identified recyclable waste stream items. Building loading dock or pick-up location must be sized appropriately to handle the recycling material volumes generated by the building occupants.

Required Documentation
- Site plan indicating recycling collection center.

- Completed City of Austin Solid Waste Services - Multi-family and Commercial Recycling Plan form.

References
Recycling Ordinance - City of Austin:
www.ci.austin.tx.us/sws/recyclerules.htm
Sustainable Building Sourcebook – Austin Energy Green Building:
www.austinenergy.com/Energy%20Efficiency/Programs/Green%20Building/Sourcebook/commercialRecycling.htm

8. Construction Waste Management

Intent
Construction waste management includes recycling or salvaging of construction, demolition/deconstruction and land clearing waste to reduce the amount of waste destined for the landfill or incineration disposal thus, saving in disposal costs, extending the life of the landfill, and saving energy, resources, and material costs in their reuse.

Requirements
Recycle and/or salvage at least 50% (by weight) of non-hazardous construction and demolition waste excluding excavated soil and stone.

Required Documentation
- Specifications for Construction Waste Management in the Contract Documents.
- Construction Waste Management Plan.
- Calculations from AEGB Construction Waste Calculator.
- Copies of weight tickets for recycling, salvage and landfill.

References
Sustainable Building Sourcebook – Austin Energy Green Building:
www.austinenergy.com/Energy%20Efficiency/Programs/Green%20Building/Sourcebook/constructionWasteManagement.htm

T E A M
Integrating the Design Team, Setting and Achieving Sustainability Goals

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1. Integrated Project Design Team and Sustainable Goals

1 point

Intent
An integrated project design team approach, where every aspect of the design process is examined by the project team, is essential in achieving the sustainable goals. Setting sustainability goals early in the design process maximizes the potential for incorporating these goals into the project phases and ultimately achieving a sustainable building.

Requirements
Choose project team professionals and consultants early in design phase who are experienced in sustainable design.
Establish and document sustainability goals.
Throughout the Programming, Schematic Design, DD & CD, and Construction phases, hold sustainability meetings with the entire project team to restate project goals and design intent, track the progress toward meeting the project's goals and obtaining an Austin Energy Green Building Star Rating.
Specifications clearly explain the sustainability goals of the project.
Incorporate the green elements of the project and proposed certification into the pre-construction meeting with all subcontractors who will be affected by them, include, at a minimum, project goals and design intent.

Required Documentation
- List of project team professionals.
- Document stating Sustainability goals developed during the Schematic Design phase acknowledged by the Project Team.
- Minutes of the project team meetings showing attendees and sustainable goal updates and tracking communication at critical design, bidding and construction phases.
- Copy of specifications clearly indicating sustainability goals for the project.
- Regularly update and submit the AEGB Worksheet to log progress toward meeting project sustainability goals.

References
Whole Building Design Guide discusses approach and process - National Institute of Building Sciences:
www.wbdg.org/index.php
Design approach, guidelines and tools - U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy:
www.eere.energy.gov/buildings/highperformance/

SITE
Sustainability through Site Selection

1. Site Selection

Intent
As the population of Central Texas increases two-fold in the next 2 to 3 decades, effectively manage the impact of growth through site selection for new developments and buildings that utilizes the existing municipal infrastructure and preserves our natural resources.

1a. Environmental Sensitivity — 2 points

Requirements
Project site is not in the Drinking Water Protected Zone which includes the Barton Springs Zone, Barton Creek Watershed, Edwards Aquifer Recharge and Contributing Zone, and Balcones Canyon Land. Also, project site is not a Greenfield defined as a parcel of land not previously developed beyond that of agriculture or forestry use.

Required Documentation
- Copy of the GEO Profile identifying site location and Watershed Classification from the Watershed Development Map GIS Viewer. Include site address.
- Pre-construction description of site as a non-greenfield site.

References
Watershed Development Map GIS Viewer - City of Austin:
http://coagis1.ci.austin.tx.us/website/COAViewer_dev/viewer.htm
Watershed Ordinance Map - City of Austin:
www.ci.austin.tx.us/watershed/ordinance_map.htm

1b. Desired Development Area — 4 points

Requirements
Project site is located within the Urban Watershed Desired Development Zone.

Required Documentation
- Print out of the GEO Profile identifying site location and Watershed Classification from the Watershed Development Map GIS Viewer. Include site address.

References
Watershed Development Map GIS Viewer - City of Austin:
http://coagis1.ci.austin.tx.us/website/COAViewer_dev/viewer.htm
Watershed Ordinance Map - City of Austin:
www.ci.austin.tx.us/watershed/ordinance_map.htm

2. Diverse, Walkable Communities 1 point

Intent
Promote livable, walkable, and bikeable communities that encourage efficient transportation and a mix of community-oriented businesses. Promote safe pedestrian access between proposed building(s) and neighborhood paths as well as safe connections to nearby destinations.

Requirements
Building(s) connects with neighboring properties with pedestrian and/or bicycle only paths (shading is preferred) that are separate from vehicular traffic.

Project includes or is located within ½ mile walking distance of residences and at least 10 Basic Services:

Basic Services include, but are not limited to:
1) Bank, 2) Place of Worship, 3) Convenience Grocery, 4) Daycare, 5) Cleaners, 6) Fire Station, 7) Beauty, 8) Hardware, 9) Laundry, 10) Library, 11) Medical / Dental, 12) Senior Care Facility, 13) Park, 14) Pharmacy, 15) Post Office, 16) Restaurant, 17) School, 18) Supermarket, 19) Theater, 20) Community Center, 21) Fitness Center, 22) Museum

Basic services must be accessible via a safe route explicitly intended for use by the pedestrian that does not require crossing a road more than 5 lanes wide or 35 miles per hour.

Required Documentation
- Vicinity plan with Residences and Basic Services highlighted and pedestrian path distance measured between project and each location.
- Narrative describing how a pedestrian makes the connection between the proposed building(s) and the Basic Services. Include suggested route to cross vehicular traffic and photographs of difficult to describe connections.

References
To identify basic services and distances for a given address - Walk Score™ Maps:
www.walkscore.com/index.shtml
Geographic Information Systems (GIS) facilities shape files on City of Austin website:
ftp://coageoid01.ci.austin.tx.us/GIS-Data/Regional/coa_gis.html
Oregon Bicycle and Pedestrian Planning and Design Manual:
www.oregon.gov/ODOT/HWY/BIKEPED/planproc.shtml
City of Austin Design Standards and Mixed-Use Subchapter, Section 2.3 Connectivity:
http://www.ci.austin.tx.us/development/downloads/final.pdf

3. Brownfield Redevelopment 1 point

Intent
Rehabilitate sites where development is complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant as defined by CERCLA §104(k) the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 to revitalize communities, utilize existing infrastructures taking development pressures off of undeveloped, open land, and improve and protect the environment.

Requirements
Project demonstrates effective remediation of site contamination (using established technologies that have minimal disruption on the site's natural features above and below ground).

Required Documentation
- Documentation on the Brownfield classification and verification of remediation efforts.

References
EPA Preliminary Remediation Goals:
www.epa.gov/region09/waste/sfund/prg/index.html
EPA Sustainable Redevelopment of Brownfields Program, legal definition, grants and loans:
www.epa.gov/brownfields/
Brownfields Redevelopment Office Services - City of Austin:
www.ci.austin.tx.us/watershed/brownfieldsdo.htm
Brownfields Site Assessment Program – Texas Commission on Environmental Quality:
www.tceq.state.tx.us/remediation/bsa/bsa.html

4. Site Characteristics Study 1 point

Intent
Reduce the impact of the structures on the environment and optimize building placement on a site.

Requirements
Evaluate and document the proposed site's environmental characteristics.
- Document existing water elements, soil conditions, ecosystems and natural habitats, trees, and other vegetation, and seasonal wind and daylight availability.
- Map all potential hazards including traffic and pollution sources.

Create a plan to maintain or restore existing site features.
Develop recommendations for building placement on site to minimize impact on the environment and to take advantage of topographical characteristics.

Required Documentation
- Report documenting existing water elements, soil conditions, ecosystems and natural habitats, trees and other vegetation, and seasonal wind and daylight availability. To include: Pre-construction map indicating all potential natural hazards including traffic and pollution sources, a plan to maintain or restore

existing site features, and recommendations for building placement to minimize environmental impact.

References
Sun Path Chart useful in passive design considerations:
http://solardat.uoregon.edu/SunChartProgram.html

5. Transportation Alternatives

Intent
Reduce pollution and development impact from automobile use.

5a. Public Transportation 1 point

Requirements
Building entrance is located within 1/4 mile of at least 2 Capital Metro bus stops or within 1/2 mile of a rail stop (or future rail stop with proposed completion within 5 years).

Required Documentation
- Area site plan highlighting the public transportation lines and stops with distance from the building's main entry to each indicated.

References
Austin Capital Metro Transit identifies services near a given location:
www.capmetro.org/riding/trip_info.asp
Austin Transit Oriented Development Districts - objectives and locations:
www.ci.austin.tx.us/planning/tod/default.htm
ftp://coageoid01.ci.austin.tx.us/GIS-Data/planning/TOD/tod_districts.pdf
Envision Central Texas:
www.envisioncentraltexas.org

5b. Bicycle Use 1 point

Requirements
Project incorporates bicycle securing areas and shower / changing facilities that accommodate 10% or more of the building occupants.
Provide one bicycle parking space for each rider and one shower for every twenty-five riders.
Provide a bikeway for safe connectivity from public corridors to building facilities.

Required Documentation
- Calculations demonstrating total building occupancy, required quantity of bicycle securing areas and shower / changing locations as indicated above.
- Building and/or site plan indicating bicycle rack locations and capacities.
- Building plans indicating locations and capacities of shower and changing areas.
- Specifications of bicycling securing systems.
- Site plan indicating safe bicycle/pedestrian routes.

References
City of Austin Bicycle and Pedestrian Program including Bicycle Route Map:
www.ci.austin.tx.us/bicycle/
Bicycle Austin discusses bicycle transportation issues in Austin:
bicycleaustin.info/
Oregon Bicycle and Pedestrian Planning and Design Manual:
www.oregon.gov/ODOT/HWY/BIKEPED/planproc.shtml

5c. Parking Capacity

1 point

Requirements
Parking does not exceed minimum local zoning requirements.
Parking area provides preferred parking for carpools for at least 5% of building occupants.

Required Documentation
- Copy of the local zoning requirements highlighting the minimum parking capacity criteria.
- Parking plan highlighting the total parking capacity and preferred parking locations for carpools.
- Documentation demonstrating that carpool programs serve 5% of the building occupants.

References
City of Austin Land Development Code Ch 25-6-471, Off-street parking and loading:
www.amlegal.com/austin_nxt/gateway.dll/Texas/austin/title25landdevelopment/chapter25-6transportation?f=templates$fn=altmain-nf.htm$3.0#JD_25-6-471

6. Site Development

Intent
Limit site disturbance or restore damaged open areas to provide habitat and promote biodiversity.

6a. Protect or Restore Open Areas

1 point

Requirements
Greenfield sites: *Site not previously developed or graded.*
Plan to limit disturbance to 40 ft beyond the building perimeter; 10 ft beyond walkways, patios, and surface parking; 15 ft beyond roadways and utility trenches; and 25 ft beyond any pervious areas that require additional staging.

Previously developed sites: *Site previously contained buildings, roadways, parking lots, or was graded.*

At least 50% of the post-development open area (site area minus building footprint) is vegetated using native/adapted plants. Vegetated roof areas may be included in the open area calculations, if the plants meet the definition of native/adapted.

Required Documentation

- Greenfield sites:
  Site plan clearly indicating limits of construction (site disturbance boundaries) as indicated above and locations of planned development within those constraints

- Previously developed sites:
  Landscaping plan including plant list and open area calculations demonstrating that at least 50% is vegetated.

References
Grow Green Guide for native and adapted plant listings - City of Austin:
www.ci.austin.tx.us/growgreen/plants.htm

6b. Maximize Vegetated Open Area

1 point

Requirements
Provide vegetated open area using native/adapted plants equal to 20% of the project site area. Vegetated roof areas may be included in the vegetated open area calculations, if the plants meet the definition of native/adapted.

Required Documentation

- Site/landscape plan indicating vegetated open areas including plant list.
- Area calculations of project site and vegetated open areas.

References
Grow Green Guide native and adapted plant listings - City of Austin:
www.ci.austin.tx.us/growgreen/plants.htm

7. Additional Heat Island Reduction

Intent
Urban Heat Island is characterized by increased temperatures which affect the formation of ground-level ozone or smog, local weather patterns and the performance of air conditioning and refrigeration equipment. Heat island effects can be reduced by designing site impervious surfaces to include vegetated open-grid pavement systems, high albedo surface treatments, and vegetative shading and roofing surfaces with high reflectance coatings. The resulting reduction in the heat island effect for the microclimate surrounding the building contributes to improved air quality and building cooling energy savings.

7a. Site

1 point

Requirements

OPTION 1 – Provide any combination of the following strategies for 50% of the site hardscape.

- Vegetated open-grid pavement system (at least 50% pervious).
- High-albedo paving materials with a Solar Reflectance Index of at least 29.
- Vegetative shading planted over the non-roof impervious surfaces within five years.

OPTION 2 - At least 50% of the parking spaces located underground or in structured parking with a top deck surface SRI of at least 29.

Required Documentation

- Copy of site plan and narrative indicating method utilized at various locations and their associated areas.
- Area calculations for the entire site demonstrating that the minimum requirements are met.
- Product specifications.

References

Design strategies and benefits to mitigating Heat Island – Heat Island Group:
eetd.lbl.gov/HeatIsland/
Design strategies to mitigate Heat Island affect - EPA:
www.epa.gov/heatisland/index.html
Grow Green Guide native and adapted plant listings - City of Austin:
www.ci.austin.tx.us/growgreen/plants.htm
"Albedo: A Measure of Pavement Surface Reflectance", American Concrete Pavement Association:
www.pavement.com/Downloads/RT/RT3.05.pdf

7b. Roof

1 point

Requirements

Install any combination of high albedo roofing materials that have Solar Reflectance **or** Solar Reflectance Index (SRI) equal to or greater than the values indicated in the table below and vegetated roofing material for the *total roof area*.

**Total Roof Area* excludes pools, patios, parapets, ancillary installations (e.g., HVAC equipment, water heaters, photovoltaic and solar thermal panels), and integrated photovoltaic systems.

Roof Type	Slope	Solar Reflectance		SRI
Low-Sloped Roof	< 2:12	0.75	**OR**	85
Steep-Sloped Roof	≥ 2:12	0.45		35

Required Documentation
- Product specifications and cut sheets for roofing materials and systems.
- Roof Plans and submittals.

Standards
Solar Reflectance is measured according to ASTM E 903, ASTM E 1918, or ASTM C 1549.
Solar Reflectance Index is measured according to ASTM E 1980.
Thermal Emittance is measured according to ASTM E 408 or ASTM C1371.

Definitions
Solar Reflectance (albedo) is the ratio of the reflected solar energy to the incoming solar energy. A reflectance of 100% means that all of the energy striking a reflecting surface is reflected back into the atmosphere and none of the energy is absorbed by the surface.

Solar Reflectance Index (SRI) is a measure of a material's ability to reject solar heat. Materials with the highest SRI values are the coolest choices for roofing. (See Lawrence Berkley National Laboratory reference and link to Cool Roofing Materials Database.) SRI may be calculated based on solar reflectance and thermal emittance. *Contact AEGB for SRI calculator.*

Thermal Emittance indicates the ability of a material to shed infrared radiation (heat).

References
Energy Star Qualified Roofing Products:
www.energystar.gov/ia/products/prod_lists/roof_prods_prod_list.pdf
Energy Star Roof Savings Calculator:
roofcalc.cadmusdev.com/RoofCalcBuildingInput.aspx
Cool Roof Rating Council and product directory:
coolroofs. org/aboutthecrrc_owners.html
Green Roof Directory:
www.greenroofs.org
Lawrence Berkley National Laboratory:
http://eetd.lbl.gov/HeatIsland/CoolRoofs/

8. Light Pollution Reduction — 1 point

Intent
Design efficient outdoor lighting systems to reduce light pollution, i.e., any adverse effect of artificial light including sky glow, glare, light trespass, and light clutter to preserve nocturnal environments.

Requirements
Exterior lighting meets the standards of the City of Austin Code – Subchapter E of Chapter 25-2: *Design Standards and Mixed Use, Article 2.5 Exterior Lighting.*

Exterior lighting meets the maximum initial illuminance values at the site boundary and beyond and the fixtures meet the percentage of lumens emitted above full cut-off

requirements as outlined in Table 1 below for the appropriate zone as defined in IESNA RP-33.

Table 1: Light Trespass Criteria per Lighting Zone

Zone	Initial Illuminance (fc)	Calculated at Location relative to site boundary	Initial Lumens Emitted above Full Cutoff[1]
LZ1 – Dark (Park & Rural Setting)	0.01 horizontal & vertical	Site boundary	0%
LZ2 – Low (Residential Areas)	0.10 horizontal & vertical 0.01 horizontal	Site boundary 10 ft beyond site boundary	2%
LZ3 – Medium (Commercial/Industrial, High-Density Residential)	0.20 horizontal & vertical 0.01 horizontal	Site boundary 15 ft beyond site boundary	5%
LZ4 – High (Major City Centers, Entertainment Districts)	0.60 horizontal & vertical 0.01 horizontal	Site boundary 15 ft beyond site boundary	10%

[1]Full Cutoff is defined as an angle of 90 degrees from nadir (straight down).

Exterior lighting levels of illuminance meet the horizontal foot candles for the facilities listed in Table 2 as defined in the City of Alpine, TX Outdoor Lighting Ordinance adopted May 23, 2000. Minimum levels shall be consistent with safety and security.

Table 2: Levels of Illuminance at Specific Facilities

Parking Lots and areas	Average 2.0 fc; minimum 0.5 fc
Entry areas near buildings	Maximum 5.0 fc
Service Stations and other fueling facilities	Maximum 10 fc in the area surrounding pump islands; parking and entry areas Average 2.0 fc, minimum 0.5 fc
Sales Lots where merchandise, including automobiles, is displayed at night	Maximum 20 fc

Required Documentation

- Exterior lighting plan and schedule
- A narrative including specific information regarding the light trespass analysis
- Photometric plan
- Product specifications

References

City of Austin Code – Subchapter E of Chapter 25-2: *Design Standards and Mixed Use, Article 2.5 Exterior Lighting*:
www.ci.austin.tx.us/development/downloads/final.pdf
International Dark-Sky Association:
www.darksky.org
"Lighting for Exterior Environments" - IESNA RP-33-99, Illuminating Engineering Society of North America:
www.iesna.org

Texas Light Ordinance as demonstrated in 'An Ordinance to improve outdoor lighting in the City of Alpine, Texas:
users.wirelessfrontier.net/~bbastro/archives/alpine_light_ord.html

9. Integrated Pest Management 1 point

Intent
Integrated pest management (IPM) is an environmentally-sound method that focuses on long-term prevention of pests in and around buildings using a least-toxic approach. The use of native and adapted plants that are naturally resistant to pests and diseases, as well as physical barriers to prevent termite infestation are a few examples of ways to control pests over the life of the building and landscape. IPM preserves the site's ecological integrity, enhances biological diversity, and protects wildlife and worker/public health and safety, and may reduce maintenance costs.

Requirements
Implement an Integrated Pest Management Plan and practices appropriate for the site and building use.

Required Documentation
- Copy of the Integrated Pest Management Plan.

References
City of Austin Integrated Pest Management:
www.ci.austin.tx.us/watershed/ipm.htm
Grow Green Guide native and adapted plants lists - City of Austin:
www.ci.austin.tx.us/growgreen/plants.htm
Massachusetts Integrated Pest Management Kit for Building Managers:
www.mass.gov/agr/pesticides/publications/IPM_kit_for_bldg_mgrs.pdf

10. Outdoor Environmental Quality 1 point

Intent
Provide outdoor places on site to enable building occupants and visitors to connect to and enjoy the natural environment.

Requirements
Shaded seating for 10% or more of the building's occupants.

Required Documentation
- Site plan and details, if necessary, indicating location of outdoor areas, seating capacities, and types of shading provided.

References
Sun Path Chart useful in shading design:
http://solardat.uoregon.edu/SunChartProgram.html

ENERGY
Save Energy, Use Clean Energy

1. Additional Energy Use Efficiency

1 - 12 points, $

Intent
The energy code establishes minimum regulations for energy-efficient buildings using prescriptive and performance-related provisions. It is founded on broad-based principles that make possible the use of new materials and innovative techniques that conserve energy. Utilizing an energy modeling program as a design tool enables effective analysis of design strategies which may result in lower operating costs, increased occupancy comfort and lower carbon dioxide emissions.

Requirements
Exceed the ASHRAE/IESNA Standard 90.1-2004 Appendix G Performance Rating Method code building by 17.5% or more. One point is earned for each additional 2.5% savings.

Percent Savings	17.5	20	22.5	25	27.5	30	32.5	35	37.5	40	42.5	45
Points	1	2	3	4	5	6	7	8	9	10	11	12

Required Documentation
- Narrative describing energy saving measures incorporated into building.
- Energy model inputs and results demonstrating building design performance over Energy Code baseline building using Building Energy Hourly Simulation and Load Software such as: Energy 10, eQUEST, DOE-2, Energy Plus, Carrier HAP, Trane Trace, EnergyGauge Summit.

References
City of Austin Energy Code Ordinance and Amendments:
http://www.cityofaustin.org/edims/document.cfm?id=109740
ASHRAE/IESNA 90.1-2004, *Energy Standard for Buildings Except for Low-Rise Residential Buildings:*
www.realread.com/prst/pageview/browse.cgi?book=1931862664
"Advanced Energy Design Guide for Small Office Buildings" ASHRAE (2004): ISBN 1-931862-55-9.

2. Green Energy

1 point

Intent
Green Power, electricity generated from clean, renewable sources such as wind, solar, and biomass, lowers fossil fuel burning emissions which cause global warming and pollution. Purchasing green power supports the development of renewable power in Texas. Additionally, the Austin Energy GreenChoice® fixed rate rider may result in lower operating costs as fossil fuel prices fluctuate throughout the term.

Renewable Energy Certificates (RECs) support the development of the renewable power industry in Texas or nationwide.

Requirements
Subscribe to Austin Energy GreenChoice®.

If GreenChoice® subscriptions are not available choose one of the following RECs options.
OPTION 1 - Obtain a 2-year contract for Texas RECs for 100% of the building's annual electricity use.

OPTION 2 – Obtain a 2-year contract for other national RECs that satisfy the technical requirements of the Green-e certification program for 100% of the building's annual electricity use.

The building's electricity use may be estimated using a Building Energy Hourly Simulation and Load program or the electricity intensity factors per building type from the DOE Commercial Buildings Energy Consumption Survey 2003 in the table below.

Building Type	Median Electricity Intensity (kWh/sf-yr)
Education	8.9
Food Sales	48.0
Food Service	37.4
Health Care	12.0
Inpatient	24.0
Outpatient	11.3
Lodging	11.9
Retail (other than mall)	9.4
Office	11.5
Public Assembly	5.1
Public Order and Safety	7.9
Religious Worship	3.5
Service	6.3
Warehouse and Storage	3.1
Other	7.2
Vacant	1.7

Required Documentation
- Copy of the commercial agreement with Austin Energy GreenChoice®.
- Copy of the RECs contract including name of REC vendor and value of RECs purchased (kWh) and total annual electricity consumption (kWh).

References
GreenChoice® - Austin Energy Renewable Power Program:
www.austinenergy.com/Energy%20Efficiency/Programs/Green%20Choice/
General guide to purchasing green power and RECs - EPA & Green Power Partnership:
www.epa.gov/greenpower/buygreenpower/index.htm
Companies selling Green-e certified RECs in Texas:
www.green-e.org/

3. Renewables

1 - 2 points, $

Intent
On-site generation of energy through the use of renewable energy technologies such as photovoltaic panels, solar thermal, and wind turbines will lower operating costs and fossil fuel burning emissions.

Requirements
On-site renewable energy system installed for 2% or 5% of the building's annual electricity use.

The building's electricity use may be estimated using a Building Energy Hourly Simulation and Load program or the electricity intensity factors per building type from the DOE Commercial Buildings Energy Consumption Survey 2003 in the table shown above in Energy Credit 2.

PV and Solar Thermal systems must meet the performance requirements of the Austin Energy PV Solar Rebate and Solar Water Heater Programs.

Required Documentation
- Calculations indicating the annual electricity requirements and amount of energy to be generated by on-site renewable energy technology.
- Copies of the required documentation from the Austin Energy PV Solar Rebate and Solar Water Heater Programs.
- Wind system sizing and performance documentation.

References
Austin Energy PV Solar Rebate Guidelines:
www.austinenergy.com/Energy%20Efficiency/Programs/Rebates/Solar%20Rebates/guidelines.htm
Austin Energy Solar Water Heater Program Guidelines:
www.austinenergy.com/Energy%20Efficiency/Programs/Rebates/Solar%20Rebates/Solar%20Water%20Heater/index.htm
Learn about renewable energy - National Renewable Energy Laboratory:
www.nrel.gov/

4. Additional Commissioning

1 point

Intent
This systematic process of ensuring that the building and all of its systems perform interactively according to the design intent and the owner's operational needs through the design, construction and warranty phases with actual verification through review, testing and documentation of performance will result in proper and efficient equipment operations, lower operating and maintenance costs, improved indoor air quality, increased occupancy comfort and productivity, and lower energy production emissions.

Requirements
Commissioning Authority shall at a minimum conduct a design document review prior to 50% CD's.

Demonstrate that all energy systems operate according to design intent narratives (lighting systems & controls, HVAC & controls, transport systems, etc.).
Demonstrate that the building structure and envelope perform according to design intent narrative.
Provide seasonal re-commissioning through the warranty period.
Complete a commissioning report.

Required Documentation

- Commissioning report demonstrating that the energy systems, building structure and envelope all operate according to design intent.
- Signed letter of certification by the commissioning authority confirming that the commissioning plan has been successfully executed and the design intent has been achieved.

References

Commissioning and Functional Testing and Design Guides - Portland Energy Conservation, Inc.:
www.peci.org/commissioning.htm
www.peci.org/ftguide/
Commissioning Guides - Energy Design Resources:
www.energydesignresources.com/category/commissioning/
"The Commissioning Process." ASHRAE Guideline 0-2005: ISSN 1049-894X

5. District Cooling

1 point

Intent

A district cooling plant distributes chilled water from a central plant to individual buildings through a network of underground pipes. A single district cooling plant can satisfy the cooling needs of several buildings and customers.

Austin Energy chilled water plants use a combination of Thermal Storage, heat recovery driven Absorption Chillers, or high efficiency electric chillers to reduce electric consumption and peak demand. District cooling contributes to the reduction of conventional power plant construction, associated green house emissions, and building operating costs.

Operational benefits of district cooling are proven reliability, convenience and simplicity and risk mitigation. Building costs are reduced initially by substantially reducing the capital investment for a cooling system. Throughout the life of the building the use of district cooling offers lower operational and energy expenses for the entire facility and stable, predictable cooling costs over the long term which will increase the net operating income. From a logistics standpoint, the use of district cooling will conserve space by eliminating the need for a chiller plant, reduce noise and potential environmental hazards and improve facility comfort.

Any building within a few blocks of existing chilled water should consider district cooling.

Requirements
Tie into an Austin Energy district cooling and heating loop for all HVAC building energy needs.

Required Documentation
- Drawings demonstrating the tie from the building into an Austin Energy district cooling and heating loop for all HVAC building energy needs.
- Signed contract with Austin Energy District Cooling.

References
Austin Energy District Cooling Services:
www.austinenergy.com/Commercial/Other%20Services/On-Site%20Energy%20Systems/districtcooling.htm
email: districtenergy@austinenergy.com

WATER

Better Water Quality, Water Conservation, Rainwater Catchment

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1. Irrigation Water Minimization

1 - 3 points

Intent
Minimizing potable water use for landscape irrigation by designing WaterWise landscapes, using drip irrigation and "smart" technology irrigation systems, and utilizing rainwater catchment systems will reduce the load on municipal water systems saving water and energy and lower building operating costs.

Requirements
Irrigation potable water consumption is reduced by at least: 50%, 75%, or 100% of total water required for irrigation.

Required Documentation
- Landscape design drawings indicating areas of the site that will require irrigation.
- Drawings and a narrative describing the captured rainwater system or recycled site water system with the capacity of the system highlighted.
- Drawings and a narrative describing the type of irrigation system.
- Calculations from the AEGB Irrigation Calculator.

OR
- Design narrative of the landscape design and describe why a permanent landscape irrigation system is not necessary.

Strategies
Potable water used for irrigation can be reduced through a number of methods.
- Retaining existing established plant material on a site will drastically reduce the amount of irrigation required to get new plant material healthily established in the site.
- Minimizing use of manicured grass.

- Landscape design and plant material choices that are appropriate to the climate will reduce the amount of water required by depending more on the natural rain cycles than the irrigation system.
- High-efficiency irrigation systems that include moisture sensors, clock timers and weather data-base controllers are widely available. These "smart" technologies ensure that plant material is being watered only when required and eliminate the waste associated with over-watering.
- Stormwater, rainwater, and condensate collection systems can also be of use in reducing the amount of potable water used for irrigation. This water will not be potable but can be used with no or minimal further treatment for irrigation purposes.

References
Water Conservation Program provides information and assistance – City of Austin:
www.ci.austin.tx.us/watercon/
Landscaping for water quality protection - Grow Green City of Austin:
www.ci.austin.tx.us/growgreen/
Sustainable Building Sourcebook – Austin Energy Green Building:
www.austinenergy.com/Energy%20Efficiency/Programs/Green%20Building/Sourcebook/water.htm
The Irrigation Association:
www.irrigation.org/
Guide to Rainwater Harvesting - Texas Water Development Board:
www.twdb.state.tx.us/assistance/conservation/Alternative_Technologies/Rainwater_Harvesting/Rain.htm
Rainwater Harvesting (including calculator) - Texas A & M:
rainwaterharvesting.tamu.edu/why.html
Texas Evapotranspiration:
texaset.tamu.edu/

2. Indoor Potable Water Use Reduction **1 - 4 points**

Intent
High efficiency plumbing fixtures reduce consumption of water for indoor use thus lessening the impact on the water supply and treatment facilities and reducing building operating costs by saving water and associated energy use.

Requirements
Reduce planned indoor potable water consumption below the baseline by 25%, 35%, 45%, or 55%. The volume and flow rates for standard plumbing fixtures used to establish the baseline are set by the current Energy Policy Act.

Required Documentation
- Calculations from the AEGB Building Water Use Reduction Calculator.
- Plumbing fixtures documentation.
- Projected actual building occupancy and occupancy schedules.

References
Toilet listings and rainwater harvesting - City of Austin Water Conservation:

www.ci.austin.tx.us/watercon/

TYPES OF WATER SAVING FIXTURES			
TOILETS	**URINALS**	**SINKS AND LAVATORIES**	**SHOWERS**
Power-Assisted Low Flush	Waterless	Low-Flow Faucets	Low-Flow Showerheads
Dual Flush	Pint Flush	Electronic Sensor Faucets	
Power-Assisted Dual Flush	Low Flush		
Composting Toilets			

Energy Star Appliance listings:
www.energystar.gov/index.cfm?c=appliances.pr_appliances
EPA **WaterSense** labeled High Efficiency Toilet:
www.epa.gov/watersense

Rainwater and condensate collection systems can also be of use in reducing the amount of potable water used in the plumbing system.

Texas Guide to Rainwater Harvesting:
www.twdb.state.tx.us/assistance/conservation/Alternative_Technologies/Rainwater_Harvesting/Rain.htm

3. Stormwater Management **1 point**

Intent
Increase infiltration of stormwater using innovative water quality controls to reduce the impact of flood, erosion, and water pollution on the environment and properties.

Requirements
Incorporate innovative water quality controls as outlined in ECM 1.6.7 to manage by infiltration a percentage of the water quality volume (WQV), as defined by the calculation in the City of Austin Environmental Criteria Manual (ECM).

OPTION 1 - For sites with at least 50% existing impervious cover
25% of the WQV must be managed by infiltration.

OPTION 2 - For sites with less than 50% existing impervious cover
50% of the WQV must be managed by infiltration.

Required Documentation
- Narrative describing contribution of each BMP (Best Management Practices)
- Calculations of total stormwater run-off from ECM 1.6.2.A

References

City of Austin, Environmental Criteria Manual 1.6.2A and 1.6.7:
www.amlegal.com/austin_nxt2/gateway.dll?f=templates&fn=default.htm&vid=amlegal:austin_environment

"Guidance Specifying Management Measures for Sources of Non-point Pollution in Coastal Waters" - EPA:
www.epa.gov/owow/nps/MMGI/

Strategies and tools to comply with EPA regulations - Stormwater Manager's Resource Center:
www.stormwatercenter.net

Design guide -Texas Guide to Rainwater Harvesting:
www.twdb.state.tx.us/assistance/conservation/Alternative_Technologies/Rainwater_Harvesting/Rain.htm

Low Impact Development design strategies and case studies – Urban Design Tools:
www.lid-stormwater.net/

"Water Quality Management Technical Manual" includes best management practices - LCRA:
www.lcra.org/library/media/public/docs/watershed_TechnicalManual.pdf

INDOOR ENVIRONMENTAL QUALITY

Better Indoor Environmental Quality, Humidity Control, Comfort

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1. Indoor Air Quality Monitoring — 1 point

Intent
Monitor Indoor Air Quality to maintain adequate volume of fresh air within a building by measuring the carbon dioxide concentrations for the health and productivity of the occupants.

Requirements
Install permanent carbon dioxide monitoring system interlocked with the ventilation system.
Commission all systems to the preferred set point parameters and optimal performance for all operating conditions.

Required Documentation
- Drawings and narratives describing the monitoring and control system.
- Monitoring system specifications and cut sheets.
- Documentation of the commissioning efforts associated with the monitoring and control system.

References
Indoor Air Quality guidance tools - EPA:
www.epa.gov/iaq/index.html

2. Indoor Chemical & Pollutant Sources — 1 point

Intent
Minimize contamination of indoor pollutants created by particulate matter generated by certain types of equipment and chemical use inside a building that affect the health, comfort, and performance of occupants.

Requirements
Identify and isolate pollution point sources which may include: copy rooms, print shops, janitorial closets/rooms, laboratories, chemical storage, etc. (Complete all below)

- Provide ventilation directly to the outside of the building.
- Between these areas and occupied spaces construct a full height deck to deck partition or construct a hard lid ceiling enclosure.
- Operate at a negative pressure relative to surrounding areas under all operating conditions by testing.

Required Documentation
- Plans locating copy rooms, print shops, laboratories, and janitorial chemical storage rooms.

- Details and partition schedule indicating types of full height partitions used.
- Mechanical and plumbing construction documents demonstrating ventilation, drainage and pressure requirements.

References
Indoor Air Quality in Large Buildings guidance tool - EPA:
http://www.epa.gov/iaq/largebldgs/i-beam/index.html
Office Equipment: Design, Indoor Air Emissions, and Pollution Prevention Opportunities - EPA:
www.p2pays.org/ref/07/06260.pdf

3. Daylighting

1 point

Intent
Integrate effective daylighting systems, electric lighting systems and controls to optimize daylighting strategies and minimize energy consumption and heat generation.

Requirements
Provide adequate daylighting and integrate daylighting systems with electric lighting systems and controls. Integrated controls are not required for dwelling units.

Required Documentation
- Lighting plan and sections showing daylighting penetration and electrical controls and photoelectric sensors.
- A narrative highlighting the methods used to provide sufficient daylighting for the task, shading strategies, depth of daylight, quality and quantity of daylight, surface colors, contrast ratio < 4:1, percentage of building day lit, and orientation.
- Include in the specifications the requirement for calibration of controls and calibration logs to be submitted by the contractor.

References
Daylighting design guide - U.S. Department of Energy EERE:
www.eere.energy.gov/buildings/info/design/integratedbuilding/passivedaylighting.html
Daylighting - Whole Building Design Guide:
www.wbdg.org/design/daylighting.php?r=ieq
Electric Lighting Controls - Whole Building Design Guide:
www.wbdg.org/design/electriclighting.php?r=ieq

4. Views to Outside

1 point

Intent
Provide a connection between the indoor and outdoor environments by providing visual access to windows.

Requirements
Glazing systems and interior partitions allow for a minimum of 75% of regularly occupied spaces a view of vision glazing (between 2'-6" and 7'-6" from finished floor height) and a view of the outdoors.

Required Documentation

- Plans and sections demonstrating the lines of site from within the building to the vision glazing.
- View Calculator indicating that areas with uninterrupted views to the outside encompass 75% of regularly occupied space (not including copy rooms, storage areas, mechanical, laundry, bathrooms and other support areas).

References

5. Thermal Comfort — 1 point

Intent
Provide an environment that controls temperature, humidity and air movement for the comfort and performance of the occupants.

Requirements
Install mechanical systems (thermal, ventilation, and dehumidification) and monitoring systems to ensure optimal parameters for thermal comfort for all operating conditions according to ASHRAE 55-2004.

Required Documentation

- Documentation from the mechanical engineer including the components described in ASHRAE 55-2004 section 6.1.1.

References
ASHRAE 55-2004 *Thermal Environmental Conditions for Human Occupancy*:
www.ashrae.org/

6. Individual Controllability — 1 point

Intent
Provide a high level of individual environmental control for thermal and air flow systems to support optimum health, productivity, and comfort conditions for the occupants.

Requirements
Install and commission systems for individual occupant controllability for thermal comfort for 75% of the occupants.

Required Documentation

- A narrative describing the individual control system and controls and calculations that show that 75% of the building occupants have individual control.

References
Research and articles on building energy performance - New Buildings Institute:
newbuildings.org/
"A Field Study of Personal Environmental Modules Performance", Bauman, Fred, Center for Environmental Design Research, Berkeley, CA, 1997:

cbe.berkeley.edu/research/pdf_files/bauman1998_bofa.pdf

7. Low-Emitting Materials

Intent
Low–emitting building materials reduce toxic pollution and waste thus conserving natural resources and habitats and minimizing global warming and ozone depletion, in addition to contributing to good indoor air quality for the benefit of the health and productivity of building occupants.

7a. Sealants and Adhesives

1 point

Requirements
All installed sealants and adhesives meet South Coast Air Quality Management District (SCAQMD) standards Rule 1168.

Required Documentation
- Cut sheet and MSDS sheet for each sealant and adhesive with VOC content highlighted.
- Tabulation using the AEGB Low VOC Materials Form.

References
South Coast Air Quality Management District:
www.aqmd.gov/rules/reg/reg11/r1168.pdf

7b. Flooring System

1 point

Requirements
All installed carpets meet Carpet & Rug Institute's (CRI) Green Label Plus minimum standards. All installed carpet pads meet CRI Green Label minimum standards. All resilient flooring products, including linoleum, laminate flooring, wood flooring, ceramic flooring, wall base, and rubber flooring must be FloorScore™ certified. All flooring systems meet the requirements of IEQ 7a) Sealants and Adhesives.

Required Documentation
- Cut sheets for carpets and pads with the VOC limits highlighted.
- Cut sheets for non-carpet flooring with listed FloorScore™ certification.
- Tabulation using the AEGB Low VOC Materials Form.

References
Green Label Plus approved products - Carpet & Rug Institute:
www.carpet-rug.org/drill_down_2.cfm?page=8&sub=17&requesttimeout=350
Certified hard flooring products – FloorScore™:
www.scscertified.com/iaq/floorscore_1.html

7c. Composite Wood — 1 point

Requirements
All installed composite wood contains no added urea-formaldehyde.

Required Documentation
- MSDS for composite wood products with urea-formaldehyde levels highlighted.
- Tabulation using the AEGB Low VOC Materials Form.

References
"Particleboard and Medium Density Fiberboard" recommendations - Green Seal:
www.greenseal.org/resources/reports/CGR_particleboard.pdf

7d. Insulation — 1 point

Requirements
All installed insulation (excluding piping) contains no added urea-formaldehyde.

Required Documentation
- MSDS for insulation with urea-formaldehyde levels highlighted.
- Tabulation using the AEGB Low VOC Materials Form.

References
Greenguard IAQ Certified Products® - Greenguard:
http://www.greenguard.org/
Products meeting CHPS Low-Emitting Materials criteria - Collaborative for High Performance Schools (CHPS):
www.chps.net/manual/lem_table.htm

8. Moisture Protection — 1 point

Intent
Protect against building moisture infiltration through direct rainwater intrusion, water vapor transmission, and negative pressurization. Avoid potentially damaging results of condensation that may occur within an exterior wall system. This affects the health of the occupants, air conditioning costs, and building integrity and durability.

Requirements
No vinyl wall coverings or other vapor barriers may be installed as the finish material on the interior of any exterior wall.
Tenant agreements state that no vinyl wall coverings or other vapor barriers may be installed as the finish material on the interior of any exterior wall.
Install building envelope drainage plane systems, including flashing and overhang systems.
Document building will be pressurized.

Required Documentation

- Wall sections for each exterior wall type indicating all materials, thermal characteristics, and permeability. Provide a temperature gradient for each wall section for heating, cooling, and dew point design conditions.
- Typical building details of building envelope drainage systems, including flashing and overhang systems.
- Narrative describing rain or bulk water drainage plane performance.
- Copy of tenant agreement, if applicable.
- Building Pressurization Schedule and Schematic.

References

ASHRAE's Handbook – Fundamentals
www.ashrae.org/

9. Acoustic Quality

1 point

Intent

To provide a building environment free from disturbing mechanical equipment noise and vibration and excessive sound reverberation and designed with sufficient acoustical privacy and adequate sound isolation. To minimize tonal noise and intermittent noise sources in occupied spaces, as these noise sources are particularly troublesome.

Requirements

- Define appropriate background sound levels, reverberation decay times, speech intelligibility, and sound isolation for the building use. Identify spaces where impact noises are likely and address the potential problem.
- Provide mechanical and duct systems designed to meet guideline RC, NC or NCB provided by current copy of ASHRAE Applications Design Guidelines for HVAC Sound and Vibration Control Chapter.
- Provide appropriate vibration isolation for mounted equipment.
- Select equipment that could not be characterized as "tonal".
- Specify surface finishes and/or masking systems to provide appropriate sound intelligibility and privacy.
- Specify partitions, ceilings, floor/ceiling assemblies, building layouts, and vestibules to provide adequate sound isolation between spaces.
- Mitigate intermittent noise sources such as footfall and loading dock noise.

Required Documentation

- Narrative of the acoustical Design Intent and Basis of Design.
- One third octave band sound data submittals (or a narrative to address tonality) for the following:
  - air handling equipment inlets, discharges, and casing radiation
  - exhaust fan bare fan sound levels
  - generators
  - pumps
  - chillers
- Vibration isolation schedule.
- Surface finish schedules including NRC and CAC Ratings as applicable.
- Schedule of partition and floor/ceiling assembly cross sections. Indicate STC, CAC and IIC ratings of partitions, ceilings and floor/ceilings on plans.

References
"A Practical Guide to Noise and Vibration Control for HVAC Systems" and "Applications of Manufacturers Sound Data" by Mark E. Schaffer
Acoustics.com – acoustic considerations and strategies
www.acoustics.com/
Acoustical Society of America Store
asastore.aip.org/

10. Outdoor Pollutant Control

1 point

Intent
Avoid exposure of building occupants to potentially hazardous particulates and chemical pollutants (vehicle exhaust, natural pollens/allergens, biological pollutants, etc.) that can enter the building through air intakes and entryways.

Requirements
Entrances, operable windows and fresh air intakes shall be located a minimum 30 feet away from designated smoking areas and air intakes shall meet the minimum separation distance requirements of ASHRAE STD. 62.1-2004, Table 5-1. Install appropriate signage to clearly designate where smoking is permitted and not permitted.

Install permanent entryway systems (grills, grates, mats), a minimum 6 feet long (10 feet recommended), in the primary direction of travel to capture dirt from entryways directly connected to the outdoors.

Mitigate air borne contaminates from outdoor air pollutant sources.

Required Documentation
- Plans indicating the location of the smoking sections, the 30 foot radius around the areas and all entrances, operable windows and air intakes.
- Signage plans denoting smoking and no smoking areas.
- Entrance plans, details and cut sheets describing the entryway system.
- Narrative identifying outdoor air pollutant sources in accordance with ASHRAE STD. 62.1-2004, Sections 4.1, 4.2, and 4.3.
- Narrative of design strategies to mitigate air borne contaminates from the outdoors.

References
City of Austin Smoking in Public Places Ordinance:
www.amlegal.com/austin_nxt/gateway.dll/Texas/austin/title10publichealthservicesandsanitation/chapter10-6smokinginpublicplaces?f=templates$fn=altmain-nf.htm$3.0#JD_10-6-8
IAQ Design Tools for Schools Graphic - U.S. EPA:
www.epa.gov/iaq/schooldesign/controlling.html
Fundamentals of IAQ in Buildings - U.S. EPA – I-BEAM Text Modules:
http://www.epa.gov/iaq/largebldgs/i-beam/text/

11. Construction Indoor Air Quality

1 point

Intent
Prevent indoor air quality problems that result from the construction process.

Requirements
Develop and implement a Construction Indoor Air Quality Management Plan that meets or exceeds the recommended control measures of the Sheet Metal and Air Conditioning National Contractor's Association (SMACNA) *IAQ Guidelines for Occupied Buildings Under Construction*. The plan should include each of these key areas of IAQ protection: Scheduling, Source Control, HVAC Protection, Pathway Interruption, and Housekeeping.

Protect stored on-site or installed absorptive materials from moisture damage.

If permanently installed air handlers are used during construction, filtration media with a minimum MERV of 8 shall be used at each return grille. Replace all media filters immediately prior to occupancy.

Required Documentation
- Copy of the Construction IAQ Management Plan, highlighting the five requirements of the SMACNA *IAQ Guidelines for Occupied Buildings Under Construction*
- Photographs of on-site construction IAQ measures, such as duct protection and on-site storage of absorptive materials.
- Cut sheets of filtration media used during construction with MERV values highlighted.

References
IAQ Guidelines for Occupied Buildings Under Construction - Sheet Metal and Air Conditioning National Contractor's Association:
www.smacna.org/bookstore/

MATERIALS & RESOURCES

Sustainable Material Choices, Use and Disposal

1. Additional Construction Waste Management 1 point

Intent
Divert construction, demolition, and land clearing debris from landfill disposal. Redirect recyclable material back to the manufacturing process.

Requirements
Recycle and/or salvage at least 75% (by weight) of non-hazardous construction and demolition waste excluding excavated soil and stone.

The following table shall be used to calculate percentage of construction waste diverted when weight tickets are not available:

SOLID WASTE CONVERSION FACTORS	
MATERIAL	DENSITY, (lbs/CY)
Mixed Waste	350
Wood	300
Cardboard	100
Gypsum Wallboard	500
Rubble	1400
Steel	1000

Required Documentation
- Specifications for Construction Waste Management in the Contract Documents.
- Construction Waste Management Plan and copies of weight tickets for recycling, salvage and landfill.
- Completed AEGB Construction Waste Management Calculator.

References
The Waste Reduction Assistance Program is available to assist with all aspects of solid and hazardous waste management through the on-site waste reduction assessment service, materials exchange, and business information-clearing house. Have a waste reduction assessment conducted for facility operation; contact City of Austin Solid Waste Services Waste Reduction Assistance Program at 974-9043.
www.ci.austin.tx.us/sws/wrap_assessment.htm

Sustainable Building Sourcebook – Austin Energy Green Building:
www.austinenergy.com/Energy%20Efficiency/Programs/Green%20Building/Sourcebook/constructionWasteManagement.htm

2. Building Reuse

Intent
Extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste, and reduce environmental impacts of new buildings as they relate to materials manufacturing and transport.

2a. Envelope and Structure

1 - 2 points

Requirements
Incorporate at least 40% or 80% (surface area) of existing building envelope (including exterior skin and framing, excluding window assemblies and non-structural roofing material) and structure (including structural floor and roof decking) in the new building.

Required Documentation
- Plans and elevations indicating pre-construction existing building shell and structure and intended area to be preserved.
- Calculations from the AEGB Building Reuse Calculator.

References
Building Reuse Case Studies - Smart Growth Network:
www.smartgrowth.org/casestudies/casestudy_index.html

2b. Interior Non-Structural Elements

1 point

Requirements
Incorporate at least 50% (surface area) of existing interior non-structural elements (walls, doors, floor coverings and ceiling surfaces) in the new building.

Required Documentation
- Plans and elevations indicating pre-construction existing building interior elements and intended areas to be reused.
- Calculations from the AEGB Building Reuse Calculator.

References

3. Salvaged Materials

1 - 2 points

Intent
Extend the life cycle of targeted building materials by reducing environmental impacts related to materials manufacturing and transport.

Requirements
Salvaged or refurbished materials account for 5% or 10% (dollar value) of total project building materials cost.

Mechanical, electrical and plumbing components as well as specialty items should not be included in the calculations. Only include materials permanently installed in the project.

Required Documentation
- Calculations from the AEGB Building Materials Calculator.

References
Salvaged Building Materials Business Directory - Building Materials Reuse Association
http://ubma.org/
ReStore Salvaged Building Materials Outlet - Austin Habitat for Humanity
www.re-store.com/

4. Recycled Content

1 - 2 points

Intent
Increase demand for building products that have incorporated recycled content materials, therefore reducing the impacts resulting from the extraction of new materials.

Requirements
Building materials contain recycled content (the sum of post-consumer recycled content plus one-half of the post-industrial content) of at least 10% or 20% (dollar value) of total project building materials cost.

Mechanical, electrical and plumbing components as well as specialty items should not be included in the calculations. Only include materials permanently installed in the project.

Required Documentation
- Calculations from the AEGB Building Materials Calculator.

References
EPA Comprehensive Procurement Guidelines:
www.epa.gov/cpg/
Recycled Content Product Database – California Integrated Waste Management Board:
www.ciwmb.ca.gov/rcp/
Recycled Content Product Database from Texas Manufacturers - Clean Texas:
www.cleantexas.org/index.cfm?fuseaction=public.resources_texasrecycle
Texas Recycled Program promotes recycled products from Texas Manufacturers -Texas Commission on Environmental Quality:
www.tceq.state.tx.us/assistance/P2Recycle/TXrecy/about.html

5. Texas Sourced Materials

1 - 2 points

Intent
Increase demand for materials that are manufactured in Texas, thereby reducing the environmental impacts resulting from their transportation and supporting the State economy.

Requirements
Building materials and products are extracted and/or manufactured (final assembly) regionally within Texas for at least 30% or 50% (dollar value) of the project materials cost.

Mechanical, electrical and plumbing components as well as specialty items should not be included in the calculations. Only include materials permanently installed in the project.

Required Documentation
- Calculations from the AEGB Building Materials Calculator.

References
Recycled Content Product Database from Texas Manufacturers - Clean Texas:
www.cleantexas.org/index.cfm?fuseaction=public.resources_texasrecycle
Sustainable Building Sourcebook – Austin Energy Green Building:
www.austinenergy.com/Energy%20Efficiency/Programs/Green%20Building/Sourcebook/materials.htm

6. Certified Wood 1 point

Intent
Encourage environmentally responsible forest management.

Requirements
At least 50% (dollar value) of new wood-based materials are certified in accordance with the Forest Stewardship Council (FSC) guidelines for wood building components.

Required Documentation
- Calculations from the AEGB Certified Wood Calculator.

References
FSC Certified Products Database - Certification Research Center:
www.certifiedwoodsearch.org
Forest Stewardship Council:
www.fsc.org

7. Low VOC Paints, Coatings, Adhesives, and Sealants 1 point

Intent
Reduce the quantity of air contaminants that are odorous or potentially irritating to installer and occupant health and comfort.

Requirements
Exterior paints meet Green Seal standards and exterior coatings, adhesives, and sealants meet South Coast Air Quality Management District (SCAQMD) standards for 100% (dollar value) of these material costs.

Required Documentation
- Tabulation using the AEGB Low VOC Materials Form

References
Green Seal GS-11– paints:
www.greenseal.org/certification/standards/paints.cfm
Green Seal GC-03 – anti-corrosive paints:
www.greenseal.org/certification/standards/anti-corrosivepaints.cfm
SCAQMD Rule 1113 – coatings:
www.aqmd.gov/rules/reg/reg11/r1113.pdf
SCAQMD Rule 1168 – adhesives and sealants:
www.aqmd.gov/rules/reg/reg11/r1168.pdf

EDUCATION
Environmental Awareness and Contribution

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1. Educational Outreach — 1 point

Intent
Provide public education highlighting the green building strategies implemented in this project. A green building can be an effective educational tool and can have a significant impact on the users' (occupants and visitors) understanding of the built and natural environment.

Requirements
Provide at least 2 Educational Services to include:
- A comprehensive signage program built into the building and site to educate the occupants and visitors on the benefits of green building. This program may include windows to view energy saving mechanical equipment and signs to call attention to water conserving plumbing fixtures or landscape features.
- A case study to showcase the green building strategies implemented to educate design professionals and general public. This case study may be published online at www.austinenergy.com at the discretion of AEGB.
- An educational outreach program to educate the community on sustainable living using this project as an example. This program may include guided tours of the facility, pamphlets, and display boards highlighting the sustainable features.

Required Documentation
- Narrative describing the signage program. Include design drawings of the educational displays and locations within the building and site.
- Case Study using the AEGB Commercial Program Case Study Form or similar.
- Narrative describing the educational outreach program including the content and means of implementation.

References
Case Study Form – AEGB Commercial Program

www.austinenergy.com/Energy%20Efficiency/Programs/Green%20Building/Resources/Case%20Studies/CommCaseStudy.rtf
Case Studies – AEGB
http://www.austinenergy.com/Energy%20Efficiency/Programs/Green%20Building/Resources/Case%20Studies/index.htm

INNOVATION
Creative, New Sustainable Solutions

1 - 5 points

Intent
Develop sustainable solutions that demonstrate a comprehensive approach and quantifiable environmental and /or health benefits beyond the requirements of measures defined in this program.

Requirements
Submit a proposal of the innovation measure to Austin Energy Green Building for approval. Include the intent of the measure, requirements for compliance, documentation to demonstrate compliance, and the design approach (strategies) that will be used to meet the requirements. One point may be earned for each Innovation measure; a maximum of five Innovation measures are possible.

Required Documentation
- A narrative meeting the requirements listed above.

References

Appendix: General Green Building Resources

Austin Energy, Commercial Programs and Rebates $:
www.austinenergy.com/Commercial/index.htm
www.austinenergy.com/Energy%20Efficiency/Programs/Rebates/Commercial/

American Council for an Energy-Efficient Economy:
http://www.aceee.org/energy/national/nrgleg.htm
Lists major energy efficiency tax incentives likely to come before Congress in 2008 or 2009 including: an extension of the commercial buildings tax deduction, and a tax credit for CHP and recycled energy systems.

IRS publications: (Congressional approval of extension of tax deductions to be considered in 2008 or 2009.) Deductions expired January 1, 2008.
- *Energy Savings Modeling and Inspection Guidelines for Commercial Building Federal Tax Deductions*
http://www.nrel.gov/docs/fy07osti/40228.pdf
- Notice 2006-52: *Deduction for Energy Efficient Commercial Buildings:*
http://www.irs.gov/pub/irs-drop/n-06-52.pdf

Austin Energy Green Building:
www.austinenergy.com/go/greenbuilding

Austin Energy Green Building *Sustainable Building Sourcebook*:
www.austinenergy.com/Energy%20Efficiency/Programs/Green%20Building/Sourcebook/index.htm

Austin Water Utility, Commercial Programs, Rebates $, and *Water Efficient Equipment and Design*:
http://www.ci.austin.tx.us/watercon/default.htm
http://www.ci.austin.tx.us/watercon/downloads/EquipmentGuide.pdf

Center for Maximum Potential Building Systems:
www.cmpbs.org/

Energy Design Resources:
www.energydesignresources.com
Energy Design Resources offers a valuable palette of energy design tools and resources that help make it easier to design and build energy-efficient commercial and industrial buildings in California. The goal of this effort is to educate architects, engineers, lighting designers, and developers about techniques and technologies that contribute to energy efficient nonresidential new construction.

Environmental Building News and *GreenSpec® Guide*:
www.buildinggreen.com/
https://www.buildinggreen.com/ecommerce/gbp.cfm?

Green Building Pages – building materials database and design tool:
www.greenbuildingpages.com

Green Building Resource Guide:
www.greenguide.com

Healthy Building Network – advocates healthier building materials:
www.healthybuilding.net/

Lawrence Berkeley National Laboratory *The Cost-Effectiveness of Commercial-Buildings Commissioning:*
http://eetd.lbl.gov/Emills/PUBS/Cx-Costs-Benefits.html

New Buildings Institute:
newbuildings.org/

Rocky Mountain Institute:
www.rmi.org/

Smart Growth Network:
www.smartgrowth.org

Sustainable Building Sourcebook:
www.greenbuilder.com/sourcebook/

Sustainable Design Resource Guide of Colorado:
http://www.aiasdrg.org

U.S. Green Building Council:
www.usgbc.org/

Texas Organizations

Austin Sustainable Building Coalition:
www.greenbuilder.com/sbc/

Infinite Power of TX – technology/concept fact sheets:
www.infinitepower.org

Solar Austin – advocacy group:
www.solaraustin.org/

TREIA (TX Renewable Energy Industries Assoc.):
www.treia.org

TXSES (TX Solar Energy Society):
www.txses.org

AUSTIN ENERGY GREEN BUILDING
COMMERCIAL

AEGB Rating Packet Contents

Forms (Green Tabs)

- Project Information - project name, location, building description, utility savings, Sustainability ratings
- Project Team - contact information for key players involved in the design and construction.
- Worksheet - working tool for evaluating Green Building measures.
- Rating Report - report of Green Building measures implemented and Star Rating earned.

Calculators (Yellow Tabs)

- Building Reuse - calculates the percentage of existing shell, structure, and interior surface areas reused in new building.
- Construction Waste - calculates the percentage of construction waste that is recycled and/or salvaged.
- Water - calculates the percent reduction in indoor potable water use.
- Irrigation - calculates the percent reduction in landscape irrigation potable water use.
- Building Materials - calculates the percentage of materials that are salvaged, contain recycled content, and Texas sourced.
- Low VOC - tabulates the low-VOC materials.
- Certified Wood - calculates the percentage of wood-based materials that are FSC certified.

