



S D H C

SAN DIEGO HOUSING COMISSION

**STANDARD
DESIGN
PACKAGE**

INTRODUCTION



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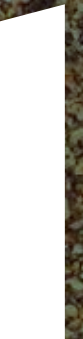
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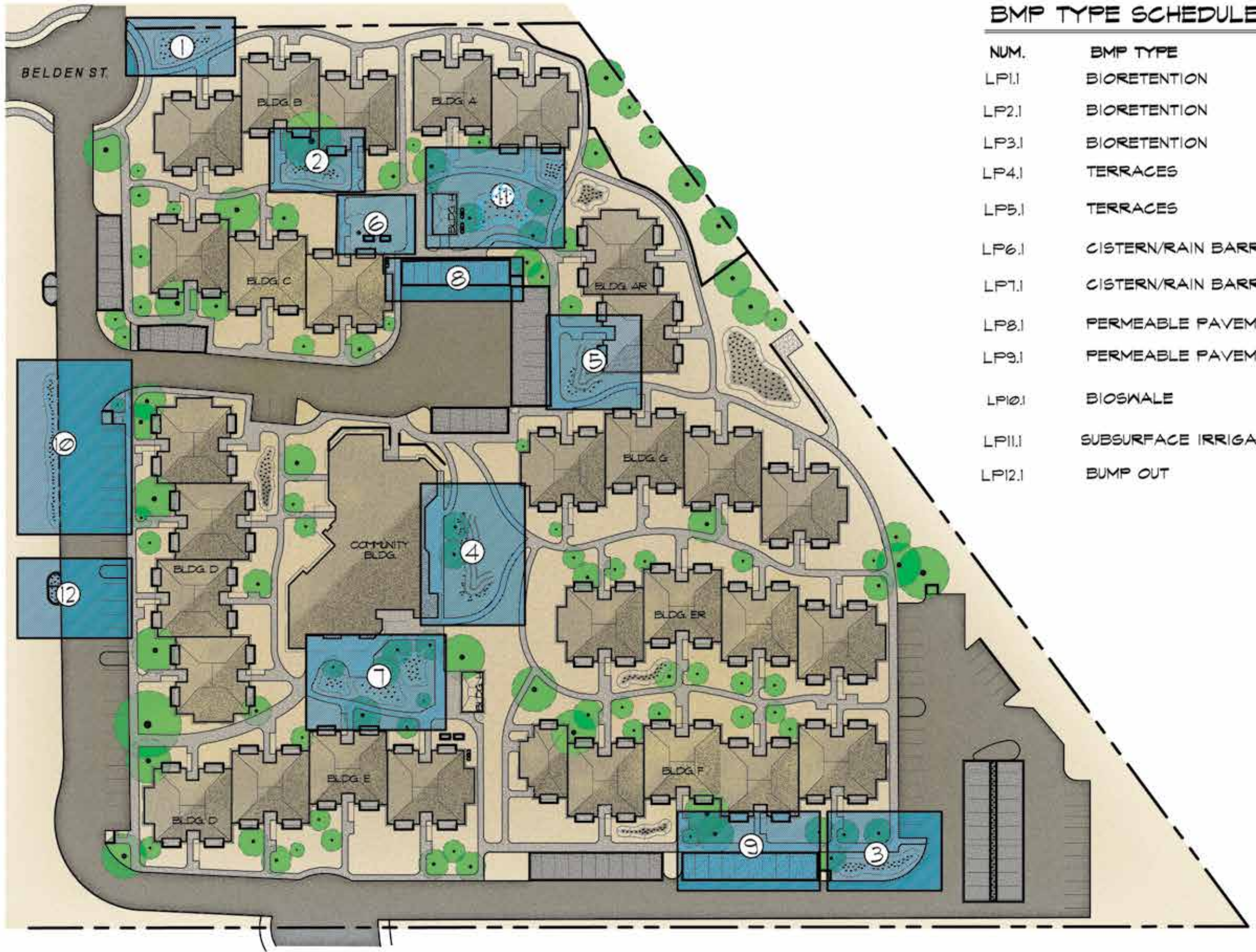
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TYPICAL
LANDSCAPE / BMP
SOLUTIONS





BMP TYPE SCHEDULE

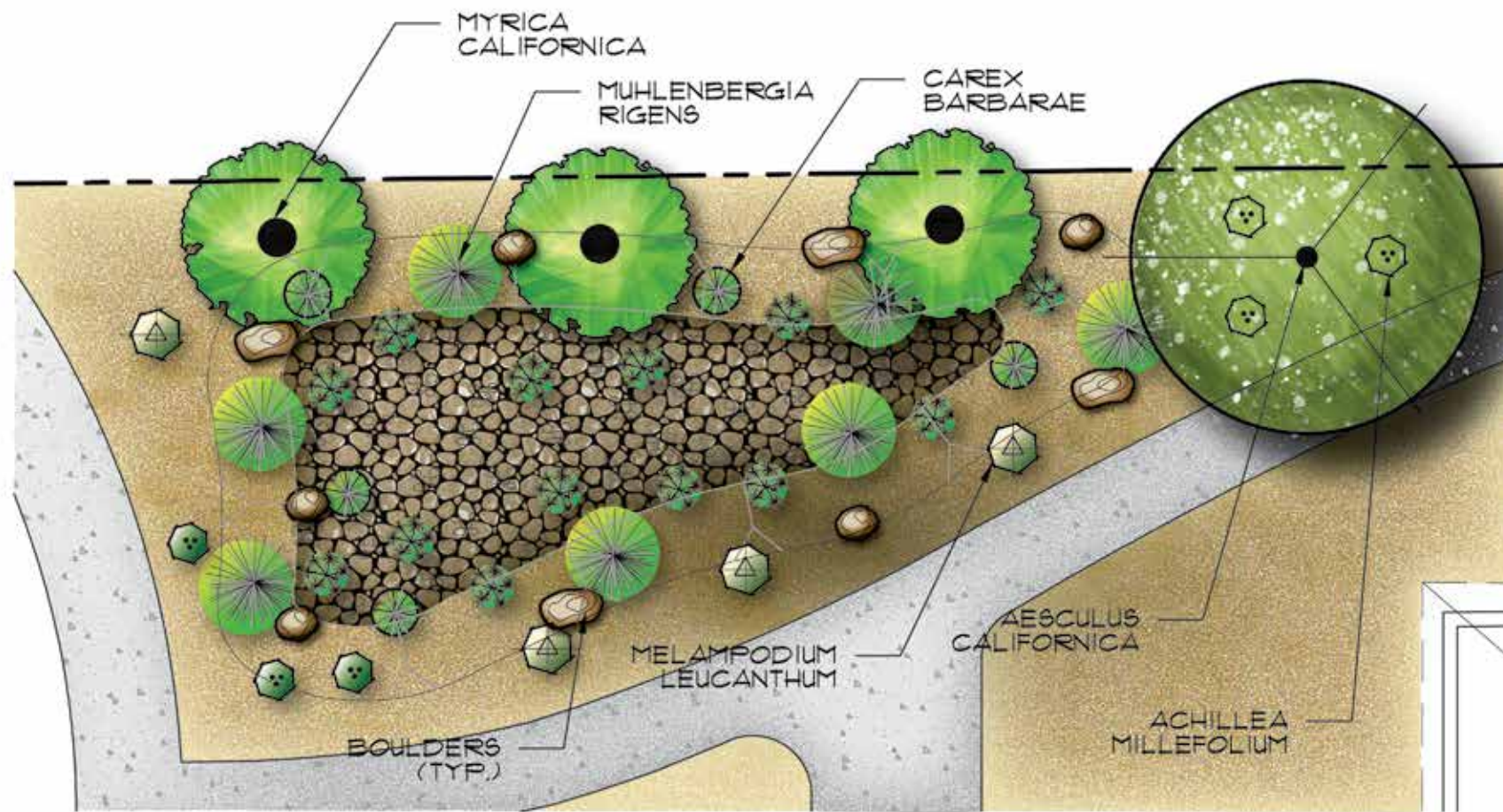
NUM.	BMP TYPE	LANDSCAPE TYPE/ SLOPE
LP1.1	BIORETENTION	OPEN SPACE / FLAT
LP2.1	BIORETENTION	NARROW / FLAT
LP3.1	BIORETENTION	NARROW / MILD
LP4.1	TERRACES	OPEN SPACE / STEEP
LP5.1	TERRACES	NARROW / STEEP
LP6.1	CISTERN/RAIN BARREL	NARROW / ABOVE GROUND
LP7.1	CISTERN/RAIN BARREL	OPEN SPACE / BELOW GROUND
LP8.1	PERMEABLE PAVEMENT	PAVED / FLAT
LP9.1	PERMEABLE PAVEMENT	PAVED / MILD
LP10.1	BIOSWALE	NARROW / MILD
LP11.1	SUBSURFACE IRRIGATION	OPEN SPACE / MILD
LP12.1	BUMP OUT	NARROW

