## Landscape Architects

- Roadside Restoration Plans
- Wetland Mitigation Plans
- Contour Grading Plans
- Planting Plans
- Site Development Plans
- Irrigation Plans
- Co-signatory on Soil Bioengineering Plans, with Geotechnical Engineer or Engineering Geologist



## Notes:

- Maximum slopes for cut and fill depend upon the materials involved. Refer to the Region Materials Engineer and the Standard Specifications for Road, Bridge and Municipal Construction 2-03.3(14) for guidance.
- The preferred slope for mowing is $1 \mathrm{~V}: 3 \mathrm{H}$ or flatter. Refer to the Maintenance Manual for more specific information.

Exhibit C-1 shows hourly sun angles for December 21 on a highway with a southwest- northeast road alignment, with a tree canopy height that might be typical for forested areas where shading is a concern. The drawing shows that for this road alignment, shading is caused by vegetation far outside the average right of way dimensions. For example, at 11:00 AM trees that shade the roadway are a minimum of 300 to 400 feet beyond the roadway centerline.


Exhibit C-1 Southwest to Northeast Road Alignment

Exhibit C-2 shows hourly sun angles for November 21 and January 21 on a road having an East-West alignment. It also depicts a tree canopy height that might be typical for forested areas where shading is a concern. The drawing shows that for this road alignment, shading is caused by vegetation far outside the average right of way dimensions. For example, at this time of year, for this road alignment, shading at 12:00 noon is caused by vegetation 500 ' to 600 ' beyond the roadway centerline. At no time during the day, for this example, does the sun reach an angle where it could reach the roadway.


Sun Positions for November 21 and January 21

Exhibit C-1 East-West Road Alignment

Assumed geometric pattern for plant spacing


If this is the geometric shape in which plants will be spaced, the area of the equilateral triangle is:

$$
\text { Area }=2^{*} x / 2 * \sqrt{ }\left(x^{2}-x^{2} / 4\right)=x^{2} / 2 * \sqrt{ } 3
$$

There will be one plant for each equilateral triangle shaped area throughout the area to be planted, plus two extra plants.

Therefore, the number of plants that will be needed for an area in acreage is:
No. of plants $=$ acreage to be planted $* 43560$ sq. ft. per acre $/ X^{2} / 2 * \sqrt{3}$ (where $X$ is the plant spacing in ft.) +2 more plants
(Formula first developed by Julie Nelson, P.E. for the SCR WSDOT Environmental Office.)

## DRAFT Plant Spacing Formula for Vegetation Mitigation Projects



Assuming a 3' on-center planting requirement, the following applies:
A. Total Area of Above: $3^{\prime} \times 5.2^{\prime}=15.6 \mathrm{sq} . \mathrm{ft}$.
B. Two (2) plants per 15.6 sq . ft. or one plant per $7.8 \mathrm{sq} . \mathrm{ft}$.
C. If at first you don't think it will work, try stacking the rectangles side by side and top to bottom and you will start to see how it works.
D. The only possible flaw would be around the edges of a large area to cover, where it may come up a little short.
E. When used in the Selah project, the planting numbers came out just right.
F. In the field, construction of the formula is not expected to be exactly $3^{\prime}$ on-center for each plant. Some variation will occur.
G. There may be room for improvement so if you have suggestions, please forward them to the SCR WSDOT Environmental Office (your comments are greatly appreciated).
H. Formula easily changed for $2^{\prime}, 4^{\prime}, 5^{\prime}, 8^{\prime}$, or $10^{\prime}$ on-center calculations.

For more information and other region native plant lists, please refer to the Native Plant List website at: http://plantnative.org/rpl-imw.htm



