Case No. PZ-26-00070 – Outdoor Lighting Update

Provisions that are being deleted are shown in bold **~~strikethrough~~** text.
Provisions that are being added are shown in bold **red** text.

Section 1. Amend Title 10 Flagstaff Zoning Code, Chapter 10-50: Supplemental to Zones, Division 10-50.70: Outdoor Lighting, Section 10-50.70.050: General Requirements – All Lighting Zones, as follows:

10-50.70.050 General Requirements – All Lighting Zones

A. Lighting Classes. **~~The Total Outdoor Light Output for a lot or parcel is cumulative of the light emitted by all lighting classes.~~**

1. Class 1 Lighting is lighting used for applications where color rendition is required to preserve the effectiveness of an activity. All Class 1 Lighting shall have a correlated color temperature (CCT) of 2,700 Kelvin (K), or less. Recognized Class 1 Lighting applications include only the following examples:

    a. Outdoor sales areas, including service station canopies;

    b. Primary customer building entry/exit areas of commercial and industrial uses (does not include service or emergency entry/exits);

    c. Outdoor eating areas at restaurants;

    d. Outdoor assembly or repair areas where assembly or repair work occurs at night as part of the normal business operations;

    e. Outdoor recreational field/track/arena areas; **~~and~~**

    f. External and internal lighting for signs**~~.~~; and**

    g. Flag and monument lighting.

2. Class 2 Lighting is lighting used for applications where general illumination for safety or security is the primary concern. Narrow-Spectrum Amber LEDs are required in all Class 2 Lighting applications. Examples of Class 2 Lighting applications include the following:

    a. Pedestrian walkways, driveways, and roadways;

b. Parking lots;

c. Equipment yards; and

d. Outdoor security.

3. Class 3 Lighting is outdoor lighting used for decorative purposes. All light sources may be used for Class 3 Lighting including technologies that allow for the color of the light to change so long as the colors change less than every two minutes**.** Examples of Class 3 Lighting applications include the following:

a. Architectural illumination;

~~**b. Flag and monument lighting; and**~~

~~**c**~~**b**. Landscape lighting and the illumination of trees, shrubs, and other vegetation.

Section 2. Amend Title 10 Flagstaff Zoning Code, Chapter 10-50: Supplemental to Zones, Division 10-50.70: Outdoor Lighting, Section 10-50.70.050.B: Total Outdoor Light Output and Table 10-50.70.050.B – Maximum Total Outdoor Light Output Standards, as follows:

B. Total Outdoor Light Output.

1. The Total Outdoor Light Output **includes the light emitted by all lighting classes, and** shall not exceed the amounts allowed in Table 10-50.70.050.B. **for a Development Site. The Development Site area shall not include undeveloped parcels for the purposes of this Division.**

Table 10-50.70.050.B Maximum Total Outdoor Light Output Standards				
Land Use			Lighting Zone 1	Lighting Zone 2
Commercial, Industrial, and Multiple-Family Development (Lumens per ~~Net~~ Acre **of the Development Site**)				
	Combined maximum for Fully and Partially Shielded Fixtures, and fixtures mounted to a building or canopy[3]		17,500	35,000
		Partially Shielded Fixtures maximum	0	~~3,850~~**3,500**
		Fixtures not mounted to a building or canopy[1] maximum	4,000	35,000
~~Single-Family and Duplex~~ **Residential** Developments **with less than five Dwelling Units**, Including Accessory Structures (Lumens per Lot, or Parcel)				
	Combined maximum for Fully and Partially Shielded Fixtures, and fixtures not mounted to a building or canopy, excluding motion sensing Outdoor Light Fixtures[2, 3]		1,500	5,000
		Partially Shielded Fixtures maximum	0	2,000
		Motion Sensing Outdoor Light Fixtures[2] (fully shielded) maximum	0	2,000
		Fixtures that are not mounted to a building or canopy[1] maximum	0	1,500
End Note				
1. Fixtures that are not directly mounted to the side of a building or to the underside of, or within, a canopy or overhang. 2. Motion sensing Outdoor Light Fixtures shall have an automated timer set to turn off the fixture at a time no greater than five minutes after the light has been turned on. **3. Class 3 lighting that does not utilize Narrow-Spectrum Amber sources is limited to 10% of the Total Outdoor Light Output or 3,500 lumens, whichever is greater. Class 3 lighting that does not utilize Narrow-Spectrum Amber sources shall not exceed 10,000 lumens on any Development Site.**				

Section 3. Amend Title 10 Flagstaff Zoning Code, Chapter 10-50: Supplemental to Zones, Division 10-50.70: Outdoor Lighting, Table 10-50.70.050.C: Shielding Standards, as follows:

Table 10-50.70.050.C

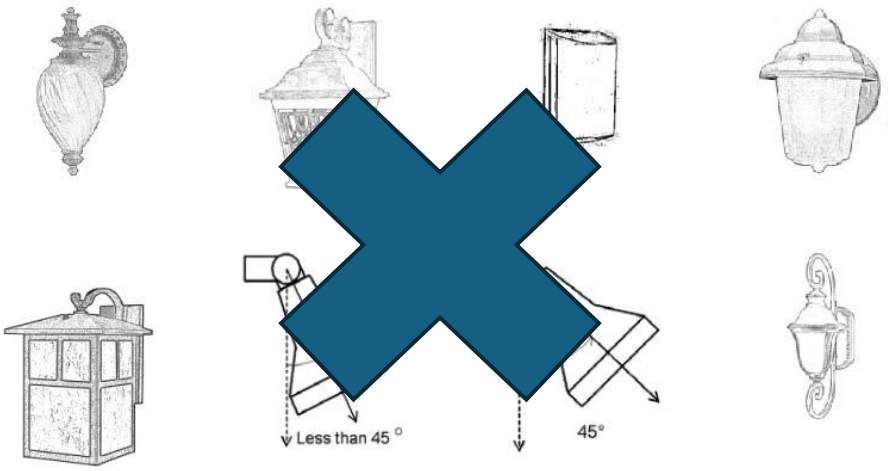
Shielding Standards

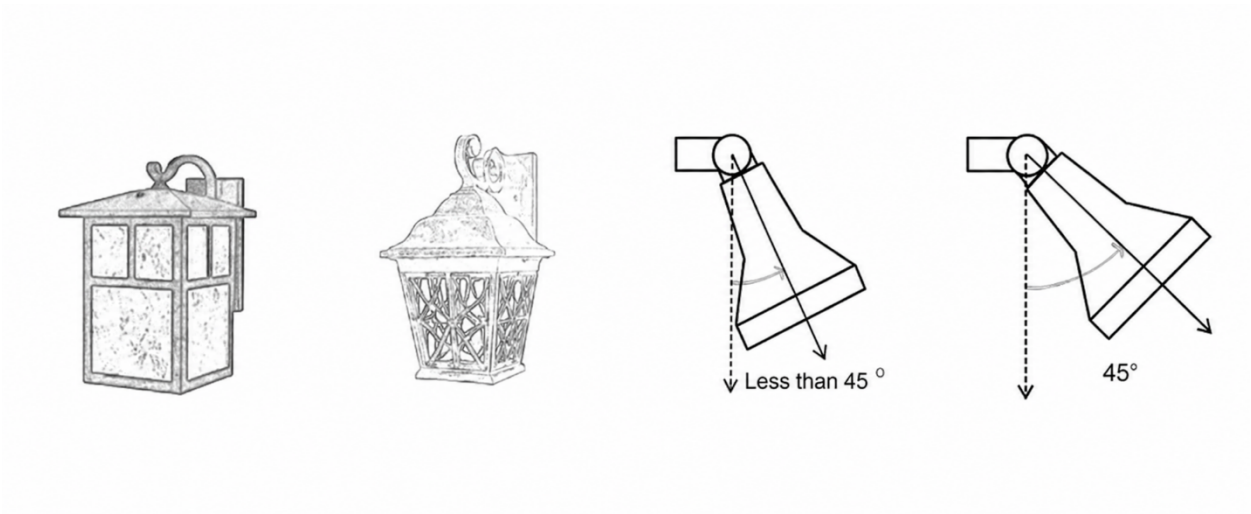
Land Use and Lighting Class		Lighting Zone 1	Lighting Zone 2
Commercial, Industrial, and Multiple-Family Development			
Class 1 Lighting All Outdoor Light Fixtures		FS	FS
Class 2 Lighting All Outdoor Light Fixtures		FS	FS
Class 3 Lighting			
	All Outdoor Light Fixtures with a Lumen output below 1,750[1] Lumens	FS	A[1]
	All Outdoor Light Fixtures with a Lumen output equal to and above 1,750[1] Lumens	X	X
	~~**Single-Family and Duplex**~~ Residential **Developments will less than five** Dwelling Units		
Class 1 – 3 Lighting			
	All Outdoor Light Fixtures with a Lumen output below 700[1] Lumens	FS	A[1]
	All Outdoor Light Fixtures with a Lumen output equal to and above 700[1] Lumens	X	X
	End Notes		
1.	For purposes of determining the Total Outdoor Light Output from an Outdoor Light Fixture, lighting assemblies which include multiple unshielded or Partially Shielded Fixtures or lamps on a single pole or assembled as a single unit shall be considered as one fixture. Refer to the Table 10-50.70.050.A.		
	Key		
FS = Allowed; Only Fully Shielded Fixtures A = Allowed; Fully Shielded Fixtures preferred, and Partially Shielded Fixtures are allowed subject to the Lumen amounts listed in Table 10-50.70.050.B**. Unshielded fixtures are not permitted.**			

Table 10-50.70.050.C Shielding Standards		
Land Use and Lighting Class	Lighting Zone 1	Lighting Zone 2
X = Outdoor light fixture is prohibited		

Section 4. Amend Title 10 Flagstaff Zoning Code, Chapter 10-80: Definitions, Division 10-80.20: Definition of Specialized Terms, Phrases, and Building Functions, Section 10-80.20.060: Definitions "F", as follows:

Fixture, Partially Shielded: A light fixture constructed and mounted such that most light emitted by the fixture, either directly from the lamp or a diffusing element, or indirectly by reflection or refraction from any part of the fixture, is projected below the horizontal. Light emitted at or above the horizontal direction (sideways or upwards) arises only from **~~incidental~~** decorative elements or strongly colored **~~or diffusing~~** materials. **~~such as "honey" or colored glass or plastic~~**. Fixtures using spot or flood lamps are considered partially shielded if the lamps are aimed no higher than 45 degrees above straight down (half-way between straight down and straight to the side). Examples of partially shielded fixtures include, but are not limited to, those illustrated below:





Examples of partially shielded light fixtures.

Section 5. Amend Title 10 Flagstaff Zoning Code, Appendices to delete Appendix 1.1, Appendix 1.2, Appendix 1.3, renumber Appendix 1.4 to 1, delete Appendix 2, renumber Appendix 3 to Appendix 2, delete Appendix 4, and renumber remaining appendices, as follows:

~~Appendix 1.1~~

~~Design Guidelines~~

~~**Sections:**~~

~~**1.1.010 – Purpose**~~

~~**1.1.020 – Applicability**~~

~~**1.1.030 – Background**~~

~~**1.1.040 – Relationship to Other Goals and Policies**~~

~~**1.1.050 – How the Guidelines Are Organized**~~

~~**1.1.060 – The City**~~

~~**1.1.070 – Neighborhoods, Districts and Corridors**~~

~~**1.1.080 – Block and Street**~~

~~**1.1.090 – Lot and Building**~~

~~1.1.010 Purpose~~

~~**A. – It is the purpose of these design guidelines to promote public convenience and prosperity, conserve the value of the property and buildings, and encourage the most appropriate use of land within the City.**~~

~~**B. – The guidelines are grounded in the interdependence of three important principles: good site planning, maintenance of aesthetics appropriate to Flagstaff, and preservation of land values. Flagstaff's economic and environmental well-being is founded upon and maintained by the distinctive character and natural attractiveness of northern Arizona. This contributes substantially to Flagstaff's potential as a regional trade center and recreational area. It is the purpose of the design guidelines to further encourage harmonious, safe, attractive and compatible development in furtherance of the public health, safety and general welfare of the citizens of the City.**~~

~~**C. – These guidelines provide applicants, neighbors and Flagstaff residents with clear documentation of the City's design objectives and expectations. The guidelines therefore present design approaches, which if followed, will offer applicants a high level of certainty through the design review process, assuming conformance with all other applicable City standards.**~~

~~1.1.020 Applicability~~

~~**A. – The guidelines apply Citywide to the following land uses:**~~

~~1. Residential and nonresidential subdivisions;~~

~~2. Multifamily uses;~~

~~3. Commercial uses;~~

~~4. Institutional uses; and~~

~~5. Business park uses.~~

~~B. Design guidelines in historic districts are applied in addition to these design guidelines. See Division 10-30.30, Heritage Preservation.~~

~~1.1.030 Background~~

~~Flagstaff wishes to protect its unique character, which is a combination of spectacular natural resources and a rich cultural heritage. The community is blessed with a tradition of building that reflects the natural features of the region, particularly its alpine setting, which the community wishes to maintain as it accommodates change that supports its quality of life.~~

~~1.1.040 Relationship to Other Goals and Policies~~

~~These design guidelines are the outgrowth of community policies that extend back many years. They demonstrate a consistent commitment to promoting livability and protecting the design traditions of the region. The following policies establish the basis for the design guidelines:~~

~~A. General Plan. In the General Plan, the community established formally defined goals to protect the character of the area through the use of design guidelines. These goals are further implemented through many specific policy and strategy statements. The primary goals of the General Plan regarding protection of the character of the Flagstaff area are as follows:~~

~~1. GOAL LU1. "Greater Flagstaff will have a compact land use pattern within a well-defined boundary that shapes growth in a manner that preserves the region's natural environment, livability, and sense of community. Flagstaff will continue to offer the primary types of housing design developments that have defined its land use patterns: the conventional and traditional neighborhood scale which provides a choice of housing types and supporting non-residential uses within walking distances."~~

~~2. GOAL CD1. "A sense of connection will be maintained in the built environment to the region's natural setting and dramatic views."~~

~~3. GOAL CD2. "The Flagstaff region will continue to protect its unique character that reflects its forested setting of ponderosa pine trees, piñon and juniper vegetation, and meadows through quality design and development. Emphasis will be placed on quality design in both the public realm – streets, civic buildings, and other public spaces – as well as the private realm – commercial buildings, work places, and housing. Preservation of vegetation and wildlife are part of the quality design and development process."~~

~~B. The Zoning Code. The City regulates the scale and intensity of development through its Zoning Code by establishing, for example, minimum standards for the development of land, including the size of lots, landscaping, building placement, outdoor signs and lighting, and thoroughfare design. While many of these standards focus on assuring safe and efficient use of land, they also influence the design and character of development. The design guidelines provide additional guidance to satisfy the intent of the Zoning Code.~~

~~1.1.050 How the Guidelines Are Organized~~

~~The guidelines are organized into four levels of design:~~

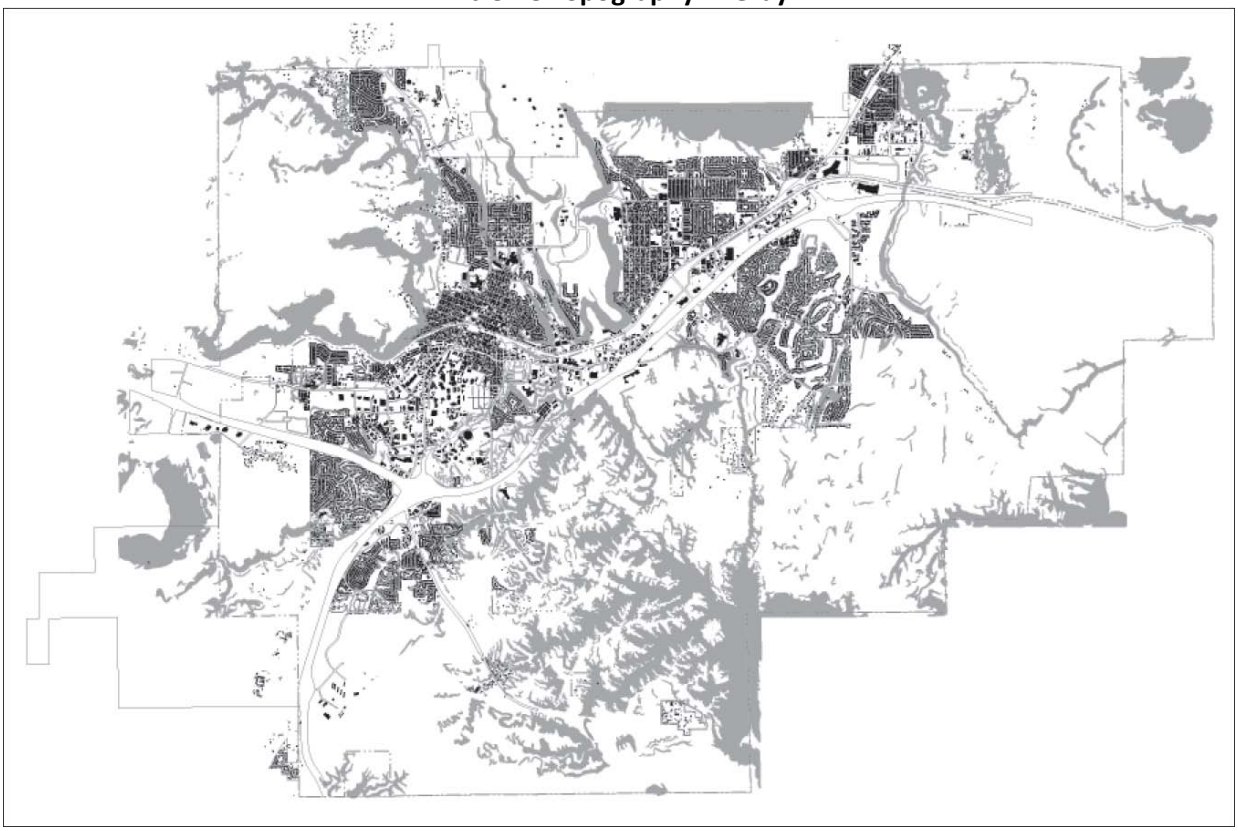
~~A. The City. Guidelines on how development should be integrated into the larger context of the City. This section looks at how development should respond to its location within the context of the region and the City.~~

~~B. Neighborhoods, Districts and Corridors. Guidelines on how development should be integrated to neighborhoods, districts or corridors.~~

~~C. Block and Street. Guidelines that talk about the interconnected nature of development at the level of the block and street.~~

~~D. Lot and Building. Guidelines at the smallest scale, focusing in on the lot and building details that make Flagstaff unique.~~

~~**Diagram Showing Developed Portions of the City of Flagstaff in Black and Land Constrained by Extreme Topography in Gray.**~~



~~**1.1.060 The City**~~

~~**The General Plan defines areas of anticipated growth within the City of Flagstaff and the Flagstaff Metropolitan Planning Organization's (FMPO) planning area within Coconino County. The guidelines found in this section describe the elements that should be considered for new development projects at a regional and City level.**~~

~~**A. Limit development to areas where the General Plan calls for growth and prevent development in those areas indicated as land to be preserved or reserved.**~~

~~**1. Development should be in keeping with the intent of General Plan. Development should be focused on the areas listed as growth in the Regional Plan and areas that are preserved should not be allowed to develop.**~~

~~**2. Clearly define and maintain edges between areas that are to be preserved or reserved and those areas that are to be developed. Areas to preserve include agricultural land, open space and wildlife habitat.**~~

~~3. Development should remain outside of sensitive habitats and watersheds.~~

~~B. Development should be focused on underutilized properties within the City.~~