Project Information

Project Name			
Street Address			
City, State		Zip	
Primary Use of Building(s)			
Type of Construction		# of Floors	
		Sq. Ft. (gross)	
		Sq. Ft. (net)	

Project Schedule	Scheduled Start	Scheduled Finish	Description
Programming			
Schematic Design			
Design Development			
Site Permit			
Construction Documents			
Building Permit			
Bidding/ Contract Negotiations			
Construction			
Project CloseOut			

Mandatory Green Building Rating		
Green Building Program Star Rating Goal		
LEED Rating Goal		

AUSTIN ENERGY GREEN BUILDING
PROJECT TEAM

AUSTIN ENERGY GREEN BUILDING

PROJECT:

AEGB Representatives		Phone	E-mail

Building Owner/Developer			
Contact Person			
Phone	Cell	Fax	E-mail

Architect			
Contact Person			
Phone	Cell	Fax	E-mail

Mechanical Engineer			
Contact Person			
Phone	Cell	Fax	E-mail

Structural Engineer			
Contact Person			
Phone	Cell	Fax	E-mail

Electrical Engineer			
Contact Person			
Phone	Cell	Fax	E-mail

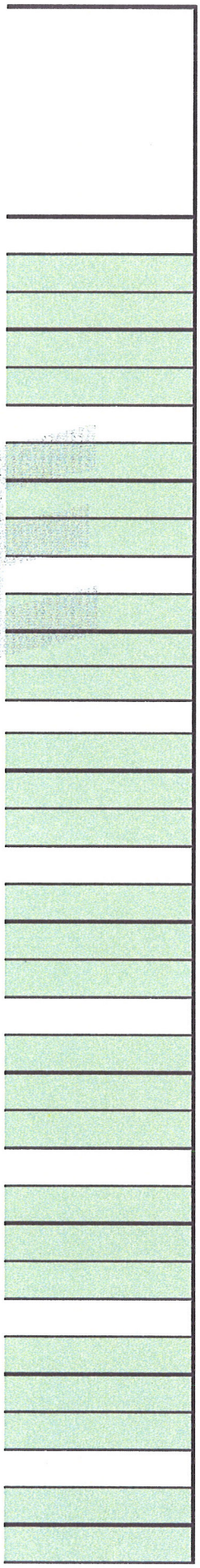
General Contractor			
Contact Person			
Phone	Cell	Fax	E-mail

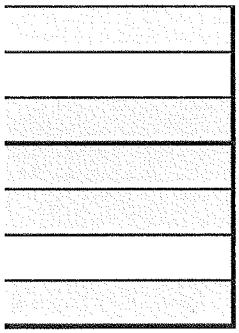
Commissioning Authority			
Contact Person			
Phone	Cell	Fax	E-mail

Professional Title			
Contact Person			
Phone	Cell	Fax	E-mail

Professional Title			

	Contact Person			
	Phone	Cell	Fax	E-mail
Professional Title				
	Contact Person			
	Phone	Cell	Fax	E-mail





Instructions for Worksheet (reference AEGB Commercial Guidebook)

1. Verify completion of all 8 measures of the Basic Requirements to qualify for any Rating by indicating "yes".

2. Signify intent of additional green measures by entering the available points in the Yes, ? (maybe), or No column.

	Category	Requirements	Web Link	Points	Design Team			AEGB	
					Yes	?	No	√'d	Final
	Basic Requirements								
1	Building Systems Commissioning (Cx)	1. design intent 2. document in CD 3. Cx plan 4. verification 5. O&M documentation & training 6. Cx report. peci.org/CxTechnical/Tools_Guides/guides.htm		Req'd					
2	Storm Water Runoff & Water Quality Control	Meet current city drainage and water quality standards and ordinances for the project site watershed. ci.austin.tx.us/watershed/ordinance_map.htm		Req'd					
3	Roofing to Reduce Heat Island	Meet current Austin Energy Code roofing requirements with vegetated or reflective roofs (<2:12 pitch: SR ≥ 0.70 or SRI ≥ 78, ≥2:12 pitch: SR ≥ 0.35 or SRI ≥ 29) energystar.gov/ia/products/prod_lists/roof_prods_prod_list.pdf		Req'd					
4	Building Energy Use Efficiency	Exceed current Austin Energy Code Building Interior Lighting and Envelope requirements by 15% each or exceed code building performance model by 15%. energycodes.gov/comcheck/		Req'd					
5	Building Water Use Reduction	Reduce planned indoor potable water consumption below the baseline (EPAct) by at least 15%. ci.austin.tx.us/watercon/ Ref: Water Use Reduction Calculator		Req'd					
6	Low VOC Interior Paints and Coatings	Meet standards for Green Seal GS-11, GC-03 for Paints and SCAQMD Rule 1113 for Coatings. greenseal.org/certification/standards/paints.cfm greenseal.org/certification/standards/anti-corrosivepaints.cfm aqmd.gov/rules/reg/reg11/r1113.pdf		Req'd					
7	Storage and Collection of Recyclables	Provide appropriately sized, easily accessible area dedicated to the separation, collection and storage of materials for recycling, including at minimum, the top two (four for multi-family >100 units) identified recyclable waste stream items. ci.austin.tx.us/sws/recyclerules.htm		Req'd					
8	Construction Waste Management	Recycle and/or salvage at least 50% by weight non-hazardous construction & demolition waste excluding excavated soil & stone. austinenergy.com/Energy%20Efficiency/Programs/Green%20Building/Sourcebook/constructionWasteManagement.htm Ref: Const. Waste Calculator		Req'd					
	Basic Requirements NOT ACHIEVED								
	Team								

	Category	Requirements	Web Link	Points	Design Team			AEGB	
					Yes	?	No	√'d	Final
1	Integrated Project Design Team & Sustainable Goals	1. Choose team members early in design phase. 2. Document sustainability goals. 3. Hold sustainability team meetings during each phase of design through construction to track progress. 4. Include sustainability goals in specifications. 5. Incorporate sustainability features, proposed certification into pre-construction meeting. wbdg.org/index.php		1					
	Total Points - Team			1	0	0	0	0	0

	Category	Requirements	Web Link	Points	Design Team			AEGB	
					Yes	?	No	√'d	Final
	Site								
1a	Site Selection - Environmental Sensitivity	Site is not located in the Drinking Water Protected Zone. Site is not a greenfield.		2					
1b	Site Selection - Desired Development Area	Site located within the Urban Watershed Desired Development Zone. Coagis1.ci.austin.tx.us/website/COAViewer dev/viewer.htm		4					
2	Diverse, Walkable Communities	Building(s) connects with neighboring properties with pedestrian and/or bicycle only paths (shading preferred) that are separate from vehicular traffic. Project includes or is located within 1/2 mile walking distance of residences and at least 10 Basic Services which are accessible via a safe route intended for use by pedestrians that does not require crossing a road more than 5 lanes wide or 35 miles per hour. ci.austin.tx.us/development/downloads/final.pdf walkscore.com/index.shtml oregon.gov/ODOT/HWY/BIKEPED/planproc.shtml		1					
3	Brownfield Redevelopment	Rehabilitate contaminated site. epa.gov/region09/waste/sfund/prg/index.html		1					
4	Site Characteristics Study	Document existing site characteristics, map all potential natural hazards (including traffic and pollution sources). Plan to maintain or restore existing site features. Site building to minimize impact and to utilize natural characteristics.		1					
5a	Transportation Alternatives - Public Transportation	Locate building within 1/4 mile of at least 2 bus stops or within 1/2 mile of a rail stop (or future rail stop with proposed completion within 5 years). capmetro.org/riding/trip_info.asp		1					
5b	Transportation Alternatives - Bicycle Use	Bicycle securing areas and shower/changing facilities for 10% or more of the building occupants. One bicycle parking space per rider, one shower per 25 riders. Safe routing on property. ci.austin.tx.us/bicycle/		1					
5c	Transportation Alternatives - Parking Capacity	Parking does not exceed minimum local zoning requirements. Preferred parking for carpools for 5% (min.) of building occupants. www.amlegal.com/austin_nxt/gateway.dll/Texas/austin/title25landdevelopment/chapter25-6transportation?f=templates$fn=altmain-nf.htm$3.0#JD_25-6-471		1					
6a	Site Development - Protect or Restore Open Areas	Limit disturbance to 40 ft beyond building perimeter; 10 ft beyond walkways, patios, surface parking; 15 ft beyond roadways & utility trenches; 25 feet beyond any pervious areas that require additional staging. Previously developed sites: At least 50% of the post-development open area (site area minus building footprint) is vegetated using native/adapted plants. Vegetated roof areas may be included in open area calculations, if plants meet the definition of native/adapted.		1					

	Category	Requirements	Web Link	Points	Design Team			AEGB	
					Yes	?	No	√'d	Final
6b	Site Development - Maximize Vegetated Open Area	Provide vegetated open area* using native/adapted plants equal to 20% of the project site area. *May include vegetated roof areas, if plants meet the definition of native/adapted. ci.austin.tx.us/growgreen/plants.htm		1					

	Category	Requirements	Web Link	Points	Design Team			AEGB	
					Yes	?	No	√'d	Final
7a	Additional Heat Island Reduction - Site	1. 50% of site hardscape any combination of: Vegetative open grid paving (at least 50% pervious), paving materials with SRI 29 min., vegetative shading planted over non-roof impervious surfaces within 5 years. OR 2. Locate 50% of parking underground or in structured parking with top deck surface of SRI 29 min. http://eetd.lbl.gov/HeatIsland/		1					
7b	Additional Heat Island Reduction - Roofing	Install any combination of vegetated and reflective roofs (<2:12 pitch: SR ≥ 0.75 or SRI ≥ 85, ≥2:12 pitch: SR ≥ 0.45 or SRI ≥ 35) coolroofs.org/aboutthecrrc_owners.html		1					
8	Light Pollution Reduction	Exterior lighting meets COA Code-Chpt.25-2, E, Art. 2.5; IESNA RP-33 Light Trespass; and Illuminance levels at specific facilities. ci.austin.tx.us/development/downloads/final.pdf		1					
9	Integrated Pest Management (IPM)	Implement IPM plan to minimize environmental impact and use least toxic practices for site and building management. ci.austin.tx.us/watershed/ipm.htm		1					
10	Outdoor Environmental Quality	Shaded seating for minimum of 10% of building occupants. http://solardat.uoregon.edu/SunChartProgram.html		1					
	Total Points - Site			**19**	**0**	**0**	**0**	**0**	**0**

	Category	Requirements	Web Link	Points	Design Team			AEGB	
					Yes	?	No	√'d	Final
	Energy								
1	Additional Energy Use Efficiency	Exceed current code building by 17.5% or better using the ASHRAE 90.1-2004 App. G Performance Rating Method. **Point Allocation:** 17.5% = 1 pt, 20% = 2 pts, 22.5% = 3 pts, 25% = 4 pts, 27.5% = 5pts, 30% = 6 pts, 32.5% = 7 pts, 35% = 8 pts, 37.5% = 9 pts, 40% = 10 pts, 42.5% = 11 pts, 45% = 12 pts. www.realread.com/prst/pageview/browse.cgi?book=1931862664		12					
2	Green Energy	GreenChoice® commercial agreement. If GreenChoice® unavailable, 2-year contract for Texas or Green-e certified National RECs for 100% of building's annual electricity use. austinenergy.com/Energy%20Efficiency/Programs/Green%20Choice/		1					
3a	Renewables 2%	On site renewable energy system for 2% of energy needs. nrel.gov/		1					
3b	Renewables 5%	On site renewable energy system for 5% of energy needs. austinenergy.com/Energy%20Efficiency/Programs/Rebates/Solar%20Rebates/guidelines.htm		1					
4	Additional Commissioning (Cx)	1. Cx agent design review < 50% CD's. 2. Demonstrate bldg. systems operate in accordance w/ design intent. 3. Demonstrate bldg. structure & envelope performance in accordance w/ design intent. 4. Seasonal re-Cx through warranty period. 5. Cx report peci.org/CxTechnical/Tools_Guides/guides.htm		1					
5	District Cooling	Tie into Austin's district cooling and heating loop for all HVAC energy needs. austinenergy.com/Commercial/Other%20Services/On-Site%20Energy%20Systems/districtcooling.htm		1					
	Total Points - Energy			**17**	0	0	0	0	0

	Category	Requirements	Web Link	Points	Design Team			AEGB	
					Yes	?	No	√'d	Final
	Water								
1a	Irrigation Water Reduction 50%	Use high efficiency irrigation, rainwater catchment, and/or climate appropriate plant materials. Reduce by 50% over baseline. Ref: Irrigation Water Use Reduction Calculator ci.austin.tx.us/watercon/		1					
1b	Irrigation Water Reduction 75%	Reduce by 75% over baseline. Ref: Water Use Reduction Calculator www.ci.austin.tx.us/growgreen/		1					
1c	Irrigation Water Reduction 100%	Reduce by 100% over baseline. Ref: Water Use Reduction Calculator		1					
2a	Indoor Potable Water Use Reduction 25%	Use low-flow fixtures. Reduce by 25% over baseline. Ref: Water Use Reduction Calculator ci.austin.tx.us/watercon/		1					
2b	Indoor Potable Water Use Reduction 35%	Reduce by 35% over baseline. Ref: Water Use Reduction Calculator energystar.gov/index.cfm?c=appliances.pr_appliances		1					
2c	Indoor Potable Water Use Reduction 45%	Reduce by 45% over baseline. Ref: Water Use Reduction Calculator www.epa.gov/watersense		1					
2d	Indoor Potable Water Use Reduction 55%	Reduce by 55% over baseline. Ref: Water Use Reduction Calculator		1					
3	Stormwater Management	Manage by infiltration 25% of the water quality volume (WQV) for sites ≥ 50% existing IC or 50% of the WQV for sites < 50% existing IC. Ref. ECM 1.6.7 www.amlegal.com/austin_nxt2/gateway.dll?f=templates&fn=default.htm&vid=amlegal:austin_environment		1					
	Total Points - Water			8	0	0	0	0	0

	Category	Requirements	Web Link	Points	Design Team			AEGB	
					Yes	?	No	√'d	Final
	Indoor Environmental Quality (IEQ)								
1	Indoor Air Quality Monitoring	Install permanent carbon dioxide monitoring system that provides feedback in a useable form to make adjustments for ventilation system. Commission all systems to the preferred parameters for optimal performance. epa.gov/iaq/index.html		1					
2	Indoor Chemical & Pollutant Sources	Identify and ventilate areas of point source pollutants (i.e. copy machines, print shops, janitors closets, labs) 1. Provide ventilation directly to the outside of the building. 2. Construct a full height deck to deck partition or a hard lid ceiling enclosure between these areas and occupied spaces. 3.Operate at negative pressure relative to surrounding areas under all operating conditions by testing. www.epa.gov/iaq/largebldgs/i-beam/index.html		1					
3	Daylighting	Provide adequate daylighting and integrate daylighting systems with electric lighting systems and controls. eere.energy.gov/buildings/info/design/integratedbuilding/passivedaylighting.html		1					
4	Views to Outside	Glazing systems and interior partitions allow for a minimum of 75% of regularly occupied spaces a view of vision glazing (between 2'-6" and 7'-6" above finish floor) and a view of the outdoors.		1					
5	Thermal Comfort	Install mechanical systems (thermal, ventilation and dehumidification) and monitoring system so ensure optimal parameter for thermal comfort for all operating conditions according to ASHRAE 55-2004.		1					
6	Individual Controllability	Install and commission systems for individual occupant controllability for thermal comfort for 75% of the occupants. http://newbuildings.org/		1					
7a	Low-Emitting Materials - Adhesives and Sealants	All installed sealants and adhesives meet South Coast Air Quality Management District (SCAQMD) standards. Ref: Low VOC Calculator aqmd.gov/rules/reg/reg11/r1168.pdf		1					
7b	Low-Emitting Materials - Flooring Systems	All flooring systems meet IEQ 7a reqmts. All installed carpet meets CRI Green Label Plus min. standard. All carpet pads meet CRI Green Label min. std. All resilient flooring is FloorScore certified. Ref: Low VOC Calculator carpet-rug.org/drill_down_2.cfm?page=8&sub=17&requesttimeout=350 scscertified.com/iaq/floorscore 1.html		1					
7c	Low-Emitting Materials - Composite Wood	All installed composite wood has no added urea-formaldehyde. Ref: Low VOC Calculator greenseal.org/resources/reports/CGR_particleboard.pdf		1					

	Category	Requirements	Web Link	Points	Design Team			AEGB	
					Yes	?	No	√ 'd	Final
7d	Low-Emitting Materials - Insulation	All installed insulation (excluding piping) contains no added urea-formaldehyde. Ref: Low VOC Calculator www.chps.net/manual/lem_table.htm		1					

	Category	Requirements	Web Link	Points	Design Team			AEGB	
					Yes	?	No	√'d	Final
8	Moisture Prevention	1. No vinyl wall coverings or vapor barriers for surface treatments on interior of exterior wall (also include in tenant agreements.) 2. Install building envelope drainage plane systems, including flashing and overhang systems. 3. Document building will be pressurized.		1					
9	Acoustic Quality	1. Define appropriate background sound levels, reverberation decay times, speech intelligibility, & sound isolation. Identify spaces where impact noises are likely & address potential problems. 2. Mechanical & duct systems designed to meet guideline RC, NC or NCB of ASHRAE Applications Design Guidelines for HVAC Sound & Vibration Control Chpt. 3. Appropriate vibration isolation for mounted equipment. 4. Select non-"tonal" equipment. 5. Specify surface finishes and/or masking systems to provide appropriate sound intelligibility & privacy. 6. Specify partitions, ceilings, floor/ceiling assemblies, building layouts, & vestibules to provide adequate sound isolation between spaces. 7. Mitigate intermittent noise sources, e.g. footfall & loading dock noise. www.acoustics.com/		1					
10	Outdoor Pollutant Sources	Entrances, operable windows, and fresh air intakes shall be located a minimum 30 feet away from designated smoking areas & air intakes shall meet the min. separation distance requirements of ASHRAE STD. 62.1-2004, Table 5-1. Install signage designating smoking and no-smoking areas. Install entryway systems (grills, grates, mats) at least 6 feet long. Mitigate air borne contaminates from outdoor air pollutant sources. www.epa.gov/iaq/largebldgs/i-beam/text/		1					
11	Construction Indoor Air Quality	Implement SMACNA Guidelines for Occupied Buildings Under Construction, or similar plan. Plan should include key areas of IAQ protection: Scheduling, Source Control, HVAC Protection, Pathway Interruption and Housekeeping. Protect absorptive materials (stored or installed) from moisture damage. For permanently installed air handlers used during construction, use MERV 8 (min.) filters in each return grill and replace all filters immediately prior to occupancy. www.smacna.org/bookstore/		1					
	Total Points - Indoor Environmental Quality			14	0	0	0	0	0

	Category	Requirements	Web Link	Points	Design Team			AEGB	
					Yes	?	No	√'d	Final
	Materials and Resources								
1	Additional Construction Waste Management	Recycle and/or Salvage at least 75% by weight of construction and demolition waste excluding excavated soil and stone. Ref: Const. Waste Calculator austinenergy.com/Energy%20Efficiency/Programs/Green%20Building/Sourcebook/constructionWasteManagement.htm		1					
2a	Building Reuse - Envelope and Structure 40%	Incorporate at least 40% (surface area) of existing building envelope and structure. Ref: Bldg. Reuse Calculator		1					
2aa	Building Reuse - Envelope and Structure 80%	Incorporate at least 80% (surface area) of existing building envelope and structure. Ref: Bldg. Reuse Calculator		1					
2b	Building Reuse - Interior Non-Structural Elements	Incorporate at least 50% (surface area) of interior non-structural elements. Ref: Bldg. Reuse Calculator		1					
3a	Salvaged Materials 5%	Use salvaged or refurbished materials for 5% ($ value) of project building materials. Ref: Bldg. Materials Calculator ubma.org/		1					
3b	Salvaged Materials 10%	Use salvaged or refurbished materials for 10% ($ value) of project building materials. Ref: Bldg. Materials Calculator re-store.com/		1					
4a	Recycled Content 10%	Use Recycle Content materials for 10% ($ value) of project building materials. Recycled Content = 100% post-consumer + 50% post-industrial Ref: Bldg. Materials Calculator epa.gov/cpg/		1					
4b	Recycled Content 20%	20% ($ value) of project building materials have Recycled Content. Ref: Bldg. Materials Calculator www.cleantexas.org/index.cfm?fuseaction=public.resources_texasrecycle		1					
5a	Texas Sourced Materials 30%	Building materials and products extracted or manufactured regionally within Texas for at least: 30% ($ value) of project building materials. Ref: Bldg. Materials Calculator cleantexas.org/index.cfm?fuseaction=public.resources_texasrecycle		1					
5b	Texas Sourced Materials 50%	50% ($ value) of project building materials meet requirements above. Ref: Bldg. Materials Calculator austinenergy.com/Energy%20Efficiency/Programs/Green%20Building/Sourcebook/materials.htm		1					
6	Certified Wood	Use Certified Wood (FSC) for at least 50% ($ value) of project wood-based materials. Ref: Certified Wood Calculator certifiedwoodsearch.org		1					

	Category	Requirements	Web Link	Points	Design Team			AEGB	
					Yes	?	No	√'d	Final
7	Low VOC Paints, Coatings, Adhesives, Sealants	Exterior paints meet Green Seal standards; exterior sealants, coatings, and adhesives meet SCAQMD standards for 100% ($ value) of these material costs. Ref: Low VOC Calculator greenseal.org/certification/standards/paints.cfm greenseal.org/certification/standards/anti-corrosivepaints.cfm aqmd.gov/rules/reg/reg11/r1113.pdf aqmd.gov/rules/reg/reg11/r1168.pdf		1					
	Total Points - Materials & Resources			**12**	**0**	**0**	**0**	**0**	**0**

	Category	Requirements	Web Link	Points	Design Team			AEGB	
					Yes	?	No	√'d	Final
	Education								
1	Educational Outreach	Provide at least 2 services to include: comprehensive signage, case study, and/or outreach program (ex. guided tours).		1					
	Total Points - Education			**1**	0	0	0	0	0
	Innovation								
1				1					
2				1					
3				1					
4				1					
5				1					
	Total Points - Innovation			**5**	0	0	0	0	0
	Total Points - Voluntary Measures			**77**	0	0	0	0	0

Point Requirements for Star Ratings

★	Basic Requirements
★★	30-36 points
★★★	37-43 points
★★★★	44-58 points
★★★★★	59 or more points

AUSTIN ENERGY
GREEN BUILDING

Strategies / Comments	Team Member

Strategies / Comments	Team Member

Strategies / Comments	Team Member

Strategies / Comments	Team Member

Strategies / Comments	Team Member

Strategies / Comments	Team Member

Strategies / Comments	Team Member

Strategies / Comments	Team Member

Strategies / Comments	Team Member

Strategies / Comments	Team Member

Strategies / Comments	Team Member

Strategies / Comments	Team Member

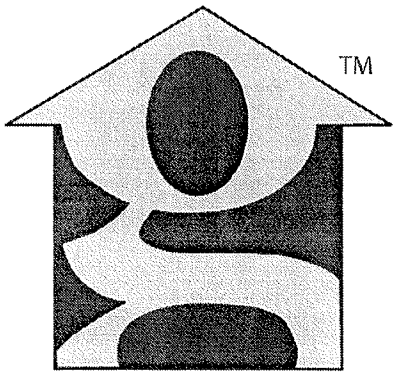
Strategies / Comments	Team Member
BASIC REQUIREMENTS NOT ACHIEVED.	
Design Team goal is 0 points equating to a 1 Star Rating.	

GUIDE

to the

SINGLE-FAMILY HOME RATING

Version 2008



AUSTIN ENERGY
GREEN BUILDING

Austin Energy Green Building Single-Family Program

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Disclaimer

The purpose of this Guide is to explain and clarify the Green Building Measures listed in the Austin Energy Green Building Single-Family Home Rating, Version 2008.

It reflects best practices known at this time by the Austin Energy Green Building staff for design and construction in the conditions of Austin, Texas. It is not intended to eliminate or substitute for the designer's and builder's own judgment or accepted engineering and construction practices.

Implementation of specific measures must be made in compliance with all current building codes and local, state, and federal regulations. Health and safety measures are not intended as medical advice.

Austin Energy Green Building relies on its participants to submit accurate rating information to the best of their ability.

Web sites and References

Please note that web sites and references may change and/or material may become outdated.

GUIDE to the SINGLE-FAMILY HOME RATING VERSION 2008

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GUIDE to the SINGLE-FAMILY HOME RATING VERSION 2008

INTRODUCTION: WHAT MAKES A HOME GREEN?

The Austin Energy Green Building (AEGB) Single-Family Home Rating assesses the design, construction, and performance of new homes according to a set of Basic Requirements for All Ratings and the extent to which they incorporate a set of recommended green building Choice Measures For Points. The Rating also serves as an educational and marketing tool for AEGB participants and homebuyers and provides a handy means of comparison for both building professionals and homebuyers.

It is crucial to recognize that a home could incorporate many of the measures listed below, achieving a high number of points and still not be a high-quality green home. This could happen if the measures are not combined in a holistic way, in accordance with a clear understanding of building science. The home performance tests measure many aspects of building quality (mainly air movement) but cannot measure many others. AEGB encourages architects, designers and builders to improve their knowledge of building science in order to design and build homes that work as intended over a long lifetime.

This Guide is intended for use as a handbook that accompanies the Rating.

In order for the AEGB to assess and rate a home, there must be some consensus regarding what a green home is. There is broad agreement nationally and across many disciplines and professions that in order for a home to be labeled "green," it must address several concerns related to the environmental impacts of the building industry and the residential sector of the U.S. economy. These concerns can usually be divided into the five environmental impact topics listed below. Each topic can include several design, specification, construction, and performance steps and some are relevant to several different building professions and trades. In addition, the scope of each topic will vary significantly with geography, climate, demographics, and building practices.

- ENERGY
- WATER
- MATERIALS AND PRODUCTS
- HEALTH AND SAFETY
- COMMUNITY

Energy

Energy affects all facets of home design, construction, and operation, from drawing the initial plans to installing light bulbs and operating appliances. Energy use over the lifespan of a building may be the single most important environmental and economic issue to address in a home. Excessive fossil-fuel energy that is used to power our homes results in significant environmental impacts on a local as well as global scale, and unnecessarily increases the home's annual operating and maintenance costs.

The green building measures listed in the Rating address the issue of energy-efficiency for the entire life of a home – starting with design, through the construction process, including operation and maintenance, and even considering repairing and remodeling. Design techniques, such as placing the home on its site to best respond to climatic conditions and site characteristics, are strongly encouraged. In Central Texas, where hot, humid conditions prevail, mechanical cooling is typically the largest energy-user in homes. Many of the listed green building measures, therefore, address ways to keep a home cool by *design* measures, such as shading, proper sizing and placement of windows, and a "cool roof" assembly.

Proper construction of the thermal envelope is critical in building an energy-efficient home, both in terms of products selected and quality of workmanship. There are several locations in a homes exterior walls and roof, especially in wood frame construction, where air leakage is a particular problem. These include electric boxes and services, framing around doors and windows, basement walls at sill plates and headers or band joists, the top of interior partitions and exterior walls, exhaust fans and dryer exhausts, plumbing vent pipes or stacks, supply and return pipes for air conditioning systems and heat pumps, and any other locations where exterior walls and ceilings are traversed by services, vents, and pipes. Openings such as these allow air to exfiltrate or infiltrate, and must be properly sealed to protect insulation, reduce drafts, reduce heating and cooling costs, and to avoid warranty repairs after construction has been completed.

Air barriers are systems of materials designed and constructed to control airflow between a conditioned space and an unconditioned space. The air barrier system is the primary air enclosure boundary that separates indoor (conditioned) air and outdoor (unconditioned) air. To function properly in the long term, an air barrier must be durable, strong, and continuous. A house wrap or gypsum board product facing the interior side of an exterior wall and partially supported on the other side by insulation can act as an air barrier. Homes that have a properly installed air barrier system can operate properly with a smaller cooling system as the cooling load does not have to compensate for a leaky building. To be contiguous, interior air barriers must be installed on attic-side of knee wall insulation and interior side of tubs, showers, and fireplaces located on exterior walls.

A house cannot be too air-tight (but it can have too little controlled ventilation). When people speak about walls needing to breathe, they mean that water vapor (not air) should be able to pass through walls and dry to either side. The Central Texas climate includes some cold days as well as many hot, humid days, so sometimes walls need to dry to the outside and sometimes to the inside.

The quality of workmanship in the cooling system, especially the duct and air-supply components, is also critical to efficient cooling of homes. High-efficiency heating and cooling systems, well-sealed ductwork, sufficient, controlled ventilation, and proper controls are all key components of an efficient HVAC system. Consequently, many of the green building measures focus not just on the equipment and materials selected, but also on the proper installation and quality of construction of cooling system components.

Using products such as compact fluorescent bulbs and Energy Star appliances can significantly reduce operating energy use. Implementation of these green building measures results in a home that is both energy-efficient and less costly to operate and maintain.

In addition to energy conservation and efficiency measures, points are also awarded for the use of renewable energy sources, including both "passive" and "active" techniques. Passive techniques such as natural ventilation, shading and daylighting must be considered during the design phases of the project. Active systems appropriate for residential applications include solar water heating and solar photovoltaic power systems. With a substantial amount of average annual sunshine, solar water heating devices for domestic water and swimming pool heating and photovoltaic systems that provide electric power for homes can perform well year-round in Central Texas.

To assess the quality of workmanship of a home's thermal-envelope and the HVAC-system installation, various tests must be conducted by a qualified 3rd-parter tester (not the same person/company that installed the system), as required by the City of Austin residential building code amendments, effective January 1, 2008. These tests include a duct-leakage test, envelope air leakage, static pressure test, supply airflow, return-air sizing and combustion-gas back-drafting. In most cases, one person can perform all the tests in one visit at a modest cost that will be quickly recouped by the homeowner by reduced utility bills.

Water

Water use in the Austin metropolitan region has dramatically increased with the rapid growth of the area's population. Water use has reached near capacity levels during several summers over the past decade. In addition, water quality issues have entered the limelight as development moves to the outskirts of Austin into environmentally sensitive areas. Competing uses for water – domestic, industrial, agricultural, and recreational – will further aggravate the situation in the near future.

Green building measures under this topic include indoor and outdoor uses. Water conservation for indoor uses has improved since code requirements for plumbing fixtures became effective in the 1990s. Consequently, most of the measures address outdoor water use. In the Austin area, summertime water-use is more than double wintertime use, due to landscaping watering, particularly turfgrass watering. Hence, climate-appropriate landscaping, organic mulch and soil amendments, and rainwater catchment are top concerns.

Materials and Products

Green building measures address four issues associated with the use of building materials and products: resource depletion, environmental burdens of manufacturing, product durability, and solid waste management. In addition to using environmentally preferred materials and products, measures that can reduce the amount of materials and products that go into a home are also listed. Low-maintenance and durable materials and products reduce replacement and repair. Planning ahead for change can facilitate future remodeling.

Green materials and products are ones that have one or more of the following attributes:

- Reused or salvaged
- Recycled-content and recyclable
- Resource-efficient during production and/or installation
- Rapidly renewable
- Low embodied-energy
- Locally produced
- Durable, low-maintenance
- Recyclable
- Biodegradable

It is extremely difficult to accurately assess the environmental performance of a building material or product over its entire life cycle. In many cases, the AEGB relies on third-party certification organizations to help with this task. For example, the Forest Stewardship Council (FSC) certifies wood products that come from sources that follow a set of FSC sustainable-forest-management practices. Thus, several of the green building measures mention FSC certified wood. Other recognized third-party certification organizations include Green Seal, GreenGuard, and Energy Star.

In Central Texas, there is an abundant supply of locally produced building materials and products. Stone such as granite and limestone are durable, no-maintenance building materials. Local wood such as cedar/juniper, often cleared from property prior to development, is a good choice for casing, trim, and cabinetry. Local hardwoods, locally milled, like pecan and mesquite, make easily maintained, durable flooring materials. In addition, composite recycled wood/plastic decking and trim products are manufactured in the region.

Health and Safety

Health concerns have increased in prominence as homes have become tighter and more energy-efficient. In addition, modern building materials and products are typically more processed and may contain chemical compounds that are irritants to some people when used under indoor conditions.

The three ways to improve indoor conditions are a) eliminate or reduce the source, b) adequately ventilate the space, and c) provide filtration of the indoor air. The green building measures include all three of these. Eliminating or reducing the source of indoor pollutants and contaminants is the best strategy. Examples are low VOC and zero VOC paints, formaldehyde-free cabinets and insulation, and having the garage detached from the house. The second group of options includes exhaust fans and outside air intake. Installing pleated-media or electronic filters are examples of implementing the third strategy.

Humidity control is extremely important in Central Texas homes. High humidity conditions that foster mold and mildew growth consistently occur year-round. Poor construction methods and over-sized cooling systems exacerbate this problem. The source cannot be easily eliminated, so mechanical ventilation and dehumidification are often the best solutions. In addition, installing a hygrometer to measure humidity levels in a home is strongly recommended to help occupants become aware of how they operate their home.

For outside the home, pest management is probably the most critical health and safety issue. Many steps can be taken to avoid the use of chemical pest treatments. Keeping wood away from the soil, installing physical termite barriers, treatment with non-toxic materials, and proper landscaping—these are all important considerations.

Community and Neighborhood

Green building measures under this topic improve the quality of "community" in Central Texas. They include location of a home near "life-support systems" of jobs, shopping and recreation. They include design features, such as front porches to encourage neighborhood interaction and safety.

Visitability and accessibility measures can potentially extend the useful life of a home for its occupants as they grow older or become infirm, or simply make a home more livable for anyone who may experience temporary mobility problems from a sports injury or accident. Homes built under the City of Austin's S.M.A.R.T. Housing Program must comply with Austin's Visitability requirements.

Small lots and lots with garage apartments and "granny flats" improve affordability and neighborhood diversity.

HOW THE SINGLE-FAMILY HOME RATING WORKS

Star Ratings

The Rating has five levels indicated by stars: One Star is the entry level, Five Stars the highest or "greenest" level.

Basic Requirements for All Ratings

All of the Basic Requirements must be fulfilled for a house to qualify for any Rating. (See page 2 of the Rating.) Compliance with all of these measures satisfies the requirement for a 1-Star Rating without any additional points from Section B, which is the a la carte "Measures for Points" available for 2-Star through 5-Star Ratings.

Measures for Points

The Rating is a record of points credited for green measures implemented. No negative points are assigned for failing to implement a given measure. It is not possible for a given house to implement all of the recommended green building measures; in fact, many are mutually exclusive. In addition to Basic Requirements for All Ratings, Three Star, Four Star, and Five Star Ratings have particular measures that must be achieved, called Special Star Requirements, in addition to attaining the required number of points. These are indicated below and on the Rating document next to the point totals. (See "Star Levels" at the top of page 1 of the Rating.) The following are the point requirements and special star requirements for each level of Star Rating for homes with 5 tons or less cooling equipment installed:

- 1 STAR 0 points
- 2 STAR 50--74 points
- 3 STAR 75--99 points plus 3.01 or 3.02 or 3.03; and 4.17; and 4.18 or 4.19
- 4 STAR 100-124 points including all 3-Star requirements plus 10.07 or 10.08
- 5 STAR 125 or more points, including all 3-Star and 4-Star requirements, plus all of the following: 3.04, 3.05, 11.06, 11.08

TCV Score

TCV (Texas Climate Vision) is a collaborative effort of Energy Systems Laboratory (ESL) and Austin Energy, funded by the US Department of Energy (DOE) and the Texas State Energy Conservation Office (SECO). The mission of the endeavor is to realize 20%-40% increases in residential building energy-efficiency through a combination of better building codes, improved processes, inspection and testing verifications, and the use of computer modeling to provide analysis of energy use when compared to the 2006 International Energy Conservation Code (2006 IECC). The TCV Project is intended to serve as a pilot program by providing technical assistance, advanced modeling, training and support. One of the key benefits from the resulting energy savings will be a reduction in the NOx emissions from energy generation, which can reduce dangerous ozone concentrations and improve air quality in the Austin metro area.

The goals of TCV include:

- increasing the number of homes built in Texas that are at least 20% better than the 2006 IECC baseline
- increase the number of builders and building officials that are familiar with high-performance homes
- increase the number of high-performance homes being built
- aid in the marketing of high-performance homes
- increase the number of homes built with properly sized HVAC systems and performance-tested
- quantify emissions-reductions resulting from these efforts

To accomplish this, web-based software is being developed to model building plans and specifications, as well as verify compliance with and performance above 2006 IECC standards. The software uses the DOE-2 simulation program to provide predictable energy performance based on local climate considerations and design factors. AEGB plans to implement TCV compliance requirements within the Green Building Rating.

Point Values

Points for each green building measure range in value from 1 to 5 and are assigned according to a measure's environmental impact. For example, under SECTION 3: DESIGN, achieving measure 3.01 - "Energy-efficient design allows for a minimum of 600 sq. ft. of living space per ton of cooling" - receives 2 points, whereas implementing measure 3.07 - "No fireplace located within conditioned space" - receives 1 point. The former measure will have a major impact on the energy consumption of the home whereas the latter measure will have a smaller impact. Difficulty of implementation and cost of installation are *not* factors used to determine points.

Additions and Innovations

Although the Rating is fairly comprehensive, it obviously does not include all possible green building measures. We set a limit of three printed pages, so we picked the most common and easiest to assess.

You, the green building professional, may have your own suggestions you'd like to propose for consideration. AEGP welcomes ideas for further measures that may qualify for bonus points. List them in SECTION 12: ADDITIONS AND INNOVATIONS and discuss their potential point value with your AEGB Representative/Rater.

Compliance Verification and Documentation

The following verification and documentation is required:

Completed preliminary Single-Family Rating

Complete Manual J Report

See Manual J Inputs for required Reports.
Manual J accuracy and equipment specifications must be approved by AEGB

Conditional Approval

Rough inspection

Post rough-in mechanical and pre-drywall) by AEGB Representative/Rater

Final inspection

By AEGB Representative/Rater upon substantial completion

Home Performance Testing

Documentation upon substantial completion by approved 3rd party inspector

Other documentation may be required for items that cannot be verified by inspection (e.g. toilet model, shower-head flow rate, construction-waste recycling)

Final Approval

RESOURCES

The Sustainable Building Sourcebook

The Sustainable Building Sourcebook is a supplement to both the Rating and this Guide. See the link in www.austinenergy.com/go/greenbuilding. The Sourcebook provides more detailed explanations for many measures, as well as regulatory information, performance standards, installation guidelines, and sources of assistance, all pertaining to the Austin metropolitan region.

Other

Federal Government
www.eere.energy.gov/buildings

www.energystarhomes.com

http://www.pathnet.org

Building Science

www.eeba.org for the Builder's Guide: Hot Humid Climate and other books

www.fsec.ucf.edu

www.buildingscience.com

www.buildingbetterhomes.com

Other helpful websites

www.globalgreen.org

www.usgbc.org

www.sbicouncil.org

www.gbapgh.org

www.rmi.org

www.cmhc-schl.gc.ca/cmhc

BASIC REQUIREMENTS FOR ALL RATINGS

Rated homes must meet all of the following Basic Requirements to qualify.

1. Energy-efficient home design allows a minimum 500 square feet of living space per ton of cooling capacity as calculated by a correct Manual J, based on actual site orientation, plans and specifications

One year in Central Texas is enough to convince anyone that heat is the main climate problem we have to live with. If a home is appropriately designed for comfort in a hot climate, the mechanical cooling system won't have to work so hard to meet modern comfort expectations and occupants won't be bankrupted by their electric bills. Appropriate design for a hot climate is the responsibility of the architect or designer. Whether the design and specifications actually are appropriate is ascertained by an accurate Manual J calculation.

The Manual J calculation was developed by the Air Conditioning Contractors of America (ACCA) to determine the heating and cooling loads on a home (existing or to-be-built). The loads determine the correct size of the heating and cooling equipment. The calculation must be based on actual design, specifications, and orientation of a project, applicable climate data, and other correct inputs. **It is a code requirement in the State of Texas that heating and cooling equipment be sized in accordance with Manual J.** Note: the Austin Energy Green Building requires that a copy of the detailed Manual J report be submitted with the Rating.

If a home cannot be comfortably cooled with a maximum of one ton of cooling per 500 square feet of net living space (floor area derived from the Manual J), based on an accurate Manual J calculation, the Austin Energy Green Building does not consider it to be an appropriate design for Central Texas and it will not be rated.

In order for a home to be energy-efficient in the central Texas climate, it is critical that the air-conditioning system be "right-sized." The obvious problem with under-sizing cooling equipment is that the system will not maintain the desired temperature in hot weather. Oversized cooling equipment, on the other hand, can cause other severe problems especially equipment short-cycling, which results in increased energy use and uncomfortably high humidity. Moreover, both the installed cost and operating cost are unnecessarily increased with oversized cooling systems.

A number of studies show that residential cooling systems are consistently and drastically oversized, especially when simple "rules of thumb" are used to select equipment. Yet, complaints about uncomfortable rooms and high energy costs are common, regardless of climate or the size of the air conditioning equipment. For example, a room that is too hot (or too cold in the winter) may not be getting enough air to it--even if the system is over-sized--because of poor duct design and construction. On the other hand, a high humidity level in a home located in a humid climate is a good indication that the cooling equipment really is too large.

Another important point to make about oversized cooling units is that they may never reach their predicted operating efficiency, expressed as a SEER (seasonal energy-efficiency ratio) number, before shutting off. For example, an oversized 14.0 SEER unit might never run at more than an 8.0 or 9.0 SEER. (As an analogy, think of city driving versus highway driving). Furthermore, a big burst of energy is required when the unit turns on, so frequent cycling is particularly bad. It wears out the equipment faster as well. **A smaller unit running continuously will operate at a higher efficiency and cost less to run than a larger unit running less often.**

When a home's cooling load is calculated correctly, the **Manual J** method will determine both the sensible load (temperature) and the latent load (humidity) for the home. When the capacity of the cooling equipment matches the sensible and latent loads from this calculation (describing how much a unit dehumidifies in relation to how much it cools), then the proper equipment can be installed to adequately perform both tasks in the most cost-effective manner to provide year-round occupant comfort. Careless selection of equipment can result in a system that is too large or not matched for the load.

Manual J calculations must be performed for each individual home, taking into account the specifics of the building's location, orientation, design, window sizes and placement, exact solar heat gain coefficient and U-value, shading elements, roofing type and color, duct type, and roof/wall/duct insulation, etc. Load calculations must be performed for the entire structure so that the capacity of heating and cooling equipment can be properly specified. In addition, a load calculation needs to be performed for *each room* in the home so that the conditioned air requirements for each room can be determined.

Several software programs are available that perform residential **Manual J** calculations. The following software packages are recommended:

RHVAC by Elite Software (www.elitesoft.com)

Right-J by Wrightsoft Corporation (www.wrightsoft.com)

Manual J Version 8 cautions against oversizing by more than 15%, but the ½ ton increments in equipment capacity can make matching difficult, especially for smaller structures. Careful selection of the condenser and evaporator coil is often required to achieve the closest match possible. The builder needs to verify that the equipment installed matches that specified in the load calculations. Lack of availability at present of half-ton increments for variable-speed equipment also presents a sizing challenge.

NOTE: Inverter controlled systems, like some mini splits, can be of a larger capacity due to their ability to operate at part capacity. This may be necessary for smaller structures.

Note: Production home builders that are building the same home plans in multiple locations using the same building specifications within the same development may perform a Manual J calculation based on the "worst case" orientation for each home plan for purposes of Pre-Approval of their rating for the development. They should be aware, however, that this may result in high humidity and lack of comfort in homes with optimum orientation.

2. Cooling and heating equipment minimum efficiency for split systems

Cooling equipment minimum efficiency: 14.0 SEER for split systems/11.5 EER

Gas furnace rated at ≥ 80 AFUE or Heat Pump rated at ≥ 8.2 HSPF

Every cooling unit is assigned an efficiency rating known as its "seasonal energy-efficiency ratio" (SEER). The SEER is defined as the total cooling output (in British thermal units or Btus) provided by the unit during its normal annual usage period divided by its total energy input (in watt-hours) during the same period. The higher the SEER rating, the more energy efficient the cooling unit is. The current Federal minimum for residential cooling equipment is 13.0 SEER.

Selecting equipment with a higher SEER rating can save energy and money, but only if the equipment was properly sized and installed so as to deliver the rated cooling capacity at the rating SEER rating. Efficiency (and comfort) is more dependent on quality of the installation than on the SEER rating of the equipment.

The efficiency of new gas furnaces is measured by the annual fuel utilization efficiency (AFUE), a measure of seasonal performance. Specifically, AFUE is the ratio of heat output of the furnace compared to the total energy consumed by a furnace. Furnaces today are between 78% AFUE and 96% AFUE. Traditional "power combustion" furnaces are 80-82% AFUE. Above 90% AFUE, a furnace is "condensing," which means it recaptures some of the heat wasted in traditional systems by condensing escaping water vapor. Specify a sealed-combustion furnace, which will bring outside air directly into the burner and exhaust flue gases (combustion products) directly to the outside, so they pose no risk of introducing dangerous combustion gases into the house. In furnaces that are not sealed-combustion units, back-drafting of combustion gases can be a big problem.

In warm climates, heat pumps may be preferable to condensing gas furnaces. Central heat pumps operate much like a central air conditioner except that they can reverse the cycle in the winter to deliver heat to the house. Because heat pumps provide both heating and cooling, they have two efficiency ratings: seasonal energy-efficiency ratio (SEER) for their cooling and heating system performance factor (HSPF). HSPF is calculated by dividing the total annual heating requirements, including all energy inputs, by the total electric power used. New hybrid gas furnace heat pumps combine the comfort of gas heat with the efficiency of a heat pump. Either type of heat pump will operate very energy-efficiently in mild or warm climates.

Other heating and cooling systems also provide high efficiency but may be much more expensive, so the payback savings must be analyzed. Ground-source heat pumps draw heat from the earth and transfer it to the conditioned space. Because temperatures underground are nearly constant year-round (e.g. warmer than the outside air during the winter and cooler than the outside air during the summer), a ground-source heat pump can be much more efficient than an air-source heat pump and appropriate for both warm and cold climates. If not designed properly, with adequate ground space, there could be problems with such a system in Central Texas.

A hydronic or radiant floor heating system is also efficient, especially when combined with a solar water collection system or as a secondary function of a heat pump. In the latter case, water heated by the sun in a roof panel is circulated in tubes between the home's foundation and hard surface flooring. Since heat rises, this installation provides continuous added heat to the home's living space. Although radiant floor heating is very pleasant and effective, it is seldom used in Central Texas because most people want a cooling system as well. That requires a dual system, however, since cold air distributed by a duct system is the only practical cooling system available at present. If you plan to use these or other high efficiency heating and cooling systems, discuss these with your AEGB Representative/Rater for consideration of additional points under Section 12: Additions and Innovations.

3. Window minimum efficiency: $\leq$ 0.35 solar heat gain coefficient (SHGC); $\leq$ 0.55 U-value in Climate Zone 2 (or Zone 3: $\leq$ 0.40 and $\leq$ 0.40)

Window products must be rated, certified, and labeled for both thermal conductance (U-Factor) and solar heat gain (SHGC) in accordance with the procedures of the National Fenestration Rating Council (NFRC) at levels which meet the qualification criteria for the Climate Zone in which the home is located. A product's energy-efficiency for a given climate is based on its impact on heat gain and loss in cold weather and heat gain in warm weather. Windows that are energy efficient in Minnesota will not necessarily be energy efficient in Texas and vice-versa.

Of all the measures of window performance, solar heat transmittance is the most critical in southern climates like Central Texas where cooling loads in the summer are much greater than heating loads in the winter. The SHGC of a glazing material is defined as the ratio of solar radiation transmitted through the material to solar radiation striking the surface of the material at a 90° angle. It includes not only the direct solar heat transmitted through the glazing, but also the solar radiation first absorbed by the glazing and then re-radiated as heat back to the indoors. Typical single-pane glass, for example, has a SHGC of 0.87 meaning that 87% of the solar heat gain falling on the outside surface of the glass is actually transmitted to the inside of the home.

Windows and glazing with a southern low-e coating achieve a SHGC of 0.40 (energy code maximum) or even much lower, as is now common in the Austin area. A special spectrally selective coating, called low-E for low emittance, is applied to one interior surface of a double-pane window. This low-E coating improves thermal performance by retarding the emittance of radiant heat from the pane. ***In warm climates, the coating is applied to the inside surface (air-space side) of the outer pane (Southern type).*** Consequently, radiant heat-flow from the outer to the inner pane is greatly reduced, thereby decreasing heat radiation to the interior of the house. Such windows also provide some help in keeping in winter heat. Low-e coatings also block ultra-violet light, which causes fading in rugs, upholstery, and fabrics.

Southern low-e glazing has played a big role in enabling smaller heating and cooling equipment to provide comfort and lowering energy bills. It also allows for shorter duct-runs (it is now seldom necessary to place supply registers at exterior walls), thus reducing many problems with ducts, such as leakage and friction losses.

4. Wall insulation: Energy Star Grade I installation; OR batts + insulative exterior sheathing with R-value of ≥ 2.0, taped at seams; OR "total fill" type (e.g. blown cellulose, BIBs, spray foam, SIPs)
Note: the first alternative is required for SMART Housing Rating

Insulation is installed to slow the transfer of heat. An insulation system works effectively only when it is uncompromised by air leaks. To be considered "Grade I the insulation may have voids and gaps no greater than 2% voids and may not be compressed in the cavities. It is extremely difficult to install batt insulation without gaps or crushes between the batts and studs or around electrical and plumbing boxes, fixtures and lines.

As an alternative, rigid foam board sheathing, having an R-value of at least R-3 can be added to the exterior of the wall to supplement a less than Grade I installation. Spray or blown-in insulation systems can also be used to completely fill such spaces. Spray-in or "total fill" insulation products, such as damp-blown cellulose, BIBs (blown-in-blanket system), and sprayed polyurethane foam provide a more complete insulation system than batt insulation.

5. Floor insulation over ambient or unconditioned space: ≥ R-13 with air barrier

Floors over crawl spaces, garages or other unconditioned spaces must be insulated to the above standard. For insulation to be effective it must be encased on six sides by an air barrier. The subfloor of the floor above the unconditioned space and, in the case of a garage, the ceiling drywall, act as air barriers, as do the floor joists and rim bands, thus creating the required enclosure of the insulation.

Since the cavity depth between the subfloor and the drywall can be significantly greater than the thickness of R-13 insulation (which is typically 3 ½ inches thick), the entire cavity depth will not be filled, however. The insulation must be installed so that it touches the air barrier in order to effectively reduce heat loss. For floors over unconditioned space, the insulation must touch the underside of the subfloor. Unless great care is taken during installation, floor insulation tends to sag over time and pull away from the subfloor, which negates its insulating benefits. Therefore, it is necessary to provide support within the cavity, at a maximum spacing of 24" on center, to maintain the contact between the insulation and the subfloor.

6. Blocking for grab bar installed in all showers and tub-shower combinations

At any time in life, a home occupant may need the added safety of grab bars in showers and tubs. It's just common sense to install blocking for grab bars during the framing stage, so sturdy bars can easily be added to a home when the need arises. The following describes blocking requirements:

a. Lateral two-inch by 6-inch or larger nominal wood blocking must be installed flush with stud edges of bathroom walls within the tub +/or shower space.

b. The centerline of the blocking must be 34 inches from and parallel to the interior floor level.

Note that if you are building in the City of Austin S.M.A.R.T. Housing Program, this blocking requirement applies to the entire bathroom, except behind the lavatory. (See 3.21 for City of Austin Visitability Ordinance.)

7. Gas water heater minimum efficiency (EF):

40 gallon ≥ 0.61; 50 gallon ≥ 0.59; 60 gallon ≥ 0.57; 80 gallon ≥ 0.53; Tankless ≥ 0.80
Or WH is solar thermal: Or if no gas available in right-of-way, electric WH meets current Austin code requirements

Water heating is the second largest energy expense in the average home, typically accounting for between 15 and 20% of the total energy used. In 2004, the U.S. Department of Energy adopted minimum efficiency standards for residential gas water heaters, with energy factors ranging from 0.61 for smaller (30 gallon) storage heaters and 0.58 for larger ones.

The energy factor, or EF, represents the amount of energy that goes to actually heating the water. For example, 40% of the gas consumed by a water heater with an EF of .60 is wasted. The most efficient conventional gas-fired storage water heaters have EFs ranging from 0.60 to 0.65 (depending on their capacity), with condensing storage water heaters having EFs above 0.90. Many demand (tankless) water heaters have an EF of .80 or higher. Note that large water heaters have large stand-by losses and low efficiencies and are not rated. For energy factors, see the GAMA (Gas Appliance Manufacturers Association) Directory: www.gamanet.org.

When calculating the capacity needed to serve new construction or a remodel, do not rely upon the gallon capacity of the storage tank. Instead, select capacity based on the first hour rating, which is a factor of storage volume and burner output, and the hour of the day when hot water use will be the highest. Many 40 gallon heaters have a first hour rating of 75 to 80 gallons – these often have the highest EF as well. Most homes with low-flow plumbing fixtures and water-efficient appliances are easily served with a 40 gallon – or smaller - heater.

8. No unvented gas logs/fireplaces installed

It is not safe practice to install unvented gas logs, fireplaces or heaters in living spaces. They should not be legal. Today's houses are being built much tighter than in the past, for comfort and energy-efficiency. As a result, concerns about healthy indoor air quality are becoming more important. In trying to keep indoor air healthy, unvented gas logs, fireplaces, and heaters must be avoided in new homes.

The recent popularity of unvented gas logs in fireplaces has led to questions about their safety due to the potentially harmful combustion gases created by a large gas appliance burning inside the house without any venting. Field experience has indicated that a lack of venting introduces carbon monoxide, carbon dioxide, nitrous oxides, sulfur dioxide, water vapor and other undesirable combustion products, while reducing oxygen in the home—all a recipe for illness and even death.

9. Exhaust fans venting to outside for cooktop/stove/microwave and baths with a tub or shower

Better construction practices result in tighter homes with significantly reduced air infiltration. Unlike commercial buildings, residential fresh air ventilation is rarely automated and is primarily the responsibility of the occupants. With new construction being relatively air-tight, natural ventilation through windows, along with intermittently operated kitchen and bathroom exhaust fans, are important sources of outside air.

Control of indoor humidity levels is also important. In Austin, relative indoor humidity levels often rise above 60%. At that point, molds and mildew grow, severely impairing indoor environmental quality (IEQ). Odors and unhealthy fumes from cooking also reduce IEQ. Point-source removal of fumes and humidity by exhaust fans vented to the outside (not just to the attic space) removes these potential contaminants. It is important that the occupants be educated about the use of these systems to achieve adequate ventilation

The recommended ventilation rate for a bathroom is in the range of 8-12.0 ACH (air changes per hour). The exhaust of air should continue for at least 20 minutes after use. To calculate the cubic feet of air per minute required to provide this, divide the cubic feet total of the room by five (LxWxH/5=CFM). For example, if the bath is 8'x11' with a ceiling height of 9', 159 CFM is needed. Note: this is a minimum CFM.

Fans for ranges or cooktops should be appropriately sized. Fans with a capacity exceeding 200 CFM can depressurize a home, leading to uncontrolled infiltration and potential backdrafting of fireplaces and combustion appliances. Larger capacity fans should be avoided. If installed, they should have some provision for introducing make-up air into the home.

10. Ceiling fans: minimum of 2 installed within heated and cooled space

Ceiling fans provide an easy, inexpensive mechanism for achieving comfort in a home. People feel cooler when there is air moving rapidly over their skin (wind chill effect). Use of a ceiling fan can allow occupants to set their thermostats four or five degrees higher, yet still be comfortable.

A ceiling fan doesn't change the air temperature--it simply makes occupants feel cooler by moving air over the skin—but that's what matters for comfort. Consequently, ceiling fans should only be used when the room is occupied. They can also be used to facilitate the movement of warm air in the home during the heating season by inhibiting air-stratification. In winter, fans should be set at low speed to avoid creating draft, but still push warm air down from the ceiling to occupant level.

Ceiling fan/light combination units that have earned the ENERGY STAR label are about 50% more efficient than conventional fan/light units. Reversible, variable-speed ceiling fans provide the best option for use during both the cooling and heating seasons. Most residential ceiling fans (and all ENERGY STAR qualified fans) feature the ability to reverse the motor and airflow direction, allowing one to operate the fan year-round. In addition, look also for fans (such as the Hampton Bay "Windward" fan) with advanced blade design and fluorescent lights for more air movement and cooler light to reduce unwanted heat gain.

11. A minimum of 75% of all lamps/bulbs are Energy Star-compliant

At present, most such lamps (the technical term for bulb) are fluorescent. Fluorescent lamps have many advantages over incandescent lamps/bulbs:

- Last up to ten times longer per lamp (especially handy in hard-to-reach fixtures)
- Give off the same amount of light for one-fourth of the kilowatts used — an 18-watt fluorescent is about equal to a 75-watt incandescent
- Generate almost no heat, so the cooling system doesn't have to work longer to compensate

You may have had a low opinion of fluorescent lighting in the past (unpleasant color, slow to light, flicker, noisy), but you don't need to any more. Fluorescent lights now come in just about any color tone you could want (both color temperature and color rendering, affecting the look of the light and how it makes things look), and they have electronic ballasts which insure that they start up quickly and have no flicker or buzz.

Lighting companies that cater to commercial customers typically have a large selection of higher-quality lamps--in regard to longevity, color temperature and color rendering, size, shape and style--than do most home lighting companies.

Note: fluorescent light *fixtures* are preferable to standard fixtures, since they have separate ballasts. If there is a failure of the ballast or lamp, they can be replaced individually, which saves money. Such fixtures are widely available for modest prices.

12. Low-VOC (volatile organic compound) interior wall and ceiling paint: VOC level of 100 grams per liter or less, or is CoA recycled paint

Volatile organic chemicals (VOCs) are emitted as gases from certain solids or liquids. VOCs include a variety of chemicals, some of which may have short- and long-term adverse health effects. Concentrations of many VOCs are consistently higher indoors (up to ten times higher) than outdoors. VOCs are emitted by a wide array of products found in homes including: paints and lacquers, paint strippers, cleaning supplies, building materials and furnishings, glues and adhesives, permanent markers, and photographic solutions. All of these products can release organic compounds while you are using them, and, to some degree, when they are stored.

U.S. EPA studies found levels of about a dozen common organic pollutants to be 2 to 5 times higher inside homes than outside, regardless of whether the homes were located in rural or highly industrial areas. Additional studies indicate that while people are using products containing organic chemicals, they can expose themselves and others to very high pollutant levels, and elevated concentrations can persist in the air long after the activity is completed.

Most household paints contain VOCs that easily evaporate when exposed to air. This evaporation continues for a long time, even after the paint is dry. This process is known as *out-gassing and* may cause a variety of health problems, including irritation of the eyes, nose, throat and upper respiratory system, and a weakened immune system. Many of these chemicals also contribute to problems of regional low-level smog and to the global greenhouse effect. The lower paint's VOC level, the less threatening it is to people's health.

Note that oil-based paints have greater out-gassing than latex at the time of painting, but typically cure more quickly than latex paints, which may out-gas for many months, particularly in warm, humid weather. Be aware that paint labels do not always give you the information you need. Some may say "Low-VOC", but have higher levels than this standard. Some labels state only a maximum. In that case, the actual amount is typically much lower. An inquiry with the manufacturer for accurate information may be required.

For more information see the EPA's webpage about indoor air quality and organic chemical gases: www.epa.gov/iaq/voc.html

13. Minimum of 2 toilets selected from current Austin Water Conservation Program Rebate list

As a result of toilet research over the last few years, new, more effective designs are being developed. Toilets on the City of Austin Water Conservation list are selected for both good flushing performance and water conservation over time.

The toilets on the rebate list were selected because they meet two criteria. First, they have very good flushing performance. Second, for gravity toilets, they do not use more than two gallons per flush, no matter which replacement flapper is used. Many toilets use an early-closure flapper, which if replaced with a standard flapper, use 3-4 gallons per flush.

Only the styles listed for each toilet (round, elongated, ADA) meet this requirement. Other styles may be available for the same model of toilet, but do not meet the eligibility requirements for performance and water-savings.

The criteria to select the models listed above were based on three studies:

- "Maximum Performance (MaP) Testing of Popular Toilet Models", Veritec Consulting and Koeller and Company;
- Consumer Reports, October 2002;
- "Water Closet Performance Testing" prepared by the National Association of Home Builders Research Center, September 2002, as well as test results for individual models from Veritec.

Check to see if a rebate applies to the job—whether new construction or replacement.

14. Planting beds have at least 6" of soil containing 25% compost (e.g. Dillo Dirt™) and minimum depth of 2" organic mulch

Deep, nutrient-rich soil is the key to healthy plants. Such soil retains moisture well. It acts like a bucket holding water--the deeper the bucket, the more water is stored. Plant roots are able to reach down into the soil depths and use the water stored there. Shallow soil results in plants with shallow root structures. That results in less healthy, less drought-tolerant plants.

Besides adding nutrients, the compost breaks up clay particles and makes the soil friable or crumbly, so plants can develop more easily. Compost and composted-sludge products, such as Austin's own Dillo Dirt™ (see below), are excellent nutrient-rich soil additives. Such products release nutrients slowly, reducing the need for fertilizing and minimizing the risk of fertilizer washing out and becoming a source of pollution.

"Dillo Dirt™" is a compost made by the City of Austin since 1989. If you know Austin, you will not be surprised to learn that it was the first program of its kind in the state and one of the oldest in the nation. All yard trimmings collected curbside across the City as well as some of our treated sewage sludge are combined and composted to create Dillo Dirt™. The heat generated in composting (130 to 170 degrees Fahrenheit) is sufficient to eliminate human and plant pathogens. After active composting for over a month, this compost is "cured" for several months, then screened to produce finished Dillo Dirt™.

Dillo Dirt™ easily meets all Texas and EPA requirements for "unrestricted" use, which even includes vegetable gardens, if you desire. Like many other composts, Dillo Dirt™ has many benefits to the soil and plants. Composts add to the organic matter in the soil, reducing the need for watering. Organic matter feeds the microbes in the soil as well as plants, fostering a healthier environment. Dillo Dirt™ is made from totally recycled materials, and this recycling is less expensive to citizens than landfilling these materials. For more information and a list of current suppliers of Dillo Dirt visit www.ci.austin.tx.us/water/dillo.htm. Note that treated sludge in some other parts of the country may not meet the same safety standards.

Saving soil moisture is an important use of mulch in Central Texas. A mulch layer on the soil surface allows the soil to soak up more water.

Mulches help plants by gradually increasing soil fertility. Organic mulches enrich the soil as they decay and provide a better environment for plant growth. Organic mulch such as straw or leaves can be turned under the soil at the end of the season. This helps build the soil's nutrient content. Mulch should be turned under as soon as the gardening season is over so it breaks down before the garden is replanted. Soils high in organic matter are easier to till and better suited to vegetable gardening.

Most mulches also provide excellent weed control. Mulches do not prevent weed seeds from sprouting. However, weed seedling emergence is blocked by a mulch layer thick enough to exclude light. A 3-inch layer of mulch on the soil surface keeps most annual weed seedlings from coming through. Weeds that do manage to break through are removed more easily from mulched soil. Hard-to-control weeds such as nutgrass and johnsongrass may come through the mulch layer but can be pulled more easily or covered by fluffing the mulch with a fork.

Non-plant-based mulches, such as gravel, are not recommended for this area because they retain and reflect a lot of heat.

In summary, mulching helps retain moisture in the soil, keep roots cool, slows weed growth, and reduces erosion. The result is a reduced need for watering, weeding and replacement planting. For sloped areas, mulching (especially shredded types) helps prevent runoff. Mulch needs to be reapplied as it decomposes and is best obtained from regionally derived materials, such as cedar, pecan hulls, pine needles, straw, wood chips, etc.

15. A minimum of 90% of new plants from current *Grow Green* plant list [≥7 plants minimum]

Plants appropriate for Austin's climate conditions are now readily available at most Austin nurseries.

Some people move to Austin and try to surround themselves with plants they are familiar with from their past homes. These plants are often poorly suited to our climate and soils. By choosing native and adapted plants, a person becomes more knowledgeable about, more aware of, and more connected to the land of Central Texas.

The plants on the City of Austin GrowGreen plant list do well in Central Texas conditions. Once established, they can save time and money, since they require very little care, water, fertilizer and pest control. Our native landscape is the inspiration for this guide to earthwise plant choices for Austin area gardens. The Grow Green plant list was created to help people select beautiful native and adapted plants which are naturally drought tolerant and resistant to pests and diseases. The less watering, fertilizing, and chemical control required in a yard, the more the home occupant contributes to the conservation and preservation of our precious water resources - our streams, lakes, and aquifers.

For more information:

Grow Green Plant List: www.ci.austin.tx.us/growgreen

16. Current City of Austin IRC, IECC Codes, and Amendments must be met, regardless of project location (including complete air barrier and restrictions on electric water heaters). Some elements of code may not apply to renovations but duct testing is required for all Ratings.

The State of Texas has adopted both the International Residential Code (IRC) and the International Energy Conservation Code 2001 (IECC) for all municipalities in the state. The City of Austin has added several additional amendments to these codes. These standards apply to all Austin Energy Green Building-rated homes, regardless of whether they are located within the City of Austin.

http://www.ci.austin.tx.us/development/downloads/2006_energy_code.pdf

SECTION 1: PLANNING PROCESS

1.01 AEGB *Green by Design* workshop attended by homeowner before completion of design phase

When people have a good understanding of what green building is all about *before* purchasing a lot or planning a new home or remodeling an existing one, they make smarter choices and get better results—greater comfort and convenience, lower utility bills, better durability and less maintenance, better health, higher resale value, and reduced environmental impact.

At the *Green by Design* workshop, attendees learn that a good home is the result of teamwork among all the people responsible for designing, building and operating it. They learn that a good home must be designed for the conditions it will "live" in, both the macro-conditions of its region and the micro-conditions of its site. They learn that a house is a system - its site, materials and products, methods of construction, mechanical systems, and occupant behavior all interact together for success or failure. The goal of the workshop is to show people how to design, construct, and operate better homes that will provide the most long-term benefits to the owners, their neighborhood, and their community.

1.02 AEGB *Green by Design* workshop attended by current designer staff +/or builder staff

Although not meant to be an in-depth technical seminar, *Green by Design* nevertheless offers building professionals a helpful overview as well, and lets them know what homeowners are learning about green building.

1.03 Documented design team meetings held in design/planning stage of project (including the designer, builder, and mechanical contractor)

The importance of a team approach to the design and construction of a green home cannot be over-emphasized. It is the basis of green building. Through the sharing of expertise, better decisions are made, costs are reduced, and the design and building process goes more smoothly.

The designer, builder, engineers, mechanical, and other relevant building professionals (as well as the homeowner if the home is custom-designed and built), all need to be working together to ensure that green measures will be incorporated into the design, building, and operation of the home. Having both a designer/architect and builder/contractor who have previous experience in constructing green-rated homes will greatly facilitate the implementation of the green building measures described in this Guide.

Green building begins with design. The designer/architect needs to understand and develop green building goals before starting the design process, so they are an integral part of decisions about aesthetics and function. The most important elements of green building are design issues and cannot be simply tacked on later in the construction process. The designer/architect needs to work in conjunction with other participants of the design and construction team to ensure that all parts and systems will work together to fulfill the green goals.

Green designs must be properly implemented during the construction process. If the builder/contractor understands the green goals of the project, then the reasons for related design and construction choices will be clear and the every-day decisions that the builder must make on the job site will be compatible. Execution of the construction work will be easier and less costly than working with a contractor who is not familiar with the Rating. Coordination with trade contractors, especially the mechanical contractor, is also critical to the success of the project.

SECTION 2: SITE SELECTION

2.01 Lot size is less than 5,750 sq.ft.

A small lot may appear to pose design problems and constraints but it can encourage (if not force) one to design and construct a space-efficient, or not-so-big, home. (See 4.02 below.) Building on a small lot also increases density, thereby decreasing the need for sprawling new development and supporting infrastructure. Increased density typically reduces automobile use and resulting pollution, since jobs, mass-transit, "life-support" businesses, and recreational facilities are more likely to be located close by. Moreover, the cost of development infrastructure increases as lot size increases. (See 2.02 below.) Depending on zoning ordinances, there are several neighborhoods in the City of Austin that allow lot sizes between 3,600 and 5,750 sq. ft.

2.02 Street, electricity, water, wastewater have been in place for a minimum of 25 years

As developable land in central urban areas becomes more scarce and costly and may require clean-up, developers usually purchase land surrounding existing development. Consequently, infrastructure is being extended to support development that is further and further from existing sewer facilities, water supplies, roads, and electricity. In situations where state and local governments provide these services, this growth can ultimately cost taxpayers more money than the residential development provided to the city or town in return for its investment.

Several factors regarding a development's form are relevant. When other variables are held constant, the cost of extending infrastructure *increases* as:

- The distance to established service centers increases;
- Lots become more widely dispersed;
- Lot size typically increases.

Building in areas where the infrastructure for development--streets, electricity, water and wastewater--have been in place for at least 20 years reduces environmental damage caused by urban sprawl. Homes using existing infrastructure place less demand on city services, which are paid for by all taxpayers and utility ratepayers. Because existing developments are usually closer to shopping and job centers, building in these neighborhoods also minimizes impacts by reducing automobile miles traveled each day.

2.03 Public transit stop is within a ¼ mile walk

2.04 Food store is within a ½ mile walk

2.05 Public hike and bike trail, green belt, or park is within a ½ mile walk

Building homes within close proximity to public transit stops, retail establishments such as a corner grocery store, and green belts or parks gives homeowners an easy opportunity to travel short distances without needing to drive their personal car. Using public transit eliminates pollution caused by automobiles and eliminates the stress of driving. In some cases, it may eliminate the need for the homebuyer to have a second automobile. After a day of working or commuting in rush-hour traffic, many people would consider it a great convenience to be able to walk to the market instead of getting back into their automobiles and driving miles to a shopping area.

In addition, homebuyers today are looking for neighborhood amenities, such as a trail, green belt, or park. Such an amenity can raise the quality of the buyer's life and increase the value of the home significantly. A recreational area provides a place for people to get out in the fresh air, exercise, walk the dog, and meet neighbors. This can help create a neighborly community and a safe place for children to live.

SECTION 3: DESIGN

3.01 Energy efficient design allows for a minimum of 600 sq. ft. of living space per ton of cooling capacity if home is 1500 sq. ft. or larger (for smaller homes: square footage per ton must be approved by AEGB for these points if 600 sq. ft. is not met)

3.02 OR Home design allows for a minimum of 700 sq. ft. of living space per ton of cooling capacity

3.03 OR Home design allows for a minimum of 800 sq. ft. of living space per ton of cooling capacity

The amount of square feet of living space that can be properly cooled per ton of cooling is a good indicator of a home's energy-efficiency. If a home cannot be adequately cooled with one ton of cooling for every 600 square feet or more of living space, then the home is not appropriately designed for the central Texas climate (or the Manual J calculation was incorrect).

Reaching this standard does not require unusual design or specifications, since current building and energy codes, correctly applied, and home-performance testing result in quite energy-efficient homes. Cooling capacity (expressed in tons of AC) must be adjusted according to these changes.

Over-sized units will run for a short amount of time to reach the thermostat set-temperature. This results in frequent on-off cycling and insufficient run-time, which have many bad effects:

- The unit uses an increased amount of electricity to start up;
- Frequent starts cause the unit to wear out faster;
- The unit never reaches the efficiency for which it was designed (e.g. a 13.0 SEER unit may operate at only about an 8.0 SEER efficiency—it's like town driving instead of highway driving);
- The unit runs too briefly for adequate dehumidification to occur, since it typically takes at least ten minutes of run-time for the coil to get cold enough to start dehumidifying. Dehumidification can only occur while the unit is running. An over-sized unit results in conditions that are cold and clammy.

With a system that properly cools 600 sq. ft. per ton, the homebuyer will have a system that is *less expensive to purchase and operate* and, more importantly for comfort, one that will *dehumidify much better* than an over-sized one.

NOTE: Because of the difficulty in matching equipment to smaller structures, Austin Energy Green Building may make exceptions to this requirement on a case-by-case basis. However, the goal will always be to match the equipment capacity to the load. Inverter controlled systems, like some mini splits, can be of a larger capacity due to their ability to operate at part capacity.

3.04 Indoor heating and cooling equipment is located within the thermal envelope (i.e. insulated space), OR home has no interior H+C equipment

Typically in southern climates, the indoor components of heating and cooling systems (air handler and ducts) are placed in an unconditioned, vented attic. If insulation is installed at the floor of the attic, then these components are located in an unconditioned space outside the home's thermal envelope or insulation barrier. One reason for locating equipment in an attic is to retain every square foot of floor area for living space. Another reason is for access to the equipment. However, locating mechanical equipment outside of the thermal envelope is extremely detrimental to energy-efficiency.

Placing indoor heating and cooling equipment within the thermal envelope of the home substantially increases the energy-efficiency of the system. In summer, unsealed attics in southern climates regularly reach temperatures of over 140 degrees, so obviously that's a poor environment for ducts filled with cold air. Equally, it makes no sense in winter, either.

3.05 All ductwork is located within the thermal enclosure/envelope OR home has no ductwork

According to code, ductwork installed in unconditioned spaces in all new homes must be insulated with R-8 insulation. This amount of insulation is not sufficient, however, to totally protect the cold air in the ducts from heat gain in hot attics that regularly reach temperatures of over 140 degrees in summer (reverse in winter). Moreover, ducts often leak a large volume of conditioned air, leading to problems with air distribution, operating cost, and health issues.

For optimum performance, air distribution components of an cooling system should be located within the conditioned space. Placing the HVAC ductwork within the thermal envelope of the home substantially increases the efficiency of the system. Here are some ways to get ductwork within the thermal envelope:

- Insulate the attic at the roof deck with polyurethane spray foam;
- Provide roof-trusses with insulated chases;
- Drop ceiling areas (e.g. hallways) to provide a duct chase;
- Construct furred-downs/outs/ups for chases in locations where they will not be odd or unattractive (e.g. in closets, utility rooms);
- Run ducts between the floor joists of multi-story homes;
- Install exposed ducts in the living space (more aesthetically acceptable in some designs than others).

Most of the measures listed above must be considered during the design phase. Interior duct chases, ceiling furr-downs, and openings in floor and roof trusses must be indicated in construction drawings and specifications.

Ductwork is inherently problematic. Heating and cooling systems that do not require ductwork (such as mini-splits) avoid these problems.

3.06 All water heaters in 1-story home are located within 20 piped feet of appliances and/or fixtures they serve; 30 piped feet for 2-story

Limiting hot water supply runs can reduce both energy and water use by reducing the time that it takes for hot water to reach points of use. The length of plumbing runs is generally determined by the design of a residence, both in its shape and size, as well as the location of appliances and bathroom/kitchen fixtures. When hot water is drawn into the household plumbing and allowed to cool, the loss of the energy used to heat the water is called "standby loss." (Storage tank water heaters also incur standby losses, especially when storage capacity exceeds household needs.) The longer the length of pipe to reach a faucet, the greater the standby losses will be and the more water will be wasted while the user waits for hot water to arrive.

Short runs for hot-water supply reduce the amount of pipe or tubing to connect appliances and fixtures to the water heater and can also reduce labor. In larger or spread-out houses, it may be necessary to have two water heaters to reduce standby losses. Another solution (where appropriate) is to use smaller diameter pipe, which further reduces standby losses.

3.07 No fireplace within conditioned space

Most modern fireplaces are not designed to provide heat: their main purpose is aesthetic value. In fact, most models tend to make a house less energy efficient.

3.08 Covered, usable front porch (minimum: side 6', minimum area 100 sf)

3.09 Covered, usable porch other than front porch (minimum: side 6', minimum area 100 sq. ft.)

A usable, covered front porch helps anchor a home to its site and makes a transition from public space to private space. It promotes interaction with neighbors and increases neighborhood security and sense of community. It provides weather protection at the entry door and a comfortable extension of living space, usable most of the year in the Central Texas climate.

Creating outdoor living spaces can extend the livable area of a home. We take it for granted that our homes are divided into rooms, but the concept of having similar "outdoor living spaces" doesn't as easily occur to us. Yet the more conscious we become of outdoor living spaces, the more we can tailor them to suit various seasonal activities. For example, outdoor cooking during the summer eliminates heat gain and moisture generation from inside the home.

In addition to creating more living space, covered outdoor spaces provide cooling shade and weather protection to the walls and windows of a home. Shading the walls, especially the east or west walls, will reduce heat build-up in the home, making it more comfortable to live in and reducing energy costs. Covered east and west outdoor areas can also allow more windows to be placed on those walls without the heat gain that would normally result from such window placement. This can be especially important if there is a desirable view to the east or west.

3.10 All roof overhangs project a minimum of 24" horizontally

Appropriately sized roof overhangs have two major functions: they block unwanted, hot summer sun from heating a home and they help protect the home from moisture damage caused by precipitation. Due to the seasonal changes in the sun's path, properly sized overhangs can block direct summer sunlight from entering windows and allow heat gain through windows from winter sunlight. Overhangs can also enhance a home's visual appeal by emphasizing the sheltering roof. The benefits are greater comfort, lower energy bills, and reduced maintenance problems and costs.