BMP LOCATION KEY MAP



GENERIC SITE	LANDSCAPE TYPE / SLOPE	SCALE
BELDEN VILLAGE	TYPICAL BMP LOCATIONS	





PLANT LIST

SYMBOL	QTY.	NAME	SIZE	WATER USE
	1	AESCULUS CALIFORNICA CALIFORNIA BUCKEYE	20' H X 25' W	0.2 LOW
	3	MYRICA CALIFORNICA PACIFIC WAX MYRTLE	20' H X 15' W	0.2 LOW
	14	MUHLENBERGIA RIGENS DEER GRASS	4' H X 5' W	0.2 LOW
	10	CAREX BARBARAE BASKET SEDGE	1.5' H X 3' W	0.2 LOW
	26	JUNCUS PATENS 'ELK BLUE' CALIFORNIA GRAY RUSH	2' H X 2' W	0.2 LOW
	8	MELAMPIDIUM LEUCANTHUM BLACKFOOT DAISY	1' H X 3' W	0.2 LOW
	12	ACHILLEA MILLEFOLIUM COMMON YARROW	2' H X 1.5' W	0.2 LOW

TYPICAL BMP INSTALLATION COST ESTIMATES

IMPLEMENTATION COMPONENT	BIORETENTION
Without Underdrains	\$4.00/ft ² to \$5.25/ft ²
With Underdrains	\$5.90/ft ² to \$7.20/ft ²
Recommended Mix	\$2.90/ft ² to \$4.30/ft ²
With Engineered Media	\$3.60/ft ² to \$5.40/ft ²
SOIL MEDIA BARRIER	
Geotextile	\$0.50/ft ²
Washed Sand (2-inch layer)	\$0.25/ft ²
No. 8 Aggregate (min 2 inches thick)	\$0.30/ft ²
UNDERDRAIN PIPE (includes drainage stone; assumes 5-foot spacing)	
	\$3.75/ft ²
CURB AND GUTTER	
	\$22/ft
MULCH (ranges from mixed hardwood to gorilla hair)	
	\$0.25/ft ² to \$0.50/ft ²
BOULDERS	
	\$150 each
CRUSHED AGGREGATE	
	\$1.50/ft ² to \$2.50/ft ²
HYDRAULIC RESTRICTION LAYER	
Filter Fabric	\$0.50/ft ²
Clay	\$0.65/ft ²
30-mil Liner	\$0.40/ft ²
Concrete Barrier	\$16.00/ft ²
VEGETATION	
	\$0.40/ft ² to \$4.00/ft ²
IRRIGATION	
	\$1.75 ft ² to \$2.25 ft ²
IRRIGATION CONTROLLER	
	\$500

NOTES

- One tree for every 1000 sq.ft.
- At maturity 50% of landscape shall be covered with vegetation
- Verify plant locations

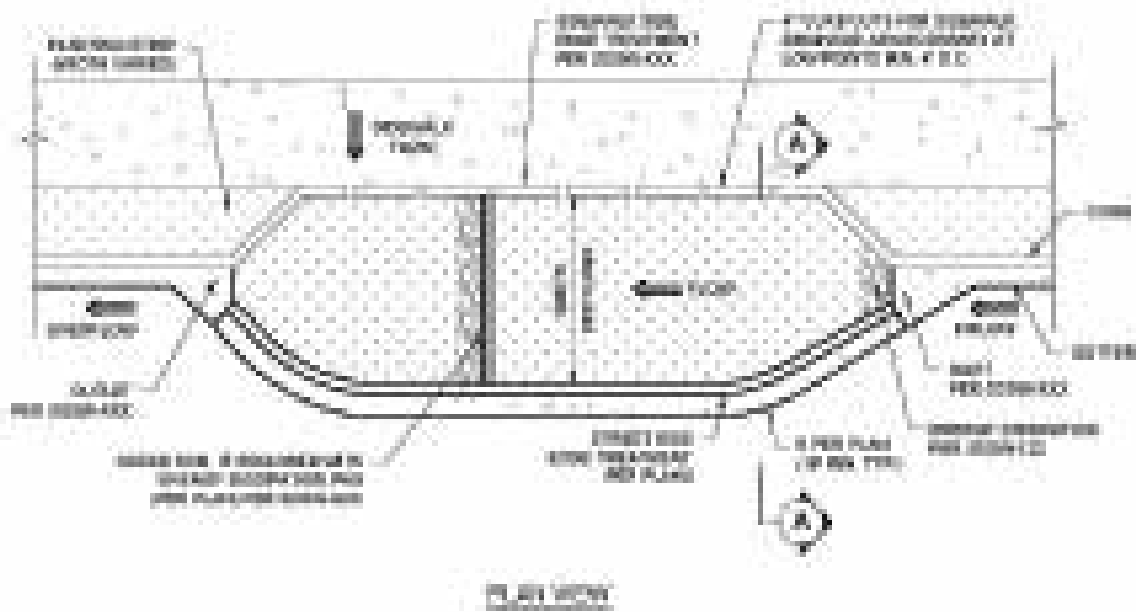


BMP TYPE	LANDSCAPE TYPE / SLOPE	SCALE
BELDEN VILLAGE SITE MAP	APERID IN SA PATIUS IA CON TEM NOTAME TE AUDEM DERIS HOS MOR UTE RE	