| Western Columbine | Aquilegia formosa | P | A-W | 2-3' | Unique red and yellow flowers spring-summer |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Wild Aster | Aster spp. | F | A | 12-36" | Purple, light blue to cream flowers |
| Arrowleaf Balsamroot | Balsamorhiza sagittata | F | A | 12-24" | Plants don't flower until they are five years old |
| Blue Camas | Camassia quamash | F | W | 1-2' | Blue petals and yellow stamen blooms May-Jun |
| Purple Coneflower | Echinacea purpurea | F-P | A | 2-3' | Continuously blooms (purple) summer-fall |
| Cut-leaf Daisy | Erigeron compositus | F | D | $6^{\prime \prime}$ | Numerous white to lavender flowers in spring |
| Wyeth Buckwheat | Eriogon. heracleoides | F | A | 6-16" | Creamy white flowers; drought tolerant |
| Snow Buckwheat | Eriogonum niveum | F | A | 6-18" | White flowers in the summer and fall |
| Sulfur Buckwheat | Eriogonum umbellatum | F | A | 1 ' | Yellow flowers with hints of reddish orange |
| Woolly Sunflower | Eriophyllum lanatum | F | A | 6-12" | Yellow flowers in the spring; drought tolerant |
| Blanket Flower | Gaillardia aristata | F-P | A | 24" | Flower rays a mix of red, yellow or orange |
| Sticky Geranium | Gerani. viscosissimum | F-P | A | 12-30" | Pink to lavender flowers with red veins May-Sep |
| Prairie Smoke | Geum triflorum | F-P | A | 18 " | Reddish to purplish flowers |
| Texas Red Yucca | Hesperaloe parviflora | F | D | 4' | Red blooms in summer reach 5'; slow-growing |
| Scarlet Gilia | Ipomopsis aggregata | F-P | A | 12-24" | Red flowers (Jun) attract hummingbirds |
| Wild Blue Flax | Linum perenne | F-P | A | 8-24" | Blue flowers all spring and summer; drought tol |
| Silver Lupine | Lupinus argenteus | F-P | A | 8-24" | Blue to white flowers; nitrogen fixing |
| MO Evening Primrose | Oenoth. missouriensis | F | D | 6-12" | Yellow flowers Jun-Sep; slightly fragrant |
| Prickly Pear Cactus | Opuntia spp. | F | D | 12" | Flowers of yellow, pink, or red bloom Jun-Jul |
| Pagoda Penstemon | Penstemon angustifolius | F | A | 1 ' | Comes in various shades of blue to lavender |
| Scarlet Bugler | Penstemon barbatus | F | A | 2-3' | Distinctly bright red corolla, flowers Jun-Sep |
| Dark Blue Penstemon | Penstemon cyaneus | F | A | 12-28" | Dark blue to violet flowers May-Aug |
| Hot Rock Penstemon | Penstemon deustus | F | A | 8-18" | Small creamy white flowers May-Jun |
| Firecracker Penstemon | Penstemon eatonii | F | A | 3' | Flower stalks lined with bright red flowers |
| Shrubby Penstemon | Penstemon fruticosus | F | A | 18" | Blue/lavender to light purplish flowers May-Jun |
| Palmer Penstemon | Penstemon palmeri | F | D-A | 2-4' | Large pink fragrant flowers attract hummingbird |
| Pine-Leaf Penstemon | Penstemon pinifolius | F | A | 6-18" | Red flowers attract hummingbirds |
| Rydberg's Penstemon | Penstemon rydbergii | F-P | A | 8-28" | Bluish-purple flowers in whirls around stem |
| Showy Penstemon | Penstemon speciosus | F-P | A | 2-6" | Bright purple to violet flowers May-Jun |
| Rocky Mtn. Penstemon | Penstemon strictus | F | A | 1-3' | Blue to violet blooms Jun-Jul |
| Lovely Penstemon | Penstemon venustus | F | A | 36 " | Stunning flowers lavender-purple May-Jun |
| Whipple's Penstemon | Penstemon whippleanus | P | A | 8-24" | Flowers usually creamy white-green Jul-Aug |
| Prairie Clover | Petalostem. purpureum | F | D | 1-2.5' | Pinkish purple flowers May-Sep; fixes nitrogen |
| Goldenrod | Solidago spp. | F | A | 2-5' | Yellow flowers cover plant late summer-fall |
| Desert Globemallow | Sphaeralcea ambigua | F | A | 20-40" | Orange to brick red flowers Mar-Jun |
| Gooseberry-leaf Globe. | Sphaera. grossulariifolia | F | D-A | 12-24" | Salmon colored flowers in the summer |
| Orange Globemallow | Sphairalcea munroana | F | D-A | 12-24" | Apricot-pink to reddish-orange flowers |
| Prince's Plume | Stanleya pinnata | F | D | 3-4' | Spikes of lacy yellow flowers spring-summer |
| Narrowleaf Yucca | Yucca glauca | F | A | 3-6' | Creamy white bell shaped flowers in July |



| Sun Exposure | Soil Moisture |
| :--- | :--- |
| $F=$ Full Sun | W = Wet |
| $P=$ Part Sun | $A=$ Average |
| $S=$ Shade | $D=$ Dry |