Ideally, roof overhangs should be sized according to the direction they face, since each direction gets a different amount of sun. Since that is not usually practical, however, at Austin's latitude, a 24" wide overhang will shade most south-facing glazing (typically all of a one-story or top story of a multi-story home) during the midday hours of summer. It will provide reasonable rain protection as well. While gable roofs provide full shading of windows on just two exposures, hip roofs will provide shading and weather protection on all four exposures.

3.11 Overhang projection factor for all windows facing east and west is > 0.5

Shading windows in the summer to prevent excessive solar gain can greatly reduce overheating of a house and cut cooling bills. Overhangs are not as effective on east or west facing windows because, when the sun is low in the east in the morning and low in the west in the afternoon, shallow overhangs provide no protection. Deeper overhangs are necessary in order to provide some protection, and porches, especially on the west side, will give the most benefit.

The projection factor is calculated by dividing the depth of the overhang by the distance from the bottom of the window to the bottom of the overhang. So, a 2 foot overhang over a 3' wide x 5' tall window, where the top of the window is 1' below the bottom of the overhang, would be calculated as follows:

2' overhang divided by (5' high window + 1' height from top of window to bottom of overhang) = 2/6 = 0.33

In the above example, the project factor does not meet the requirement for points. If the overhang was increased to a 3' depth, then 3/6 = 0.5, which would qualify for the points. Of course, a 6' or deeper porch would provide the best shading for the window.

3.12 Windows designed for daylighting (e.g. high windows not requiring privacy treatment)

While good lighting design and efficient fixtures and lamps help reduce energy consumption in a home, good daylighting can sharply reduce consumption during daylight hours. Furthermore, natural daylight creates healthier environments by improving occupant mental well-being. When properly designed, transom windows, clerestories, and dormers can provide a large portion of lighting needs without undesirable heat gain or glare. To be counted for these points, windows must be located high on exterior walls so window treatments are not required for shading or privacy. A home designed with adequate overhang projects and the use of awnings or other shading devices can significantly reduce or negate heat gains while allowing natural sunlight to penetrate a room. Sunlight itself actually carries less heat than is produced by incandescent lamps. This can result in smaller sensible-cooling loads and may allow the downsizing of cooling systems, reducing the initial cost of equipment. Properly designed daylighting strategies can reduce both lighting and cooling energy and control glare.

3.13 Designed, effective cross-ventilation in main living areas

3.14 Designed, effective stack ventilation (e.g. operable cupola, clerestory exhaust)

In Central Texas, natural ventilation plays an important role in maintaining comfort, providing fresh air, and reducing the need for mechanical cooling, especially on days when the relative humidity is low.

Natural ventilation relies on air pressure differences to move fresh air through buildings. Air pressure differences can be caused by wind or the buoyancy-effect created by differences in temperature or humidity. Both cross-ventilation - air flow horizontally through the home - and stack-effect ventilation - buoyant, upward movement of air - should be considered while designing the home, taking into consideration that the summer prevailing breezes come from the south or southeast off the Gulf of Mexico. The amount of ventilation will depend on the size and placement of openings in the home, giving equal consideration to supply and exhaust. Open floor plans, as well as openings between rooms, should also be considered to provide a continuous airflow path through a home.

Cross ventilation

These points will be given if the main living area of the home (living, dining, family room) allow air to move through it even if the door is closed. This requires an operable window on more than one wall.

Cross ventilation is induced by wind pressure. Wind causes a positive pressure on the windward side and a negative pressure on the leeward side of a home. To equalize pressure, fresh air will enter any windward opening and be exhausted from any leeward opening. An open floor plan facilitates air movement. Major living spaces and rooms should be designed with openings in opposite walls whenever possible. Corner rooms should have windows on both exterior walls whenever possible. In addition, installing operable transoms above interior doors is a good way to facilitate air movement through rooms that frequently have closed doors.

Window styles play a role in enhancing cross ventilation. Casement windows provide the largest opening area and a right or left opening can be selected for a given room to best direct air into or out of a room. Furthermore, casements seal more tightly than other window styles. Awning windows can be left open during light rain (if the wind is low). Double-hung windows, which open at both the bottom and the top, increase ventilation as well.

Sometimes wind flows at an acute angle or parallel to a wall rather than perpendicular to it. In this case, it is still possible to induce wind ventilation by architectural features or by the direction a casement window opens. For example, if the wind blows from southeast to northwest along an east-facing wall, the first window (closer to the south) would have hinges on the right-hand side opening toward the wind to the south acting as a scoop and directing air under positive pressure into the room. The second window (closer to the north) would hinge on the left-hand side opening down-wind to the north, allowing air under negative pressure to draw air out of the room.

Stack-effect ventilation can occur when no breeze is available since it relies on convection--the fact that hot air rises. It requires the design of a high vertical architectural component such as a stairwell, cupola, monitor, or clerestory, with high operable windows or other exhaust vents. Outside air enters through lower windows, heats up inside the house, rises to the top and exits out operable windows or vents at the top. The greater the distance between the intake and the exhaust, the greater the temperature differential that can be created, the faster the air will move (like a fireplace chimney), and the greater the cooling effect. This will be especially useful in the spring and fall of the year, when cooling may not be required.

In summary, a home can be designed to take advantage of either cross ventilation, stack ventilation, or both. Orientation of the home toward prevailing breezes, layout of interior spaces, and window style, size and placement and/or a thermal-chimney should be carefully designed and constructed to maximize passive cooling by ventilation. For ventilation to work, windows and vents need to be operated properly both seasonally and daily. In Central Texas, spring and fall are the best times of year to utilize natural ventilation, unless the relative humidity of outdoor air is unpleasantly high.

3.15 Shading on east and west walls of living space for at least 50% of wall area (e.g., covered porch, pergola, trees)

Shading the east and west walls of a house is an effective way to lower cooling costs and increase comfort, since one or the other of these walls is always in the sun's path. The solar heat gain is transmitted rapidly through the windows and slowly through the exterior walls, gradually passing through even well insulated structures into the living space. Heat transfer through the walls continues during the night.

Properly situated new or existing trees or architectural features such as a pergola or trellis can shade the east and west walls of a home and significantly reduce cooling loads. Trees are particularly helpful, not only because they provide shade, but because they also create an area of cooler air around the house, due to transpiration of moisture from the foliage.

3.16 Total glazing area is no greater than 18% of conditioned floor area

In hot, humid climates, a good thermal envelope helps slow down heat transfer from outside to inside. The R-value of even minimally insulated walls and ceilings always provides better thermal protection than any window or skylight available on the market, however. Windows and skylights are in essence "holes" in the thermal envelope. For that reason, it helps reduce energy costs to reduce window area.

Since many inefficiently designed homes have unnecessary wall projections and changes in walls that can adversely skew the window-to-wall ratio, a better gauge of an acceptable glazing area is the percentage of total window and skylight area to total conditioned floor area.

3.17 Glazing on east and west walls combined does not exceed 25% of total glazing area; glazing on west wall does not exceed 10% of west wall and glazing on east wall does not exceed 10% of east wall

Window sizing and placement are usually the main determinant of a home's cooling costs. It is extremely difficult to protect glazing on east and west walls from the sun's heat, since it is always in the sun's path. Adding an unshaded 6' sliding glass/patio door to the west side of a home can increase the cooling load by almost half a ton.

Reducing glazing area on east and west walls is one of the most effective ways to increase comfort and reduce utility bills. A good design guideline is to limit glass on these walls to no more than 25% of the total glazing area and to allow no more than 20% of an east and west wall area to be glazing.

Following this recommendation, most windows will be placed on the north and south sides of a home. Windows on the north provide very good light quality (the kind artists like) and will not contribute significantly to heat gain in the summer. (Some heat gain due to diffuse or reflected solar input will occur.) North-facing windows are not a problem in Central Texas, except on very wind-swept sites. Windows on the south reduce utility bills in both winter and summer, due to the changing sun path: in winter the low sun helps heat the home and in summer the high sun is easily kept from shining on the windows with small overhangs and other shading devices.

3.18 No skylights into conditioned space (solar tubes are acceptable)

In Central Texas, having a skylight in a house is much like punching a hole in the roof and letting the sun's heat pour in. Although skylights add light to dark interiors, that light comes at the cost of increased cooling bills and lowered comfort. They also are potential leak points in the roof during our torrential rains. In winter, they contribute to heat loss.

There are better ways to get light into the interior of a home without a lot of heat gain - for example, light tubes or windows placed high on vertical walls, well protected by overhangs.

3.19 Garage is detached from the house; or house has no garage

OR 3.20 Attached garage has exhaust fan with timer; or passive roof vent with supply intake vent openings are installed a minimum of 18" above finish floor

A vehicle exhausts fumes that are dangerous and easily trapped in a garage. Even after it is turned off, fumes are emitted until the engine is cool. If the garage is attached to the house, fumes easily migrate into living space and ductwork, endangering the health and safety of occupants. An exhaust fan on an automatic timer exhausts these fumes to the outdoors. A passive roof vent with supply intake vent openings in the garage walls or door help as well. A garage structure separate from the home, a carport, or no garage at all eliminate this risk.

3.21 Basic access to house provided according to City of Austin Visitability Ordinance

Homes built to the City of Austin Visitability Ordinance make a home "visitable" to mobility-impaired guests. Moreover, if occupants become mobility-impaired, even temporarily, they will still have easy access to critical rooms of a home and easy use of the electrical controls. Building to this standard is a requirement for all City of Austin-financially-assisted housing projects.

The specific requirements are:

1. One ramp or no-step entrance on an accessible route with an entrance door that has a minimum net-clear-opening of 32 inches and a lever handle. It may be at the front, side, or back of the house.
2. Interior doorways on the first floor have a minimum net-free-opening of 30 inches and lever handles (except doors leading to closets less than 15sf).
3. A minimum 36-inch-wide level route through hallways and passageways throughout the first floor of the dwelling unit, with ramped or beveled changes at door thresholds.
4. Reinforcement in first floor bathroom walls, utilizing lateral two-inch by six-inch-or-larger wood blocking installed flush with stud edges of walls. The centerline of the blocking must be 34 inches from and parallel to the floor.
5. First floor light switches, thermostats, receptacles, and electrical panels must be within 18" and 42" above the floor, and outdoor electrical panels adjacent to an accessible route must be installed to the same height requirements.

OR

3.22 Home incorporates Barrier-Free Universal Design Elements

A barrier-free home includes a number of features that allow more independent living. The list below is a summary of the components required to be installed in the home to meet the requirements of this credit:

Minimum One Accessible Entrance

1. Accessible route and level entrance
2. Covered entry
3. Minimum 32" clear opening of door
4. Full length sidelights at entry doors

Interiors

1. 36" minimum-clearance access corridors (hallways) throughout home
2. Minimum 30" interior door openings
3. Lever door handles
4. Adjustable-height closet rods
5. Light switches between 44" and 48" above floor
6. Electrical receptacles at 18" above floor
7. View-windows with a sill height of 36" or less

Kitchens

1. Knee space under the sinks and cooktops
2. Lever-type water controls
3. Variable height work surfaces
4. Contrasting border treatment on counter tops
5. Pull-out shelves in base cabinets
6. Pantry cabinets with full length shelves

Bathrooms

1. Grab bars in the tubs and showers
2. Mirrors extending to backsplash behind sinks
3. Offset controls in tubs and showers
4. Adjustable-height showerheads
5. Mixer valves with pressure balance and hot water limiter

SECTION 4: MATERIAL EFFICIENCY AND CONSTRUCTION WASTE

4.01 Lot has more than one dwelling unit

Having more than one dwelling unit per lot increases density and decreases sprawl. This results in reduced need for utility and transportation infrastructure expansion. That, in turn, results in money saved on development costs. When a home site has more than one living unit, it also has the potential for rental income, which can be an excellent investment and hedge against property tax increases and other expenses.

4.02 Existing home removed from site is reused (whether deconstructed and recycled or moved)

Redevelopment and/infill building in established neighborhoods often result in the demolition and disposal of older/smaller houses. From a resource-use perspective, this is extremely wasteful – the resources and energy that went into the demolished house are lost, while additional resources and energy are used to build the replacement.

Depending upon the condition and location of the existing house, it can likely be moved to another location. Depending upon lot size and zoning, a small house can sometimes be reused on site by moving it to another portion of the lot to make room for an additional residence.

Even if a house's overall condition makes it a poor candidate for renovation, much of the structure is often salvageable. The type and quality of wood used in an older home is often unobtainable today – it could be used as attractive trim or architectural details in the house that replaces it. Solid wood siding on interior walls may be re-milled for cabinets, stair treads and other trim. Doors and other fixtures can often be reused, and are often more distinctive and affordable than contemporary replacements.

Affordable housing non-profits, like Habitat for Humanity, may be available for deconstruction. These groups will use some materials in their own projects while offering remaining materials for sale so as to fund their own homebuilding activities. A tax-deductible donation may be possible in some cases.

4.03 Project is renovation of, and/or addition to, an existing home

While the AEGB Single-Family Home Rating is primarily applicable to the design and construction of new residences, substantial improvements in energy-efficiency and water use, as well as resource efficiency, can be realized in the renovation of and additions to existing structures. Renovations are a resource-friendly means of increasing the volume of existing housing stock, as they extend the life of building materials already in use, and avoid demolition/disposal of existing housing. If done carefully, an addition can substantially increase the square footage while having little impact the overall energy use of the house.

The look and feel of a neighborhood or community is determined by the size and appearances of houses, as well as their setbacks from the street and adjacent houses. Renovations/additions can usually be performed without altering the look and feel of the community. They can also renew older neighborhoods, where the transportation and utility infrastructure already exist.

4.04 Home is factory-built modular construction on permanent foundation

Modular homes (not "manufactured" housing) can often outperform site-constructed homes from the standpoints of energy-efficiency, efficient use of building materials and waste reduction. When modules are assembled in a factory setting, greater quality control is often the result, and the process is inherently resource-efficient because there is very little material waste in a factory. Additionally, building materials are not lost to theft or damage from the elements. Designers can prepare material lists so as to most efficiently utilize materials.

Modular construction greatly reduces the influence played by the weather. Modules are constructed in factories, under conditions that are superior to those found on construction sites. Modules can usually be constructed in one week, and assembled on site in a single day, almost eliminating delays due to inclement weather.

Under Texas law, factory-built homes are required to meet the codes of localities where they are erected. Because modules have to withstand the stresses of transportation and handling, they are often more resistant to natural forces than are site-built homes.

4.05 Conditioned space: maximum of 1,500 sq. ft.

4.06 OR Conditioned space: maximum of 1,200 sq. ft.

4.07 Conditioned space: maximum of 900 sq. ft.

Common practice today is to build ever-larger homes with as much "cheap" space as possible. "Cheap" space includes living, dining, family rooms, and bedrooms, which are less expensive to build than kitchens and bathrooms, since there are no expensive fixtures and utilities to install in these rooms. While inexpensive to build, this space is just as expensive to heat, cool, illuminate, clean and furnish as any other space. The construction of excessively large homes consequently requires the homebuyer to spend more to purchase the home and more in operating costs, while not necessarily receiving more in function and beauty.

As the average American home size has steadily increased since 1940, the average family size has decreased. Smart design results in a home with enough space for a convenient, comfortable lifestyle, for its occupants without additional unneeded space. Square footage is not a component of beauty and elegance. Excessive size is frequently just an excuse for bad design. It results from not taking the time to solve design problems in more intelligent and aesthetically satisfying ways.

As Susan Susanka, author of "The Not So Big House" has stated, "the problem is that comfort has almost nothing to do with how big a space is. It is attained, rather, by tailoring our houses to fit the way we really live, and to the scale and proportions of our human form." Designing and building a "not-so-big" house results in a home that offers greater comfort with less consumption of energy, water, and material resources and reduced impacts from both the construction and operation of the home than an unnecessarily large home. Many homeowners are heeding Susanka's message. According to Builder Magazine, surveys show that although most Americans want bigger houses (51%), *an almost equal number (49%)say they would prefer a smaller house with more amenities for their money.*

4.08 Exterior rough-in dimensions are modules of 4'-0"

Designing to a 4' grid reduces waste, since most standard building products are sized in multiples of 2' and 4' and many building components, such as floor and roof trusses, are typically laid out on 24" centers. Constructing on this grid saves time as well as materials, since fewer cuts may be required and less material is wasted.

4.09 Exterior walls system is constructed off-site (e.g. panelized wood frame, SIPs)

Traditional framing techniques call for constructing wall panels on the structure floor, then lifting or tilting them into place. Sometimes, the exterior sheathing is installed while the panel is still lying flat on the floor, but the extra weight reduces the length of each wall section so more workers are required to perform each lift.

Factory construction of entire wall assemblies leads to more efficient use of materials. Smaller cutoffs are used for blocking. The panels may also be built on waist-high assembly stations, reducing worker fatigue. In addition to reduced waste, the panels are true and square, since they are built with jigs to assist in assembly. In some cases, adhesives may be used in addition to fasteners.

The wall sections are numbered and loaded for delivery so the first wall section off the trailer is the first one needed on site.

Structural Insulated Panels (SIPs) are a "sandwich" panel product consisting of an insulated foam core, with an inner and outer layer of structural sheathing material – usually OSB (oriented strand board). They are available from various manufacturers and can be reliably used in place of conventional studs, plywood, and insulation systems that use more natural resources and are more labor-intensive. SIPs provide greatly reduced air-infiltration, high R-values, rot/pest/fire resistance, and are easier and quicker to install.

OR

4.10 Exterior wall system is ICF, ACC block, straw, earth or other AEGB-approved system)

There are many types of effective exterior wall construction products and techniques other than conventional wood framed walls. They may be known as "solid", "advanced", "alternative", or "innovative" systems, and have a variety of advantages, depending on the system. They are typically very energy-efficient and quiet.

Here are some examples:

Insulating Concrete Forms (ICFs) are modular, panel or block-like, permanent, concrete forms with hollow-core interiors that are stacked or set in place and then filled with steel-reinforced concrete, creating a monolithic concrete structure. Foam types, assembly methods, and amount of concrete needed vary, depending on the manufacturer. Advantages are high insulation values, high strength, easy and rapid installation, rot/pest/fire resistance, and low maintenance.

Aerated autoclaved concrete (ACC) blocks are made of cement, sand, lime, and an aerating agent, and are baked in an autoclave. These lightweight and strong cement blocks are stacked together, much like bricks, and can be finished in a variety of methods, typically with stucco on the outside and plaster on the inside. Advantages are rot/pest/fire resistance, low maintenance, and ease of installation. The R-value is adequate for Central Texas.

Straw bales can be stacked like blocks and provide a highly insulative, natural wall system, usually given a stucco finish. The bales can be either the structural support for the roof or serve as an insulative infill in a post-and-beam type wall construction. Straw has low embodied-energy and is a waste product (do not confuse it with hay). It has no nutritive value and is largely composed of silica, which deters pests (they cannot penetrate it because it cuts them to pieces). This waste has few traditional uses other than landscaping or animal bedding and unless prohibited, often burned, causing pollution.

Earth is a natural, beautiful, biodegradable, and abundantly available building material. It can be used for Rammed Earth, Compressed Soil Blocks, Cobb, Adobe, Superadobe, and more. Stabilized with cement, earth can provide both exterior and interior, structural and finish walls. It is pest resistant, long lasting and has high thermal mass (not a huge advantage in Central Texas, with our low diurnal temperature swing, but not a drawback, either, and possible a means of regulating moisture in the home). Like straw, it has the advantages of low embodied-energy, minimal impact on natural resources, and is biodegradable when the life of the building is over.

OR 4.11 Wall framing is by the "Optimum Value Engineering" (OVE) or "advanced framing" method (as allowed by Code): employ a minimum of 3 measures:

a. Exterior wall framing at 24" on center
b. Interior wall framing at 24" on center
c. Right-sized headers (designed and constructed for actual load conditions or doubled rim joist in lieu of header
d. Open corner framing (2-stud corners) with drywall clips and ladder blocking
e. No wood wall sheathing (corners excepted
f. Window framing without jack studs

Advanced Framing involves framing exterior and interior walls 24" on center. Placing wood studs on 24" centers (where Code allows) reduces wood use by about 1/3, without a significant reduction in structural strength. The result is reduced impact on forests, as well as reduced cost for stud materials. Secondarily, framing labor and delivery costs will also be reduced. (Note: Advanced Framing is a subset of framing practices called Optimum Value Engineering. See below.)

The extraction, manufacture, transport, and disposal of lumber depletes resources, damages natural habitats, and pollutes air and water. Dimensional lumber depends upon larger trees that require decades to mature. Conventional framing can often be structurally redundant, using wood unnecessarily and reducing space for insulation.

OVE framing techniques provide a means to reduce environmental impacts in the construction of quality, structurally sound, code-approved wood-framed homes. According to the US Department of Energy's Office of Building Technology, advanced framing techniques can save hundreds of dollars in material costs and shave 3 to 5 percent off of labor costs. They reduce annual heating and cooling costs up to 5 percent by maximizing the exterior wall cavity available for insulation installation, creating a more energy-efficient building envelope.

While the system can be applied as a whole package, many of its components can be used independently. Framers unfamiliar with these techniques may need training. In general more planning is needed when using these techniques, but once they are mastered, great savings can ensue. We suggest that builders try some of them and add more over time.

See the following websites for more information and details about OVE wood frame construction:

www.toolbase.org/pdf/techinv/oveadvancedframingtechniques_techspec.pdf

www.nrdc.org/cities/building/rwoodus.asp

4.12 Finger-jointed studs are used for a minimum of 50% of wall construction

The use of engineered, finger-jointed studs saves forests, material, time and money, without compromise of structural strength. Finger-jointed studs are comprised of short pieces of lumber glued together into stud lengths. These studs are straighter, more stable, and stronger than solid-sawn studs. This substantially reduces the need to cull bad studs, normally required with solid-sawn studs.

Structural finger-jointed lumber is manufactured to meet the requirements of two different types of end-use applications. The first category is basically an all-purpose product, indicated by *CERT EXT JNTS* on the grade stamp. The second category is appropriate for use where the primary loading will be in compression parallel-to-grain, indicated by *VERTICAL USE ONLY* on the grade stamp.

Finger-jointed products grade-stamped *CERT EXT JNTS* are intended for all structural applications. This lumber is assembled with a waterproof, exterior-type adhesive. Limitations on knot size and placement near joints are highly restrictive. *CERT EXT JNTS*-stamped products may be used interchangeably with any solid-sawn lumber product of the same species and grades. The lumber may be used as beams, joists, rafters, studs, plates, or in any other exterior or interior framing application.

Products that are grade-stamped *VERTICAL USE ONLY* (previously stamped and known as *STUD USE ONLY*) are appropriate for carrying loads in compression as vertical framing members. *VERTICAL USE ONLY*-stamped finger-jointed lumber is manufactured to meet the performance capabilities of solid sawn, end-loaded bearing members where short-term bending or tension loads from lateral forces such as wind, seismic and impact may be present, but where forces from the conditions of long-term, sustained-bending or tension loading are not present.

4.13 Roof framing system: engineered trusses or materials such as I joists, truss joists, or LVLs (no solid lumber 2x10 or larger)

Due to the dwindling supply of large timber, engineered wood products or non-wood substitutes should be used in place of large-dimension lumber. These products are more consistent in quality than solid lumber. They may be made up of smaller and/or shorter pieces of solid lumber, or from small, fast-growing tree species, or other materials, thus saving our old-growth forests.

Engineered wood products offer many advantages:

- Optimize the use of global wood resources by using only very small trees or fast-growing species
- Use a very high percentage of the tree
- Are more consistent in quality and result in less waste
- Use less material to provide greater strength
- Are made to-order for a given job, which reduces job site waste
- Are less prone to expansion and contraction; engineered trusses less prone to squeaking
- Floor trusses can be constructed to allow easy placement of ductwork, wiring and plumbing
- Roof trusses can be constructed with duct chases

All of the products described below fall into the general category of engineered lumber:

Floor and Roof Trusses
Wood trusses eliminate waste since they are made to order. They reduce the pressure on old growth forests by replacing 2x10s and 2x12s traditionally used for floor joists and roof rafters. Manufacturers have the ability to vary flange sizes, depth of webs, grades and types of timber to meet the desired load constraints and thereby maximize the use of raw material. The open web design also allows excellent access for plumbers, electricians and air-conditioning contractors to design and install services through the floor without cutting or notching.

NOTE: Ensure that ducts chases in trusses line up to allow straight duct runs.

Glulams
Glulams (glued laminated timber) are comprised of wood laminations, or "lams," that are bonded together with strong, waterproof adhesives. Glulam lumber can be milled from a variety of species. Individual "lams" are typically two inches or less in thickness and vary in width depending on the size of the beam. The final products are beams that range in size from 4x8 up to 6x20 and larger. Glulams can be used as beams and girders where standard construction practices would require large dimension timber.

Laminated Veneer Lumber
Laminated veneer lumber (LVL) is made from layers of dried and graded wood veneers bonded together with waterproof adhesive. The grain of each layer of veneer runs in the same direction, rather than cross-lamination which is typical of other engineered wood products such as plywood. The result is a solid and uniform engineered wood product that is sawn to consistent sizes and is virtually free from warping and splitting. LVL is available in various thicknesses and widths and is easily worked in the field using conventional construction tools. LVL typically out-performs conventional lumber and can be used as studs, headers, rim joists, beams, columns, and girders in floor framing and as rafters in roof framing. LVL is also known as structural composite lumber (SCL).

Wood I-Joists and I-Beams
Wood I-joists are comprised of top and bottom flanges of various widths combined with webs of various depths. The flanges resist common bending stresses, and the web provides outstanding shear performance. I-joists can be manufactured using solid sawn lumber or LVL for the flange components and plywood or oriented strand board (OSB) for the web. They can be manufactured to span longer distances than solid lumber and can be purchased in lengths up to 40 feet. Moreover, they are dimensionally stable and do not crown or bow as does solid lumber.

Oriented Strand Board
Oriented strand board (OSB) is a solid panel product manufactured from waterproof heat-cured adhesives and rectangularly shaped wood strands that are arranged in cross-oriented layers, similar to plywood. This results in a structural engineered wood panel that shares many of the strength and performance characteristics of plywood.

Parallel Strand Lumber
Parallel strand lumber (PSL) is manufactured from 2'-8' long, thin wood strands. The strands are generally taken from veneers peeled from the outermost section of the logs, where stronger grain is located. Veneers are dried to and graded for strength before chopping into strands. The strands are then aligned parallel to one another, coated with a waterproof adhesive, then pressed and cured to form a rectangular billet. The product is quite uniform throughout the cross section, and is re-sawn from the manufactured billet to a wide range of sizes. Large members, some approaching sizes common in glulams, are manufactured by assembling strands which have been chopped from sheets of veneer up to 8 feet long. The result is an engineered wood product with considerably higher strength than is available from solid timbers of the same cross section.

Laminated Strand Lumber
Laminated strand lumber (LSL) is manufactured from short (about 12") thin wood strands. The strands are aligned parallel to one another, coated with a waterproof adhesive, then pressed and cured to form a rectangular billet. Like PSL, the product is quite uniform throughout the cross section, and is re-sawn from the manufactured billet to a wide range of sizes.

4.14 A minimum of 50% of framing or sheathing or decking material is SFI-certified engineered products or lumber

SFI—the Sustainable Forestry Initiative--is the certification program of the forestry industry. See: **http://www.sfiprogram.org**. This industry has made steady advances in recent years toward more sustainable forestry practices and 3rd-party certification. It differs substantially from the FSC in regard to its assessment of the amount of remaining old-growth forests. See the document "FSC and SFI Similarities and Differences" on the SFI website.

4.15 A minimum of 50% of framing or sheathing or decking material is FSC-certified engineered products or lumber

FSC-certified wood products are verified by a third party as originating from sustainable, well-managed forests. The Forest Stewardship Council (FSC) is currently recognized as having the most rigorous standards and also the only certification system that provides for chain-of-custody supervision to ensure that products used were derived from certified forests. FSC has developed a set of Principles and Criteria for forest management that are applicable to all FSC-certified forests throughout the world. There are 10 Principles and 57 Criteria that address legal issues, indigenous rights, labor rights, multiple benefits, and environmental impacts surrounding forest management.

Sustainable forestry practices as established by the FSC minimize or eliminate the negative impacts on air, water and soil quality, wildlife, recreation, and forest longevity that are associated with conventional forestry. The use of FSC certified products reduces the negative impacts of conventional forestry practices--such as clear-cutting, monoculture, destruction of recreational areas and wildlife habitat.

Some companies sell both certified and non-certified wood products, or products that have been certified according to different, less stringent environmental standards. To make certain that you get environmentally responsible wood products, be sure to specify FSC-certified wood. Many FSC-certified products are now available at local building supply stores. Others still have to be special ordered.

For further information visit the U.S. FSC website: **www.fscus.org**

4.16 Use of reclaimed materials, such as doors, hardware, flooring: provide list of all products used for this credit in Section 12

Reclaimed materials or products are ones that have previously had a life in one structure or location and are then removed and installed in a new or renovated one, thus reducing the need for virgin resources. These materials and products are often of higher quality than new ones and often are a better fit in a renovation project.

4.17 80% of excess lumber and drywall are recycled/reused (not landfilled); approved documentation required

Lumber and drywall waste from construction sites can be recycled for new uses instead of being sent to a landfill. For example, wood may be find new life in engineered lumber or mulched and used for landscaping and erosion control. The gypsum in drywall can be used as a soil amendment, in the production of cement, and as an ingredient in the manufacture of many types of commercial products. Since gypsum makes up approximately 90% of the weight of a piece of drywall, if the gypsum can be recovered from the drywall, the majority of the material can be recycled.

OR 4.18 Minimum 40%-by-volume of waste is recycled/reused (not landfilled); approved documentation required

OR 4.19 Approved construction waste management plan; documentation required

The purpose of a construction waste plan is to reduce the need for landfills, reduce hauling and its environmental impacts, reduce dumping and storage fees, provide materials for reuse and resources for the manufacture of new products, and save money for the builder and owner.

This plan is ideally included in the specifications, but if this has not been done, the builder can develop a plan and may want to do so with a construction waste management company.

Here are examples of matters a construction waste plan should address:

- Measures taken to reduce on-site waste (e.g. factory-construction of walls)
- Reuse of usable structures and materials, on-site if possible
- Recycling of waste materials for new uses, on-site if possible
- Proper and safe disposal of unusable or hazardous material

Best practice is to use construction waste on site as much as possible. This reduces the problems related to transport and disposal—pollution from vehicle emissions and shortened life of disposal sites. It may also mean finding uses for deconstructed materials in a new structure that are often much higher quality than available new materials.

Trade contractors are available that bring a mulching machine to a site to pulverize organic materials, such as scrap lumber, gypsum board, stone, brick, concrete, roof tiles, for on-site or nearby reuse. This material can be spread around the foundation to keep workers from tracking through mud and for erosion control. It can be used for landscaping, as well. Mulched gypsum provides a soil amendment which loosens the soil, increases water penetration, and reduces stormwater runoff.

To the extent that construction waste cannot be used on-site or on a neighboring site, a plan can be developed for uses off-site, always with the goal of sending as little waste as possible to the landfill. The easiest method is to contract with a construction-waste-management company. Some such companies do not require any job-site sorting—they do it themselves at their own site. They have contacts for selling reusable and recyclable material, thus reducing the cost of this service. They are set up to keep track of what happens to the waste, by volume or by weight, obviating the need for the builder to do this.

4.20 Concrete truck wash-out managed to recycle concrete residue and treat wash-out water

Washout containment systems need to be water-tight to prevent all water and fine concrete material from coming in contact with the ground. Some local waste-management companies may provide a service for containment and recycling. The containment system may be job-built. Builders should consult with their AEGB Representative/Rater to discuss options before implementing a system.

The waste water from concrete washout is alkaline and contains high levels of chromium, which can leach into the ground and contaminate groundwater. If washout facilities allow runoff into storm drains, creeks, and streams, the resulting increase the pH not only harms aquatic life but affects our drinking water supply. Managing concrete washout can prevent this contamination, as well as reduce construction waste by diverting and recycling concrete waste from the landfills. Appropriate steps should be taken to recycle and reuse aggregates salvaged from washout operations, as well as treat the wash-out water to remove contaminants before it is allowed to permeate into storm drains or ground soils. The treatments site should be located for convenient access for the concrete trucks nearby the area where concrete is being poured so that the maximum amount of residue can be treated. The system of treatment should be inspected and serviced frequently to assure components are functioning to completely remove contaminants.

The Construction Waste Management Documentation form provides a means for tracking construction waste. It is available on the Austin Energy Green Building website (See the link: For Building Professionals) or from your AEGB Representative/Rater. On this form, waste materials, their quantities, volume/weight conversion factors and disposal methods are listed.

SECTION 5: INTEGRATED PEST MANAGEMENT

5.01 Sand or mechanical-barrier termite control system is used (or structure is not termite-edible)

Physical barriers, made of materials such as aggregate, stainless-steel mesh or plastic, do the job of termite control without dangerous chemicals, which could harm occupants and ground water. Actually most of the chemicals that are still legal aren't very effective after a short time anyway, so why risk using them?

Stainless-steel-mesh barriers must have correctly sized openings that termites cannot pass through and they must be strong enough not to break. Plastic barriers have a termiticide sandwiched between layers of plastic, but this is not the kind of termiticide used in conventional chemical treatment. All of these methods rely on correct installation and must not be broken over time. A sand barrier requires the correct grain size—one that termites are unable to dig through or move.

When slab foundations first became common, people assumed they would offer better protection against termites but that has not been the case. In fact, subterranean termites like the underside of slabs, are well-protected there, enter the home through tub traps openings, control joints, plumbing and other penetrations, and cannot be easily discovered until they have done their damage. (Termites are now being found farther north, as slabs have become a more accepted foundation type in moderate climate areas). Pier and beam foundations actually make termite detection easier.

5.02 All wood framing is treated with a borate product to a minimum of 3 feet above foundation (or structure is not termite-edible)

The old-fashioned "spray and kill" methods of termite control are dangerous, not only to termites, but also to workers, occupants, the soil, beneficial insects, pets, plants and groundwater.

There are numerous advantages to using borate chemicals on lumber. Although they are highly toxic to wood boring insects and fungi, they exhibit low toxicity to humans and other mammals. Once the wood has been treated and kept dry, the borate protection is extremely long lasting. What's more, the borates do not affect the appearance or workability of the lumber. The borates are non-corrosive to metal fasteners used in lumber, they are odorless, and they are extremely cost effective.

Borate is usually sold in powder form that readily dissolves in water. It should be applied to framing lumber after the house is dried in. The borate solution should be sprayed or brushed on before the lumber is covered over with insulation, drywall, or plastic. If possible, two applications on separate days are preferable to one. Dry, rough lumber absorbs borate chemicals readily. Once the solution is applied to bare lumber, it can soak deeply into the wood. The depth and extent of penetration depends on several things: temperature of the lumber, lumber species and texture, the internal moisture content of the lumber, and the number of applications.

5.03 All exterior wood-to-concrete connections are separated by metal or plastic fasteners/dividers (e.g., posts, deck supports, stair stringers)

If exterior wood comes in direct contact with concrete (especially if it is sunk directly into it), the wood tends to rot quickly. That's because the wood swells and shrinks from rain and humidity changes and can't drain and dry out properly. By separating the wood and concrete with metal or plastic, a barrier is created and the wood has a better chance to dry out. Fasteners designed for this purpose, with air separation and drainage, do the best job. Be certain that wood-to-concrete connections are properly made with metal or plastic spacers. This will reduce chances of wood rot, structural damage, and termite infestation.

5.04 All new plants have trunk, base, or stem located at least 36" from foundation

Extra precaution should be taken to keep landscape plants a safe distance from the foundation and walls of a home. A clear space--devoid of plants, bushes, and trees--around the perimeter of a house allows easy access for homeowner inspection for termite tunnels and removes an easy pathway for termites and other pests to attack the house. Having this clear space is not a guarantee, but it is an aid in having a termite-free home. Homeowners should be informed to maintain this clear zone around their home over time—prune and remove plants as necessary. This will also make it easier for the homeowner to inspect for good drainage away from the home, as well. Keeping plants away also protects siding materials from deterioration.

SECTION 6: THERMAL ENVELOPE AND MOISTURE CONTROL

See "Builder's Guide to Hot-Humid Climates" + "Water Management" for design and construction guidelines. In Central Texas, make wall system as air-tight as possible but vapor permeable and able to dry to both inside and outside.

6.01 Window U-value of 0.51 or lower

6.02 Glazing has SHGC of 0.30 or lower

See Basic Requirements: #3. Window efficiency

6.03 "Raised-heel" or "energy" roof trusses

Typical roof construction with standard trusses or cut-in rafters (rafter meets bottom chord at top of wall) does not easily allow sufficient space above the wall for ventilation-air intake and full depth of insulation where the rafter meets the wall. If a larger overhang is desired for shading and protection from rain, the rafter tail obscures the view out the window, especially if the roof is steeply pitched.

With raised heel trusses, the rafter and bottom chord of the truss meet at the outer end of the overhang or rake (not at the top of the wall), so all the above problems are solved. These trusses are cost-effective and installation is no different from conventional pre-fabricated trusses.

Note: this type of truss is not needed in a sealed attic insulated at the rafters.

6.04 Vented attic has continuous ridge and soffit vents (no functioning gable vents)

Continuous ridge and soffit vents provide the best method of cooling a *ventilated attic* in hot weather. They allow the relatively cooler outside air to enter the attic in a continuous path under the entire length of the eave and exit along the entire length of the ridge. This means the whole underside of the roof will be bathed in cooler air. This attic ventilation system exhausts the largest possible volume of air continuously and evenly and is not affected by wind volume or direction. It works naturally, based on the physics of hot air rising, and needs no mechanical help. A cooler attic results in less heat flowing through the attic insulation into the living space on hot summer days, and provides a more congenial space for the cooling equipment and ductwork, if they are located in the attic.

Ridge vents are inexpensive, easy to install, reduce the number of roof penetrations, and are more aesthetically pleasing than gravity vents, since they can be roofed over and are virtually invisible. Some hip-style roofs may not have room for a long continuous ridge vent. With such designs, hip vents or exhaust vents placed as close to the peak as possible are required to augment or replace the ridge vent.

Other types of vents, such as gable vents, gravity vents, and non-continuous soffit vents result in limited and uneven air paths and are more dependent on wind volume and direction. Power attic vents are not recommended because their energy consumption exceeds their overall energy benefit and are seldom repaired if they stop working. Even the use of solar-powered vents is not recommended for the latter reason.

OR

6.05 Closed/sealed attic system: unvented; polyurethane foam-insulation at roof rafters, minimum 5.5" depth (any gas equipment located therein is sealed-combustion)

The rationale for venting attics in the South has been to flush out hot air in summer. However, the dominant heat transfer mechanism in an attic is radiation, which cannot be "flushed" out. This heat slowly passes through insulation on the floor of the attic into the living space. When ductwork is installed in a vented attic, the problem is compounded: heat passes into the conditioned air in the ducts as well, which also ends up in the living space.

To date, we have no evidence that sealed and insulated attics in hot, humid climates trap moisture. In fact, researchers have found that, in this climate, buildings with unvented attics are actually less likely to have condensation and mold than those with vented attics. That's because in our climate most moisture comes from outside, and the foam keeps the attic dry by keeping that moisture out.

In the Austin climate, it makes sense to insulate the attic at the roof plane/rafters (no ventilation provided), bringing the attic space and anything within it inside the thermal enclosure. In most localities, building codes will allow unvented roof assemblies if two conditions are met: there's no vapor barrier between the attic and the home's living space, and the insulation is installed between the rafters with an air-impermeable product--polyurethane spray foam.

An unvented, sealed attic may result in a slight increase in shingle temperature but has not been proven to have an impact on shingle durability. (The same battle with shingle manufacturers was once fought over the use of radiant barrier.) The color of the shingle is more important than venting or non-venting. However, the biggest factor in long-term on shingle durability is ultra-violet radiation, which is the same whether the attic is vented or not.

For a case study of unvented attics in production-built homes see:

www.nrel.gov/docs/fy01osti/30909.pdf#search=%22unvented%20attic%22

6.06 "Total-fill" insulation in walls (e.g. blown cellulose, BIBS, spray foam, SIPs)

Total-fill insulation refers to any type that is blown-in or sprayed that fills all "nooks and crannies" of the wall framing, so there are no visible voids or gaps or compression. Various types of insulation may be applied or installed in this manner. These points also apply to any system which is constructed with the insulation as an integral part of the material or system itself. Such types of insulation installation or wall system greatly reduce flaws in a home's thermal envelope.

6.07 Insulation has no added urea-formaldehyde

Formaldehyde glues have typically been a common component of fiberglass batt insulation. The glue is used to hold the short fibers together and help maintain batt shape. Since formaldehyde is a known health threat, the reduction of its use will contribute to improved indoor environmental quality and occupant health.

Formaldehyde-free fiberglass insulation is being produced by major manufacturers and is readily available. It is usually distinguishable by its white color. In addition, most other types of insulation, such as cellulose, rock wool, cotton, and foam, do not contain added urea-formaldehyde.

6.08 Wall and attic insulation have average total-recycled-content of 75% minimum

Producing insulation from recycled materials reduces the consumption of virgin resources and the energy used to process them. Cellulose insulation, mostly from recycled newsprint, has become a popular and cost-effective option for insulating attics and exterior walls. Cotton batts made from old clothing and scrap cloth are a resource-friendly option for wall insulation. Both products are treated with borates to increase their resistance to both pests and fire.

6.09 Roofing meets requirements of Energy Star; minimum 10-year warranty

Roof products that meet or exceed a specified solar reflectance, without compromising product quality, performance and longevity, qualify for the Energy Star label.

Energy Star roof standards are not restricted to any particular type of roof product. However, Energy Star expects that, at least initially, metal, single-ply membrane, and roof coating products will be most widely represented.

For Energy Star roof products visit:
www.energystar.gov/index.cfm?c=roof_prods.pr_roof_products

For more energy information about roofing products, see
www.coolroofs.org/documents/September2006ProductDirectory090106.pdf

The Cool Roof Rating Council (CRRC) develops accurate and credible methods for evaluating and labeling the solar reflectance and thermal emittance (radiative properties) of roofing products and to disseminate the information to all interested parties. CRRC recognizes only roofing product radiative property tests performed by properly trained and accredited independent laboratories. CRRC standardizes and assures the quality of the rating process - *they don't establish or enforce performance thresholds.* EPA's Energy Star program is complementary in that it promotes only products meeting certain performance levels but it relies on manufacturer performance claims.

Other "cool" roofing materials may be found in the Lawrence Berkeley Labs (LBL) "Cool Roofing Materials Database". These roofing materials have been selected for performance, durability, and availability. Some are appropriate only for low-slope and flat roofs. The LBL cool roof list can be found at the following website: http://eande.lbl.gov/coolroof.

6. 10 Roofing is tile or metal

Tile and metal roofing materials out-perform other kinds in regard to keeping a house cooler. Tile does not transfer heat well. Metal, though it can get very hot, cannot hold much heat, and cools quickly in the evening when the sun is no longer striking it. Because these materials are poor heat sinks, they will not be radiating heat to the interior all night long, as composition shingles do. If they are white in color, they offer reflectance as well, for the ideal cooling combination.

In addition, tile and metal roofing materials can be life-time materials, so the homeowner may never have to replace them and the need for virgin materials is reduced. Lifetime labor costs are reduced by up to 60% compared to roofing materials that need replacing every 15 to 25 years and a huge amount of landfill space can be saved. Clay tiles are biodegradable. Metal roofing typically has a high percentage of recycled content and can be recycled over and over again.

A third benefit of tile and metal roofs is that they are well suited as a collecting surface for rainwater harvesting systems. And because of their longevity, they are a better choice for installation of solar thermal collectors and photovoltaic panels.

6.11 Gutters and downspout system directs water away from foundation to landscaping or catchment system

A rain gutter system is an effective way to help protect a home's walls, windows, doors and foundations from damage due to stormwater run-off from the roof and reduces termite problems. Water and moisture at the foundation and wall system also attract termites. Directing this captured water away from the foundation to the landscaping or a catchment system will put this water to use, saving on water bills as well.

6.12 Blower door test performed results in envelope leakage no greater than 0.40 ACH (air changes per hour)

For good energy-efficiency, the tighter the thermal envelope of a home, the better it is. A blower-door test determines the amount of air infiltration through the thermal envelope. A large fan is attached to the open front door, the home is de-pressurized, and the amount of outside air entering the home—through all the cracks in the envelope—is measured.

The staff at Austin Energy Green Building believes that it is always best to build the tightest-possible structure and to control ventilation through mechanical means.

Air pressure imbalances cause air to leak into or out of a home. Imbalances depend on such factors as wind speed, whether the mechanical system is turned on, and whether pressure imbalances exist inside the home (e.g. if doors are shut to rooms that have no dedicated return air ducts or pressure-relief measures). The rate of leakage depends on the magnitude of the imbalance.

SECTION 7: PLUMBING AND APPLIANCES

7.01 ≥ R-2 insulation of all water lines located outside the thermal envelope and in exterior walls

Plumbing that is located in exterior walls can compromise the integrity of insulation by causing it to be compressed or otherwise reduced in thickness. This is especially true of plumbing drains that have a diameter only slightly less than the depth of a 4" (nominally, 31/2") stud wall. Installation of plumbing also requires boring or notching of the framing members through which they are installed, so it is good to minimize this in exterior walls.

Water supply pipes are also more prone to freezing when placed in exterior walls, especially cold water pipes which are often not insulated. (The City of Austin code requires that *hot* water pipes be covered with at least ½ inch of insulation when installed within walls.) Condensation can also form on cold water pipes if their temperature falls below the dew point, a situation more likely to occur in an exterior wall.

Insulating hot water pipes reduces heat loss and can raise water temperature 2°F–4°F hotter than uninsulated pipes can deliver, allowing for a lower water temperature setting on the water heater. The homeowner also won't have to wait as long for hot water when turning on a faucet or showerhead, which helps conserve water.

Insulate all accessible hot water pipes, especially within 3 feet of the water heater. It's also a good idea to insulate the cold water inlet pipes for the first 3 feet. Use quality pipe insulation wrap, or neatly tape strips of fiberglass insulation around the pipes. Pipe sleeves made with polyethylene or neoprene foam are the most commonly used insulation. Match the pipe sleeve's inside diameter to the pipe's outside diameter for a snug fit. Place the pipe sleeve so the seam will be face down on the pipe. Tape, wire, or clamp (with a cable tie) it every foot or two to secure it to the pipe. If you use tape, some recommend using acrylic tape instead of duct tape.

On gas water heaters, keep insulation at least 6 inches from the flue. If pipes are within 8 inches of the flue, the safest choice is to use fiberglass pipe-wrap (at least 1-inch thick) without a facing. Either wire or aluminum foil tape can be used to secure it to the pipe.

7.02 Gas water heater is sealed-combustion/direct vent model

Sealed-combustion water heaters draw combustion air directly from outdoors through a pipe connected to the burner compartment. The best units have both an air intake pipe and an exhaust pipe. The entire combustion process is totally sealed from the interior of the house, avoiding the introduction of combustion by-products, such as carbon monoxide, into the living space. Consequently, sealed-combustion units are safer and typically more efficient than open-combustion units.

Compare this with most residential gas appliances installed in Central Texas, which are open-combustion designs: the combustion chamber and flue are open to the surrounding air and the flame takes combustion air from the space around it. The hot combustion by-products flow up through the appliance

flue and out of the house because they are lighter than the surrounding air. It's very important for this to occur properly, because combustion gases contain carbon monoxide and other noxious and dangerous gases, which can cause health problems (headache, fatigue, respiratory problems) and even death.

In very tight houses, drawing combustion air from the house and passively venting flue gases up the chimney can sometimes result in back-drafting of dangerous combustion gases into the house. This can occur if depressurization occurs inside the house. This could be caused by a gust of wind, poorly constructed flues, leaks in the HVAC duct system, too many exhaust fans running at the same time, or an over-sized range hood in the kitchen.

7.03 Gas water heater is tankless/on-demand

As described by their name, demand / tankless water heaters have no storage tank for hot water. A heating element heats water only when there is a demand for hot water—i.e. when someone turns on a hot water faucet. Since these water heaters have no stand-by losses (heat loss out the walls of the storage tank), they have higher efficiency—typically 10% to 20% higher than storage-tank water heaters. Note that only gas models receive points on the Rating. Gas models have a higher hot water output than electric ones. Look for a model with electronic ignition to eliminate the energy consumed by a continuously burning pilot light.

Tankless models have additional advantages: they take up less space, they can be installed outside in Austin's climate (solving the venting problem) and they last longer because they are less susceptible to mineral scaling. Tankless models have a life-expectancy of 15—25 years, whereas storage models last only 5—15 years, depending in part on how they are maintained.

Whether or not these water heaters save water and energy may depend on hot-water use patterns within the home.

It is important to choose the right tankless water heater for occupant needs, since adequate water flow of a sufficiently high temperature is limited in many models. Large units intended for whole house water heating are usually located centrally in the house. If necessary, more than one unit can be installed in a home, especially if baths, laundry, and kitchen are not well consolidated. In such point-of-use applications, the water heater usually sits in a closet or under a sink.

For more information see the NAHB research center website:

www.toolbase.org/TechInventory/techDetails.aspx?ContentDetailID=599

OR

7.04 Water heater is solar thermal

According to the DOE/Energy Efficiency and Renewable Energy division, solar water heaters can be a cost-effective way to generate hot water for a home. They can be used in any climate, and the fuel they use—sunshine—is free. Solar water heating systems include storage tanks and solar collectors. There are two types of solar water heating systems: active, which have circulating pumps and controls, and passive, which don't.

Most solar water heaters require a well-insulated storage tank. Solar storage tanks have an additional outlet and inlet connected to and from the collector. In two-tank systems, the solar water heater preheats water before it enters the conventional water heater. In one-tank systems, the back-up heater is combined with the solar storage in one tank.

Three types of **solar collectors** are used for residential applications:

- **Flat-plate collector**
  Glazed flat-plate collectors are insulated, weatherproofed boxes that contain a dark absorber plate under one or more glass or plastic (polymer) covers. Unglazed flat-plate collectors (usually used for swimming pool water heating) have a dark absorber plate, made of metal or polymer, without a cover or enclosure.
- **Integral collector-storage systems**
  Also known as ICS or *batch* systems, they feature one or more black tanks or tubes in an insulated, glazed box. Cold water first passes through the solar collector, which preheats the water. The water then continues on to the conventional backup water heater, providing a reliable source of hot water. They should be installed only in mild-freeze climates because the outdoor pipes could freeze in severe, cold weather.
- **Evacuated-tube solar collectors**
  They feature parallel rows of transparent glass tubes. Each tube contains a glass outer tube and metal absorber tube attached to a fin. The fin's coating absorbs solar energy but inhibits radiative heat loss. These collectors are used more frequently for U.S. commercial applications.

There are two types of active solar water heating systems:

- **Direct circulation systems**
  Pumps circulate household water through the collectors and into the home. They work well in climates where it rarely freezes.
- **Indirect circulation systems**
  Pumps circulate a non-freezing, heat-transfer fluid through the collectors and a heat exchanger. This heats the water that then flows into the home. They are popular in climates prone to freezing temperatures.

Passive solar water heating systems are typically less expensive than active systems, but they're usually not as efficient. However, passive systems can be more reliable and may last longer. There are two basic types of passive systems:

- **Integral collector-storage passive systems**
  These work best in areas where temperatures rarely fall below freezing. They also work well in households with significant need for hot water both day and night.
- **Thermosyphon systems**
  Water flows through the system when warm water rises as cooler water sinks. The collector must be installed below the storage tank so that warm water will rise into the tank. These systems are reliable, but contractors must pay careful attention to the roof design because of the heavy storage tank. They are usually more expensive than integral collector-storage passive systems.

Solar hot water systems should be designed with a solar collection area of 10-15 square feet and 20-30 gallons of storage per person. In central Texas, collectors should be placed facing south and tilted at a 30-degree angle for optimal results. Water-saving faucets and showerheads are recommended to reduce hot-water needs.

Austin Energy offers rebates for installation of solar thermal hot water systems for existing homes that use electric resistant water heaters, as well as for new homes. For information on the rebate:

http://www.austinenergy.com/Energy%20Efficiency/Programs/Rebates/Solar%20Rebates/Solar%20Water%20Heater/index.htm

For more information see the DOE/EERE and NREL websites:

www.eere.energy.gov/consumer/your_home/electricity/index.cfm/mytopic=1285

www.nrel.gov/learning/re_solar_hot_water.html

7.05 Push-button on-demand hot-water recirculation system (not continuously operating pump system)

A huge amount of water gets wasted when we let water run down the drain while waiting for it to get hot. The typical home wastes between 7,000--14,000 gallons per year for this reason. This raises utility bills for both water and energy, not to mention wasting the money, time, equipment and materials used to clean and get that water to the home, heat it, and carry it away in the sewage system. This problem is growing due to the increase in the size of homes, the increase in the size of water pipes, and the increase in the number of fixtures requiring hot water. Aside from the cost of this wasted water, it is annoying to wait for hot water.

An on-demand hot-water recirculation system can significantly reduce wasted water. By running a return line from the last tap on the hot water supply line back to the water heater and installing a small circulating pump, hot water is circulated in the supply line and is quickly available when the faucet is turned on. The direction of flow moves from the water heater through the hot water supply line, through the return line, through the recirculating pump, and then back to the water heater.

This system is user-activated by a button so *hot water is only circulated when needed.* A thermo-sensor in the pipe deactivates circulation when hot water is no longer needed. It's not necessary to have this device on every tap, but it's a good idea for taps that are most remote from the water heater, especially showers. Recirculation pumps tied to a motion sensor or light switch are not advised, since someone might enter the bathroom without wanting hot water.

Note--here are some other factors that affect the amount of water wasted in the wait for hot water:

- Pipe size—the bigger the pipe, the more water will have to be evacuated before hot water arrives. The system should be designed for the smallest size allowed by code.
- Amount of insulation surrounding the pipe—the better the insulation, the less heat will be lost to the pipe itself. Note that the City of Austin requires a minimum of ½" pipe insulation, or ¾" in attics if above the insulation level.
- Distribution design—preferable to more common systems (radial, manifold, parallel pipe or trunk and branch), a half-loop type, with a demand recirculation system, can bring hot water quickly to the tap. All fixtures are on the "supply" portion of the loop, with the "return" length approximately equal to the supply length. Since the fixtures are located on only half of the loop, the pipe size can be reduced. The thermo-sensor to turn off the pump is located after the last fixture, so it is not necessary to heat the second half of the loop. This type of system can be piped with copper, CPVC or PEX.

7.06 Toilet is dual flush or HET (high efficiency toilet) from current City of Austin Water Conservation Program Rebate Toilets list

Dual-flush toilets, long popular in Australia, Western Europe, and East Asia, offer two flush options: a standard flush for solid wastes and a lower-volume flush for liquid wastes and paper. Typical products use 1.6 gallons at the full flush and 0.8-0.9 gallons at the low flush. One manufacturer estimates that a typical family of four will save approximately 7,000 gallons of water per year with this toilet, compared with a standard 1.6 gallon-per-flush toilet. In terms of flush performance, the toilet successfully removes 800 grams of test media at full flush, based on standardized tests.

High-efficiency toilets include pressure-assisted and vacuum-assisted models. Under the tank lid of a pressure assisted toilet there is an inner tank which is completely sealed. When water is fed from the water line, the air inside the tank gets compressed. When the toilet is flushed, instead of just falling by the force of gravity, the water is forced out with the pressure of the compressed air. This pressurized stream of water cleans all the waste from the bowl much more efficiently than the water from gravity toilets. Vacuum-assisted toilets have a vacuum chamber inside the tank that works like a siphon to pull air out of the trap below the bowl so that it can quickly fill with water to clear waste.

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7.06 Toilet is ADA model from current CoA toilet list (at least one)

The two standards set forth by the Americans with Disabilities Act that apply to residential toilets are the height to the top of the seat and the location of the flush controls. The top of the seat must be at least 17 inches and no more than 19 inches above the floor. The flush controls cannot be mounted above 36 inches from the floor and must be mounted on the "wide," or unobstructed, side of the toilet. Toilets listed on the CoA toilet rebate list that are available meeting the ADA compliance requirements will have a model number listed as "ADA (17") Bowl: [model number]".

7.08 All shower heads have maximum flow of 2.0 gallons per minute; no more than one shower head per shower or tub

A great deal of water is wasted by shower heads with high flow rates. The challenge is to find low-flow models that give a satisfactory shower to the user, but models that give high satisfaction do exist.

There are two types of low-flow shower heads: aerating and non-aerating.

Aerating - mixes air into the water stream. This maintains steady pressure so the flow has an even, full shower spray. Because air is mixed in with the water, the water temperature can cool down a bit towards the floor of the shower. Aerating shower heads are the most popular type of low-flow shower head.

Non-aerating - air is not mixed into the water stream. This maintains temperature well and delivers a strong spray. The water flow pulses with non-aerating shower heads, giving more of a massaging-showerhead effect.

For more information see **www.h2ouse.net**.

7.09 Clothes washer from current WashWise list of the City of Austin Water Conservation WashWise list

The City of Austin Water Conservation Program maintains a list of high-efficiency clothes washers. Due to availability of water and the costs to treat it, the City's Water Conservation Program offers rebates on the listed models. Some manufacturers offer rebates, as well.

The list includes both top-loading and horizontal-loading models, but typically the horizontal-type (horizontal axis) has some added advantages: they rate very high in both water- and energy-savings (they use on average 40% less water and 50% less energy than typical top-loading washers); they clean by a rotating basket, not agitation, so they are gentler on clothes; they need very little detergent; and because the door is gasketed, they do not add humidity to the home's interior.

City of Austin high efficiency clothes washer list: **www.ci.austin.tx.us/watercon/sfwasher.htm**

SECTION 8: MECHANICAL

8.01 Cooling tonnage does not exceed 5 tons

OR 8.02 Cooling tonnage does not exceed 4 tons
OR 8.03 Cooling tonnage does not exceed 3 tons
OR 8.04 Cooling tonnage does not exceed 2 tons.

If tonnage is less than 2, write in amount in Section 12)

The square footage of living space per ton of cooling is a good indicator of climate-appropriate design. A well-designed 3,000-square-foot house may require no more cooling than an inappropriately designed 1,000-sq. ft. house. For example, the 3,000 house might have very little wall area and very little unprotected glass facing west, while the 1,000 house might have a lot.

(Of course, cooling tonnage is not the only measure of "greenness", since the larger house will require much more material. Even if the larger home has fewer occupants than the smaller home, studies show they typically use more water and energy.)

8.05 Whole house, ductless, mini-split heating and cooling system

Long common in other parts of the world, ductless mini-split heat pumps are becoming a popular choice for homes in the U.S., especially for smaller homes (for which the smallest split systems are too large) or those in which a ducted forced-air system would be impractical. While cooling-only models are available, heat pump models, which both heat and cool, are more practical for Central Texas' mild winters which don't require much supplemental heat for a home.

Like standard cooling systems, mini-splits have two main components: an outdoor compressor/ condenser, and an indoor air-handling unit. But unlike standard systems, which distribute cooled or heated air throughout the house via ducts, mini-splits distribute *refrigerant* to air handlers that are located in each room or area to be cooled.

Mini splits come in a wide range of sizes and capacities, with one-to eight air handlers operating off of a single compressor/condenser, making them suitable for a single room or an entire house. Depending upon the manufacturer, air handlers can be hung on a wall, recessed in or suspended from a ceiling, or concealed in a chase. Most use a remote control to make it easier to program the air handler when it's positioned in an elevated location.

Several features of mini-splits make them more energy-efficient than conventional ducted systems. Because each air handler can be set independently of the others, a house can be zoned room-by-room. Some mini-splits rely upon variable-speed fans and compressors to precisely respond to demands for heating and cooling. Energy losses through duct leakage, a major concern with ducted systems, are nonexistent. Mini-splits are available with seasonal energy-efficiency ratings (SEER) up to 21.

For types of construction where there is no or limited space for ducts, a mini-split may be the only option. The lineset (refrigerant lines, condensate tube and power/controller wires) from the air handler to the compressor/condenser generally requires only a three-inch hole for installation.

While window units and PTACs (packaged terminal air conditioners) are also ductless, they are generally not recommended due to their lower efficiency (10 to 12 SEER) and higher noise levels. Most require installation in a window or through a substantial opening in an exterior wall.

8.06 Variable-speed air handler and minimum 600 sq. ft. /ton of cooling

Variable-speed air handlers are desirable for their ability to meet both normal demand (most hours of the cooling season) and abnormal demand (unusually hot times or an above-average occupant load), as well as their superior ability to dehumidify.

Electrically commutated motors (ECMs) for powering fans/blowers are becoming more common in residential air handlers. Electronic controllers automatically change the fan motor speed and the amount of air flow to match heating and cooling requirements. This unique feature of speed variability helps ensure compressor reliability, proper system capacity and airflow distribution through the duct system. Because the motor only runs at a speed that meets required air flow, it can also reduce electric consumption.

ECMs are a necessity for zoned systems, where dampers shut off airflow to one or more rooms in a house. The controller can sense the resulting increase in pressure within the system and lower the speed of the fan motor accordingly. They can also facilitate humidity removal by delivering less air flow across the evaporator coil.

When mechanical ventilation (a requirement for tightly-built houses) is incorporated into the heating and cooling system, ECMs can be used to move just enough air through the system to satisfy ventilation requirements.

NOTE: Some mechanical contractors use installation of ECMs as a rationale to oversize an HVAC system. ECMs allow a system to be sized more closely to heating and cooling requirements, so oversizing the system would be wasteful and inefficient. Points are given for installation of an ECM only for systems serving 600 square feet or more per ton of cooling capacity.

8.07 Variable-capacity compressor and minimum 600 sq. ft./ton of cooling

Variable capacity, dual-stage, or dual capacity compressors can achieve greater efficiency by tailoring refrigerant delivery to meet partial cooling needs. Variable capacity is usually accomplished via inductive control of the compressor motors. While this system is fairly common in ductless mini split systems, it is only now being introduced in the ducted split systems that common in the US or Canada.

More common are systems using either a two-stage compressor or two compressors, one smaller and the other larger. When the system starts, it first operates at the smaller capacity. If the thermostat set point cannot be reached at the smaller capacity, the second stage (or larger compressor) is brought into operation. In other words, only the capacity needed to lower the temperature of the house is utilized.

This type of system can also be used to reduce humidity levels when cooling is not needed. The smaller compressor capacity, coupled with a lower fan speed, dehumidifies with reduced power consumption. When properly sized to heating and cooling loads, dehumidification can be improved as part of the cooling cycle.

NOTE: Some contractors may want to oversize a dual stage system because of its ability to operate at reduced capacity. Superior dehumidification occurs only when the system is properly sized, and an oversized dual stage system will have the same type of comfort problems as a single-speed system and will increase peak electricity demand. Points are given for installation of multi-stage systems serving 600 square feet or more per ton of cooling capacity.

8.08 Ground-source heat pump

Ground-source or geothermal heat pumps are different from traditional air source heat pump units in that there is no outside condensing unit. Instead of rejecting heat from the cooling cycle to the air, the heat is rejected to the earth or water through buried or submerged piping. The indoor unit is the same as other heat-pump equipment.

Ground-source heat pumps take advantage of the near-constant temperatures that exist underground or in the deeper waters of lakes. In the summer, heat is removed from the house and transferred to the earth or water, which is at a lower temperature. In the winter, the process is reversed, with the heat pump extracting heat and then transferring it into the conditioned space.

These systems are energy efficient in both heating and cooling when compared to conventional (air) heat pumps, but the initial cost is greater. Ground source heat pumps can achieve efficiency ratings as high as 28 SEER, producing energy savings of 25-50% over air source heat pump units and up to 75% better than electric resistance heating. Ground source heat pumps are a good solution in locations where electric rates are high and steps to reduce cooling loads (better windows, more insulation, reflective roofing) have been taken.

Different types of installations include:

- **Trench**— Trenches for the tubing, often hundreds of feet long, require a lot of surface area, but may be the only option in hard to drill areas. Refrigerant is sent through closed spirals of tubing and back to the indoor unit.
- **Deep Well** — Wells are drilled (usually one per ton of cooling) and refrigerant is sent through closed, deep pipes and back into the unit. Requires less land area than the trench installation, but drilling the wells may be more costly than trenching.
- **Water source** — An open system where water is pumped into a deep well and drawn out of an adjacent well. Prohibited in many areas due to concern over potential for groundwater contamination.
- **Lake Source**—If a large private body of water is nearby, it can be the most economical ways to reject heat. Closed tubes are extended to the bottom of the lake and back.

All of these systems require careful calculations to ensure the length of pipe run will reject enough heat to operate the unit efficiently.

8.09 Gas furnace is sealed combustion/direct vent model (CoA requirement if located in "sealed" attic)

Sealed-combustion furnaces draw combustion-air directly from outdoors through pipes or tubes connected to sealed-burner compartments. The best units have both an air intake pipe and an exhaust pipe. The entire combustion process is totally sealed from the interior of the house, avoiding the introduction of combustion by-products into the living space. Consequently, sealed-combustion units are safer and usually more efficient than open-combustion units. They get all the air they need for the flame to burn from outside the home, not from the air in the living space. They prevent dangerous and noxious gases, such as carbon monoxide, from entering the home, in case of a drop in air pressure.

Compare this with most residential gas appliances installed in Central Texas, which are open-combustion designs: the combustion chamber and flue are open to the surrounding air and the flame takes combustion air from the space around it. The hot combustion by-products flow up through the appliance flue and out of the house because they are lighter than the surrounding air. It's very important for this to occur properly, because combustion gases contain carbon monoxide and other noxious and dangerous gases, which can cause health problems (headache, fatigue, respiratory problems) and even death. Combustion gases may back-draft into the living space, however, if depressurization occurs inside the house. This could be caused by a gust of wind, poorly constructed flues, leaks in the HVAC duct system, too many exhaust fans running at the same time, etc.

8.10 Hydronic space heat supplied by gas water heater or is solar-assisted

A gas-fueled, combination ("combo") hydronic space-and-water heating system uses a water heater as a heat source for a forced-air heating system. Hot water from the water heater circulates through a heat exchanger in an air-handler, where a blower moves the heated air into a standard duct system to supply warm air to the supply registers.

This system saves space, since no furnace is necessary. It also avoids combustion gases that are produced by a gas fired furnace. More than one air handler can be connected to a single water heater if a zoned system is desired.

Note that the water heater must be sized for the heat load of the house (not the desired hot-water amount) and a minimum recovery-efficiency of 76% is required. Models with recovery-efficiency ratings of up to 90% are available. The higher the recovery-efficiency and energy factor, the lower the utility bills will be for the homeowner.

Hydronic systems can also be connected to solar thermal collectors, providing space heating as well as domestic hot water. Both the heating requirements of the living space and hot water requirements must be calculated to determine the correct size/number of the solar collectors and the appropriate storage capacity. Gas or electric back-up water heating will be necessary for periods of persistent low temperatures or cloudy conditions.

8.11 Sheet metal plenum and main trunk lines; any flex-duct take-offs are no longer than 10 feet

An air-delivery system of a sheet-metal plenum and main trunk lines with short flex-duct runs (no longer than 10') will result in good air-flow, more even temperatures from room to room, and greater energy-efficiency. This will help improve total system efficiency.

As handy as flex-duct is to install, it was not designed for long duct runs, due to its corrugated, high-friction interior surface and consequent reduced airflow. It was designed for very short turns that would be difficult or not cost-effective to fabricate from metal.

Main trunk lines should be used to avoid the "octopus" effect. If too many sections of flex duct are run directly from a small plenum, airflow will not be equal among them. Some will receive more air than necessary and some will receive too little.