KEY NOTES

COSTING



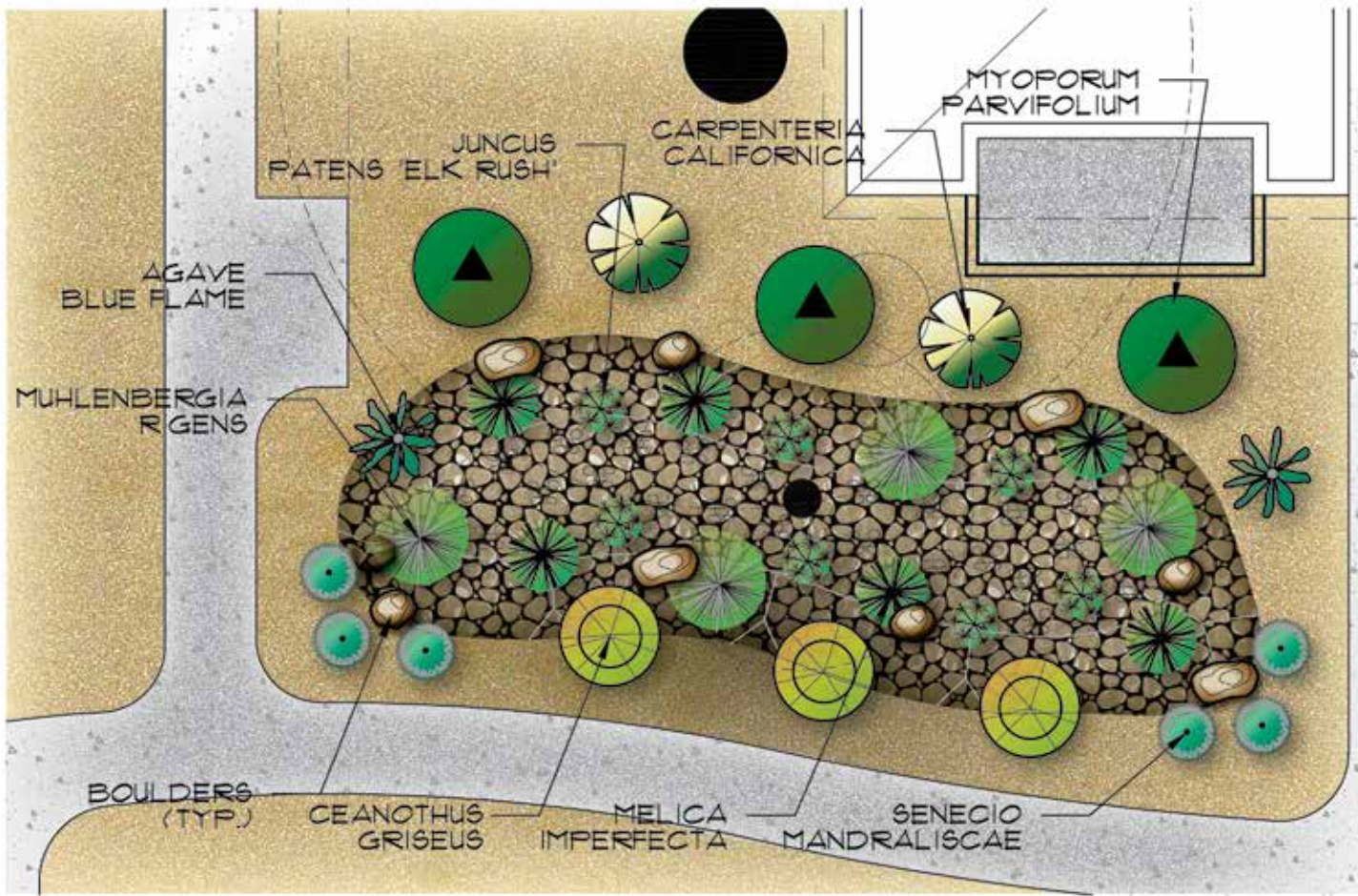
ENGINEER NOTES

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- NOTES:
1. CONSIDER THE SLOPE OF EACH TYPICAL SECTION AND HOW IT RELATES TO THE ADJACENT PAVED SURFACES.
 2. VERIFY THE SLOPE OF EACH TYPICAL SECTION IS NOT NEGATIVE AND DOES NOT EXCEED THE VALUE SPECIFIED TO GRADE TO BE MAINTAINED FOR THE LIFE OF THE PROJECT.
 3. SEE THE SPECIFICATIONS FOR THE USE OF EACH MATERIAL.
 4. CHECK THE SLOPE OF EACH TYPICAL SECTION TO BE SUFFICIENT TO PREVENT STAGNATION OF WATER IN THE BIORETENTION DETAIL.
 5. VERIFY THE SLOPE OF EACH TYPICAL SECTION IS SUFFICIENT TO PREVENT STAGNATION OF WATER IN THE BIORETENTION DETAIL.
 6. VERIFY THE SLOPE OF EACH TYPICAL SECTION IS SUFFICIENT TO PREVENT STAGNATION OF WATER IN THE BIORETENTION DETAIL.



BMP TYPE	LANDSCAPE TYPE / SLOPE	SCALE
BIORETENTION DETAIL	NARROW / FLAT	



PLANT LIST

SYMBOL	QTY.	NAME	SIZE	WATER USE
	3	MYOPORUM PARVIFOLIUM MYOPORUM	1' H X 6' W	0.2 LOW
	2	CARPENTERIA CALIFORNICA "BUSH ANEMONE"	5' H X 4' W	0.2 LOW
	2	AGAVE 'BLUE FLAME' BLUE FLAME AGAVE	2' H X 3' W	0.2 LOW
	6	MELICA IMPERFECTA CALIFORNIA MELIC	2' H X 3' W	0.2 LOW
	3	CEANOTHUS GRISEUS 'DIAMOND HEIGHTS'	1' H X 5' W	0.2 LOW
	5	SENECIO MANDRALISCAE BLUE CHALKSTICKS	1' H X 3' W	0.2 LOW
	6	JUNCUS PATENS 'ELK BLUE' CALIFORNIA GRAY RUSH	2' H X 2' W	0.2 LOW
	4	MUHLENBERGIA RIGENS DEER GRASS	4' H X 5' W	0.2 LOW

TYPICAL BMP INSTALLATION COST ESTIMATES

IMPLEMENTATION COMPONENT	BIORETENTION SWALE
Without Underdrains	\$4.00/ft ² to \$5.25/ft ²
With Underdrains	\$5.90/ft ² to \$7.20/ft ²
Recommended Mix	\$2.90/ft ² to \$4.30/ft ²
With Engineered Media	\$3.60/ft ² to \$5.40/ft ²
SOIL MEDIA BARRIER	
Geotextile	\$0.50/ft ²
Washed Sand (2-inch layer)	\$0.25/ft ²
No. 8 Aggregate (min 2 inches thick)	\$0.30/ft ²
UNDERDRAIN PIPE (includes drainage stone; assumes 5-foot spacing)	
	\$3.75/ft ²
CURB AND GUTTER	
	\$22/ft
MULCH (ranges from mixed hardwood to gorilla hair)	
	\$0.25/ft ² to \$0.50/ft ²
BOULDERS	
	\$150 each
CRUSHED AGGREGATE	
	\$1.50/ft ² to \$2.50/ft ²
HYDRAULIC RESTRICTION LAYER	
Filter Fabric	\$0.50/ft ²
Clay	\$0.65/ft ²
30-mil Liner	\$0.40/ft ²
Concrete Barrier	\$16.00/ft ²
VEGETATION	
	\$0.40/ft ² to \$4.00/ft ²
IRRIGATION	
	\$1.75 ft ² to \$2.25 ft ²
IRRIGATION CONTROLLER	
	\$500