## Grasses

## Common Name

Indian Ricegrass
Little Bluestem
Blue Grama
Buffalograss
Bottlebrush Squirreltail
Idaho Fescue
Sheep Fescue Great Basin Wildrye Bluebunch Wheatgrass Sand Dropseed
Scientific Name
Achnather. hymenoides
Andropogon scoparium
Bouteloua gracilis
Buchloe dactyloides
Elymus elymoides
Festuca idahoensis
Festuca ovina
Leymus cinereus
Pseudo. spicata
Sporobolus cryptandrus

| Sun | Moist. | Height | Comments |
| :---: | :---: | :---: | :--- |
| F | D | $12-16^{\prime \prime}$ | Beautiful inflorescence when it goes to seed |
| F | A | $12-36^{\prime \prime}$ | Blue-green warm season grass; reddish in fall |
| F | D | $4-12^{\prime \prime}$ | Mat forming warm season grass |
| F | D | $3-5^{\prime \prime}$ | Long blue-gray to green blades; reddish in fall |
| F | D | $13-24^{\prime \prime}$ | Unique tufted seed head in mid-spring |
| F-P | A | $18^{\prime \prime}$ | Gray-blue blades in early summer |
| F-P | D-A | $18^{\prime \prime}$ | Does not do well in continuously wet sites |
| F | D | $4-6^{\prime}$ | Bluish tan blades with wheatlike seed heads |
| F | D | $13-24^{\prime \prime}$ | Bluish cast, decorative inflorescence |
| F | D | $8-16^{\prime \prime}$ | Stays green in heat of summer; resists fire if mowed anually |
|  |  |  |  |
|  |  |  |  |
| JBS |  |  |  |

## IMPORTANT CONSIDERATION:

1. While the plants listed above are native to and appropriate for their indicated regions, please recognize that, in some instances, human development alters the characteristics of a site such that it may be advisable to use plants from a neighboring region. For example, plantings in urban and suburban areas may receive reflected heat from streets, sidewalks and/or walls or be in media that receives less moisture than normal (e.g., next to a paved area - the pavement blocks rain from entering soil). Accordingly, using plants from a neighboring region that support higher temperatures and/or drier conditions may be more appropriate.
2. While a plant is native to a region, that does not mean that it will grow everywhere in that region. The characteristics of any site will typically vary from place to place and some plants may do better than others at various places within a site. In other words, a little experimentation might be required.
3. The above list is a starter list. Though adequate for most residential and commercial landscapes, there are many more native plants and should you want to consider them, please inquire at a listed nursery, community service organization, reference book or other resources.

## CREDITS:

## 1. Landscaping with Native Plants of the Intermountain Region

US Department of the Interior Bureau of Land Management in cooperation with Boise
State University and the Pahove Chapter of the Idaho Native Plant Society
www.id.blm.gov/publications/TR1730-3/cover_p7.pdf. Find another Native Plant List!
2. Idaho Native Plant Society.
P.O. Box 9451, Boise, ID 83707
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For more information and other region native plant lists, please refer to the Native Plant List website at: http://www.plantnative.org/rpl-orwa.htm



## Perennials - Sun

| Common Name | Scientific Name | Sun | Moist. | Height |  |
| :--- | :--- | :---: | :---: | :---: | :--- |
| Red Columbine | Aquilegia formosa | F-P | A-W | to 3' | Soft foliage, drooping red to yellow flowers. |
| Shooting Star | Dodecatheon hendersonii | F | A-W |  | Magenta to lavender flowers on singular stalk. |
| White Fawn Lily | Erythronioum oregonum | F-S | A |  | Lance-shaped leaves, white nodding flower. |
| Tiger Lily | Lilium columbianum | F |  |  | Bright orange flowers with red or purple spots. |
| Big Leaf Lupine | Lupinus polyphyllus | F | A-W | $3-4$ | Nitrogen fixer. Blue to violet pea-like flowers. |
| Oregon Stonecrop | Sedum oregonum | F-P | A-W |  | Yellow to pink flowers. Good for rock gardens. |
| Yellow-Eyed Grass | Sysyrinchium californicum | F-P | W |  | Yellow flowers on short stalks. Spreads easily. |

For more info, enter a plant name

| For more info, enter a plant name |  |
| :--- | :---: | :---: | :---: |
|  | Go |


| Sun Exposure | Soil Moisture |
| :--- | :--- |
| $F=$ Full Sun | W = Wet |
| $P=$ Part Sun | $A=$ Average |
| $S=$ Shade | $D=$ Dry |

## Perennials - Shade

## Common Name Scientific Name

Dwarf Dogwood Bleeding Heart Early Blue Violet

Cornus canadensis Decentra formosa

| Sun | Moist. | Height |
| :---: | :---: | :---: |
| S | W |  |
| S | W | $1-2^{\prime}$ |
| S | W | to 4' |

## Comments

Low, trailing. White flwrs, red berry-like drupes. Fern-like. Pink/purple heart-shaped flowers. Heart-shaped leaves, yellow flwrs, purple lines.
TREES SHRUBS PERENNIALS-SUN PERENNIALS-SHADE

## IMPORTANT CONSIDERATION:

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## CREDITS:

## 1. East Multnomah SWCD 2006 Native Plant Descriptions

East Multnomah Soil and Water Conservation District
2701 NW Vaughn St. Suite 450, Portland, OR 97210

## 2. PlantNative Staff.

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