~~1. Promoting infill on underutilized properties to maintain the rural-to-urban character of Flagstaff.~~

~~a. Preserve the edge of the City by discouraging auto dependent development that consumes large quantities of land at the edge of the City.~~

~~b. Develop infill in areas called out in the General Plan as focused infill growth before developing the periphery of the City.~~

~~2. In order to develop and preserve urban centers development should:~~

~~a. Maintain the existing neighborhoods and district edges while encouraging development within the urban pattern.~~

~~b. Create or reinforce a mix of residential, civic, retail and service uses integrated into the existing urban fabric, especially new development adjacent to existing development.~~

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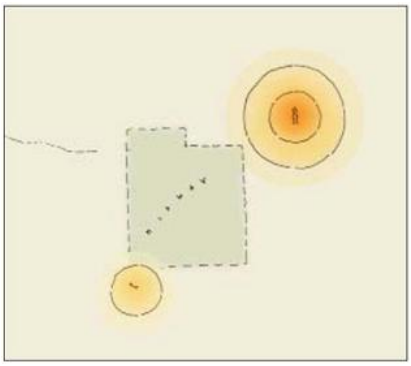
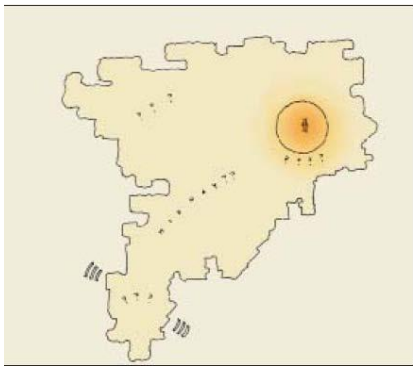
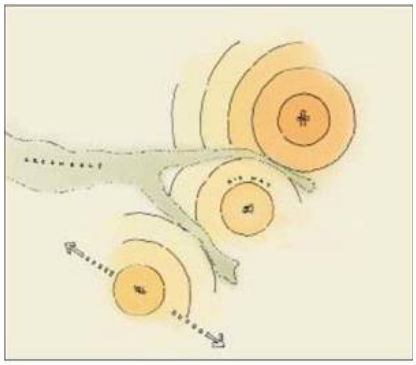
~~**Example of the use of creeks to define the edges of neighborhoods.**~~



~~**Existing nodes of development separated by undeveloped land. Hypothetical example of a community with a large mixed use walkable core and a distant smaller core.**~~



~~**Example of what not to do. Growth pattern that ignores natural features and focuses on single use zones.**~~



~~**Example of growth pattern to emulate. Growth that focuses on creating compact walkable mixed use communities and uses natural features to define boundaries.**~~

~~**C. New non-contiguous development should:**~~

~~1. Be designed with a mix of residential, civic, retail and service uses in a town or village setting with urban centers and defined edges.~~

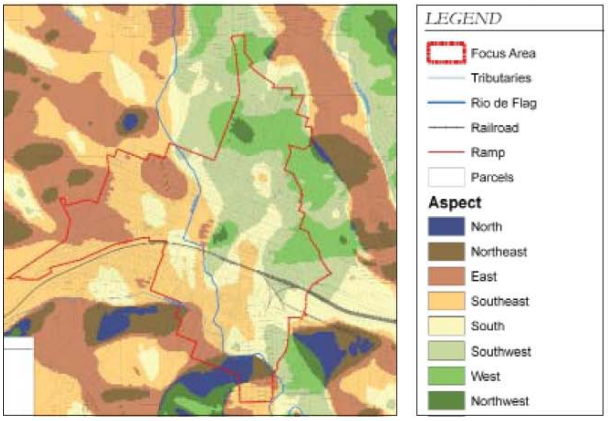
~~2. Preserve natural features such as ravines and bluffs to provide opportunities to define natural edges to communities. Where possible these areas should be linked into the Flagstaff Urban Trails System.~~

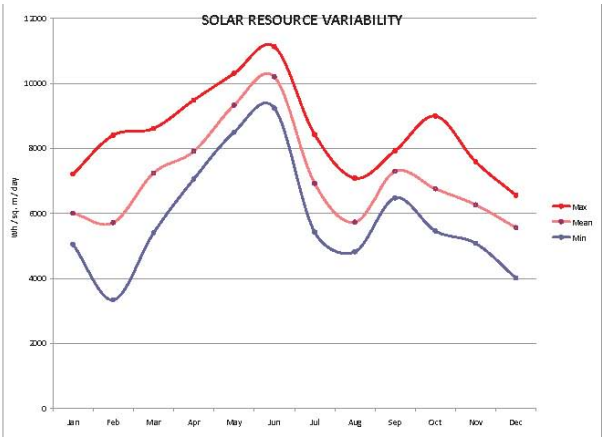
~~3. At the regional level, support a framework of different transportation modes. New development should connect into the public transit system, the Flagstaff Urban Trails System and bicycle routes. Non-industrial developments should create a walkable environment regardless of the zone in which they are located.~~

~~4. Incorporate transit service and existing and proposed routes for the Flagstaff Urban Trails System where possible.~~

~~D. New development should take advantage of harvesting alternative energy.~~

~~1. Flagstaff has an annual average of 288 days of sun in which there is good solar access. Development on lots and slopes that have good solar access should consider solar power and solar water heating as alternative energy solutions.~~





~~Diagram showing areas with high potential for using solar power and solar water heating based on orientation of slopes.~~

~~Graph showing the potential of solar power in the Flagstaff region.~~

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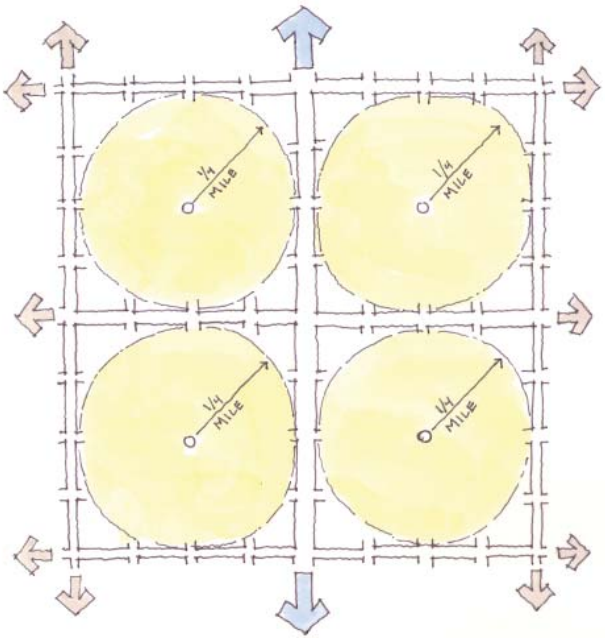

~~**Conceptual diagram of the potential development of a square mile into four one-quarter mile radius neighborhoods.**~~

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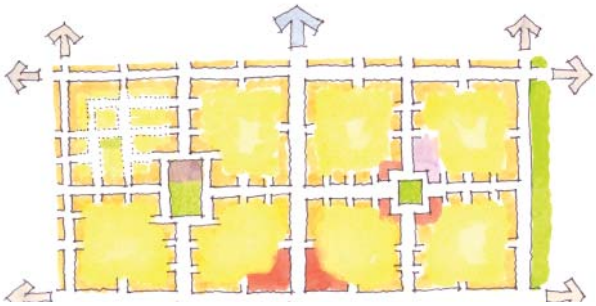
~~**Conceptual diagram of a mixed use center within a neighborhood, showing an interconnected network of thoroughfares and a mix of lot sizes.**~~

~~**Illustrative diagram showing a mix of building types and densities within a neighborhood.**~~



~~Conceptual diagram of a mixed use center at the middle of a one square mile area and smaller mixed use, civic and open spaces centered neighborhoods.~~

~~Community gardens provide the opportunity for residents of the City of Flagstaff to grow their own produce.~~

~~1.1.070 Neighborhoods, Districts and Corridors~~

~~A. Neighborhoods.~~

~~1. A neighborhood is the basic building block of a community which is typically limited in physical size with a well-defined edge and a center. Walkable communities are created and reinforced when neighborhoods:~~

~~a. Reduce the reliance upon automobiles as the main form of transportation for short trips and provide alternatives for longer trips.~~

~~b. Encourage walkability with a mix of uses and amenities in neighborhood main street environments.~~

~~c. Are defined by an area encompassed by a one-quarter to one-half mile radius.~~

~~2. Encourage a mix of residential building types to provide increased density and diversity for all ages, individuals, families, and income levels.~~

~~3. Distribute schools and other institutions throughout the City within walking distance of residential neighborhoods and not isolate them in locations from where residents would need to drive.~~

~~4. Provide a range of civic spaces such as parks and playgrounds convenient to as many dwellings as possible to encourage people to exercise and relax within their community.~~

~~5. Provide gardens where residents without yards are given the opportunity to grow their own produce. Community gardens often work well in conjunction with civic uses, such as school, where community members and school children are given the opportunity to grow local produce.~~

~~6. Streets within a neighborhood should be a connected network to disperse traffic by providing a variety of pedestrian and vehicular routes to any destination. Streets are also relatively narrow, provide on street parking, and shaded by rows of trees. This helps to slow traffic, creating an environment more suitable for pedestrians and bicycles.~~

~~7. Buildings in the neighborhood center are placed close to the street.~~

~~8. Parking is provided at the rear of buildings, usually reached by alleys, or is permitted on the street.~~

~~9. As needed within a neighborhood, prominent sites for civic buildings such as education, religion, culture, and government uses are reserved at the termination of street vistas or in neighborhood centers.~~

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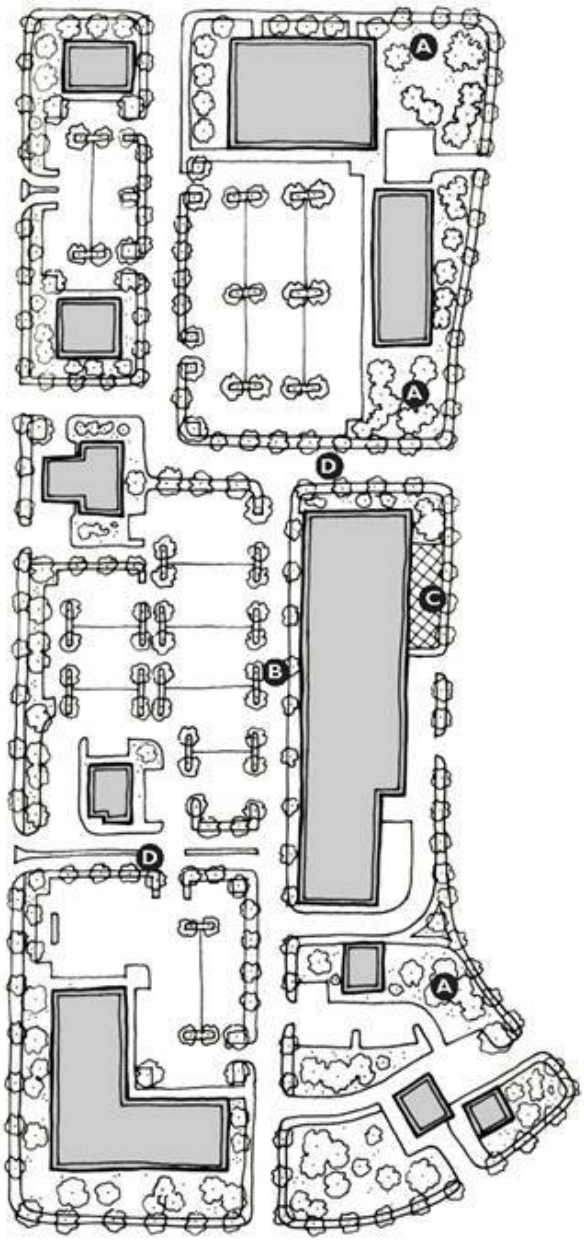

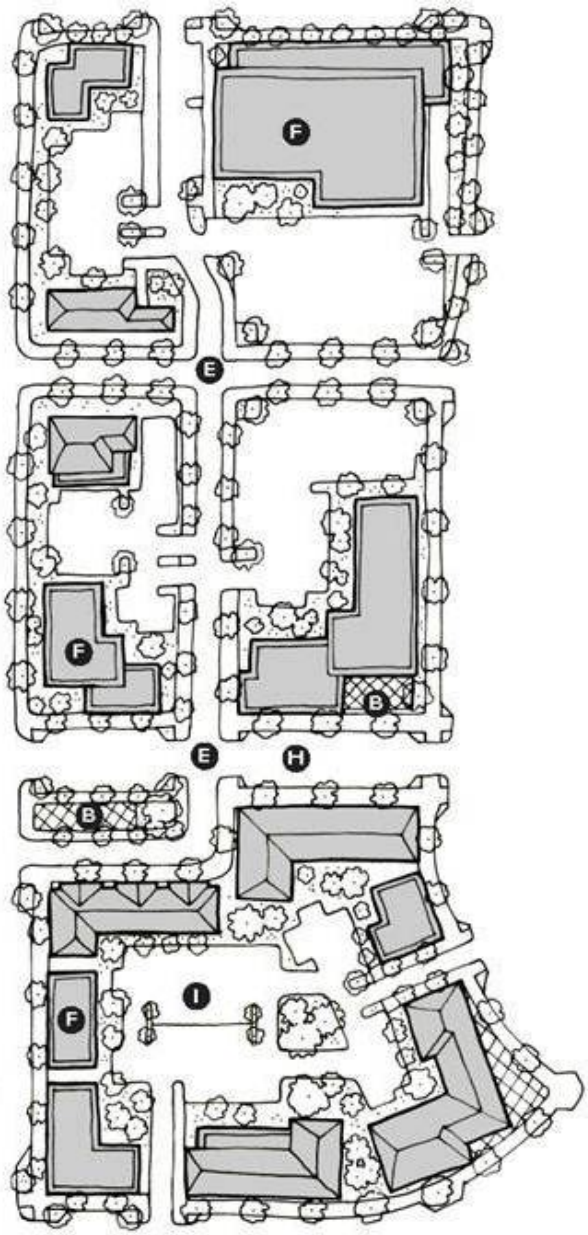

~~**Inappropriate layout of an auto-dependent development. (A) Large expanses of poorly defined landscaping. (B) Lack of two sided pedestrian environment. (C) Plaza space not integrated into the pedestrian environment. (D) No hierarchy of places or street network.**~~

~~**Appropriate layout of a "park once" auto-dependent development. (E) Defined grid of streets and blocks, not with driveways. (F) Larger retail buildings hold the edge of the block and provide entrances along the street edge and the parking within the block. (G) Open spaces integrated into the walkable environment. (H) Two-sided walkable environment. (I) Parking**~~

~~within the block with clusters of trees preserved.~~

~~B. Districts and Corridors.~~

~~1. The City is comprised of many different environments, within which it is not always possible or intended to be walkable; these areas are often the transportation corridors and the single-use districts. In these predominately auto-dependent areas it is important to create small areas of walkability, where residents, tenants and users can be in a park-once environment. Doing so reduces the number of automobile trips and creates a more sustainable environment. The following features should be used to create a pedestrian-friendly park-once environment:~~

~~a. Create nodes of walkability within auto-dependent districts and corridors that reduce the need to drive and park from one destination to another;~~

~~b. Place parking in the middle of the block and behind buildings to increase the walkability of the block and create a more pedestrian-friendly environment;~~

~~c. Create environments where both sides of the street are pedestrian-friendly to encourage walking;~~

~~d. Place open or civic spaces within a walkable environment where buildings front onto the space; and~~

~~e. Encourage a mix of uses within a walkable node to allow a variety of daily activities to be completed within a park-once environment.~~

~~2. A fine-grained interconnected network of streets, trails and sidewalks provide the opportunity for users both within and from outside of a district or corridor to reduce the reliance on automobiles. A fine-grained network can also reduce the dependence and pressure on major corridors. Districts and corridors should provide connections throughout to transit, railways, bike lanes, boulevards, and walkable streets.~~

~~3. Providing good public transit and bicycle facilities along corridors reduces the reliance on automobiles in the community. In addition these facilities provide alternatives for all ages, individuals, families, and income levels who cannot or choose not to drive an automobile.~~

~~Example of a transit shelter integrated into the pedestrian realm and local architectural character.~~

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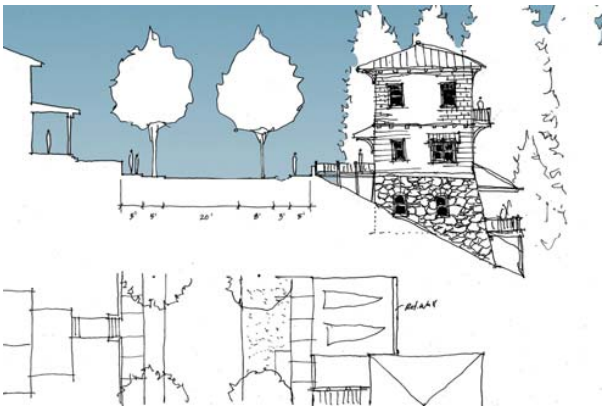

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~~Small footprint house on a steeply sloped lot.~~

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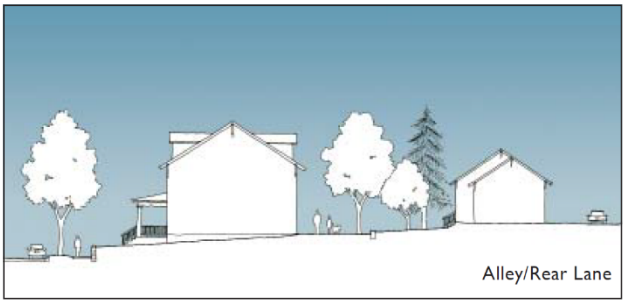
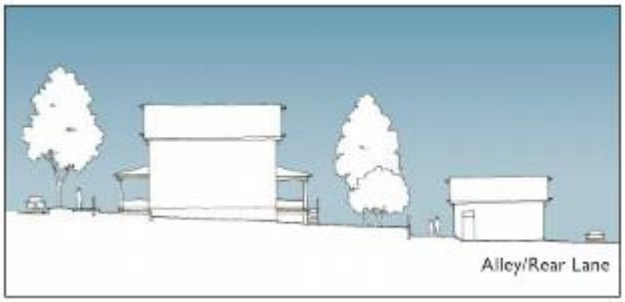
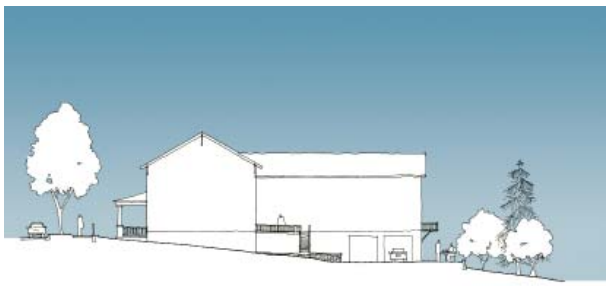


~~Uphill lot with alley access showing detached garages or carriage houses.~~

~~Uphill lot without alley access showing parking placed in the rear of the lot around a parking court.~~





~~Downhill lot with alley access showing detached~~

~~Downhill lot without alley access showing~~

~~garages or carriage houses.~~

~~parking placed in the rear of the lot around a parking court.~~

~~Individually graded lots allow for more variety in the character of the street and increase the possibility of preserving existing trees.~~

-

~~1.1.080 Block and Street~~

~~A. It is important to consider the size of the blocks, the spacing and size of streets, and what the streets connect both physically and visually. This section provides a series of elements to consider when creating a network of blocks and streets.~~

~~B. A fine-grained network of streets and blocks provides flexibility over time and disperses all modes of transportation throughout the City. Smaller blocks create a more pedestrian-friendly environment that also supports transit and bicycle usage.~~