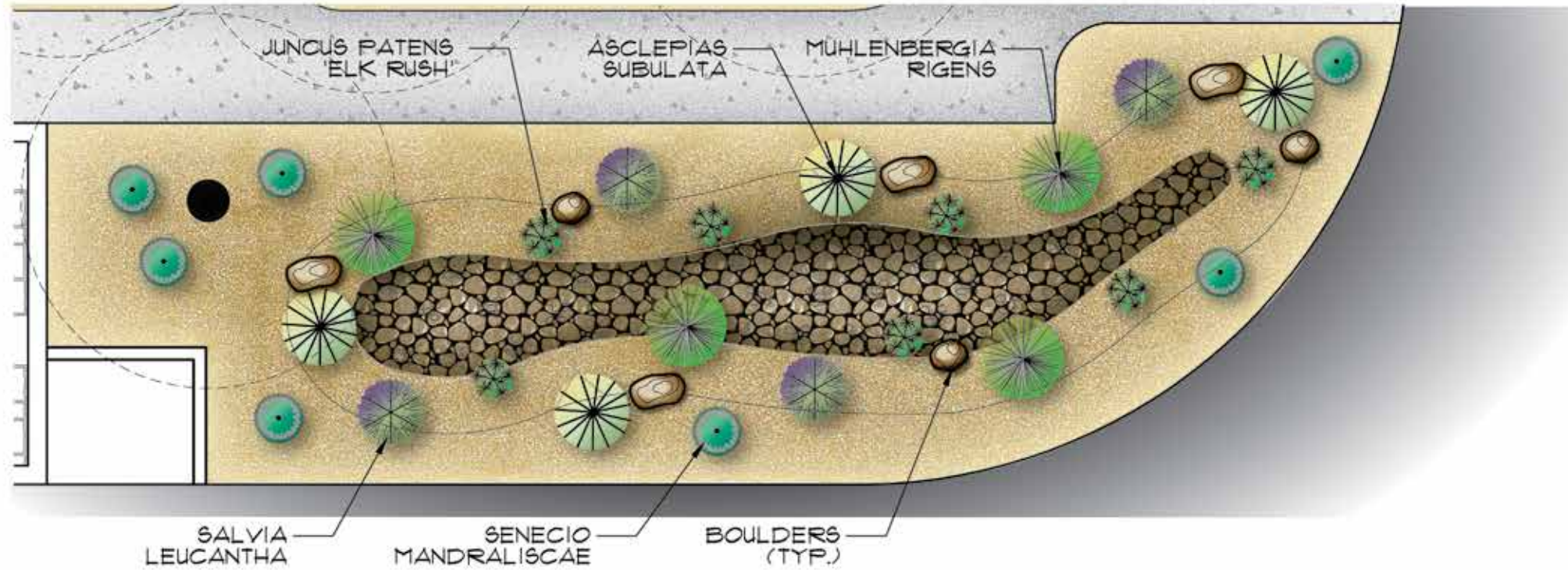
NOTES

- One tree for every 1000 sq.ft.
- At maturity 50% of landscape shall be covered with vegetation
- Verify plant locations



BMP TYPE	LANDSCAPE TYPE / SLOPE	SCALE
BIORETENTION	NARROW / FLAT	





PLANT LIST

SYMBOL	QTY.	NAME	SIZE	WATER USE
	4	MUHLENBERGIA RIGENS DEER GRASS	4' H X 5' W	0.2 LOW
	7	SENECIO MANDRALISCAE BLUE CHALKSTICKS	1' H X 3' W	0.2 LOW
	4	ASCLEPIAS SUBULATA DESERT MILKWEED	2' H X 3' W	0.2 LOW
	7	JUNCUS PATENS 'ELK BLUE' CALIFORNIA GRAY RUSH	2' H X 2' W	0.2 LOW
	4	SALVIA LEUCANTHA "MEXICAN SAGE"	3' H X 5' W	0.2 LOW

TYPICAL BMP INSTALLATION COST ESTIMATES

IMPLEMENTATION COMPONENT	VBIORETENTION
Without Underdrains	\$4.00/ft ² to \$5.25/ft ²
With Underdrains	\$5.90/ft ² to \$7.20/ft ²
Recommended Mix	\$2.90/ft ² to \$4.30/ft ²
With Engineered Media	\$3.60/ft ² to \$5.40/ft ²

SOIL MEDIA BARRIER

Geotextile	\$0.50/ft ²
Washed Sand (2-inch layer)	\$0.25/ft ²
No. 8 Aggregate (min 2 inches thick)	\$0.30/ft ²

UNDERDRAIN PIPE (includes drainage stone; assumes 5-foot spacing)	\$3.75/ft ²
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CURB AND GUTTER	\$22/ft
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MULCH (ranges from mixed hardwood to gorilla hair)	\$0.25/ft ² to \$0.50/ft ²
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BOULDERS	\$150 each
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CRUSHED AGGREGATE	\$1.50/ft ² to \$2.50/ft ²
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HYDRAULIC RESTRICTION LAYER

Filter Fabric	\$0.50/ft ²
Clay	\$0.65/ft ²
30-mil Liner	\$0.40/ft ²
Concrete Barrier	\$16.00/ft ²

VEGETATION	\$0.40/ft ² to \$4.00/ft ²
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IRRIGATION	\$1.75 ft ² to \$2.25 ft ²
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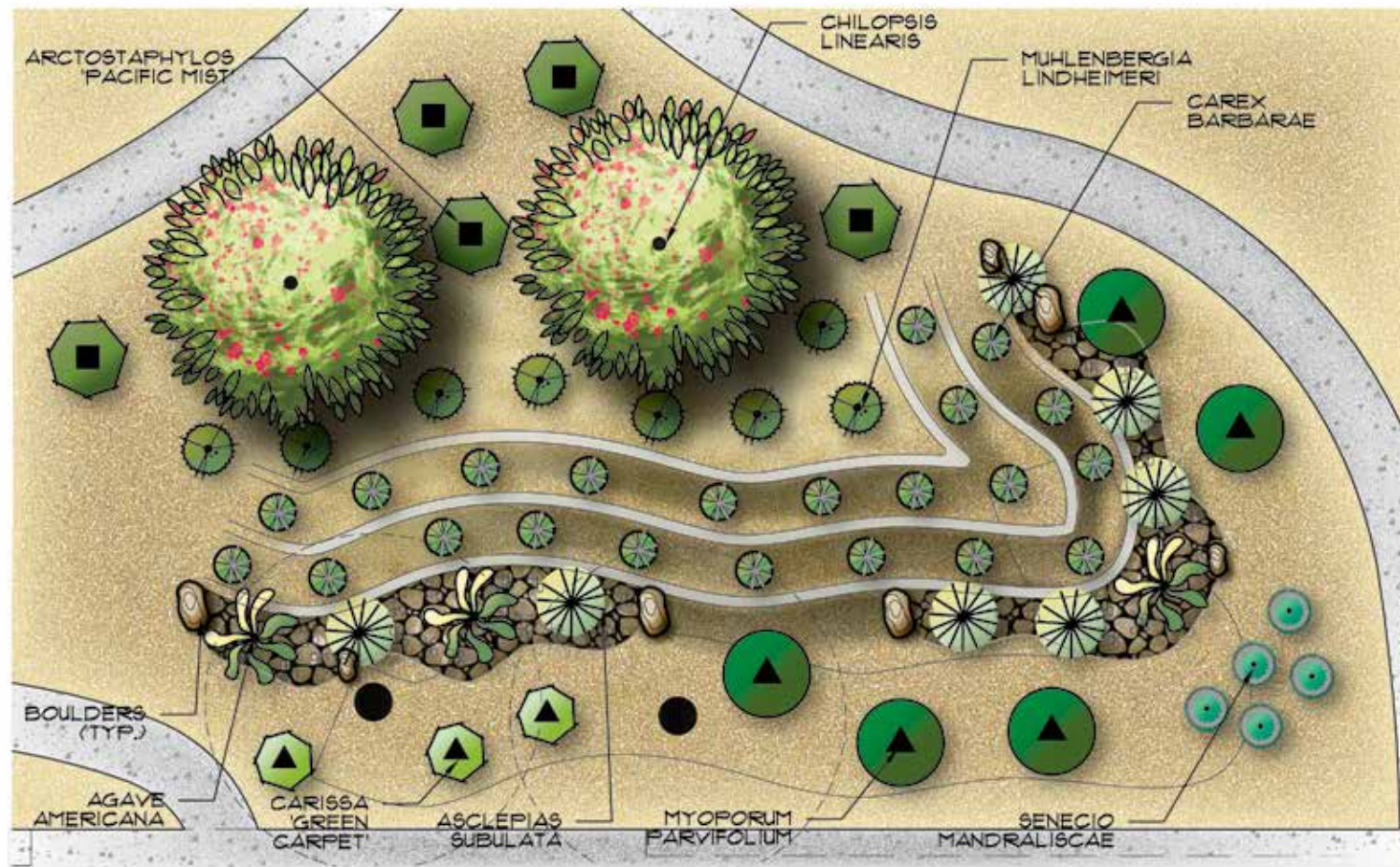
NOTES