8.12 Air-tight supply buckets/boots (ductboard or pre-fabricated)

The 2006 IECC code requirements for HVAC duct system joints and seams requires that they "shall be made substantially airtight by means of tapes, mastics, gasketing or other approved closure systems". Air-tight supply buckets or supply boots are available ready-made that meet this requirement by using snap rail flanges. This improved boot design is available either uninsulated or wrapped with an R-6 EPS cover.

Supply buckets fabricated from ductboard can be made fairly leak-proof, since they have a minimum of seams that can be sealed with mastic or approved tape. Care should be exercised to avoid damaging the outer surface of unlined ductboard – small holes or scrapes can allow supply air to escape.

8.13 Ceiling registers are curved-blade type located high on walls or in ceiling

Supply registers can have a substantial impact upon the amount of air delivered to a room and how that air is distributed. Ceiling registers with curved blades can reduce noise and increase air flow, and they redirect air for a better throw into the room – registers with flat blade deflect the air, reducing flow. The builder should ensure that the size, location and type of the register are matched to the air flow requirements for each room.

Registers should be located either in the ceiling or high on a wall so as to distribute air across the room, not down toward occupants.

8.14 Ductwork system is masked/sealed at supplies and returns during construction

In most residential construction, the ducts are installed after the structure is framed, but before drywall, paints, and other components are installed. If the openings in the ductwork are not sealed, dust and other contaminants common during the construction process can settle in them. These contaminants, if deposited on the blower and coil, reducing system efficiency. Dust in the ducts can also contribute to the growth of mold and dust mites.

All ducts should be sealed at the supplies and returns until the rest of the mechanical system is installed and work in the interior of the house is substantially complete.

8.15 HVAC filter: $\geq$ 4" pleated-media, or electronic (not electrostatic); easily accessed (HVAC system designed for filter type)

The filter is an important part of the heating, ventilating, and air conditioning (HVAC) system. A good filter protects the evaporator coils, blower fan, and ducts from becoming covered with dust, pollen and other particulates that can significantly decrease the HVAC unit efficiency and shorten its life. A good filter can improve the quality of conditioned indoor air for the occupants, as well.

Standard woven-fiberglass panel filters provide no improvement in indoor air quality and only minimal protection for the HVAC equipment. They are ineffective at protecting the HVAC equipment (the fan motor and heating/cooling coil) and they do not remove indoor dust and air pollutants that irritate people. Such filters are rated <1 on the MERV scale (Minimum Efficiency Reporting Value). (The MERV system rates filters on a scale of 1 to 20, 20 being the most effective at removing contaminants.) Since these fiberglass filters can only screen out very large particles, such as pollen and dust mites, they are not recommended, in spite of their low price.

A pleated-media filter is reasonably effective at doing these two jobs for a modest price and is therefore a far superior choice for the cost. A 4-inch filter typically lasts at least six months in most households, especially one without pets. People who get twice-a-year HVAC maintenance (a good idea) can have the technician take care of the filter and they never have to bother with it themselves. They are about 5--10 times more efficient than standard woven-fiberglass filters, mainly depending on the thickness installed

(20%—75% efficiency range on a dust-spot test and 6 - 12 on the MERV). An electronic (not electrostatic filter) is also acceptable (dust spot efficiency of 90%).

Due to its substantial impact on airflow, the filter must function properly with the mechanical system. In new homes, it should be possible to get good filtering and proper airflow at the same time. More efficient filters may require a more powerful blower.

Electronic filters use high voltage to charge particles in the return-air stream. They are the most efficient kind of filter (90% "dust spot" rating) and restrict air flow only minimally. However, they are very expensive, use electricity, and must be well-maintained. They are the best filter for people with severe allergy problems but may not be practical for other people.

Another choice for people suffering from allergies is a HEPA (high efficiency particulate arresting) filter. It is made of ultra-fine glass fibers pressed into a paper-like material, which is folded in pleats to maximize surface area, thereby improving air flow and increasing the apparent thickness of the filter medium relative to the particle's angle of attack. The principle means by which HEPA filters stop particles is simply through impact. As a particle tries to penetrate the filter it runs into a fiber and remains there because of the attraction between positively-charged and negatively-charged materials.

Note: we do not recommend electrostatic filters (even though they have the virtue of being reusable and of not restricting air flow) because they are not very efficient. Ozone generators are not recommended because ozone is a powerful oxidant and can damage lung tissue.

Note: The mechanical system must be designed for the filter used because filters affect airflow. Also, location of filters is also an important part of design: they should be located for easy maintenance.

8.16 Mechanical ventilation with damper brings outside air into return-air plenum

Improvement in building materials and construction techniques produces tighter houses, which means some degree of mechanical ventilation is desirable to maintain indoor air quality. The amount of mechanical ventilation required depends on a number of factors: size of the house, number of occupants, rate of natural infiltration (tightness), amount/types of indoor pollutants, and climatic conditions.

In the past, ASHRAE 62.2 called for a combined natural infiltration/mechanical ventilation rate of .35 ACH (air changes/hour). For example, if a house with an interior volume of 13,050ft^3 (1450ft^2 with 9 foot ceilings) has an infiltration rate of .2 ACH - or 43.5cfm - it would require additional continuous mechanical ventilation of 33cfm for a total rate of 76.5cfm to meet the .35 ACH benchmark.

The current standard for ventilation, ASHRAE 62.2-2004, sets a ventilation rate based on the square footage of the house and estimated number of occupants (number of bedrooms + 1), resulting in a ventilation rate for smaller houses that is similar to the prior standard, but generally lower for larger houses. It is up to the builder and mechanical contractor to determine the natural infiltration rate and what amount of mechanical ventilation is required using the following formula:

$Q_{fan} = 0.01A_{floor} + 7.5(N_{br}+1)$
where
Q_{fan} = fan flow rate in cubic feet per minute (cfm)
A_{floor} = floor area in square feet (ft^2)
N_{br} = number of bedrooms; not to be less than one

Keep in mind that the above formula includes a default credit for ventilation provided by infiltration of 2cfm/100ft^2 of occupiable floor space. For example, if the 1450ft^2 house in the example above had three bedrooms, then $.01 \times 1450 + 7.5 \times 4 = 44.5$cfm continuous ventilation. When added to the default infiltration of 29cfm (2cfm/100ft^2), the resulting total ventilation rate is 73.5cfm, very close to 76.5cfm of the old ASHRAE 62.2. A house with an infiltration rate of less than 2cfm/100ft^2 would need more mechanical ventilation; a house with infiltration greater than 2cfm/100ft^2, less mechanical ventilation.

Fresh outside air can be added in a controlled manner to the air distribution components of the heating and cooling system by use of an outside-air intake-duct. When connected to the return air plenum, a fresh-air duct allows outside air to be mixed with the house air when the heating or cooling system is operating. A timer can be added to introduce fresh air into the home periodically (e.g. every twenty minutes) when the heating and cooling system is not operating. A balancing damper controls the flow of fresh air into the system.

Certain thermostats can also accommodate control of mechanical ventilation systems. In some cases, they will prevent ventilation when outdoor temperatures are too high or low, or outdoor humidity is excessive.

Note: ASHRAE 62.2-2004 sets a maximum whole-house mechanical net exhaust flow of 7.5 cfm per 100 ft^2. Some integrated ventilation systems take into account exhaust fan operation and can adjust the operation of ventilation fans accordingly so as to not exceed the maximum rate. Care should also be taken to temporarily reduce ventilation rates when the outdoor temperature/humidity is extremely high.

8.17 Stand-alone hygrometer; OR thermostat has integral hygrometer or humidistat

A hygrometer measures both temperature and relative humidity. Although it doesn't "do" anything, it serves as a powerful tool to help occupants better understand and operate their home.

A thermostat with an integral humidistat can allow certain cooling equipment to maintain a desired relative humidity. This is especially valuable in the spring and autumn when humidity is high but the temperature moderate, causing the system to "short cycle" and turn off before moisture in the air has had a chance to condense on the evaporator coil located inside the house. Humidistats are usually combined with variable-speed air handlers (see 8.06). When set to dehumidify, the air handler operates at a lower airflow which allows the evaporator coil to reach a lower temperature more quickly.

Humidity control is important in Central Texas homes since high humidity conditions that foster mold and mildew growth consistently occur year-round. Poor construction methods and over-sized cooling systems exacerbate this problem. The source cannot be easily eliminated, so mechanical ventilation and dehumidification are often the best solutions.

8.18 Energy Star Programmable thermostat

A thermostat, in its simplest form, must be manually adjusted to change the indoor air temperature. Programmable thermostats can be pre-programmed to adjust temperature automatically, according to occupants' lifestyle, and thus have the potential to reduce monthly heating and cooling bills by up to 10%.

All ENERGY STAR qualified programmable thermostats perform one or more of the following energy control functions:

- Store and repeat multiple daily settings, including a "hold" feature that allows users to temporarily override automatic settings without deleting programs (For example, programming can be adjusted to maximize savings during a vacation or extended absence)
- Store four or more temperature settings a day, including separate weekday and weekend programs, each with up to four customized temperature settings—two for occupied, "in use" periods and two for energy-saving periods when the house is unoccupied or occupants are asleep
- Adjust heating or cooling turn-on times as the outside temperatures change

Other desirable features include:

- An advanced recovery feature that can be programmed to reach the desired temperature at a specific time in a way that minimizes system run-time and auxiliary heat use
- Ability to maintain room temperature within 2 degrees Fahrenheit of desired temperature Digital, backlit displays
- Touch pad screen programming
- Voice and/or phone programming
- Hold/Vacation features
- Indicators which tell you when its time to change air filters
- Indicators that signal malfunctioning of heating/cooling systems
- Adaptive Recovery/ Smart Recovery features - control features that senses the amount of time it will take to reach the next set-point temperature, and reach desired temperatures by the set time

Homeowners need to be instructed on how to use their programmable thermostat.

8.19 Air distribution system leakage no greater than 5%

Air-distribution system leakage no greater than 10% as verified by a direct duct-pressure test performed by approved 3rd party, is required by the City of Austin energy code for all homes permitted since January 1, 2008 and for homes in any location rated under the AEGB program. Leakage of no greater than 5% represents a substantial improvement over that requirement.

Air leakage is more difficult to identify than water leaking from pipes, but the problems created by it may be just as serious. These problems may include loss of conditioned air, infiltration of unconditioned outside air, unbalanced supply-air flow, backdrafting of combustion gases from gas appliances, and introduction of dust, pollen, and mold into living spaces.

HVAC system leakage testing and repair can improve cooling equipment efficiency, operating conditions, and indoor air quality in a home in four ways:

1. **The quality of workmanship can be evaluated.** When leaking supply air ducts are located in an attic, for example, the conditioned air leaks out into the attic and is eventually vented to the outside without ever reaching a living space. It is obviously inefficient and costly to condition air only to have it leak to places where it is not needed. Good test results can assure the homeowner that conditioned air is being delivered to actual living space and not unintentionally to locations outside the home's thermal envelope.
2. **Air pressure imbalances in a home may be discovered.** When the indoor air pressure is negative, for example, the house can draw in hot, humid outdoor air, and also from the attic, crawl space, basement or garage. In addition, gases can be drawn into the living space from flues and chimneys. This is called backdrafting and can occur when fireplaces, gas furnaces and gas water heaters are being used or operated.
3. **Health and safety risks can be assessed.** Sealing leaks in return-air ducts stops pollutants from being drawn into the home from the attic (insulation fibers, dust), crawl space (moisture, pesticides, mold and mildew spores, animal residue, insulation fibers, dust), and the garage (car exhaust, carbon monoxide, chemical fumes, dust).
4. **A smaller capacity and less costly cooling unit may be installed.** A person performing Manual J calculations (see above) can now rely on correct duct installation and therefore won't be tempted to over-size the equipment.

The duct leakage test is typically performed by the 3rd party home performance testing company when construction is complete. It is good practice, however, for the mechanical contractor to test at the rough stage to be sure he is on track to pass the final 3rd party test. This is particularly critical if ductwork will not be accessible later on (e.g. it is located in a furred down or house is 2-story with ductwork in the floor between). A final test at completion is always needed, however, since damage may occur at a later time during construction.

Builders should be sure that their agreement with their mechanical contractor states that testing will be done, and that the mechanical contractor is responsible for workmanship that meets the Rating standard.

SECTION 9: ELECTRICAL

9.01 Ceiling fans in all main rooms and bedrooms (not required in dining areas)

Air moving over the skin increases the evaporation rate of moisture on the skin, which has a cooling effect. A person exposed to moving air will be comfortable at a temperature four to five degrees higher than if he is in still air. The thermostat can be raised several degrees, thus saving on expensive air-conditioning. Ceiling fans are a low-cost way of making people more comfortable in hot weather. A ceiling fan costs about the same to run as a 100-watt incandescent bulb.

Ceiling fan blade spans range from 29 to 54 inches. To determine which size you need, measure the room where the ceiling fan will be installed and follow these guidelines:

Room Dimensions	Suggested Fan Size
Up to 75 ft^2	29 - 36"
76 - 144 ft^2	36 - 42"
144 - 225 ft^2	44"
225 - 400 ft^2	50 - 54"

Energy Star-qualified ceiling fans provide more energy savings with improved motors and blade designs, and light kits. Ceiling fan/light combination units that have earned the Energy Star designation are about 50% more efficient than conventional fan/light units. This can save $15-$20 per year on utility bills, plus any additional cooling or heating savings that may be gained when fans are operated properly.

9.02 Whole-house fan with insulated cover

A whole-house fan (also known as an attic fan) can reduce the need for mechanical cooling when properly used. Opening windows and running the whole-house fan whenever the outdoor temperature is lower than the indoor temperature and relative humidity is not too high will help cool the house.

When a whole-house fan is installed in an attic, care must be taken to ensure that enough ventilation pathways are present in the attic to exhaust the air out. Determining the amount of airflow in cubic feet per minute (cfm) that the whole house fan should provide involves a simple calculation. Multiply the total gross square footage of the house (include upstairs area) by the ceiling height (typically 8 feet). Select a fan that delivers between one half to one times that amount of cfm at 0.1" static pressure. For example, a 25'x40', one-story home is 1,000 square feet and would need an 8 x 1,000 x 0.5 = 4,000 cfm fan or better. One manufacturer offers a two-speed unit that delivers 4,500 cfm at the high setting (240 watts) and 3,200 cfm at low (120 watts); this unit should be adequate.

A removable, insulated cover should also be installed for use when the fan is not on. If an insulated cover is not used, conditioned air will escape from the living spaces through the fan opening. Because the louvers are leaky, a cover should be purchased or constructed to seal and insulate this opening during the seasons when the fan is not in operation. The cover can be installed from the attic side if attic access is easily available or from the house side. Both covers could be included in excessively hot or cold climates. Homeowners must remember to remove cover(s) before operating the fan and to replace cover(s) during seasons when the fan is not in use.

Homeowners should be informed that the fan must be used in conjunction with open windows. Closing windows in unused rooms will create higher velocity air movement in occupied rooms. They should also be told that during times of high humidity, it's better to use the central cooling system, which dehumidifies the interior air, rather than the whole-house fan, which will draw in outside humid air.

Note: do not install a whole-house fan if attic is sealed (not ventilated).

9.03 Bathroom exhaust-fans connected to timer or humidistat (recommended sone rating ≤1)

Whether a bathroom fan is connected to the light switch or is independently switched, the occupant typically turns off both at the same time, before the fan has had time to exhaust excess humidity (this typically requires a run-time of about 20 minutes.. Separating these functions and connecting the fan to a timer or humidistat will do a much better job of reducing excess humidity.

Ideally, a fan exhausts enough air to get rid of the excess humidity without making so much noise that no one wants to turn it on in the first place. After the correct CFM rating is selected (see above) the sone (sound) rating should be selected. (One sone is equivalent to the sound of a quiet refrigerator in a quiet kitchen.) Typically, the sone level is measured at maximum CFM (speed). However, some newer products are also being tested at normal CFM (speed) settings to provide consumers with typical sound level information. Installing a fan with a sone rating no greater than 1.0 increases the likelihood that the occupants will use it. A combination of a more powerful fan motor and a larger turbine (fan blade) results in a quieter fan.

Installation quality is equally important to having a quiet fan, however. The duct should be right-sized for the fan, as short as possible, taut and well supported, and have no kinks or compression (just like HVAC ductwork). Although in-line fans that mount in the attic, not in the ceiling, are the quietest, they are not recommended because they tend to exhaust so much air, they can easily depressurize the house. This causes an increase in air infiltration and risk of backdrafting from gas-appliance.

9.04 Recessed-can lighting fixtures installed do not break through the thermal enclosure OR no recessed-can fixtures are installed

Research shows that recessed can lights (even air-sealed IC-AT type) in insulated ceilings are one of the largest sources of air loss in homes because they usually puncture and compromise the thermal envelope.

If a home has a sealed attic (polyurethane foam at the rafters) can lights are acceptable. They are also acceptable in the first-floor ceiling of a 2-story home. Otherwise they must be omitted for these points to count.

9.05 ENERGY STAR Advanced Lighting Package (ALP) requirements met

An ENERGY STAR Advanced Lighting Package includes only lighting fixtures and ceiling fan products that are rated for compliance according to EPA/DOE's stringent requirements aimed at maximizing efficiency and energy bill savings. The ALP designation apaplies to lighting packages that consist of a minimum of 60% ENERGY STAR-qualified hard-wired fixtures and 100% ENERGY STAR qualified ceiling fans. ENERGY STAR-qualified recessed downlights, ceiling fan light kits and ventilation fans with lighting may also be counted toward the fixture requirement. Certain fixtures are required to use non-screw based technologies for sustained savings so that CFL or LED bulbs cannot be replaced by standard screw-in incandescent bulbs.

9.06 A minimum of five items from the following list are Energy Star qualified: appliances, light fixtures/luminaries, ceiling fans, and/or ventilation fans

ENERGY STAR-qualified appliances incorporate advanced technologies that use 10–50% less energy and water than standard models. The money saved on utility bills can more than make up for the cost of a more expensive but more efficient ENERGY STAR model. A helpful website for identifying the *most* efficient dishwashers and other appliances is **www.aceee.org**.

The average dishwasher uses 8 -12 gallons of water when set on its normal cycle. Though electricity or gas is used to run the machine, about 80% of the energy consumed by the dishwasher is used to heat the water. Decreased water usage can save hundreds of dollars over the lifetime of a machine. Some dishwashers have options to allow the adjustment of the machine's settings to reflect the size of the load and how dirty the dishes are. This can also lower the water use and therefore the energy bills. An efficient dishwasher typically consumes less water and energy than washing by hand under a running faucet.

ENERGY STAR-labeled dishwashers are at least 25% better than the federal water and energy requirements set for dishwashers. A list of these appliances and other information on efficient appliances can be found at the ENERGY STAR web site. Although Energy Star does not measure water efficiency, Energy-Star-rated dishwashers typically use 30-50% less water.

Check out these websites: **www.epa.gov/WaterSense/**

www.energystar.gov/index.cfm?c=dishwash.pr_dishwashers

ENERGY STAR qualified ceiling fans use improved motors and blade designs. Ceiling fan/light combination units that have earned the Energy Star are about 50% more efficient than conventional fan/light units.

ENERGY STAR qualified kitchen range hoods, bathroom and utility fans, and inline fans provide energy savings and are significantly quieter than standard models. Qualified ventilation fans that include lighting use 70% less energy on average than standard models, saving $120 in electricity costs over the life of the fan. These fans high performance motors and improved blade design, providing better performance and longer life and are more than fifty percent quieter than standard models.

9.07 A minimum of 90% of lamps/bulbs are Energy Star-compliant

Lighting fixtures that have earned the Energy Star designation combine high performance, attractive design, and highest levels of energy-efficiency, so they save energy, save money on utility bills and help protect the environment. Energy Star fixtures accommodate bulbs that have a minimum life of 10,000 hours. This means that with regular use (i.e., four hours per day), you won't need to change the bulb for at least seven years. All Energy Star-qualified light fixtures carry a two year warranty - double the industry standard. They also have a color rendition index (CRI) of 82 or higher, so the colors they illuminate look true and natural. Qualified fixtures can now be found at most home centers, lighting showrooms, and specialty stores. Look for qualified fixtures for the following applications: torchieres, under and over cabinets in the kitchen, ceiling-mounted, wall sconces, suspended fixtures and outdoor lighting, including motion sensor fixtures.

9.08 Exterior light fixtures are designed to reduce up-lighting / light pollution, or locations are shielded from above

Exterior light fixtures, which allow light to shine above the horizontal plane, create light pollution and rob people of being able to see the night sky. Furthermore, they frequently cause annoying "light trespass" on to neighboring property, and are often a safety hazard because they produce a blinding glare.

An obvious result of all this wasted light is the huge waste of the energy required to produce it. The International Dark-Sky Association estimated in 1996 that the cost of energy spilled upward into the night sky was nearly 1.5 billion dollars per year in the U.S. alone. The cost of energy wasted in light trespass was not calculated. The costs of power production and the resulting pollution are borne by the whole community.

Attractive, appropriate light fixtures that prevent up-lighting are now readily available. Fixtures that reduce light trespass as well are also available. Wattage of the lamps/bulbs should be as low as possible to reduce glare, promote safety and prevent energy waste. The eye adapts very quickly to low light levels at night.

The International Dark-Sky Association (IDA) provides objective, third-party certification for luminaires that minimize glare, reduce light trespass, and don't pollute the night sky. For a modest fee, IDA will evaluate the photometric data of any luminaire submitted by its manufacturer. When the fixture is approved, the manufacturer receives a certificate and the Fixture Seal of Approval. Manufacturers may use the FSA seal to promote and advertise their IDA-Approved™ Dark Sky Friendly products. For a directory of lighting fixtures approved by the International Dark Sky Association see: www.darksky.org/fixtures/.

Note: to earn the points of this measure, it is not necessary to install IDA-approved fixtures.

9.09 All exterior lighting has motion detectors with photocell controllers or is solar-powered

Outdoor lighting that is fluorescent, motion detector, or photocell-controlled will reduce energy costs to the homeowner and provide security or landscape lighting when it is needed.

Fluorescent lighting is much more energy-efficient than incandescent lighting. For example, a 27-watt fluorescent lamp will produce the same amount of light as a 100-watt incandescent and will last ten times longer, on average. This reduces both the cost of operating the lighting and the replacement costs. Exterior light fixtures are often hard to reach—another good reason to install a long-lasting lamp.

Motion-detector lighting provides security lighting when someone enters the field of the motion detector. This type of security lighting is far more effective than constantly illuminating security lighting, since people tend to ignore an unchanging environment. It also saves energy by having the light on only when it is needed. This is convenient for the occupant needing to find the keyhole at night, and makes him/her feel safer. Motion-detector lighting should be equipped with a photocell. Photocells sense ambient light and only turn on when ambient light falls below a certain level.

Solar-powered outdoor lighting fixtures use photovoltaic cells to produce electricity directly from sunlight.

9.10 Central vacuum system; exhausts to the outside

Central vacuum systems offer numerous advantages in terms of improved indoor air quality, reduced energy usage, and reduced landfill waste. When installed with exhaust air to the outside, many pollutants are removed from the indoor living space. Additionally, several central vacuum power units offer the following environmentally friendly advantages:

- Made of recyclable steel, reducing the impact on landfills
- Require no paper bags or filters reducing the impact on forests and landfills
- Longer life - less impact on landfills than traditional vacuum cleaners
- Built-in dust pan to encourage sweeping dust to the pan, which means the central vacuum runs less, thus conserving energy
- Turbine powerheads run from the airflow of the central vacuum instead of from electricity, so they further reduce the amount of energy used

9.11 Solar photovoltaic (PV) power system installed: 1.5 kW minimum

9.12 Solar photovoltaic (PV) power system installed: 3.0 kW minimum (at least 1.5 kW in addition to 9.10)

Solar electric photovoltaic panels turn a home into its own power plant. Although it is not yet practical for a home connected to an electric grid to have a solar PV array large enough to meet its entire need for electricity, a small array provides an excellent supplement.

However, it makes sense to install PVs only after insuring that the home is built to a high standard of energy-efficiency. Otherwise the PVs would be like lipstick on a pig (or *hog*, to be more apt).

A photovoltaic (PV) or solar cell is the basic building block of a PV (or solar electric) system. An individual PV cell is usually quite small, typically producing about 1 or 2 watts of power. To boost the power output of PV cells, we connect them together to form larger units called modules. Modules, in turn, can be connected to form even larger units called arrays, which can be interconnected to produce more power, and so on. In this way, we can build PV systems able to meet almost any electric power need, whether small or large.

The most common array design uses flat-plate PV modules or panels. These panels can either be fixed in place or allowed to track the movement of the sun. They respond to sunlight that is either direct or diffuse. Even in clear skies, the diffuse component of sunlight accounts for between 10% and 20% of the total solar radiation on a horizontal surface. On partly sunny days, up to 50% of that radiation is diffuse. And on cloudy days, 100% of the radiation is diffuse.

It is the law in the State of Texas that an electric provider must buy back excess electricity produced by a home or building. Some electric service providers try to discourage the installation of grid-tied systems by making the process difficult and costly.

Within the Austin Energy service grid, this is not a problem, however. Homes may have PVs installed to supply energy to the home or to the centralized grid when the PV power exceeds the homeowner's need for electricity. The interface between the home-produced power and the grid can be metered so that when power produced by the PVs is sent into the grid, the meter will run backwards and the homeowner's utility bill will be credited. When power is needed from the grid, the meter will run forward and the utility bill will be charged. The monthly utility bill will therefore be the cost for the home's "net energy use" – total power provided by Austin Energy minus the unneeded power the home's PV system sent back to the electric grid.

To encourage the implementation of solar technology, Austin Energy offers rebates to its qualifying electric customers to help offset the cost of a solar photovoltaic electric system or solar-thermal hot water system. One of the highest in the country, this rebate level will pay between 45-75% of the cost of installation of a solar system. For example, the cost of installation of a 1-kilowatt (1,000 watts) solar system, the smallest considered practical, is expected to cost between $6,000 and $10,000. The Austin Energy rebate will pay approximately $4,000 toward the installation.

For more information about how PV systems work, visit the DOE Energy Efficiency and Renewable Energy website:www1.eere.energy.gov/solar/photovoltaics.html

For more information about the Austin Energy solar rebate program visit:

www.austinenergy.com/Energy%20Efficiency/Programs/Rebates/Solar%20Rebates/index.htm

SECTION 10: INTERIOR CONSTRUCTION AND FINISHES

10.01 Interior moulding is finger-jointed or MDF

10.02 OR Interior moulding is locally milled local species; made from agricultural waste product; or is FSC-certified wood

Such materials have many environmental and other advantages. The doors/cabinet faces/trim made of wood from local species keeps local money in the local economy, as well as saving the additional expense and pollution that would be incurred if the products were shipped long distances.

Engineered trim is designed to do its job properly and use resources efficiently at the same time. It may be made up of smaller pieces of lumber or from small, fast-growing tree species, thus saving our old-growth forests.

FSC-certified (Forest Stewardship Council) wood means that the lumber has been taken from a certified, sustainably harvested forest that is well managed to preserve wildlife, plant life, water, soil, and the health of the forest for future generations.

10.03 Cabinet boxes, doors, drawers + adhesives: a) meet E1; or b) CARB Phase 1; or have no added urea-formaldehyde

Since formaldehyde is a known threat to health, reducing its use in building products is a prudent thing to do. Formaldehyde is a common component of typical cabinet materials, such as interior plywood, most medium-density fiberboards (MDF), and particleboard. Materials that meet the E1 standard (in effect in most European countries as well as others that have adopted an equivalent standard) have formaldehyde emissions no greater than 0.1 parts per million. Materials meeting this standard are usually so marked on their labeling. If there is any question as to whether a material meets the standard, contact the manufacturer.

CARB Phase 1: In April 2007 California adopted limits on formaldehyde for panel materials that are similar to the E1 standard. (The California standard relies on the ASTM E-1333-1996 testing protocol, which differs from the European protocol.) The initial phase of standard takes effect in January 2009.

See **http://www.arb.ca.gov/toxics/compwood/compwood.htm**

Examples of materials that do not contain added formaldehyde are solid wood, metal, glass, and "formaldehyde-free" MDF panels. In regard to these MDF materials, that means that no formaldehydes have been added during manufacture. Very low levels of formaldehyde may occur naturally in the wood itself.

10.04 At least 75% of all cabinet faces are locally milled local species; or FSC-certified wood

10.05 At least 75% of all doors are locally milled local species; or FSC-certified wood

See 10. 2 above.

10.06 Structural floor is the finish floor for a minimum of 50% of all floor area (e.g. exposed concrete, single-layer wood)

When the finish floor of a home is also the structural floor, materials and installation labor can be cut substantially, significantly reducing overall material needs and costs.

Exposed concrete floors are extremely durable, easy to clean and maintain, and are very desirable in today's marketplace. They may be colored with low-toxin pigments, scored, and finished in patterns, for great, aesthetic appeal. As an added bonus, they also provide an energy benefit, due to the ideal ground temperature in Central Texas.

Single layer wood flooring (no sub-floor) usually consists of tongue-and-groove 2x solid lumber. Since construction-grade lumber is usually used for this purpose, it is less expensive than flooring-grade wood laid over a sub-floor (and saves the cost of the sub-floor) and can be very aesthetically appealing. Since both sides of the lumber can be exposed, it can be installed to serve as the finish ceiling of the lower story of a two-story house, an even more material-conserving and beautiful technique. Note, however, that this application does not provide sound protection, and since no wiring or other "guts" can be run in the ceiling, careful planning is required to find other locations for them.

10.07 Finish flooring is durable material for minimum of 50% of all floor area (e.g. ceramic tile, concrete, wood)

OR

10.08 Flooring is 100% durable material

When floors are made of the durable materials listed above, they require less maintenance, less frequent replacement (in some cases, they never need replacing) and contribute to a healthier indoor environment, for both the installers and occupants. They are easier to clean and do not harbor dust mites, as carpet does.

NOTE: Although soft vinyl flooring (sheet vinyl) has some of these same benefits, it is does not qualify for these points, due to our efforts to reduce the use of fossil-fuel and chlorine-based materials, with their associated health and environmental risks. Superior substitutes are readily available, such as true linoleum. Vinyl composition tile currently remains on the acceptable list because it does not contain plasticizers--chlorine-based compounds that increase health risks and environmental burdens.

10.09 Flooring is rapidly renewable or reused material for a minimum of 25% of all floor area (e.g. cork, wool)

Rapidly renewable materials can be replenished quickly and have minimal negative environmental impacts. Examples of such materials are cork, linoleum, bamboo, and carpeting of sisal, sea grass, jute, and wool.

- Cork can be safely harvested from cork trees every nine years. It provides acoustic and thermal insulation, is resilient (if dented, returns to its shape), is air and water-tight, termite and rot-resistant, and provides a pleasant cushion underfoot. It is no longer made with urea-formaldehyde binders.
- Linoleum (made from linseed oil, wood flour, cork flour and ground limestone) is extremely durable and resilient (good point load, so very resistant to high heels), naturally anti-static and anti-bacterial (therefore popular in hospitals), resistant to oil and many solvents, and has low flammability. Do not confuse it with vinyl.
- Bamboo is harvested about every six years and is as hard as maple, but is more stable in conditions of changing humidity (as is common in our climate) than hardwoods. Buyers should look for products which do not contain added formaldehyde in glues and finishes.
- Wool carpet naturally resists dirt and stains, reduces the problem of static electricity, is flame resistant, and will far outlast synthetic carpets because of its natural resilience (the fiber is shaped in a coil and can spring back many more times than synthetic fiber). Most other natural carpet materials are also resilient, and resistant to staining, dirt, and static-electricity.

Bear in mind that many of these materials are sourced in far-away locations that substantially increase their embodied energy by the time they get to the job-site.

10.10 Carpet, carpet padding or flooring adhesives have the CRI Green Label

The Carpet and Rug Institute has established a labeling program to identify carpet, carpet padding and flooring adhesives, which have been tested by an independent laboratory and met certain criteria for low emissions of harmful chemicals. (See **http://www.carpet-rug.org/drill_down_2.cfm?page=8&sub=4**) Products are re-tested quarterly to monitor continued compliance. The current criteria, based on a maximum emission factor measured in mg/m^2 hr are as follows:

Carpet	
Total VOCs	0.50
4-PC (4-phenylcyclohexene)	0.05
Formaldehyde	0.05
Styrene	0.40
Carpet padding/cushion	
Total VOCs	1.00
BHT (butylated hydroxytoluene)	0.30
Formaldehyde	0.05
4-PC	0.05
Adhesives	
Total VOCs	10.00
Formaldehyde	0.05
2-Ethyl-1-Hexanol	3.00

10.11 Interior wall and ceiling paint has maximum VOC level of 10 grams per liter

See Basic Requirements. The more we can reduce VOC levels in our indoor environment, the less health risk occupants will face. The lowest level paints are particularly recommended for remodeling work if occupants remain in the home while work is being done.

10.12 All doors have lever handles

Lever door handles are much easier to turn than knobs. People with a hand impairment from illness or injury will have a much easier time using doors with lever handles. Since they can be operated with a push of the elbow, they are more convenient for someone with his hands full, as well.

10.13 Grab bars installed in tub and/or shower of at least one bathroom

Grab bars make tubs and showers safer for all users.

Many people associate grab bars with the elderly, and not wanting to put themselves in that category, don't want to consider installing these bars. But even able-bodied people have accidents in slippery tubs and showers—e.g., they may be distracted by shaving or they may be stiff and sore from overdoing their exercise program. They may be temporarily disabled from an accident or operation.

Fortunately there are styles to suit every décor now, so one doesn't have to settle for "hospital" style.

10.14 Carbon monoxide detector installed (may be combined with smoke detector)

Today's houses are built very tight to be energy-efficient, so maintaining a healthy indoor environment is becoming an increasing concern, especially in homes with gas appliances (see H17). A carbon monoxide detector can be a helpful tool to protect occupants from the dangers of combustion appliances.

Only a few gas appliances are made with sealed-combustion chambers, and installation of available ones (some furnaces, water heaters and fireplaces) is not yet common in the Austin area, due to unfamiliarity and higher cost. For these reasons, it is wise to install a carbon monoxide detector. Two-story and spread-out one-story homes may need more than one.

SECTION 11: SITEWORK AND LANDSCAPING

See Grow Green for information on appropriate, water-wise landscaping for Central Texas

11.01 Permanent erosion and storm-water control measures (such as piped drainage system, berms and swales)

New developments are required to construct stormwater detention, retention and/or water quality ponds to reduce flow and clean the water from rain events.

Individual homesites can be designed to do the same thing and recycle rainwater without the use of cisterns. Swales and berms can direct the sheet flow of rainwater to depressed areas where it slowly percolates back into the soil. Another way to use stormwater on the landscape is to create a rain garden with native plants (http://www.ci.austin.tx.us/growgreen/raingardenplants.htm) that thrive in occasional wet and dry conditions.

11.02 Decking material of raised porch/deck is recycled-plastic/composite lumber

Wood composite and plastic lumber are manufactured with up to 100% recycled materials, sometimes including a large percentage of post-consumer products. They are durable, waterproof, and pest resistant.

11.03 Existing natural vegetation is retained on at least 50% of pervious cover area

Existing natural vegetation has proven itself able to thrive on the site without added water or fertilizers. Keeping this vegetation intact will eliminate the homeowner's need for landscape maintenance, the use of pesticides and fertilizers, and will reduce water bills. It will also help preserve existing wildlife on the site. Taking the lessons that nature provides us about our soil, water, and sun will give us clues to the types of plants to put into re-planting areas.

Some of this vegetation may be native to our area and some of it may just be well-adapted* for our conditions. For additional information on *native vegetation* go the Lady Bird Johnson Wildflower Center at http://www.wildflower.org/collections/collection.php?collection=TX_central or see *Native and Adapted Landscape Plants* http://www.ci.austin.tx.us/growgreen/pg_pdfs.htm from the City of Austin Grow Green Program.

*Many well-adapted plants are highly invasive and should be avoided.

11.04 No turfgrass installed or *planned*

"Planned" means that the entire site is landscaped with something other than turf (for example, hardscape areas, mulched sections, a groundcover named on 11.06 approved lists). This does not mean that the builder has provided no landscaping, leaving that to the homeowner, who will then likely install turfgrass!

OR

11.05 Turfgrass/lawn does not exceed 50% of pervious cover area

Turfgrass lawns are popular for their beauty and for being a pleasant surface for recreational activities. Most varieties require huge amounts of water to thrive in our climate, however. Omitting turfgrass entirely from a home's landscape, or reducing the amount planted, eliminates or reduces the need for water, fertilizer, pesticides, cutting time and costs. Many other kinds of vegetation, with fewer negative environmental impacts, are available for attractive landscaping.

11.06 Existing vegetation substantially retained; OR all new plants from Grow Green list AND turfgrass area installed ≤ 2,000 sq.ft.

11.07 Turfgrass/lawn in full sun is AEGB-approved low-water variety (common Bermudagrass, zoysia japonica, buffalo)

Austin's blazing sun takes a heavy toll on most varieties of turf grass. A number of low-water varieties are available, however, that thrive better in sunny areas. They typically have these advantages:

- Drought-tolerance
- Heat and cold-tolerance
- Establish quickly
- Need very little fertilizer
- Need very little watering
- Insect, disease, and fungus-resistant

Common Bermuda grass requires 1/5 of the water commonly required by St. Augustine grass. Buffalo grass is the most water-conserving type of grass for Central Texas. It grows slowly and seldom needs mowing (maybe only twice in a season). (609 Buffalo Grass will thrive in shadier areas as well: it needs only 5-6 hours of sun per day.)

Here is a list of acceptable grasses for the Austin area. Please note that this list may change as more research is done and new grasses are developed. For more information about grass choices, contact your Austin Energy Green Building Representative/Rater.

Benefits of Suitable Grasses	Buffalograss	Bermudagrass	Zoysiagrass Japonica Sp. Only	St. Augustine
Available as seed	Common, Top Gun	Common only	Limited, sources on the Web	No
Available as sod or plugs	Prairie, 609, Stampede (dwarf)	419 Tifway, Tifway II, Tifdwarf, Tifgreen	Palisades, El Toro, JaMur, Cavalier, Crowne	Common, Floratam, Raleigh, Palmetto
Green Building allowable growing conditions	Minimum 6 hours of sun per day	Minimum 6 hours of sun per day	Full sun or part shade	NO FULL SUN Shady areas only
Drought tolerance	Excellent	Good	Good	Fair
Insect problems	Minimal	Chiggers, Bermuda mites	Grub worms	Chinch bugs Grub worms
Weed problems	Nutgrass, Bermudagrass invades easily if you mow & watered! Will not discourage weeds until established.	Nutgrass, broad-leafed weeds, crabgrass, dallisgrass, others.	Some weeds possible, but good cultural practices discourage weeds.	Broad-leafed weeds, crabgrass, nutgrass (not noticeable), others.
Disease problems	Occasional fungal diseases	Occasional fungal diseases	Fungal diseases	Fungal, viral diseases

Note: water use is not the only criteria for turfgrass choice. Some grasses will take more wear and tear, some are more susceptible to weed invasion or disease, some are more invasive, etc.

See the Water Conservation Program website for more information: www.cityofaustin.org/watercon.

11.08 Newly installed turfgrass areas have at least 6" of soil containing 25% compost (e.g., Dillo Dirt, http://www.ci.austin.tx.us/water/dillo.htm); OR no turfgrass installed or planned

See Basic Requirements #14.

11.09 Trees are protected with fencing at the drip line; or a tree protection plan prepared by professional arborist is followed

Trees add value to our entire community because of their beauty, their cooling effect, and contribution to health. Each large shade tree cleans the air by absorbing carbon dioxide. It cleans up the pollution created by a typical car that drives 11,000 miles per year. It gives off enough oxygen to fulfill the needs of a family of four. It reduces the temperature around it through shade and transpiration by about 10°. In addition, trees help reduce the "heat-island effect" in cities. Heat islands develop as vegetation and its cooling effects are lost and replaced by heat-absorbing materials, such as asphalt and concrete. These higher temperatures result in *increased* demand for air-conditioning, which requires *increased* energy production, which *increases* greenhouse gasses (which *increase* global warming), and ground-level ozone, which *increases* threats to human health. For the individual homeowner trees increase property value, as well.

Some large specimen trees have historic value. Trees provide important symbolic links with the past. If a living tree is associated with important events, the tree takes on historical values unrelated to aesthetics or usefulness. For example, a community would normally value a tree that shaded the deliberations of the community's founders. In Austin, a good example is Treaty Oak. Aside from specific events, old trees may be regarded as important simply because they have lived through eras with which we have few other connections.

Placing protective fencing at the drip line of the tree will greatly improve the chances that a mature tree will survive the construction process. In Central Texas, where there is often very little soil, the feeder roots of trees may spread out horizontally from the trunk as much as 2.5 times more than the height of the tree. When protective fences are placed too close to the trunk, trucks, equipment and even foot traffic can compact the soil above the root system. That prevents the tree from getting enough water and oxygen to thrive and can permanently damage the roots. It may take several years for this damage to become apparent, but by that time it may be too late to save the tree. A fence at the drip line is not ideal protection, but provides a simple rule-of-thumb.

It is far better to engage the services of a professional arborist. An arborist can prepare a detailed tree protection plan, which includes correct tree protection measures for a given site and tree, dedicated construction-traffic access, mulching, pruning, a replanting plan, etc. Following these practices will greatly increase the chances of maintaining healthy trees, thus increasing the value of the property.

11.10 Rainwater Harvesting: 110-600 gallons storage

11.11 OR Rainwater Harvesting: 601-2000 gallons storage

11.12 OR Rainwater Harvesting: 2001 or more gallons storage

Rainwater harvesting is an old idea that is popular again. The future of our region depends, in part, on innovative approaches to water supply. In Central Texas, as in many parts of the world, sources for potable water are diminishing. On building sites with no municipal water supply, rainwater harvesting may be an especially appealing option, since wells are expensive and the water quality is often very poor. Due to its high mineral content, well water often has an unpleasant taste, stains plumbing fixtures and teeth, degrades water lines, and can damage appliances.

Harvesting rainwater is a great way to get high-quality water with the following benefits:

- Soft water (good for hair, skin and plants)
- Chlorine-free,
- Tastes good,
- Won't stain plumbing fixtures
- Lengthens appliance lifespan (no mineral scaling)
- Plants grow better
- Reduces water bills
- Reduces the burden on a municipal water system
- Obviates the need for a well when no municipal supply is available
- Helps control storm-water runoff

In Central Texas, with a yearly average rainfall of 32 inches, almost 45,000 gallons of water falls on a 2,500 square-foot roof. Obviously, rainwater harvesting is potentially a viable method to achieve sustainability with regard to water resources. Many old homesteads and farms had rainwater cisterns as their main source of drinking water.

The basic concept of harvesting rainwater is simple. Rainwater is typically collected from the roofs of buildings. It flows by gravity through gutters and downspouts into a storage tank. From the tank it can be used in the landscape as is, or be filtered and treated to become a source of high-quality drinking water. Since most of our rainfall occurs in large storm events, the ability to store collected rainwater is paramount. Farmers and ranchers know the value of stored water as evidenced by today's major sources for large water tanks— fence, ranch, and feed stores. But, garden and nursery retailers sell smaller rain barrels and the City of Austin Water Conservation Program offers 75-gallon barrels at a subsidized cost.

All of the components for rainwater harvesting can be found in the plumbing section of area retailers. A typical system replaces metal downspouts with solvent-welded PVC piping. By making the downspouts watertight, water can be carried by gravity to a storage tank. Several downspouts can be joined together into one larger main pipe leading to the tank. This main pipe is usually buried below ground and breaks the surface again at the side of the tank. An inlet to the tank is installed as high as possible to maximize storage capacity. The inlet can be on the side or the top of the tank. Just remember, the solid PVC piping system (downspouts) at the building must be at least 6 inches (preferable 18 inches) above the highest piping at the tank. This will allow the tank to fill, as the pressure of the water will work like a "P" trap under a sink. The water will equalize and flow into the tank. This "P" trap part of the system also must have an outlet installed to allow water to drain out for maintenance and to prevent freezing.

For more information visit the following websites:

City of Austin
www.ci.austin.tx.us/watercon/ Click on 'Outdoor Uses' and then on 'Rainwater Harvesting'
State of Texas Water Development Board
www.twdb.state.tx.us/assistance/conservation/Alternative_technologies/Rainwater_Harvesting/Rain.asp

11.13 Rainwater is sole source of indoor water

Homesites where a centralized potable water source is not available have traditionally depended on well water. When more development occurs in the area, wells may have to be deepened. In some areas, the well water is not suitable for drinking without considerable processing. Rainwater is an excellent alternative with costs similar to drilling and outfitting a well. When a dependable water provider services a site with piped water, rainwater harvesting for potable uses is seldom an economical alternative.

■ SECTION 12.0 Additions and Innovations

The advancement of building science and development of better practices and new materials is occurring at a rapid pace. Builders, architects and designers sometimes incorporate features, materials, or technology that is not covered by the items in the preceding sections. Please confer with your Representative/Rater to discuss what measures may be included and points earned in this Section.

Please note that this is an example of our rating only.

Please contact an Austin Energy Green Building representative to find out how to rate a project.

AUSTIN ENERGY GREEN BUILDING

SINGLE-FAMILY HOME RATING 2008.2

Update 5.20.08

0	
0	
Stars Achieved	No Stars

STAR LEVELS

1 Star	★	Basic Requirements (BR) + points	0
2 Stars	★★	BR + points	50
3 Stars	★★★	BR + 3.01, 2 or 3; 4.17, 4.18 or 4.19 + points	75
4 Stars	★★★★	BR + 3-Star Requirements + 10.07 or 10.08 + points	100
5 Stars	★★★★★	BR + 4-Star + 3.04, 3.05, 11.06, 11.08 + points	125

RATING RESULTS

Total Points	0
Basic Requirements	Not Fulfilled
3-5 Star special measures met	
Square feet per ton of cooling	
TCV score	0

PROJECT INFORMATION

Submitter (Designer or Builder)

Contact | Phone

E-mail

Complete Mailing Address

Rater (if other than AEGB)

Contact | Phone

E-mail

Complete Mailing Address

Architect/Designer (if not submitter)

Phone

Contact

Builder (if not submitter)

Phone

Contact

Mechanical Contractor Phone

TCV Score | Contact

Electric Source Austin Energy

Describe: Other

Water Source City of Austin

All rainwater

Describe other: Exterior-only rainwater

Describe: Other

Wastewater City of Austin

Describe: Other

Heating Gas furnace

Heat pump

Describe: Other

Cooling Split-system AC

Mini-split system

Other: Heat p'mp

Tons of cooling per unit: Unit 1

Unit 2

Unit 3

Unit 4

Total # of cooling tons: 0

Sq. ft. ***gross*** living space measured from outside of exterior walls

Sq. ft. ***net*** conditioned floor area derived from the Manual J calculation

Project Street Address (or Base Rating)

City | Zip

County | Subdivision

Austin building permit | Other

Approx. permit date | Lot size

Required-Rating Information

S.M.A.R.T. Housing

Mandatory (e.g. PUD agreement)

Minimum Star level required

Construction Type	Project Type
Slab foundation	Single-Family
Pier & beam	Duplex
Wood frame	Condo
Altern.exterior wall (describe)	New home
	Renovation
W'd frame roof	Addition: sf
Altern. roof sys. (describe)	Begun as spec
	Begun as custom

To the best of my knowledge, this project meets the requirements for the Rating requested at time of submittal.

Submitter Name | **Date**

INSTRUCTIONS TO SUBMITTER (DESIGNER OR BUILDER)

A. Submit Rating and Manual J Report to Rater (AEGB staff or other approved Rater).

Projects requiring a ***mandatory*** Rating must receive an **AEGB Conditional Approval** for the Rating and Manual J report prior to construction.

For more information about all aspects of the Rating, see the "Guide to the Single-Family Rating": Rating Guide

1. **Fill in all applicable light-yellow cells.**
2. **Basic Requirements must be met for all Ratings.**
3. **Measures for Points:**
   If information is not known at time of submittal, leave cell blank and revise for final submittal. **If item is either/ OR, check only one.**
   If "Stars Achieved" does not match point total, a Basic or required Star level measure has not been met.
   If square feet per ton of cooling or TCV score do not meet requirements, Star Rating shown will not be awarded.
4. **Manual J Report:** submit complete report calculated according to the AEGB "Manual J Inputs for SF Homes". Manual J Inputs
5. **Production builders:** enter "Base Rating" in address cell above.
   See PRODUCTION tab below for instructions for pre-construction approval, inspections and final submittals.

B. Schedule inspections and submit documentation to Rater.

Note that AEGB Rating inspections do not substitute for inspections required by other jurisdictions to which submitter may be subject.

No inspections will be made until Rater has approved the Rating, the Manual J Report and (if applicable) has issued a Conditional Approval.

1. **Schedule a rough AEGB inspection** (post rough mechanical, insulation, air barrier and pre-drywall).
2. **Submit a copy of the home performance testing report and any other requested documentation.**
3. **Schedule an AEGB final inspection** (after all items have been implemented).

Items marked with dot pattern must be viewable at rough.

C. Complete the rating process.

1. **Rater will finalize Rating and send submitter an AEGB Certificate and Homeowner Packet.**
2. **Submitter agrees to convey Certificate and Homeowner Packet to the homeowner.**

Prelim		Man J		Conditional Approval		Rough Inspection		Testing	Test.	Final Inspect		Prem #
Date	By	Approv.	By	Date	By	By	Date	By	Appr'd	Date	By	

A green home is comfortable, efficient, durable, and healthy and safe for inhabitants, workers, and the planet.

A green home must be designed and constructed so all parts interact successfully with each other and their environment to manage heat, air and moisture. Since it is difficult to address all crucial design and construction matters within a rating, please see the following publication from the Energy and Environmental Building Association (EEBA) for effective construction details:

Builder's Guide for Hot-Humid Climates and the Water Management Guide. Purchase at Builders Guide

A. Basic Requirements

See "Guide to the Single-Family Rating" for explanations of all measures. Rating Guide

Place an x in each box. All items must be included in any rated home.

☐ 1 **Energy-efficient home design: minimum of 500 sq. ft. of living space per ton of cooling as calculated by correct Manual J, based on site orientation, plans and specifications**
Use calculation design inputs for Austin, TX, and "GBP Manual J Inputs for Single-Family Homes." Manual J Inputs

☐ 2 **Cooling and heating equipment minimum efficiency for split systems**
Cooling: 14.0 SEER/11.5 EER AC or heat pump
Gas furnace: ≥ 80 AFUE or Heat Pump ≥ 8.2 HSPF
Brand _____ SEER/+EER _____
Model _____ AFUE/HSPF _____

☐ 3 **Window efficiency: ≤0.35 SHGC and ≤0.55 U-Value in Climate Zone 2** (Zone 3: ≤0.40 and ≤0.40)
Climate Zone _____

☐ 4 **Wall insulation--one of the following:**
Approved by: _____
☐ **a. Energy Star Grade 1 installation**
☐ **b. Batts + insulative exterior sheathing with R-value of ≥2.0, taped at seams** (unfaced batts preferred)
☐ **c. "Total fill" type (e.g. blown cellulose, BIBS, spray foam, SIPs)**

☐ 5 **Floor insulation over ambient or unconditioned space: ≥R-13 with air barrier**

☐ 6 **Blocking for grab bar installed in all showers and tub-shower combinations**

☐ 7 **Gas water heater minimum efficiency (EF): 40 Gal: 0.61; 50 Gal: 0.59; 60 Gal: 0.57; 80 Gal: 0.53; tankless: 0.80**
Or WH is solar thermal: Or if no gas available in right-of way, electric WH meets current Austin code requirements

☐ 8 **No unvented gas logs/fireplaces**

☐ 9 **Exhaust fans venting to outside for cooktop/stove/microwave and baths with tub or shower**

☐ 10 **Ceiling fans: minimum of 2 installed within heated and cooled space**

☐ 11 **A minimum of 75% of all lamps/bulbs are Energy Star-compliant**

☐ 12 **Low-VOC interior wall and ceiling paint: VOC ≤100 grams per liter or is CoA recycled paint**
Brand _____ Product _____ VOC gpl _____ Paint from CoA Household Hazardous Waste _____
For information on "Second Chance Paint": (512) 974-4343 CoA Recycled Paint

☐ 13 **Minimum of 2 toilets selected from current Austin Water Conservation Program Rebate list**
One per one-bath home; check list for available rebates CoA Toilet List
Brand _____ Model, type _____
Brand _____ Model, type _____

☐ 14 **Planting beds have a minimum depth of 6" of soil containing 25% compost (such as Dillo Dirt) and minimum depth of 2" organic mulch**

☐ 15 **A minimum of 90% of new plants are from current Grow Green plant list** Grow Green

☐ 16 **Current City of Austin IRC, IECC Codes and Amendments must be met, regardless of project location (including complete air barrier and restrictions on electric water heaters)** CoA Codes Scroll to Energy Code 2006

If you intend to obtain an Energy Star Rating, code-required testing must be done by a HERS rater.

☐ **All Basic Requirements Fulfilled**

B. Measures For Points

Place an x in the yellow column to the left of the items you are incorporating in your project.

If items are either/or, do not check both: points will subtract.

See far-left green column for star level requirements above One Star and S.M.A.R.T. Housing requirements.
Required star items are cumulative: e.g. all items required for a 3-Star Rating are required for a Four-Star Rating.

Star Requirements	Total Points	x		
SECTION 1: PLANNING PROCESS				
	3		1.01	AEGB Green by Design workshop attended by homeowner before completion of design stage
	3		1.02	AEGB Green by Design workshop attended by design staff +/or builder staff
	3		1.03	Documented design team meeting held in design stage (including owner, designer, builder, mechanical contractor)
SECTION 2: SITE SELECTION				
	3		2.01	Lot size is less than 5,750 sq. ft.
	3		2.02	Street, electricity, water and wastewater have been in place for a minimum of 25 years
	2		2.03	Public transit stop is within a 1/4 mile walk
	2		2.04	Grocery store is within a 1/2 mile walk
	2		2.05	Public hike and bike trail, green belt, or park is within a 1/2 mile walk
SECTION 3: DESIGN				
3	2		3.01	Energy-efficient design allows for a minimum of 600 sq. ft. of living space per ton of cooling if home is 1500 sq. ft. or larger (Smaller homes: square footage per ton must be approved by Rater for these points if 600 sf is not met)
	3		3.02	**OR** Home design allows for a minimum of 700 sq. ft. of living space per ton of cooling
	4		3.03	**OR** Home design allows for a minimum of 800 sq. ft. of living space per ton of cooling
5	3		3.04	Indoor cooling equipment is located within the thermal envelope
5	5		3.05	All duct work is located within the thermal envelope OR home has no duct work
	2		3.06	All water heaters in 1-story home located within 20 piped feet of appliances +/or fixtures they serve; 30 piped feet for 2-story
	1		3.07	No fireplace located within conditioned space
	2		3.08	Covered, usable front porch (minimum side dimension: 6'; minimum area: 100 sf)
	2		3.09	Covered, usable porch other than front porch (minimum side dimension: 6'; minimum area 100 sf)
	2		3.10	All roof overhangs project a minimum of 24" horizontally
	4		3.11	Overhang projection factor for all windows facing east and west is ≥0.5 — See projection factor calculation: Overhangs
	3		3.12	Windows designed for daylighting (e.g. high windows not requiring privacy treatment)
	2		3.13	Designed, effective cross-ventilation in main living areas
	2		3.14	Designed, effective stack ventilation (e.g. operable cupola, clerestory, or stairwell exhaust)
	2		3.15	Shading on east and west walls of living space for at least 50% of wall area (e.g. covered porch, pergola, trees)
	3		3.16	Total glazing area is no greater than 18% of conditioned floor area
	5		3.17	Glazing on east and west walls combined does not exceed 25% of total glazing area; glazing on west wall does not exceed 10% of west wall and glazing on east wall does not exceed 10% of east wall
	1		3.18	No skylights into conditioned space (solar tubes are acceptable)
	3		3.19	Garage is detached from the house or house has no garage
	2		3.20	**OR** Attached garage has exhaust fan with timer or passive vent openings installed 18" above floor
	2		3.21	Basic access to house provided according to *City of Austin Visitability Ordinance* — SMART Housing
	4		3.22	**OR** Accessibility provided according to *Barrier-Free Residential Construction Guidelines* — Rating Guide
SECTION 4: MATERIAL EFFICIENCY AND CONSTRUCTION WASTE				
	4		4.01	Lot has more than one dwelling unit
	3		4.02	Existing home removed from site is reused (deconstructed and recycled/reused or relocated)
	4		4.03	Project is renovation of, and/or addition to existing home
	4		4.04	Home is factory-built modular construction placed on a permanent foundation — Make and model:
	3		4.05	Conditioned space: maximum of 1,500 sq. ft.
	4		4.06	**OR** Conditioned space: maximum of 1,200 sq. ft.
	5		4.07	**OR** Conditioned space: maximum of 900 sq. ft.
	2		4.08	Exterior structure dimensions are in modules of 4'
	2		4.09	Exterior wall system is constructed off-site (e.g. panelized wood frame, SIPs)
	2		4.10	**OR** Exterior wall system is ICF, AAC block, straw, earth or other AEGB-approved system
	2		4.11	**OR** Wall framing is by the "Optimum Value Engineering" or "advanced framing" method: employ a minimum of 3 measures:
				a. Exterior wall framing 24" o.c. — d. 2-stud corners and ladder blocking; drywall clips
				b. Interior wall framing 24" o.c. — e. No wood wall sheathing (corners excepted)
				c. Headers sized for loads — f. Window framing without jack studs
	1		4.12	Finger-jointed studs
	1		4.13	Roof framing system: engineered trusses or materials/products such as I-joists, truss joists, LVLs, SIPs

B. Measures for Points Continued

SECTION 4: CONTINUED

1		4.14	A minimum of 50% of framing or sheathing or decking material is SFI-certified engineered products or lumber	
2		4.15	A minimum of 50% of framing or sheathing or decking material is FSC-certified engineered products or lumber	
2		4.16	Use of reclaimed materials, such as doors, hardware, flooring: list in Section 12	
4		4.17	80% of excess lumber and drywall is recycled/reused (not landfilled); approved documentation required	Documentation
3 4		4.18	**OR** Minimum 40%-by-weight of waste is recycled/reused (not landfilled); approved documentation required	Documentation
4		4.19	**OR** Approved construction waste management plan; approved documentation for reuse/recycling required	
1		4.20	Concrete-truck wash-out managed to recycle concrete residue and treat wash-out water	

SECTION 5: INTEGRATED PEST MANAGEMENT

2		5.01	Sand or mechanical-barrier termite control system is used: OR structure is not termite-edible	
3		5.02	All wood framing is treated with borate to a minimum of 3 feet above the foundation; OR structure is not termite-edible	
1		5.03	All exterior wood-to-concrete connections are separated by metal or plastic fasteners/dividers (e.g. deck posts)	
1		5.04	All new plants, shrubs and trees have trunk, base or stem located at least 36" from foundation	

SECTION 6: THERMAL ENVELOPE AND MOISTURE CONTROL

See "Builder's Guide to Hot-Humid Climates" + "Water Management" for design and construction guidelines.
In Central TX, make wall system as air-tight as possible but vapor permeable and able to dry to both inside and outside.

2		6.01	Window U-value of 0.51 or lower	
2		6.02	Glazing has a SHGC of 0.30 or lower	
1		6.03	"Raised-heel"/"energy" roof trusses	
2		6.04	Vented attic system: continuous ridge and continuous soffit vents (no functioning gable vents)	
5		6.05	**OR** Closed/sealed attic system: unvented; polyurethane foam insulation at roof; minimum 5.5" depth	
3		6.06	"Total fill" insulation in walls (e.g. blown cellulose, BIBS, spray foam, SIPs)	
2		6.07	Insulation has no added formaldehyde	
2		6.08	Wall and attic insulation have average total-recycled-content of 75% minimum	
2		6.09	Roofing meets requirements of Energy Star; minimum 10-year warranty	Energy Star
4		6.10	Tile roof or Metal roof	Cool Roofs
2		6.11	Gutter and downspout system directs stormwater away from foundation to landscaping or catchment system	
2		6.12	Blower door test performed results in envelope leakage no greater than 0.40	

SECTION 7: PLUMBING AND APPLIANCES

1		7.01	≥R-2 insulation of all water lines located outside the thermal envelope and in exterior walls	
2		7.02	Gas water heater is sealed-combustion/direct vent model (required if located in sealed attic)	
2		7.03	Gas water heater is tankless/on-demand; minimum 0.82 efficiency	
4		7.04	**OR** Water heater is solar thermal	
2		7.05	Push-button on-demand hot water recirculation system (not continuously-operating pump system)	
2		7.06	Toilet is dual-flush or HET model from current CoA toilet list (at least one)	
2		7.07	Toilet is ADA model from current CoA toilet list (at least one)	CoA Toilet List
3		7.08	All shower heads have maximum flow of 2.0 gallons per minute; no more than one shower head per shower or tub	
3		7.09	Clothes washer is from the current CoA Water Conservation WashWise list	CoA Washer List

SECTION 8: M ECHANICAL

1		8.01	Cooling tonnage does not exceed 5 tons	
2		8.02	**OR** cooling tonnage does not exceed 4 tons	
3		8.03	**OR** cooling tonnage does not exceed 3 tons	
4		8.04	**OR** cooling tonnage does not exceed 2 tons (If tonnage is lower than 2, write amount in Section 12.)	
5		8.05	Whole-house, ductless, mini-split heating and cooling system	Brand, model #:
3		8.06	Variable-speed air handler and minimum 600 sq. ft./ton of cooling	Brand, model #:
2		8.07	Variable-capacity compressor and minimum 600 sf/ton of cooling	Brand, model #:
3		8.08	Ground-source heat pump	
2		8.09	Gas furnace is sealed-combustion/direct-vent model (CoA requirement if in sealed attic)	Texas Gas Service
2		8.10	Hydronic space heat is supplied by gas water heater or is solar-assisted	
4		8.11	Sheet metal plenum and main trunk lines; any flex-duct take-offs are no longer than 10'	
2		8.12	Air-tight supply boots (ductboard or pre-fabricated)	
2		8.13	Ceiling registers are curved-blade type located high on walls or in ceiling	
1		8.14	Ductwork system is masked/sealed at supplies and returns during construction	
2		8.15	HVAC filter: ≥ 4" pleated-media, or electronic (not electrostatic); easily accessed (HVAC system designed for filter type)	
3		8.16	Mechanical ventilation with automatic damper + humidity sensor provides fresh air into return-air plenum	
1		8.17	Stand-alone hygrometer; OR thermostat has integral hygrometer or humidistat	
1		8.18	Energy Star programmable thermostat	
2		8.19	Air distribution system leakage no greater than 5% as ascertained by duct-blaster testing method	

B. Measures for Points Continued

SECTION 9: ELECTRICAL

2		9.01	Ceiling fans in all bedrooms	
2		9.02	Whole-house fan with insulated cover	
2		9.03	Bathroom exhaust fans are connected to humidistat or timer	
2		9.04	Recessed-can lighting fixtures do not break through the thermal envelope; OR no recessed-can fixtures are installed	
2		9.05	Energy Star Advanced Lighting Package requirements met	Advanced Lighting Package
2		9.06	Energy Star-qualified fixtures-->5 from following list: appliances, light fixtures/luminaires, ceiling fans, +/or ventilation fans	
3		9.07	A minimum of 90% of lamps/bulbs are Energy Star-compliant	Energy Star lamps/bulbs
2		9.08	All exterior light fixtures are designed to reduce up-lighting/light pollution; OR fixture locations are shielded from above	
1		9.09	All exterior lighting has motion detectors with photocell controllers; OR is solar-powered	
1		9.10	Central vacuum system; exhausts to outside	
5		9.11	Solar photovoltaic (PV) power system installed: 1.5 kW minimum	kW installed:
2		9.12	A minimum of 1.5 kW additional solar PV installed (in addition to 9.11)	Additional kW installed:

SECTION 10: INTERIOR CONSTRUCTION AND FINISHES

1		10.01	Interior moulding is finger-jointed or MDF	
2		10.02	**OR** Interior moulding is locally milled local species; made from agricultural waste product; or is FSC-certified wood	
2		10.03	Cabinet boxes, doors, drawers + adhesives: a) meet E1; or b) CARB Phase I; or c) have no added urea-formaldehyde	
2		10.04	At least 75% of all cabinet faces are locally milled local species; or FSC-certified wood	a, b or c
2		10.05	At least 75% of all doors are locally milled local species; or FSC-certified wood	
2		10.06	Structural floor is the finish floor for a minimum 50% of all floor area (e.g. exposed concrete, single-layer wood)	
4	2	10.07	Finish flooring is durable material for a minimum of 50% of all floor area (e.g. ceramic tile, concrete, wood)	
	4	10.08	**OR** Flooring is 100% durable material	
2		10.09	Flooring is rapidly renewable material for a minimum 25% of all floor area (e.g. cork, wool)	
1		10.10	Carpet, carpet padding and flooring adhesives have the CRI Green Label	Product: Green Label
3		10.11	Interior wall and ceiling paint has maximum VOC level of 10 grams per liter	Product: VOCs:
1		10.12	All doors have lever handles	
2		10.13	Grab bars installed in tub +/or shower of at least one bathroom	
1		10.14	Carbon monoxide detector installed (may be combined with smoke detector)	

SECTION 11: SITEWORK AND LANDSCAPING

See Grow Green for information on appropriate, water-wise landscaping for Central Texas. Grow Green

3		11.01	Permanent erosion and storm-water control measures (e.g. piped drainage system, berms and swales)
2		11.02	Decking material of raised porch/deck is recycled-plastic/composite lumber
2		11.03	Existing vegetation retained on at least 50% of pervious cover area
3		11.04	No turfgrass installed or planned
2		11.05	**OR** Turfgrass/lawn area does not exceed 50% of pervious cover area
5	0	11.06	Existing vegetation substantially retained; OR all new plants from Grow Green list AND turgrass area installed <u>≤</u>**2000** sq. ft.
2		11.07	Turfgrass/lawn in full sun is AEGB-approved low-water variety (e.g. common bermuda, zoysia japonica, buffalo)
5	4	11.08	Newly installed turfgrass areas have at least 6" of soil containing 25% compost; OR no turfgrass installed or planned
2		11.09	Trees are protected with fencing at the <u>drip line</u>; or a tree protection plan by a professional arborist is followed
2		11.10	Rainwater harvesting: 110-600 gallons storage
3		11.11	**OR** Rainwater harvesting: 601-2,000 gallons storage
4		11.12	**OR** Rainwater harvesting: 2,001 or more gallons storage
3		11.13	Rainwater is sole source of indoor water

SECTION 12: ADDITIONS AND INNOVATIONS

Describe other green measures incorporated in this project. Your AEGB Rater will determine points.

12.01
12.02
12.03
12.04
12.05
12.06
12.07
12.08
12.09
12.10
12.11
12.12
12.13
12.14
12.15

AUSTIN ENERGY GREEN BUILDING

MULTI-FAMILY RATING 2008

Green Building Program Packet Contents

Forms (Green Tabs)

- Project Information - project name, location, building description, utility savings, sustainability ratings.
- Project Team - contact information for key players involved in the design and construction.
- Worksheet - working tool for evaluating Green Building measures.
- Rating Report - report of Green Building measures implemented and Star Rating earned.

Calculators (Yellow Tabs)

- Water - calculates the percent reduction in indoor potable water use.
- Construction Waste - calculates the percentage of construction waste that is recycled and/or salvaged.
- Irrigation - calculates the percent reduction in landscape irrigation potable water use.
- Building Reuse - calculates the percentage of existing shell, structure, and interior surface areas reused in new building.
- Building Materials - calculates the percentage of materials that are salvaged, contain recycled content, and Texas sourced.
- Low VOC - tabulates the low-VOC materials.
- Certified Wood - calculates the percentage of wood-based materials that are FSC certified.

