WORK SESSION

AGENDA ITEM 7

MEMO

DATE: April 4, 2011

TO: Honorable Mayor and City Council

FROM: Karl Eberhard, AIA
Community Design and Redevelopment Program Manager

RE: Irrigation of Municipal Landscaping:
Woodlands/Beulah Medians
Butler Avenue Medians
City Hall Flowerbeds (Pork Chop)
East Flagstaff Neighborhood Gateway
Fort Valley Road Enhancements

At a work session on April 12, 2011, staff will seek City Council direction and policy with regard to the irrigation of municipal landscaping associated with five projects currently at various stages of implementation. In addressing the Woodlands/Buelah Medians project, Council direction was to provide options, notably options that excluded the use of water. Please find following background information and various options for municipal landscaping. Options presented include some choices with no irrigation, plant establishment using a combination of storm water and reclaim water, the use of reclaim water, or the use of potable water. For brevity, and based on our understanding of Council concerns, landscape options requiring permanent, on-going irrigation service are not presented. The specific projects are addressed following the discussion of options.

Background:

Current Water Usage:

Currently, the area of beautification landscaping is about 51 acres and includes approximately 3,500 trees and 19,000 shrubs. For beautification landscaping, annually we use approximately 6,500,000 gallons, or .39 acre-feet per acre.

In context, the Arizona Department of Water Resources model ordinance for landscape irrigation efficiency specifies that less than 1.5 acre-feet, per acre, is "low water use landscaping". Were our landscaping a part of a LEED certification, we would get one point for our level of water use and another point for areas using reclaimed water. In another context, consider that waiting for hot water in the shower uses 200 to 300 gallons of water per month, per household, which for Flagstaff is 60,000,000 gallons annually.

Municipal Landscaping Options:

The following is a menu of general options for municipal landscaping. Except as noted, each can be applied to any of the current projects, and thus it is convenient to understand the options before addressing the specific projects.

Option 1 – No Irrigation:

Under this option, landscaping installations would be designed such that no irrigation was provided to plantings. Within this option, there are three general strategies, the no-build option, designs that do not use plants, and designs that rely solely on storm water for the survival of the plants. A variant of relying solely on storm water involves essentially no plant materials, just grasses.

A. No-build Option

In this scenario, we would not build any landscape areas. Areas not occupied by driving lanes would either be paved over or left as bare earth. Street designs that minimize such areas would be appropriate (For example, streets that have dual left turn lanes instead of medians). Over time, windblown plants would grow in the areas left bare.

Besides the advantage of not using any water, this option eliminates construction and additional maintenance costs. While construction costs are often supplemented by grant funds, outside funds are rarely available for ongoing maintenance. Other maintenance costs may be reduced as well (medians in particular frustrate snow plowing and overlay efforts).

Not landscaping the built environment diminishes the appearance of the community and thus reduces the quality of life (sense of place, crime, retail sales, and tourism), and also increases our carbon footprint. In addition, increases in property values, traffic calming, and environmental benefits other than water conservation are not realized.

B. Designs without Plants (Hardscape)

Plantless designs rely on hardscape (concrete, stamped concrete, and pavers), gravel ground covers, boulders, and similar solutions for aesthetics. Often multiple materials are used and composed as one would compose a painting or Zen garden. Some communities use steel and other materials so that there are more design options.

As can be seen in Phoenix, there are many striking design opportunities using gravel, rocks, and various pavement options. As with the no-build option, these designs would not shade the adjacent street surfaces (thus reducing icing in the winter months) and road safety is not decreased by wildlife that may be attracted to the planted areas.

This option still has construction costs, generally more than planting costs. The native environment of Flagstaff is high altitude desert characterized by grasses and ponderosa pines with occasional rock outcroppings. Thus, these hardscape designs counter the Regional Plan policy of integrating the built and natural environments. As with the no-build option, there is little or no opportunity for vertical dimension that produces readability, pedestrian friendly shade, and the softening of buildings and other built elements. These areas still require notable maintenance to preserve or restore designs and as weeds grow in the groundcovers (unless pavement is used).

C. Just Grasses

Instead of having bare earth areas, under this scenario, such areas would be treated with hydro-seeding and with the right conditions the grasses (and windblown materials) would grow. The use of soil amendments can assist in the success of these areas and designs that allow ponding of storm water also assist.