- One tree for every 1000 sq.ft.
- At maturity 50% of landscape shall be covered with vegetation
- Verify plant locations



BMP TYPE	LANDSCAPE TYPE / SLOPE	SCALE
BIORETENTION	NARROW / MILD	





PLANT LIST

SYMBOL	QTY.	NAME	SIZE	WATER USE
	2	CHILOPSIS LINEARIS DESERT WILLOW	20' H X 15' W	0.2 LOW
	3	AGAVE AMERICANA CENTURY PLANT	4' H X 6' W	0.2 LOW
	5	MYOPORUM PARVIFOLIUM MYOPORUM	1' H X 6' W	0.2 LOW
	5	ARCTOSTAPHYLOS 'PACIFIC MIST' PACIFIC MIST MANZANITA	1' H X 10' W	0.2 LOW
	3	CARISSA "GREEN CARPET" PROSTRATE NATAL PLUM	1' H X 5' W	0.2 LOW
	7	ASCLEPIAS SUBULATA DESERT MILKNEED	2' H X 3' W	0.2 LOW
	3	MUHLENBERGIA LINDHEIMERI LINDHEIMER'S MUHLY	3' H X 4' W	0.2 LOW
	22	CAREX BARBARAE BASKET SEDGE	1.5' H X 3' W	0.2 LOW
	5	SENECIO MANDRALISCAE BLUE CHALKSTICKS	1' H X 3' W	0.2 LOW

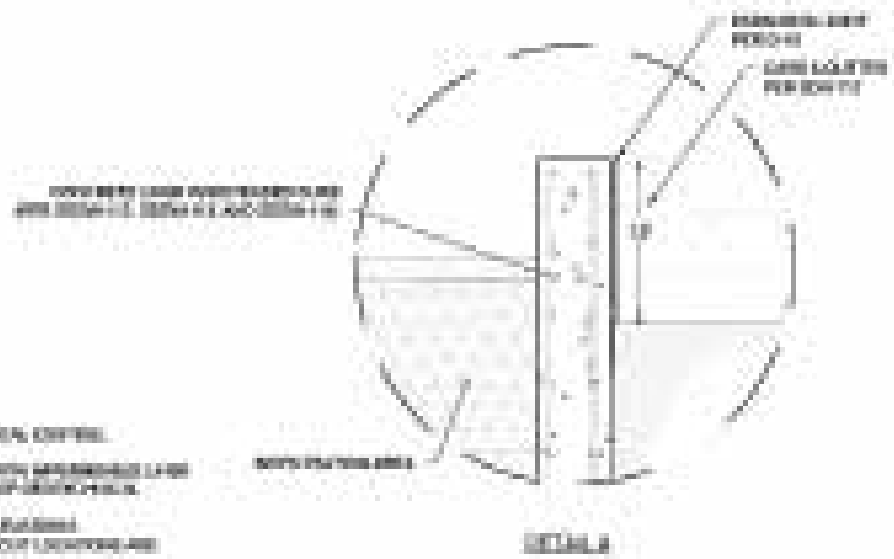
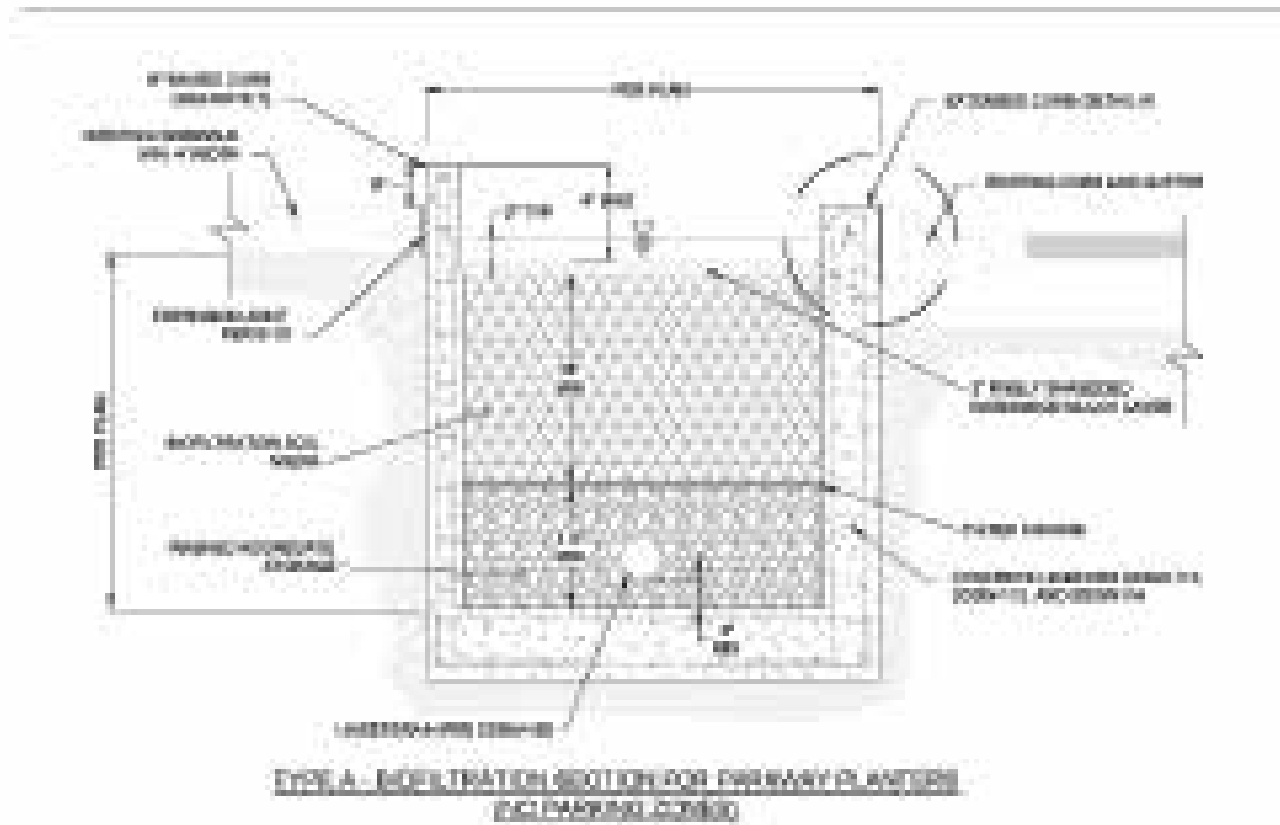
TYPICAL BMP INSTALLATION COST ESTIMATES	
IMPLEMENTATION COMPONENT	TERRACED VEGETATED FILTER STRIP
SOIL MEDIA BARRIER	
BOULDERS	\$150 each
CRUSHED AGGREGATE	\$1.50/ft ² to \$2.50/ft ²
HYDRAULIC RESTRICTION LAYER	
Filter Fabric	\$0.50/ft ²
Clay	\$0.65/ft ²
30-mil Liner	\$0.40/ft ²
Concrete Barrier	\$16.00/ft ²
VEGETATION	\$0.40/ft ² to \$4.00/ft ²
Sod	\$0.42/ft ²
Seeding	\$0.33/ft ²