~~C. Blocks and streets should be designed to minimize negative impacts to natural resources on abutting properties by:~~

~~1. Minimizing excavation that may be visible from adjacent properties; and~~

~~2. Minimizing the use of mass grading across blocks and streets. Instead, grade properties in smaller increments to preserve more natural resources such as existing trees and ground cover. This has the added benefit of allowing new development to maintain the character of the site.~~

~~D. Scenic views to natural features and landmarks from major viewpoints along a public way should be preserved or enhanced. Simple methods of preserving or enhancing scenic views of natural features include:~~

~~1. Frame distant views by locating streets and blocks to create terminated vistas on major viewpoints; and~~

~~2. Siting buildings in relation to adjoining properties to frame a view as it may be observed from the public rights-of-way. Siting of buildings should avoid completely blocking a view with a large building mass.~~

~~E. Streets with shared use of slower speed roadways for bicycles and cars create a better pedestrian and bicycle-friendly environment that reduces the reliance on automobiles and increases safety for bicycles and pedestrians.~~

~~F. Streets and development within the City should accommodate automobiles while protecting the safety and walkability of the area for pedestrians.~~

~~G. Development and streets within the City should be designed to feel comfortable and safe at the pedestrian scale in order to:~~

~~1. Encourage residents to walk and bicycle; and~~

~~2. Reduce the reliance on automobiles.~~

~~**Local Building Character**~~

~~**1.1.090 Lot and Building**~~

~~**A. The lot and building are at the most intimate of scales at which people can relate to and understand. The character of different memorable neighborhoods and cities is provided by the**~~

~~texture, variety and richness found in pedestrian environment. This section provides elements to consider to help provide a rich pedestrian and bicycle friendly environment and a sustainable future.~~

~~B. Buildings should be tailored to their urban/rural setting. See Division 10-50.20, Architectural Design Standards, for more specific standards.~~

~~C. Buildings should be positioned to enhance significant natural features that exist on a site. The features can be enhanced by:~~

~~1. Locating entry plaza or open spaces to frame a view, such as an existing rock outcropping or stand of mature trees; and~~

~~2. Siting buildings to minimize the destruction of natural features, allowing sites to take advantage of resources such as mature trees.~~

~~D. Buildings and lots should be designed and furnished to provide visual interest to pedestrians.~~

~~1. Active ground-floor spaces with windows and doors addressing the street help create an inviting pedestrian experience.~~

~~2. In walkable environments low walls, decorative fences, and hedges help define the edges of the public realm and the private realm while providing visual interest to pedestrians. These elements should be less than three feet in height.~~

~~3. Recessed windows and doors combined with projecting elements, such as balconies, eaves, and bay windows, provide visual relief to walls. Over the course of the day, the shadows cast by the small variations create a facade that appears to change throughout the day. This constantly changing back drop to the public realm provides a pedestrian experience that changes throughout the day and year.~~

~~4. In retail and service settings, furnishings along the street can provide areas to rest and additional visual interest for pedestrians.~~

~~E. Flagstaff's multistory heritage homes have a pattern of having ground floors that are taller than the upper stories. The extra height in the ground floor allows for taller windows and more natural light to enter the buildings. In keeping with this pattern multi-story residential buildings should have~~

~~ground floors that are taller than any individual upper floor. A minimum floor to ceiling height of nine feet in all T3 and T4 transect zones is preferred.~~

~~Local Building Character~~

~~F. Urban agriculture and community gardens provide an urban environment with a local food source. They also empower residents to grow their own food and teach others on food growing techniques.~~

~~G. Understanding sustainable building practices provides the opportunity to consider the long-term effects of development on the City. The following elements provide guidance on what to consider.~~

~~1. Buildings should be designed to efficiently use space and energy.~~

~~2. Flagstaff has a unique environment that provides 288 days of solar access. Buildings should be designed to take advantage of this resource by utilizing passive systems to the maximum extent feasible. The following items should be considered when locating and designing a building.~~

~~a. Orientation of the site and building.~~

~~(1) Lots with good southern exposure provide the best opportunity to take advantage of Flagstaff's remarkable solar access.~~

~~(2) Buildings should be laid out to take advantage of the solar access by orienting rooms to take advantage of the natural light and passive heating opportunities.~~

~~b. Passive cooling.~~

~~(1) Cross or stack ventilation systems, when carefully designed to take advantage of prevailing winds, can passively cool and ventilate the interior of a building without the need or use of energy.~~

~~(2) Thermal massing, appropriately arranged in conjunction with a passive ventilation system, can collect cool breezes from the open windows during the night and cool the air during the day when ambient temperatures are higher.~~

~~c. Passive heating.~~

~~(1) Thoughtful placement of windows can allow direct sunlight to enter a building, passively heating the interior while providing natural light.~~

~~(2) Thermal massing, appropriately arranged in conjunction with thoughtfully placed windows, can collect solar heat during the day and release the heat at night when ambient temperatures are lower.~~

~~(3) Solar water heaters passively heat water for showers and other uses by using solar heat to warm water as it is stored in an external container. Using solar water heaters can reduce the energy needed to provide hot water.~~

~~3. Photovoltaic panels can also take advantage of Flagstaff's unique environment by providing energy and reducing reliance on the electrical grid.~~

~~4. Water collection and storage during Flagstaff's times of rain can provide water for on-site irrigation.~~

~~5. The use of sustainable local materials and systems should be considered in order to reduce the short-term and long-term environmental impact of constructing and maintaining buildings.~~

~~6. Living roofs or vegetated roofs reduce the heat island effect and if planted with indigenous flora enhance the local urban ecology.~~

~~7. Landscaping should include native plant species.~~

~~a. Native plant species enhance the urban ecology and provide habitat to at-risk fauna while preserving the natural character of the region.~~

~~8. The following resources provide additional guidance on what to consider before, during and after development.~~

~~a. Leadership in Energy and Environmental Design (LEED) programs encourage sustainable development and building practices.~~

~~b. Energy Star appliances reduce the energy needs of a building.~~

~~c. Alternative energy is energy that is used in place of what is provided by the grid that serves the City and is derived from natural occurring sources (water, wind, solar) that would have otherwise gone unused. For more information see Appendix 1.3, Sustainability Guidelines.~~

~~Appendix 1.2~~

~~Additional Information on Smart Growth and Traditional Neighborhood Developments~~

~~Sections:~~

~~1.2.010 What Is Smart Growth?~~

~~1.2.020 What Is New Urbanism and Traditional Neighborhood Development?~~

~~1.2.030 SmartCode~~

~~1.2.040 Transect-Based Planning and Form-Based Codes~~

~~1.2.050 A Brief Overview of Design Charrettes~~

~~1.2.060 Thoroughfares (i.e. Streets) in Traditional Neighborhoods~~

~~1.2.070 Online Resources for Smart Growth and Traditional Neighborhood Developments~~

~~1.2.010 What Is Smart Growth?~~

~~A. "Growth is smart when it gives us great communities, with more choices and personal freedom, good return on public investment, greater opportunity across the community, a thriving natural environment, and a legacy we can be proud of to leave our children and grandchildren." (Smart Growth Network)~~

~~B. Smart Growth as promoted by the Smart Growth Network (www.smartgrowth.org) is based on the following principles:~~

1. ~~Mix land uses.~~
2. ~~Take advantage of compact building design.~~
3. ~~Create a range of housing opportunities and choices.~~
4. ~~Create walkable neighborhoods.~~
5. ~~Foster distinctive, attractive communities with a strong sense of place.~~
6. ~~Preserve open space, farmland, natural beauty, and critical environmental areas.~~
7. ~~Strengthen and direct development towards existing communities.~~
8. ~~Provide a range of transportation choices.~~
9. ~~Make development decisions predictable, fair and cost effective.~~

~~10. Encourage community and stakeholder collaboration in development decisions.~~

~~C. Smart Growth principles when properly applied in a community provide a number of important benefits that can include:~~

~~1. Added value to a community through new development;~~

~~2. A greater return on investment for cities and towns through new development;~~

~~3. A variety of transportation choices – walking, biking, transit and driving – for residents to get to convenient amenities (e.g. schools, libraries, shops and restaurants);~~

~~4. A mix of housing and neighborhood types that meet the needs of couples, singles, families and seniors;~~

~~5. Greater opportunities for the preservation of open space; and~~

~~6. Development and urban growth patterns that are more sustainable than conventional development.~~

~~1.2.020 What Is New Urbanism and Traditional Neighborhood Development?~~

~~A. The term traditional neighborhood development (TND) has been utilized in planning and development circles within the City since November 2001 when the General Plan was first adopted. Indeed, the General Plan contains numerous references to, and actively promotes the use of, TND. With the undertaking of the Zoning Code update, the TND has been incorporated as an integral part of this Zoning Code.~~

~~B. New urbanism emerged over the past two decades in response to the urban sprawl that has characterized development in most parts of America. From its earliest roots up to the first quarter of the last century, the United States developed in the form of compact, mixed-use neighborhoods. Urban development patterns began to change with the emergence of modern architecture and zoning and the expanded use of the automobile. Following World War II, neighborhoods were replaced with development patterns that separated land uses, i.e., conventional suburban development, or sprawl.~~

~~C. New urbanism is an approach to urban planning and design that can be applied at a variety of scales, moving from a single block in an urban area to a large metropolitan region. At the neighborhood level, new urbanism is often referred to as traditional neighborhood development~~

~~because it revives the urban form and character of U.S. cities and towns built from the 1600s until World War II.~~

~~Figure 1.2A~~

~~Early Mixed-Use Compact Traditional Neighborhood Development in the United States.~~

~~D. New Urbanist developments do not seek to mimic past patterns of development. Instead, New Urbanist or traditional neighborhood developments strive to reinterpret the qualities of old patterns of building placement, design and public spaces to suit modern living needs, including of course the needs of the automobile.~~

~~Figure 1-2B~~

~~A New Traditional Neighborhood Recently Completed in Denver, CO.~~

~~E. New urbanism and traditional neighborhood developments are based on principles of planning and architecture that work together to create human-scale, walkable, functional and sustainable communities. They can be applied to either infill developments within a city, communities proposed on the periphery of cities, developments focused on transit-oriented development (TOD), or even entire cities.~~

~~F. From modest beginnings, the New Urbanist movement is now having a substantial impact on development in the U.S. More than 600 new towns, villages and neighborhoods are planned or under construction in the U.S., using the principles of the new urbanism. Additionally, hundreds of small-scale new urban infill developments are restoring the urban fabric of cities and towns by reestablishing walkable streets and blocks. Many Gulf Coast communities ravished by hurricanes Katrina and Rita are rebuilding themselves based on these principles.~~

~~G. Principles of Traditional Neighborhood Development. The heart of the new urbanism is in the design of neighborhoods, which can be defined by 13 elements, according to town planners Andres Duany and Elizabeth Plater-Zyberk, who founded the architecture and town planning firm Duany Plater-Zyberk & Co., and who are also two of the founders of the Congress for the New Urbanism (www.cnu.org). An authentic neighborhood should contain most of these elements:~~

~~1. The neighborhood has a discernible center. This is often a square or a green and sometimes a busy or memorable street corner. A transit stop would be located at this center.~~

~~2. Most of the dwellings are within a five-minute walk of the center, an average of roughly 2,000 feet.~~

~~3. There are a variety of dwelling types – usually houses, rowhouses and apartments – so that younger and older people, singles and families, the poor and the wealthy may find places to live.~~

~~4. At the edge of the neighborhood, there are shops and offices of sufficiently varied types to supply the weekly needs of a household.~~

~~5. A small ancillary building is permitted within the backyard of each house. It may be used as a rental unit or place to work (e.g., office or craft workshop).~~

~~6. An elementary school is close enough so that most children can walk from their home.~~

~~7. There are small playgrounds accessible to every dwelling – not more than a tenth of a mile away.~~

~~8. Streets within the neighborhood form a connected network, which disperses traffic by providing a variety of pedestrian and vehicular routes to any destination.~~

~~9. The streets are relatively narrow and shaded by rows of trees. This slows traffic, creating an environment suitable for pedestrians and bicycles.~~

~~10. Buildings in the neighborhood center are placed close to the street, creating a well-defined outdoor room.~~

~~11. Parking lots and garage doors rarely front the street. Parking is relegated to the rear of buildings, usually accessed by alleys.~~

~~12. Certain prominent sites at the termination of street vistas or in the neighborhood center are reserved for civic buildings. These provide sites for community meetings, education, and religious or cultural activities.~~

~~13. The neighborhood is organized to be self-governing. A formal association debates and decides matters of maintenance, security, and physical change. Taxation is the responsibility of the larger community.~~

~~H. Flagstaff has some excellent older traditional neighborhoods like the Old Town Site neighborhood, Southside neighborhood, and the neighborhoods to the north and northwest of the downtown area. These neighborhoods, as well as the downtown area itself, provide a wealth of planning and architectural patterns that can be interpreted and applied in other areas of the City through the application of traditional neighborhood developments.~~

~~Figure 1-2C~~

~~**Photographs Showing Some Architectural Elements that Reflect the City of Flagstaff's Mountain Architectural Vernacular.**~~

~~**Figure 1-2D**~~

~~**Artist Renderings Showing the Urban Character of a Proposed TND Project (Juniper Point)**~~

~~**Reflecting the City of Flagstaff's Mountain Architectural Vernacular, with a Corner Store on the Left, and a Residential Street on the Right.**~~

~~**Illustrations by Dover, Kohl & Partners.**~~

~~**1.2.030 SmartCode**~~

~~A. The SmartCode is a model unified land development ordinance for planning and urban design. It is the property of Duany Plater-Zyberk & Co. (DPZ) but may be freely reproduced and used with proper credit given to DPZ. The SmartCode incorporates smart growth and new urbanism principles, transect-based planning, environmental and zoning regulations, and regional, community and building-scaled design outcomes. It is a tool that guides the form of the built environment to resemble that of traditional neighborhoods, towns and villages. As noted previously, this form is compact, walkable, and mixed-use, and it is meant to be comfortable, safe and ecologically sustainable. As a model code, the SmartCode is intended to be calibrated or customized to the specific region within which it is applied by professional urban designers, planners, architects, engineers and other professionals, with the participation of local citizens. The SmartCode may be downloaded for free from http://smartcodecentral.com.~~

~~B. The principles of smart growth and traditional neighborhood development are addressed in the SmartCode at the scale of the region, the community, the block and the building, and the transect as provided below. This text is taken from the SmartCode and has been adapted to Flagstaff.~~

~~1. The Region.~~

~~a. That its natural infrastructure and visual character should be derived from its unique location in northern Arizona, and its topography, forests, farmlands, and riparian corridors.~~

~~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 neighborhood pattern and be integrated with the existing urban pattern.~~

~~d. That development noncontiguous to urban areas should be organized in the pattern of traditional neighborhoods.~~

~~e. That affordable housing should be distributed throughout the region to match job opportunities and to avoid concentrations of poverty.~~

~~f. That the planning and reservation of transportation corridors should be coordinated with land use planning.~~

~~g. That open space green corridors should be used to define and connect urbanized areas.~~

~~h. That the region should include a framework of transit, pedestrian, and bicycle systems that provide alternatives to the automobile.~~

~~i. That natural resources should be preserved by encouraging the concentration of development in mixed-use higher density neighborhoods than might otherwise be permitted under existing zoning.~~

~~2. The Community.~~

~~a. That neighborhoods should be coordinated, compact, pedestrian-oriented and mixed-use.~~

~~b. That neighborhoods should be the preferred pattern of development and that districts specializing in 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 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 or other planned neighborhood centers, 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 useable open space including parks, squares and playgrounds should be distributed within neighborhoods and urban zones.~~

~~j. That public trails within neighborhoods should link to the existing regional trail system.~~

~~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 space.~~

~~c. That the design of thoroughfares 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 and therefore respect and support Flagstaff's unique forest and mountain environment and architectural vernacular.~~

~~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 located in places 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 the adoption of form-based codes that serve as guides for change for the proposed traditional neighborhood district. The form-based code establishes land use regulations for the district that may be different from zoning regulations applicable to other zoning districts in the Zoning Code or any other approved traditional neighborhood district.~~

~~1.2.040 Transect–Based Planning and Form–Based Codes~~

~~A. The SmartCode provides a detailed overview of the transect from an ecological perspective, and how transects can also be applied in an urban-to-rural context. As this concept is critical in understanding the application of the SmartCode to the proposed traditional neighborhood district in the City, an overview of transect-based planning is provided in the Preamble to this Zoning Code.~~

~~B. Form-based codes address the relationship between building facades and the public realm, the form and mass of buildings in relation to one another, and the scale and types of streets and blocks. The regulations and standards in form-based codes, presented in both diagrams and words, are keyed to a regulating plan that designates the appropriate form and scale (and therefore character) of development rather than only distinctions in land use types. This is in contrast to conventional zoning's focus on the segregation of land use types, permissible property uses, and the control of development intensity through simple numerical parameters (e.g., floor area ratio, dwellings per acre, height limits, setbacks, parking ratios). Not to be confused with design guidelines or general statements of policy, form-based codes are regulatory, not advisory. An overview of form-based codes is provided in the Preamble to this Zoning Code, Chapter 10.00.~~

~~1.2.050 A Brief Overview of Design Charrettes~~

~~This synopsis of design charrettes is taken from a publication written by Bill Lennertz called "The Charrette as an Instrument of Change," and published in New Urbanism: Comprehensive Report & Best Practices Guide, Third Edition, Ithaca NY: New Urban Publications, 2003. Pp. 12-2 to 12-8. Additional information is also available from the National Charrette Institute website – www.charretteinstitute.org.~~

~~A. A charrette is a multi-day planning process during which an interdisciplinary professional design team creates a complete and buildable plan (typically based on smart growth and traditional neighborhood principles) that reflects the input of all stakeholders who are involved by engaging them in a series of feedback loops. It is a comprehensive and intensive planning process to bring transformative change to a neighborhood or planning area.~~

~~B. As Mr. Lennertz states, "charrettes offer much more than just a quick fix," and they result in lasting, transformative change. A charrette requires a carefully planned and orchestrated process that starts well before the actual charrette and continues long after it.~~

~~C. The National Charrette Institute (NCI) suggests that there are nine strategies that differentiate an authentic charrette from other planning processes. Further information on these strategies is available at the NCI website.~~

1. ~~Work collaboratively;~~
2. ~~Design cross-functionally;~~
3. ~~Use design to achieve a shared vision and create holistic solutions;~~
4. ~~Work in detail;~~
5. ~~Constrain work schedules;~~
6. ~~Communicate in short feedback loops;~~
7. ~~Work for at least four to seven consecutive days;~~
8. ~~Work on-site; and~~
9. ~~Produce a buildable plan.~~

~~1.2.060 Thoroughfares (i.e., Streets) in Traditional Neighborhoods~~

~~There is an extensive amount of information available on the subject of context sensitive design and the design of streets to promote walkability and safety for pedestrians. An excellent resource on this subject can found in a chapter titled "Designing Streets for Walkability and Safety" by various authors in the book *New Urbanism: Comprehensive Report & Best Practices Guide*, Third Edition, Ithaca NY: New Urban Publications, 2003. Pp. 8-1 to 8-30.~~

~~The following introduction to this subject is excerpted from the above referenced book, Pp. 8-1 to 8-2 in the chapter titled "Designing Streets for Walkability and Safety" by various authors.~~

~~A. A traditional neighborhood development (TND) is a human scale, walkable community with moderate to high residential densities and a mixed-use core. Compared with conventional suburban developments, TNDs have a higher potential to increase modal split by encouraging and accommodating alternate transportation modes. TNDs also have a higher potential for capturing internal trips, thus reducing vehicle miles traveled.~~