This option balances the plant materials and the ability of storm water to supply the necessary water and involves less initial cost. Many of the benefits of no-build and plantless options are applicable to this solution (such as low initial costs). Unlike no treatment, there is an opportunity to seed with native grasses or flowers and direct the general growth toward a more native state.

A non-native version of this condition is seen currently in the Woodlands Boulevard medians and is generally less aesthetically pleasing than the hardscape option. These areas are prone to the collection of litter, particularly plastic bags. Notable maintenance of the plant materials is still required (weed whacking). Like bare earth areas, historically in Flagstaff, these have been one of the areas most prone to noxious weeds – the eradication of which is a Regional Plan policy.

D. Reliance on Storm Water Only

Using storm water to supply plant watering needs is an option used in other communities. The most basic systems involve the diversion of storm water though curb openings and catchment basins (ponding areas) within the planting areas. More complicated systems use underground tanks and other more active components. When tanks are used, the system usually needs pumps. Plant selection would need to respect the amount of water available.

The advantage of this conceptual approach is that it squarely hits the "ideal landscaping design" in terms of eliminating the costs of irrigation and preserving utility water for other purposes. The financial return on our investment in planting trees would

increase slightly (from 4.4 times to 5 times). This would be particularly exciting if storm water were diverted from curbs and into planted areas as is done in Portland and similar cities, thus reducing the overall runoff from the city.

In Flagstaff, it is impossible for new plant materials to get established solely on storm water and our periodic times of drought would cause plant loss. Even ongoing water needs cannot be met due to the erratic delivery rates (monsoon season). To survive deicer, pre-monsoon storms or irrigation would be needed to flush the soil. The more "built" the storm water collection is, such as the use of underground collection tanks, the higher the initial cost and maintenance, exceeding the cost of traditional irrigation. Diversion of curb storm water, usually through openings, frustrates snow plowing efforts.

Option 2 – Hybrid Storm Water Tank and Reclaimed Water Establishment Irrigation:

This is a mix of the preceding storm water only option (1D) and following reclaim water option (3). To capture more than the planter area, storm water would be diverted from surrounding streets via storm drain systems to an underground tank. The water is then fed to a leeching field system under the planted areas. The system is supplemented by reclaimed water, fed into the tank, when storm water is not available.

This method would provide sufficient water for xeriscaping. It compensates for the shortcomings of the storm patterns in Flagstaff. It is an achievable way to enjoy the benefits of municipal landscaping and truly minimize use of reclaimed water to only what needs cannot be provided by storms.

However, relative to current practice, the initial cost would be very high to construct storm drains, tanks, leeching systems, and planting beds, and this solution involves significantly greater impacts on the streets. The use of water, albeit reclaimed, remains a feature of the option. Like any leeching field, its ability to discharge water will eventually diminish and require replacement of both these structures and the plant materials.

Option 3 – Reclaimed Water Establishment Irrigation:

Under this option, xeriscapes are employed that through good design use native, appropriate, and water-efficient plant materials, plantings grouped by water use, efficient irrigation systems, soil preparation, mulch, and no turf. All seven principles of xeriscaping are used except that as we implement the strategy, "limited turf" becomes "no turf". Note that irrigation is required for xeriscapes and reclaimed water is used. Once the plants are established the irrigation systems are simply not restarted in the spring and are only restarted in times of drought. Ideally, storm water retention is included by shaping the ground into ponds and by terracing.

This option allows all of the advantages of planting, including quality of life and the economic vitality of community enhancement, reduced carbon footprint, and increased

property values, with a minimal usage of recycled water. This option is not a permanent drain on the water utility. Finally, the use of the right plants assists us in harmonizing the built environment with the natural surroundings.

Even using reclaimed water, a resource is diverted from other purposes. This approach also means that we buy irrigation systems that are only used for a few years and then mostly abandoned. Conceptually, any landscaping has the general appearance of wasting water and really can waste water when irrigation systems are poorly designed or maintained.

Option 4 – Potable Water Establishment Irrigation:

Other than a different water source, this option is the same as the "Reclaimed Water Establishment Irrigation" option in terms of the design, advantages, and disadvantages. It has the added disadvantage that potable water is used for irrigation, but retains the feature of use of water for only a short term and in times of drought.