NOTES
• One tree for every 1000 sq.ft.
• At maturity 50% of landscape shall be covered with vegetation
• Verify plant locations



BMP TYPE	LANDSCAPE TYPE / SLOPE	SCALE
TERRACES	OPEN SPACE / STEEP	





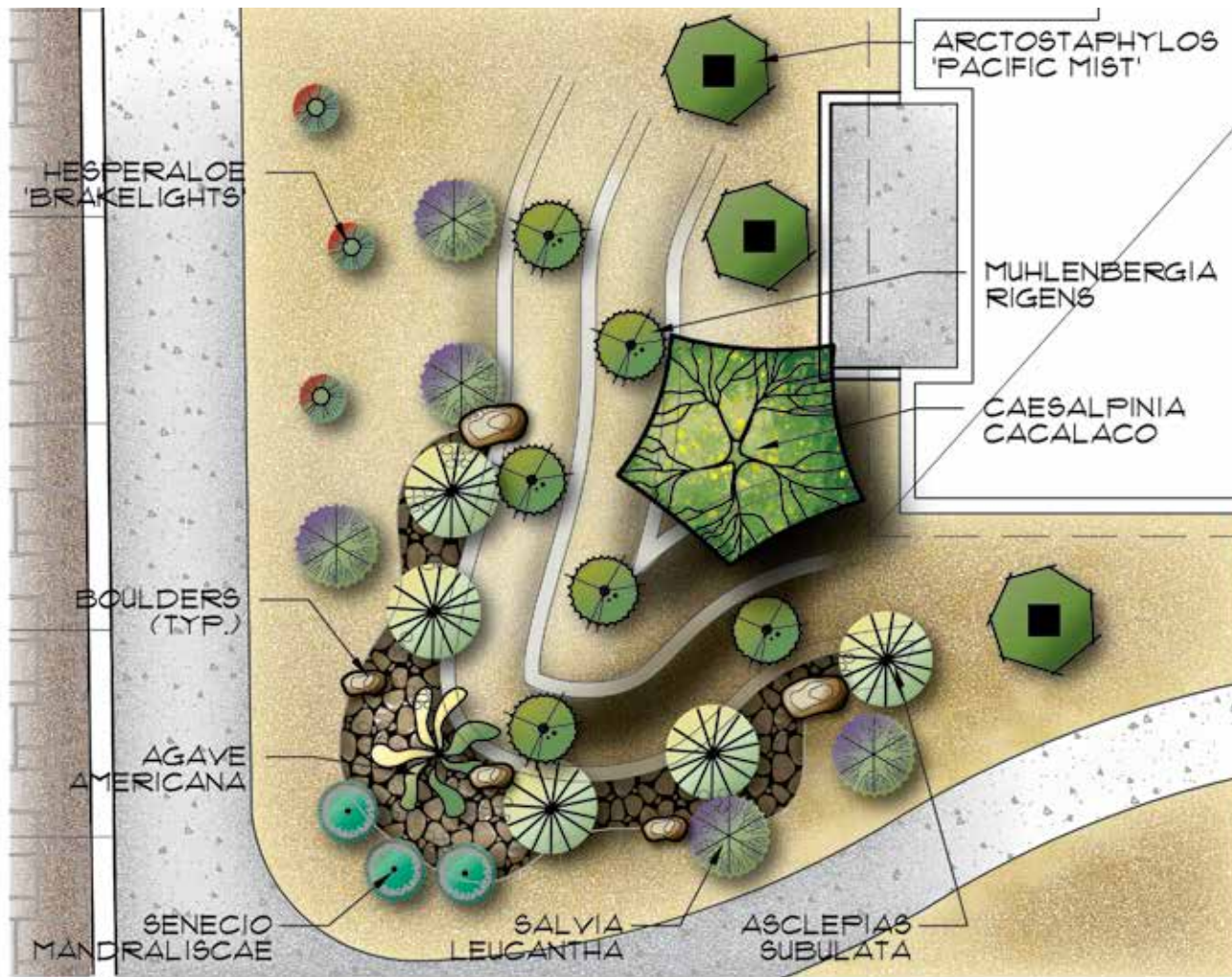
NOTES:
 1. SEE THE PLAN FOR HORIZONTAL AND VERTICAL CURVES.
 2. SEE THE PLAN FOR THE LOCATION OF THE CURB AND THE LOCATION OF THE PLANTER.
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ENGINEER NOTES	
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BMP TYPE	LANDSCAPE TYPE / SLOPE	SCALE
TERRACES DETAIL	OPEN SPACE / STEEP	0 5' 10' 3/32" = 1'-0"





PLANT LIST

SYMBOL	QTY.	NAME	SIZE	WATER USE
	1	CAESALPINIA CACALACO CASCALOTE	18' H X 18' W	0.2 LOW
	1	AGAVE AMERICANA CENTURY PLANT	4' H X 6' W	0.2 LOW
	3	ARCTOSTAPHYLOS 'PACIFIC MIST' PACIFIC MIST MANZANITA	1' H X 10' W	0.2 LOW
	6	MUHLENBERGIA LINDHEIMERI LINDHEIMER'S MUHLY	3' H X 4' W	0.2 LOW
	5	SALVIA LEUCANTHA "MEXICAN SAGE"	3' H X 5' W	0.2 LOW
	5	ASCLEPIAS SUBULATA DESERT MILKWEED	2' H X 3' W	0.2 LOW
	3	SENECIO MANDRALISCAE BLUE CHALKSTICKS	1' H X 10' W	0.2 LOW
	3	HESPERALOE 'BRAKELIGHTS' RED YUCCA	2' H X 2' W	0.2 LOW