~~**Figure 1-2E**~~

~~**Example of a Street**~~

~~**Designed to Promote Walkability and Safety for Pedestrians.**~~

~~**Photo by Rick Hall.**~~

~~**B. A dense network of narrow streets with reduced curb radii is fundamental to TND design. This network serves to both slow and disperse vehicular traffic and provide a pedestrian friendly atmosphere. Such alternate guidelines are encouraged by North Carolina Department of Transportation when the overall design ensures that nonvehicular travel is to be afforded every practical accommodation that does not adversely affect safety considerations. The overall function, comfort, and safety of a multipurpose or "shared" street are more important than its vehicular efficiency alone.**~~

~~**C. TNDs have a high proportion of interconnected streets, sidewalks and paths. Streets and rights-of-way are shared between vehicles (moving and parked), bicycles, and pedestrians. The dense network of TND streets function in an interdependent manner, providing continuous routes that enhance non-vehicular travel. Most TND streets are designed to minimize through traffic by the design of streets and the location of land uses. Streets are designed to only be as wide as needed to accommodate the usual vehicular mix for that street while providing adequate access for moving vans, garbage trucks, fire engines and school buses.**~~

~~**1.2.070 Online Resources for Smart Growth and Traditional Neighborhood Developments**~~

~~**Smart Growth:**~~

~~***http://www.smartgrowth.org***~~

~~**Traditional Neighborhood Development:**~~

~~***http://www.tndtownpaper.com/neighborhoods.htm***~~

~~***http://safety.fhwa.dot.gov/ped_bike/***~~

~~***http://www.newurbannews.com/***~~

~~***http://www.tndhomes.com/feature.htm***~~

~~***http://www.preservenet.com/politics/NewUrb.html***~~

~~***http://fullyarticulated.typepad.com/sprawledout/2007/06/traditional_nei.html***~~

~~**Congress for the New Urbanism:**~~

~~***http://www.cnu.org/***~~

~~**Transect:**~~

~~***http://www.transect.org/***~~

~~***http://www.dpz.com/transect_articles.htm***~~

~~**Form-Based Codes:**~~

~~***http://www.formbasedcodes.org/***~~

~~**SmartCode:**~~

~~***http://www.smartcodecentral.com***~~

~~**Design Charrettes:**~~

~~***http://www.charretteinstitute.org***~~

~~**Context Sensitive Solutions:**~~

~~***http://www.contextsensitivesolutions.org/***~~

~~***http://www.fhwa.dot.gov/context/index.cfm***~~

~~***http://www.pedshed.net***~~

~~***http://www.completestreets.org***~~

~~Appendix 1.3~~

~~Sustainability Guidelines~~

~~**Sections:**~~

- ~~**1.3.010 – Purpose**~~
- ~~**1.3.020 – Applicability**~~
- ~~**1.3.030 – What Is Sustainability?**~~
- ~~**1.3.040 – Project Siting**~~
- ~~**1.3.050 – Modes of Transportation**~~
- ~~**1.3.060 – Economic Sustainability**~~
- ~~**1.3.070 – Urban Agriculture**~~
- ~~**1.3.080 – Water Resource and Conservation**~~
- ~~**1.3.090 – Energy and Materials**~~
- ~~**1.3.100 – Stormwater Management, Grading and Drainage**~~
- ~~**1.3.110 – Watershed Restoration**~~
- ~~**1.3.120 – Solid Waste Management**~~

~~1.3.010 Purpose~~

~~**The purpose of the sustainability guidelines is to provide principles of sustainability and guidelines to promote sustainability to encourage and direct development in a manner that is sustainable in the City. Links to the sections of the Zoning Code and other City documents are inserted that provide additional information and standards.**~~

~~**These sustainable principles and practices are intended to inform applicants, planners, architects, landscape architects, engineers and construction managers about sustainable site planning, design and construction practices that encompass long term economic, social and environmental considerations in Flagstaff. By following the standards provided in the Zoning Code and the supplementary guidelines that accompany them into the design and construction process, a commitment to building a healthy and sustainable future for Flagstaff can be demonstrated.**~~

~~**In addition to pursuing a general culture of sustainability, compliance with these principles and guidelines can help ensure that sustainable goals specific to community needs are met. By accomplishing these goals, the community can establish itself as a leader in sustainable development.**~~

~~1.3.020 Applicability~~

~~The guidelines found within this Division apply to all development within the City. Applicants should consider following these guidelines to help create a more sustainable community.~~

~~1.3.030 What Is Sustainability?~~

~~Sustainability is living and managing activities in a manner that balances social, economic and environmental considerations to meet Flagstaff's current needs and those of future generations. A sustainable Flagstaff is a community where the social well-being of current and future citizens is supported by a vibrant economy and a self-renewing, healthy environment.~~

~~The Zoning Code plays an integral role in addressing community sustainability by addressing energy conservation, climate change and adaptation, renewable energy production, community health, and food production. Sustainability supports the development of attractive, prosperous and healthy communities. The core values of sustainability include:~~

~~A. Consideration of long-term impacts upon future generations;~~

~~B. The prudent use of resources; and~~

~~C. Understand resource limitations and use to prevent overuse and serious degradation and loss of productive capacity.~~

~~1.3.040 Project Siting~~

~~A. Principle. Throughout the design of a new development, applicants should evaluate the development's location, site layout, and programming to determine short- and long-term impacts on the community's sustainability.~~

~~Project siting has the greatest impact on how effectively the other sustainability principles can be addressed. Poor siting of a development can detrimentally impact the potential to harvest solar energy, create a less automobile dependent environment, and address economic and agricultural sustainability. This section provides elements that should be addressed in order for the other sustainability principles to be most effective. See Division 10-30.60, Site Planning Design Standards, and Division 10-50.90, Resource Protection Standards, for methodologies and submittal requirements for site analysis.~~

~~B. General Guidelines. The following properties should be considered during all phases of design to produce a development that is beneficial to the community in the short and long term. A development site should be planned and designed to address the following key elements:~~

~~1. The absence of or the ability to buffer sensitive environmental zones, such as floodplains, critical habitats or forest resources, from the impacts of development;~~

~~2. The presence of an infill opportunity or the ability to be located on a previously developed site;~~

~~3. The presence of existing or planned transit services;~~

~~4. The presence of existing or planned neighborhood amenities and services;~~

~~5. The location of everyday goods and services relative to the development's use and needs;~~

~~6. The ability to reinforce and fill in an incomplete urban development pattern;~~

~~7. The ability to utilize on-site winds to minimize or eliminate needs for mechanical cooling and ventilation; and~~

~~8. The potential to access Flagstaff's average of 321 days of solar access.~~

~~C. Resources.~~

~~1. Division 10-30.60, Site Planning Design Standards.~~

~~2. Division 10-50.90, Resource Protection Standards.~~

~~3. City of Flagstaff General Plan.~~

~~4. Appendix 1.1, Design Guidelines.~~

~~1.3.050 Modes of Transportation~~

~~A. Principle. Where feasible, dependence on the automobile should be reduced by creating neighborhoods that provide a diverse choice of transportation modes. Providing a mix of transportation modes allows for greater accessibility for a diverse range of the population who does not or may not have access to an automobile.~~

~~B. General Guidelines. The diversity and mix of transportation modes as well as the intent of the transportation networks may vary between walkable urban environments and drivable suburban environments but nonetheless the following key elements should be addressed:~~

~~1. The creation or enhancement of walkable environments within the development;~~

~~2. The ability to connect to existing or planned transportation networks to reduce the need for travel by private vehicle; and~~

~~3. The provision of a mix and hierarchy of transportation options to amenities outside the development, including:~~

~~a. Transit service;~~

~~b. Bicycle facilities;~~

~~c. Sidewalks;~~

~~d. Multi-use trails; and~~

~~e. Vehicular thoroughfares.~~

~~C. Resources.~~

~~1. Division 10-30.60, Site Planning Design Standards.~~

~~2. Section 10-50.80.050, Bicycle Parking.~~

~~3. Section 10-50.80.060, Parking Adjustments.~~

~~4. Chapter 10-60, Specific to Thoroughfares.~~

~~5. Appendix 1.1, Design Guidelines.~~

~~1.3.060 Economic Sustainability~~

~~A. Principle. In order to help maintain the economic sustainability of Flagstaff, new developments in Flagstaff should provide a diverse mix of nonresidential uses and a range of housing options within compact walkable environments.~~

~~B. General Guidelines. The following key elements should be addressed in all new developments, when applicable:~~

~~1. The presence of a mix of commercial, civic and residential uses within a neighborhood and across the City allows an area to change over time and provides a diverse employment/shopping and tax base for the City;~~

~~2. The presence of industrial uses or land zoned for industrial uses, where appropriate, should be maintained to provide areas for manufacturing and production jobs;~~

~~3. The ability to site, design, and construct buildings to take advantage of Flagstaff's climate to reduce energy usage and cost, providing long term economic sustainability as energy prices fluctuate;~~

~~4. The ability to provide a mix of housing types can provide a more diverse set of housing options at a more diverse range of rents and price points for residents of Flagstaff; and~~

~~5. The ability to build in a more compact manner to reduce the initial and long-term transportation and public infrastructure costs, providing additional opportunities for economic stability for the City.~~

~~C. Resources.~~

~~1. Division 10-30.20, Affordable Housing Incentives.~~

~~2. Division 10-40.40, Transect Zones.~~

~~3. Division 10-50.110, Specific to Building Types.~~

~~1.3.070 Urban Agriculture~~

~~A. Principle. In order to help maintain food production and security in Flagstaff, agricultural uses are allowed within the City. This Zoning Code provides opportunities for urban agriculture by allowing:~~

~~1. Food production in industrial and commercial zones;~~

~~2. Community gardens in civic spaces and neighborhoods;~~

~~3. Edible landscaping as part of range of vegetation allowed within the required landscaping for new developments; and~~

~~4. Urban agriculture within designated green spaces and parks.~~

~~B. Resources.~~

~~1. Chapter 10-40, Specific to Zones.~~

~~2. Chapter 10-70, Specific to Civic Spaces.~~

~~3. Division 10-50.60, Landscaping Standards.~~

~~1.3.080 Water Resource and Conservation~~

~~A. Principle. The future of Flagstaff is dependent on access to long-term clean water resources. Water resources should therefore be conserved to protect the environment and to maintain adequate supplies of water for future generations. A long term water source is integral to the economic vitality and social health of the community. Water conservation measures should be a visible component of developments to promote water resource conservation and build awareness of the precious nature of water. Water conservation measures include:~~

~~1. The use of reclaimed water;~~

~~2. Active and passive harvesting of rain water; and~~

~~3. Collecting of greywater for nonpotable uses.~~

~~B. General Guidelines.~~

~~1. Where feasible prior to development, applicants should provide a water balance analysis that includes all water demands at build-out of the development. The City can then evaluate whether an adequate supply exists to accommodate the proposed new projected build-out water demands. In all residential developments, this balance would assume year-round residence for calculation purposes. This may be replaced by a water adequacy study.~~

~~2. Applicants should identify and implement water conservation measures on their development that will reduce the water demands created by the development. Example measures could include the use of reclaimed water and the installation and use of rainwater~~

~~capture and reuse (greywater) devices for all nonpotable applications to the maximum extent feasible.~~

~~3. Use of potable water for irrigation of private lawns is not encouraged.~~

~~C. Resources.~~

~~1. City of Flagstaff amendments.~~

~~2. City of Flagstaff Energy Code.~~

~~3. State of Arizona water conservation measures.~~

~~4. Division 10-50.90, Resource Protection Standards.~~

~~5. Division 10-50.60, Landscaping Standards.~~

~~1.3.090 Energy and Materials~~

~~A. Principle. New structures, renovated buildings, and new infrastructure facilities should be designed to minimize energy consumption and maximize renewable energy generation in order to reduce greenhouse gas (GHG) emissions, provide cost savings and promote the conservation of natural resources. To create a more sustainable Flagstaff, the renovation of existing buildings or the construction of new buildings will require the efficient use of resources. Two main areas that can readily be addressed are the materials used to construct buildings and the energy used daily within them. The guidelines provided below provide guidance on design considerations that can make a building more sustainable.~~

~~B. General Guidelines.~~

~~1. Commercial and residential developments consisting of four or more units should develop covenants, conditions and restrictions relating to energy efficient practices and fixtures to ensure the development's energy efficiency throughout its life.~~

~~2. All designs for commercial dwellings should utilize available solar, wind, geothermal or other renewable energy sources using approved devices to the maximum extent feasible.~~

~~3. Natural on-site wind patterns should be evaluated and utilized in all building designs to minimize or eliminate mechanical cooling and ventilation needs.~~

~~4. New buildings should maximize the use of natural, ambient light to reduce the use of energy for lighting. Applicants should demonstrate optimization of natural lighting through the submission of an architectural lighting plan submitted to the Director.~~

~~5. Green roofs or other roofs specifically designed to absorb heat from the sun may be utilized as approved by the Director.~~

~~6. Heating of water for domestic, non-cooking, or pools usage should be accomplished using a heating strategy that includes the use of solar water heating technology unless denied by any other division.~~

~~C. Architects, engineers, builders and applicants should acquire as many local resources for building materials as possible and minimize the embodied energy in building materials. Materials that are easily salvaged and recycled and that require minimal mineral extraction and production should be selected for construction.~~

~~D. Mechanical Heating and Cooling Guidelines.~~

~~1. New structures greater than 2,000 square feet in size should be designed to reduce the cooling load to a specification of 4.2 kilowatts per 1,000 square feet.~~

~~2. Developments that feature medium- to high-density housing, such as hotel complexes, apartments and mixed-use commercial buildings, should utilize centralized cooling systems in place of distributed units to maximize efficiency unless the applicant can demonstrate that distributed units can achieve long-term efficiency gains.~~

~~3. Ventilation intake should be paired with a heat recovery ventilation unit to recover the thermal energy present in exhaust air and reduce conditioning requirements for incoming air.~~

~~4. All air-conditioned spaces should be outfitted with appropriate window technology. Windows should be double-paned, well-sealed and operable, with nonconductive frames, and low thermal emissive coatings.~~

~~E. Resources.~~

~~1. Energy Efficiency and Renewable Energy Resolution 2010-16.~~

~~2. 2006 International Energy Conservation Code IECC Chapter 5 for Commercial Air Conditioning.~~

~~3. Wildland Urban Interface Code (WUI).~~

~~4. Leadership in Energy and Environmental Design (LEED).~~

~~5. Division 10-30.60, Site Planning Design Standards.~~

~~6. Section 10-40.60.040, Accessory Wind Energy Systems.~~

~~7. Appendix 1.1, Design Guidelines.~~

~~1.3.100 Stormwater Management, Grading and Drainage~~

~~A. Principle. Stormwater management provides many benefits to Flagstaff in the form of preserving existing drainage channels, preventing excessive erosion, flood prevention, improving runoff water quality, protecting clean water resources and recharging of ground water. These guidelines work with the Section 1.3.030 (Water Resource and Conservation) and Section 1.3.060 (Watershed Restoration) to help ensure a clean and adequate water supply.~~

~~B. General Guidelines.~~

~~1. All developments not otherwise required to, should comply with City Ordinance No. 2009-07 "*Low Impact Development (LID) Amendments to the City of Flagstaff Stormwater Management Design Manual.*"~~

~~2. A licensed professional engineer or licensed landscape architect should prepare a full set of construction drawings including grading, drainage, utility locations, re-vegetation and sedimentation and erosion control plans for new construction.~~

~~3. Cut and fill quantities should be balanced on-site to the maximum extent feasible.~~

~~4. All buildings should be designed with foundation drains and grades sloping away from buildings at a minimum of five percent in areas where high groundwater levels exist, or sloped away from building foundations for a minimum of 10 feet. Runoff from impervious surfaces should flow across pervious surfaces before discharging to the public drainage system, to the maximum extent feasible.~~

~~C. Grading Guidelines.~~

~~1. Extent of grading and site disturbance should be limited to the 30 feet immediately adjacent to approved improvements.~~

~~2. Developments should avoid the compaction of native soil.~~

~~3. Grading designs should utilize natural and/or curvilinear shapes rather than straight and angular solutions unless required for safety or the prevention of flooding.~~

~~4. No building or development of infrastructure within 100 feet (measured by vertical elevation) of a ridgeline should be permitted on sites over 10 percent in average grade that are not previously developed.~~

~~5. Topsoil should be stockpiled in a designated location prior to construction and used for required on-site landscaping. All applicable City, State, and Federal requirements for soil stockpiling shall be followed.~~

~~D. Drainage Guidelines.~~

~~1. Drainage from non-vegetated roofs and other elevated impervious surfaces should be channeled to rainwater harvesting equipment or landscaped areas such as earthworks or rain-gardens.~~

~~2. Grass, mulch, gravel, or other local natural materials should be placed under the drip line of non-guttered roofs to prevent soil erosion and to increase ground absorption.~~

~~3. Gutters, downspouts, and overflows should be used to direct drainage not captured by rainwater harvesting equipment away from foundations and paved surfaces, into natural drainage systems such as crushed rock beds, mulch beds or naturalized swales located at a minimum of 10 feet from the building foundation.~~

~~4. Light and heavy industrial impervious parking surfaces over 1,800 square feet should include an oil separator or other surface pollution attenuation mechanism such as a natural infiltration system to treat the runoff prior to discharge to the public drainage system.~~

~~E. Resources.~~

~~1. City of Flagstaff's *Low Impact Development Guidance Manual for Site Design and Implementation*.~~

~~2. *City of Flagstaff Stormwater Management Design Manual*.~~

~~3. Section 10-30.70.040, Project Siting.~~

~~4. Division 10-50.90, Resource Protection Standards.~~

~~5. Division 10-50.60, Landscaping Standards.~~

~~6. International Building Code (IBC).~~

~~7. International Residential Code (IRC).~~

~~1.3.110 Watershed Restoration~~

~~A. Intent. Watershed restoration provides additional opportunities to provide a clean and adequate supply of water resources. In addition, watershed restoration provides the ecological benefit of providing additional habitat for local flora and fauna. These guidelines work with Section 1.3.080, Water Resource and Conservation, and Section 1.3.100, Stormwater Management, Grading and Drainage, to help ensure a clean and adequate water supply.~~

~~B. General Guidelines.~~

~~1. Landscape plans should minimize the disturbance and maximize the preservation of existing natural landscapes and wildlife areas by providing a 300-foot buffer around all significant habitat areas. The term "significant habitat areas" includes areas designated as habitat for species listed as endangered under state or federal law, patches of natural vegetation at least 150 acres in size, or habitat flagged for conservation under an ecological ordinance.~~

~~2. Pre-existing, existing and anticipated post development conditions need to be documented prior to construction to identify restoration goals for the watershed.~~

~~3. Protection buffer widths should be no less than 20 feet from the centerline of washes.~~

~~4. Riparian buffers disturbed during construction should be vegetated to pre-construction conditions with native plants, in areas including:~~

~~a. The 100-year floodplain;~~

~~b. All steep slopes (greater than 25 percent); and~~

~~c. Any adjacent delineated wetland or critical habitat.~~

~~5. Plantings should replace invasive species with indigenous flora.~~

~~6. Applicants are required to develop a long-term (25-year) operation and maintenance plan for the watershed.~~

~~C. Resources.~~

~~1. *City of Flagstaff Low Impact Development Guidance Manual for Site Design and Implementation*.~~

~~2. Section 10-30.70.040, Project Siting.~~

~~3. Division 10-50.90, Resource Protection Standards.~~

~~1.3.120 Solid Waste Management~~

~~A. Intent. Part of a sustainable society involves the efficient use of resources. An easy way to more efficiently use resources is to reduce consumption, reuse or recycle materials and compost biodegradable materials. Only those items that cannot be reused, recycled or composted should be transported to a processing facility. The following guidelines are intended to provide guidance on:~~

~~1. Reducing material consumption;~~

~~2. Reusing and recycling materials (on-site to the maximum extent feasible);~~

~~3. Composting biodegradable materials; and~~

~~4. Transporting excess solid waste to processing facilities.~~

~~B. General Guidelines.~~

~~1. Applicants with commercial or institutional uses are required to estimate volumes of waste generation for the proposed development, including estimations of anticipated seasonal fluxes, based on known quantities or comparable developments in the area and submitted to the~~

~~Director. The estimation provided should be used as a baseline for solid waste generation and to develop an overall reduction goal over the course of first 10 years of operation.~~

~~2. Applicants for commercial and residential structures containing three or more units are required to designate an accessible area for the separation and storage of recyclables, landfill waste and compostable materials. Areas should be well lit for safety and clearly labeled.~~

~~C. Construction Waste Guidelines.~~

~~1. Applicants should submit a construction waste management program for all developments to include a description of the following actions and items:~~

~~a. Designate a specific area on the construction site where recyclable materials will be sorted;~~

~~b. Contractors should check with local waste disposal agencies to determine whether recycling services are available for construction waste materials, including but not limited to cardboard, metals, concrete, asphalt, land clearing debris, clean dimensional wood, glass, plastic, gypsum board, carpet and insulation materials;~~

~~c. Contractors should investigate and utilize any opportunity for salvage of waste materials that can be donated to regional charitable organizations; and~~

~~d. No wood waste should go to landfills.~~

~~2. Contractors should clean up all trash and debris on the construction site at the end of each day.~~

~~3. A minimum of 50 percent, calculated by weight or by volume, of construction, demolition, land clearing, and non-hazardous wastes generated through construction or infrastructure development of a site should be recycled, reused or salvaged.~~

~~4. Lightweight materials, packaging and other items should be covered, weighted down or otherwise secured to prevent wind from blowing such materials off the construction site.~~

~~5. Dirt, mud or debris resulting from activity on each construction site should be promptly removed from roads, open spaces and driveways and should not leave the construction site.~~

~~6. The resulting waste stream from clearing and grubbing should be source separated and composted, and may not enter the general solid waste stream.~~

~~D. Resources.~~

~~1. City of Flagstaff Building Code.~~

~~2. City of Flagstaff Solid Waste Code, City Code Chapter 7-04.~~

Appendix 1~~.~~**4**

Bicycle Parking Space Design Requirements

Sections:

1~~.~~**4**.010 Purpose

1~~.~~**4**.020 Applicability

1~~.~~**4**.030 Standard Bicycle Rack Design Requirements

1~~.~~**4**.040 Standards for Indoor Secure Bicycle Parking Spaces

1~~.~~**4**.050 Standards for Bicycle Lockers

1~~.~~**4**.010 Purpose

A. It is the purpose of this Appendix to establish the minimum acceptable standards for bicycle parking spaces that are required by the Zoning Code.