Definitions

1. **Residential Uses**

   Dwellings and all residential common space including, but not limited to the following: clubhouse, leasing office, mail room, laun corridors, pool area, changing/restrooms and parking areas associated with residential uses.

2. **Non-residential Uses**

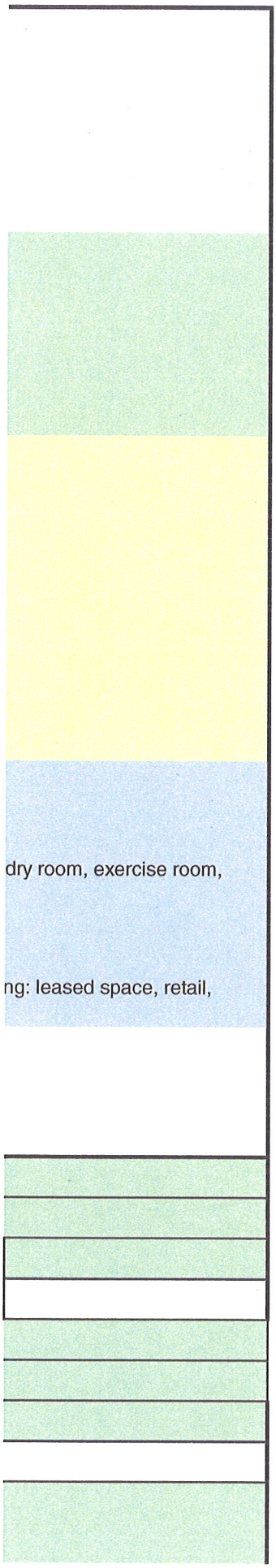
   In a mixed-use development, all spaces other than those associated with residential uses including, but not limited to the followi commercial, office, etc. (These spaces are typically operated by an entity other than the residential space management.)

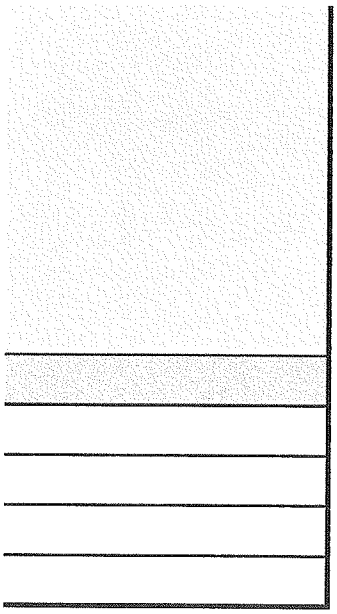
Project Information

Project Name			
Street Address			
City, State			Zip
Primary Use of Building(s)			
Type of Construction			# of Floors
			Sq. Ft. (gross)
			Sq. Ft. (net)

Project Schedule	Scheduled Start	Scheduled Finish	Description
Programming			
Schematic Design			

Design Development			
Site Permit			
Construction Documents			
Building Permit			
Bidding/ Contract Negotiations			
Construction			
Project CloseOut			
Mandatory Green Building Rating			
Green Building Program Star Rating Goal			
LEED Rating Goal			


dry room, exercise room,
ng: leased space, retail,



AUSTIN ENERGY GREEN BUILDING

PROJECT TEAM

PROJECT:

GBP Representatives		Phone	E-mail

Building Owner/Developer			
Contact Person			
Phone	Cell	Fax	E-mail

Architect			
Contact Person			
Phone	Cell	Fax	E-mail

Mechanical Engineer			
Contact Person			
Phone	Cell	Fax	E-mail

Structural Engineer			
Contact Person			
Phone	Cell	Fax	E-mail

Electrical Engineer			
Contact Person			
Phone	Cell	Fax	E-mail

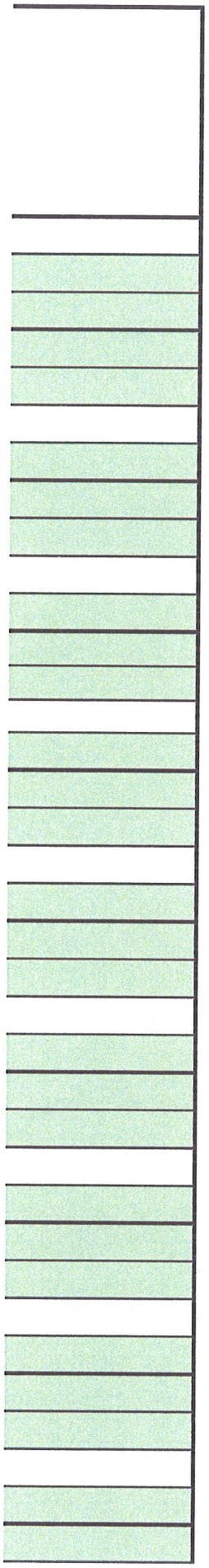
General Contractor			
Contact Person			
Phone	Cell	Fax	E-mail

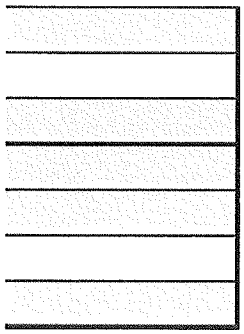
Commissioning Authority			
Contact Person			
Phone	Cell	Fax	E-mail

Civil Engineer			
Contact Person			
Phone	Cell	Fax	E-mail

Professional Title	

	Contact Person			
	Phone	Cell	Fax	E-mail
Professional Title				
	Contact Person			
	Phone	Cell	Fax	E-mail





AUSTIN ENERGY GREEN BUILDING

Instructions for Worksheet

1. Verify completion of all 14 measures of the Basic Requirements to qualify for any Rating by indicating "yes".
2. Signify intent of additional green measures by entering the available points in the Yes, ? (maybe), or No column.

Austin Energy Multi-Family Green Building Rating 2008

	Category	Requirements (Residential Uses)	Requirements (Non-residential Uses)	Max Points	Design Team			AEGB	
					Yes	?	No	√'d	Final
Basic Requirements									
1	Current Regulations	Meet current City of Austin Codes (including current drainage & water quality standards applicable in project watershed).		Req'd					
2	Transportation Alternatives - Bicycle Use	Provide covered bicycle parking for 15% of residents and permanent building occupants and provide a safe path from property entrance to bike parking		Req'd					
3	Building Envelope	Building envelope meets **EITHER** Option A (Prescriptive) or Option B (Performance): **A. PRESCRIPTIVE OPTION:** Glazing meets **ONE** of the following 2 measures: 1. Vertical fenestration on west, south, & east* shaded by permanent projections that have a projection factor of not less than 0.5 and that will last as long as the building 2. SHGC does not exceed 0.30 and U-factor does not exceed 0.4 *The building can be rotated up to 45 degrees to the nearest cardinal orientation. **B. PERFORMANCE OPTION:** Design meets **BOTH** of the following requirements: 1. Exceed current City of Austin building envelope requirements by 15% (as demonstrated by COMcheck or equivalent) OR Exceed building performance model by 15% 2. Meet Roofing criteria of 2006 IECC with Local Amendments		Req'd					
4	Residential Mechanical Systems	Systems meet **ALL** of the following requirements: 1. Dwellings served by split or individual systems sized according to Manual J and installed according to code 2. Air conditioning system components are matched according to ARI (Air-Conditioning & Refrigeration Institute)		Req'd					
5	High Efficacy Lighting	• Dwellings: at least 50% of all indoor lamps in high use areas are Energy Star-compliant high efficacy lamps **OR** install 3 Energy Star fixtures in high use area • Common spaces: at least 25% of all indoor lamps are Energy Star-compliant high efficacy lamps	Exceed current City of Austin Building Lighting requirements by 15% each or exceed building performance model by 15%.	Req'd					

	Category	Requirements (Residential Uses)	Requirements (Non-residential Uses)	Max Points	Design Team			AEGB	
					Yes	?	No	√'d	Final
6	Testing / Commissioning (Cx)	Develop and implement a plan that achieves ALL of the following tests*: 1. Visual inspection of mechanical rough-ins: 100% of dwellings 2. Duct leakage testing: 25% of dwellings 3. Air balancing/static pressure: 25% of dwellings *(*For split systems only; if central mechanical system installed, meet non-residential Cx requirements)*	Commission Mechanical and Electrical systems: • design intent • Cx plan • document Cx in CDs • installation verification • Cx report	Req'd					
7	Building Water Use Reduction - Metering	Site meets BOTH of the following measures: 1. All dwellings are individual metered or submetered 2. All dwellings are billed individually for water usage		Req'd					
8	Building Water Use Reduction	**A. PRESCRIPTIVE OPTION:** Each dwelling includes ALL of the following: 1. lavatory fixtures (max. 1.0 gpm) 2. showerheads (max. 2.0 gpm) (no more than one showerhead installed per shower) 3. kitchen fixtures (max. 2.2 gpm) 4. either no clothes washer is installed in each unit OR washer uses fewer than 31 gal/cycle **B. PERFORMANCE OPTION:** Reduce indoor potable water consumption below baseline (EPAct plus residential water-using appliances) by at least 15%	Reduce indoor potable water consumption below the baseline (EPAct) by at least 15%	Req'd					
9	Irrigation Water Reduction	Site meets ALL of the following requirements: 1. 90% of new plants on COA Grow Green list (Native and Adapted Landscape Plants) 2. Plant-based mulch covers all non-turf planting beds to a minimum 4 inch depth 3. Install a minimum of 6 inches of soil below all turf areas		Req'd					
10	Low VOC Interior Paints and Coatings	Meet or exceed Green Seal GS-11, GC-03 for Paints and SCAQMD Rule 1113 for Coatings.		Req'd					
11	Filtration for Indoor Air Quality	Filters installed in ventilation systems shall have a minimum efficiency reporting value (MERV) rating of 7 or greater		Req'd					
12	Moisture Prevention	Site meets ALL of the following requirements: 1. No vinyl wall coverings or vapor barriers for surface treatments on interior of exterior wall (also include in tenant agreements.) 2. Install building envelope drainage plane systems, including flashing and overhang systems. 3. Document building will be pressurized (for buildings with mechanical ventilation systems that bring in outside air).		Req'd					

	Category	Requirements (Residential Uses)	Requirements (Non-residential Uses)	Max Points	Design Team			AEGB	
					Yes	?	No	√'d	Final
13	Storage and Collection of Recyclables	Provide appropriately sized, easily accessible area dedicated to the separation, collection and storage of materials for recycling, including at minimum, the top four identified recyclable waste stream items		Req'd					
14	Construction Waste Management	Divert from landfill at least 50% (by weight) non-hazardous construction and demolition waste excluding excavated soil and stone		Req'd					
	Basic Requirements NOT ACHIEVED								0

	Category	Requirements (Residential Uses)	Requirements (Non-residential Uses)	Max Points	Design Team			AEGB	
					Yes	?	No	√'d	Final
Site									
1a	Site Selection - Environmental Sensitivity	Site meets **BOTH** of the following requirements: 1. Not located in the Drinking Water Protected Zone 2. Not a greenfield		2					
1b	Site Selection - Desired Development Area	Site is located within the Urban Watershed Desired Development Zone		4					
2	Brownfield Redevelopment	Rehabilitate contaminated site.		1					
3	Site Characteristics Study	Study includes **ALL** of the following: 1. Evaluate and document the proposed site's environmental characteristics including existing water elements, soil conditions, ecosystems and natural habitats, trees, and other vegetation, and seasonal wind and daylight availability 2. Map all potential hazards including traffic & pollution sources 3. Create a plan to maintain or restore existing site features 4. Develop recommendations for building placement on site to minimize impact on the environment and to take advantage of topographical characteristics		1					
4a	Transportation Alternatives - Public Transportation	Locate building within 1/4 mile of at least 2 bus stops or within 1/2 mile of a rail stop (or future rail stop with proposed completion within 5 years)		1					
4b	Transportation Alternatives - Parking Capacity	Parking does not exceed minimum local zoning requirements. Preferred parking for carpools for 5% (min.) of building occupants.		1					
5	Site Disturbance	Site meets **BOTH** of the following measures: 1. Limit disturbance to 40 ft beyond building perimeter; 10 ft beyond walkways, patios, surface parking; 15 ft beyond roadways & utility trenches; 25 feet beyond any pervious areas that require additional staging. 2. On previously developed sites, at least 50% of the post-development open area (site area minus building footprint) is vegetated using native/adapted plants. Vegetated roof areas may be included in open area calculations, if plants meet the definition of native/adapted.		1					
6	Heat Island Reduction	Site meets **ONE** of the following: 1. Open grid paving (less than 50% net impervious) for 50% of parking area 2. Locate 50% of parking underground or in structured parking 3. Use high albedo materials on at least 30% of non-roof surfaces 4. Vegetative shading of at least 30% of non-roof impervious surfaces within 5 years		1					
7	Light Pollution Reduction	Exterior lighting meets COA Code-Chpt.25-2, E, Art. 2.5; IESNA RP-33 Light Trespass; and Illuminance levels at Specific Facilities		1					
8	Accessibility	Site meets **BOTH** of the following: 1. 100% of units are either adaptable or visitable 2. Door handle levers installed on 100% of units		1					

	Category	Requirements (Residential Uses)	Requirements (Non-residential Uses)	Max Points	Design Team			AEGB	
					Yes	?	No	√'d	Final
9	Outdoor Environmental Quality	Site has shaded seating for minimum of 10% of building occupants.		1					
10	Integrated Pest Management (IPM)	Implement IPM plan to minimize environmental impact and use least toxic practices for site and building management.		1					
	Total Points - Site			16	0				0

	Category	Requirements (Residential Uses)	Requirements (Non-residential Uses)	Max Points	Design Team			AEGB	
					Yes	?	No	√'d	Final
Energy									
1	Energy Efficient Building - PERFORMANCE OPTION	Exceed current code building by 17.5% or better using the ASHRAE 90.1-2004 App. G Performance Rating Method. **Point Allocation:** 17.5% = 1 pt, 20% = 2 pts, 22.5% = 3 pts, 25% = 4 pts, 27.5% = 5pts, 30% = 6 pts, 32.5% = 7 pts, 35% = 8 pts, 37.5% = 9 pts, 40% = 10 pts, 42.5% = 11 pts, 45% = 12 pts. NOTE: PUDs requiring 2 Star Rating must exceed Energy Code by ≥25%		10					
2a	Energy Efficient Building - PRESCRIPTIVE OPTION	Include 1 item from Roofing, 2 items from ductwork and 1 item from envelope and demonstrate with Manual J calculations (min. 600 sq ft/ton)		1					
		Include 2 items from Roofing, 3 items from ductwork and 1 item from envelope and demonstrate with Manual J calculations (min 650 sq ft/ton)		1					
		Include 3 items from Roofing, 4 items from ductwork and 2 items from envelope and demonstrate with Manual J calculations (min 700 sq ft/ton)		1					
		Roofing Flat or low-slope (2:12 or less): • Building is 3 stories or fewer above grade & Roofing product is Energy Star listed • Roofing product > 75% reflective for > 90% of roof area** • Raised heel roof truss allows for a minimum of 8" insulation at the exterior wall face OR sealed attic • Insulation - minimum R32 • Green/vegetated roof 50% minimum** Steep Slope (greater than 2:12): • Building is 3 stories or fewer above grade & Roofing product is Energy Star listed • Roofing product > 45% reflective for > 90% of roof area** • Emissivity > 90% • Raised heel roof truss allows for a minimum of 8" insulation at the exterior wall face OR sealed attic • Insulation - minimum R32 • Radiant barrier system installed next to air space AND 1:150 ventilation **Ductwork** • Located within the thermal envelope • Ducts are cut to exact length, original diameter maintained, no change in direction in any single duct greater than 180° and no single turn greater than 90° • Duct systems are sized according to Manual D • Supply and return ductwork insulation outside the thermal envelope > R-10 • Bedrooms have dedicated return air duct OR pressure relief for all bedrooms is provided by means of jump ducts, transfer grills, or ducted returns • Maximum length of any flex duct take-off is 10 feet **Envelope** • "Total fill" insulation in exterior walls (e.g. wet-blown cellulose, BIBS, open-cell foam, cementitious foam) • East and west glazing is less than 10% of façade • Use airtight building systems such as structural insulated panels (SIPs) or insulating concrete form (ICF) • All south windows are shaded with overhangs -- must demonstrate glazing is 100% shaded at 10 AM and 3 PM on September 21							

	Category	Requirements (Residential Uses)	Requirements (Non-residential Uses)	Max Points	Design Team			AEGB	
					Yes	?	No	√'d	Final
2b	Energy Efficient Building - PRESCRIPTIVE OPTION (Equipment/Appliances - Cooling Equipment Efficiency)	Dwellings served by split or individual systems: 14 SEER OR Chillers: 10% better than code		1					
2c	Energy Efficient Building - PRESCRIPTIVE OPTION (Equipment/Appliances - Water Heaters)	Water heater meets at least ONE of the following: 1. Gas - minimum Energy Factor (EF): 0.63 (< 50 gallon tank), 0.60 (> 50 gallon tank) 2. Gas tankless 3. Solar thermal 4. Gas boilers are Energy Star labeled		1					
2d	Energy Efficient Building - PRESCRIPTIVE OPTION (Equipment/Appliances - Gas Furnaces)	Gas furnaces are Energy Star labeled		1					
2e	Energy Efficient Building - PRESCRIPTIVE OPTION (Equipment/Appliances - Ceiling Fans)	Ceiling fans installed in all main rooms and bedrooms (not required in dining rooms/kitchens) AND fans are Energy Star listed		1					
2f	Energy Efficient Building - PRESCRIPTIVE OPTION (Lighting)		a. 75% of all indoor lamps are Energy Star-compliant high efficacy lamps	1					
			b. 100% of all indoor lamps are Energy Star-compliant high efficacy lamps	1					
			c. 100% of all indoor fixtures are Energy Star-compliant	1					
3	Green Energy	10-year GreenChoice® commercial agreement for 100% of building's electricity use. If GreenChoice® unavailable, 2-year contract for Texas or Green-e certified National RECs for 100% of building's annual electricity use. (Dwelling units excluded.)		1					
4	Renewable Energy - Onsite		a. 10 kW min. OR generate 25% of annual kwh usage of non-residential space	1					
			b. 15 kW min. OR generate 50% of annual kwh usage of non-residential space	1					
			c. 20 kW min. OR generate 75% of annual kwh usage of non-residential space	1					
			d. >20 kW OR generate >90% of annual kwh usage of non-residential space	1					

	Category	Requirements (Residential Uses)	Requirements (Non-residential Uses)	Max Points	Design Team			AEGB	
					Yes	?	No	√'d	Final
			Exception: Properties with insufficient roof space may receive points for smaller systems (see Guidebook)						

	Category	Requirements (Residential Uses)	Requirements (Non-residential Uses)	Max Points	Design Team			AEGB	
					Yes	?	No	√'d	Final
5	Additional Building Systems Commissioning (Cx)	1. Cx agent design review < 50% CD's. 2. Demonstrate bldg. systems operate in accordance w/ design intent. 3. Demonstrate bldg. structure & envelope performance in accordance w/ design intent. 4. Seasonal re-Cx through warranty period. 5. Cx report		1					
6	District Cooling	Tie into Austin's district cooling loop for all HVAC energy needs.		1					
7a	Equipment/Appliances - Energy Star Labeled	• Refrigerators		0.5					
		• Dish Washers*		0.5					
		• Clothes Washers*		0.5					
		• Clothes Dryers		0.5					
		• Microwaves		0.5					
		Only whole points will be awarded for credit (* Must be listed on COA Water Conservation Wash Wise list)							
7b	Equipment/Appliances - Central Laundry	Central laundry site participates in COA multifamily rebate program for coin-operated equipment **AND** equipment is Energy Star listed		1					
8	Lighting	a. 75% of all indoor lamps in high use areas are Energy Star-compliant high efficacy lamps		1					
		b. 100% of all indoor lamps in high use areas are Energy Star-compliant high efficacy lamps		1					
		c. 100% of all indoor fixtures in high use areas are Energy Star-compliant		1					
		d. Common space exterior lighting is controlled by automatic daylight controls or controlled by an astronomical time switch in series with a photo sensor.		1					
	Total Points - Energy			24	0				0
Water									
1	Outdoor Water Use Reduction	a. Reduce outdoor water usage by 50% over baseline		1					
		b. Reduce outdoor water usage by 75% over baseline and does not include plants listed on COA Grow Green "Invasive Plants to Avoid"		1					
		c. Reduce outdoor water usage by 100% over baseline and does not include plants listed on COA Grow Green "Invasive Plants to Avoid"		1					
		Note: Based on landscaped area, vegetation species factor water usage (low, medium, high), density factor (low, medium high), microclimate factor (low, medium, high) and irrigation technology (drip, sprinkler, other) efficiency							
2	Indoor Potable Water Use Reduction	a. Reduce indoor water usage by 25% over baseline		1					
		b. Reduce indoor water usage by 35% over baseline		1					
		c. Reduce indoor water usage by 45% over baseline		1					

	Category	Requirements (Residential Uses)	Requirements (Non-residential Uses)	Max Points	Design Team			AEGB	
					Yes	?	No	√'d	Final
3	Central laundry	The site meets **BOTH** of the following: 1. Central laundry facility located on site 2. No clothes washer hook-ups in dwellings		1					
	Total Points - Water			7	0				0

	Category	Requirements (Residential Uses)	Requirements (Non-residential Uses)	Max Points	Design Team			AEGB	
					Yes	?	No	√'d	Final
Indoor Environmental Quality (IEQ)									
1	Indoor Air Quality Monitoring		Install permanent carbon dioxide monitoring system that provides feedback in a useable form to make adjustments for ventilation system. Commission all systems to the preferred parameters for optimal performance.	1					
2	Indoor Chemical & Pollutant Sources		Sources are controlled by ALL of the following: 1. Identify and ventilate areas of point source pollutants (i.e. copy machines, print shops, janitors closets, labs) 2. Provide ventilation directly to the outside of the building and provide drains for appropriate disposal. 3. Construct a full height deck to deck partition or a hard lid ceiling enclosure between these areas and occupied spaces. 4. Operate at negative pressure relative to surrounding areas under all operating conditions by testing.	1					
3	Daylighting		Provide adequate daylighting and integrate daylighting systems with electric lighting systems and controls.	1					
4	Views to Outside	Glazing systems and interior partitions allow for a minimum of 75% of regularly occupied spaces a view of vision glazing (between 2'-6" and 7'-6" above finish floor) and a view of the outdoors.		1					
5	Thermal Comfort	Install mechanical systems (thermal, ventilation and dehumidification) and monitoring system so ensure optimal parameter for thermal comfort for all operating conditions according to ASHRAE 55-2004.		1					
6a	Low-emitting Materials - Sealants and Adhesives	All installed sealants and adhesives meet South Coast Air Quality Management District (SCAQMD) standards.		1					
6b	Low-emitting Materials - Flooring	All flooring systems meet the requirements of IEQ-6a above and at least ONE of the following: 1. All carpets meet Carpet & Rug Institute's (CRI) Green Label Plus minimum standards 2. All installed carpet pads meet CRI Green Label minimum standards 3. All resilient flooring products, including linoleum, laminate flooring, and rubber flooring, must be FloorScore certified.		1					
6c	Low-emitting Materials - Composite Wood	All installed composite wood has no added urea-formaldehyde.		1					
6d	Low-emitting Materials - Insulation	All installed insulation (excluding piping) contains no added urea-formaldehyde.		1					

	Category	Requirements (Residential Uses)	Requirements (Non-residential Uses)	Max Points	Design Team			AEGB	
					Yes	?	No	√'d	Final
7	Humidity Control	Humidity is controlled by **BOTH** of the following measures: 1. Exhaust fans vented to outside for at least 50% of all dwellings in all of the following locations: • above cooktop/stove • any room with tub or shower 2. Bathroom (with shower or tub) fan connected to timer or humidistat		1					
8	Acoustic Quality	Ensure acoustic quality through **ALL** of the following measures: 1. Define appropriate background sound levels, reverberaton decay times, speech intelligibility, & sound isolation. Identify spaces where impact noises are likely & address potential problems. 2. Mechanical & duct systems designed to meet guideline RC,NC or NCB of ASHRAE Applications Design Guidelines for HVAC Sound & Vibration Control Chpt. 3. Appropriate vibration isolation for mounted equipment. 4. Select non-"tonal" equipment. 5. Specify surface finishes and/or masking systems to provide appropriate sound intelligibility & privacy. 6. Specify partitions, ceilings, floor/ceiling assemblies, building layouts, & vestibules to provide adequate sound isolation between spaces. 7. Mitigate intermittent noise sources, e.g. footfall & loading dock noise.		1					
9	Outdoor Pollutant Sources	Minimize outdoor pollutant sources by **ALL** of the following measures: 1. Entrances, operable windows, and fresh air intakes located at least 30 ft from designated smoking areas 2. Install signage designating smoking and no-smoking areas 3. Install entryway systems (grills, grates, mats) at least 10 ft long in direction of travel. 4. Specify effective filters for intake, return, and re-circulation air		1					
10	Construction Indoor Air Quality	Implement SMACNA Guidelines for Occupied Buildings Under Construction, or similar plan. (Plan should include key areas of IAQ protection: Scheduling, Source Control, HVAC Protection, Pathway Interruption and Housekeeping.)		1					
	Total Points - Indoor Environmental Quality (IEQ)			13	0				0
Materials & Resources									
1	Additional Construction Waste Management	Recycle or Salvage at least 75% by weight of construction demolition and land clearing debris (excluding soils and stone).		1					
2a	Building Reuse - Envelope and Structure	a. Incorporate at least 40% (surface area) of existing building envelope and structure.		1					
		b. Incorporate at least 80% (surface area) of existing building envelope and structure.		1					
2b	Building Reuse - Interior Non-structural Elements	Incorporate at least 50% (surface area) of interior non-structural elements.		1					
3	Exterior Wall Material	Exterior walls are constructed of material other than stick frame construction (e.g. SIPS, ICF, AAC, etc.)		1					

	Category	Requirements (Residential Uses)	Requirements (Non-residential Uses)	Max Points	Design Team			AEGB	
					Yes	?	No	√'d	Final
4	Interior and Exterior Materials - PERFORMANCE OPTIONS	Use the appropriate calculator to achieve the following goals for each material:							
4a	Salvaged materials	Salvaged materials used for minimum value of project building materials							
		1. Use salvaged or refurbished materials for 5% ($ value) of project building materials.		1					
		2. Use salvaged or refurbished materials for 10% ($ value) of project building materials.		1					
4b	Recycled content	Recycled content materials used for a minimum value of project building materials (Recycled Content = (sum of 100% post-consumer + 50% post-industrial)							
		1. Recycle Content materials used for 10% ($ value) of project building materials.		1					
		2. Recycle Content materials used for 20% ($ value) of project building materials.		1					
4c	Texas sourced materials	Texas Sourced materials: Building materials and products extracted or manufactured regionally within the state of Texas for a minimum value of the project building materials (Use GBP Bldg. Materials Calculator)							
		1. Texas sourced materials for at least: 30% ($ value) of project building materials.		1					
		2. Texas sourced materials for at least: 50% ($ value) of project building materials.		1					
4d	Certified wood	Use Certified Wood (FSC) for at least 50% ($ value) of all wood-based materials.		1					
4e	Exterior paints	Exterior paints meet Green Seal standards; 100% of all exterior sealants, coatings, and adhesives meet SCAQMD standards. (Use GBP Low VOC Calculator)		1					
5	Interior and Exterior Materials - PRESCRIPTIVE OPTIONS	Achieve at least 1 attribute per material listed below							
		Material	**Recycled Content**	**Rapidly Renewable**	**Regionally Sourced**	**FSC Certified**	**Low-emitting/Formaldehyde Free**		
		All cabinetry						0.5	
		All doors						0.5	
		All trim/moulding						0.5	
		All studs						0.5	
		All flooring						0.5	
		All insulation						0.5	
6	Durable Floor Materials	Floor is durable material (e.g. concrete, stone, brick, wood, ceramic tile) for minimum of 75% of all flooring		1					
	Total Points - Materials			14	0				0
Innovation									
1									
2									
3									

	Category	Requirements (Residential Uses)	Requirements (Non-residential Uses)	Max Points	Design Team			AEGB	
					Yes	?	No	√'d	Final
4									
5									
6									
7									
8									
9									
10									
	Total Points - Innovation			0	0				0
	Total Voluntary Measures			74	0				0

Note: Basic requirements = 1 star; 29-35 pts. = 2 stars; 36-42 pts. = 3 stars; 43-56 pts. = 4 stars; 57+ pts. = 5 stars

Strategies / Comments	Team Member

Strategies / Comments	Team Member

Strategies / Comments	Team Member

Strategies / Comments	Team Member

Strategies / Comments	Team Member

Strategies / Comments	Team Member

Strategies / Comments	Team Member

Strategies / Comments	Team Member

Strategies / Comments	Team Member

Strategies / Comments	Team Member

Strategies / Comments	Team Member

Strategies / Comments	Team Member

Strategies / Comments	Team Member

Strategies / Comments	Team Member

AUSTIN ENERGY GREEN BUILDING

MULTI-FAMILY RATING 2008

PROJECT:

Point Requirements for Star Ratings	
★	Basic Requirements
★★	29-35 points
★★★	36-42 points
★★★★	43-56 points
★★★★★	57 or more points

Star Rating	0
Sub-Totals: Basic Reqs	Not Achieved
Site	0
Energy	0
Water	0
IEQ	0
Materials	0
Innovation	0
Total Points:	**0**

Project Information Summary

Physical Address:

Primary Use of Building(s):

Mandatory Green Building Rating:

:

Green Building Program Star Rating Goal:

LEED Rating Goal:

:

Description:

Type of Construction:

# of Floors:

Sq. Ft. (gross):

Sq. Ft. (net):

Construction Scheduled Start:

Construction Scheduled Finish:

Demand and Energy Savings - calculated:

kW

kWH/year

CCF/year

Water and Wastewater Savings - Calculated:

Building Water 10,503 Gallons or 13% reduction over Baseline

Irrigation Water 0,000 Gallons in July or reduction over Baseline

Project Team Summary

GBP Representatives:

Building Owner/Developer:
(000) 000-0000

Architect:
(000) 000-0000

Mechanical Engineer:
(000) 000-0000

Structural Engineer:
(000) 000-0000

Electrical Engineer:
(000) 000-0000

General Contractor:
(000) 000-0000

Commissioning Authority:
(000) 000-0000

Civil Engineer:
(000) 000-0000

Professional Title:
(000) 000-0000

Construction Waste Management 0 tons or diverted from landfill	**Professional Title:** *(000) 000-0000*

C13. CITY OF AUSTIN TRADITIONAL NEIGHBORHOOD DISTRICT ("TND") ORDINANCE (AS CODIFIED)

CHAPTER 25-3. TRADITIONAL NEIGHBORHOOD DISTRICT.

ARTICLE 1. GENERAL PROVISIONS.

ARTICLE 2. ZONING.

ARTICLE 3. SUBDIVISION.

ARTICLE 4. GENERAL DEVELOPMENT STANDARDS.

ARTICLE 5. NEIGHBORHOOD CENTER AREA DEVELOPMENT STANDARDS.

ARTICLE 6. MIXED RESIDENTIAL AREA DEVELOPMENT STANDARDS.

ARTICLE 7. NEIGHBORHOOD EDGE AREA DEVELOPMENT STANDARDS.

ARTICLE 8. WORKSHOP AREA AND EMPLOYMENT CENTER AREA DEVELOPMENT STANDARDS.

ARTICLE 9. BUILDING AND CONSTRUCTION PERMITS.

CHAPTER 25-3. TRADITIONAL NEIGHBORHOOD DISTRICT.

ARTICLE I. GENERAL PROVISIONS.

§ 25-3-1 SCOPE OF CHAPTER.

This chapter regulates the design and development of a traditional neighborhood zoning district.

Source: Section 13-9-1; Ord. 990225-70; Ord. 031211-11.

§ 25-3-2 PURPOSE AND DESIGN.

(A) The purpose of a traditional neighborhood district is to encourage mixed-use, compact development that is sensitive to the environmental characteristics of the land and facilitates the efficient use of services. A traditional neighborhood district diversifies and integrates land uses within close proximity to each other, and it provides for the daily recreational and shopping needs of the residents. A traditional neighborhood district is a sustainable, long-term community that provides economic opportunity and environmental and social equity for the residents.

(B) A traditional neighborhood district is designed to ensure the development of land as a traditional neighborhood. Its design adopts the urban conventions which were the norm in the United States from colonial times until the 1940's. A traditional neighborhood district is characterized by the following design elements:

(1) neighborhoods that are limited in size and oriented toward pedestrian activity;

(2) a variety of housing types, jobs, shopping, services, and public facilities;

(3) residences, shops, workplaces, and civic buildings interwoven within the neighborhood, all within close proximity;

(4) a network of interconnecting streets and blocks that maintains respect for the natural landscape;

(5) natural features and undisturbed areas that are incorporated into the open space of the neighborhood;

(6) a coordinated transportation system with a hierarchy of appropriately designed facilities for pedestrians, bicycles, public transit, and automotive vehicles;

(7) well-configured squares, plazas, greens, landscaped streets, preserves, greenbelts, and parks woven into the pattern of the neighborhood and dedicated to the collective social activity, recreation, and visual enjoyment of the populace;

(8) civic buildings, open spaces, and other visual features that act as landmarks, symbols, and focal points for community identity;

(9) compatibility of buildings and other improvements as determined by their arrangement, bulk, form, character, and landscaping to establish a livable, harmonious, and diverse environment;

(10) private buildings that form a consistent, distinct edge and define the border between the public street space and the private block interior; and

(11) architecture and landscape that respond to the unique character of the region.

Source: Section 13-9-2; Ord. 990225-70; Ord. 031211-11.

§ 25-3-3 OVERVIEW.

(A) A traditional neighborhood district consists of an area of not less than 40 contiguous acres and not more than 250 contiguous acres. In this chapter, property is considered contiguous even if separated by a public roadway.

(B) A traditional neighborhood district is divided into at least two types of Areas, and each type of Area has different land use and site development regulations. A traditional neighborhood district must have one Neighborhood Center Area and at least one Mixed Residential Area. A traditional neighborhood district may also have a Neighborhood Edge Area, a Workshop Area, or an Employment Center Area.

(C) A Neighborhood Center Area serves as the focal point of a traditional neighborhood district, containing retail, commercial, civic, and public services to meet the daily needs of community residents. A Neighborhood Center is pedestrian-oriented, and it is designed to encourage pedestrian movement between a Mixed Residential Area and a Neighborhood Center Area. A square is required in a Neighborhood Center Area. Retail and commercial uses should generally be located adjacent to a square. Neighborhood Center Area uses include retail shops, restaurants, offices, banks, hotels, post office, governmental offices, churches, community centers, and attached residential dwellings.

(D) A Mixed Residential Area includes a variety of residential land uses including single-family residential, duplex, townhouse, and multi-family. Residential scale retail and commercial uses are permitted within a Mixed Residential area with strict architectural and land use controls. Retail and commercial uses in a Mixed Residential area are required to blend into the residential character of the neighborhood. A Mixed Residential area includes open spaces including small squares, pocket parks, community parks, and greenbelts. A Mixed Residential Area promotes pedestrian activity through well designed and varied streetscapes that also provide for the safe and efficient movement of vehicular traffic. Mixed Residential Area uses include single-family homes, condominiums, townhouses, apartments, offices, restaurants, neighborhood scale retail, and civic uses.

(E) A Neighborhood Edge Area is the least dense portion of a traditional neighborhood district, with larger lots and greater setbacks than the rest of the neighborhood. Alleys are not required, and direct vehicular access to the street is permitted. Only single family residential dwellings are permitted. A Neighborhood Edge Area is appropriate along the perimeter of the neighborhood. A portion of a traditional neighborhood district that adjoins existing or platted conventional low density housing must be designated as a Neighborhood Edge Area.

(F) A traditional neighborhood district may have a Workshop Area, an Employment Center Area, or both. Commercial and light industrial uses that are not appropriate for a Neighborhood Center Area or a Mixed Residential Area but which serve the local residents may be located in a Workshop Area. Large office and low-impact manufacturing uses may be located within an Employment Center Area. The scale and architectural conventions of a traditional neighborhood district apply to a Workshop area and an Employment Center Area.

(G) Civic uses that are oriented to the general public are permitted in a Neighborhood Center Area and a Mixed Residential Area. These uses are essential components of the social and physical fabric of a traditional neighborhood district. Special attention should be paid to the location of government offices, libraries, museums, schools, churches, and other prominent public buildings to create focal points and landmarks for the community. The locations of these major public civic uses are designated on the Development Plan at the time of zoning approval.

(H) Open space is a significant part of a traditional neighborhood district design. Formal and informal open spaces are required. These serve as areas for community gatherings, landmarks, and as organizing elements for the neighborhood. Open space includes squares, plazas, greens, preserves, parks, and greenbelts.

(I) A traditional neighborhood district is designed to be pedestrian oriented. To accomplish this goal, street pattern and design is used to reduce vehicle travel speeds and encourage pedestrian activity. An interconnected network of streets and alleys is required. Streets may be smaller than in conventional development and more varied in size and form to control traffic and give character to the neighborhood.

Source: Section 13-9-3; Ord. 990225-70; Ord. 000309-39; Ord. 031211-11.

§ 25-3-4 DEFINITIONS.

In this chapter:

(1) COMMUNITY PARKING FACILITY means an off-site parking lot or garage that provides required parking for some or all of the uses within a Neighborhood Center Area.

(2) CRITERIA MANUAL means a manual containing administrative rules adopted in accordance with Chapter 1-2 *(Adoption Of Rules)* of the City Code.

(3) DIRECTOR means the director of the Neighborhood Planning and Zoning Department of the City of Austin.

(4) FRONTAGE BUILDOUT means the length of a front building facade compared to the length of the front lot line, expressed as a percentage.

(5) GREEN means an open space available for unstructured recreation, its landscaping consisting of grassy areas and trees.

(6) GREENBELT means a series of connected open spaces that may follow natural features such as ravines, creeks, or streams.

(7) MAJOR CIVIC USE includes Administrative and Business Offices use by a governmental entity, College and University Facilities use, Cultural Services use, Postal Facilities use, Private Primary Educational Facilities use, Private Secondary Educational Facilities use, Public Primary Educational Facilities use, Public Secondary Educational Facilities use, Religious Assembly use, Safety Services use, and Transportation Terminal use.

(8) MAJOR PRIVATE OPEN SPACE IMPROVEMENTS include swimming pools, tennis courts, basketball courts, sports fields, recreation centers, and community meeting halls.

(9) OPEN SPACE includes squares, plazas, greens, preserves, parks, and greenbelts.

(10) PARK means an open space, available for recreation, its landscape consisting of paved paths and trails, some open lawn, trees, open shelters, or recreational facilities.

(11) PLAZA means open space at the intersection of important streets, set aside for civic purposes and commercial activity, including parking, its landscape consisting of durable pavement and formal tree plantings.

(12) PRESERVE means open space that preserves or protects endangered species, a critical environmental feature, or other natural feature.

(13) PRIVATE OPEN SPACE means open space that is owned and maintained by a Property Owners' Association or an individual property owner.

(14) PUBLIC OPEN SPACE means open space that is owned and maintained by the City.

(15) SIDE YARD HOUSE means a dwelling built adjacent to an interior side lot line with a yard adjacent to the opposite side lot line.

(16) SQUARE means open space that may encompass an entire block, is located at the intersection of important streets, and is set aside for civic purposes, with landscape consisting of paved walks, lawns, trees, and civic buildings.

(17) STREETSCAPE means the area within a street right of way that contains sidewalks, street furniture, landscaping, or trees.

Source: Section 13-9-4; Ord. 990225-70; Ord. 010329-18; Ord. 031211-11.

§ 25-3-5 LAND DEVELOPMENT CODE APPLICABILITY.

(A) The Land Development Code applies to a traditional neighborhood district and development within it unless this chapter expressly provides otherwise.

(B) The requirements of this chapter supersede any inconsistent provisions of the City Code or other ordinance.

(C) The following provisions of the Land Development Code do not apply to a traditional neighborhood district or development within it:

(1) Chapter 25-2, Subchapter B, Article 2, Division 2 *(Conditional Overlay Combining Districts)*, Division 4 *(Neighborhood Conservation Combining District)*, Division 5 *(Planned Unit Developments)*, and Division 6 *(Planned Development Areas; Mixed Use Combining Districts)*;

(2) Chapter 25-2, Subchapter C, Article 3, Division 5 *(Combining And Overlay Districts)*;

(3) Chapter 25-2, Subchapter C, Article 10 *(Compatibility Standards)*;

(4) Section 25-2-773 *(Duplex Residential Use)*;

(5) Section 25-2-775 *(Townhouses)*;

(6) Section 25-2-776 *(Condominium Residential Use)*;

(7) Section 25-2-894 *(Accessory Uses For A Principal Commercial Use)*;

(8) Section 25-2-901 *(Accessory Apartments)*;

(9) Chapter 25-4, Article 3 *(Platting Requirements)*, except for Section 25-4-134 *(Hazardous Pipelines)*;

(10) Chapter 25-5 *(Site Plans)*;

(11) Chapter 25-6, Article 4, Division 2 *(Roadways In Water Supply Rural Watersheds Or Water Supply Suburban Watersheds)*;

(12) Chapter 25-6, Article 7 *(Off-Street Parking And Loading)*; and

(13) Section 25-6-171 *(Standards For Design And Construction)*.

Source: Section 13-9-5; Ord. 990225-70; Ord. 030410-12; Ord. 031211-11.

§ 25-3-6 LIMITED TO FULL PURPOSE LIMITS.

Only property in the full purpose limits of the city may be designated as a traditional neighborhood zoning district.

Source: Ord. 031211-42.

ARTICLE 2. ZONING.

§ 25-3-21 ZONING PROCEDURE.

A traditional neighborhood district is a zoning district that is created in the same manner as other zoning districts. The procedures in Chapter 25-2, Subchapter B *(Zoning Procedures; Special Requirements For Certain Districts)* apply to a traditional neighborhood zoning district. Additional requirements are described in this article.

Source: Section 13-9-11; Ord. 990225-70; Ord. 031211-11.

§ 25-3-22 PRESUBMITTAL MEETING.

An application for zoning or rezoning to a traditional neighborhood district may not be accepted for filing before the applicant meets with the director or the director's designee in a presubmittal meeting. The purpose of the meeting is to acquaint the city staff with the proposed development, provide the applicant with preliminary staff comments, and identify major concerns or the need for additional data. Discussion topics at the meeting must include transportation, the environment, drainage, land use, and design concepts.

Source: Section 13-9-12; Ord. 990225-70; Ord. 031211-11.

§ 25-3-23 DEVELOPMENT PLAN REQUIRED.

An applicant for a traditional neighborhood district shall prepare a Development Plan as part of the zoning application. The Development Plan must contain the following information:

(1) locations and sizes of the Neighborhood Center Area, Mixed Residential Area, and, if applicable, Neighborhood Edge Area, Workshop Area, and Employment Center Area;

(2) locations of major civic uses;

(3) locations of commercial uses in Mixed Residential Areas;

(4) layout of the transportation network for all modes of travel;

(5) locations and sizes of private open space and public open space;

(6) locations and descriptions of proposed major private open space improvements;

(7) a construction phasing plan for major private open space improvements, if needed;

(8) locations and types of drainage and water quality controls;

(9) locations and types of environmentally sensitive areas, including critical environmental features, critical water quality zones, and water quality transition zones;

(10) a tree protection plan, including an aerial photograph, that demonstrates that the design of the traditional neighborhood district will result in the reasonable preservation of protected trees and significant tree clusters;

(11) the 100 year floodplain, as calculated to exist under fully developed conditions in accordance with the Drainage Criteria Manual;

(12) the locations of major utility facilities and easements that are within or immediately adjacent to the proposed traditional neighborhood district;

(13) preliminary architectural standards that are consistent with the architectural objectives of this chapter; and

(14) all additional information required by the director to demonstrate compliance with the traditional neighborhood district concept.

Source: Section 13-9-13; Ord. 990225-70; Ord. 031211-11.

§ 25-3-24 ADOPTION OF DEVELOPMENT PLAN.

The Development Plan for the traditional neighborhood district shall be included in the ordinance zoning or rezoning the land as a traditional neighborhood district.

Source: Section 13-9-14; Ord. 990225-70; Ord. 031211-11.

§ 25-3-25 REVISIONS TO DEVELOPMENT PLAN.

(A) A minor revision to a Development Plan may not be made to an area that is part of a final plat. The director may administratively approve minor revisions to a Development Plan if the director determines that there are no adverse effects on areas that are part of a final plat. The following are minor revisions:

(1) The location of a Neighborhood Center Area, a Mixed Residential, a Neighborhood Edge Area, a Workshop Area, or an Employment Center Area may be revised if the director determines that (a) the basic layout of the traditional neighborhood district remains the same, and (b) the district functions as well as before the revision.

(2) The size of a Neighborhood Center Area, a Mixed Residential, a Neighborhood Edge Area, a Workshop Area, or an Employment Center Area may be revised if the size is increased or decreased by not more than 10 percent, and the director determines that (a) the basic layout of the traditional neighborhood district remains the same, and (b) the district functions as well as before the revision.

(3) The location of a major civic use may be revised if the director determines that (a) the revised location is appropriate, and (b) the transportation network, the infrastructure, and the overall land use mix are not adversely affected. The director may not approve a revision that includes the addition of a major civic use within 200 feet of an area that is part of a final plat in a Mixed Residential Area or Neighborhood Edge Area.

(4) The location of a commercial use in a Mixed Residential Area may be revised if the director determines that the revised location is appropriate.

(5) The layout of a transportation network may be revised if the director determines that (a) the basic layout remains the same, and (b) the revised layout functions as well as the previous layout.

(6) The location or size of a private open space may be revised if the overall amount of private open space acreage does not decrease, and the director determines that the quality and functionality of the revised private open space is the same or better. The director may not approve a revision that includes the deletion of a private open space within 200 feet of an area that is part of a final plat in a Mixed Residential Area or Neighborhood Edge Area.

(7) The location or size of a public open space may be revised if the overall amount of public open space acreage does not decrease, and the director determines that the quality and functionality of the revised public open space is the same or better. The director may not approve a revision that includes the deletion of a public open space within 200 feet of an area that is part of a final plat in a Mixed Residential Area or Neighborhood Edge Area. The location or size of a public open space may not be revised without the approval of the director of the Parks and Recreation Department.

(8) The location or description of a major private open space improvement may be revised if the director determines that the revised improvement is as beneficial to the residents as the previous improvement.

(9) A construction phasing plan for major private open space improvements may be revised to extend a deadline by not more than 18 months.

(10) The location or type of a drainage or water quality control may be revised if the director determines that (a) the basic layout of the traditional neighborhood district remains the same, and (b) the revised location or type of control functions as well as the previous location or type of control.

(11) The location or type of an environmentally sensitive area may be revised if the director determines that the revision more accurately describes the location or type of an environmentally sensitive area.

(12) A tree protection plan may be revised if the director determines that the revised plan provides the same or more protection for trees overall.

(13) The location of a 100 year floodplain may be revised if the director determines that the revision more accurately describes the location of the floodplain.

(14) The locations of major utility facilities and easements may be revised if the director determines that the revised locations are more appropriate or functional.

(15) A preliminary architectural standard may be revised if the director determines that the revised standard is consistent with the architectural character of the traditional neighborhood district.

(B) All revisions other than those described in Subsection (A) are major revisions. Major revisions must be approved by the city council through a rezoning of the property.

Source: Section 13-9-15; Ord. 990225-70; Ord. 031211-11.

§ 25-3-26 REGULATION MODIFICATION BY CITY COUNCIL.

The city council may, at the time a traditional neighborhood district is created, modify the permitted uses or the site development regulations set forth in this chapter. The modifications must be included in the ordinance zoning or rezoning the property. Modifications may be permitted only if justified by exceptional circumstances and must be consistent with the character of the traditional neighborhood district.

Source: Section 13-9-16; Ord. 990225-70; Ord. 031211-11.

§ 25-3-27 WORKSHOP AREA AND EMPLOYMENT CENTER AREA USES.

(A) The specific land uses for a Workshop Area or an Employment Center Area must be proposed by the applicant, approved by the city council, and included in the ordinance zoning or rezoning the property. Those land uses must be consistent with this section.

(B) A Workshop Area is for commercial and light industrial uses that are not appropriate for a Neighborhood Center Area or Mixed Residential Area but which serve the local residents.

(C) An Employment Center Area is for large office and low-impact manufacturing uses.

Source: Section 13-9-17; Ord. 990225-70; Ord. 031211-11.

§ 25-3-28 NEIGHBORHOOD EDGE AREA USES.

(A) Single family residential use is permitted in a Neighborhood Edge Area.

(B) A major civic use is permitted in a Neighborhood Edge Area if shown on the Development Plan.

(C) All other uses are prohibited in a Neighborhood Edge Area.

Source: Section 13-9-18; Ord. 990225-70; Ord. 031211-11.

§ 25-3-29 NEIGHBORHOOD CENTER AREA AND MIXED RESIDENTIAL AREA USES.

The table below lists the permitted uses within a Neighborhood Center Area and a Mixed Residential Area of a traditional neighborhood district. "MRA" means Mixed Residential Area, "NCA" means Neighborhood Center area, "P" means that a use is permitted, "P*" means that a use is permitted but subject to Section 25-3-105 (*Additional Regulations For Neighborhood Center Area*), and "X" means that a use is not permitted. Uses not listed in the table are not permitted.

TABLE OF PERMITTED USES

Residential Uses	MRA	NCA
Condominiums	P	P*
Duplex Residential	P	X
Group Residential	P	P*
Lodging House Residential	P	P*
Multi-Family Residential	P	P*
Retirement Housing (Large Site)	X	P*
Retirement Housing (Small Site)	P	P*
Single Family Residential	P	X
Townhouse Residential	P	P*
Commercial Uses	**MRA**	**NCA**
Administrative & Business Office	P	P
Art Gallery	P	P
Art Workshop	X	P
Automotive Rentals	X	P*
Automotive Repair Services	X	P*
Building Maintenance Services	X	P
Business or Trade School	X	P
Business Support Services	X	P
Cocktail Lounge	P	P
Commercial Blood Plasma Center	X	P

Commercial Uses	MRA	NCA
Commercial Off-Street Parking	X	P*
Communications Services	X	P
Consumer Convenience Services	P	P
Consumer Repair Services	P	P
Drop-off Recycling Collection Facility	X	P
Electronic Prototype Assembly	X	P
Exterminating Services	X	P
Financial Services	X	P
Food Preparation	X	P
Food Sales	P	P
General Retail Sales (Convenience)	P	P
General Retail Sales (General)	X	P
Hotel-Motel	X	P
Indoor Entertainment	X	P
Indoor Sports & Recreation	X	P
Kennels	X	P*
Liquor Sales	X	P
Medical Offices	P	P
Off-site Accessory Parking	X	P
Outdoor Sports & Recreation	P	P
Pawn Shop Services	X	P
Personal Improvement Services	P	P
Personal Services	P	P
Pet Services	P	P
Printing and Publishing	X	P
Professional Office	P	P
Research Assembly Services	X	P
Restaurant (General)	P	P
Restaurant (Limited)	P	P
Service Station	X	P*
Software Development	P	P
Theater	X	P

Industrial Uses	MRA	NCA
Custom Manufacturing	X	P

Civic Uses	MRA	NCA
Club or Lodge	P	P
College & University Facilities	X	P
Communication Service Facilities	P	P
Community Recreation (Private)	P	P
Community Recreation (Public)	P	P
Congregate Living	X	P
Convalescent Services	X	P

Civic Uses	MRA	NCA
Cultural Services	P	P
Day Care Services (Commercial)	X	P
Day Care Services (General)	P	P
Day Care Services (Limited)	P	P
Family Home	P	P
Group Home, Class I (General)	P	P
Group Home, Class I (Limited)	P	P
Group Home, Class II	P	P
Guidance Services	X	P
Hospital Services (Limited)	X	P
Local Utility Services	P	P
Major Utility Facilities	P	P
Park & Recreation Services (General)	P	P
Park & Recreation Services (Special)	P	P
Postal Facilities	X	P
Private Primary Educational Facilities	P	P
Private Secondary Educational Facilities	P	P
Public Primary Educational Facilities	P	P
Public Secondary Educational Facilities	P	P
Religious Assembly	P	P
Safety Services	P	P
Telecommunications Tower	X	P*
Transportation Terminal	X	P

Source: Section 13-9-19; Ord. 990225-70; Ord. 031211-11; Ord. 031211-41; Ord. 040617-Z-1.

ARTICLE 3. SUBDIVISION.

§ 25-3-51 SUBDIVISION PROCEDURE.

The subdivision procedures in Chapter 25-4 *(Subdivision)* apply to the traditional neighborhood district, except as follows:

(1) All property within a traditional neighborhood district must be subdivided under this chapter. A previously approved final subdivision plat must be vacated, and a previously approved preliminary subdivision plan must be withdrawn.

(2) The traditional neighborhood district shall be on one preliminary subdivision plan.

(3) An open space area shall be included in the final subdivision plat of adjacent property. All open space areas must be platted as separate open space lots.

(4) A final subdivision plat may not be approved unless there has been compliance with the provisions of this chapter relating to a Property Owners' Association, Architectural Standards, Land Use Allocations, Drainage, and Water Quality.

(5) A final subdivision plat for more than 50 percent of the land area covered by the preliminary subdivision plan may not be approved until construction of the community meeting hall has begun. Once begun, the construction of the community meeting hall must be diligently pursued to completion.

(6) Improvements to private open spaces, except those included in a construction phasing plan for major private open space

improvements, shall be constructed by the subdivider as part of the subdivision infrastructure.

Source: Section 13-9-31; Ord. 990225-70; Ord. 031211-11.

§ 25-3-52 SUBDIVISION LAYOUT REQUIREMENTS.

(A) Street monuments and property markers.

(1) Property pins or other forms of permanent markers identified in the most recent edition of the Manual of Practice for Land Surveying in Texas, published by the Texas Society of Professional Surveyors, shall be placed by the surveyor at all corners of boundary lines of a subdivision. Pins and markers may not be spaced more than 1,300 feet apart. One corner of the subdivision shall be identified by a concrete monument unless a concrete monument exists on an adjacent platted subdivision within 1,300 feet of the proposed plat.

(2) If a concrete monument exists on an adjacent platted subdivision within 1,300 feet of the proposed plat, no concrete monuments are required for the proposed plat. In that instance, boundary corners may be set with permanent markers identified in the most recent edition of Manual of Practice for Land Surveying in Texas.

(3) Intermediate property corners, curve points, and angle points shall be marked by iron stakes.

(B) Easements for public utilities and enclosed or open drainage ways shall be retained in all subdivisions in the widths and locations deemed necessary by the director. To the extent practicable, the easements for water lines, wastewater lines, and storm sewers shall be located in the street rights-of-way, and the easements for all other utilities shall be located in the alley rights-of-way. All the easements shall be dedicated to public use for the named purpose and shall be aligned to minimize construction cost.

(C) Utilities shall be located underground unless this requirement is, for good cause, waived by the director, and, if applicable, the director of the Electric Utility Department.

(D) When the director finds that easements in areas adjoining a proposed subdivision are necessary to provide adequate drainage or to serve the subdivision with utilities, the subdivider shall obtain the easements or make arrangements with the City to obtain them.

(E) Streets of new subdivisions shall be aligned with existing streets on adjoining property unless the Land Use Commission determines that the Comprehensive Plan, topography, requirements of traffic circulation, or other considerations make it desirable to depart from the alignment.

(F) Each lot in a subdivision, except a lot that fronts on a plaza and abuts an alley, shall abut a dedicated public street.

(G) Except in a Neighborhood Edge Area, each lot in a subdivision shall abut an alley unless the director determines that good cause exists to omit an alley or portion of an alley.

(H) An interconnected network of streets is required unless the director determines that good cause exists to require a different street pattern.

(I) Streets, alleys, and pedestrian paths shall be designed and constructed in accordance with this chapter, the Traditional Neighborhood District Criteria Manual, the Standards Criteria Manual, and the Standard Specifications Criteria Manual.

(J) New streets in subdivisions shall be named to provide continuity of name with existing streets and to prevent conflict with identical

or similarly spelled or pronounced names in other parts of the city's planning jurisdiction.

(K) Street intersections, whether public or private streets, shall be designed in accordance with the provisions of the Traditional Neighborhood District Criteria Manual and the Transportation Criteria Manual.

(L) Dead-end streets are prohibited unless the director determines that the most desirable plan requires laying out a dead-end street. A dead-end street shall terminate in a courtyard designed in accordance with the Traditional Neighborhood District Criteria Manual, unless the director determines that topography, density, adequate circulation, or other unusual conditions require a deviation from the design criteria in the Traditional Neighborhood District Criteria Manual.

(M) The side lines of lots in subdivisions shall be approximately at right angles to straight street lines or radial to curved street lines. An arrangement placing adjacent lots at right angles to each other shall be avoided.

(N) Block length may not exceed 600 feet. Block width may not exceed 300 feet. The director may approve a block width of not more than 400 feet or a block length of not more than 1000 feet if required because of topography or existing street layout, but a block longer than 800 feet must be traversed by a pedestrian path near the midpoint.

(O) Minimum lot size, maximum lot size, and minimum lot width are specified in the site development regulations contained in this chapter for a Neighborhood Center Area, a Mixed Residential Area, a Neighborhood Edge Area, a Workshop Area, and an Employment Center Area. Open space lots must comply with the dimensional requirements of this chapter.

(P) Townhouse lots may be created where each townhouse lot is to be served by a public sewage system, subject to the following conditions in addition to those applicable to all other subdivisions:

(1) All common areas shall be clearly identified on the plat and adequate provisions made for maintenance and taxation.

(2) There may be not less than two and not more than eight units in a townhouse group.

(3) Not more than one townhouse may be located on a lot.

(4) A legal opinion by an attorney licensed to practice law in the state, accurately describing and defining the rights and duties of the owners, the legal status of common areas and facilities, and provisions for taxation and maintenance of the common areas, must accompany each subdivision with townhouse lots.

Source: Section 13-9-32; Ord. 990225-70; Ord. 010607-8; Ord. 031211-11.

ARTICLE 4. GENERAL DEVELOPMENT STANDARDS.

§ 25-3-71 APPLICABLE TO ALL DEVELOPMENT.

This article applies to the design and development of a traditional neighborhood district.

Source: Section 13-9-41; Ord. 990225-70; Ord. 031211-11.

§ 25-3-72 PROPERTY OWNERS' ASSOCIATION.

(A) Conditions, Covenants, and Restrictions for all the property within a traditional neighborhood district must be filed in the

county real property records by the owner before a final subdivision plat may be approved, a lot sold, or a building permit issued.

(B) Conditions, Covenants, and Restrictions must be approved by the city attorney, and they must:

(1) create a Property Owners' Association with mandatory membership for each property owner;

(2) establish architectural standards that are in conformity with the requirements of this chapter;

(3) create an Architectural Control Committee to review development for compliance with the architectural standards and issue certificates of approval;

(4) provide for the ownership, development, management, and maintenance of private open space (except plazas owned by individual property owners), community parking facilities, community meeting hall, and other common areas;

(5) provide for the maintenance of the landscaping and trees within the streetscape;

(6) require the collection of assessments from members in an amount sufficient to pay for its functions;

(7) be effective for a term of not less than 50 years;

(8) require that the Property Owners' Association obtain the approval of the director regarding the disposition and management of private open space, community parking facilities, community meeting hall, and other common areas before it may be dissolved; and

(9) require that the Property Owners' Association obtain the approval of the director for amendments to the Conditions, Covenants, and Restrictions which relate to provisions required by this chapter.

Source: Section 13-9-42; Ord. 990225-70; Ord. 031211-11.

§ 25-3-73 COMMUNITY MEETING HALL.

(A) A community meeting hall for the use of the neighborhood residents is required. The community meeting hall is a civic use.

(B) A community meeting hall must be located so that it is easily accessible to the residents. It may be placed in a square, park, or other suitable open space location.

(C) The minimum size of a community meeting hall is 2,000 square feet. A community meeting hall must be large enough to meet the needs of the neighborhood residents.

Source: Section 13-9-43; Ord. 990225-70; Ord. 031211-11.

§ 25-3-74 ARCHITECTURAL STANDARDS.

(A) The Conditions, Covenants, and Restrictions shall establish architectural standards for the property within a traditional neighborhood district. The standards must comply with this section.

(B) The architectural standards must achieve the following objectives:

(1) architectural compatibility;

(2) human scale design;

(3) integration of uses;

(4) encouragement of pedestrian activity;

(5) buildings that relate to and are oriented toward the street and surrounding buildings;

(6) residential scale buildings in Mixed Residential Areas;

(7) buildings that contain special architectural features to signify entrances to the Neighborhood Center Area and important street intersections; and

(8) Neighborhood Center Area buildings that focus activity on the neighborhood square.

(C) The director may adopt guidelines for architectural standards for inclusion in the Traditional Neighborhood District Criteria Manual.

Source: Section 13-9-44; Ord. 990225-70; Ord. 031211-11.

§ 25-3-75 LAND USE ALLOCATIONS.

(A) Each lot within a traditional neighborhood district must be allocated to a particular land use category.

(B) The amounts of land that must be allocated to particular land use categories, excluding streets, alleys, open spaces, drainage controls, and water quality controls, are as follows:

(1) For a Neighborhood Center Area:

(a) Townhouse, condominium, and multi-family uses shall be allocated not less than 20 percent of the land area.

(b) Commercial uses shall be allocated not less than 20 percent of the land area.

(c) Civic use shall be allocated not less than five percent of the land area, or one-half acre, whichever is greater. In a traditional neighborhood district of 100 acres or less, the provision of a community meeting hall in the Neighborhood Center satisfies the civic use allocation even if less than one-half acre is used.

(2) For a Mixed Residential Area:

(a) Single family residential use shall be allocated not less than 50 percent and not more than 80 percent of the land area.

(b) Duplex use shall be allocated not more than 10 percent of the land area.

(c) Townhouse, condominium, and multi-family uses shall be allocated not less than 10 percent of the land area.

(d) Commercial uses shall be allocated not less than one percent and not more than two percent of the land area.

(e) Civic uses shall be allocated not less than two percent of the land area.

(C) A preliminary subdivision plan may not be approved until the director approves a Land Use Allocation Map, submitted by the owner, that allocates a particular land use category to each lot on the preliminary subdivision plan.

(D) Development and use shall comply with the Land Use Allocation Map.

(E) The director may approve a revision to a Land Use Allocation Map if the director finds that (a) the revised land uses are

appropriate, and (b) the revision does not adversely affect land owners within 200 feet of the boundary line of a revised area.

(F) A Land Use Allocation Map and the land use allocations required by this section are effective for a period of 50 years after the date the map is first approved by the director.

Source: Section 13-9-45; Ord. 990225-70; Ord. 031211-11.

§ 25-3-76 OPEN SPACE.

The following open space requirements apply within a traditional neighborhood district:

(1) Not less than 20 percent of the gross land area of the traditional neighborhood district must be open space.

(2) Public open space shall conform to the plans, goals, and standards of the Parks and Recreation Department and must be approved by the director of the Parks and Recreation Department.

(3) The Parks and Recreation Department shall be consulted regarding the locations and types of private open space.

(4) The portions of drainage and water quality facilities that are usable by the public for recreational purposes, as determined by the director, may be designated as parks or greenbelts.

(5) At least one square shall be located in the Neighborhood Center Area. The required square shall be at least one-half acre in size in a traditional neighborhood district of 100 acres or less, and the required square shall be at least one acre in size in a traditional neighborhood district that is larger than 100 acres.

(6) A square must adjoin streets along at least 75 percent of its perimeter.

(7) A plaza must adjoin building lots along at least 50 percent of its perimeter.

(8) At least one green that is not less than one acre in size must be located within 600 feet of the geographic center of the traditional neighborhood district.

(9) A park may be not less than 10,000 square feet in size.

(10) A greenbelt may not be located behind dwellings. The director may permit exceptions where topography, existing street layout, or other good reasons that make this restriction impractical. If a greenbelt is located behind dwellings, access shall be provided in accordance with the Traditional Neighborhood Criteria Manual standards.

(11) A greenbelt must have an average width of not less than 200 feet. A greenbelt may be not less than 50 feet wide. Not more than 10 percent of the uninterrupted length of a greenbelt may be the minimum 50 feet width. A greenbelt must have not less than 25 percent of its boundary abutting a street.

(12) At least 90 percent of the lots in a Mixed Residential Area must be within 600 feet of a square, plaza, green, or park.

Source: Section 13-9-46; Ord. 990225-70; Ord. 031211-11.

§ 25-3-77 PARKLAND DEDICATION.

The parkland dedication provisions of Chapter 25-4, Article 3, Division 5 *(Parkland Dedication)* apply to a traditional neighborhood district, except as follows:

(1) The amount of land required to be dedicated for parkland is 25 percent of the open space in a traditional neighborhood district. The formula in Section 25-4-212 *(Dedication Of Parkland Required)* does not apply.

(2) At the time of zoning, the director of the Parks and Recreation Department shall require one of the following:

(a) dedication by the subdivider of all or part of the required amount of parkland;

(b) payment in lieu of dedicated parkland by the subdivider;

(c) general public access on up to 25 percent of the open space; or

(d) a combination of (a), (b), and (c), not to exceed the equivalent of 25 percent of the open space.

(3) Land to be dedicated as parkland or to which there will be general public access shall be shown on the Development Plan.

(4) The director of the Parks and Recreation Department shall calculate a parkland fee at the time of zoning, and shall apportion a parkland fee by acreage to each final subdivision plat. A subdivider shall pay a parkland fee, if required, before a final subdivision plat may be approved.

(5) The owner of a tract of land that has been designated for general public access may make and enforce reasonable regulations that are similar to City park regulations.

Source: Section 13-9-47; Ord. 990225-70; Ord. 031211-11.

§ 25-3-78 DRAINAGE.

(A) The drainage provisions of the Land Development Code apply to development in a traditional neighborhood district, except as provided in this section.

(B) Drainage planning and engineering for a traditional neighborhood district shall be for the district as a whole.

(C) In designing drainage facilities, impervious cover calculations shall assume maximum impervious cover for each lot within the traditional neighborhood district.

(D) Drainage facilities shall be privately owned, with easements granted to the City, and maintained for functionality by the City, unless other arrangements are made with the director of the Watershed Protection and Development Review Department.

(E) A final plat may not be approved unless a drainage master plan for the entire traditional neighborhood district has been approved by the director of the Watershed Protection and Development Review Department. A final plat may not be approved unless adequate drainage facilities are provided for all property within the plat.

Source: Section 13-9-48; Ord. 990225-70; Ord. 010329-18; Ord. 031211-11.

§ 25-3-79 WATER QUALITY.

(A) The water quality provisions of the Land Development Code apply to development in a traditional neighborhood district, except as provided in this section.

(B) Water quality planning and engineering for a traditional neighborhood district shall be for the district as a whole.

(C) Allowable impervious cover is calculated in accordance with this subsection.

(1) In calculating water quality related development intensities, the term "site" shall include all property within a traditional neighborhood district.

(2) In calculating water quality development intensities, a traditional neighborhood district is classified as "commercial development".

(3) Impervious cover calculations shall assume the maximum impervious cover allowable for each lot within a traditional neighborhood district.

(D) Impervious cover limits in a traditional neighborhood district are as follows:

(1) Overall impervious cover for a traditional neighborhood district is limited to 65 percent of net site area or the amount permitted in the watershed, whichever is less.

(2) A Neighborhood Center Area lot, except an open space lot, is limited to impervious cover of not more than 90 percent of gross site area.

(3) A Mixed Residential Area lot, except a commercial lot or an open space lot, is limited to impervious cover of not more than 65 percent of gross site area. A commercial lot is limited to impervious cover of not more than 90 percent of gross site area.