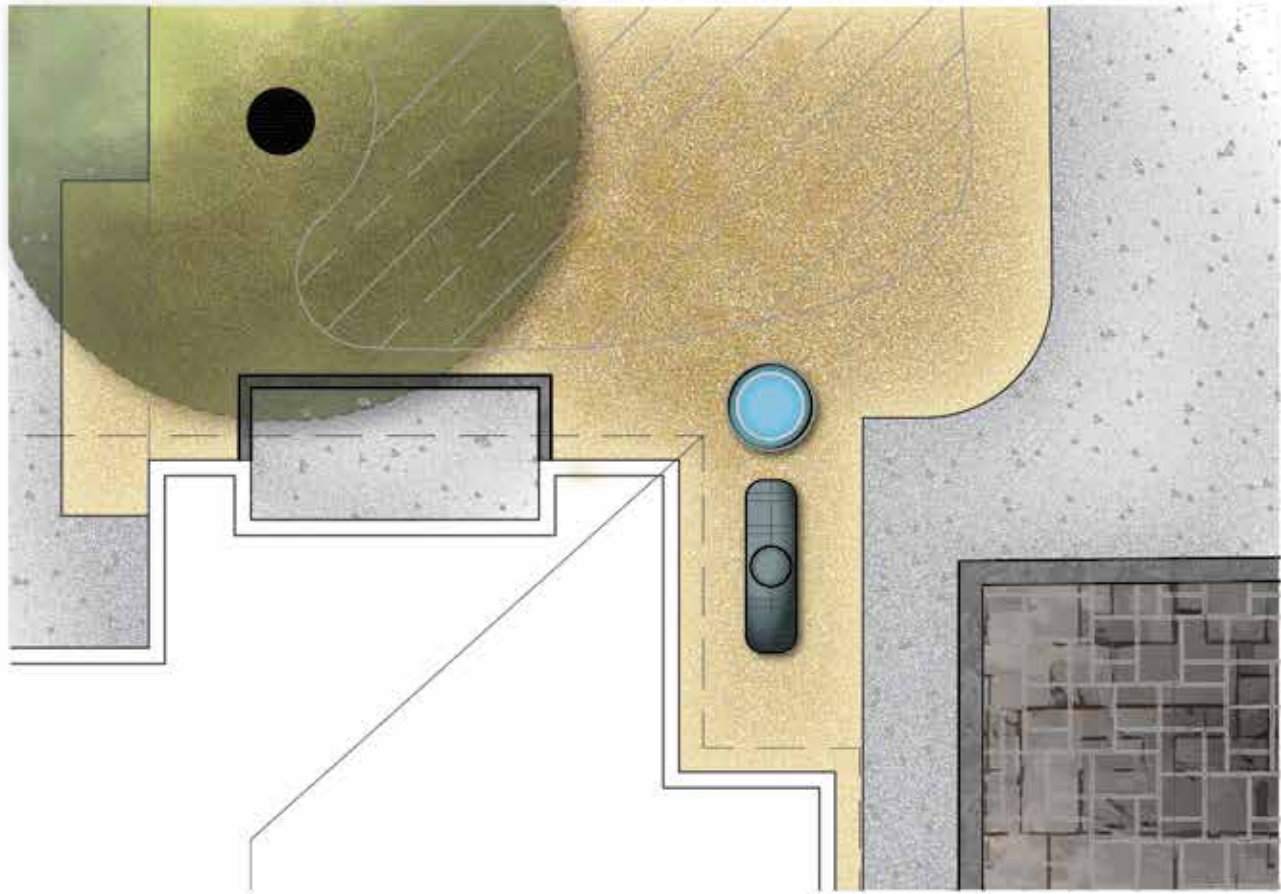
TYPICAL BMP INSTALLATION COST ESTIMATES	
IMPLEMENTATION COMPONENT	TERRACED VEGETATED FILTER STRIP
SOIL MEDIA BARRIER	
BOULDERS	\$150 each
CRUSHED AGGREGATE	\$1.50/ft ² to \$2.50/ft ²
HYDRAULIC RESTRICTION LAYER	
Filter Fabric	\$0.50/ft ²
Clay	\$0.65/ft ²
30-mil Liner	\$0.40/ft ²
Concrete Barrier	\$16.00/ft ²
VEGETATION	\$0.40/ft ² to \$4.00/ft ²
Sod	\$0.42/ft ²
Seeding	\$0.33/ft ²

NOTES
• One tree for every 1000 sq.ft.
• At maturity 50% of landscape shall be covered with vegetation
• Verify plant locations



BMP TYPE	LANDSCAPE TYPE / SLOPE	SCALE
TERRACES	NARROW / STEEP	





TYPICAL BMP INSTALLATION COST ESTIMATES

IMPLEMENTATION COMPONENT	CISTERNS/ RAIN BARRELS
TANKS/CISTERNS	\$0.75/gallon
Filter	\$35.00 to \$360.00
FOUNDATION	
Gravel (assume 6-inch depth)	\$1.00/ft ²
Concrete (assume 6-inch depth)	\$16.00/ft ²