Current Design Practice:

Over the recent years, with Beautification and Public Art Commission and City Council oversight and direction, our practice has been to use xeriscape designs that are established with reclaimed water as the first choice (Option 3), and when not possible, by potable water (Option 4). So far, the use of reclaimed water has been possible except in the case of one pending project. The establishment period includes ground cover materials for one year, shrubs for two years, and trees for three to five years. Early versions (US 89 Medians) were less successful at storm water retention. This design practice has been based on various factors that are roughly summarized by the attached decision matrix.

The matrix shows various economic, social, and environmental variables, each given a score between zero and ten for each option. The scores for each are then added together and ranked. The right side (colorful) shows four different possible rankings:

1. The first column has all the variables having equal weight.
2. The next column has only water usage being weighted by a factor of 9 (nine times more important than any other factor, or 50% of the decision).
3. Next, the water is weighted at 9 (40% of decision) and maintenance cost is weighted at 4.5 (20% of decision).
4. The last column has water weighted at 9 (35%), maintenance cost weighted at 4.5 (17.5%), and the initial cost weighted at 4.5 (17.5%). The eight other variables combined are 30% of the decision.

Current Beautification Projects:

Woodlands/Beulah Medians:

Along Woodlands, nothing was done with the medians and what is seen today is windblown plant material growth (Option 1 A - No-build Option). The initial design prepared by Urban Earth included more exotic elements including storm water storage tanks and delivery systems with a potable water backup (Similar to Option 2). Following Council feedback, the current landscape design was developed and follows Option 4. It is a xeriscape design and includes terracing to capture and retain on site storm water. Due to a lack of service, potable water is still proposed as the irrigation supply, but the system can be shut off after plant establishment. Options 2 and 3 are not applicable to this project since there is no reclaimed water service within a reasonable distance.

Butler Avenue Medians:

Xeriscape median landscape designs using reclaimed water for establishment (Option 3) were installed in front of the High Country Conference Center and in front of the Sawmill project. The Commission envisioned that this project would install the same landscaping design, including storm water retention, in between these two existing median segments making a consistent boulevard from Milton Road to Sawmill Road. The project is in the early stages of planning. Any of the municipal landscaping options would work. However, we know already that due to the crown of the road, the hybrid option requires even greater capital expense.

City Hall Flowerbeds (Pork Chop):

Originally conceived as including all of the flowerbeds and water intensive flower plantings, based on staff feedback and general City Council discussions about water usage, this project has been reduced by the Commission to just the "pork chop" area and a water-wise solution. The little planter at Sitgreaves and Sante Fe (the pork chop) serves as an important community gateway. Currently it contains juniper bushes, some bulbs, and cinders and relies solely on storm water for irrigation (Option 1 D). As an aesthetic element, and as a gateway, it is a failure. This small project proposed using xeriscaping and reclaimed water for plant establishment (Option 3) creating an appropriate community accent point that could demonstrate xeriscape principles. A low wall and other treatments are employed to maximize retention of storm water. Alternatively, any of the other landscaping options could be applied.

East Flagstaff Neighborhood Gateway:

Pursuant to community desires, the Commission has planned for a gateway project at the northeast corner of Route 66 and Fourth Street where the City owns a sixth of an

acre remnant parcel. It is expected that the community design process will yield a project that includes landscaping, hardscaping, community and event signage, and public art. As a possible "pocket park", but certainly as a gateway, irrigation for the establishment of the plants would be appropriate. Permanent irrigation may be appropriate. Staff has anticipated initiating the community outreach and development of a design for City Council review over the next few months.

Fort Valley Road Enhancements:

This project has no development other than a concept. The Commission is interested in plantings in the bare earth vacant lots just north of the Shell station, conceptually Aspen trees and grasses. Community leaders have suggested that the project should include a split-log fence (as can be seen elsewhere along Fort Valley Road) that could replace the boulders dropped on site to prevent parking. To establish such plantings, irrigation would be necessary.

Next Steps:

Providing specific project designs is expensive and for that reason graphic representations of the options for each project are not provided herein. Following Council consideration of this comprehensive memo, the current projects will be modified according to direction received such that when the specific projects are considered by the Council, the desired options have been employed.

Attachments:

1. Current Practice Decision Matrix