(4) A Neighborhood Edge Area lot, except an open space lot, is limited to impervious cover of not more than 65 percent of gross site area.

(5) A Workshop Area lot or Employment Center Area lot, except an open space lot, is limited to impervious cover of not more than 80 percent of gross site area.

(6) Open space impervious cover limits are as follows:

(a) An open space lot that is a plaza or square is limited to impervious cover of not more than 90 percent of gross site area.

(b) Greenbelts, preserves, parks, and greens are limited to impervious cover of not more than 10 percent of gross site area overall.

(c) A greenbelt, preserve, park, or green may be restricted by the owner to impervious cover of less than 10 percent of the gross site area. The restricted amount shall be used for impervious cover calculations.

(d) Impervious coverage for greenbelts, preserves, parks, and greens classified as public open space shall be calculated and enforced separately from those classified as private open space.

(E) Water quality control facilities shall be privately owned, with easements granted to the City, and maintained for functionality by the City, unless other arrangements are made with the director of the Watershed Protection and Development Review Department.

(F) A final plat may not be approved unless a water quality master plan for the entire traditional neighborhood district has been approved by the director of the Watershed Protection and Development Review Department. A final plat may not be approved unless adequate water quality control facilities are provided for all property within the plat.

(G) Development on a lot may not exceed the impervious cover limit set forth in this section. A building or construction permit may not be issued for development that exceeds the limit.

Source: Section 13-9-49; Ord. 990225-70; Ord. 010329-18; Ord. 031211-11.

§ 25-3-80 LANDSCAPING.

The landscaping requirements of Chapter 25-2, Subchapter C, Article 9 *(Landscaping)* apply to development within a traditional neighborhood district, except as follows:

(1) A street yard 1,000 square feet or less in size is not required to be landscaped.

(2) A parking area with 12 motor vehicle parking spaces or less is not required to have landscaped islands, peninsulas, or medians.

Source: Section 13-9-50; Ord. 990225-70; Ord. 031211-11.

§ 25-3-81 ROADWAY DESIGN.

(A) The roadway designs used within the different areas of the traditional neighborhood district may vary depending on the proposed function of the roadway, the anticipated adjacent land uses, and the anticipated traffic load. The City encourages the use of a variety of designs to lend character to the neighborhood.

(B) Roadway designs that may be used in a traditional neighborhood district are in the Traditional Neighborhood District Criteria Manual.

(C) The director may approve the use of innovative roadway designs that are not listed in the Traditional Neighborhood District Criteria Manual.

Source: Section 13-9-51; Ord. 990225-70; Ord. 031211-11.

§ 25-3-82 VEHICULAR ACCESS.

(A) Direct vehicular access from a lot to an alley in the traditional neighborhood district is permitted and preferred. Direct vehicular access from a lot to a street is not permitted, except as provided in this section.

(B) Exceptions.

(1) Direct vehicular access from a lot to a street is permitted in a Neighborhood Edge Area or if a lot does not abut an alley.

(2) The director may grant vehicular access from a lot to a street if the director determines it is warranted by exceptional circumstances.

(C) If adjacent lots have direct vehicular access to a street, the director may require that the access be through a common or joint driveway.

Source: Section 13-9-52; Ord. 990225-70; Ord. 031211-11.

§ 25-3-83 PARKING.

(A) The following parking regulations apply in a traditional neighborhood district:

(1) A parking lot or garage may not be adjacent to a square or adjacent to or opposite a street intersection.

(2) A parking lot shall be located at the rear or side of a building. If located at the side, screening shall be provided at the lot line by landscaping or decorative walls or fences.

(3) Compact parking spaces are prohibited.

(4) There is no off-street loading requirement for a building with less than 10,000 square feet of gross building area. The director shall determine the location, number, and dimensions of the off-street loading for a larger building.

(5) Except as approved by the director, parking in alleys is prohibited.

(6) Minimum parking requirements are as follows:

(a) Except as otherwise provided in this subsection, a commercial use must provide one parking space for every 500 square feet of gross building area.

(b) A commercial use parking lot or garage must provide not less than one bicycle parking space for every 10 motor vehicle parking spaces.

(c) A condominium, multi-family, group residential, or retirement housing use must provide one parking space for the first bedroom of a dwelling unit and 0.5 parking space for each additional bedroom.

(d) A townhouse, single-family residential, duplex, group home, or family home use must provide two parking spaces for each dwelling unit.

(e) A convalescent services or congregate living use must provide one parking space for every four beds.

(f) A daycare services, primary educational facilities, or secondary educational facilities use must provide one parking space for each employee.

(g) The director shall determine the parking requirement for any use not listed in this subsection.

(B) The following parking regulations apply in a Neighborhood Center Area:

(1) The required parking for a use may be located anywhere in the Neighborhood Center Area. Community parking facilities are encouraged.

(2) Not more than 125 percent of the required parking for a use may be provided on-site.

(3) A commercial or a multi-family use may apply adjacent on-street parking toward the minimum parking requirements.

(C) In a Mixed Residential Area or Neighborhood Edge Area, the required parking for a use must be provided on-site.

(D) The director shall determine the parking requirements for a Workshop Area or Employment Center Area.

Source: Section 13-9-53; Ord. 990225-70; Ord. 031211-11.

§ 25-3-84 PARKING AREA DESIGN AND CONSTRUCTION STANDARDS.

(A) Parking and loading facilities, circulation areas, and queue lines must comply with the design and construction standards in this section and the Traditional Neighborhood District Criteria Manual.

(B) Surfacing, curbing, and drainage improvements on all parking and loading facilities must preclude the free flow of water onto adjacent properties, public streets, or alleys and provide adequate drainage.

(C) Areas used for primary circulation, for frequent idling of vehicle engines, or for loading activities shall be designed and located to minimize impacts on adjoining properties, including provisions for screening or baffling.

(D) All parking and loading facilities shall be maintained to assure desirability and usefulness of the facility. The facilities shall be maintained free of refuse, debris, or other accumulated matter and shall at all times be available for the off-street parking or loading for which they are required or intended.

Source: Section 13-9-54; Ord. 990225-70; Ord. 031211-11.

§ 25-3-85 SIGNS.

Signs are regulated by Chapter 25-10 *(Sign Regulations)*.
Source: Section 13-9-55; Ord. 990225-70; Ord. 031211-11.

§ 25-3-86 COMPATIBILITY STANDARDS.

(A) Except for lighting in a public right of way, all exterior lighting must be hooded or shielded so that the light source is not directly visible from adjacent properties. Exterior lighting may not exceed 0.4 foot candles across the source property line.

(B) The noise level of mechanical equipment may not exceed 70 decibels at the property line.

(C) The use of highly reflective surfaces, including reflective glass and reflective metal roofs with a pitch of more than a run of seven to a rise of 12, is prohibited. This prohibition does not apply to solar panels and copper or painted metal roofs.

(D) Dumpsters and permanently placed refuse receptacles must be located at least 20 feet from adjacent residential uses. The location of and access to dumpsters or any other refuse receptacles must comply with the Transportation Criteria Manual.

(E) Commercial, multi-family, and condominium uses must be screened in accordance with this subsection. Yards, fences, vegetative screening, or berms shall be provided to screen off-street parking areas, mechanical equipment, storage areas, and areas for refuse collection. If fences are used for screening, the height may not exceed six feet unless otherwise permitted in the Land Development Code. The property owner is responsible for the upkeep and maintenance of fences, berms, and vegetative screening.

Source: Section 13-9-56; Ord. 990225-70; Ord. 031211-11.

§ 25-3-87 ADDITIONAL REGULATIONS FOR ALL DEVELOPMENT.

(A) A principal building must have its main entrance from a street or plaza.

(B) Development must comply with the Greenbuilder provisions of the Traditional Neighborhood District Criteria Manual.

(C) Drive-through facilities and other facilities that allow people to remain in vehicles while receiving products or services are prohibited. This prohibition does not apply to the fueling facilities of a service station.

(D) A residential use may be located above the first floor of a commercial building.

(E) A stoop, open porch, or balcony may extend into the front setback not more than five feet.

(F) A townhouse must have a private rear yard not less than 200 square feet in size. A townhouse must have a finished first floor elevation not less than eighteen inches above the elevation of the sidewalk at the front lot line.

Source: Section 13-9-57; Ord. 990225-70; Ord. 031211-11.

§ 25-3-88 ACCESSORY USES.

(A) The accessory use regulations of Chapter 25-2, Subchapter C, Article 5 *(Accessory Uses)* apply except as provided in this section.

(B) Notwithstanding Section 25-2-893 *(Accessory Uses For A Principal Residential Use)*, one accessory dwelling unit containing not more than 700 square feet of gross building area is permitted as an accessory to a residential use if the other requirements of this chapter are met.

(C) Notwithstanding Section 25-2-894 *(Accessory Uses For A Principal Commercial Use)*, commercial uses may

include the following as accessory uses, activities, and structures on the same site or lot:

(1) a commercial use not listed as a permitted use in the same district that:

(a) is operated primarily for the convenience of employees, clients, or customers of the principal use;

(b) occupies less than 10 percent of the total floor area of the use; and

(c) is located and operated as an integral part of the principal use and does not comprise a separate business use or activity; or

(2) a parking facility in a Neighborhood Center Area.

Source: Section 13-9-58; Ord. 990225-70; Ord. 031211-11.

§ 25-3-89 MAJOR CIVIC USE SITE DEVELOPMENT REGULATIONS.

(A) The following site development regulations do not apply to a major civic use:

(1) maximum front yard setback;

(2) minimum front yard setback;

(3) minimum street side yard setback;

(4) minimum interior yard setback;

(5) minimum rear yard setback;

(6) maximum building coverage;

(7) maximum building footprint; and

(8) maximum height.

(B) The director shall specify the parameters of the development regulations listed in Subsection (A) for each specific development proposal. The parameters shall not be more restrictive than those that would otherwise apply to a civic use.

Source: Section 13-9-59; Ord. 990225-70; Ord. 031211-11.

ARTICLE 5. NEIGHBORHOOD CENTER AREA DEVELOPMENT STANDARDS.

§ 25-3-101 APPLICABLE TO NEIGHBORHOOD CENTER AREA.

This article applies to the design and development of a Neighborhood Center Area.

Source: Section 13-9-61; Ord. 990225-70; Ord. 031211-11.

§ 25-3-102 SIZE OF NEIGHBORHOOD CENTER AREA.

A Neighborhood Center Area must contain not less than five percent of the gross land area of the traditional neighborhood district.

Source: Section 13-9-62; Ord. 990225-70; Ord. 031211-11.

§ 25-3-103 LOCATION OF NEIGHBORHOOD CENTER AREA.

A Neighborhood Center must be easily accessible by pedestrians from all parts of the Mixed Residential Areas. At least 90 percent of the lots in the Mixed Residential Areas must be within 2000 linear feet of a Neighborhood Center Area boundary.

Source: Section 13-9-63; Ord. 990225-70; Ord. 031211-11.

§ 25-3-104 SITE DEVELOPMENT REGULATIONS FOR NEIGHBORHOOD CENTER AREA.

The following table lists the site development regulations for a Neighborhood Center Area.

REGULATION	SINGLE-FAMILY DUPLEX	TOWN-HOUSE	COMMERCIAL MULTIFAMILY CONDOMINIUM
Minimum Lot Size	2,000 SF 2,500 SF on corner lot	3,600 SF 4,000 SF on corner lot	3,600 SF 4,000 SF on corner lot
Maximum Lot Size	4,000 SF	43,560 SF	43,560 SF
Minimum Lot Width [2]	20 FT 25 FT on corner lot	40 FT 45 FT on corner lot	40 FT 45 FT on corner lot
Maximum Site Area	20,000 SF	43,560 SF	43,560 SF
Minimum Frontage Buildout [3]	80%	80%	60%
Maximum Height	35 FT	60 FT	60 FT
Maximum Front Yard Setback	5 FT	5 FT	5 FT
Minimum Front Yard Setback	-0-	-0-	-0-
Minimum Street Side Yard Setback	5 FT	5 FT	5 FT
Minimum Interior Side Yard Setback	-0-	-0-	-0-
Minimum Rear Yard Setback	5 FT	-0-	5 FT
Maximum Building Coverage	70%	70%	70%
Maximum Impervious Cover	90%	90%	90%

[1] See Section 25-3-89 *(Major Civic Use Site Development Regulations)*.
[2] On a courtyard or curved street, the minimum lot width between the front lot line and the minimum front yard setback is 15 feet for a townhouse lot and 30 feet for other lots.
[3] The director may reduce the minimum frontage buildout to accommodate a protected tree or significant tree cluster.
Source: Section 13-9-64; Ord. 990225-70; Ord. 031211-11.

§ 25-3-105 ADDITIONAL REGULATIONS FOR NEIGHBORHOOD CENTER AREA.

(A) An automotive rental use may keep not more than 20 vehicles on site.

(B) An automotive repair services use may not exceed 2400 square feet of gross building area.

(C) A building that is adjacent to a square may be not less than two stories high.

(D) An open colonnade may extend into the front setback a maximum of five feet. An unenclosed balcony with a minimum clearance of nine feet above finished grade may extend five feet over a public sidewalk. An awning or walkway covering with a minimum clearance of eight feet above finished grade may extend five feet over a public sidewalk.

(E) A commercial off-street parking use may not exceed one acre in site size. Not more than one commercial off-street parking Use site may be located in a block. A site must be screened from the street by low hedges or walls not less than three feet and not more than four feet in height.

(F) A kennel use must be conducted entirely within an enclosed structure.

(G) A residential use with street level living space must have a finished first floor elevation not less than eighteen inches above the elevation of the sidewalk at the front lot line. A residential use may not front at ground level on a square.

(H) A service station use may have the capability of fueling not more than eight vehicles at one time.

(I) A telecommunications tower must be located on top of a building or be an architectural component of the building. Free standing towers are prohibited.

(J) A printing and publishing use may not exceed 5,000 square feet of gross floor area.

Source: Section 13-9-65; Ord. 990225-70; Ord. 031211-11; Ord. 040617-Z-1.

ARTICLE 6. MIXED RESIDENTIAL AREA DEVELOPMENT STANDARDS.

§ 25-3-121 APPLICABLE TO MIXED RESIDENTIAL AREA.

This article applies to the design and development of a Mixed Residential Area.

Source: Section 13-9-71; Ord. 990225-70; Ord. 031211-11.

§ 25-3-122 SITE DEVELOPMENT REGULATIONS FOR MIXED RESIDENTIAL AREA.

The following table lists the site development regulations for a Mixed Residential Area.

REGULATION	SINGLE-FAMILY DUPLEX	TOWN-HOUSE	COMMERCIAL MULTIFAMILY CONDOMINIUM	CIVIC [1]
Minimum Lot Size	3,600 SF [2]	2,000 SF	3,600 SF	3,600 SF
	4,000 SF on corner lot [2]	2,500 SF on corner lot	4,000 SF on corner lot	4,000 SF on corner lot

REGULATION	SINGLE-FAMILY DUPLEX	TOWN-HOUSE	COMMERCIAL MULTIFAMILY CONDOMINIUM	CIVIC [1]
Maximum Lot Size	None	4,000 SF	20,000 SF	20,000 SF
Minimum Lot Width [3]	40 FT [2] 45 FT on corner lot [2]	20 FT 25 FT on corner lot	40 FT 45 FT on corner lot	40 FT 45 FT on corner lot
Maximum Site Area	None	20,000 SF	20,000 SF	20,000 SF
Maximum Height	35 FT	35 FT	35 FT	35 FT
Maximum Front Yard Setback	15 FT	10 FT	10 FT	10 FT
Minimum Front Yard Setback	10 FT	5 FT	5 FT	5 FT
Minimum Street Side Yard Setback	10 FT	10 FT	10 FT	10 FT
Minimum Interior Side Yard Sideback	5 FT[2]	0 FT	5 FT	5 FT
Minimum Rear Yard Setback	5 FT	5 FT	10 FT	10 FT
Maximum Building	55%	55%	55%	55%

REGULATION	SINGLE-FAMILY DUPLEX	TOWN-HOUSE	COMMERCIAL MULTIFAMILY CONDOMINIUM	CIVIC [1]
Coverage				
Maximum Building Footprint	5,000 SF	5,000 SF	5,000 SF	5,000 SF [4]
Maximum Impervious Cover	65%	65%	65%[5]	65%

[1] See Section 25-3-89 *(Major Civic Use Site Development Regulations).*
[2] See Section 25-3-123 *(Side Yard Houses).*
[3] On a courtyard or curved street, the minimum lot width between the front lot line and the minimum front yard setback is 15 feet for a townhouse lot and 30 feet for other lots.
[4] A community meeting hall may exceed this limitation.
[5] Maximum impervious cover for a commercial use is 90%.
Source: Section 13-9-72; Ord. 990225-70; Ord. 031211-11.

§ 25-3-123 SIDE YARD HOUSES.

(A) A side yard house is permitted on a lot if the following requirements are met:

(1) the lot is in a Mixed Residential Area that has been designated as single family residential on a Land Use Allocation Map; and

(2) all the lots in the same block and fronting on the same street comply with Subsection (B).

(B) An owner of a lot must impose the following limitations on the lot by the filing of appropriate deed restrictions:

(1) A structure may be erected adjacent to an interior side lot line. The wall of a structure erected adjacent to an interior side lot line must be solid and opaque with no openings of any kind. The eaves of a structure may extend across the interior side lot line not more than three feet.

(2) Except for a patio or patio cover, the minimum distance between structures on adjoining lots is ten feet. The minimum distance between a patio or patio cover and a structure on an adjoining lot is six feet.

(3) An easement is required on each lot that abuts a lot with a structure adjacent to a common interior side lot line. The easement is for the purpose of construction and maintenance of the

structure and drainage. The easement must be not less than five feet wide and extend the full length of the interior side lot line.

(C) If a lot is subject to this section, the following site development regulations apply:

(1) The minimum interior side yard setback is zero feet.

(2) The minimum required side yard between structures is ten feet.

(3) The minimum lot width is 30 feet, or 35 feet on a corner lot.

(4) The minimum lot size is 2400 square feet, or 2800 square feet on a corner lot.

Source: Section 13-9-73; Ord. 990225-70; Ord. 031211-11.

§ 25-3-124 ADDITIONAL REGULATIONS FOR MIXED RESIDENTIAL AREA.

(A) Similar land uses should face across streets, and dissimilar land uses should abut at rear lot lines or across alleys.

(B) A commercial use may only be located on the first floor of a building. Up to one-half of the second floor may be used for accessory uses that are not open to the public.

(C) Commercial uses are limited to corner locations that are designated on the Development Plan.

(D) A commercial use may not be open to the public between the hours of 11:00 p.m. and 6:00 a.m.

(E) There may be not more than eight dwelling units in a single structure.

(F) There may be not more than one principal structure on a site.

(G) There may be not more than one accessory dwelling unit on a site.

(H) A garage entry may not face the street unless it is at least 20 feet behind the front building face of the principal structure.

(I) A front porch or stoop is required on a single family residential or duplex structure.

Source: Section 13-9-74; Ord. 990225-70; Ord. 031211-11.

ARTICLE 7. NEIGHBORHOOD EDGE AREA DEVELOPMENT STANDARDS.

§ 25-3-151 APPLICABLE TO NEIGHBORHOOD EDGE AREA.

This article applies to the design and development of a Neighborhood Edge Area.

Source: Section 13-9-81; Ord. 990225-70; Ord. 031211-11.

§ 25-3-152 LOCATION OF NEIGHBORHOOD EDGE AREA.

(A) A Neighborhood Edge Area may be designated along the perimeter of a traditional neighborhood district. Unless there is a park, green, greenbelt, or preserve at least 100 feet wide, a Neighborhood Edge Area must be designated for those portions of a traditional neighborhood district that abut:

(1) land zoned SF-3 or more restrictive;

(2) land used for any use permitted in an SF-3 or more restrictive district;

(3) land included in an approved preliminary subdivision plan or final subdivision plat that is designated on the plan or plat for any use permitted in an SF-3 or more restrictive district.

(B) The minimum width of a Neighborhood Edge Area is 100 feet. The maximum width of a Neighborhood Edge Area is 250 feet, but if the 250 foot width line falls within a block, the width may be extended to the nearest block edge.

Source: Section 13-9-82; Ord. 990225-70; Ord. 031211-11.

§ 25-3-153 SITE DEVELOPMENT REGULATIONS FOR NEIGHBORHOOD EDGE AREA.

The site development regulations for a Neighborhood Edge Area are as follows:

(1) Minimum lot size: 5,750 square feet

(2) Minimum lot width: 50 feet

(3) Maximum height: 35 feet

(4) Minimum front setback: 25 feet

(5) Minimum street side yard setback: 15 feet

(6) Minimum interior side yard setback: 5 feet

(7) Minimum rear yard setback: 10 feet

(8) Maximum building coverage: 55%

(9) Maximum impervious cover: 65%

Source: Section 13-9-83; Ord. 990225-70; Ord. 031211-11.

§ 25-3-154 ADDITIONAL REGULATIONS FOR NEIGHBORHOOD EDGE AREA.

(A) There may be no more than one principal structure on a site.

(B) There may be no more than one accessory dwelling unit on a site.

(C) A garage entry may not face the street unless it is at least 20 feet behind the front building face of the principal structure.

Source: Section 13-9-84; Ord. 990225-70; Ord. 031211-11.

ARTICLE 8. WORKSHOP AREA AND EMPLOYMENT CENTER AREA DEVELOPMENT STANDARDS.

§ 25-3-171 APPLICABLE TO WORKSHOP AREA AND EMPLOYMENT CENTER AREA.

This article applies to the design and development of a Workshop Area or an Employment Center Area.

Source: Section 13-9-91; Ord. 990225-70; Ord. 031211-11.

§ 25-3-172 SIZE OF WORKSHOP AREA AND EMPLOYMENT CENTER AREA.

The aggregate size of all Workshop Areas and Employment Center Areas within a traditional neighborhood district may not exceed 10 percent of the gross land area.

Source: Section 13-9-92; Ord. 990225-70; Ord. 031211-11.

§ 25-3-173 SITE DEVELOPMENT REGULATIONS FOR WORKSHOP AREA AND EMPLOYMENT CENTER AREA.

The site development regulations for the Workshop Area and Employment Center Area are as follows:

(1) Minimum lot size: 5,000 square feet

(2) Maximum lot size:

(a) In Workshop Area: 5 acres

(b) In Employment Center Area: 10 acres

(3) Maximum site area:

(a) In Workshop Area: 5 acres

(b) In Employment Center Area: 10 acres

(4) Minimum lot width: 50 feet

(5) Minimum frontage buildout: 80%

(6) Maximum height: 60 feet

(7) Minimum front yard setback: 0 feet

(8) Maximum front yard setback: 10 feet

(9) Minimum side setback: 10 feet

(10) Minimum rear yard setback: 25 feet

(11) Maximum building coverage: 65%

(12) Maximum impervious coverage: 80%

(13) Maximum floor-to-area ratio: 1:1

Source: Section 13-9-93; Ord. 990225-70; Ord. 031211-11.

ARTICLE 9. BUILDING AND CONSTRUCTION PERMITS.

§ 25-3-191 SITE PLAN NOT REQUIRED.

A site plan is not required for development in a traditional neighborhood district. The Development Plan, the subdivision regulations, and the plot plan incorporate conventional site plan regulations.

Source: Section 13-9-101; Ord. 990225-70; Ord. 031211-11.

§ 25-3-192 PERMITS.

(A) A building permit is required for a structure within a traditional neighborhood district.

(B) A construction permit is required for development of more than 1000 square feet of site area if a building permit is not otherwise required.

(C) A plot plan must be submitted with the building or construction permit application. A building or construction permit may not be issued unless a plot plan complies with this chapter and Title 25 *(Land Development)*. A plot plan must provide the following information, if applicable:

(1) all information required by Chapter 25-11 *(Building, Demolition, And Relocation Permits; Special Requirements For Historic Structures)* or 25-12 *(Technical Codes)* to be on a plot plan;

(2) locations and types of easements;

(3) the locations of proposed utility connections;

(4) the 100 year floodplain, as calculated to exist under fully developed conditions in accordance with the Drainage Criteria Manual;

(5) building location and gross building square footage;

(6) proposed use that complies with the Land Use Allocation Map;

(7) number of bedrooms;

(8) locations, quantity, and dimensions of sidewalks, pedestrian ramps, driveways, parking areas, parking spaces, and off-street loading areas;

(9) information that shows compliance with accessibility requirements;

(10) landscaping, screening, and fencing;

(11) locations of protected trees, significant tree clusters, and 8-inch survey trees;

(12) an erosion and sedimentation control plan;

(13) lot size, setbacks, building height, building coverage, and impervious coverage; and

(14) other information that may be required by administrative rules.

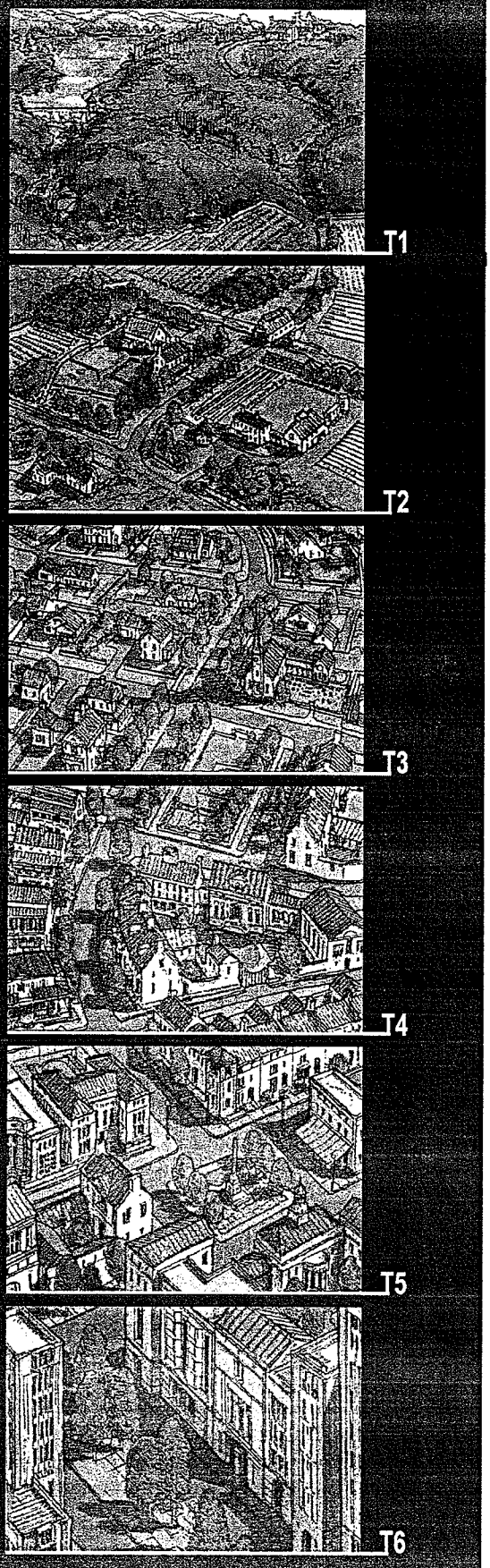
(D) A building or construction permit may not be issued unless the Architectural Control Committee of the Property Owners' Association has certified that the proposed development complies with the architectural standards.

Source: Section 13-9-102; Ord. 990225-70; Ord. 031211-11; Ord. 041202-16.

C14. SMARTCODE, VERSION 9.2

SmartCode

VERSION 9.2



1.1 AUTHORITY

1.1.1 The action of the Municipality, State in the adoption of this Code is authorized under the Charter of the Municipality, Section X and Local and State Statutes, Section X.

1.1.2 This Code was adopted as one of the instruments of implementation of the public purposes and objectives of the adopted Municipal Comprehensive Plan. This Code is declared to be in accord with the Municipal Comprehensive Plan, as required by the Local Land Development Statutes.

1.1.3 This Code was adopted to promote the health, safety and general welfare of the _____ of _____, State and its citizens, including protection of the environment, conservation of land, energy and natural resources, reduction in vehicular traffic congestion, more efficient use of public funds, health benefits of a pedestrian environment, historic preservation, education and recreation, reduction in sprawl development, and improvement of the built environment.

1.1.4 This Code was adopted and may be amended by vote of the Planning Commission and Legislative Body.

1.2 APPLICABILITY

1.2.1 Provisions of this Code are activated by "shall" when required; "should" when recommended; and "may" when optional.

1.2.2 The provisions of this Code, when in conflict, shall take precedence over those of other codes, ordinances, regulations and standards except the Local Health and Safety Codes.

1.2.3 The existing _____ of _____, State Zoning Ordinances and the _____ of _____, State Subdivision Ordinances (the "Existing Local Codes") shall continue to be applicable to issues not covered by this Code except where the Existing Local Codes would be in conflict with Section 1.3 Intent.

1.2.4 Capitalized terms used throughout this Code may be defined in Article 7 Definitions of Terms. Article 7 contains regulatory language that is integral to this Code. Those terms not defined in Article 7 shall be accorded their commonly accepted meanings. In the event of conflicts between these definitions and those of the Existing Local Codes, those of this Code shall take precedence.

1.2.5 The metrics of Article 6 Standards and Tables are an integral part of this Code. However, the diagrams and illustrations that accompany them should be considered guidelines, with the exception of those on Table 15 Form-Based Code Graphics, which are also legally binding.

1.2.6 Where in conflict, numerical metrics shall take precedence over graphic metrics.

1.3 INTENT

The intent and purpose of this Code is to enable, encourage and qualify the implementation of the following policies:

1.3.1 THE REGION

a. That the region should retain its natural infrastructure and visual character derived from topography, woodlands, farmlands, riparian corridors and coastlines.

b. That growth strategies should encourage Infill and redevelopment in parity with New Communities.

c. That development contiguous to urban areas should be structured in the pattern of Infill TND or Infill RCD and be integrated with the existing urban pattern.

d. That development non-contiguous to urban areas should be organized in the pattern of CLD, TND, or RCD.
e. That Affordable Housing should be distributed throughout the region to match job opportunities and to avoid concentrations of poverty.
f. That transportation Corridors should be planned and reserved in coordination with land use.
g. That green corridors should be used to define and connect the urbanized areas.
h. That the region should include a framework of transit, pedestrian, and bicycle systems that provide alternatives to the automobile.

1.3.2 THE COMMUNITY

a. That neighborhoods and Regional Centers should be compact, pedestrian-oriented and Mixed Use.
b. That neighborhoods and Regional Centers should be the preferred pattern of development and that Districts specializing in a single use should be the exception.
c. That ordinary activities of daily living should occur within walking distance of most dwellings, allowing independence to those who do not drive.
d. That interconnected networks of Thoroughfares should be designed to disperse traffic and reduce the length of automobile trips.
e. That within neighborhoods, a range of housing types and price levels should be provided to accommodate diverse ages and incomes.
f. That appropriate building Densities and land uses should be provided within walking distance of transit stops.
g. That Civic, institutional, and Commercial activity should be embedded in downtowns, not isolated in remote single-use complexes.
h. That schools should be sized and located to enable children to walk or bicycle to them.
i. That a range of Open Space including Parks, Squares, and playgrounds should be distributed within neighborhoods and downtowns.

1.3.3 THE BLOCK AND THE BUILDING

a. That buildings and landscaping should contribute to the physical definition of Thoroughfares as Civic places.
b. That development should adequately accommodate automobiles while respecting the pedestrian and the spatial form of public areas.
c. That the design of streets and buildings should reinforce safe environments, but not at the expense of accessibility.
d. That architecture and landscape design should grow from local climate, topography, history, and building practice.
e. That buildings should provide their inhabitants with a clear sense of geography and climate through energy efficient methods.
f. That Civic Buildings and public gathering places should be provided as locations that reinforce community identity and support self-government.
g. That Civic Buildings should be distinctive and appropriate to a role more important than the other buildings that constitute the fabric of the city.
h. That the preservation and renewal of historic buildings should be facilitated, to affirm the continuity and evolution of society.
i. That the harmonious and orderly evolution of urban areas should be secured through form-based codes.

1.3.4 THE TRANSECT

a. That Communties should provide meaningful choices in living arrangements as manifested by distinct physical environments.
b. That the Transect Zone descriptions on Table 1 shall constitute the Intent of this Code with regard to the general character of each of these environments.

1.4 PROCESS

1.4.1 Municipality hereby creates a Consolidated Review Committee ("CRC") comprised of a member from each regulatory agency having jurisdiction over the permitting of a project, a representative of the Development and Design Center, and the town architect, to process administratively applications and plans for proposed projects.

1.4.2 The geographic locations of the Sectors and the standards for theTransect Zones shall be determined as set forth in Article 2, Article 3, Article 4, and Article 5 through a process of public consultation with approval by the Legislative Body. Once these determinations have been incorporated into this Code and its associated plans, then projects that require no Variances or Warrants, or only Warrants, shall be processed administratively without further recourse to public consultation.

1.4.3 An owner may appeal a decision of the CRC to the Board of Zoning Adjustment and may appeal a decision of the Board of Zoning Adjustment to the Legislative Body.

1.4.4 Should a violation of an approved Regulating Plan occur during construction, or should any construction, site work, or development be commenced without an approved Regulating Plan or Building Scale Plan, the Board of Zoning Adjustment has the right to require the owner to stop, remove, and/or mitigate the violation, or to secure a Variance to cover the violation.

1.5 WARRANTS AND VARIANCES

1.5.1 There shall be two types of deviation from the requirements of this Code: Warrants and Variances. Whether a deviation requires a Warrant or Variance shall be determined by the CRC.

1.5.2 A Warrant is a ruling that would permit a practice that is not consistent with a specific provision of this Code but is justified by the provisions of Section 1.3 Intent. The CRC shall have the authority to approve or disapprove administratively a request for a Warrant pursuant to regulations established by the CRC.

1.5.3 A Variance is any ruling on a deviation other than a Warrant. Variances shall be granted only in accordance with _____Statutes, _____, as amended.

1.5.4 The request for a Warrant or Variance shall not subject the entire application to public hearing, but only that portion necessary to rule on the specific issue requiring the relief.

1.5.5 The following standards and requirements shall not be available for Warrants or Variances:

a. The maximum dimensions of traffic lanes. (See Table 3a.)
b. The required provision of Rear Alleys and Rear Lanes.
c. The minimum Base Residential Densities. (See Table 14b.)
d. The permission to build Accessory Buildings.
e. The minimum requirements for parking. (See Table 10.)

1.6 SUCCESSION

1.6.1 Twenty years after the approval of a Regulating Plan, each Transect Zone, except the T1 Natural and T2 Rural Zones, shall be automatically rezoned to the successional (next higher) Transect Zone, unless denied in public hearing by the Legislative Body.

ARTICLE 1. SMARTCODE MODULES

1.7 FOR INCENTIVES
1.8 FOR AFFORDABLE HOUSING INCENTIVES
1.9 FOR HAZARD MITIGATION STANDARDS
1.10 FOR HAZARD MITIGATION STANDARDS

2.1 INSTRUCTIONS

2.1.1 This Article governs the preparation of Regional Scale Plans ("Regional Plans") that allocate Sectors. For lands within Municipality that have been mapped pursuant to this Article, Sections 2.5 et seq. prescribe the Community Unit types permitted in each Growth Sector. Articles 3 and 4 regulate the standards of those Community Unit types.

2.1.2 Regional Plans shall integrate the largest practical geographic area, overlapping property lines as necessary and municipal boundaries if possible.

2.1.3 Regional Sectors are defined in Article 2 and are comprised of Open Space and growth areas. Growth areas are intended for the development of Communy Units, defined in Article 3 and Article 4, which in turn are comprised of Transect Zones, defined by the elements appropriate to them in Article 5 and Article 6.

2.1.4 Regional Plans shall be prepared by the Planning Office and/or consultants under its supervision. The process shall involve citizen participation and the approval of the Legislative Body.

2.2 SEQUENCE OF SECTOR DETERMINATION

Determination of Sector designations shall be made in the following sequence:

2.2.1 The areas to be designated Preserved Open Sector (O-1) shall be mapped using the criteria listed in Section 2.3. The outline of this Sector is effectively the Rural Boundary Line, which is permanent.

2.2.2 The areas to be designated Reserved Open Sector (O-2) shall be mapped using the criteria listed under Section 2.4. The outline of this Sector is effectively the Urban Boundary Line which is to be adjusted by the ongoing permitting of New Community Plans or Infill Community Plans in accordance with this Code.

2.2.3 The areas to be designated Infill Growth Sectors (G-4) shall be mapped as described in Section 2.8. These areas may be redeveloped according to Article 4 of this Code.

2.2.4 All remaining areas shall be available for new development pursuant to New Community Plans submitted and approved in accordance with Article 3 of this Code. These areas shall be assigned to the Restricted Growth Sector, the Controlled Growth Sector, or the Intended Growth Sector using the criteria listed in this Article. Within these Sectors, the Community Unit types of CLD (Clustered Land Development), TND (Traditional Neighborhood Development), and RCD (Regional Center Development), shall be permitted to the extent set forth in Table 2.

2.2.5 Within the four Growth Sectors, development according to the Existing Local Codes remains as an option.

2.2.6 Those areas that cannot or should not conform to one of the Community Unit types shall be allocated to Special Districts. See Section 2.9.

2.2.7 A system for the gradual Transfer of Development Rights (TDR) shall be established and administered for the purpose of transferring development rights from the Reserved Open Sector (O-2) to the Growth Sectors as set forth in Section 2.4.3.

2.3 (O-1) PRESERVED OPEN SECTOR

2.3.1 The Preserved Open Sector shall consist of Open Space that is protected from development in perpetuity. The Preserved Open Sector includes areas under environmental protection by law or regulation, as well as land acquired for conservation through purchase, by easement, or by past Transfer of Development Rights.

2.3.2 The Preserved Open Sector shall consist of the aggregate of the following categories:
a. surface waterbodies
b. protected wetlands
c. protected habitat
d. riparian Corridors
e. purchased Open Space
f. conservation easements
g. transportation Corridors
h. areas residual to Clustered Land Development (CLD)

2.3.3 Development and construction within the Preserved Open Sector and the specifications required to do so shall be determined on an individual project basis by public hearing of the Legislative Body.

2.4 (O-2) RESERVED OPEN SECTOR

2.4.1 The Reserved Open Sector shall consist of Open Space that should be, but is not yet, protected from development.

2.4.2 The Reserved Open Sector shall consist of the aggregate of the following categories:
a. flood plain, including Special Flood Hazard Areas
b. steep slopes
c. Open Space to be acquired
d. Corridors to be acquired
e. buffers to be acquired
f. legacy woodland
g. legacy farmland
h. legacy viewsheds

2.4.3 The Reserved Open Sector is a Transfer of Development Rights (TDR) sending area, for the gradual sale of rights for development in the Controlled Growth Sector and the Intended Growth Sector. An owner who has purchased such development rights may exceed the allocated Densities of New Communities as set forth in Section 3.8 and Table 14b. Areas from where development rights have been transferred shall be designated Preserved Open Sector.The Planning Office shall maintain a record of such transfers, updating the regional map accordingly.

2.4.4 (For HAZARD MITIGATION STANDARDS)

2.5 (G-1) RESTRICTED GROWTH SECTOR

2.5.1 The Restricted Growth Sector shall be assigned to areas that have value as Open Space but nevertheless are subject to development, either because the zoning has already been granted or because there is no legally defensible reason, in the long term, to deny it.

2.5.2 Within the Restricted Growth Sector, Clustered Land Development (CLD) shall be permitted By Right.

2.6 (G-2) CONTROLLED GROWTH SECTOR

2.6.1 The Controlled Growth Sector shall be assigned to those locations that can support Mixed Use by virtue of proximity to an existing or planned Thoroughfare.

2.6.2 Within the Controlled Growth Sector, CLD and Traditional Neighborhood Development (TND) shall be permitted By Right.

2.6.3 Any TND on an existing or projected rail or Bus Rapid Transit (BRT) network may

be redesignated in whole or in part as TOD and permitted the higher Density represented by the Effective Parking allowance in Section 5.9.2d. The use of a TOD overlay requires approval by Variance.

2.7 (G-3) INTENDED GROWTH SECTOR

2.7.1 The Intended Growth Sector shall be assigned to those locations that can support substantial Mixed Use by virtue of proximity to an existing or planned regional Thoroughfare and/or transit.

2.7.2 Within the Intended Growth Sector, Communities in the pattern of Regional Center Developments (RCD), as well as TNDs, shall be permitted By Right, .

2.7.3 Any TND or RCD on an existing or projected rail or Bus Rapid Transit (BRT) network may be redesignated in whole or in part as TOD and permitted the higher Density represented by the Effective Parking allowance in Section 5.9.2d. The use of a TOD overlay requires approval by Variance.

2.8 (G-4) INFILL GROWTH SECTOR

2.8.1 The Infill Growth Sector shall be assigned to areas already developed, having the potential to be modified, confirmed or completed in the pattern of Infill TNDs or Infill RCDs.

2.9 (SD) SPECIAL DISTRICTS

2.9.1 Special District designations shall be assigned to areas that, by their intrinsic size, Function, or Configuration, cannot conform to the requirements of a CLD, a TND, or an RCD as set forth in Article 3.

2.9.2 Conditions of development for Special Districts shall be determined in public hearing of the Legislative Body and recorded on Table 16. Alternatively, the provisions of the Existing Local Codes shall remain applicable to Special Districts.

ARTICLE 2. SMARTCODE MODULES

2.4 FOR HAZARD MITIGATION STANDARDS

3.1 INSTRUCTIONS

3.1.1 Within the Growth Sectors as shown on the Regional Scale Plan ("Regional Plan"), the provisions of Article 3 and this Code in general shall be available By Right, upon request by the owner.

3.1.2 New Community Plans may be prepared in the absence of a Regional Plan or Comprehensive Plan by approval of the Legislative Body. New Community Plans may contain more than one Community Unit and/or more than one Community Unit type.

3.1.3 Once the CRC or Legislative Body approves a New Community Plan, the parcel shall become a Community Planning Area and shall be marked as such on the Zoning Map of Municipality. Within the Community Planning Area, this Code shall be the exclusive and mandatory zoning regulation, and its provisions shall be applied in their entirety.

3.1.4 New Community Plans submitted in accordance with the provisions of this Code, for the appropriate Sector of a Regional Plan and requiring no Variances, shall be approved administratively by the CRC.

3.1.5 New Community Plans may be prepared by an owner or by the Planning Office.

3.1.6 New Community Plans shall include a Regulating Plan consisting of one or more maps showing the following for each Community Unit in the plan area, in compliance with the standards described in this Article:

a. Transect Zones
b. Civic Zones
c. Thoroughfare network
d. Special Districts, if any
e. Special Requirements, if any
f. numbers of Warrants or Variances, if any.

3.1.7 New Community Plans shall include one set of preliminary site plans for each Transect Zone, as provided by Table 15 and Section 5.1.3a.

3.2 SEQUENCE OF COMMUNITY DESIGN

3.2.1 The site shall be structured using one or several Pedestrian Sheds, which should be located according to existing conditions, such as traffic intersections, adjacent developments, and natural features. The site or any Community Unit within it may be smaller or larger than its Pedestrian Shed.

3.2.2 The Pedestrian Sheds may be adjusted to include land falling between or outside them, but the extent of each shall not exceed the acreage limit specified in Section 3.3 for the applicable Community Unit type. An Adjusted Pedestrian Shed becomes the boundary of a Community Unit.

3.2.3 Areas of Transect Zones (Section 3.4) shall be allocated within the boundaries of each Community Unit as appropriate to its type. See Section 3.3 and Table 14a.

3.2.4 Civic Zones shall be assigned according to Section 3.5.

3.2.5 Special Districts, if any, shall be assigned according to Section 3.6.

3.2.6 The Thoroughfare network shall be laid out according to Section 3.7.

3.2.7 Density shall be calculated according to Section 3.8.

3.2.8 Remnants of the site outside the Adjusted Pedestrian Shed(s) shall be assigned to Transect Zones or Civic Space by Warrant or Special District by Variance.

3.3 COMMUNITY UNIT TYPES

3.3.1 **CLUSTERED LAND DEVELOPMENT (CLD)**

a. A Clustered Land Development (CLD) shall be permitted within the G-1 Restricted Growth Sector and the G-2 Controlled Growth Sector.

b. A CLD shall be structured by one Standard Pedestrian Shed and shall consist of no fewer than 30 acres and no more than 80 acres.

c. A CLD shall include Transect Zones as allocated on Table 2 and Table 14a. A minimum of 50% of the Community Unit shall be permanently allocated to a T1 Natural Zone and/or T2 Rural Zone.

3.3.2 **TRADITIONAL NEIGHBORHOOD DEVELOPMENT (TND)**

a. A Traditional Neighborhood Development (TND) shall be permitted within the G-2 Controlled Growth Sector, the G-3 Intended Growth Sector, and the G-4 Infill Growth Sector.

b. A TND within the G-2 Controlled Growth Sector and the G-3 Intended Growth Sector shall be structured by one Standard or Linear Pedestrian Shed and shall be no fewer than 80 acres and no more than 160 acres. See Article 4 for Infill TND acreage requirements in the G-4 Infill Growth Sector.

c. A TND shall include Transect Zones as allocated on Table 2 and Table 14a.

d. Larger sites shall be designed and developed as multiple Communities, each subject to the individual Transect Zone requirements for its type as allocated on Table 2 and Table 14a. The simultaneous planning of adjacent parcels is encouraged.

e. In the T-4 General Urban Zone, a minimum Residential mix of three Building Disposition types (none less than 20%) shall be required, selected from Table 9.

3.3.3 **REGIONAL CENTER DEVELOPMENT (RCD)**

a. A Regional Center Development (RCD) shall be permitted within the G-3 Intended Growth Sector and the G-4 Infill Growth Sector.

b. An RCD within the G-3 Intended Growth Sector shall be structured by one Long Pedestrian Shed or Linear Pedestrian Shed and shall consist of no fewer than 80 acres and no more than 640 acres. See Article 4 for Infill RCD acreage requirements in the G-4 Infill Growth Sector

c. An RCD shall include Transect Zones as allocated on Table 2 and Table 14a.

d. For larger sites, an RCD may be adjoined without buffer by one or more TNDs, each subject to the individual Transect Zone requirements for TND as allocated on Table 2 and Table 14a. The simultaneous planning of adjacent parcels is encouraged.

3.3.4 **TRANSIT ORIENTED DEVELOPMENT (TOD)**

a. Any TND or RCD on an existing or projected rail or Bus Rapid Transit (BRT) network may be redesignated in whole or in part as TOD and permitted the higher Density represented by the Effective Parking allowance in Section 5.9.2d.

b. The use of a TOD overlay requires approval by Variance.

3.4 TRANSECT ZONES

3.4.1 Transect Zones shall be assigned and mapped on each New Community Plan according to the percentages allocated on Tables 2 and 14a.

3.4.2 A Transect Zone may include any of the elements indicated for its T-zone number throughout this Code, in accordance with Intent described in Table 1 and the metric standards summarized in Table 14.

3.5 CIVIC ZONES

3.5.1 General

a. Civic Zones dedicated for public use shall be required for each Community Unit and designated on the New Community Plan as Civic Space (CS) and Civic Building (CB).
b. Civic Space Zones are public sites permanently dedicated to Open Space.
c. Civic Building Zones are sites dedicated for buildings generally operated by not-for-profit organizations dedicated to culture, education, religion, government, transit and municipal parking, or for a use approved by the Legislative Body.
d. A Civic Zone may be permitted by Warrant if it does not occupy more than 20% of a Pedestrian Shed, otherwise it is subject to the creation of a Special District. See Section 3.6.
e. Parking for Civic Zones shall be determined by Warrant. Civic parking lots may remain unpaved if graded, compacted and landscaped.

3.5.2 Civic Zones Specific to T1 & T2 Zones

a. Civic Buildings and Civic Spaces within T1 Natural and T2 Rural Zones shall be permitted only by Variance.

3.5.3 Civic Space (CS) Specific to T3-T6 Zones

a. Each Pedestrian Shed shall assign at least 5% of its Urbanized area to Civic Space.
b. Civic Spaces shall be designed as generally described in Table 13, approved by Warrant, and distributed throughout Transect Zones as described in Table 14e.
c. Those portions of the T1 Natural Zone that occur within a development parcel shall be part of the Civic Space allocation and should conform to the Civic Space types specified in Table 13a or 13b.
d. Each Pedestrian Shed shall contain at least one Main Civic Space. The Main Civic Space shall be within 800 feet of the geographic center of each Pedestrian Shed, unless topographic conditions, pre-existing Thoroughfare alignments or other circumstances prevent such location. A Main Civic Space shall conform to one of the types specified in Table 13b, 13c, or 13d.
e. Within 800 feet of every Lot in Residential use, a Civic Space designed and equipped as a playground shall be provided. A playground shall conform to Table 13e.
f. Each Civic Space shall have a minimum of 50% of its perimeter enfronting a Thoroughfare, except for playgrounds.
g. Civic Spaces may be permitted within Special Districts by Warrant.
h. Parks may be permitted in Transect Zones T4, T5 and T6 by Warrant.

3.5.4 Civic Buildings (CB) Specific to T3-T6 Zones

a. The owner shall covenant to construct a Meeting Hall or a Third Place in proximity to the Main Civic Space of each Pedestrian Shed. Its corresponding Public Frontage shall be equipped with a shelter and bench for a transit stop.
b. One Civic Building Lot shall be reserved for an elementary school. Its area shall be one (1) acre for each increment of 100 dwelling units provided by the Community Plan, with a minimum of three (3) acres. The school site may be within any Transect Zone. Any playing fields should be outside the Pedestrian Shed.
c. One Civic Building Lot suitable for a childcare building shall be reserved within each Pedestrian Shed. The owner or a homeowners' association or other community council may organize, fund and construct an appropriate building as the need arises.

d. Civic Building sites shall not occupy more than 20% of the area of each Pedestrian Shed.
e. Civic Building sites should be located within or adjacent to a Civic Space, or at the axial termination of a significant Thoroughfare.
f. Civic Buildings shall not be subject to the standards of Article 5. The particulars of their design shall be determined by Warrant.
g. Civic Buildings may be permitted within Special Districts by Warrant.

3.6 SPECIAL DISTRICTS

3.6.1 Special District designations shall be assigned to areas that, by their intrinsic size, Function, or Configuration, cannot conform to the requirements of any Transect Zone or combination of zones. Conditions of development for Special Districts shall be determined in public hearing of the Legislative Body and recorded on Table 16.

3.7 THOROUGHFARE STANDARDS

3.7.1 **General**

a. Thoroughfares are intended for use by vehicular and pedestrian traffic and to provide access to Lots and Open Spaces.
b. Thoroughfares shall generally consist of vehicular lanes and Public Frontages.
c. Thoroughfares shall be designed in context with the urban form and desired design speed of the Transect Zones through which they pass. The Public Frontages of Thoroughfares that pass from one Transect Zone to another shall be adjusted accordingly or, alternatively, the Transect Zone may follow the alignment of the Thoroughfare to the depth of one Lot, retaining a single Public Frontage throughout its trajectory.
d. Within the most rural Zones (T1 and T2) pedestrian comfort shall be a secondary consideration of the Thoroughfare. Design conflict between vehicular and pedestrian generally shall be decided in favor of the vehicle. Within the more urban Transect Zones (T3 through T6) pedestrian comfort shall be a primary consideration of the Thoroughfare. Design conflict between vehicular and pedestrian movement generally shall be decided in favor of the pedestrian.
e. The Thoroughfare network shall be designed to define Blocks not exceeding the size prescribed in Table 14c. The perimeter shall be measured as the sum of Lot Frontage Lines. Block perimeter at the edge of the development parcel shall be subject to approval by Warrant.
f. All Thoroughfares shall terminate at other Thoroughfares, forming a network. Internal Thoroughfares shall connect wherever possible to those on adjacent sites. Cul-de-sacs shall be subject to approval by Warrant to accommodate specific site conditions only.
g. Each Lot shall Enfront a vehicular Thoroughfare, except that 20% of the Lots within each Transect Zone may Enfront a Passage.
h. Thoroughfares along a designated B-Grid may be exempted by Warrant from one or more of the specified Public Frontage or Private Frontage requirements. See Table 7.
i. Standards for Paths and Bicycle Trails shall be approved by Warrant.
j. The standards for Thoroughfares within Special Districts shall be determined by Variance.

3.7.2 **VEHICULAR LANES**

a. Thoroughfares may include vehicular lanes in a variety of widths for parked and for moving vehicles, including bicycles. The standards for vehicular lanes shall be as shown in Table 3A.

b. A bicycle network consisting of Bicycle Trails, Bicycle Routes and Bicycle Lanes should be provided throughout as defined in Article 7 Definitions of Terms and allocated as specified in Table 14d. Bicycle Routes should be marked with Sharrows. The community bicycle network shall be connected to existing or proposed regional networks wherever possible.

3.7.3 **PUBLIC FRONTAGES**

a. **GENERAL TO ALL ZONES T1, T2, T3, T4, T5, T6**

i. The Public Frontage contributes to the character of the Transect Zone, and includes the types of Sidewalk, Curb, planter, bicycle facility, and street trees.

ii. Public Frontages shall be designed as shown in Table 4A and Table 4B and allocated within Transect Zones as specified in Table 14d.

iii. Within the Public Frontages, the prescribed types of Public Planting and Public Lighting shall be as shown in Table 4A, Table 4B, Table 5 and Table 6. The spacing may be adjusted by Warrant to accommodate specific site conditions.

b. **SPECIFIC TO ZONES T1, T2, T3**

i. The Public Frontage shall include trees of various species, naturalistically clustered, as well as understory.

ii. The introduced landscape shall consist primarily of native species requiring minimal irrigation, fertilization and maintenance. Lawn shall be permitted only by Warrant.

c. **SPECIFIC TO ZONE T4, T5, T6**

i. The introduced landscape shall consist primarily of durable species tolerant of soil compaction.

d. **SPECIFIC TO ZONE T4**

i. The Public Frontage shall include trees planted in a regularly-spaced Allee pattern of single or alternated species with shade canopies of a height that, at maturity, clears at least one Story.

e. **SPECIFIC TO ZONES T5, T6**

i. The Public Frontage shall include trees planted in a regularly-spaced Allee pattern of single species with shade canopies of a height that, at maturity, clears at least one Story. At Retail Frontages, the spacing of the trees may be irregular, to avoid visually obscuring the shopfronts.

ii. Streets with a Right-of-Way width of 40 feet or less shall be exempt from the tree requirement.

3.8 DENSITY CALCULATIONS

3.8.1 All areas of the New Community Plan site that are not part of the O-1 Preserved Sector shall be considered cumulatively the Net Site Area. The Net Site Area shall be allocated to the various Transect Zones according to the parameters specified in Table 14a.

3.8.2 Density shall be expressed in terms of housing units per acre as specified for the area of each Transect Zone by Table 14b. For purposes of Density calculation, the Transect Zones include the Thoroughfares but not land assigned to Civic Zones. Ten percent (10%) shall be in the Affordable Housing range.

3.8.3 The Base Density of the Community Unit may be increased by the Transfer of Development Rights (TDR) up to the amount specified for each Zone by Table 14b. Fifteen percent (15%) of the increase in housing units by TDR shall be in the Affordable Housing range.

3.8.4 Within the percentage range shown on Table 14b for Other Functions, the housing units specified on Table 14b shall be exchanged at the following rates:
a. For Lodging: 2 bedrooms for each unit of Net Site Area Density.
b. For Office or Retail: 1000 square feet for each unit of Net Site Area Density.
c. The number of units exchanged shall be subject to approval by Warrant.

3.8.5 The housing and other Functions for each Transect Zone shall be subject to further adjustment at the building scale as limited by Table 10, Table 11 and Section 5.9.

3.9 SPECIAL REQUIREMENTS

3.9.1 A New Community Plan may designate any of the following Special Requirements:
a. A differentiation of the Thoroughfares as A-Grid and B-Grid. Buildings along the A-Grid shall be held to the highest standard of this Code in support of pedestrian activity. Buildings along the B-Grid may be more readily considered for Warrants allowing automobile-oriented standards. The Frontages assigned to the B-Grid shall not exceed 30% of the total length of Frontages within a Pedestrian Shed.
b. Designations for Mandatory and/or Recommended Retail Frontage requiring or advising that a building provide a Shopfront at Sidewalk level along the entire length of its Private Frontage. The Shopfront shall be no less than 70% glazed in clear glass and shaded by an awning overlapping the Sidewalk as generally illustrated in Table 7 and specified in Article 5. The first floor shall be confined to Retail use through the depth of the second Layer. (Table 17d)
c. Designations for Mandatory and/or Recommended Gallery Frontage, requiring or advising that a building provide a permanent cover over the Sidewalk, either cantilevered or supported by columns. The Gallery Frontage designation may be combined with a Retail Frontage designation..
d. Designations for Mandatory and/or Recommended Arcade Frontage, requiring or advising that a building overlap the Sidewalk such that the first floor Facade is a colonnade. The Arcade Frontage designation may be combined with a Retail Frontage designation.
e. A designation for Coordinated Frontage, requiring that the Public Frontage (Table 4A) and Private Frontage (Table 7) be coordinated as a single, coherent landscape and paving design.
f. Designations for Mandatory and/or Recommended Terminated Vista locations, requiring or advising that the building be provided with architectural articulation of a type and character that responds visually to the location, as approved by the CRC.
g. A designation for Cross Block Passages, requiring that a minimum 8-foot-wide pedestrian access be reserved between buildings.
h. A designation for Buildings of Value, requiring that such buildings and structures may be altered or demolished only in accordance with Municipal Preservation Standards and Protocols.

ARTICLE 3. SMARTCODE MODULES

3.5.2 b. FOR HAZARD MITIGATION STANDARDS
3.7 FOR ENVIRONMENTAL STANDARDS
3.7.3 a. FOR NATURAL DRAINAGE STANDARDS
3.7.3 c. FOR NATURAL DRAINAGE STANDARDS

4. 1 INSTRUCTIONS

4.1.1 Within the G-4 Infill Growth Sector of the Regional Plan (Article 2), or other areas designated as Infill, the Planning Office shall prepare, or have prepared on its behalf, Infill Regulating Plans to guide further development. Infill Regulating Plans shall be prepared in a process of public consultation subject to approval by the Legislative Body.

4.1.2 Infill Regulating Plans shall regulate, at minimum, an area the size of the Pedestrian Shed commensurate with its Community Unit type as listed in Section 4.2. The Planning Office shall determine a Community Unit type based on existing conditions and intended evolution in the plan area.

4.1.3 Infill Regulating Plans shall consist of one or more maps showing the following:

a. The outline(s) of the Pedestrian Shed(s) and the boundaries of the Community Unit(s)
b. Transect Zones and any Civic Zones within each Pedestrian Shed, assigned according to an analysis of existing conditions and future needs
c. a Thoroughfare network, existing or planned (Table 3A, Table 3B, Table 4A, Table 4B, and Table 4C)
d. any Special Districts (Section 4.5)
e. any Special Requirements (Section 4.7)
f. a record of any Warrants or Variances.

4.1.4 Within any area subject to an approved Infill Regulating Plan, this Code becomes the exclusive and mandatory regulation. Property owners within the plan area may submit Building Scale Plans under Article 5 in accordance with the provisions of this Code. Building Scale Plans requiring no Variances shall be approved administratively by the CRC.

4.1.5 The owner of a parcel, or abutting parcels, consisting of 10 acres or more of contiguous lots within an area subject to an Infill Regulating Plan may apply to prepare a Special Area Plan. In consultation with the Planning Office, a Special Area Plan may assign new Transect Zones, Civic Zones, Thoroughfares, Special Districts and/or Special Requirements as provided in this Code, with appropriate transitions to abutting areas. Special Area Plans may be approved by Warrant.

4.1.6 The owner of a parcel, or abutting parcels, consisting of 30 acres or more of contiguous lots, whether inside or outside an area already subject to an Infill Regulating Plan, may initiate the preparation of a New Community Plan. New Community Plans for the G-4 Sector, or other areas designated as Infill by the Planning Office, shall regulate, at minimum, an area the size of the Pedestrian Shed commensurate with its Community Unit type as listed in Section 4.2, even if it overlaps adjacent parcels. Both the site and plan area should connect and blend with surrounding urbanism.

4.2 COMMUNITY UNIT TYPES

4.2.1 Infill Regulating Plans shall encompass one or more of the following Community Unit types. The allocation percentages of Table 14a do not apply.

4.2.2 **INFILL TND (TRADITIONAL NEIGHBORHOOD DEVELOPMENT)**

a. An Infill TND should be assigned to neighborhood areas that are predominantly residential with one or more Mixed Use Corridors or centers. An Infill TND shall be mapped as at least one complete Standard Pedestrian Shed, which may be adjusted as a Network Pedestrian Shed, oriented around one or more existing or planned Common Destinations.

b. The edges of an Infill TND should blend into adjacent neighborhoods and/or a downtown without buffers.

4.2.3 **INFILL RCD (REGIONAL CENTER DEVELOPMENT)**

a. An Infill RCD should be assigned to downtown areas that include significant Office and Retail uses as well as government and other Civic institutions of regional importance. An Infill RCD shall be mapped as at least one complete Long or Linear Pedestrian Shed, which may be adjusted as a Network Pedestrian Shed, oriented around an important Mixed Use Corridor or center.

b. The edges of an Infill RCD should blend into adjacent neighborhoods without buffers.

4.2.4 **INFILL TOD (TRANSIT ORIENTED DEVELOPMENT)**

a. Any Infill TND or Infill RCD on an existing or projected rail or Bus Rapid Transit (BRT) network may be redesignated in whole or in part as TOD and permitted the higher Density represented by the Effective Parking allowance in Section 5.9.2d.

b. The use of a TOD overlay shall be approved by Variance.

4.3 TRANSECT ZONES

4.3.1 Transect Zone standards for Infill Regulating Plans should be calibrated by means of a survey of exemplary existing and intended conditions, as identified in a process of public consultation and subject to the approval of the Legislative Body. Metrics shall be recorded on Table 14 and Table 15.

4.3.2 A Transect Zone shall include elements indicated by Article 3, Article 5, and Article 6.

4.4 CIVIC ZONES

4.4.1 **GENERAL**

a. Infill Plans should designate Civic Space Zones (CS) and Civic Building Zones (CB).

b. A Civic Zone may be permitted by Warrant if it does not occupy more than 20% of a Pedestrian Shed, otherwise it is subject to the creation of a Special District. See Section 4.5.

c. Parking provisions for Civic Zones shall be determined by Warrant.

4.4.2 **CIVIC SPACE ZONES (CS)**

a. Civic Spaces shall be generally designed as described in Table 13, their type determined by the surrounding or adjacent Transect Zone in a process of public consultation subject to the approval of the Legislative Body.

4.4.3 **CIVIC BUILDING ZONES (CB)**

a. Civic Buildings shall be permitted by Variance in any Transect Zone or by Warrant on Civic Zones reserved in the Infill Regulating Plan.

b. Civic Buildings shall not be subject to the Requirements of Article 5. The particulars of their design shall be determined by Warrant.

4.5 SPECIAL DISTRICTS

4.5.1 Areas that, by their intrinsic size, Function, or Configuration, cannot conform to the requirements of any Transect Zone or combination of zones shall be designated as Special Districts by the Planning Office in the process of preparing an Infill Plan. Conditions of development for Special Districts shall be determined in public hearing of the Legislative Body and recorded on Table 16.

4.6 PRE-EXISTING CONDITIONS

4.6.1 Existing buildings and appurtenances that do not conform to the provisions of this Code may continue in the same use and form until a Substantial Modification occurs or is requested, at which time the Consolidated Review Committee (CRC) shall determine the provisions of this Section that shall apply.

4.6.2 Existing buildings that have at any time received a certificate of occupancy shall not require upgrade to the current Building Code and when renovated may meet the standards of the code under which they were originally permitted.

4.6.3 The modification of existing buildings is permitted By Right if such changes result in greater conformance with the specifications of this Code.

4.6.4 Where buildings exist on adjacent Lots, the CRC may require that a proposed building match one or the other of the adjacent Setbacks and heights rather than the provisions of this Code.

4.6.5 Any addition to or modification of a Building of Value that has been designated as such by the Local Preservation Organization or to a building actually or potentially eligible for inclusion on a state, local or national historic register, shall be subject to approval by the Local Preservation Organization.

4.6.6 The restoration or rehabilitation of an existing building shall not require the provision of (a) parking in addition to that existing or (b) on-site stormwater retention/detention in addition to that existing. Existing parking requirements that exceed those for this Code may be reduced as provided by Tables 10 and 11.

4.7 SPECIAL REQUIREMENTS

4.7.1 An Infill Community Plan may designate any of the following Special Requirements:

a. A differentiation of the Thoroughfares as A-Grid and B-Grid. Buildings along the A-Grid shall be held to the highest standard of this Code in support of pedestrian activity. Buildings along the B-Grid may be more readily considered for Warrants allowing automobile-oriented standards. The Frontages assigned to the B-Grid shall not exceed 30% of the total length of Frontages within a Pedestrian Shed.

b. Designations for Mandatory and/or Recommended Retail Frontage requiring or advising that a building provide a Shopfront at Sidewalk level along the entire length of its Private Frontage. The Shopfront shall be no less than 70% glazed in clear glass and shaded by an awning overlapping the Sidewalk as generally illustrated in Table 7 and specified in Article 5. The first floor shall be confined to Retail use through the depth of the second Layer. (Table 17d.)

c. Designations for Mandatory and/or Recommended Gallery Frontage, requiring or advising that a building provide a permanent cover over the Sidewalk, either cantilevered or supported by columns. The Gallery Frontage designation may be combined with a Retail Frontage designation.

d. Designations for Mandatory and/or Recommended Arcade Frontage, requiring or advising that a building overlap the Sidewalk such that the first floor Facade is a colonnade. The Arcade Frontage designation may be combined with a Retail Frontage designation.

e. A designation for Coordinated Frontage, requiring that the Public Frontage (Table 4A) and Private Frontage (Table 7) be coordinated as a single, coherent landscape and paving design.

f. Designations for Mandatory and/or Recommended Terminated Vista locations, requiring or advising that the building be provided with architectural articulation of a type and character that responds visually to the location, as approved by the CRC.
g. A designation for Cross Block Passages, requiring that a minimum 8-foot-wide pedestrian access be reserved between buildings.
h. A designation for Buildings of Value, requiring that such buildings and structures may be altered or demolished only in accordance with Municipal Preservation Standards and Protocols.

5.1 INSTRUCTIONS

5.1.1 Lots and buildings located within a New Community Plan or Infill Community Plan governed by this Code and previously approved by the Legislative Body shall be subject to the requirements of this Article.

5.1.2 Owners and developers may have the design plans required under this Article prepared on their behalf. Such plans require administrative approval by the CRC.

5.1.3 Building and site plans submitted under this Article shall show the following, in compliance with the standards described in this Article:

a. For preliminary site and building approval:
- Building Disposition
- Building Configuration
- Building Function
- Parking Location Standards

b. For final approval, in addition to the above:
- Landscape Standards
- Signage Standards
- Special Requirements, if any
- Hazard Mitigation Standards
- Natural Drainage Standards
- Architectural Standards
- Lighting Standards
- Sound Standards
- Visitability Standards

5.1.4 Special Districts that do not have provisions within this Code shall be governed by the standards of the pre-existing zoning.

5.2 PRE-EXISTING CONDITIONS

5.2.1 Existing buildings and appurtenances that do not conform to the provisions of this Code may continue in use as they are until a Substantial Modification is requested, at which time the CRC shall determine the provisions of this section that shall apply.

5.2.2 Existing buildings that have at any time received a certificate of occupancy shall not require upgrade to the current Building Code and when renovated may meet the standards of the code under which they were originally permitted.

5.2.3 The modification of existing buildings is permitted By Right if such changes result in greater conformance with the specifications of this Code.

5.2.4 Where buildings exist on adjacent Lots, the CRC may require that a proposed building match one or the other of the adjacent Setbacks and heights rather than the provisions of this Code.