1~~.~~**4**.020 Applicability

A. Requirements of this Appendix shall apply to all bicycle parking spaces provided on a Development Site within the Flagstaff city limits.

1~~.~~**4**.030 Standard Bicycle Rack Design Requirements

A. Rack Design.

1. Each rack shall be provided in accordance with one of the designs indicated in Figure 1~~.~~**4**.030.A., unless an alternative design is allowed in accordance with subsection C. of this section.

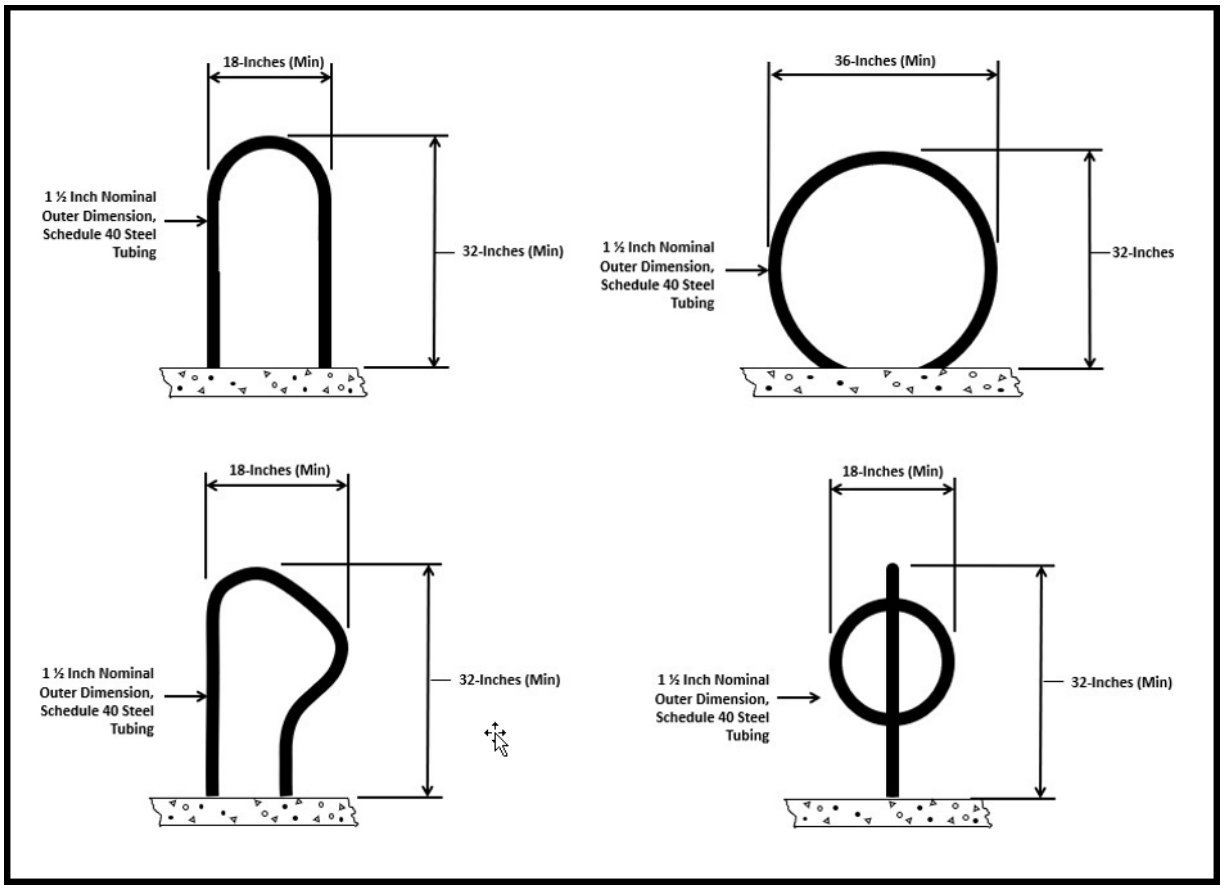


Figure 1~~.~~**4**.030.A. Rack Designs

B. Rack Placement.

1. The bicycle rack(s) shall be:

a. Placed in an area that complies with the location provisions of Section 10-50.80.050.B., is highly visible, well illuminated, has frequent pedestrian activity, and is in accordance with Figure 1~~.~~**4**.030.B.1.; and

b. Securely mounted with a tamper-proof mounting technique to an impervious concrete, paver, or asphalt surface, unless an alternative surface is approved by the Director.

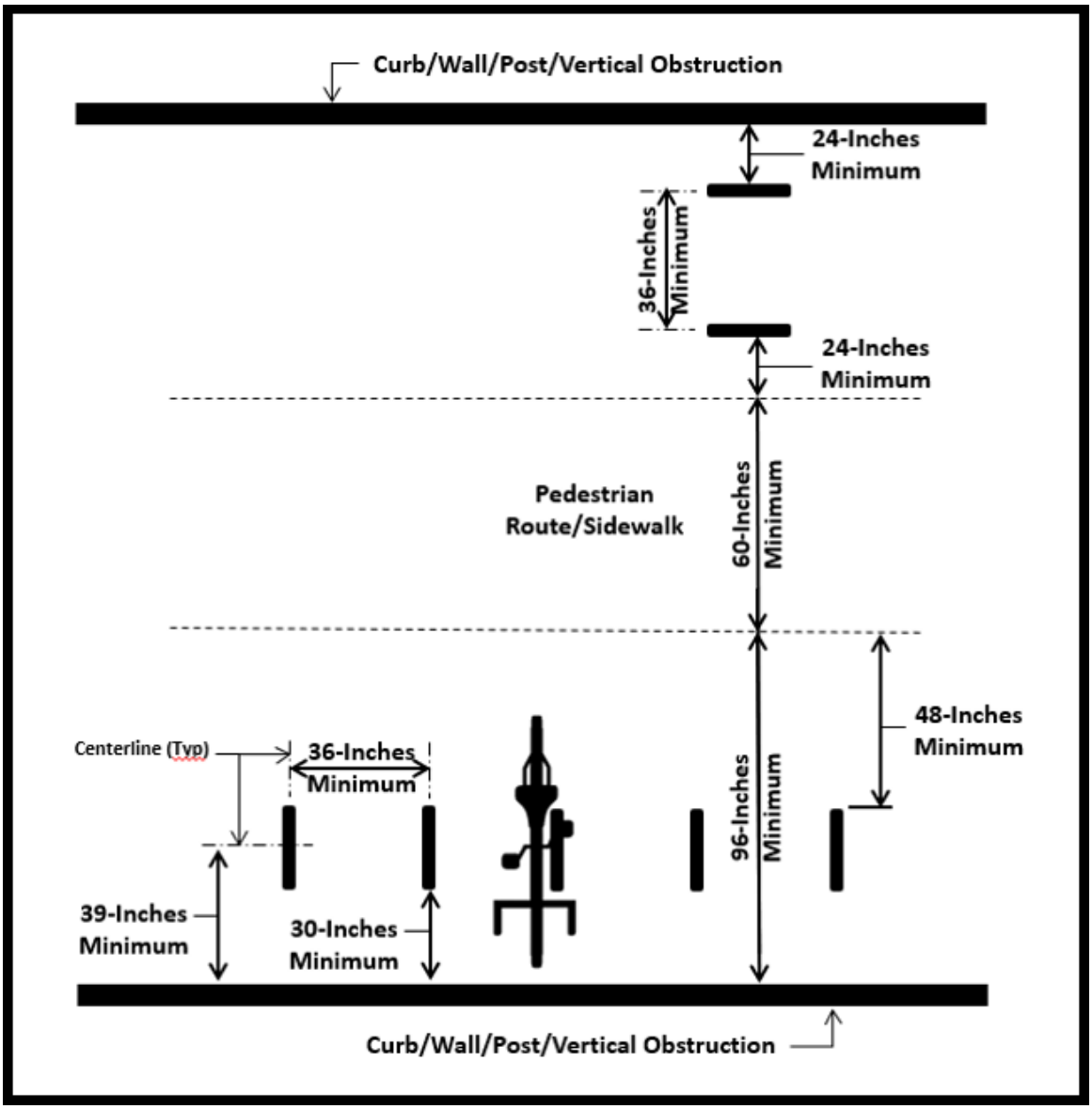


Figure 1~~.~~**4**.030.B.1. Bicycle Rack Placement

2. The placement of a bicycle rack shall not interfere with pedestrian movements.

3. Any bicycle rack(s) located within a parking area shall be within a barrier consisting of bollards, curbs, curb-bumpers, fences, planting areas, or a similar barrier approved by the Director.

C. Alternative Bicycle Rack Designs. The Director may approve an alternative rack design that complies with the following requirements:

1. The rack shall allow the bicycle frame and one or both wheels to be secured with a standard U-lock;

2. The rack shall be designed to support a bicycle frame in two places in a manner that does not cause damage to the wheels or allow the bicycle to tip over;

3. The rack shall be constructed of a material of sufficient strength that resists cutting, rust, bending, and deformation (Schedule 40 metal pipe is the minimum standard); and

4. The rack is not a design similar to types indicated in Figure 1~~.~~**4**.030.C.4.

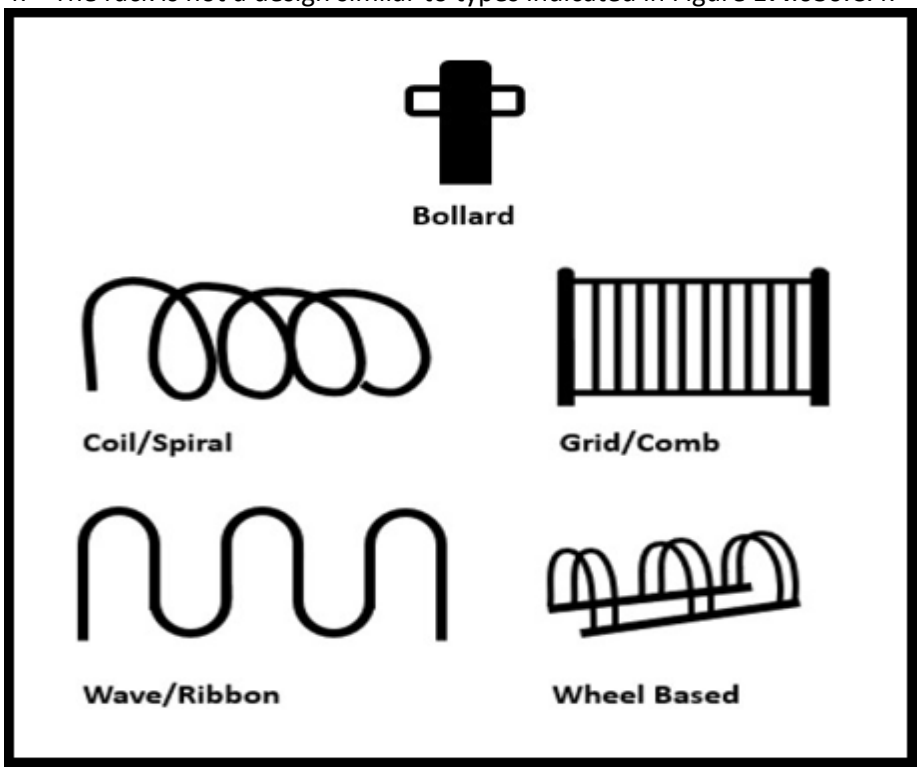


Figure 1~~.~~**4**.030.C.4. Unacceptable Bicycle Rack Designs

1~~.~~**4**.040 Standards for Indoor Secure Bicycle Parking Spaces

A. Secure Bicycle Parking Space Design.

1. The required secure bicycle parking spaces shall be in separate room(s) or cage(s) (the "facilities") designed for bicycle storage within a building or parking structure.

2. The facilities shall be:

a. On the ground level, or another level that has elevator access; provided, that the elevator has an interior width or depth of at least six feet;

b. Accessed through a door or gate that utilizes an electronic keypad and code, security pass card, or a similar electronic system approved by the Director;

c. In a location that is illuminated in accordance with the Illuminating Engineering Society (IES) of North America (IESNA) standards for security;

d. Limited to the storage of bicycles; and

e. Include bicycle racks or lockers.

3. The bicycle rack(s) shall:

a. Conform with Section 1~~.~~**4**.030.A., unless an alternative design is allowed in accordance with Section 1~~.~~**4**.030.C.;

b. Be securely mounted with a tamper-proof mounting technique to an impervious concrete, paver, or asphalt surface; and

c. Be placed in accordance with Figure 1~~.~~**4**.040.A.3.c., unless an alternative configuration is approved by the Director.

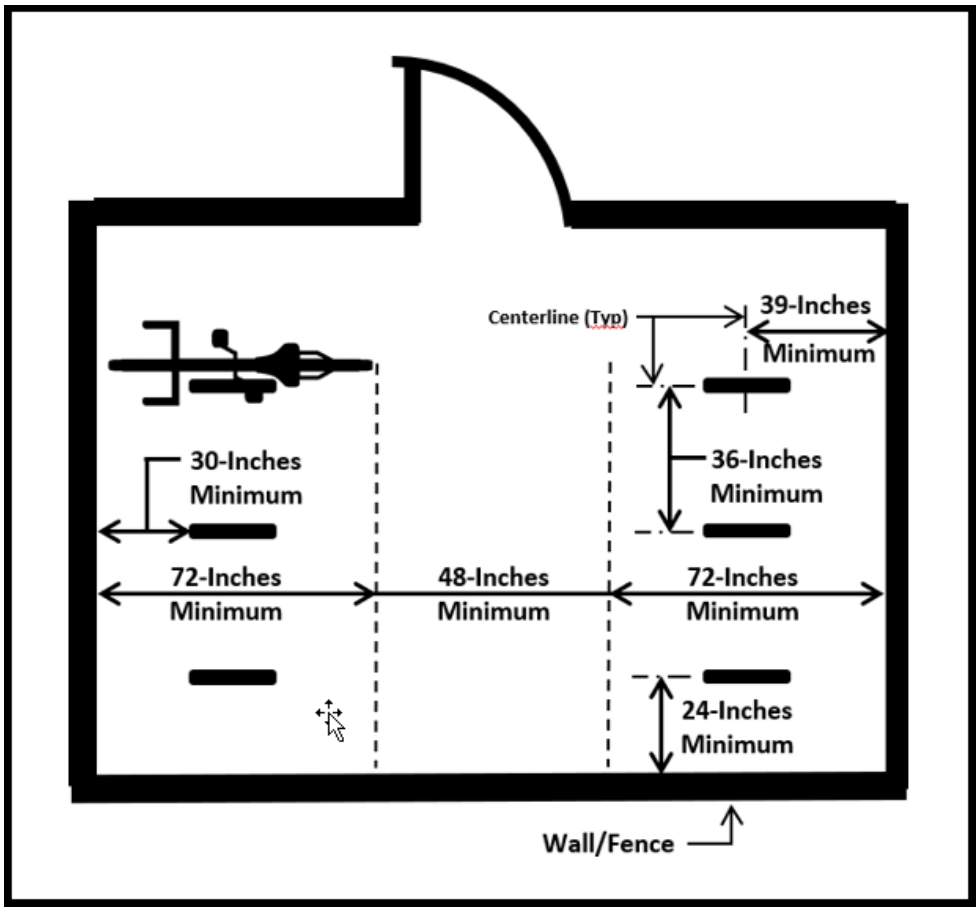


Figure 1.4.040.A.3.c. Bicycle Storage Room/Cage

1.4.050 Standards for Bicycle Lockers

A. Bicycle Locker Design and Location Requirements.

1. The lockers shall be constructed of metal. If windows are provided in the locker, the windows shall be constructed with unbreakable material. Plastic lockers are prohibited.

2. The lockers shall utilize an integral mechanical or digital ("smart") locking mechanism. Lockers that use hasp or mechanisms that allow the use of user locks is prohibited.

3. Stacked lockers shall have a wheel track to guide the bicycle into the locker.

4. Lockers located within a parking area shall be within a barrier consisting of bollards, curbs, curb-bumpers, fences, planting areas, or similar barriers approved by the Director.

5. Lockers placed outdoors shall be within 50 feet of a primary resident entry to a building. The locker(s) shall not be placed between a building and a street.

6. The lockers shall be in a location that is illuminated in accordance with the Illuminating Engineering Society (IES) of North America (IESNA) standards for security.

7. Lockers placed in a building or parking structure shall be on the ground level, or another level that has elevator access, provided that the elevator has an interior width or depth of at least six feet.

8. The placement of a locker shall not interfere with pedestrian movements.

9. The size and placement of the lockers shall conform with Figure 1~~.~~**4**.050.A.9., unless an alternative configuration is approved by the Director.

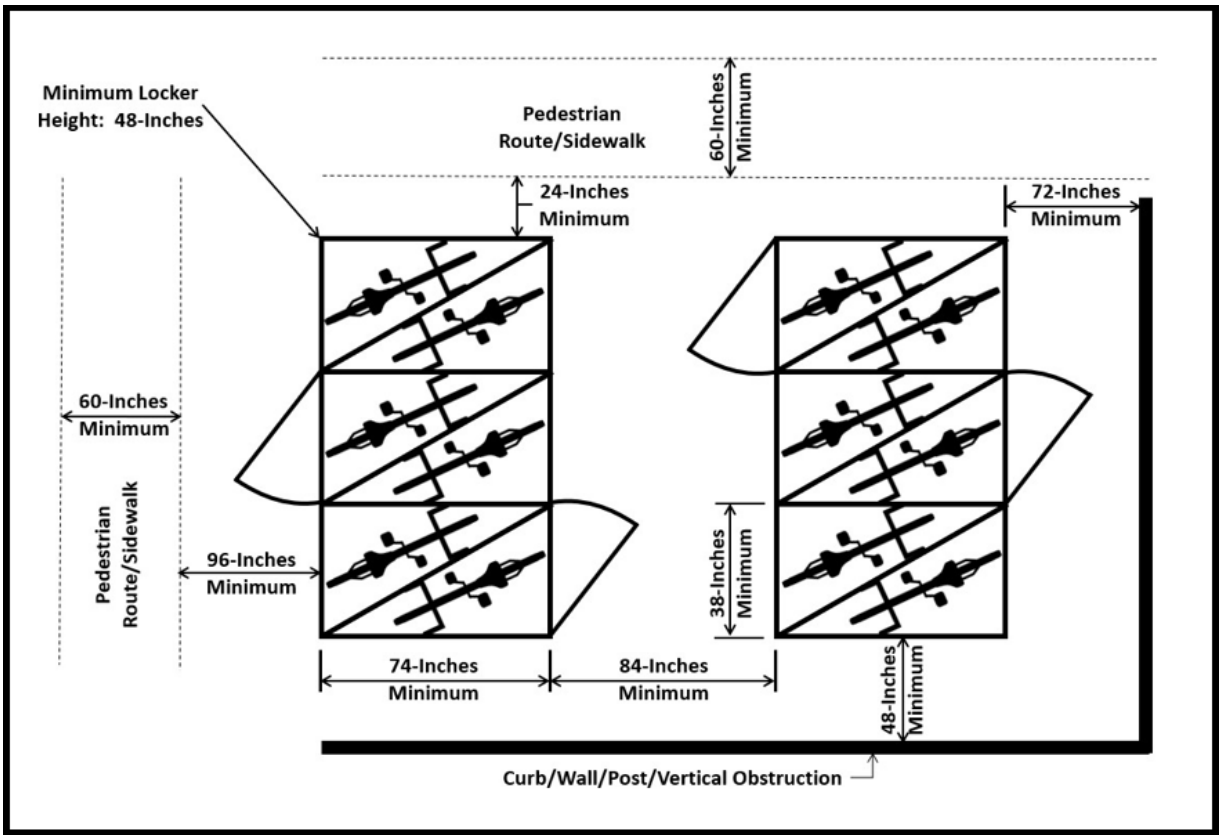


Figure 1~~.~~**4**.050.A.9. Bicycle Locker Size and Placement

~~Appendix 2~~

~~Planning Fee Schedule~~

~~**A. By separate ordinance, the City Council shall adopt applicable fees for planning and related applications and/or services.**~~

~~**B. The applicable fee schedule shall be available at the Community Development Division.**~~

Appendix ~~3~~2

City of Flagstaff Landscape Plant List

Sections:

~~3~~2.010 Purpose

~~3~~2.020 Organization of the Landscape Plant List

~~3~~2.030 Landscape Plant List

~~3~~2.010 Purpose

The City of Flagstaff Landscape Plant List is a compilation of recommended landscape plant types that are well-suited for survival and sustainable application in Flagstaff's unique climate and soil conditions. Plant types were selected based upon the research and recommendations of local landscape architects, landscape professionals and concerned citizens. This list is intended as a guide for the landscape requirements of Division 10-50.60, Landscaping Standards, of the Zoning Code, and is not intended to be an all-inclusive list of acceptable landscape plants.

~~3~~2.020 Organization of the Landscape Plant List

A. The plants contained in this appendix are divided into eight separate categories, as follows, and are intended to meet a variety of landscaping needs and circumstances.

1. Trees (Deciduous);
2. Trees (Evergreen);
3. Shrubs (Deciduous);
4. Shrubs (Evergreen);
5. Groundcovers;
6. Vines;
7. Grasses; and
8. Perennials.

B. Within each category, the plants are arranged alphabetically by botanical name, with the common name listed in the adjacent right column.

C. The following supplemental information is also provided in the table for each plant type:

1. Native or Naturalized. This indicates whether the plant is native to the Flagstaff region, or if it has been naturalized to the local environment.

2. Overstory or Understory (Trees Only).

a. Overstory trees are deciduous or evergreen trees that are generally in excess of 12 feet in height, under which other understory trees and shrubs may be planted.

b. Understory trees may be either deciduous or evergreen, and grow under taller, overstory trees. These trees are usually no more than 10 to 12 feet in height, and therefore may be appropriate for planting under overhead power lines. Understory trees add structure, texture, color and multi-season interest to a landscape design.

3. Sun Requirements. The sun requirements of each plant are indicated as follows, and are intended to assist in the proper placement of plant types in relation to the sun.

a. S = Full sun;

b. PS = Partial shade; and

c. SH = Full shade.

4. Water Needs. The water needs of each plant are indicated as follows, and are intended to assist in the proper placement of plant types according to water consumption and therefore their placement in different landscape zones.

a. L = Low;

b. M = Medium; and

c. H = High.

5. Spacing. Spacing information is provided for those plants which require a minimum separation in order to achieve greatest success.

6. Special Characteristics. Special characteristics include supplemental information specific to each plant type, such as growth rate, leaf color, shape, and ideal environment for planting.

7. Notes/Comments. Notes and comments provide additional plant information, such as root characteristics, preferred soil types and maintenance needs.

8. Parkways and Medians. These columns identify those plants that have been pre-approved by the City Parks Division for placement in parkways and medians based on their size at maturity and maintenance requirements.

9. Approved for ROW. This column identifies those plants that have been pre-approved by the City Parks Division for placement in City rights-of-way based on their size at maturity and maintenance requirements.

~~3~~2.030 City of Flagstaff Landscape Plant List

~~Appendix 4~~

~~Outdoor Lighting Reference Materials~~

~~Sections:~~

~~4.010 – Purpose~~

~~4.020 – Typical Lumen Outputs and Energy Costs for Outdoor Lighting (Guide Only)~~

~~4.030 – Light Code Verification~~

~~4.040 – Power Costs per 100 Maintained Lumens~~

~~4.050 – Typical Lumen Outputs for "Neon" Luminous Tube Lighting~~

~~4.010 Purpose~~

~~This appendix includes information useful to an applicant when applying the requirements of Division 10-50.70, Outdoor Lighting Standards. The information in this Appendix was developed in September 2010.~~

~~4.020 Typical Lumen Outputs and Energy Costs for Outdoor Lighting (Guide Only)~~

~~In the tables that follow, initial lamp lumen outputs for typical lighting products, or specific lighting products if indicated, except for sports lighting are provided. For products with a range of outputs at a given wattage, the highest typical values are listed. These initial output values are the values considered by most lighting codes that specify shielding requirements based on threshold lamp lumen outputs or limit total lamp lumen outputs for development projects.~~

~~Per year power costs are based on 4,000 hours operation (approximately all night every night) and $0.10/kWh energy cost (data from September 2010). Power costs are for lamps only; they do not include ballast losses used with HID (HPS and MH), LPS and fluorescent lamps. Inclusion of these electrical losses will increase electrical consumption for these lights about 10 to 20 percent. Cost per 100 "maintained" lumens is calculated using "end of life" outputs, using the following lamp lumen depreciation (LLD) factors: 0.95 (LPS), 0.73 (HPS), 0.80 (FL T-12), 0.90 (FL T-8), 0.62 (standard MH), 0.82 (INC) and 0.93 (TH). LLD values for pulse start metal halide vary for the lamps listed from about 0.44 to 0.66 – typical end-of-life values listed by the manufacturers are used for these products. End-of-life figures, rather than initial or "mean" outputs, are most appropriate when comparing outdoor lighting systems where recommended lighting practices specify minimum maintained illuminances (such as roadways and parking lots) and lamps are changed at burnout – a most common maintenance practice.~~

~~Actual in-service lumen outputs, power cost figures, and overall operation costs will depend on the particular lamp, ballast, local power rates, and installation and maintenance details. The different lamp types and wattages have differing replacement costs and differing lifetimes before burnout, so lead to different costs associated with lamp replacement. These figures are offered only as approximates, though representative values for rough lighting system power cost comparison and approximate verification of lamp lumen outputs must be submitted with lighting plans.~~

~~LED lighting is a new and fast-evolving technology. Representative figures for cool-white (4,000 – 6,000K CCT) products are included for completeness, but the products available change frequently and lumen packages are highly variable.~~

~~4.030 Light Code Verification~~

~~Actual initial lumen outputs of lamps vary from manufacturer to manufacturer, depend on specific lamp and ballast specifications, and for metal halide may depend on lamp orientation. For determining compliance with light codes that have lumen specifications (such as shielding thresholds or lumens per acre caps – see the *IDA Outdoor Lighting Code Handbook Pattern Lighting Code*) the figures presented in this table are considered by most jurisdictions to be adequate. Technically, lighting plan submittals typically are to include the lumen outputs of the actual lamps proposed, but if values from this table are matched to the lamp type and wattage of the proposed lighting product, they in general will be within about 10 percent or better of the true output.~~

~~"Neon" Lighting: For luminous output of luminous tube or "neon" products, see Typical Lumen Outputs for "Neon" Luminous Tube Lighting.~~

~~"Effective" Lumens: For those interested in the effects of the eye's spectral (Purkinje) shift on the relative efficiencies of the various lamp types, see the discussion of these issues in the *IDA Outdoor Lighting Code Handbook*.~~

~~Abbreviations~~	
~~LPS~~	~~Low pressure sodium~~
~~HPS~~	~~High pressure sodium~~
~~MH~~	~~Metal halide~~
~~LED~~	~~Light emitting diode~~

~~Abbreviations~~	
~~FL~~	~~Fluorescent~~
~~PL~~	~~Compact fluorescent~~
~~INC~~	~~Incandescent~~
~~TH~~	~~Tungsten halogen~~

~~4.040 Power Costs per 100 Maintained Lumens~~

~~The tables that follow show the power costs per 100 maintained lumens for various lamp types. The power costs are based on data from September 2010.~~

~~Lamp Wattage~~	~~Lumen Output~~		~~Power Cost~~	~~Cost per 100 Lumens~~
	~~(initial)~~	~~(maintained)~~	~~(per year)~~	~~(per year)~~
~~Low-Pressure Sodium (LPS)~~				
~~18~~	~~1800~~	~~1800~~	~~$7.20~~	~~$0.40~~
~~35~~	~~4800~~	~~4800~~	~~$14.00~~	~~$0.29~~
~~55~~	~~8000~~	~~8000~~	~~$22.00~~	~~$0.28~~
~~90~~	~~13500~~	~~13500~~	~~$36.00~~	~~$0.27~~
~~135~~	~~22500~~	~~22500~~	~~$54.00~~	~~$0.24~~
~~180~~	~~33000~~	~~33000~~	~~$72.00~~	~~$0.22~~
~~High-Pressure Sodium (Clear) (HPS)~~				
~~35~~	~~2250~~	~~1643~~	~~$14.00~~	~~$0.85~~
~~50~~	~~4000~~	~~2920~~	~~$20.00~~	~~$0.68~~
~~70~~	~~6300~~	~~4599~~	~~$28.00~~	~~$0.61~~
~~100~~	~~9500~~	~~6935~~	~~$40.00~~	~~$0.58~~
~~150~~	~~16000~~	~~11680~~	~~$60.00~~	~~$0.51~~
~~200~~	~~22000~~	~~16060~~	~~$80.00~~	~~$0.50~~

~~Lamp Wattage~~	~~Lumen Output~~		~~Power Cost~~	~~Cost per 100 Lumens~~
	~~(initial)~~	~~(maintained)~~	~~(per year)~~	~~(per year)~~
~~250~~	~~29000~~	~~21170~~	~~$100.00~~	~~$0.47~~
~~310~~	~~37000~~	~~27010~~	~~$124.00~~	~~$0.46~~
~~350~~	~~46500~~	~~33945~~	~~$140.00~~	~~$0.41~~
~~400~~	~~50000~~	~~36500~~	~~$160.00~~	~~$0.44~~
~~430~~	~~51500~~	~~37595~~	~~$172.00~~	~~$0.46~~
~~Standard Metal Halide (MH)~~				
~~150~~	~~13500~~	~~8413~~	~~$60.00~~	~~$0.71~~
~~175~~	~~15000~~	~~9348~~	~~$70.00~~	~~$0.75~~
~~250~~	~~23000~~	~~14333~~	~~$100.00~~	~~$0.70~~
~~360~~	~~36000~~	~~22434~~	~~$144.00~~	~~$0.64~~
~~400~~	~~40000~~	~~24928~~	~~$160.00~~	~~$0.64~~
~~Pulse Start Metal Halide (MH)~~				
~~50~~	~~3400~~	~~1496~~	~~$20.00~~	~~$1.34~~
~~70~~	~~5600~~	~~2464~~	~~$28.00~~	~~$1.14~~
~~100~~	~~9000~~	~~3960~~	~~$40.00~~	~~$1.01~~
~~150~~	~~14000~~	~~8000~~	~~$60.00~~	~~$0.75~~
~~175~~	~~17500~~	~~11000~~	~~$70.00~~	~~$0.64~~
~~200~~	~~21000~~	~~13800~~	~~$80.00~~	~~$0.58~~
~~250~~	~~25000~~	~~16500~~	~~$100.00~~	~~$0.61~~
~~320~~	~~33000~~	~~21000~~	~~$128.00~~	~~$0.61~~
~~350~~	~~37000~~	~~24000~~	~~$140.00~~	~~$0.58~~
~~400~~	~~44000~~	~~28500~~	~~$160.00~~	~~$0.56~~

~~Lamp Wattage~~	~~Lumen Output~~		~~Power Cost~~	~~Cost per 100 Lumens~~
	~~(initial)~~	~~(maintained)~~	~~(per year)~~	~~(per year)~~
~~450~~	~~50000~~	~~33000~~	~~$180.00~~	~~$0.55~~
~~Light Emitting Diode (LED)~~				
~~63~~	~~3400~~	~~2380~~	~~$25.20~~	~~$1.16~~
~~90~~	~~5400~~	~~3780~~	~~$36.00~~	~~$0.95~~
~~140~~	~~9996~~	~~6997~~	~~$56.00~~	~~$0.80~~
~~210~~	~~12300~~	~~8610~~	~~$84.00~~	~~$0.98~~
~~T12 Cool-White Fluorescent (FL)~~				
~~21~~	~~1190~~	~~952~~	~~$8.40~~	~~$0.88~~
~~30~~	~~2050~~	~~1640~~	~~$12.00~~	~~$0.73~~
~~36~~	~~2450~~	~~1960~~	~~$14.40~~	~~$0.73~~
~~39~~	~~3000~~	~~2400~~	~~$15.60~~	~~$0.65~~
~~50~~	~~3700~~	~~2960~~	~~$20.00~~	~~$0.66~~
~~52~~	~~3900~~	~~3120~~	~~$20.80~~	~~$0.67~~
~~55~~	~~4600~~	~~3680~~	~~$22.00~~	~~$0.60~~
~~70~~	~~5400~~	~~4320~~	~~$28.00~~	~~$0.65~~
~~75~~	~~6300~~	~~5040~~	~~$30.00~~	~~$0.60~~
~~T12 High-Output (800 ma) Fluorescent (FL)~~				
~~75~~	~~5150~~	~~4120~~	~~$30.00~~	~~$0.73~~
~~80~~	~~5600~~	~~4480~~	~~$32.00~~	~~$0.71~~
~~85~~	~~6900~~	~~5520~~	~~$34.40~~	~~$0.62~~
~~95~~	~~8625~~	~~6900~~	~~$38.00~~	~~$0.55~~
~~110~~	~~9500~~	~~7600~~	~~$44.00~~	~~$0.58~~

~~Lamp Wattage~~	~~Lumen Output~~		~~Power Cost~~	~~Cost per 100 Lumens~~
	~~(initial)~~	~~(maintained)~~	~~(per year)~~	~~(per year)~~
~~T8 Fluorescent (FL)~~				
~~17~~	~~1400~~	~~1260~~	~~$6.80~~	~~$0.54~~
~~25~~	~~2225~~	~~2003~~	~~$10.00~~	~~$0.50~~
~~30~~	~~2900~~	~~2610~~	~~$12.00~~	~~$0.46~~
~~32~~	~~3100~~	~~2790~~	~~$12.80~~	~~$0.46~~
~~40~~	~~3725~~	~~3353~~	~~$16.00~~	~~$0.48~~
~~44~~	~~4000~~	~~3600~~	~~$17.60~~	~~$0.49~~
~~55~~	~~5050~~	~~4545~~	~~$22.00~~	~~$0.48~~
~~65~~	~~6100~~	~~5490~~	~~$26.00~~	~~$0.47~~
~~59~~	~~5950~~	~~5355~~	~~$23.60~~	~~$0.44~~
~~86~~	~~8200~~	~~7380~~	~~$34.40~~	~~$0.47~~
~~Compact Fluorescent (PL)~~				
~~7~~	~~400~~	~~320~~	~~$2.80~~	~~$0.88~~
~~9~~	~~600~~	~~480~~	~~$3.60~~	~~$0.75~~
~~13~~	~~900~~	~~720~~	~~$5.20~~	~~$0.72~~
~~18~~	~~1250~~	~~1000~~	~~$7.20~~	~~$0.72~~
~~23~~	~~1500~~	~~1200~~	~~$9.20~~	~~$0.77~~
~~26~~	~~1710~~	~~1368~~	~~$10.40~~	~~$0.76~~
~~32~~	~~2400~~	~~1920~~	~~$12.80~~	~~$0.67~~
~~42~~	~~3200~~	~~2560~~	~~$16.80~~	~~$0.66~~
~~Incandescent (standard) (INC)~~				
~~15~~	~~120~~	~~98~~	~~$6.00~~	~~$6.10~~

~~Lamp Wattage~~	~~Lumen Output~~		~~Power Cost~~	~~Cost per 100 Lumens~~
	~~(initial)~~	~~(maintained)~~	~~(per year)~~	~~(per year)~~
~~25~~	~~210~~	~~172~~	~~$10.00~~	~~$5.81~~
~~40~~	~~490~~	~~402~~	~~$16.00~~	~~$3.98~~
~~60~~	~~855~~	~~701~~	~~$24.00~~	~~$3.42~~
~~75~~	~~1180~~	~~968~~	~~$30.00~~	~~$3.10~~
~~100~~	~~1750~~	~~1435~~	~~$40.00~~	~~$2.79~~
~~150~~	~~2800~~	~~2296~~	~~$60.00~~	~~$2.61~~
~~200~~	~~3850~~	~~3157~~	~~$80.00~~	~~$2.53~~
~~Tungsten Halogen (Quartz) (TH)~~				
~~75~~	~~1400~~	~~1302~~	~~$30.00~~	~~$2.30~~
~~100~~	~~1800~~	~~1674~~	~~$40.00~~	~~$2.39~~
~~150~~	~~2800~~	~~2604~~	~~$60.00~~	~~$2.30~~
~~200~~	~~3600~~	~~2952~~	~~$82.00~~	~~$2.78~~
~~250~~	~~5000~~	~~4650~~	~~$100.00~~	~~$2.15~~
~~300~~	~~6000~~	~~4920~~	~~$123.00~~	~~$2.50~~
~~500~~	~~10100~~	~~9393~~	~~$200.00~~	~~$2.13~~