5.2.5 Any addition to or modification of a Building of Value that has been designated as such by the Local Preservation Organization, or to a building actually or potentially eligible for inclusion on a state, local or national historic register, shall be subject to approval by the Local Preservation Organization.

5.2.6 The restoration or rehabilitation of an existing building shall not require the provision of (a) parking in addition to that existing nor (b) on-site stormwater retention/detention in addition to that existing. Existing parking requirements that exceed those for this Code may be reduced as provided by Table 10 and Table 11.

5.3 SPECIAL REQUIREMENTS

5.3.1 To the extent that a Regulating Plan for either a New Community Plan or an Infill Community Plan designates any of the following Special Requirements, standards shall be applied as follows:

a. Buildings along the A-Grid shall be held to the highest standard of this Code in support of pedestrian activity. Buildings along the B-Grid may be more readily considered for Warrants allowing automobile-oriented standards.

b. a Mandatory or Recommended Retail Frontage designation requires or advises that a building provide a Shopfront at Sidewalk level along the entire length of its Private Frontage. The Shopfront shall be no less than 70% glazed in clear glass and shaded by an awning overlapping the Sidewalk as generally illustrated in Table 7. The first floor shall be confined to Retail use through the depth of the second Layer. (Table 17d.)

c. a Mandatory or Recommended Gallery Frontage designation requires or advises that a building provide a permanent cover over the Sidewalk, either cantilevered or supported by columns (as generally illustrated in Table 7). A Gallery Frontage may be combined with a Retail Frontage.

d. a Mandatory or Recommended Arcade Frontage designation requires or advises that a building overlap the Sidewalk such that the first floor Facade is a colonnade (as generally illustrated in Table 7 and Table 8). The Arcade Frontage may be combined with a Retail Frontage.

e. a Coordinated Frontage designation requires that the Public Frontage (Table 4A) and Private Frontage (Table 7) be coordinated as a single, coherent landscape and paving design.

f. a Mandatory or Recommended Terminated Vista designation requires or advises that the building be provided with architectural articulation of a type and character that responds visually to its axial location, as approved by the CRC.

g. a Cross Block Passage designation requires that a minimum 8-foot-wide pedestrian access be reserved between buildings.

h. a Building of Value designation requires that the building or structure may be altered or demolished only in accordance with Municipal Preservation Standards and Protocols.

5.4 CIVIC ZONES

5.4.1 **General**

a. Civic Zones are designated on Community Plans as Civic Space (CS) or Civic Building (CB).

b. Parking provisions for Civic Zones shall be determined by Warrant.

5.4.2 **Civic Spaces (CS)**

a. Civic Spaces shall be generally designed as described in Table 13.

5.4.3 **Civic Buildings (CB)**

a. Civic Buildings shall not be subject to the requirements of this Article. The particulars of their design shall be determined by Warrant.

5.5 SPECIFIC TO T1 NATURAL ZONE

5.5.1 Buildings in the T1 Natural Zone are permitted only by Variance. Permission to build in T1 and the standards for Article 5 shall be determined concurrently as Variances, in public hearing of the Legislative Body.

5.6 BUILDING DISPOSITION

5.6.1 **SPECIFIC TO ZONE T2**

a. Building Disposition shall be determined by Warrant.

5.6.2 **SPECIFIC TO ZONES T3, T4, T5, T6**

a. Newly platted Lots shall be dimensioned according to Table 14f and Table 15.
b. Building Disposition types shall be as shown in Table 9 and Table 14i.
c. Buildings shall be disposed in relation to the boundaries of their Lots according to Table 14g, Table 14h, and Table 15.
d. One Principal Building at the Frontage, and one Outbuilding to the rear of the Principal Building, may be built on each Lot as shown in Table 17c.
e. Lot coverage by building shall not exceed that recorded in Table 14f and Table 15.
f. Facades shall be built parallel to a rectilinear Principal Frontage Line or to the tangent of a curved Principal Frontage Line, and along a minimum percentage of the Frontage width at the Setback, as specified as Frontage Buildout on Table 14g and Table 15.
g. Setbacks for Principal Buildings shall be as shown in Table 14g and Table 15. In the case of an Infill Lot, Setbacks shall match one of the existing adjacent Setbacks. Setbacks may otherwise be adjusted by Warrant.
h. Rear Setbacks for Outbuildings shall be a minimum of 12 feet measured from the centerline of the Rear Alley or Rear Lane easement. In the absence of Rear Alley or Rear Lane, the rear Setback shall be as shown in Table 14h and Table 15.
i. To accommodate slopes over ten percent, relief from front Setback requirements is available by Warrant.

5.6.3 **SPECIFIC TO ZONE T6**

a. The Principal Entrance shall be on a Frontage Line.

5.7 BUILDING CONFIGURATION

5.7.1 **GENERAL TO ZONES T2, T3, T4, T5, T6**

a. The Private Frontage of buildings shall conform to and be allocated in accordance with Table 7 and Table 14j.
b. Buildings on corner Lots shall have two Private Frontages as shown in Table 17. Prescriptions for the second and third Layers pertain only to the Principal Frontage. Prescriptions for the first Layer pertain to both Frontages.
c. All Facades shall be glazed with clear glass no less than 30% of the first Story.
d. Building heights, Stepbacks, and Extension Lines shall conform to Table 8 and Table 14j.
e. Stories may not exceed 14 feet in height from finished floor to finished ceiling, except for a first floor Commercial Function, which shall be a minimum of 11 feet with a maximum of 25 feet. A single floor level exceeding 14 feet, or 25 feet at ground level, shall be counted as two (2) stories. Mezzanines extending beyond 33% of the floor area shall be counted as an additional Story.
f. In a Parking Structure or garage, each above-ground level counts as a single Story regardless of its relationship to habitable Stories.
g. Height limits do not apply to Attics or raised basements, masts, belfries, clock towers, chimney flues, water tanks, or elevator bulkheads. Attics shall not exceed 14 feet in height.

5.7.2 **SPECIFIC TO ZONES T2, T3, T4, T5**

a. The habitable area of an Accessory Unit within a Principal Building or an Out-building shall not exceed 440 square feet, excluding the parking area.

5.7.3 **SPECIFIC TO ZONE T3**

a. No portion of the Private Frontage may Encroach the Sidewalk.
b. Open porches may Encroach the first Layer 50% of its depth. (Table 17d)
c. Balconies and bay windows may Encroach the first Layer 25% of its depth except that balconies on porch roofs may Encroach as does the porch.

5.7.4 **SPECIFIC TO ZONE T4**

a. Balconies, open porches and bay windows may Encroach the first Layer 50% of its depth. (Table 17d)

5.7.5 **SPECIFIC TO ZONES T5, T6**

a. Awnings, Arcades, and Galleries may Encroach the Sidewalk to within 2 feet of the Curb but must clear the Sidewalk vertically by at least 8 feet.
b. Maximum Encroachment heights (Extension Lines) for Arcades shall be as shown on Table 8.
c. Stoops, Lightwells, balconies, bay windows, and terraces may Encroach the first Layer 100% of its depth. (Table 17d)
d. Loading docks and service areas shall be permitted on Frontages only by Warrant.
e. In the absence of a building Facade along any part of a Frontage Line, a Streetscreen shall be built co-planar with the Facade.
f. Streetscreens should be between 3.5 and 8 feet in height. The Streetscreen may be replaced by a hedge or fence by Warrant. Streetscreens shall have openings no larger than necessary to allow automobile and pedestrian access.
g. A first level Residential or Lodging Function shall be raised a minimum of 2 feet from average Sidewalk grade.

5.8 BUILDING FUNCTION

5.8.1 **GENERAL TO ZONES T2, T3, T4, T5, T6**

a. Buildings in each Transect Zone shall conform to the Functions on Table 10, Table 12 and Table 14l. Functions that do not conform shall require approval by Warrant or Variance as specified on Table 12.

5.8.2 **SPECIFIC TO ZONES T2, T3**

a. Accessory Functions of Restricted Lodging or Restricted Office shall be permitted within an Accesory Building. See Table 10.

5.8.3 **SPECIFIC TO ZONES T4, T5**

a. Accessory Functions of Limited Lodging or Limited Office shall be permitted within an Accesory Building. See Table 10.

5.8.4 **SPECIFIC TO ZONES T5, T6**

a. First Story Commercial Functions shall be permitted.
b. Manufacturing Functions within the first Story may be permitted by Variance.

5.9 PARKING AND DENSITY CALCULATIONS

5.9.1 **SPECIFIC TO ZONES T2, T3**

a. Buildable Density on a Lot shall be determined by the actual parking provided within the Lot as applied to the Functions permitted in Table 10 and Table 11.

5.9.2 **SPECIFIC TO ZONES T4, T5, T6**

a. Buildable Density on a Lot shall be determined by the sum of the actual parking

calculated as that provided (1) within the Lot (2) along the parking lane corresponding to the Lot Frontage, and (3) by purchase or lease from a Civic Parking Reserve within the Pedestrian Shed, if available.

b. The actual parking may be adjusted upward according to the Shared Parking Factor of Table 11 to determine the Effective Parking. The Shared Parking Factor is available for any two Functions within any pair of adjacent Blocks.
c. Based on the Effective Parking available, the Density of the projected Function may be determined according to Table 10.
d. Within the overlay area of a Transit Oriented Development (TOD) the Effective Parking may be further adjusted upward by 30%.
e. The total Density within each Transect Zone shall not exceed that specified by an approved Regulating Plan based on Article 3 or Article 4.
f. Accessory Units do not count toward Density calculations.
g. Liner Buildings less than 30 feet deep and no more than two Stories shall be exempt from parking requirements.

5.10 PARKING LOCATION STANDARDS

5.10.1 General to zones T2, T3, T4, T5, T6

a. Parking shall be accessed by Rear Alleys or Rear Lanes, when such are available on the Regulating Plan.
b. Open parking areas shall be masked from the Frontage by a Building or Streetscreen.
c. For buildings on B-Grids, open parking areas may be allowed unmasked on the Frontage by Warrant, except for corner lots at intersections with the A-Grid.

5.10.2 Specific to zones T2, T3

a. Open parking areas shall be located at the second and third Lot Layers, except that Driveways, drop-offs and unpaved parking areas may be located at the first Lot Layer. (Table 17d)
b. Garages shall be located at the third Layer except that side- or rear-entry types may be allowed in the first or second Layer by Warrant.

5.10.3 Specific to zones T3, T4

a. Driveways at Frontages shall be no wider than 10 feet in the first Layer. (Table 3B.f)

5.10.4 Specific to zone T4

a. All parking areas and garages shall be located at the second or third Layer. (Table 17d)

5.10.5 Specific to zones T5, T6

a. All parking lots, garages, and Parking Structures shall be located at the second or third Layer. (Table 17d)
b. Vehicular entrances to parking lots, garages, and Parking Structures shall be no wider than 24 feet at the Frontage. (Table 3B.f)
c. Pedestrian exits from all parking lots, garages, and Parking Structures shall be directly to a Frontage Line (i.e., not directly into a building) except underground levels which may be exited by pedestrians directly into a building.
d. Parking Structures on the A-Grid shall have Liner Buildings lining the first and second Stories.
e. A minimum of one bicycle rack place shall be provided within the Public or Private Frontage for every ten vehicular parking spaces.

5.11 LANDSCAPE STANDARDS

5.11.1 **GENERAL TO ZONES T2, T3, T4, T5, T6**

a. Impermeable surface shall be confined to the ratio of Lot coverage specified in Table 14f.

5.11.2 **SPECIFIC TO ZONES T2, T3, T4**

a. The first Layer may not be paved, with the exception of Driveways as specified in Section 5.10.2 and Section 5.10.3. (Table 17d)

5.11.3 **SPECIFIC TO ZONE T3**

a. A minimum of two trees shall be planted within the first Layer for each 30 feet of Frontage Line or portion thereof. (Table 17d)
b. Trees may be of single or multiple species as shown on Table 6.
c. Trees shall be naturalistically clustered.
d. Lawn shall be permitted by Warrant.

5.11.4 **SPECIFIC TO ZONE T4**

a. A minimum of one tree shall be planted within the first Layer for each 30 feet of Frontage Line or portion thereof. (Table 17d)
b. Trees shall be a single species to match the species of Street Trees on the Public Frontage, or as shown on Table 6.
c. Lawn shall be permitted By Right.

5.11.5 **SPECIFIC TO ZONES T5, T6**

a. Trees shall not be required in the first Layer.
b. The first Layer may be paved to match the pavement of the Public Frontage.

5.12 SIGNAGE STANDARDS

5.12.1 **GENERAL TO ZONES T2, T3, T4, T5, T6**

a. There shall be no signage permitted additional to that specified in this section.
b. The address number, no more than 6 inches measured vertically, shall be attached to the building in proximity to the Principal Entrance or at a mailbox.

5.12.2 **SPECIFIC TO ZONES T2, T3**

a. Signage shall not be illuminated.

5.12.3 **SPECIFIC TO ZONES T4, T5, T6**

a. Signage shall be externally illuminated, except that signage within the Shopfront glazing may be neon lit.

5.12.4 **SPECIFIC TO ZONES T2, T3, T4**

a. One blade sign for each business may be permanently installed perpendicular to the Facade within the first Layer. Such a sign shall not exceed a total of 4 square feet and shall clear 8 feet above the Sidewalk.

5.12.5 **SPECIFIC TO ZONES T5, T6**

a. Blade signs, not to exceed 6 square ft. for each separate business entrance, may be attached to and should be perpendicular to the Facade, and shall clear 8 feet above the Sidewalk.
b. A single external permanent sign band may be applied to the Facade of each building, providing that such sign not exceed 3 feet in height by any length.

ARTICLE 5. SMARTCODE MODULES

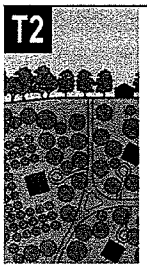
5.7.3d FOR HAZARD MITIGATION STANDARDS
5.7.6 FOR HAZARD MITIGATION STANDARDS
5.13 FOR NATURAL DRAINAGE STANDARDS
5.14 FOR ARCHITECTURAL STANDARDS
5.15 FOR LIGHTING STANDARDS
5.16 FOR SOUND STANDARDS
5.17 FOR VISITABILITY STANDARDS
5.18 FOR HAZARD MITIGATION STANDARDS
5.19 FOR HAZARD MITIGATION STANDARDS

TABLE 1: Transect Zone Descriptions. This table provides descriptions of the character of each T-zone.

T-1 NATURAL

T-1 Natural Zone consists of lands approximating or reverting to a wilderness condition, including lands unsuitable for settlement due to topography, hydrology or vegetation.

General Character:	Natural landscape with some agricultural use
Building Placement:	Not applicable
Frontage Types:	Not applicable
Typical Building Height:	Not applicable
Type of Civic Space:	Parks, Greenways



T-2 RURAL

T-2 Rural Zone consists of sparsely settled lands in open or cultivated states. These include woodland, agricultural land, grassland, and irrigable desert. Typical buildings are farmhouses, agricultural buildings, cabins, and villas.

General Character:	Primarily agricultural with woodland & wetland and scattered buildings
Building Placement:	Variable Setbacks
Frontage Types:	Not applicable
Typical Building Height:	1- to 2-Story
Type of Civic Space:	Parks, Greenways

T-3 SUB-URBAN

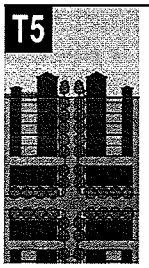
T-3 Sub-Urban Zone consists of low density residential areas, adjacent to higher zones that some mixed use. Home occupations and outbuildings are allowed. Planting is naturalistic and setbacks are relatively deep. Blocks may be large and the roads irregular to accommodate natural conditions.

General Character:	Lawns, and landscaped yards surrounding detached single-family houses; pedestrians occasionally
Building Placement:	Large and variable front and side yard Setbacks
Frontage Types:	Porches, fences, naturalistic tree planting
Typical Building Height:	1- to 2-Story with some 3-Story
Type of Civic Space:	Parks, Greenways

T-4 GENERAL URBAN

T-4 General Urban Zone consists of a mixed use but primarily residential urban fabric. It may have a wide range of building types: single, sideyard, and rowhouses. Setbacks and landscaping are variable. Streets with curbs and sidewalks define medium-sized blocks.

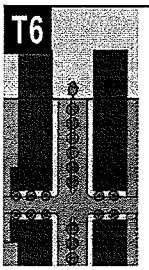
General Character:	Mix of Houses, Townhouses & small Apartment buildings, with scattered Commercial activity; balance between landscape and buildings; presence of pedestrians
Building Placement:	Shallow to medium front and side yard Setbacks
Frontage Types:	Porches, fences, Dooryards
Typical Building Height:	2- to 3-Story with a few taller Mixed Use buildings
Type of Civic Space:	Squares, Greens



T-5 URBAN CENTER

T-5 Urban Center Zone consists of higher density mixed use building that accommodate etail, offices, rowhouses and apartments. It has a tight network of streets, with wide sidewalks, steady street tree planting and buildings set close to the sidewalks.

General Character:	Shops mixed with Townhouses, larger Apartment houses, Offices, workplace, and Civic buildings; predominantly attached buildings; trees within the public right-of-way; substantial pedestrian activit
Building Placement:	Shallow Setbacks or none; buildings oriented to street defining a street wall
Frontage Types:	Stoops, Shopfronts, Galleries
Typical Building Height:	3- to 5-Story with some variation
Type of Civic Space:	Parks, Plazas and Squares, median landscaping

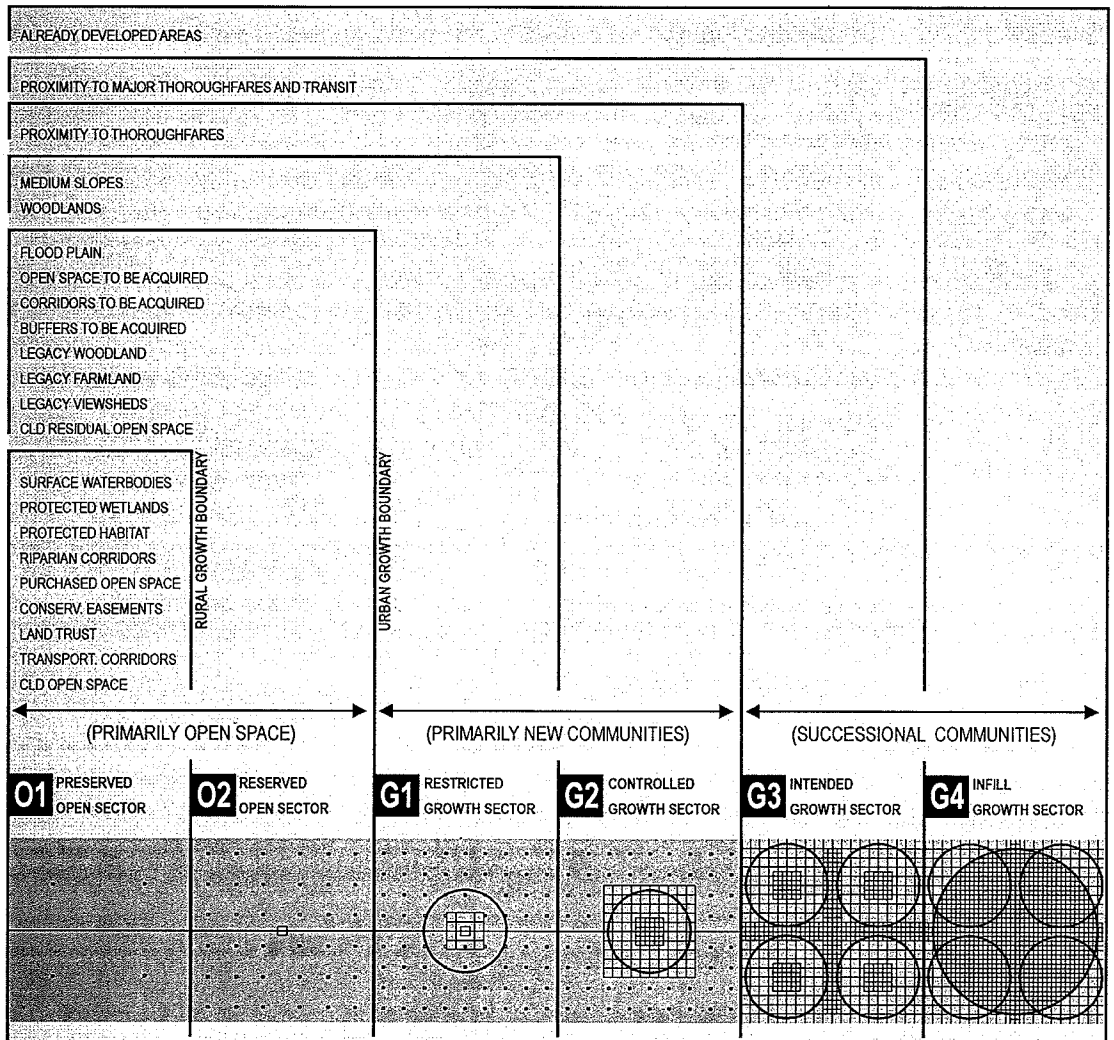


T-6 URBAN CORE

T-6 Urban Core Zone consists of the highest density and height, with the greatest variety of uses, and civic buildings of regional importance. It may have larger blocks; streets have steady street tree planting and buildings are set close to wide sidewalks. Typically only large towns and cities have an Urban Core Zone.

General Character:	Medium to high-Density Mixed Use buildings, entertainment, Civic and cultural uses. Attached buildings forming a continuous street wall; trees within the public right-of-way; highest pedestrian and transit activity
Building Placement:	Shallow Setbacks or none; buildings oriented to street, defining a street wall
Frontage Types:	Stoops, Dooryards, Forecourts, Shopfronts, Galleries, and Arcades
Typical Building Height:	4-plus Story with a few shorter buildings
Type of Civic Space:	Parks, Plazas and Squares; median landscaping

TABLE 2: Sector/Community Allocation. Table 2 defines the geography, including both natural and infrastructure elements, determining areas that are or are not suitable for development. Specific Community Types of various intensities are allowable in specific Sectors. This table also allocates the proportions of Transect Zones within each Community Type.



			CLD	CLD	TND	TND	RCD	TND	RCD
T1	NO MINIMUM	NO MINIMUM	50% MIN	50% MIN					
T2	NO MINIMUM	NO MINIMUM			NO MIN	NO MIN			
T3			10 - 30%	10 - 30%	10 - 30%	10 - 30%			
T4			20 - 40%	20 - 40%	30 - 60%	30 - 60%	10 - 30%	VARIABLE	VARIABLE
T5					10 - 30%	10 - 30%	10 - 30%	VARIABLE	VARIABLE
T6							40 - 80%	VARIABLE	VARIABLE

TABLE 3A: Vehicular Lane Dimensions. This table assigns lane widths to Transect Zones. The Design ADT (Average Daily Traffic) is the determinant for each of these sections. The most typical assemblies are shown in Table 3B. Specific requirements for truck and transit bus routes and truck loading shall be decided by Warrant.

DESIGN SPEED	TRAVEL LANE WIDTH	T1	T2	T3	T4	T5	T6
Below 20 mph	8 feet	■	■	■	▫		
20-25 mph	9 feet	■	■	■	■	▫	▫
25-35 mph	10 feet	■	■	■	■	■	■
25-35 mph	11 feet	■	■			■	■
Above 35 mph	12 feet	■	■			■	■

DESIGN SPEED	PARKING LANE WIDTH						
20-25 mph	(Angle) 18 feet					■	■
20-25 mph	(Parallel) 7 feet				■		
25-35 mph	(Parallel) 8 feet			■	■	■	■
Above 35 mph	(Parallel) 9 feet					■	■

DESIGN SPEED	EFFECTIVE TURNING RADIUS (See Table 17b)						
Below 20 mph	5-10 feet			■	■	■	■
20-25 mph	10-15 feet	■	■	■	■	■	■
25-35 mph	15-20 feet	■	■	■	■	■	■
Above 35 mph	20-30 feet	■	■			▫	▫

■ BY RIGHT

▫ BY WARRANT

TABLE 3B: Vehicular Lane/Parking Assemblies. The projected design speeds determine the dimensions of the vehicular lanes and Turning Radii assembled for Thoroughfares.

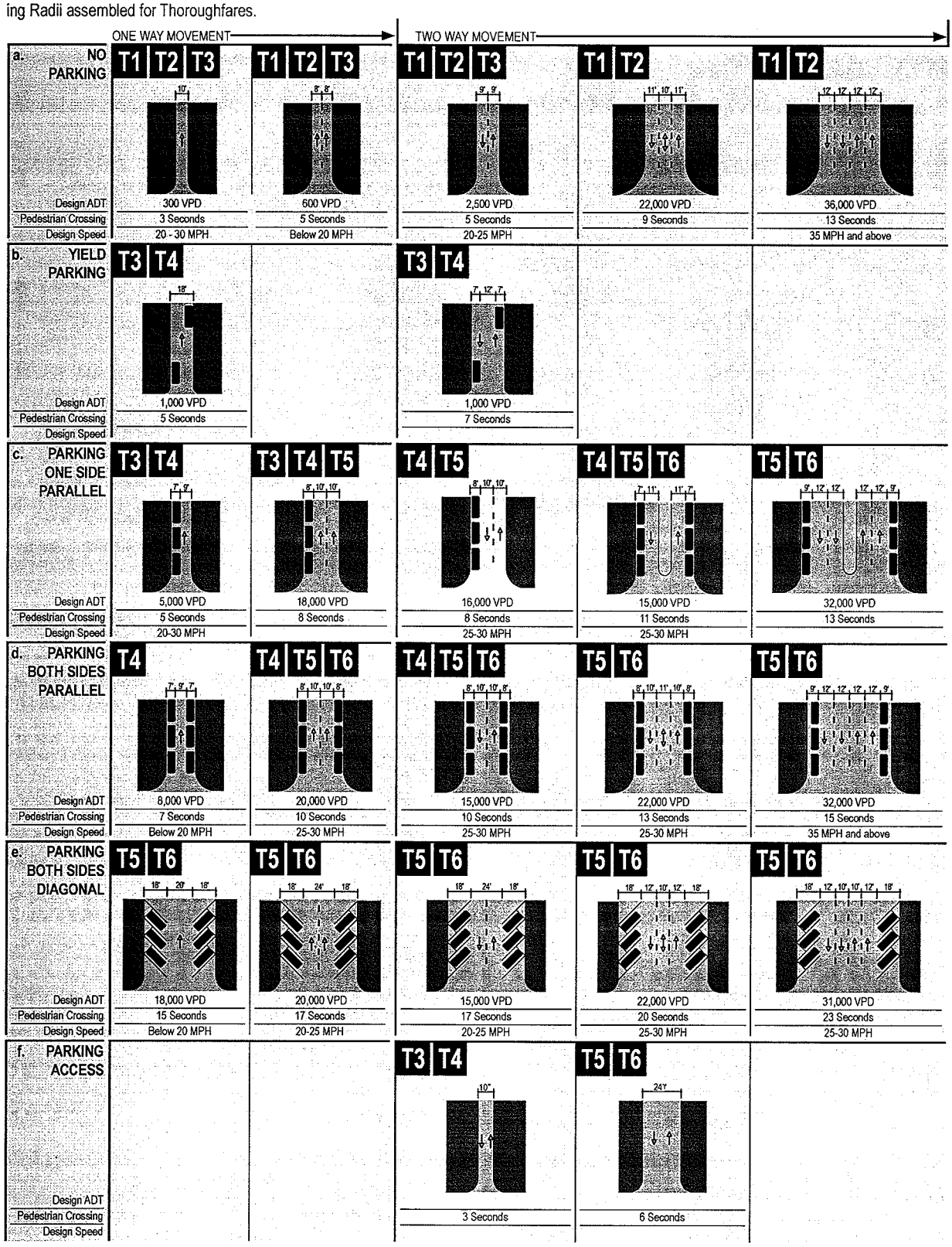
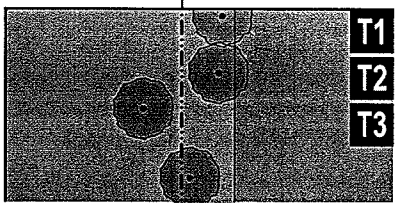


TABLE 4A: Public Frontages - General. The Public Frontage is the area between the private Lot line and the edge of the vehicular lanes. Dimensions are given in Table 4B.

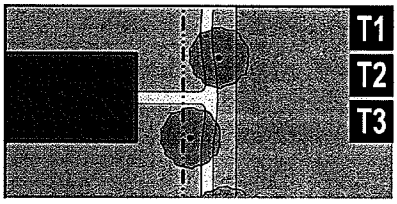
PLAN

LOT ▶ ◀ R.O.W.
PRIVATE FRONTAGE ▶ ◀ PUBLIC FRONTAGE

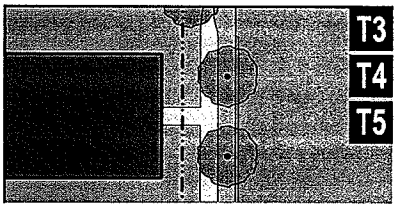
a. **(HW) For Highway:** This Frontage has open Swales drained by percolation, Bicycle Trails and no parking. The landscaping consists of the natural condition or multiple species arrayed in naturalistic clusters. Buildings are buffered by distance or berms.



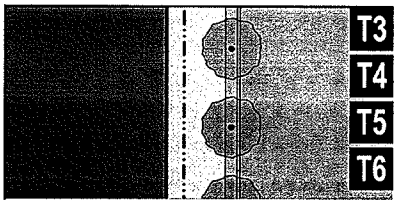
b. **(RD) For Road:** This Frontage has open Swales drained by percolation and a walking Path or Bicycle Trail along one or both sides and Yield parking. The landscaping consists of multiple species arrayed in naturalistic clusters.



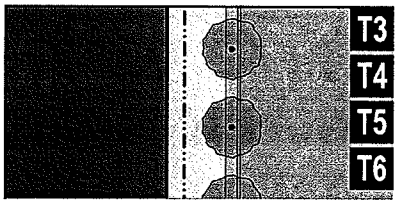
c. **(ST) For Street:** This Frontage has raised Curbs drained by inlets and Sidewalks separated from the vehicular lanes by individual or continuous Planters, with parking on one or both sides. The landscaping consists of street trees of a single or alternating species aligned in a regularly spaced Allee, with the exception that Streets with a right-of-way (R.O.W.) width of 40 feet or less are exempt from tree requirements.



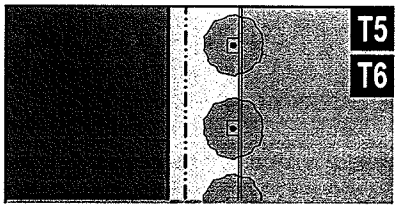
d. **(DR) For Drive:** This Frontage has raised Curbs drained by inlets and a wide Sidewalk or paved Path along one side, related to a Greenway or waterfront. It is separated from the vehicular lanes by individual or continuous Planters. The landscaping consists of street trees of a single or alternating species aligned in a regularly spaced Allee.



e. **(AV) For Avenue:** This Frontage has raised Curbs drained by inlets and wide Sidewalks separated from the vehicular lanes by a narrow continuous Planter with parking on both sides. The landscaping consists of a single tree species aligned in a regularly spaced Allee.



f. **(CS) (AV) For Commercial Street or Avenue:** This Frontage has raised Curbs drained by inlets and very wide Sidewalks along both sides separated from the vehicular lanes by separate tree wells with grates and parking on both sides. The landscaping consists of a single tree species aligned with regular spacing where possible, but clears the storefront entrances.



g. **(BV) For Boulevard:** This Frontage has Slip Roads on both sides. It consists of raised Curbs drained by inlets and Sidewalks along both sides, separated from the vehicular lanes by Planters. The landscaping consists of double rows of a single tree species aligned in a regularly spaced Allee.

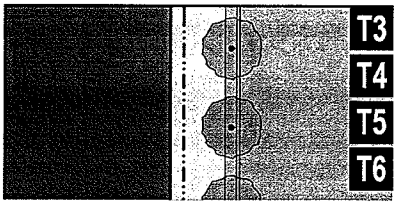


Table 4B: Public Frontages - Specific. This table assembles prescriptions and dimensions for the Public Frontage elements - Curbs, walkways and Planters – relative to specific Thoroughfare types within Transect Zones. Table 4B-a assembles all of the elements for the various street types. Locally appropriate planting species should be filled in to the calibrated Code.

RURAL ⟷ TRANSECT ⟷ URBAN

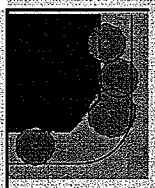
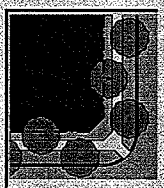
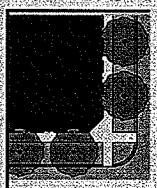
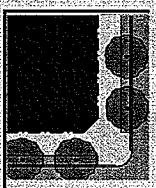
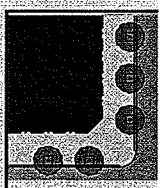
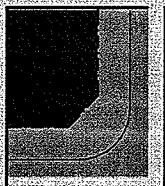
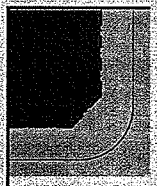
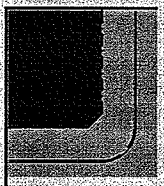
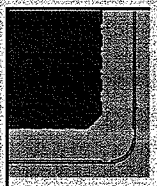
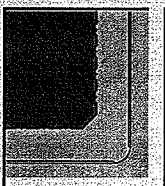
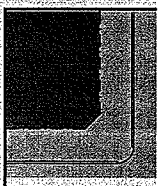
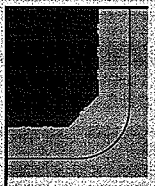
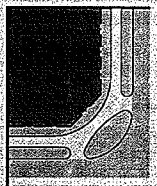
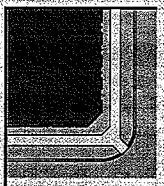
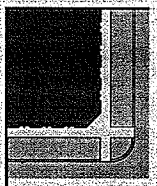
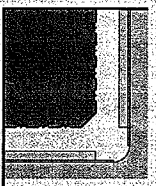
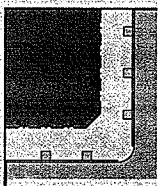
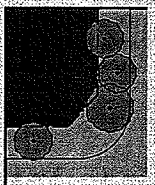
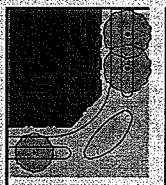
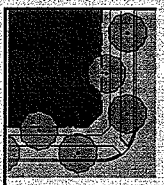
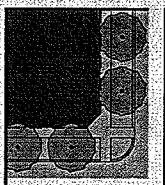
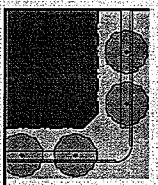
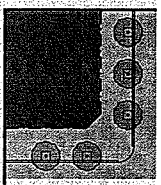
TRANSECT ZONE Public Frontage Type	T1 T2 T3 HW & RD	T1 T2 T3 RD & ST	T3 T4 ST-DR-AV	T4 T5 ST-DR-AV-BV	T5 T6 CS-DR-AV-BV	T5 T6 CS-DR-AV-BV
a. **Assembly:** The principal variables are the type and dimension of Curbs, walkways, Planters and landscape. Total Width	 16-24 feet	 12-24 feet	 12-18 feet	 12-18 feet	 18-24 feet	 18-30 feet
b. **Curb:** The detailing of the edge of the vehicular pavement, incorporating drainage. Type Radius	 Open Swale 10-30 feet	 Open Swale 10-30 feet	 Raised Curb 5-20 feet	 Raised Curb 5-20 feet	 Raised Curb 5-20 feet	 Raised Curb 5-20 feet
c. **Walkway:** The pavement dedicated exclusively to pedestrian activity. Type Width	 Path Optional n/a	 Path 4-8 feet	 Sidewalk 4-8 feet	 Sidewalk 4-8 feet	 Sidewalk 12-20 feet	 Sidewalk 12-30 feet
d. **Planter:** The layer which accommodates street trees and other landscape. Arrangement Species Planter Type Planter Width	 Clustered Multiple Continuous Swale 8 feet-16 feet	 Clustered Multiple Continuous Swale 8 feet-16 feet	 Regular Alternating Continuous Planter 8 feet-12 feet	 Regular Single Continuous Planter 8 feet-12 feet	 Regular Single Continuous Planter 4 feet-6 feet	 Opportunistic Single Tree Well 4 feet-6 feet
e. **Landscape:** The recommended plant species. (See Table 6)						
f. **Lighting:** The recommended Public Lighting. (See Table 5)						

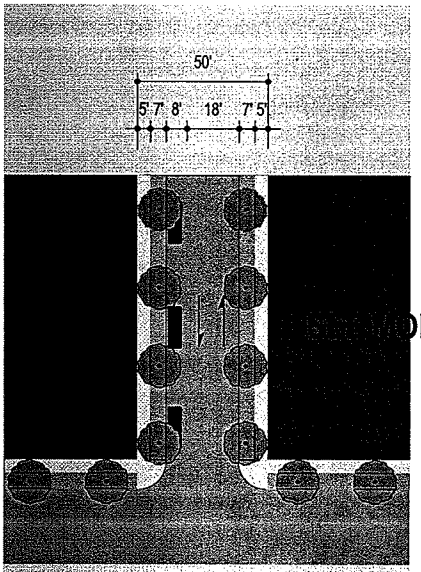
TABLE 4C: Thoroughfare Assemblies. These Thoroughfares are assembled from the elements that appear in Tables 3A and 3B and incorporate the Public Frontages of Table 4A. The key gives the Thoroughfare type followed by the right-of-way width, followed by the pavement width, and in some instances followed by specialized transportation capability.

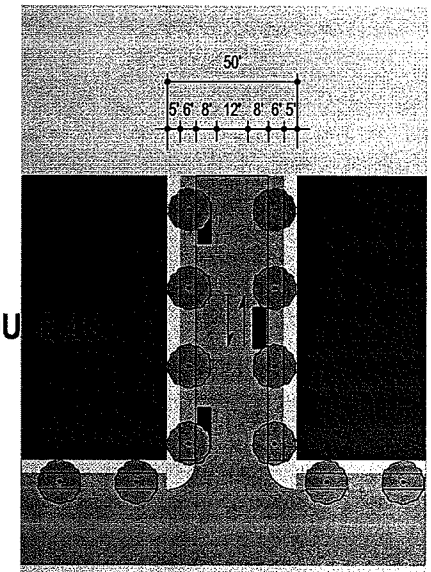
KEY ST-57-20-BL

- Thoroughfare Type
- Right of Way Width
- Pavement Width
- Transportation

THOROUGHFARE TYPES

Highway:	HW
Boulevard:	BV
Avenue:	AV
Commercial Street:	CS
Drive:	DR
Street:	ST
Road:	RD
Rear Alley:	RA
Rear Lane:	RL
Bicycle Trail:	BT
Bicycle Lane:	BL
Bicycle Route:	BR
Path:	PT
Passage:	PS
Transit Route:	TR





	ST-50-26	ST-50-28
Thoroughfare Type	Street	Street
Transect Zone Assignment	T4, T5, T6	T4, T5, T6
Right-of-Way Width	50 feet	50 feet
Pavement Width	26 feet	28 feet
Movement	Slow Movement	Yield Movement
Design Speed	20 MPH	20 MPH
Pedestrian Crossing Time	7.4 seconds	7.6 seconds
Traffic Lanes	2 lanes	2 lanes
Parking Lanes	One side @ 8 feet marked	Both sides @ 8 feet unmarked
Curb Radius	10 feet	10 feet
Walkway Type	5 foot Sidewalk	5 foot Sidewalk
Planter Type	7 foot continuous Planter	6 foot continuous Planter
Curb Type	Curb	Curb
Landscape Type	Trees at 30' o.c. Avg.	Trees at 30' o.c. Avg.
Transportation Provision	BR	BR

TABLE 5: Public Lighting. Lighting varies in brightness and also in the character of the fixture according to the Transect. The table shows five common types. A listed set of streetlights corresponding to these types would be approved by the utility company and listed on the page.

	T1	T2	T3	T4	T5	T6	SD	Specifications
Cobra Head 	▪						▪	
Pipe 	▪	▪	▪					
Post 		▪	▪	▪				
Column 			▪	▪	▪			
Double Column 					▪	▪		

TABLE 6: Public Planting. This table shows six common types of street tree shapes and their appropriateness within the Transect Zones. The local planning office selects species appropriate for the bioregion.

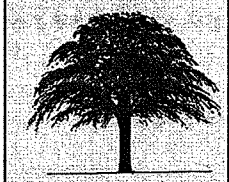
	T1	T2	T3	T4	T5	T6	SD	Specific Lighting
Pole 	▪	▪	▪	▪	▪	▪		
Oval 	▪	▪	▪	▪	▪	▪		
Ball 	▪	▪	▪	▪	▪	▪		
Pyramid 	▪	▪	▪	▪				
Umbrella 	▪	▪	▪	▪				
Vase 	▪	▪	▪	▪				

TABLE 7: Private Frontages. The Private Frontage is the area between the building Facades and the Lot lines.

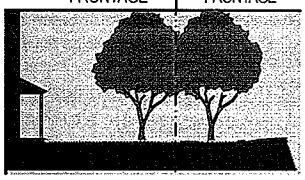
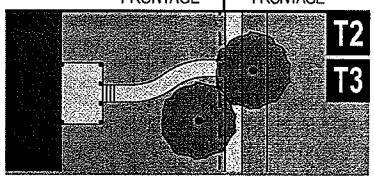
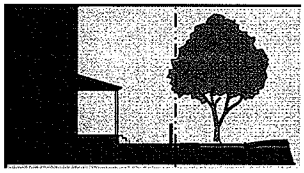
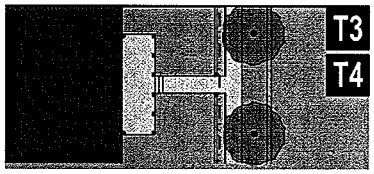
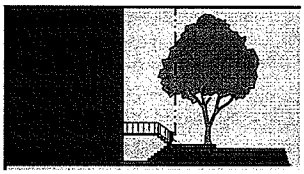
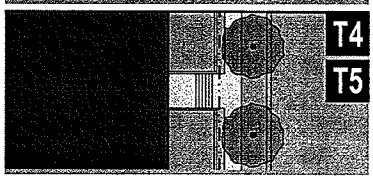
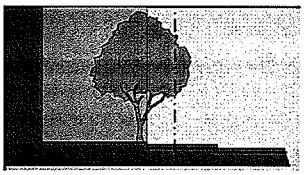
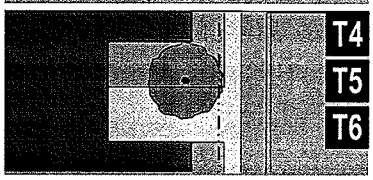
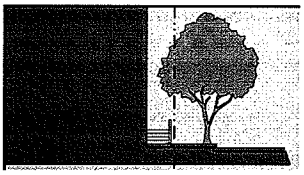
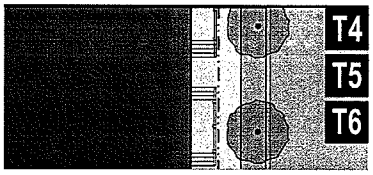
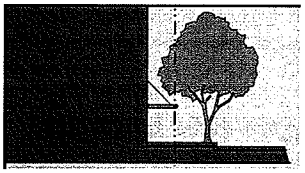
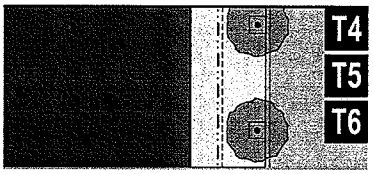
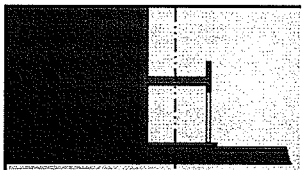
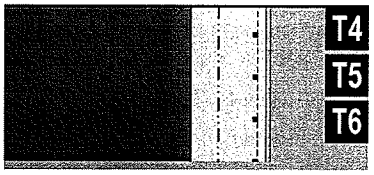
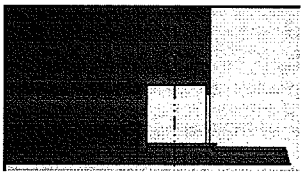
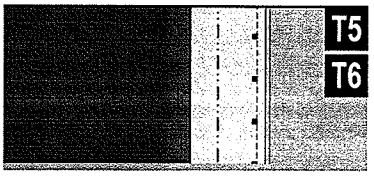
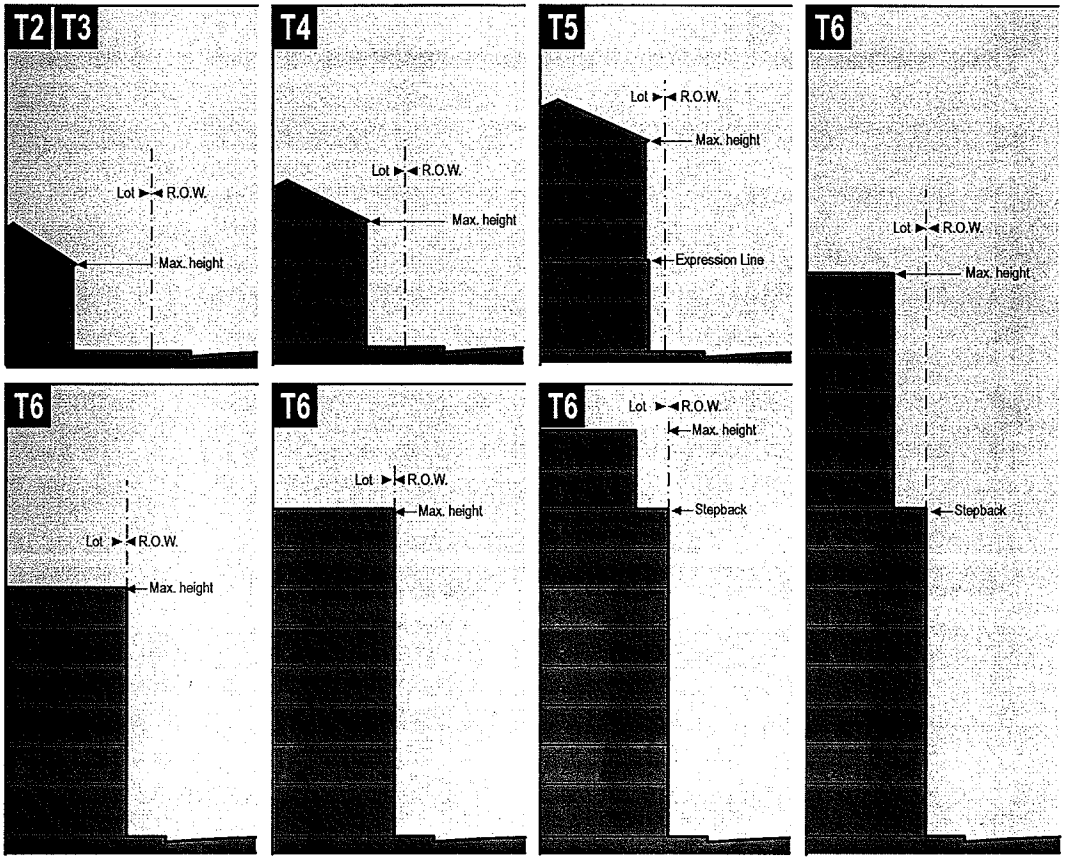
	SECTION	PLAN	
	LOT ► PRIVATE ► FRONTAGE ◄ R.O.W. ◄ PUBLIC FRONTAGE	LOT ► PRIVATE ► FRONTAGE ◄ R.O.W. ◄ PUBLIC FRONTAGE	
a. **Common Yard:** a planted Frontage wherein the Facade is set back substantially from the Frontage Line. The front yard created remains unfenced and is visually continuous with adjacent yards, supporting a common landscape. The deep Setback provides a buffer from the higher speed Thoroughfares.			T2 T3
b. **Porch & Fence:** a planted Frontage wherein the Facade is set back from the Frontage Line with an attached porch permitted to Encroach. A fence at the Frontage Line maintains street spatial definition. Porches shall be no less than 8 feet deep.			T3 T4
c. **Terrace or Lightwell:** a Frontage wherein the Facade is set back from the Frontage line by an elevated terrace or a sunken Lightwell. This type buffers Residential use from urban Sidewalks and removes the private yard from public Encroachment. Terraces are suitable for conversion to outdoor cafes. Syn: **Dooryard.**			T4 T5
d. **Forecourt:** a Frontage wherein a portion of the Facade is close to the Frontage Line and the central portion is set back. The Forecourt created is suitable for vehicular drop-offs. This type should be allocated in conjunction with other Frontage types. Large trees within the Forecourts may overhang the Sidewalks.			T4 T5 T6
e. **Stoop:** a Frontage wherein the Facade is aligned close to the Frontage Line with the first Story elevated from the Sidewalk sufficiently to secure privacy for the windows. The entrance is usually an exterior stair and landing. This type is recommended for ground-floor Residential use.			T4 T5 T6
f. **Shopfront:** a Frontage wherein the Facade is aligned close to the Frontage Line with the building entrance at Sidewalk grade. This type is conventional for Retail use. It has a substantial glazing on the Sidewalk level and an awning that should overlap the Sidewalk to within 2 feet of the Curb. Syn: Retail Frontage.			T4 T5 T6
g. **Gallery:** a Frontage wherein the Facade is aligned close to the Frontage line with an attached cantilevered shed or a lightweight colonnade overlapping the Sidewalk. This type is conventional for Retail use. The Gallery shall be no less than 10 feet wide and should overlap the Sidewalk to within 2 feet of the Curb.			T4 T5 T6
h. **Arcade:** a colonnade supporting habitable space that overlaps the Sidewalk, while the Facade at Sidewalk level remains at or behind the Frontage Line. This type is conventional for Retail use. The Arcade shall be no less than 12 feet wide and should overlap the Sidewalk to within 2 feet of the Curb. See Table 8.			T5 T6

TABLE 8: Building Configuration. This table shows the Configurations for different building heights for each Transect Zone. It must be modified to show actual calibrated heights for local conditions. Recess Lines and Expression Lines shall occur on higher buildings as shown. N = maximum height as specified in Table 14k.



Stepbacks/Arcade Heights. The diagrams below show Arcade Frontages. Diagrams above apply to all other Frontages.

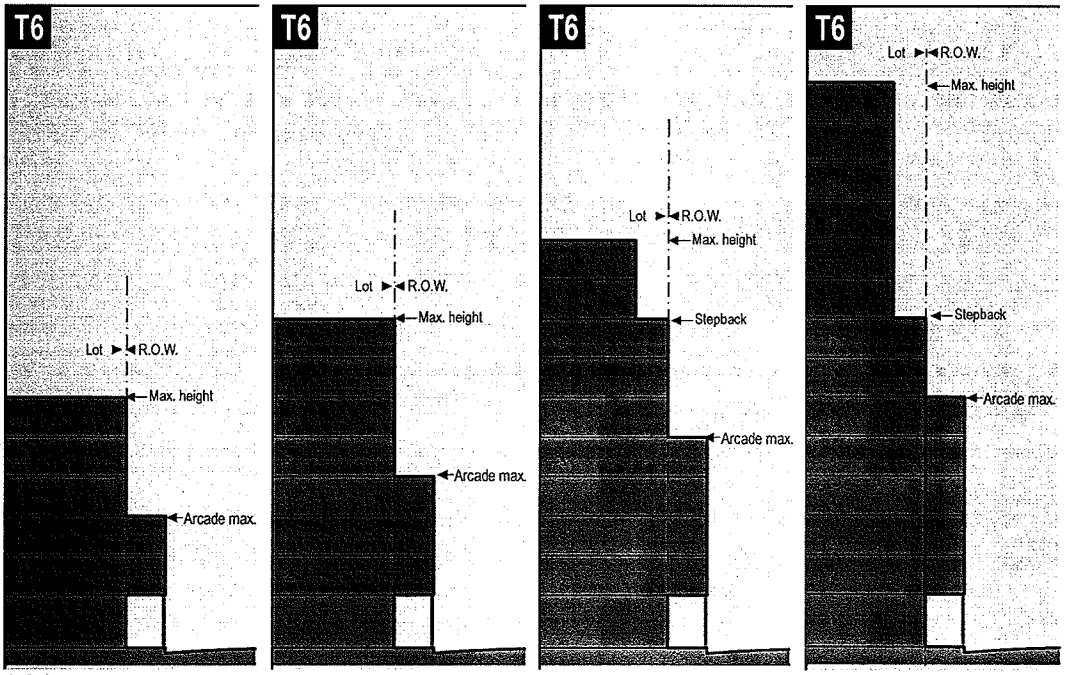
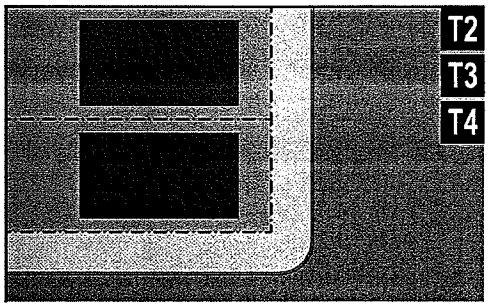
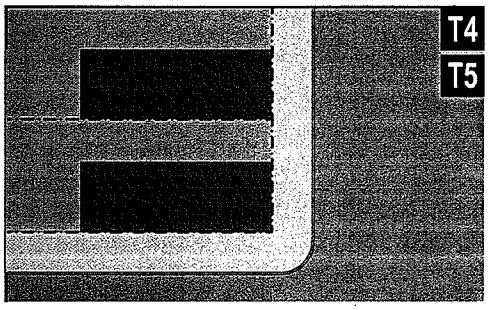


TABLE 9: Building Disposition. This table approximates the location of the structure relative to the boundaries of each individual Lot, establishing suitable basic building types for each Transect Zone.

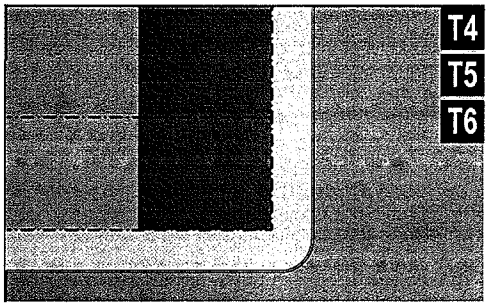
a. Edgeyard: Specific Types - single family House, cottage, villa, estate house, urban villa. A building that occupies the center of its Lot with Setbacks on all sides. This is the least urban of types as the front yard sets it back from the Frontage, while the side yards weaken the spatial definition of the public Thoroughfare space. The front yard is intended to be visually continuous with the yards of adjacent buildings. The rear yard can be secured for privacy by fences and a well-placed Backbuilding and/or Outbuilding.



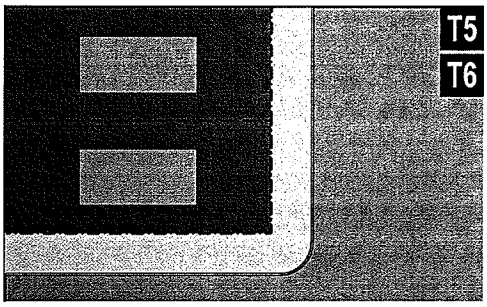
b. Sideyard: Specific Types - Charleston single house, double house, zero lot line house, twin. A building that occupies one side of the Lot with the Setback to the other side. A shallow Frontage Setback defines a more urban condition. If the adjacent building is similar with a blank side wall, the yard can be quite private. This type permits systematic climatic orientation in response to the sun or the breeze. If a Sideyard House abuts a neighboring Sideyard House, the type is known as a twin or double House. Energy costs, and sometimes noise, are reduced by sharing a party wall in this Disposition.



c. Rearyard: Specific Types - Townhouse, Rowhouse, Live-Work unit, loft building, Apartment House, Mixed Use Block, Flex Building, perimeter Block. A building that occupies the full Frontage, leaving the rear of the Lot as the sole yard. This is a very urban type as the continuous Facade steadily defines the public Thoroughfare. The rear Elevations may be articulated for functional purposes. In its Residential form, this type is the Rowhouse. For its Commercial form, the rear yard can accommodate substantial parking.



d. Courtyard: Specific Types - patio House. A building that occupies the boundaries of its Lot while internally defining one or more private patios. This is the most urban of types, as it is able to shield the private realm from all sides while strongly defining the public Thoroughfare. Because of its ability to accommodate incompatible activities, masking them from all sides, it is recommended for workshops, Lodging and schools. The high security provided by the continuous enclosure is useful for crime-prone areas.



e. Specialized: A building that is not subject to categorization. Buildings dedicated to manufacturing and transportation are often distorted by the trajectories of machinery. Civic buildings, which may express the aspirations of institutions, may be included.

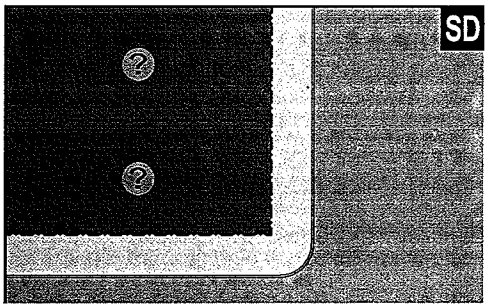


TABLE 10: Building Function. This table categorizes Building Functions within Transect Zones. Parking requirements are correlated to functional intensity. For Specific Function and Use permitted By Right or by Warrant, see Table 12.

	T2 T3	T4	T5 T6
a. RESIDENTIAL	**Restricted Residential:** The number of dwellings on each Lot is restricted to one within a Principal Building and one within an Accessory Building, with 2.0 parking places for each. Both dwellings shall be under single ownership. The habitable area of the Accessory Unit shall not exceed 440 sf, excluding the parking area.	**Limited Residential:** The number of dwellings on each Lot is limited by the requirement of 1.5 parking places for each dwelling, a ratio which may be reduced according to the shared parking standards (See Table 11).	**Open Residential:** The number of dwellings on each Lot is limited by the requirement of 1.0 parking places for each dwelling, a ratio which may be reduced according to the shared parking standards (See Table 11).
b. LODGING	**Restricted Lodging:** The number of bedrooms available on each Lot for lodging is limited by the requirement of 1.0 assigned parking place for each bedroom, up to five, in addition to the parking requirement for the dwelling. The Lodging must be owner occupied. Food service may be provided in the a.m. The maximum length of stay shall not exceed ten days.	**Limited Lodging:** The number of bedrooms available on each Lot for lodging is limited by the requirement of 1.0 assigned parking places for each bedroom, up to twelve, in addition to the parking requirement for the dwelling. The Lodging must be owner occupied. Food service may be provided in the a.m. The maximum length of stay shall not exceed ten days.	**Open Lodging:** The number of bedrooms available on each Lot for lodging is limited by the requirement of 1.0 assigned parking places for each bedroom. Food service may be provided at all times. The area allocated for food service shall be calculated and provided with parking according to Retail Function.
c. OFFICE	**Restricted Office:** The building area available for office use on each Lot is restricted to the first Story of the Principal or the Accessory Building and by the requirement of 3.0 assigned parking places per 1000 square feet of net office space in addition to the parking requirement for each dwelling.	**Limited Office:** The building area available for office use on each Lot is limited to the first Story of the principal building and/or to the Accessory building, and by the requirement of 3.0 assigned parking places per 1000 square feet of net office space in addition to the parking requirement for each dwelling.	**Open Office:** The building area available for office use on each Lot is limited by the requirement of 2.0 assigned parking places per 1000 square feet of net office space.
d. RETAIL	**Restricted Retail:** The building area available for Retail use is restricted to one Block corner location at the first Story for each 300 dwelling units and by the requirement of 4.0 assigned parking places per 1000 square feet of net Retail space in addition to the parking requirement of each dwelling. The specific use shall be further limited to neighborhood store, or food service seating no more than 20.	**Limited Retail:** The building area available for Retail use is limited to the first Story of buildings at corner locations, not more than one per Block, and by the requirement of 4.0 assigned parking places per 1000 square feet of net Retail space in addition to the parking requirement of each dwelling. The specific use shall be further limited to neighborhood store, or food service seating no more than 40.	**Open Retail:** The building area available for Retail use is limited by the requirement of 3.0 assigned parking places per 1000 square feet of net Retail space. Retail spaces under 1500 square feet are exempt from parking requirements.
e. CIVIC	See Table 12	See Table 12	See Table 12
f. OTHER	See Table 12	See Table 12	See Table 12

TABLE 11: Parking Calculations. The Shared Parking Factor for two Functions, when divided into the sum of the two amounts as listed on the Required Parking table below, produces the Effective Parking needed for each site involved in sharing. Conversely, if the Sharing Factor is used as a multiplier, it indicates the amount of building allowed on each site given the parking available.

REQUIRED PARKING (See Table 10)

	T2 T3	T4	T5 T6
RESIDENTIAL	2.0 / dwelling	1.5 / dwelling	1.0 / dwelling
LODGING	1.0 / bedroom	1.0 / bedroom	1.0 / bedroom
OFFICE	3.0 / 1000 sq. ft.	3.0 / 1000 sq. ft.	2.0 / 1000 sq. ft.
RETAIL	4.0 / 1000 sq. ft.	4.0 / 1000 sq. ft.	3.0 / 1000 sq. ft.
CIVIC	To be determined by Warrant		
OTHER	To be determined by Warrant		

SHARED PARKING FACTOR

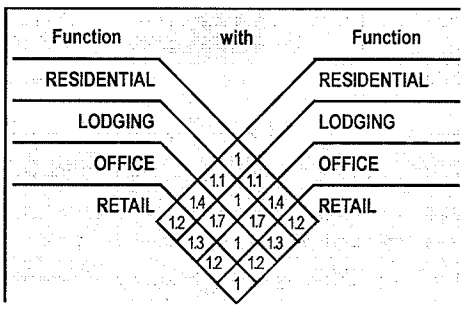


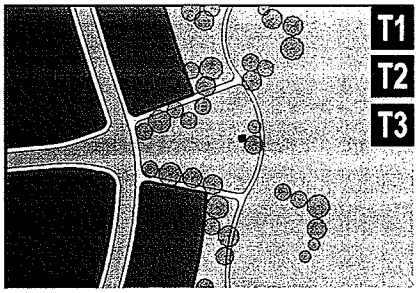
TABLE 12: Specific Function & Use. This table expands the categories of Table 10 to delegate specific Functions and uses within Transect Zones. Table 12 should be customized for local character and requirements.

a. RESIDENTIAL	T1	T2	T3	T4	T5	T6	SD
Mixed Use Block					■	■	
Flex Building				■	■	■	
Apartment Building				■	■	■	
Live/Work Unit			■	■	■	■	□
Row House				■	■		
Duplex House				■	■		
Courtyard House				■	■		
Sideyard House			■	■	■		
Cottage			■	■			
House		■	■	■			
Villa		■					
Accessory Unit		■	■	■	■		
b. LODGING							
Hotel (no room limit)					■	■	□
Inn (up to 12 rooms)		□		■	■	■	
Bed & Breakfast (up to 5 rooms)		□	■	■	■	■	
S.R.O. hostel			□	□	□	□	□
School Dormitory				■	■	■	■
c. office							
Office Building				■	■	■	□
Live-Work Unit			■	■	■	■	□
d. RETAIL							
Open-Market Building		■	■	■	■	■	■
Retail Building				■	■	■	□
Display Gallery				■	■	■	□
Restaurant				■	■	■	□
Kiosk				■	■	■	□
Push Cart					□	□	□
Liquor Selling Establishment					□	□	□
Adult Entertainment						□	□
e. CIVIC							
Bus Shelter			■	■	■	■	■
Convention Center						□	■
Conference Center					□	■	■
Exhibition Center						□	■
Fountain or Public Art		■	■	■	■	■	■
Library				■	■	■	■
Live Theater					■	■	■
Movie Theater					■	■	■
Museum					□	■	■
Outdoor Auditorium		□	■		■	■	■
Parking Structure					■	■	■
Passenger Terminal					□	□	■
Playground		■	■	■	■	■	■
Sports Stadium						□	■
Surface Parking Lot				□	□	□	■
Religious Assembly		■	■	■	■	■	■

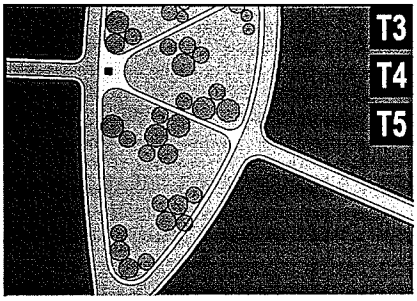
f. OTHER: AGRICULTURE	T1	T2	T3	T4	T5	T6	SD
Grain Storage	■	■					□
Livestock Pen	□	□					□
Greenhouse	■	■	□				□
Stable	■	■	□				□
Kennel	■	■	□	□	□	□	□
f. OTHER: AUTOMOTIVE							
Gasoline		□			□	□	■
Automobile Service							■
Truck Maintenance							■
Drive -Through Facility					□	□	■
Rest Stop	■	■					□
Roadside Stand	■	■					□
Billboard						□	□
Shopping Center							□
Shopping Mall							□
f. OTHER: CIVIL SUPPORT							
Fire Station			■	■	■	■	■
Police Station				■	■	■	■
Cemetery		■	□	□			■
Funeral Home				■	■	■	■
Hospital					□	□	■
Medical Clinic				□	■	■	■
f. OTHER: EDUCATION							
College					□	□	■
High School				□	□	□	■
Trade School					□	□	■
Elementary School			□	■	■	■	■
Other- Childcare Center		■	■	■	■	■	□
f. OTHER: INDUSTRIAL							
Heavy Industrial Facility							■
Light Industrial Facility						□	■
Truck Depot							■
Laboratory Facility						□	■
Water Supply Facility							■
Sewer and Waste Facility							■
Electric Substation	□	□	□	□	□	□	■
Wireless Transmitter	□	□					■
Cremation Facility							■
Warehouse						□	■
Produce Storage							■
Mini-Storage							■

■ BY RIGHT
□ BY WARRANT

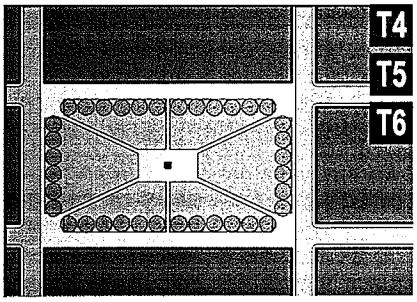
a. Park: A natural preserve available for unstructured recreation. A park may be independent of surrounding building Frontages. Its landscape shall consist of Paths and trails, meadows, waterbodies, woodland and open shelters, all naturalistically disposed. Parks may be lineal, following the trajectories of natural corridors. The minimum size shall be 8 acres. Larger parks may be approved by Warrant as Special Districts in all zones.



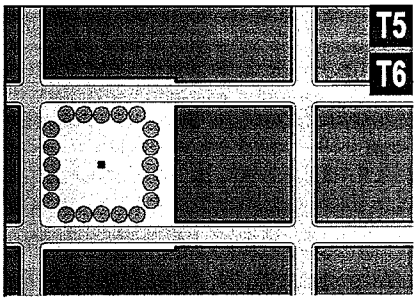
b. Green: An Open Space, available for unstructured recreation. A Green may be spatially defined by landscaping rather than building Frontages. Its landscape shall consist of lawn and trees, naturalistically disposed. The minimum size shall be 1/2 acre and the maximum shall be 8 acres.



c. Square: An Open Space available for unstructured recreation and Civic purposes. A Square is spatially defined by building Frontages. Its landscape shall consist of paths, lawns and trees, formally disposed. Squares shall be located at the intersection of important Thoroughfares. The minimum size shall be 1/2 acre and the maximum shall be 5 acres.



d. Plaza: An Open Space available for Civic purposes and Commercial activities. A Plaza shall be spatially defined by building Frontages. Its landscape shall consist primarily of pavement. Trees are optional. Plazas should be located at the intersection of important streets. The minimum size shall be 1/2 acre and the maximum shall be 2 acres.



e. Playground: An Open Space designed and equipped for the recreation of children. A playground should be fenced and may include an open shelter. Playgrounds shall be interspersed within Residential areas and may be placed within a Block. Playgrounds may be included within parks and greens. There shall be no minimum or maximum size.