~~4.050 Typical Lumen Outputs for "Neon" Luminous Tube Lighting~~

~~The tables below list initial luminous outputs, in lumens per foot, for a selection of luminous tube or "neon" products. These values are useful for calculating luminous outputs of decorative, non-sign luminous tube lighting, for determination of compliance with outdoor lighting regulations that address the total amount of light (measured in lumens) used in development projects.~~

~~These figures are values provided by the manufacturers. Actual lumen outputs may vary due to various factors including processing methods and tube age. Many manufacturers carry a greater variety of colors, tube diameters, and current ratings than listed here; contact the manufacturer for detailed information.~~

~~Color~~	~~Tube Diameter and Current Rating~~			
	~~12 mm~~		~~15 mm~~	
	~~30 mA~~	~~60 mA~~	~~30 mA~~	~~60 mA~~
~~EGL 4500 White~~	~~160~~	~~–~~	~~160~~	~~290~~
~~V-4500~~	~~210~~	~~–~~	~~180~~	~~320~~
~~6500 Snow White~~	~~170~~	~~–~~	~~150~~	~~260~~
~~8300 Brite White~~	~~160~~	~~–~~	~~140~~	~~250~~
~~EGL 3500 White~~	~~170~~	~~–~~	~~150~~	~~280~~
~~V-3500~~	~~190~~	~~–~~	~~160~~	~~300~~
~~3000 Warm White~~	~~210~~	~~–~~	~~180~~	~~340~~
~~C.L. Designer 28~~	~~250~~	~~–~~	~~210~~	~~400~~
~~C.L. Designer 30~~	~~260~~	~~–~~	~~220~~	~~410~~
~~C.L. Designer 35~~	~~250~~	~~–~~	~~210~~	~~400~~
~~C.L. Designer 41~~	~~240~~	~~–~~	~~200~~	~~380~~
~~C.L. Designer 65~~	~~240~~	~~–~~	~~200~~	~~390~~
~~EGL H-37 Pink~~	~~120~~	~~–~~	~~110~~	~~210~~
~~Coral Pink~~	~~170~~	~~–~~	~~130~~	~~270~~
~~Flamingo~~	~~125~~	~~–~~	~~100~~	~~200~~
~~Purple~~	~~100~~	~~–~~	~~90~~	~~160~~
~~Violet II~~	~~65~~	~~–~~	~~50~~	~~100~~
~~E-40 Blue~~	~~110~~	~~–~~	~~110~~	~~190~~
~~E-40 Blue (Neon)~~	~~70~~	~~–~~	~~50~~	~~90~~
~~Horizon Blue~~	~~100~~	~~–~~	~~80~~	~~170~~
~~E-12 Turquoise~~	~~180~~	~~–~~	~~170~~	~~310~~

Color	Tube Diameter and Current Rating			
	12 mm		15 mm	
	30 mA	60 mA	30 mA	60 mA
E-20 Turquoise	140	–	130	240
E-21 Aqua	240	–	160	290
E-10 Green	240	–	210	380
Tropic Green	270	–	240	420
Seacrest	190	–	150	290
FMS 8300 Brite White	170	265	145	240
FMS 6500 Snow White	175	275	150	250
BL6500 HO White	195	305	170	280
BL4500 HO White	190	295	160	270
BL3500 HO White	170	270	150	245
BL3000 HO White	160	250	135	225
BL2800 TC White	235	370	205	340
BL32 Aquamarine	150	235	130	215
BL33 Green	250	375	215	365
BL34 Mint Green	105	165	90	150
BL35 Vine Green	145	230	125	210
BL49 Magenta	40	60	35	55
BL50 Ice Blue	45	70	40	65
BL51 Rich Blue	85	135	75	125
BL54 Turquoise	180	280	155	255
BL55 Blue	105	170	100	165

~~Color~~	~~Tube Diameter and Current Rating~~			
	~~12 mm~~		~~15 mm~~	
	~~30 mA~~	~~60 mA~~	~~30 mA~~	~~60 mA~~
~~BL56 Argon Pink~~	~~120~~	~~170~~	~~105~~	~~155~~
~~BL58 Lavender~~	~~90~~	~~140~~	~~80~~	~~125~~
~~BL59 Purple~~	~~50~~	~~70~~	~~45~~	~~60~~
~~BL60 Sun Yellow~~	~~175~~	~~275~~	~~150~~	~~250~~
~~BL62 Clear Gold~~	~~130~~	~~200~~	~~110~~	~~180~~
~~BL73 Deep Aqua~~	~~80~~	~~125~~	~~70~~	~~115~~
~~BL77 Royal Blue~~	~~70~~	~~100~~	~~60~~	~~90~~
~~BL80 Neon Red~~	~~45~~	~~70~~	~~40~~	~~60~~
~~BL92 Emerald Green~~	~~40~~	~~60~~	~~35~~	~~55~~
~~BL94 Bromo Blue~~	~~35~~	~~55~~	~~30~~	~~50~~
~~BL95 Grape~~	~~25~~	~~35~~	~~20~~	~~30~~
~~BL96 Noviol Gold~~	~~95~~	~~150~~	~~80~~	~~135~~
~~BL97 Sunset Gold~~	~~90~~	~~140~~	~~80~~	~~130~~
~~BL98 Ruby Red~~	~~40~~	~~60~~	~~35~~	~~55~~
~~Trilite 6500~~	~~190~~	~~359~~	~~162~~	~~307~~
~~Trilite 5000~~	~~201~~	~~380~~	~~172~~	~~325~~
~~Trilite 4600~~	~~189~~	~~354~~	~~162~~	~~303~~
~~Trilite 4200~~	~~185~~	~~344~~	~~158~~	~~294~~
~~Trilite 3500~~	~~226~~	~~400~~	~~193~~	~~342~~
~~Trilite 3000~~	~~200~~	~~365~~	~~171~~	~~312~~
~~Softlite~~	~~215~~	~~385~~	~~184~~	~~329~~

~~Color~~	~~Tube Diameter and Current Rating~~			
	~~12 mm~~		~~15 mm~~	
	~~30 mA~~	~~60 mA~~	~~30 mA~~	~~60 mA~~
~~Warm White~~	~~154~~	~~287~~	~~132~~	~~246~~
~~White~~	~~174~~	~~318~~	~~149~~	~~290~~
~~White 3500~~	~~169~~	~~282~~	~~145~~	~~241~~
~~Daylight~~	~~196~~	~~354~~	~~168~~	~~303~~
~~White 4500~~	~~192~~	~~344~~	~~164~~	~~294~~
~~V5100~~	~~132~~	~~248~~	~~113~~	~~212~~
~~Northlight~~	~~186~~	~~308~~	~~159~~	~~263~~
~~Snow White~~	~~151~~	~~272~~	~~130~~	~~233~~
~~White 6500~~	~~121~~	~~215~~	~~104~~	~~184~~
~~Super White~~	~~139~~	~~246~~	~~119~~	~~211~~
~~V4T5B~~	~~151~~	~~241~~	~~129~~	~~206~~
~~6500HO~~	~~120~~	~~226~~	~~103~~	~~193~~
~~8300~~	~~116~~	~~204~~	~~99~~	~~175~~
~~2400 White~~	~~186~~	~~329~~	~~159~~	~~281~~
~~Light Blue~~	~~69~~	~~109~~	~~59~~	~~93~~
~~Standard Blue~~	~~44~~	~~77~~	~~38~~	~~66~~
~~Brilliant Blue~~	~~46~~	~~83~~	~~39~~	~~71~~
~~Midnight Blue~~	~~10~~	~~19~~	~~9~~	~~16~~
~~Deep Blue~~	~~7~~	~~12~~	~~6~~	~~11~~
~~Maroon~~	~~2~~	~~4~~	~~2~~	~~3~~
~~Purple~~	~~4~~	~~8~~	~~4~~	~~7~~

~~Color~~	~~Tube Diameter and Current Rating~~			
	~~12 mm~~		~~15 mm~~	
	~~30 mA~~	~~60 mA~~	~~30 mA~~	~~60 mA~~
~~Purple Haze~~	~~34~~	~~55~~	~~29~~	~~47~~
~~Orchid~~	~~44~~	~~76~~	~~37~~	~~65~~
~~Magenta~~	~~71~~	~~120~~	~~61~~	~~103~~
~~Lavender/Lilac~~	~~94~~	~~183~~	~~80~~	~~156~~
~~Peach~~	~~116~~	~~205~~	~~99~~	~~176~~
~~Pale Pink~~	~~109~~	~~184~~	~~93~~	~~157~~
~~Rose Pink~~	~~92~~	~~161~~	~~79~~	~~138~~
~~Argon Pink~~	~~110~~	~~205~~	~~94~~	~~176~~
~~Bright Pink~~	~~47~~	~~76~~	~~40~~	~~65~~
~~Shocking Pink~~	~~45~~	~~71~~	~~38~~	~~61~~
~~Fluorescent Red~~	~~48~~	~~78~~	~~41~~	~~67~~
~~Clear Red~~	~~46~~	~~73~~	~~39~~	~~62~~
~~Ruby Neon~~	~~15~~	~~23~~	~~13~~	~~20~~
~~Brilliant Red~~	~~21~~	~~34~~	~~18~~	~~29~~
~~Argon Red~~	~~24~~	~~34~~	~~21~~	~~30~~
~~Turquoise~~	~~153~~	~~267~~	~~131~~	~~228~~
~~Aquamarine~~	~~150~~	~~262~~	~~128~~	~~224~~
~~Brilliant Yellow~~	~~153~~	~~272~~	~~131~~	~~233~~
~~Buttercup Yellow~~	~~158~~	~~298~~	~~135~~	~~255~~
~~Golden Yellow~~	~~63~~	~~107~~	~~54~~	~~91~~
~~Amber~~	~~54~~	~~78~~	~~46~~	~~67~~

~~Color~~	~~Tube Diameter and Current Rating~~			
	~~12 mm~~		~~15 mm~~	
	~~30 mA~~	~~60 mA~~	~~30 mA~~	~~60 mA~~
~~Brilliant Orange~~	~~61~~	~~161~~	~~46~~	~~138~~
~~Standard Green~~	~~160~~	~~313~~	~~158~~	~~268~~
~~Emerald Green~~	~~231~~	~~411~~	~~198~~	~~351~~
~~Deep Green~~	~~17~~	~~27~~	~~14~~	~~23~~
~~Lime Green~~	~~123~~	~~205~~	~~105~~	~~176~~
~~Apple Green~~	~~161~~	~~270~~	~~138~~	~~230~~
~~Ultra Violet~~	~~16~~	~~29~~	~~14~~	~~25~~
~~New Gold~~	~~131~~	~~231~~	~~112~~	~~198~~
~~Old Gold~~	~~104~~	~~185~~	~~89~~	~~158~~
~~Brite Yellow~~	~~143~~	~~251~~	~~122~~	~~215~~
~~Vee Green~~	~~184~~	~~313~~	~~157~~	~~268~~
~~Neo Blue~~	~~3~~	~~5~~	~~2~~	~~4~~
~~Neo Ruby~~	~~13~~	~~20~~	~~11~~	~~17~~
~~Green~~	~~385~~	~~655~~	~~325~~	~~575~~
~~Aquamarine~~	~~335~~	~~570~~	~~280~~	~~500~~
~~Warm White~~	~~240~~	~~435~~	~~200~~	~~380~~
~~Allura~~	~~225~~	~~400~~	~~190~~	~~350~~
~~Decora~~	~~220~~	~~395~~	~~185~~	~~345~~
~~Turquoise~~	~~215~~	~~375~~	~~180~~	~~330~~
~~4500 White~~	~~195~~	~~335~~	~~165~~	~~295~~
~~Clear Bright Yellow~~	~~195~~	~~335~~	~~165~~	~~295~~

~~Color~~	~~Tube Diameter and Current Rating~~			
	~~12 mm~~		~~15 mm~~	
	~~30 mA~~	~~60 mA~~	~~30 mA~~	~~60 mA~~
~~3500 White~~	~~190~~	~~330~~	~~160~~	~~290~~
~~6500 Snow White~~	~~180~~	~~330~~	~~150~~	~~285~~
~~Mercury Rose~~	~~180~~	~~330~~	~~150~~	~~285~~
~~8300 Bright White~~	~~165~~	~~295~~	~~140~~	~~260~~
~~Clear Gold II~~	~~175~~	~~295~~	~~145~~	~~260~~
~~Pink White~~	~~135~~	~~240~~	~~115~~	~~210~~
~~Blue~~	~~130~~	~~230~~	~~110~~	~~200~~
~~Sparkling Blue~~	~~105~~	~~175~~	~~90~~	~~155~~
~~Green/Neon~~	~~95~~	~~150~~	~~80~~	~~130~~
~~Blue/Neon~~	~~85~~	~~135~~	~~70~~	~~120~~
~~Purple~~	~~5~~	~~80~~	~~40~~	~~70~~
~~Clear Red~~	~~43~~	~~61~~	~~36~~	~~54~~

Appendix ~~5~~3

Additional Information Applicable to Division 10-50.90, Resource Protection Standards

Sections:

~~5~~3.010 Purpose

~~5~~3.020 Implementation of the Flagstaff Fire Department (FFD) Firewise Process

~~5~~3.030 Summary of How to Apply Resource Protection Standards

~~5~~3.010 Purpose

This appendix provides additional information relative to the application of standards to protect rural floodplains, steep slopes and forest resources as required in Division 10-50.90, Resource Protection Standards. Section 5.020 describes how the Flagstaff Fire Department implements various codes to ensure that Flagstaff is a firewise community by providing an overview of the stewardship programs that typically occur before forest resources are calculated on a site subject to new development. Section 5.030 provides an overview of how to apply the standards for the protection of rural floodplains, steep slopes and forest resources as required in Division 10-50.90, Resource Protection Standards.

~~5~~3.020 Implementation of the Flagstaff Fire Department (FFD) Firewise Process

A. The *International Code Council (ICC) International Wildland Urban Interface Code (WUI)* current edition (in 2006 the City adopted the edition which may be updated in the future as new editions are published) was adopted with amendments into Title 5 (Fire Prevention Code) of the City Code in February 2008.

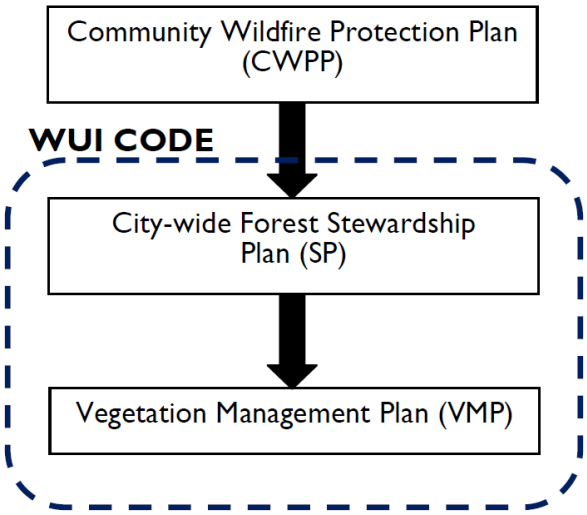
B. With regard to wildland stewardship, forest health and community protection from wildfire, the City has a number of documents that are closely related. The Resource Protection Standards in the Zoning Code (Division 10-50.90) are applied subsequent to the implementation of these documents/processes. The figure below summarizes the resource protection process in Flagstaff.

Figure ~~5~~3-020A

Summary of the Tree Resource Process

As Applied by the Flagstaff Fire Department

Applies to Greater Flagstaff:



Establishes priorities for protecting Flagstaff from wildfire.

Internal to City:

A general statement of what needs to occur to protect Flagstaff from fire and to restore a healthy forest.

Site Specific Operations:

Essentially implements the WUI on a development site.

1. Community Wildfire Protection Plan (CWPP).

    a. The Healthy Forests Restoration Act passed by Congress in November 2003 authorizes development of CWPPs.

    b. The CWPP has been adopted by the Council and the Coconino County Board of Supervisors and has been approved by the State of Arizona.

    c. The CWPP is consistent with the Governor's "Statewide Strategy for Restoring Arizona's Forests."

    d. It establishes priorities for protecting Greater Flagstaff (actually a bigger area than the FMPO boundary) from wildfire by establishing goals, policies and strategies for the long term protection of Greater Flagstaff from wildfire.

2. City-Wide Forest Stewardship Plan by the Flagstaff Fire Department.

    a. The City-wide forest stewardship plan essentially implements the WUI Code.

    b. It is implemented within the Flagstaff city limits only.

    c. The plan is a generic statement of coordination of the general issues and of what needs to occur to protect the community from fire and to restore forest health.

3. Site Specific Vegetation Management Plan.

   a. A vegetation management plan implements the WUI Code on a site-specific basis.

   b. It establishes site-specific operations for tree thinning or removal.

   c. It is a refinement of the City-wide forest stewardship plan.

~~5~~3.030 Summary of How to Apply Resource Protection Standards

The following narrative provides a step-by-step summary of resource protection requirements and procedures as specified in Division 10-50.90, Resource Protection Standards. This division should be referred to for additional information.

A. The City of Flagstaff Overlay District Map (available at www.flagstaff.az.gov/zoningcode) should be consulted to determine whether the proposed development site is subject to resource protection standards. All parcels located within the Resource Protection Overlay (RPO) are subject to resource protection (See Section 10-40.50.030(A)(4), Resource Protection Overlay).

B. The minimum amount of resources required to be retained and protected on the subject site must be determined.

1. Floodplain Resources. Defined in Section 10-50.90.040, Floodplains, these include urban and rural floodplains. While urban floodplains may sometimes be disturbed (subject to review and approval by the Stormwater Manager), rural floodplains must remain undisturbed. Rural floodplains are mapped in Section 10-90.40.030, Rural Floodplain Map.

2. Steep Slope Resources. Table 10-50.90.050.A, Slope Protection Thresholds, indicates the slope area which must be protected based upon the steepness of the slope and the zone in which the site is located. A methodology for calculating steep slopes on a site is provided in Section 10-50.90.050(C).

3. Forest Resources. Table 10-50.90.060.A, Forest Resource Protection Thresholds as a Percentage of Site Area, establishes the minimum amount of forest resources that must be retained on the site by land use category.

4. The table below provides a summary of resource protection factors as a percentage of site area according to the zone/land use in which the site is located.

Summary of Resource Protection Factors as a Percentage of Site Area					
Resource Type	Public Lands	Residential	Commercial	Industrial	TNCP
Rural Floodplain	100%				
Urban Floodplain	N/A[1]				
Slopes:					
0 – 16.99%	No protection required				
17% – 24.99%	60%	70%	60%	60%	70%
25% – 34.99%	80%				
35% and greater	No development allowed[2]				
Forest	30%	50%	30%	20%	30%

End Notes:

[1] Proposed disturbances to urban floodplains shall be reviewed by the Stormwater Manager.

[2] Even though no development is allowed on areas with slopes of 35% and greater, these slope areas may be used to determine the overall resource area to be protected.

C. A resources survey for the site is required to be completed in compliance with the requirements of Section 10-50.90.070, Resources Survey Requirements. This survey requires the identification of all natural resources on the site and a recommendation for protection and/or mitigation measures. The necessary maps (topographic, aerial photograph, etc.) and a narrative describing each resource as it exists on the development site shall also be provided in accordance with the following:

1. Floodplains: Section 10-50.90.040, Floodplains;

2. Steep slopes: Section 10-50.90.050, Steep Slopes; and

3. Forest: Section 10-50.90.060, Forest, and Sections 10-50.90.070(C)(3) through (9), and 10-50.90.070(D).

D. The details of how to calculate the amount of resources to be protected on a site are explained in the narrative below. An example site is described in subsection (F) of this section.

1. Rural Floodplains. Calculate the area of the development site located in rural floodplains, as designated on the Rural Floodplain Map (Division 10-90.30). Indicate these areas on a topographic map of the development site, and include a narrative describing these areas. Apply the protection thresholds summarized in the table to determine the areas required for protection of rural floodplains.

2. Steep Slopes. Calculate the total area of the development site located in areas designated as steep slopes, as defined in Table 10-50.90.050.A, Slope Protection Thresholds. Indicate the required area of each slope category to be protected on a topographic map of the development site by applying the protection thresholds summarized in the table above to the total area with slopes. Include a narrative describing these areas.

3. Forest Resources. Submit maps and a narrative describing the forest resources located on the development site.

a. Determine the minimum percentage of forest resources which must be protected on the development site as designated in Table 10-50.90.060.A, Forest Resource Protection Thresholds as a Percentage of Site Area.

b. Provide a description of the ecological value of the ponderosa pine forest located on the development site, based upon tree size, condition and location.

c. Perform a survey of forest resources located on the development site, with required methods of survey dependent upon the size of the site. Note that the survey of forest resources will commence after any required pre-thinning as approved by the Flagstaff Fire Department has been completed.

(1) For sites less than five acres in size, 100 percent of the site must be surveyed for forest resources.

(2) For sites five or more acres in size, sampling of forest resources may be employed, using the following procedure to ensure that a diverse sample of the forest is achieved:

(a) The total site area shall be sampled by using a technique that distributes one-tenth acre circular plots across a minimum of 15 percent of the site. The one-tenth acre circular plots shall be distributed across the site on a series of transect

lines. The distance between the sample plots along the transect line and the distance between the transect lines should be approximately the same, and will vary based on the size of the site to ensure that a 15 percent representative sample is achieved.

(b) Each circular plot will be mapped on a site plan that accurately shows tree locations, or on a recent aerial photograph of the site. The centers of the one-tenth acre plots must be staked and numbered, and included on the site plan to enable verification of the survey's accuracy. The circular plots must be placed no closer than the radius of the plot (i.e., 37 feet) from any property line.

(c) Within each circular plot, all trees will be mapped, and with each tree, data shall be collected to identify its species, ecological value, overall health and condition, and diameter. Based on the diameter of the tree, points shall be assigned to the tree from Table 10-50.90.070.A, Point Rating System for Ponderosa Pines, or Table 10-50.90.070.B, Point Rating System for Other Native Trees.

(d) After completing a survey of all trees within all the circular plots on the site to achieve a minimum 15 percent sample of the area of the site, the data can be compiled to calculate the total number of points and trees that need to be protected on the site.

(e) Note that Section 10-50.90.030, Priority for Resource Protection, provides specific standards to prioritize the protection of trees within a development site.

(3) After mapping of the forest resources has been completed and points have been assigned as described above, the forest resources to be protected on the site are determined by applying the protection thresholds summarized in the table above to the total number of points for the trees mapped on the site. Note that the applicant has flexibility to determine which trees may be removed and which are required to be preserved (provided that no less than the required minimum number of trees as established in the summary table provided above are preserved), based on their locations on the site.

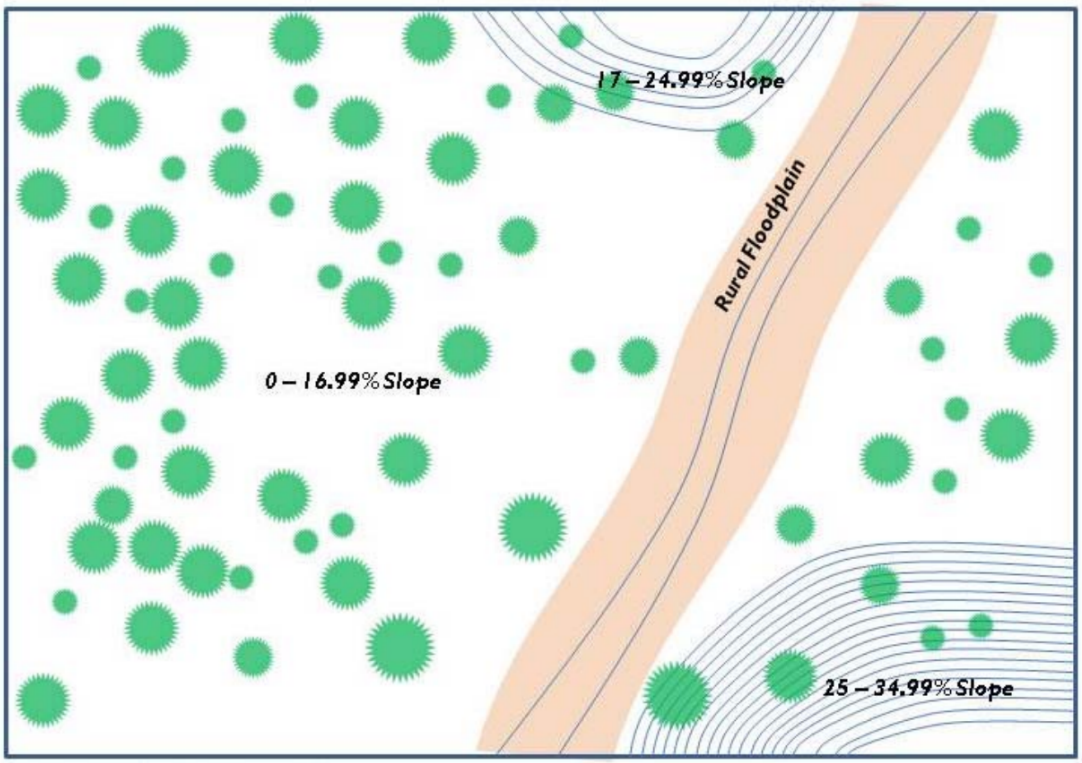
(4) When determining which trees may be removed and which should be preserved, it is important to apply the standards in Section 10-50.90.030(B)(3), Priority for Resource Protection, as this section establishes rules for prioritizing forest resource protection. For example, forest resources located in areas that connect to urban and rural floodplains or that are located in steep slope areas are more important than those located elsewhere on the site.

E. A natural resources protection plan, the purpose of which is to protect existing trees during construction, shall also be prepared in accordance with Section 10-50.90.080, Natural Resources Protection Plan, to be submitted with the grading plan for the development site.

F. Sample Resources Calculation. A hypothetical 8.8-acre site that includes a rural floodplain, steep slopes and forest resources is mapped in the illustration below.

Figure ~~5~~3.030B

Sample Site Plan – Existing Conditions



Site Size = 8.8 ac (383,320 sq. ft.)

1. Rural Floodplain. The rural floodplain covers approximately 51,000 square feet of the site, and it must be 100 percent protected. The only permitted disturbance to this area includes roadway and utility crossings.

2. Steep Slopes. Table 10-50.90.050.A, Slope Protection Thresholds, indicates that for residential uses, 70 percent of slopes measuring 17 to 24.99 percent must be protected; 80 percent of slopes measuring 25 to 34.99 percent must be protected; and, that no slope protection is required for slopes less than 17 percent.

The following table shows the area that is required to be protected in each of the slope categories by using this simple formula:

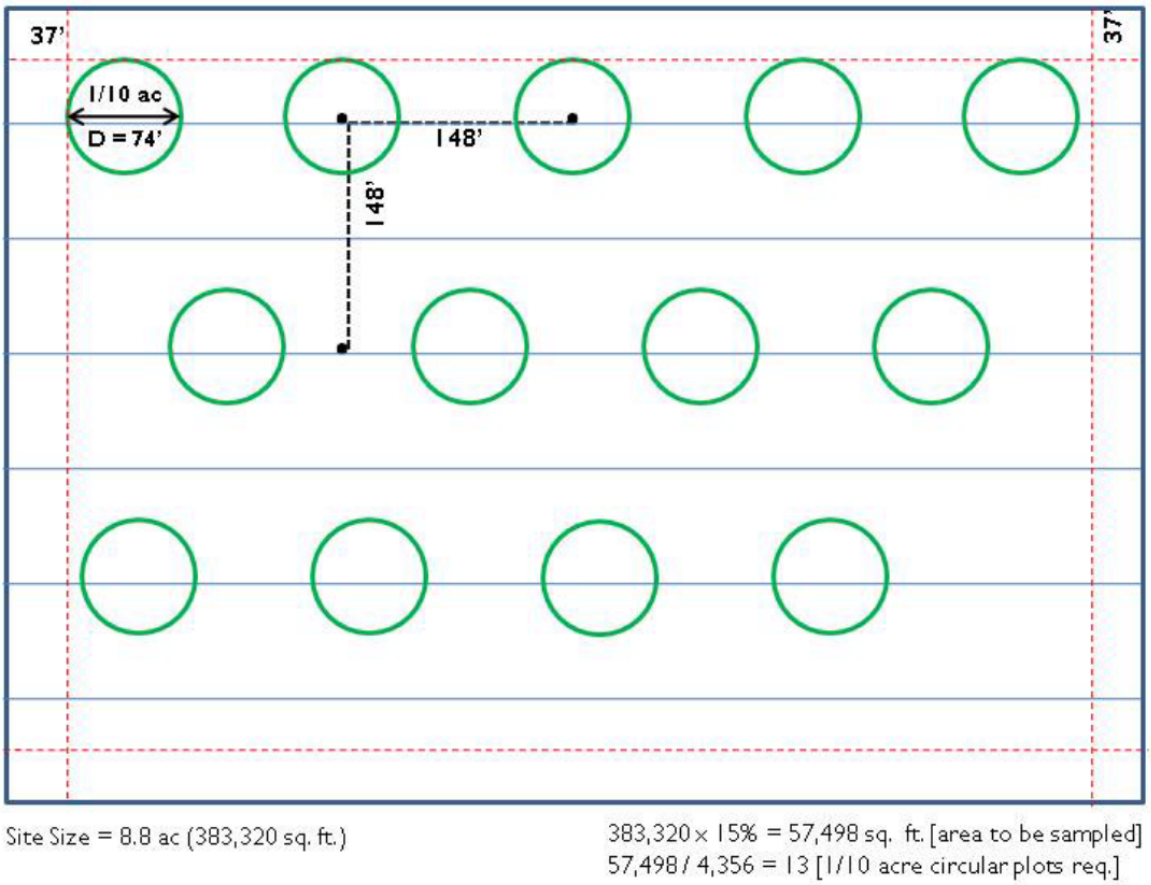
Area in each slope category x Protection Threshold (%) = Area to be protected.

Sample Slope Calculation			
Slope	Protection Threshold	Approximate Area in Sample	Minimum Area to Be Protected
0 – 16.99%	0%		
17 – 24.99%	70%	14,000 sq. ft.	9,800 sq. ft.
25 – 34.99%	80%	35,000 sq. ft.	28,000 sq. ft.
35% and greater	100%	0 sq. ft.	0 sq. ft.

3. Forest Resources. The sample site is larger than five acres in size, and therefore it may be sampled using a simple technique that distributes one-tenth acre circular sample plots across a minimum of 15 percent of the site (one-tenth acre equals 4,356 square feet). The circular sample plots are distributed across the site on a series of transect lines. The distance between the sample plots along the transect line and the distance between the transect lines should be approximately the same, and will vary based on the size of the site to ensure that a 15 percent representative sample is achieved. The circular plots must be placed no closer than the radius of the plot (i.e., 37 feet) from any property line.

Figure ~~5~~3.030C

Sample Site Plan – Distribution of One-Tenth Acre Sample Circular Plots



a. As the proposed use of the site is a residential development, the forest resource protection threshold is 50 percent, which is determined from Table 10-50.90.060.A, Forest Resource Protection Thresholds as a Percentage of Site Area.

b. The area of the site is 8.8 acres (383,320 square feet). Therefore, the minimum area to be sampled is: 383,320 (15 percent) equals 57,498 square feet.

c. The number of one-tenth acre circular plots is determined by dividing the minimum area to be sampled by the area of a one-tenth-acre circular sample plot: 57,498/4,356 equals 13.

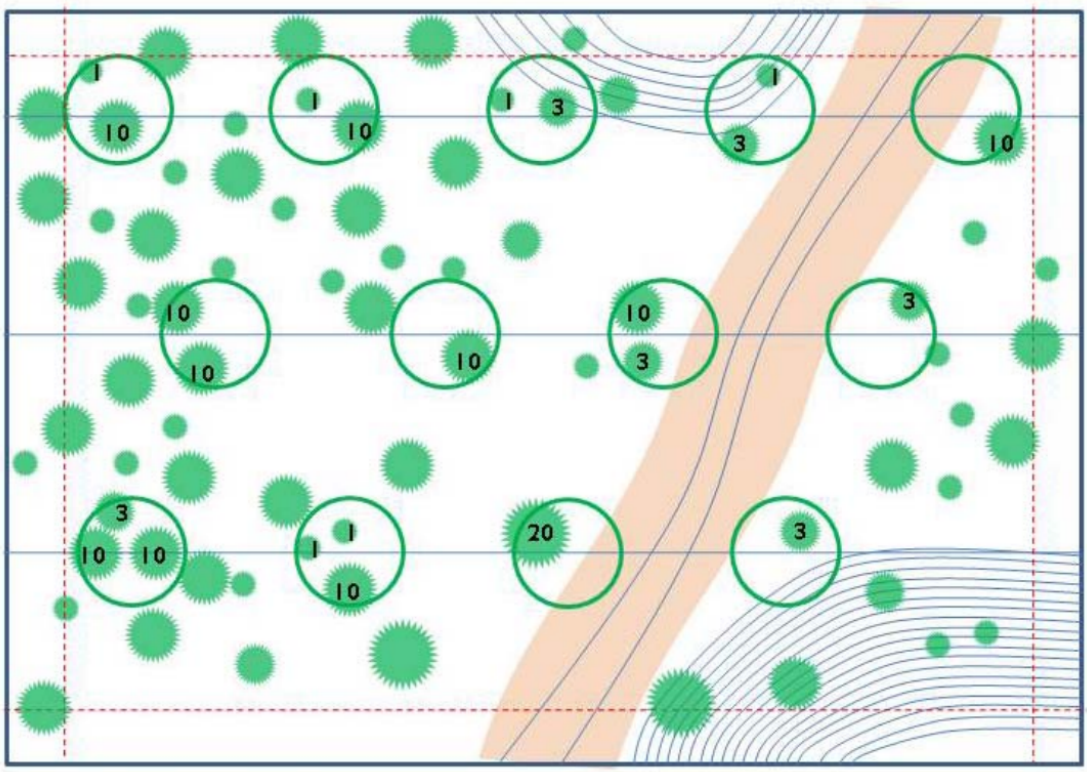
d. The diameter of a one-tenth-acre circular sample plot is 74 feet. Therefore all sample plots need to be placed a minimum of 37 feet from any property line.

e. The 13 sample plots are distributed across the site such that they are equally spaced from each other along a transect line and between transect lines. In this example the distance between circular plots on separate transect lines is 148 feet (from center), and the distance between circular plots on the same transect line is also 148 feet (from center).

f. As shown on the site plan below, points are assigned to trees based on their diameter at breast height (DBH) measured in inches. Note that if a tree is located only partially within the circular sample plot it is only counted if 50 percent or more of the tree is within the sample plot.

Figure ~~5~~3.030D

Sample Site Plan – Distribution of Sample Plots Relative to Tree Locations



Site Size = 8.8 ac (383,320 sq. ft.)

Points assigned to each tree are determined by the diameter at breast height (DBH) of each tree, as indicated in Table 10-50.90.070.A (Point Rating System for Ponderosa Pines).

g. The total of forest resource points for all trees within the sample plots can then be calculated using the values provided in Table 10-50.90.070.A, Point Rating System for Ponderosa Pines.

Sample Forest Resource Calculation				
Tree Canopy	DBH in Inches	Points	# in Sample	Total Points
	8 – 12	1	6	6
	13 – 17	3	6	18
	18 – 24	10	10	100
	25 +	20	1	20
				144

h. As the values in the table above are only for the 15 percent sample area, the total number of forest resource points for the entire site must be calculated:

(Total points from sample x 100) / 15 = Points for entire site, i.e., (144 x 100) / 15 = 960 total points

i. To apply the forest resource protection threshold for the site as a residential use (50%), use the following simple formula:

(Points for entire site) x 50% = Resources (points) to be retained on site, i.e., 960 x 50% = 480

Therefore, a total of 480 forest resource points must be retained on the site. To determine which trees may be removed and which should be preserved, it is important to apply the standards in Section 10-50.90.030(B)(3), Priority for Resource Protection, as this section establishes rules for prioritizing forest resource protection. For example, forest resources located in areas that connect to urban and rural floodplains or that are located in steep slope areas are more important than those located elsewhere on the site.

Appendix ~~6~~4
Additional Information on Affordable Housing

Sections:

~~6~~4.010 Purpose

~~6~~4.020 Affordable Housing Categories

~~6~~4.010 Purpose

Division 10-30.20, Affordable Housing Incentives, implements the City's Incentive Policy for Affordable Housing (IPAH), which is intended to foster the preservation and production of permanent affordable housing units. The Division encourages the preservation and production of affordable units by providing increased residential densities and other developer incentives for projects that guarantee that at least a portion of the housing will be affordable. The intent is to narrow the housing deficit for households that cannot afford market-priced rental or for-sale housing. In conjunction with market dynamics, the Council sets policies on the area median income the City will serve. This information will be updated in the IPAH document.

~~6~~4.020 Affordable Housing Categories

Table ~~6~~4-020.A lists the household income ranges most recently updated by the Council for the four categories for housing affordability noted in Table 10-30.20.040.A and Table 10-30.20.040.B, and included within the IPAH document. This information is provided in this Appendix for the convenience of users of this Zoning Code, and it will be updated following Council action on the IPAH document. In the event of a conflict between the household income ranges provided below and those established in the IPAH, the household income ranges in the IPAH document shall control.

Table ~~6~~4.020.A: Household Income Ranges as Approved by the Council, October 2009

Category	Description
1	This category serves up to 80% of the area median income, and it provides permanent affordability through both rental and ownership opportunities.
2	This category serves between 81 and 100% of the area median income, and it is reserved for ownership opportunities only.
3	This category serves up to 120% of the area median income with sustainability/green building provisions throughout the entire development.
4	This category serves up to 100% of the area median income with no permanent affordable housing provision.

Appendix ~~7~~5

List of Major Arterial Streets

Sections:

~~7~~5.010 Purpose

~~7~~5.010 Purpose

This list of major arterial streets in the City of Flagstaff has been compiled from maps in the Flagstaff Regional Map. The list may be used to identify major arterial streets, and therefore, where Type A freestanding signs as established in Section 10-50.100.060(E)(4)(b)(7) may be located. Type B freestanding signs are permitted on all other street classifications within the City.

A List of Major Arterial Streets in the City of Flagstaff

Major Arterial Name	Description
Business 40 (Commonly referred to as Route 66 or Santa Fe Avenue)	From the intersection with Milton Road at City Hall to the E. Route 66 intersection.
U.S. Highway 89	From the intersection with Country Club Drive north to the City limits.
U.S. Highway 89A	From the southern City limits to the intersection of South Park Road and John Wesley Powell Boulevard.
	Milton Road from Interstate 40 to the East Route 66 intersection at City Hall.
U.S. Highway 180	North Humphreys Street and Fort Valley Road to the northern City limits.
	South Country Club Drive between Interstate 40 and East Route 66