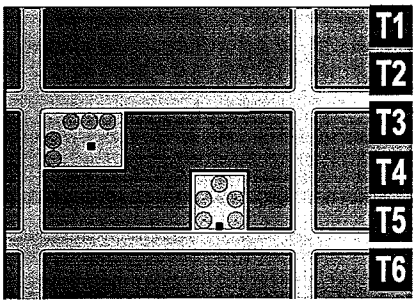
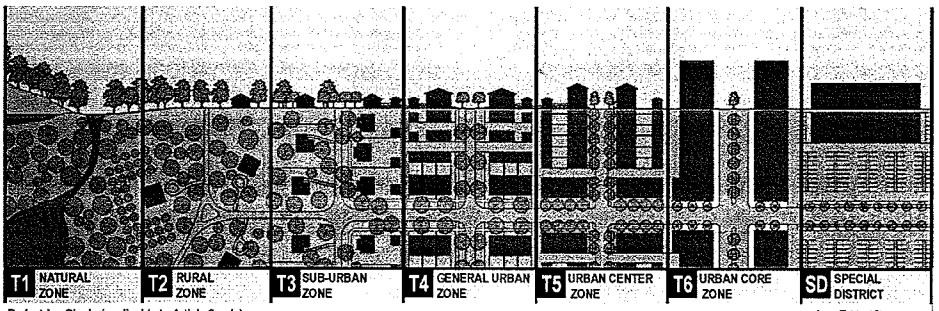
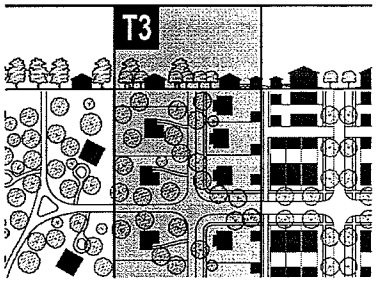


TABLE 14. SMARTCODE SUMMARY

Note: All requirements in this Table are subject to calibration for local context.



	T1 NATURAL ZONE	T2 RURAL ZONE	T3 SUB-URBAN ZONE	T4 GENERAL URBAN ZONE	T5 URBAN CENTER ZONE	T6 URBAN CORE ZONE	SD SPECIAL DISTRICT
a. ALLOCATION OF ZONES per Pedestrian Shed (applicable to Article 3 only)							(see Table 16)
CLD requires	no minimum	50% min	10 - 30%	20 - 40%	not permitted	not permitted	
TND requires	no minimum	no minimum	10 - 30%	30 - 60 %	10 - 30%	not permitted	
RCD requires	no minimum	no minimum	not permitted	10 - 30%	10 - 30%	40 - 80%	
b. BASE RESIDENTIAL DENSITY (see Section 3.4)							
By Right	not applicable	1 unit / 20 ac avg.	2 units / ac. gross	4 units / ac. gross	6 units / ac. gross	12 units / ac. gross	
By TDR	by Variance	by Variance	6 units / ac. gross	12 units / ac. gross	24 units / ac. gross	96 units / ac. gross	
Other Functions	by Variance	by Variance	10 - 20%	20 - 30%	30 - 50%	50 - 70%	
c. BLOCK SIZE							
Block Perimeter	no maximum	no maximum	3000 ft. max	2400 ft. max	2000 ft. max	2000 ft. max *	
d. THOROUGHFARES (see Table 3 and Table 4)						* 3000 ft. max with parking structures	
HW	permitted	permitted	permitted	not permitted	not permitted	not permitted	
BV	not permitted	not permitted	permitted	permitted	permitted	permitted	
AV	not permitted	not permitted	permitted	permitted	permitted	permitted	
CS	not permitted	not permitted	not permitted	not permitted	permitted	permitted	
DR	not permitted	not permitted	permitted	permitted	permitted	permitted	
ST	not permitted	not permitted	permitted	permitted	permitted	not permitted	
RD	permitted	permitted	permitted	not permitted	not permitted	not permitted	
Rear Lane	permitted	permitted	permitted	permitted	not permitted	not permitted	
Rear Alley	not permitted	not permitted	permitted	required	required	required	
Path	permitted	permitted	permitted	permitted	not permitted	not permitted	
Passage	not permitted	not permitted	permitted	permitted	permitted	permitted	
Bicycle Trail	permitted	permitted	permitted	not permitted *	not permitted	not permitted	
Bicycle Lane	permitted	permitted	permitted	permitted	not permitted	not permitted	
Bicycle Route	permitted	permitted	permitted	permitted	permitted	permitted	
e. CIVIC SPACES (see Table 13)						* permitted within Open Spaces	
Park	permitted	permitted	permitted	by Warrant	by Warrant	by Warrant	
Green	not permitted	not permitted	permitted	permitted	permitted	not permitted	
Square	not permitted	not permitted	not permitted	permitted	permitted	permitted	
Plaza	not permitted	not permitted	not permitted	not permitted	permitted	permitted	
Playground	permitted	permitted	permitted	permitted	permitted	permitted	
f. LOT OCCUPATION							DISPOSITION
Lot Width	not applicable	by Warrant	72 ft. min 120 ft. max	18 ft. min 96 ft. max	18 ft. min 180 ft. max	18 ft. min 700 ft. max	
Lot Coverage	not applicable	by Warrant	60% max	70% max	80% max	90% max	
g. SETBACKS - PRINCIPAL BUILDING (see Table 15)							
(g.1) Front Setback (Principal)	not applicable	48 ft. min	24 ft. min	6 ft. min 18 ft. max	2 ft. min 12 ft. max	2 ft. min 12 ft. max	
(g.2) Front Setback (Secondary)	not applicable	48 ft. min	12 ft. min	6 ft. min 18 ft. max	2 ft. min 12 ft. max	2 ft. min 12 ft. max	
(g.3) Side Setback	not applicable	96 ft. min	12 ft. min	0 ft. min	0 ft. min 24 ft. max	0 ft. min 24 ft. max	
(g.4) Rear Setback	not applicable	96 ft. min	12 ft. min	3 ft. min *	3 ft. min *	0 ft. min	
Frontage Buildout	not applicable	not applicable	40% min	60% min	80% min	80% min	
h. SETBACKS - OUTBUILDING (see Table 15)							
(h.1) Front Setback	not applicable	20 ft. min +bldg setback	20 ft. min +bldg setback	20 ft. min +bldg setback	40 ft. max from rear prop	not applicable	
(h.2) Side Setback	not applicable	3 ft. or 6 ft.	3 ft. or 6 ft.	0 ft. min or 3 ft.	0 ft min	not applicable	
(h.3) Rear Setback	not applicable	3 ft. min	3 ft. min	3 ft.	3 ft. max	not applicable	
i. BUILDING DISPOSITION (see Table 9)							
Edgeyard	permitted	permitted	permitted	permitted	not permitted	not permitted	
Sideyard	not permitted	not permitted	not permitted	permitted	permitted	not permitted	
Rearyard	not permitted	not permitted	not permitted	permitted	permitted	permitted	
Courtyard	not permitted	not permitted	not permitted	not permitted	permitted	permitted	
j. PRIVATE FRONTAGES (see Table 7)							CONFIGURATION
Common Yard	not applicable	permitted	permitted	not permitted	not permitted	not permitted	
Porch & Fence	not applicable	not permitted	permitted	permitted	not permitted	not permitted	
Terrace or Dooryard	not applicable	not permitted	not permitted	permitted	permitted	not permitted	
Forecourt	not applicable	not permitted	not permitted	permitted	permitted	permitted	
Stoop	not applicable	not permitted	not permitted	permitted	permitted	permitted	
Shopfront & Awning	not applicable	not permitted	not permitted	permitted	permitted	permitted	
Gallery	not applicable	not permitted	not permitted	permitted	permitted	permitted	
Arcade	not applicable	not permitted	not permitted	not permitted	permitted	permitted	
k. BUILDING CONFIGURATION (see Table 8)							
Principal Building	not applicable	2 Stories max	2 Stories max	3 Stories max, 2 min	5 Stories max, 2 min	8 Stories max, 2 min	
Outbuilding	not applicable	2 Stories max	2 Stories max	2 Stories max	2 Stories max	not applicable	
l. BUILDING FUNCTION (see Table 10 &Table 12)							FUNCTION
Residential	not applicable	restricted use	restricted use	limited use	open use	open use	
Lodging	not applicable	restricted use	restricted use	limited use	open use	open use	
Office	not applicable	restricted use	restricted use	limited use	open use	open use	
Retail	not applicable	restricted use	restricted use	limited use	open use	open use	
	ARTICLE 5						
	ARTICLE 2, 3, 4						



(see Table 1)

I. BUILDING FUNCTION (see Table 10 & Table 12)	
Residential	restricted use
Lodging	restricted use
Office	restricted use
Retail	restricted use

k. BUILDING CONFIGURATION (see Table 8)	
Principal Building	2 stories max.
Outbuilding	2 stories max.

f. LOT OCCUPATION (see Table 14f)	
Lot Width	72 ft. min 120 ft. max
Lot Coverage	60% max

i. BUILDING DISPOSITION (see Table 9)	
Edgeyard	permitted
Sideyard	not permitted
Rearyard	not permitted
Courtyard	not permitted

g. SETBACKS - PRINCIPAL BUILDING (see Table 14g)	
(g.1) Front Setback Principal	24 ft. min
(g.2) Front Setback Secondary	12 ft min.
(g.3) Side Setback	12 ft min.
(g.4) Rear Setback	12 ft min.
Frontage Buildout	40% min at setback

h. SETBACKS - OUTBUILDING (see Table 14h)	
(h.1) Front Setback	20 ft. min. + bldg setback
(h.2) Side Setback	3 ft. or 6 ft at corner
(h.3) Rear Setback	3 ft. min

j. PRIVATE FRONTAGES (see Table 7)	
Common Lawn	permitted
Porch & Fence	permitted
Terrace or L.C.	not permitted
Forecourt	not permitted
Stoop	not permitted
Shopfront & Awning	not permitted
Gallery	not permitted
Arcade	not permitted
	Refer to Summary Table 14

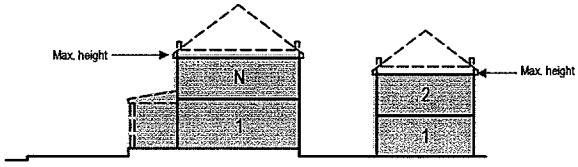
PARKING PROVISIONS
See Table 10 & Table 11

*or 15 ft. from center line of alley

"N" stands for any Stories above those shown, up to the maximum. Refer to metrics for exact minimums and maximums

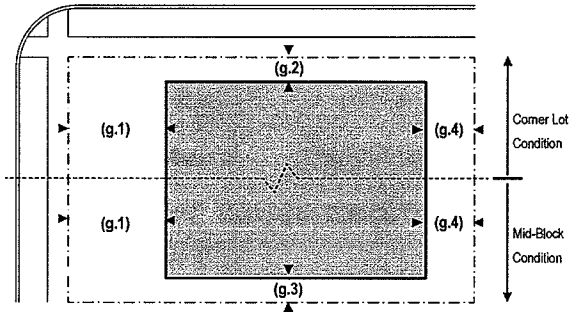
BUILDING CONFIGURATION

1. Building height shall be measured in number of Stories, excluding Attics and raised basements.
2. Stories may not exceed 14 feet in height from finished floor to finished ceiling, except for a first floor Commercial function which must be a minumum of 11 ft with a maximum of 25 feet.
3. Height shall be measured to the eave or roof deck as specified on Table 8.



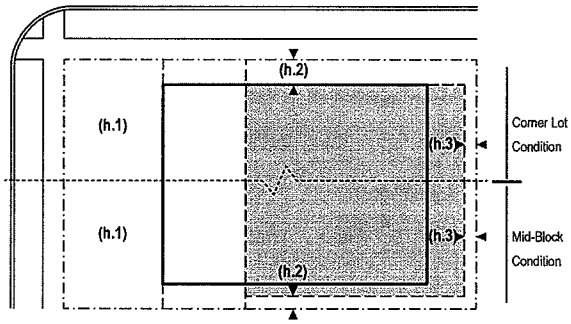
SETBACKS - PRINCIPAL BLDG

1. The Facades and Elevations of Principal Buildings shall be distanced from the Lot lines as shown.
2. Facades shall be built along the Principal Frontage to the minimum specified width in the table.



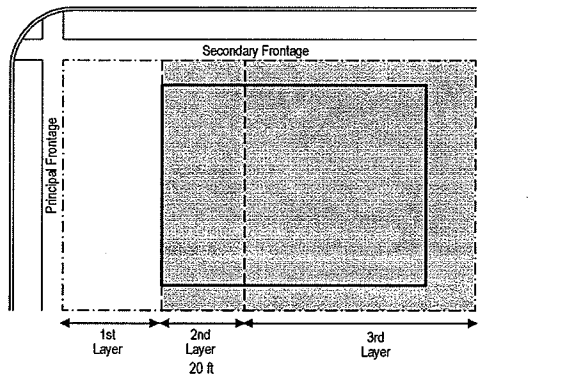
SETBACKS - OUTBUILDING

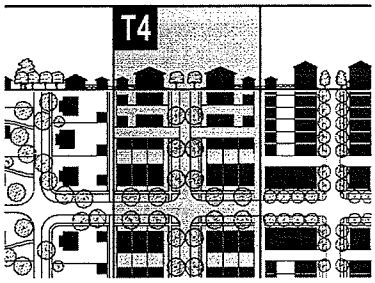
1. The Elevation of the Outbuilding shall be distanced from the Lot lines as shown.



PARKING PLACEMENT

1. Uncovered parking spaces may be provided within the second and third Layer as shown in the diagram (see Table 17d).
2. Covered parking shall be provided within the third Layer as shown in the diagram (see Table 17d). Side- or rear-entry garages may be allowed in the first or second Layer by Warrant.
3. Trash containers shall be stored within the third Layer.





(see Table 1)

I. BUILDING FUNCTION (see Table 10 & Table 12)	
Residential	limited use
Lodging	limited use
Office	limited use
Retail	limited use

k. BUILDING CONFIGURATION (see Table 8)	
Principal Building	3 stories max., 2 min
Outbuilding	2 stories max.

f. LOT OCCUPATION (see Table 14f)	
Lot Width	18 ft min 96 ft max
Lot Coverage	70% max

i. BUILDING DISPOSITION (see Table 9)	
Edgeyard	permitted
Sideyard	permitted
Rearyard	permitted
Courtyard	not permitted

g. SETBACKS - PRINCIPAL BUILDING (see Table 14g)	
(g.1) Front Setback Principal	6 ft. min. 18 ft. max.
(g.2) Front Setback Secondary	6 ft. min. 18 ft. max
(g.3) Side Setback	0 ft. min.
(g.4) Rear Setback	3 ft. min.*
Frontage Buildout	60% min at setback

h. SETBACKS - OUTBUILDING (see Table 14h)	
(h.1) Front Setback	20 ft. min. + bldg. setback
(h.2) Side Setback	0 ft. min. or 3 ft at corner
(h.3) Rear Setback	3 ft. min

j. PRIVATE FRONTAGES (see Table 7)	
Common Lawn	not permitted
Porch & Fence	permitted
Terrace or L.C.	permitted
Forecourt	permitted
Stoop	permitted
Shopfront & Awning	permitted
Gallery	permitted
Arcade	not permitted
	Refer to Summary Table 14

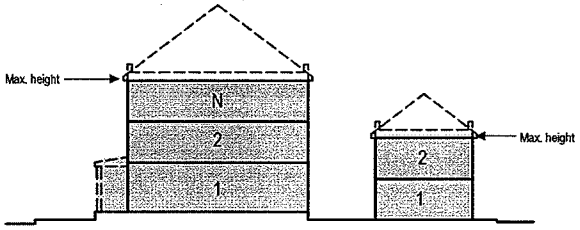
PARKING PROVISIONS
See Table 10 & Table 11

*or 15 ft. from center line of alley

"N" stands for any Stories above those shown, up to the maximum. Refer to metrics for exact minimums and maximums

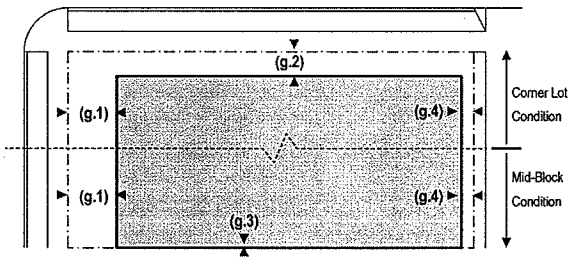
BUILDING CONFIGURATION

1. Building height shall be measured in number of Stories, excluding Attics and raised basements.
2. Stories may not exceed 14 feet in height from finished floor to finished ceiling, except for a first floor Commercial function which must be a minumum of 11 ft with a maximum of 25 ft.
3. Height shall be measured to the eave or roof deck as specified on Table 8.



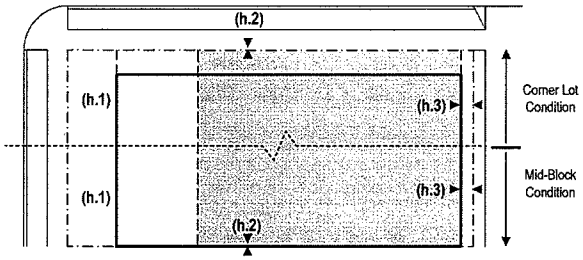
SETBACKS - PRINCIPAL BLDG

1. The Facades and Elevations of Principal Buildings shall be distanced from the Lot lines as shown.
2. Facades shall be built along the Principal Frontage to the minimum specified width in the table.



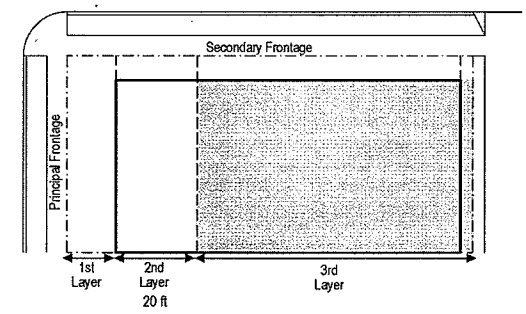
SETBACKS - OUTBUILDING

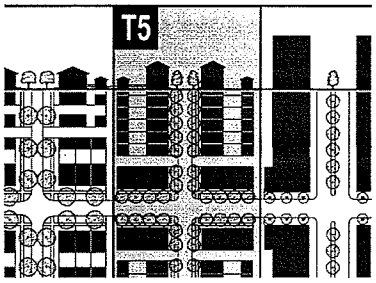
1. The Elevations of the Outbuilding shall be distanced from the Lot lines as shown.



PARKING PLACEMENT

1. Uncovered parking spaces may be provided within the third Layer as shown in the diagram (see Table 17d).
2. Covered parking shall be provided within the third Layer as shown in the diagram (see Table 17d).
3. Trash containers shall be stored within the third Layer.





(see Table 1)

I. BUILDING FUNCTION (see Table 10 & Table 12)	
Residential	open use
Lodging	open use
Office	open use
Retail	open use

k. BUILDING CONFIGURATION (see Table 8)	
Principal Building	5 stories max. 2 min.
Outbuilding	2 stories max.

f. LOT OCCUPATION (see Table 14f)	
Lot Width	18 ft min 180 ft max
Lot Coverage	80% max

i. BUILDING DISPOSITION (see Table 9)	
Edgeyard	not permitted
Sideyard	permitted
Rearyard	permitted
Courtyard	permitted

g. SETBACKS - PRINCIPAL BUILDING (see Table 14g)	
(g.1) Front Setback Principal	2 ft. min. 12 ft. max.
(g.2) Front Setback Secondary	2 ft. min. 12 ft. max.
(g.3) Side Setback	0 ft. min. 24 ft. max.
(g.4) Rear Setback	3 ft. min.*
Frontage Buildout	80% min at setback

h. SETBACKS - OUTBUILDING (see Table 14h)	
(h.1) Front Setback	40 ft. max. from rear prop.
(h.2) Side Setback	0 ft. min. or 2 ft at corner
(h.3) Rear Setback	3 ft. max.

j. PRIVATE FRONTAGES (see Table 7)	
Common Lawn	not permitted
Porch & Fence	not permitted
Terrace or L.C.	permitted
Forecourt	permitted
Stoop	permitted
Shopfront & Awning	permitted
Gallery	permitted
Arcade	permitted
	Refer to Summary Table 14

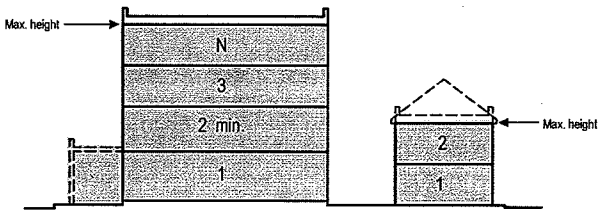
PARKING PROVISIONS
See Table 10 & Table 11

*or 15 ft. from center line of alley

"N" stands for any Stories above those shown, up to the maximum. Refer to metrics for exact minimums and maximums

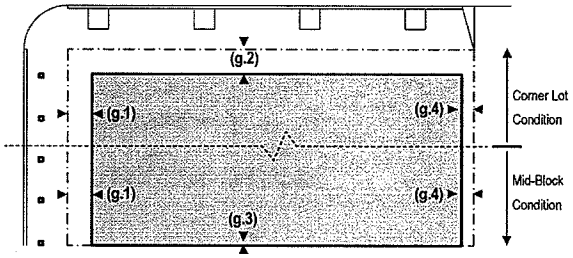
BUILDING CONFIGURATION

1. Building height shall be measured in number of Stories, excluding Attics and raised basements.
2. Stories may not exceed 14 feet in height from finished floor to finished ceiling, except for a first floor Commercial function which must be a minumum of 11 ft with a maximum of 25 ft.
3. Height shall be measured to the eave or roof deck as specified on Table 8.
4. Expression Lines shall be as shown on Table 8.



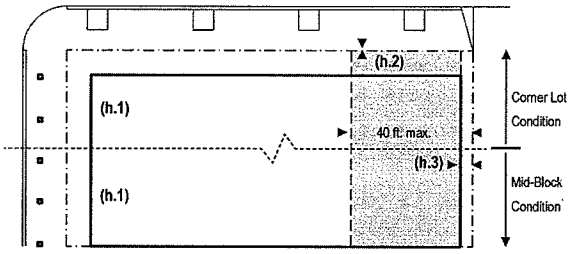
SETBACKS - PRINCIPAL BLDG

1. The Facades and Elevations of Principal Buildings shall be distanced from the Lot lines as shown.
2. Facades shall be built along the Principal Frontage to the minimum specified width in the table.



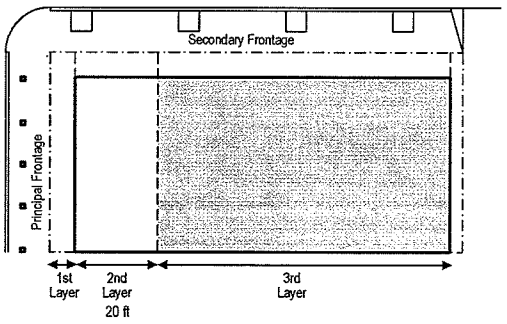
SETBACKS - OUTBUILDING

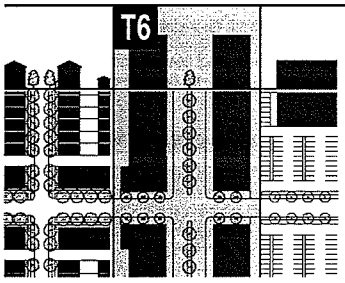
1. The Elevations of the Outbuilding shall be distanced from the Lot lines as shown.



PARKING PLACEMENT

1. Uncovered parking spaces may be provided within the third Layer as shown in the diagram (see Table 17d).
2. Covered parking shall be provided within the third Layer as shown in the diagram (see Table 17d).
3. Trash containers shall be stored within the third Layer.





(see Table 1)

I. BUILDING FUNCTION (see Table 10 & Table 12)

Residential	open use
Lodging	open use
Office	open use
Retail	open use

k. BUILDING CONFIGURATION (see Table 8)

Principal Building	8 stories max. 2 min.
Outbuilding	N/A

f. LOT OCCUPATION (see Table 14f)

Lot Width	18 ft. min 700 ft. max
Lot Coverage	90% max

i. BUILDING DISPOSITION (see Table 9)

Edgeyard	not permitted
Sideyard	not permitted
Rearyard	permitted
Courtyard	permitted

g. SETBACKS - PRINCIPAL BUILDING (see Table 14g)

(g.1) Front Setback Principal	2 ft. min. 12 ft. max.
(g.2) Front Setback Secondary	2 ft. min. 12 ft. max.
(g.3) Side Setback	0 ft. min. 24 ft. max.
(g.4) Rear Setback	0 ft. min.
Frontage Buildout	80% min. at setback

h. SETBACKS - OUTBUILDING (see Table 14h)

Front Setback	N/A
Side Setback	N/A
Rear Setback	N/A

j. PRIVATE FRONTAGES (see Table 7)

Common Lawn	not permitted
Porch & Fence	not permitted
Terrace or L.C.	not permitted
Forecourt	permitted
Stoop	permitted
Shopfront & Awning	permitted
Gallery	permitted
Arcade	permitted

Refer to Summary Table 14

PARKING PROVISIONS

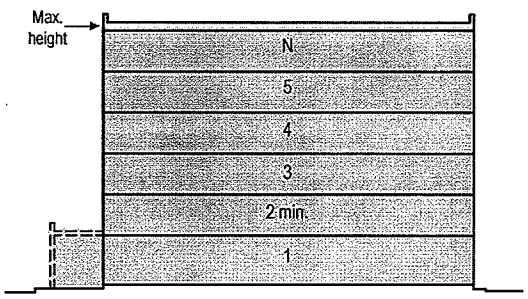
See Table 10 & Table 11

*or 15 ft. from center line of alley

"N" stands for any Stories above those shown, up to the maximum. Refer to metrics for exact minimums and maximums

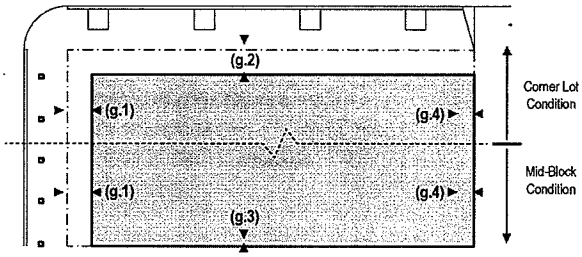
BUILDING CONFIGURATION

1. Building height shall be measured in number of Stories, excluding Attics and raised basements.
2. Stories may not exceed 14 feet in height from finished floor to finished ceiling, except for a first floor Commercial Function which must be a minumum of 11 ft with with a maximum of 25 ft.
3. Height shall be measured to the eave or roof deck as specified on Table 8.
4. Stepbacks, Recess Lines, and Extension Lines shall be as shown on Table 8.



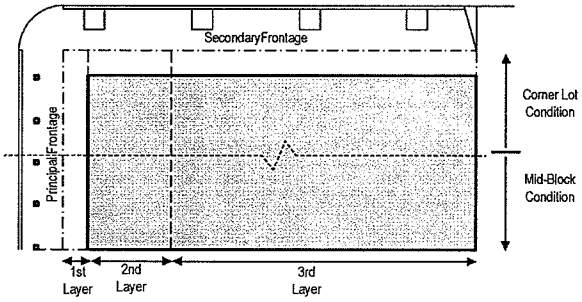
SETBACKS - PRINCIPAL BLDG

1. The Facades and Elevations of Principal Buildings shall be distanced from the Lot lines as shown.
2. Facades shall be built along the Principal Frontage to the minimum specified width in the table.



PARKING PLACEMENT

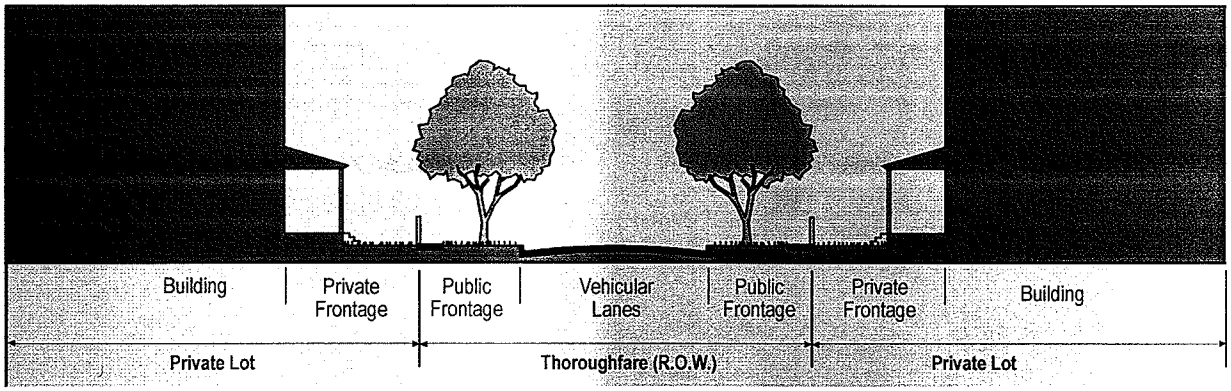
1. Uncovered parking spaces may be provided within the third Layer as shown in the diagram (see Table 17d).
2. Covered parking shall be provided within the third Layer as shown in the diagram (see Table 17d).
3. Trash containers shall be stored within the third Layer.



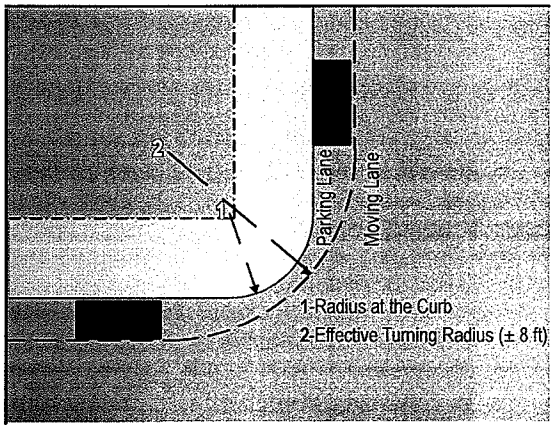
The metrics for each column of this table (SD1, SD2, etc.) are to be filled in for each Special District as they currently exist, or as they are permitted.More pages can be added. Special Districts that do not have provisions within this Code shall be governed by the standards of the pre-existing zoning.

	SD1	SD2	SD3	SD4	SD5	SD6	SD7	
a. ALLOCATION OF ZONES								
CLD	X							
TND	X							
TOD	X							
b. BASE RESIDENTIAL DENSITY								
By Right	X							
By TDR	X							
Other Functions	X							
c. BLOCK SIZE								
Block Perimeter	X							
d. THOROUGHFARES								
HW	X							
BV	X							
AV	X							
CS	X							
DR	X							
ST	X							
RD	X							
Rear Lane	X							
Rear Alley	X							
Path	X							
Passage	X							
Bicycle Trail	X							
Bicycle Lane	X							
Bicycle Route	X							
e. CIVIC SPACES								
Park	X							
Green	X							
Square	X							
Plaza	X							
Playground	X							
f. LOT OCCUPATION								DISPOSITION
Lot Width	X							
Lot Coverage	X							
g. SETBACKS - PRINCIPAL BUILDING								
Front Setback	X							
Side Setback	X							
Rear Setback	X							
h. BUILDING Disposition								
Edgeyard	X							
Sideyard	X							
Rearyard	X							
i. PRIVATE FRONTAGES								CONFIGURATION
Common Yard	X							
Porch & Fence	X							
Terrace, Dooryard	X							
Forecourt	X							
Stoop	X							
Shopfront	X							
Gallery	X							
Arcade	X							
Parking Lot	X							
j. BUILDING CONFIGURATION								
Principal Building	X							
Outbuilding	X							
k. BUILDING FUNCTION								FUNCTION
Residential	X							
Lodging	X							
Office	X							
Retail	X							

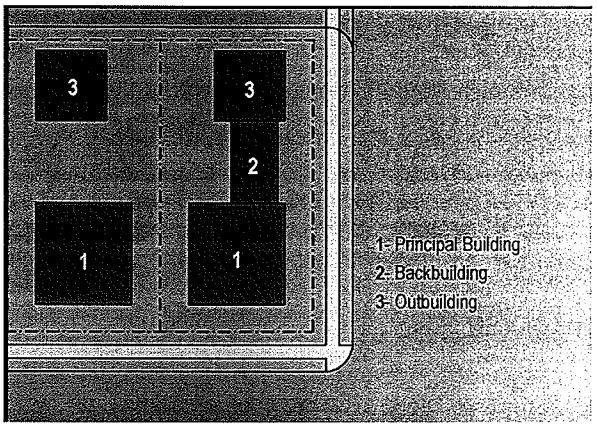
a. THOROUGHFARE & FRONTAGES



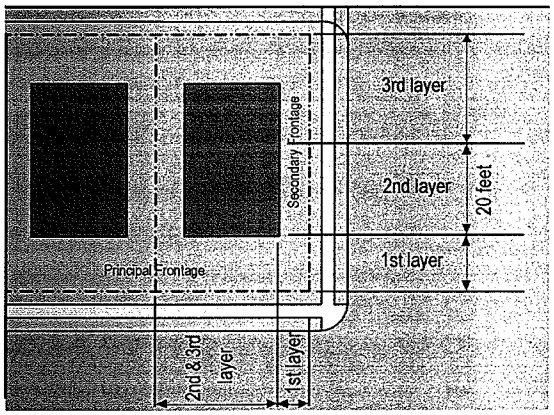
b. TURNING RADIUS



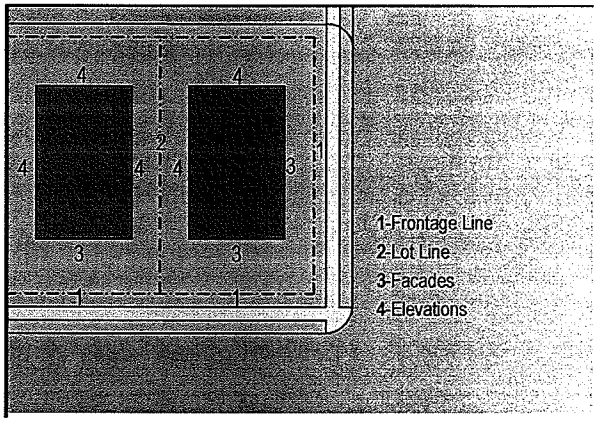
c. BUILDING DISPOSITION



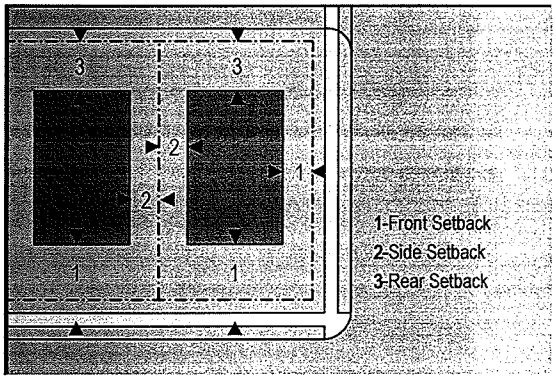
d. LOT LAYERS



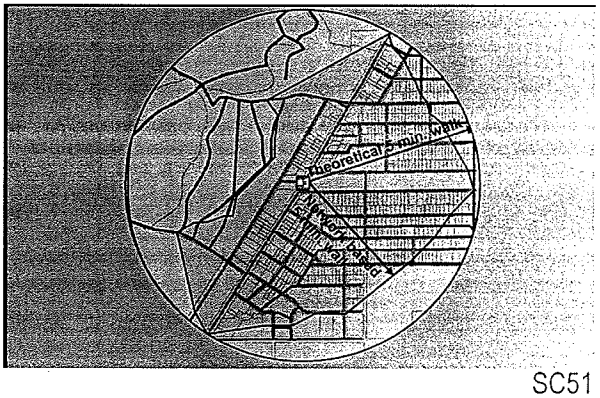
e. FRONTAGE & LOT LINES



f. SETBACK DESIGNATIONS



g. NETWORK-BASED PEDESTRIAN SHED



DEFINITIONS

This Article provides definitions for terms in this Code that are technical in nature or that otherwise may not reflect a common usage of the term. If a term is not defined in this Article, then the CRC shall determine the correct definition. Items in italics refer to *Articles, Sections,* or *Tables* in the SmartCode.

A-Grid: cumulatively, those Thoroughfares that by virtue of their pre-existing pedestrian-supportive qualities, or their future importance to pedestrian connectivity, are held to the highest standards prescribed by this Code. See B-Grid. (Syn: primary grid.)

Accessory Building: an Outbuilding with an Accessory Unit.

Accessory Unit: an Apartment not greater than 440 square feet sharing ownership and utility connections with a Principal Building; it may or may not be within an Outbuilding. *See Table 10 and Table 17.* (Syn: ancillary unit)

Adjusted Pedestrian Shed: a Pedestrian Shed that has been adjusted according to Section 3.2, creating the regulatory boundary of a Community Unit.

Affordable Housing: dwellings consisting of rental or for-sale units that have a rent (including utilities) or mortgage payment typically no more than 30% of the income of families earning no more than 80% of median incomes by family size for the county. (Alt. definition: rental or for-sale dwellings that are economically within the means of the starting salary of a local elementary school teacher.)

Allee: a regularly spaced and aligned row of trees usually planted along a Thoroughfare or Path.

Apartment: a Residential unit sharing a building and a Lot with other units and/or uses; may be for rent, or for sale as a condominium.

Arcade: a Private Frontage conventional for Retail use wherein the Facade is a colonnade supporting habitable space that overlaps the Sidewalk, while the Facade at Sidewalk level remains at the Frontage Line.

Attic: the interior part of a building contained within a pitched roof structure.

Avenue (AV): a Thoroughfare of high vehicular capacity and low to moderate speed, acting as a short distance connector between urban centers, and usually equipped with a landscaped median.

B-Grid: cumulatively, those Thoroughfares that by virtue of their use, location, or absence of pre-existing pedestrian-supportive qualities, may meet a standard lower than that of the A-Grid. See **A-Grid.** (Syn: secondary grid.)

BRT: see **Bus Rapid Transit.**

Backbuilding: a single-Story structure connecting a Principal Building to an Outbuilding. *See Table 17.*

Base Density: the number of dwelling units per acre before adjustment for other Functions and/or TDR. See **Density.**

Bed and Breakfast: an owner-occupied Lodging type offering 1 to 5 bedrooms, permitted to serve breakfast in the mornings to guests.

Bicycle Lane (BL): a dedicated lane for cycling within a moderate-speed vehicular Thoroughfare, demarcated by striping.

Bicycle Route (BR): a Thoroughfare suitable for the shared use of bicycles and automobiles moving at low speeds.

Bicycle Trail (BT): a bicycle way running independently of a vehicular Thoroughfare.

Block: the aggregate of private Lots, Passages, Rear Alleys and Rear Lanes, circumscribed by Thoroughfares.

Block Face: the aggregate of all the building Facades on one side of a Block.

Boulevard (BV): a Thoroughfare designed for high vehicular capacity and moderate speed, traversing an Urbanized area. Boulevards are usually equipped with Slip Roads buffering Sidewalks and buildings.

Brownfield: an area previously used primarily as an industrial site.

Bus Rapid Transit: a rubber tire system with its own right-of-way or dedicated lane along at least 70% of its route, providing transit service that is faster than a regular bus.

By Right: characterizing a proposal or component of a proposal for a Community Plan or Building Scale Plan *(Article 3, Article 4, or Article 5)* that complies with the SmartCode and is permitted and processed administratively, without public hearing. See **Warrant** and **Variance.**

CLD or **Clustered Land Development:** a Community Unit type structured by a Standard Pedestrian Shed oriented toward a Common Destination such as a general store, Meeting Hall, schoolhouse, or church. CLD takes the form of a small settlement standing free in the countryside. *See Table 2 and Table 14a.* (Syn: Hamlet, Conservation Land Development, cluster)

CRC: Consolidated Review Committee.

Civic: the term defining not-for-profit organizations dedicated to arts, culture, education, recreation, government, transit, and municipal parking.

Civic Building: a building operated by not-for-profit organizations dedicated to arts, culture, education, recreation, government, transit, and municipal parking, or for use approved by the legislative body.

Civic Parking Reserve: Parking Structure or parking lot within a quarter-mile of the site that it serves. *See Section 5.9.2.*

Civic Space: an outdoor area dedicated for public use. Civic Space types are defined by the combination of certain physical constants including the relationships among their intended use, their size, their landscaping and their Enfronting buildings. *See Table 13.*

Civic Zone: designation for public sites dedicated for Civic Buildings and Civic Space.

Commercial: the term collectively defining workplace, Office, Retail, and Lodging Functions.

Common Destination: An area of focused community activity, usually defining the approximate center of a Pedestrian Shed. It may include without limitation one or more of the following: a Civic Space, a Civic Building, a Commercial center, or a transit station, and may act as the social center of a neighborhood.

Common Yard: a planted Private Frontage wherein the Facade is set back from the Frontage line. It is visually continuous with adjacent yards. *See Table 7.*

Community Unit: a regulatory category defining the physical form, Density, and extent of a settlement. The three Community Unit types addressed in this Code are

CLD, TND, and RCD. Variants of TND and RCD for Infill *(Article 4)* are called Infill TND and Infill RCD. The TOD Community Unit type may be created by an overlay on TND or RCD.

Configuration: the form of a building, based on its massing, Private Frontage, and height.

Consolidated Review Committee (CRC): Usually part of the Planning Office, a CRC is comprised of a representative from each of the various regulatory agencies that have jurisdiction over the permitting of a project, as well as a representative of the Development and Design Center. *See Section 1.4.3.*

Corridor: a lineal geographic system incorporating transportation and/or Greenway trajectories. A transportation Corridor may be a lineal Transect Zone.

Cottage: an Edgeyard building type. A single-family dwelling, on a regular Lot, often shared with an Accessory Building in the back yard.

Courtyard Building: a building that occupies the boundaries of its Lot while internally defining one or more private patios. *See Table 9.*

Curb: the edge of the vehicular pavement that may be raised or flush to a Swale. It usually incorporates the drainage system. *See Table 4A and Table 4B.*

DDC: Development and Design Center.

Density: the number of dwelling units within a standard measure of land area.

Design Speed: is the velocity at which a Thoroughfare tends to be driven without the constraints of signage or enforcement. There are four ranges of speed: Very Low: (below 20 MPH); Low: (20-25 MPH); Moderate: (25-35 MPH); High: (above 35 MPH). Lane width is determined by desired Design Speed. *See Table 3A.*

Developable Areas: lands other than those in the O-1 Preserved Open Sector.

Development and Design Center (DDC): A component of the Planning Office assigned to advise on the use of this Code and to aid in the design of the Communities and buildings based on it.

Disposition: the placement of a building on its Lot. *See Table 9 and Table 17.*

Dooryard: a Private Frontage type with a shallow Setback and front garden or patio, usually with a low wall at the Frontage Line. *See Table 7.* (Variant: **Lightwell,** light court.)

Drive: a Thoroughfare along the boundary between an Urbanized and a natural condition, usually along a waterfront, Park, or promontory. One side has the urban character of a Thoroughfare, with Sidewalk and building, while the other has the qualities of a Road or parkway, with naturalistic planting and rural details.

Driveway: a vehicular lane within a Lot, often leading to a garage. *See Section 5.10 and Table 3B-f.*

Edgeyard Building: a building that occupies the center of its Lot with Setbacks on all sides. *See Table 9.*

Effective Parking: the amount of parking required for Mixed Use after adjustment by the Shared Parking Factor. *See Table 11.*

Effective Turning Radius: the measurement of the inside Turning Radius taking parked cars into account. *See Table 17.*

Elevation: an exterior wall of a building not along a Frontage Line. *See Table 17.* See: **Facade.**

Encroach: to break the plane of a vertical or horizontal regulatory limit with a structural element, so that it extends into a Setback, into the Public Frontage, or above a height limit.

Encroachment: any structural element that breaks the plane of a vertical or horizontal regulatory limit, extending into a Setback, into the Public Frontage, or above a height limit.

Enfront: to place an element along a Frontage, as in "porches Enfront the street."

Estate House: an Edgeyard building type. A single-family dwelling on a very large Lot of rural character, often shared by one or more Accessory Buildings. (Syn: country house, villa)

Expression Line: a line prescribed at a certain level of a building for the major part of the width of a Facade, expressed by a variation in material or by a limited projection such as a molding or balcony. *See Table 8.* (Syn: transition line.)

Extension Line: a line prescribed at a certain level of a building for the major part of the width of a Facade, regulating the maximum height for an Encroachment by an Arcade Frontage. *See Table 8.*

Facade: the exterior wall of a building that is set along a Frontage Line. *See* **Elevation.**

Forecourt: a Private Frontage wherein a portion of the Facade is close to the Frontage Line and the central portion is set back. *See Table 7.*

Frontage: the area between a building Facade and the vehicular lanes, inclusive of its built and planted components. Frontage is divided into **Private Frontage** and **Public Frontage.** *See Table 4A and Table 7.*

Frontage Line: a Lot line bordering a Public Frontage. Facades facing Frontage Lines define the public realm and are therefore more regulated than the Elevations facing other Lot Lines. *See Table 17.*

Function: the use or uses accommodated by a building and its Lot, categorized as *Restricted, Limited,* or *Open*, according to the intensity of the use. *See Table 10 and Table 12.*

Gallery: a Private Frontage conventional for Retail use wherein the Facade is aligned close to the Frontage Line with an attached cantilevered shed or lightweight colonnade overlapping the Sidewalk. *See Table 7.*

GIS (Geographic Information System): a computerized program in widespread municipal use that organizes data on maps.The protocol for preparing a *Regional Plan* should be based on GIS information. *See Section 2.1.*

Green: a Civic Space type for unstructured recreation, spatially defined by landscaping rather than building Frontages. *See Table 13.*

Greenfield: an area that consists of open or wooded land or farmland that has not been previously developed.

Greenway: an Open Space Corridor in largely natural conditions which may include trails for bicycles and pedestrians.

Greyfield: an area previously used primarily as a parking lot. Shopping centers and shopping malls are typical Greyfield sites. (Variant: Grayfield.)

Growth Sector: one of four Sectors where development is permitted By Right in the SmartCode, three for New Communities and one for Infill. *See Article 2.*

Hamlet: *See* **CLD.** (Syn: cluster, settlement.)

Highway: a rural and suburban Thoroughfare of high vehicular speed and capacity. This type is allocated to the more rural Transect Zones (T-1, T-2, and T-3).

Home Occupation: non-Retail Commercial enterprises. The work quarters should be invisible from the Frontage, located either within the house or in an Outbuilding. Permitted activities are defined by the Restricted Office category. *See Table 10.*

House: an Edgeyard building type, usually a single-family dwelling on a large Lot, often shared with an Accessory Building in the back yard. (Syn: single.)

Infill: *noun* - new development on land that had been previously developed, including most Greyfield and Brownfield sites and cleared land within Urbanized areas. *verb*- to develop such areas.

Infill RCD: a Community Unit type within an Urbanized, Greyfield, or Brownfield area based on a Long or Linear Pedestrian Shed and consisting of T-4, T-5, and/or T-6 Zones. An Infill RCD is permitted By Right in the G-4 Infill Growth Sector and is regulated by Article 4. *See Section 4.2.3.* (Var: downtown.)

Infill TND: a Community Unit type within an Urbanized, Greyfield, or Brownfield area based on a Standard Pedestrian Shed and consisting of T-3, T-4, and/or T-5 Zones. An Infill TND is permitted By Right in the G-4 Infill Growth Sector and is regulated by Article 4. *See Section 4.2.2.* (Var: neighborhood.)

Inn: a Lodging type, owner-occupied, offering 6 to 12 bedrooms, permitted to serve breakfast in the mornings to guests. *See Table 10.*

Layer: a range of depth of a Lot within which certain elements are permitted. *See Table 17.*

Lightwell: A Private Frontage type that is a below-grade entrance or recess designed to allow light into basements. *See Table 7.* (Syn: light court.)

Linear Pedestrian Shed: A Pedestrian Shed that is elongated along an important Mixed Use Corridor such as a main street. A Linear Pedestrian Shed extends approximately 1/4 mile from each side of the Corridor for the length of its Mixed Use portion. The resulting area is shaped like a lozenge. It may be used to structure a TND, RCD, Infill TND, or Infill RCD. (Syn: elongated pedestrian shed.)

Liner Building: a building specifically designed to mask a parking lot or a Parking Structure from a Frontage.

Live-Work: a Mixed Use unit consisting of a Commercial and Residential Function. The Commercial Function may be anywhere in the unit. It is intended to be occupied by a business operator who lives in the same structure that contains the Commercial activity or industry. *See* **Work-Live.** (Syn.: flexhouse.)

Lodging: premises available for daily and weekly renting of bedrooms. *See Table 10 and Table 12.*

Long Pedestrian Shed: a Pedestrian Shed that is an average 1/2 mile radius or 2640 feet, used when a transit stop (bus or rail) is present or proposed as the Common Destination. A Long Pedestrian Shed represents approximately a ten-minute walk at a leisurely pace. It is applied to structure an RCD Community Unit type. *See* **Pedestrian Shed.**

Lot: a parcel of land accommodating a building or buildings of unified design. The size of a Lot is controlled by its width in order to determine the grain (i.e., fine grain or coarse grain) of the urban fabric.

Lot Line: the boundary that legally and geometrically demarcates a Lot.

Lot Width: the length of the Principal Frontage Line of a Lot.

Main Civic Space: the primary outdoor gathering place for a community.The Main Civic Space is often, but not always, associated with an important Civic Building.

Manufacturing: premises available for the creation, assemblage and/or repair of artifacts, using table-mounted electrical machinery or artisanal equipment, and including their Retail sale.

Meeting Hall: a building available for gatherings, including conferences, that accommodates at least one room equivalent to a minimum of 10 square feet per projected dwelling unit within the Pedestrian Shed in which it is located.

Mixed Use: multiple Functions within the same building through superimposition or adjacency, or in multiple buildings by adjacency, or at a proximity determined by Warrant.

Net Site Area: all developable land within a site including Thoroughfares but excluding land allocated as Civic Zones.

Network Pedestrian Shed: a Pedestrian Shed adjusted for average walk times along Thoroughfares. This type may be used to structure Infill Community Plans. *See Table 17.*

Office: premises available for the transaction of general business but excluding Retail, artisanal and Manufacturing uses. *See Table 10.*

Open Space: land intended to remain undeveloped; it may be for Civic Space.

Outbuilding: an Accessory Building, usually located toward the rear of the same Lot as a Principal Building, and sometimes connected to the Principal Building by a Backbuilding. *See Table 17.*

Park: a Civic Space type that is a natural preserve available for unstructured recreation. *See Table 13.*

Parking Structure: a building containing one or more Stories of parking above grade.

Passage (PS): a pedestrian connector, open or roofed, that passes between buildings to provide shortcuts through long Blocks and connect rear parking areas to Frontages.

Path (PT): a pedestrian way traversing a Park or rural area, with landscape matching the contiguous Open Space, ideally connecting directly with the urban Sidewalk network.

Pedestrian Shed: An area that is centered on a Common Destination. Its size is related to average walking distances for the applicable Community Unit type. Pedestrian Sheds are applied to structure Communities. *See* **Standard, Long, Linear** or **Network Pedestrian Shed.** (Syn: walkshed, walkable catchment.)

Planter: the element of the Public Frontage which accommodates street trees, whether continuous or individual.

Plaza: a Civic Space type designed for Civic purposes and Commercial activities in the more urban Transect Zones, generally paved and spatially defined by building Frontages.

Principal Building: the main building on a Lot, usually located toward the Frontage. *See Table 17.*

Principal Entrance: the main point of access for pedestrians into a building.

Principal Frontage: On corner Lots, the Private Frontage designated to bear the address and Principal Entrance to the building, and the measure of minimum Lot width. Prescriptions for the parking Layers pertain only to the Principal Frontage. Prescriptions for the first Layer pertain to both Frontages of a corner Lot. *See* **Frontage.**

Private Frontage: the privately held Layer between the Frontage Line and the Principal Building Facade. *See Table 7 and Table 17.*

Public Frontage: the area between the Curb of the vehicular lanes and the Frontage Line. *See Table 4A and Table 4B.*

RCD: *see* **Regional Center Development.**

Rear Alley (RA): a vehicular way located to the rear of Lots providing access to service areas, parking, and Outbuildings and containing utility easements. Rear Alleys should be paved from building face to building face, with drainage by inverted crown at the center or with roll Curbs at the edges.

Rear Lane (RL): a vehicular way located to the rear of Lots providing access to service areas, parking, and Outbuildings and containing utility easements. Rear Lanes may be paved lightly to Driveway standards. The streetscape consists of gravel or landscaped edges, has no raised Curb, and is drained by percolation.

Rearyard Building: a building that occupies the full Frontage Line, leaving the rear of the Lot as the sole yard. *See Table 9.* (Var: Rowhouse, Townhouse, Apartment House)

Recess Line: a line prescribed for the full width of a Facade, above which there is a Stepback of a minimum distance, such that the height to this line (not the overall building height) effectively defines the enclosure of the Enfronting public space. Var: Extension Line. *See Table 8.*

Regional Center: Regional Center Development or **RCD.**

Regional Center Development (RCD): a Community Unit type structured by a Long Pedestrian Shed or Linear Pedestrian Shed, which may be adjoined without buffers by one or several Standard Pedestrian Sheds, each with the individual Transect Zone requirements of a TND. RCD takes the form of a high-Density Mixed Use center connected to other centers by transit. See **Infill RCD**, *Table 2 and Table 14a.* (Var: town center, downtown. Syn: **Regional Center)**

Regulating Plan: a Zoning Map or set of maps that shows the Transect Zones, Civic Zones, Special Districts if any, and Special Requirements if any, of areas subject to, or potentially subject to, regulation by the SmartCode.

Residential: characterizing premises available for long-term human dwelling.

Retail: characterizing premises available for the sale of merchandise and food service. *See Table 10 and Table 12.*

Retail Frontage: Frontage designated on a Regulating Plan that requires or recommends the provision of a Shopfront, encouraging the ground level to be available for Retail use. *See* **Special Requirements.**

Road (RD): a local, rural and suburban Thoroughfare of low-to-moderate vehicular speed and capacity. This type is allocated to the more rural Transect Zones (T1-T3). *See Table 3A.*

Rowhouse: a single-family dwelling that shares a party wall with another of the same type and occupies the full Frontage Line. See **Rearyard Building.** (Syn: **Townhouse)**

Rural Boundary Line: the extent of potential urban growth as determined by existing geographical determinants. The Rural Boundary Line is permanent.

Sector: a neutral term for a geographic area. In the SmartCode there are six specific Sectors for regional planning that establish the legal boundaries for Open Space and development.

Secondary Frontage: on corner Lots, the Private Frontage that is not the Principal Frontage. As it affects the public realm, its First Layer is regulated. *See Table 17.*

Setback: the area of a Lot measured from the Lot line to a building Facade or Elevation that is maintained clear of permanent structures, with the exception of Encroachments listed in *Section 5.7. See Table 14g.* (Var: build-to-line.)

Shared Parking Factor: an accounting for parking spaces that are available to more than one Function. *See Table 11.*

Shopfront: a Private Frontage conventional for Retail use, with substantial glazing and an awning, wherein the Facade is aligned close to the Frontage Line with the building entrance at Sidewalk grade. *See Table 7.*

Sidewalk: the paved section of the Public Frontage dedicated exclusively to pedestrian activity.

Sideyard Building: a building that occupies one side of the Lot with a Setback on the other side. This type can be a Single or Twin depending on whether it abuts the neighboring house. *See Table 9.*

Slip Road: an outer vehicular lane or lanes of a Thoroughfare, designed for slow speeds while inner lanes carry higher speed traffic, and separated from them by a planted median. (Syn: access lane, service lane)

Specialized Building: a building that is not subject to Residential, Commercial, or Lodging classification. *See Table 9.*

Special District (SD): an area that, by its intrinsic Function, Disposition, or Configuration, cannot or should not conform to one or more of the normative Community Unit types or Transect Zones specified by the SmartCode. Special Districts may be mapped and regulated at the regional scale or the community scale.

Special Flood Hazard Area: a designation by the Federal Emergency Management Agency (FEMA) that may include the V (Velocity) Zones and Coastal A Zones where building construction is forbidden, restricted, or contingent upon raising to the Base Flood Elevation.

Special Requirements: provisions of Section 3.9, Section 4.7, and Section 5.3 of this Code and/or the associated designations on a Regulating Plan or other map for those provisions.

Square: a Civic Space type designed for unstructured recreation and Civic purposes, spatially defined by building Frontages and consisting of Paths, lawns and trees, formally disposed. *See Table 13.*

Standard Pedestrian Shed: a Pedestrian Shed that is an average 1/4 mile radius or 1320 feet, about the distance of a five-minute walk at a leisurely pace. See Pedestrian Shed.

Stepback: a building Setback of a specified distance that occurs at a prescribed number of Stories above the ground. *See Table 8.*

Stoop: a Private Frontage wherein the Facade is aligned close to the Frontage Line with the first Story elevated from the Sidewalk for privacy, with an exterior stair and landing at the entrance. *See Table 7.*

Story: a habitable level within a building, excluding an Attic or raised basement. *See Table 8.*

Street (ST): a local urban Thoroughfare of low speed and capacity. *See Table 3B and Table 4B.*

Streetscreen: a freestanding wall built along the Frontage Line, or coplanar with the Facade. It may mask a parking lot from the Thoroughfare, provide privacy to a side yard, and/or strengthen the spatial definition of the public realm. (Syn: streetwall.) *See Section 5.7.5f.*

Substantial Modification: alteration to a building that is valued at more than 50% of the replacement cost of the entire building, if new.

Swale: a low or slightly depressed natural area for drainage.

T-zone: Transect Zone.

TDR: Transfer of Development Rights, a method of relocating existing zoning rights from areas to be preserved as Open Space to areas to be more densely urbanized.

TDR Receiving Area: an area intended for development that may be made more dense by the purchase of development rights from TDR Sending Areas.

TDR Sending Area: an area previously zoned for development within a designated Reserved Open Sector (O-2), from which development rights may be transferred to a Growth Sector.

Terminated Vista: a location at the axial conclusion of a Thoroughfare. A building located at a Terminated Vista designated on a Regulating Plan is required or recommended to be designed in response to the axis.

Thoroughfare: a way for use by vehicular and pedestrian traffic and to provide access to Lots and Open Spaces, consisting of Vehicular Lanes and the Public Frontage. *See Table 3A, Table 3B and Table 17a.*

TND: Traditional Neighborhood Development, a Community Unit type structured by a Standard Pedestrian Shed oriented toward a Common Destination consisting of a Mixed Use center or Corridor, and in the form of a medium-sized settlement near a transportation route. *See Table 2 and Table 14a.* (Syn: village. Variant: **Infill TND**, neighborhood.)

TOD: Transit Oriented Development. TOD is created by an overlay on all or part of a TND or RCD, or by designation on a Regional Plan, permitting increased Density to support rail or Bus Rapid Transit (BRT) as set forth in *Section 5.9.2d.*

Townhouse: See **Rearyard Building.** (Syn: **Rowhouse**)

Transect: a cross-section of the environment showing a range of different habitats. The rural-urban Transect of the human environment used in the SmartCode template is divided into six Transect Zones. These zones describe the physical form and character of a place, according to the Density and intensity of its land use and Urbanism.

Transect Zone (T-zone): One of several areas on a Zoning Map regulated by the SmartCode. Transect Zones are administratively similar to the land use zones in conventional codes, except that in addition to the usual building use, Density, height, and Setback requirements, other elements of the intended habitat are integrated, including those of the private Lot and building and Public Frontage. *See Table 1.*

Turning Radius: the curved edge of a Thoroughfare at an intersection, measured at the inside edge of the vehicular tracking. The smaller the Turning Radius, the smaller the pedestrian crossing distance and the more slowly the vehicle is forced to make the turn. *See Table 3B and Table 17.*

Urban Boundary Line: the extent of potential urban growth as determined by the projected demographic needs of a region. The Urban Boundary Line may be adjusted from time to time.

Urbanism: collective term for the condition of a compact, Mixed Use settlement, including the physical form of its development and its environmental, functional, economic, and sociocultural aspects.

Urbanized: generally, developed. Specific to the SmartCode, developed at T-3 (Sub-Urban) Density or higher.

Variance: a ruling that would permit a practice that is not consistent with either a specific provision or the Intent of this Code *(Section 1.3).* Variances are usually granted by the Board of Appeals in a public hearing. *See Section 1.5.*

Warrant: a ruling that would permit a practice that is not consistent with a specific provision of this Code, but that is justified by its Intent *(Section 1.3).* Warrants are usually granted administratively by the CRC. *See Section 1.5.*

Work-Live: a Mixed Use unit consisting of a Commercial and Residential Function. It typically has a substantial Commercial component that may accommodate employees and walk-in trade. The unit is intended to function predominantly as work space with incidental Residential accommodations that meet basic habitability requirements. See Live-Work. (Syn: Live-With.)

Yield: characterizing a Thoroughfare that has two-way traffic but only one effective travel lane because of parked cars, necessitating slow movement and driver negotiation. Also, characterizing parking on such a Thoroughfare.

Zoning Map: the official map or maps that are part of the zoning ordinance and delineate the boundaries of individual zones and districts. See **Regulating Plan.**

C15. SITE REGULATORY CONSTRAINTS MAPS: FEDERAL AND STATE; CITY OF AUSTIN; BRACKENRIDGE DEVELOPMENT AGREEMENT

LEGEND

- Brackenridge Tract
- Jurisdictional Waters of the US
- Intermittent Stream
- Ephemeral Drainage/Stream
- COA Designated Water/Wetlands
- Rimrock
- 100yr Flood Plain
- State Designated Capitol View Corridor
- City Designated Capitol View Corridor
- Water
- Wastewater
- Gas
- Easement
- Watershed
- SLOPES 15% to 25%
- SLOPES 25% to 35%
- SLOPES 35% or Greater
- Critical Environmental Feature Buffer 150' Radius
- Critical Water Quality Zone
- Water Quality Transition Zone

City of Austin Waterfront Overlay

- Primary Setback
- Secondary Setback

Notes:

1. Entire tract is located within the Edwards Aquifer, as defined by the COA.
2. Hertiage Trees must be preserved in accordance with COA regulations.

0 300' 600'
SCALE: 1" = 300'

Scale in Feet

CONCEPTUAL MASTER PLAN: CONSTRAINTS MAP: CITY OF AUSTIN REGULATIONS

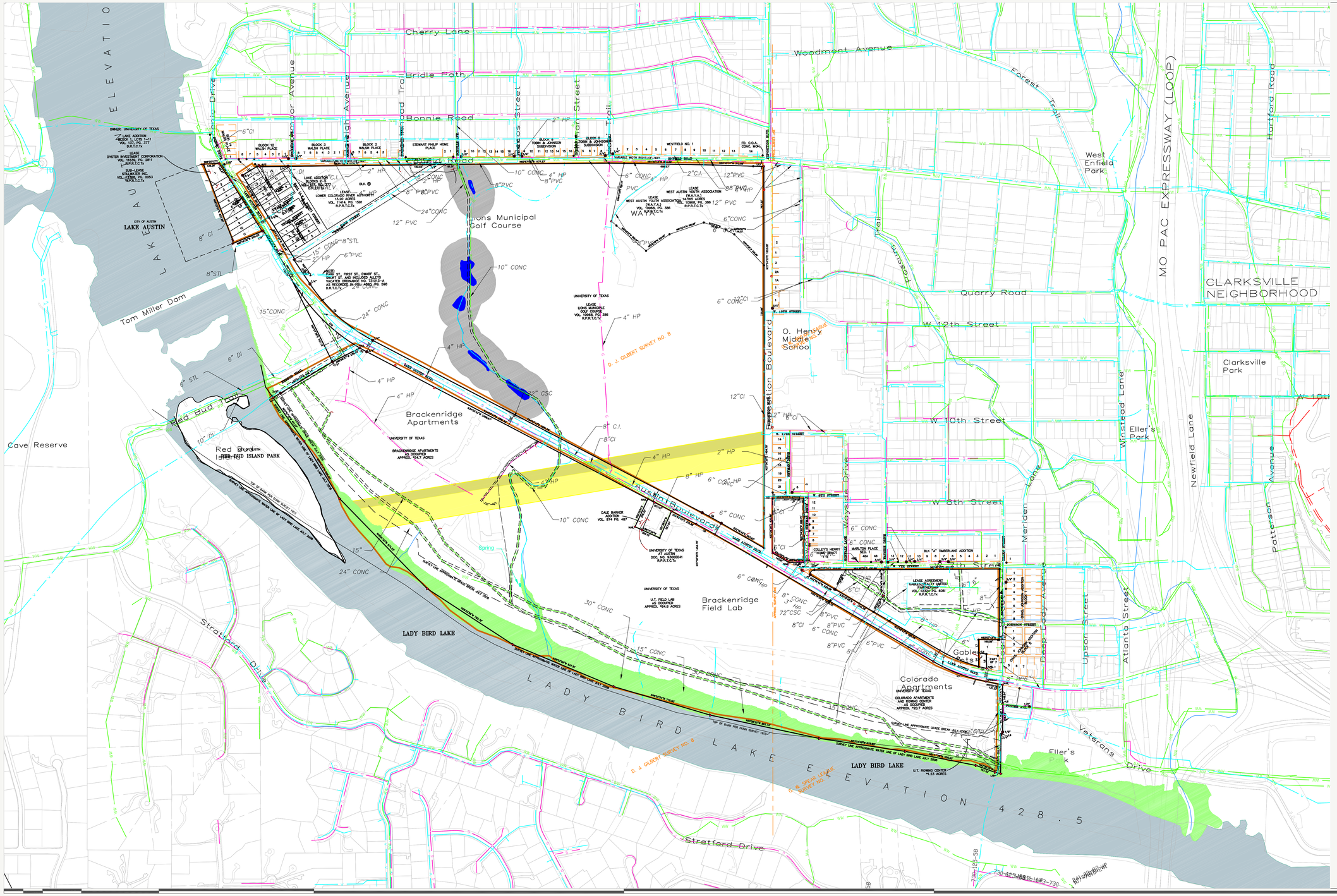
UNIVERSITY OF TEXAS: Brackenridge Tract

AUSTIN, TEXAS

Cooper, Robertson & Partners
Master Planner and Team Leader

TBG Partners — *Landscape Architects*
CAS Consulting Services,Inc. — *Civil Engineers*
K. Friese & Associates,Inc. — *Cost Estimator and Academic Programmer*
HS&A — *Concept Development and Communications, LLC* — *Stakeholder Input and Communications Consultant*
Prime Strategies, Inc. — *Traffic and Transportation Analyst*
Economics Research Associates — *Financial and Market Analyst*
DuBois, Bryant & Campbell, LLP — *Zoning and Public Policy Specialist*
Raba-Kistner Consultants, Inc. — *Environmental Consultant*

October 22, 2008



CONCEPTUAL MASTER PLAN: CONSTRAINTS MAP: FEDERAL/STATE REGULATIONS

UNIVERSITY OF TEXAS: Brackenridge Tract

AUSTIN, TEXAS

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DuBois, Bryant & Cambell, LLP
Zoning and Public Policy Specialist
Raba-Kistner Consultants, Inc.
Environmental Consultant

October 22, 2008

CONCEPTUAL MASTER PLAN: CONSTRAINTS MAP: BRACKENRIDGE DEVELOPMENT AGREEMENT

UNIVERSITY OF TEXAS: Brackenridge Tract

AUSTIN, TEXAS

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