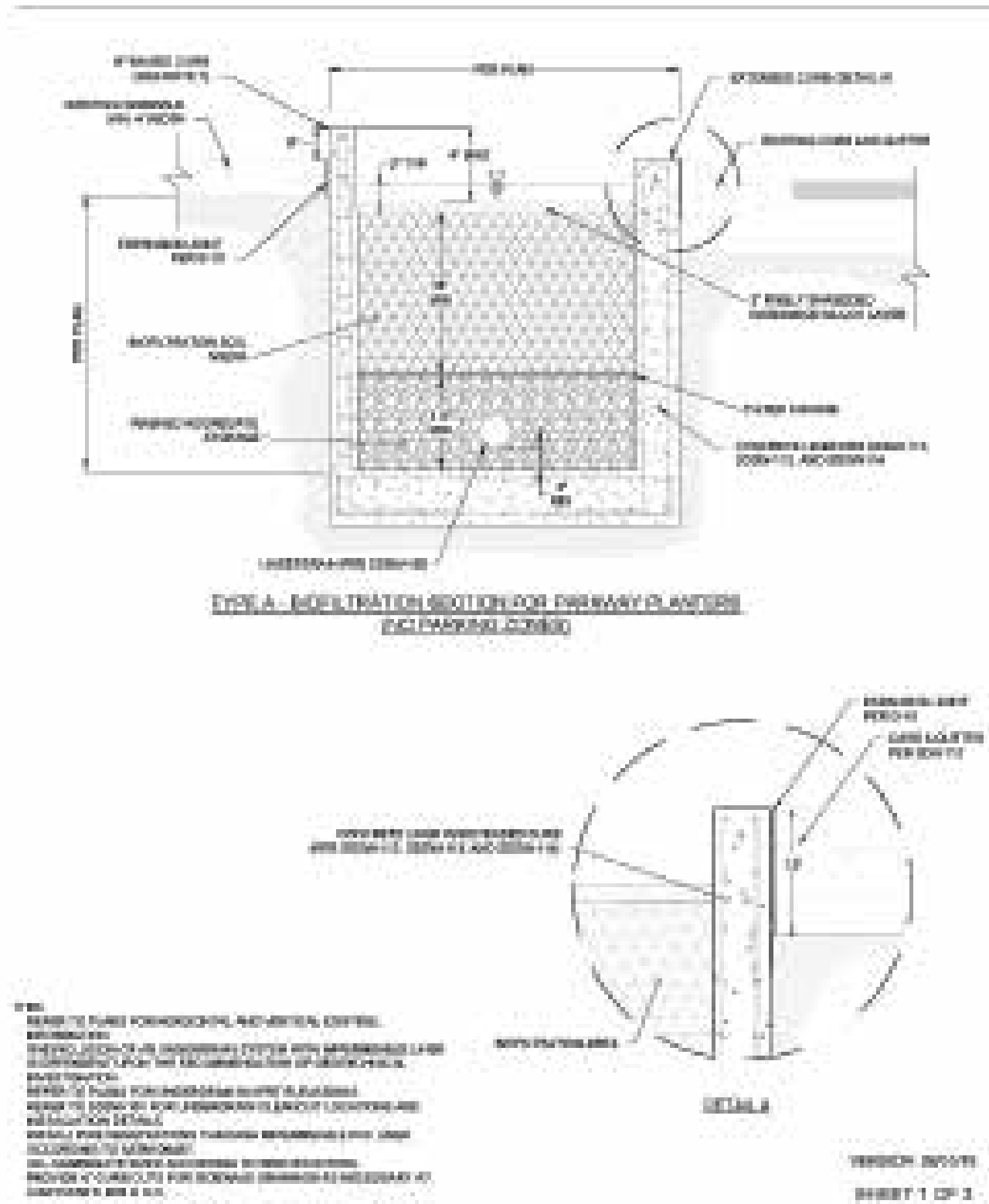
NOTES

- One tree for every 1000 sq.ft.
- At maturity 50% of landscape shall be covered with vegetation
- Verify plant locations



BMP TYPE	LANDSCAPE TYPE / SLOPE	SCALE
CISTERN/RAIN BARREL	NARROW / ABOVE GROUND	



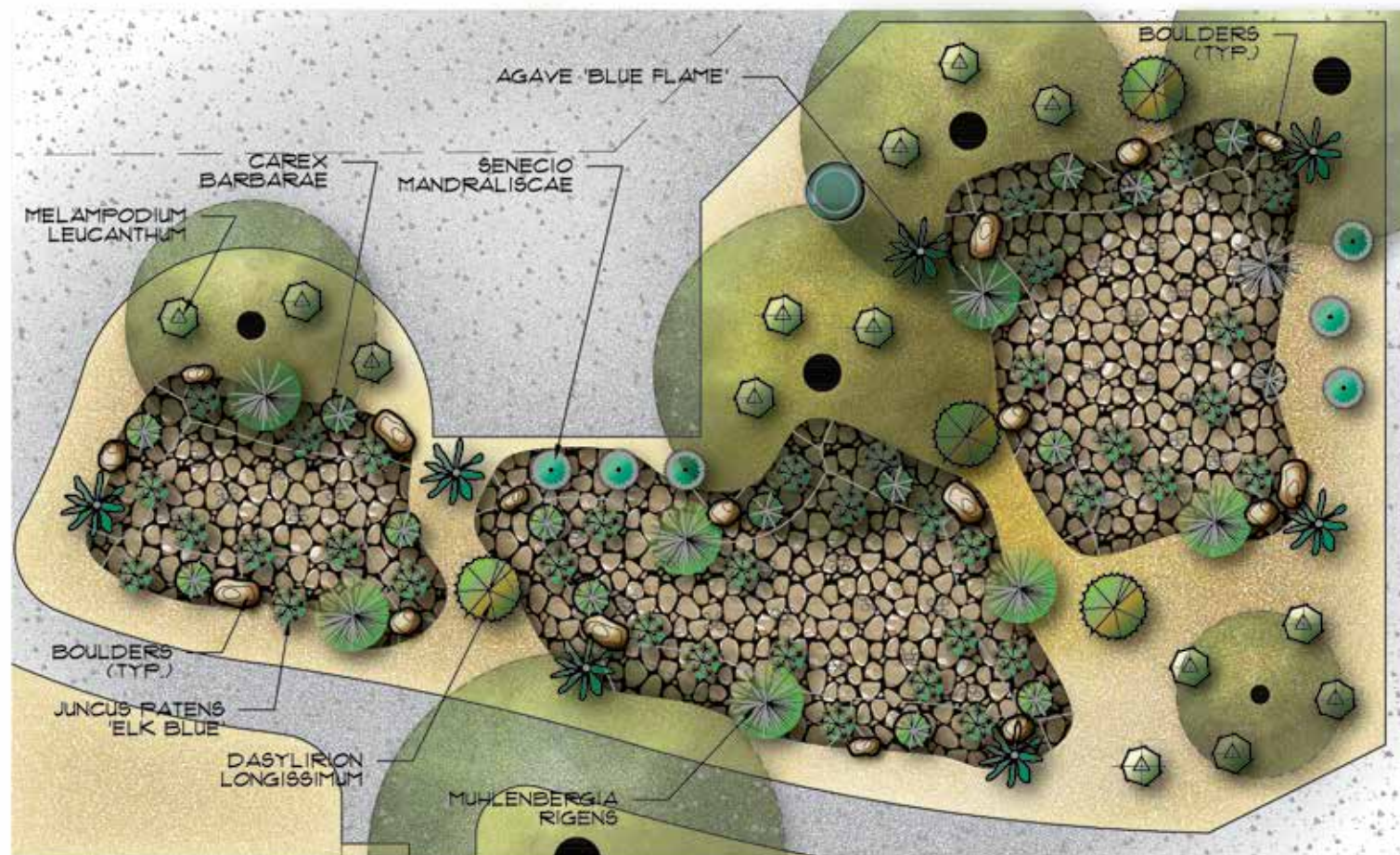


ENGINEER NOTES	
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•	qqq
•	qqq



BMP TYPE	LANDSCAPE TYPE / SLOPE	SCALE
CISTERN/RAIN BARREL DETAIL	NARROW / ABOVE GROUND	





PLANT LIST

SYMBOL	QTY.	NAME	SIZE	WATER USE
	38	JUNCUS PATENS 'ELK BLUE' CALIFORNIA GRAY RUSH	2' H X 2' W	0.2 LOW
	6	SENECIO MANDRALISCAE BLUE CHALKSTICKS	1' H X 10' W	0.2 LOW
	7	AGAVE 'BLUE FLAME' BLUE FLAME AGAVE	2' H X 3' W	0.2 LOW
	14	MELAMPODIUM LEUCANTHUM BLACKFOOT DAISY	1' H X 3' W	0.2 LOW
	8	MUHLENBERGIA RIGENS DEER GRASS	4' H X 5' W	0.2 LOW
	15	CAREX BARBARAE BASKET SEDGE	1.5' H X 3' W	0.2 LOW
	4	DASYLIRION LONGISSIMUM MEXICAN GRASS TREE	5 GAL.	0.2 LOW

TYPICAL BMP INSTALLATION COST ESTIMATES

IMPLEMENTATION COMPONENT	CISTERNS/ RAIN BARRELS
TANKS/CISTERNS	\$0.75/gallon
Filter	\$35.00 to \$360.00
FOUNDATION	
Gravel (assume 6-inch depth)	\$1.00/ft ²
Concrete (assume 6-inch depth)	\$16.00/ft ²

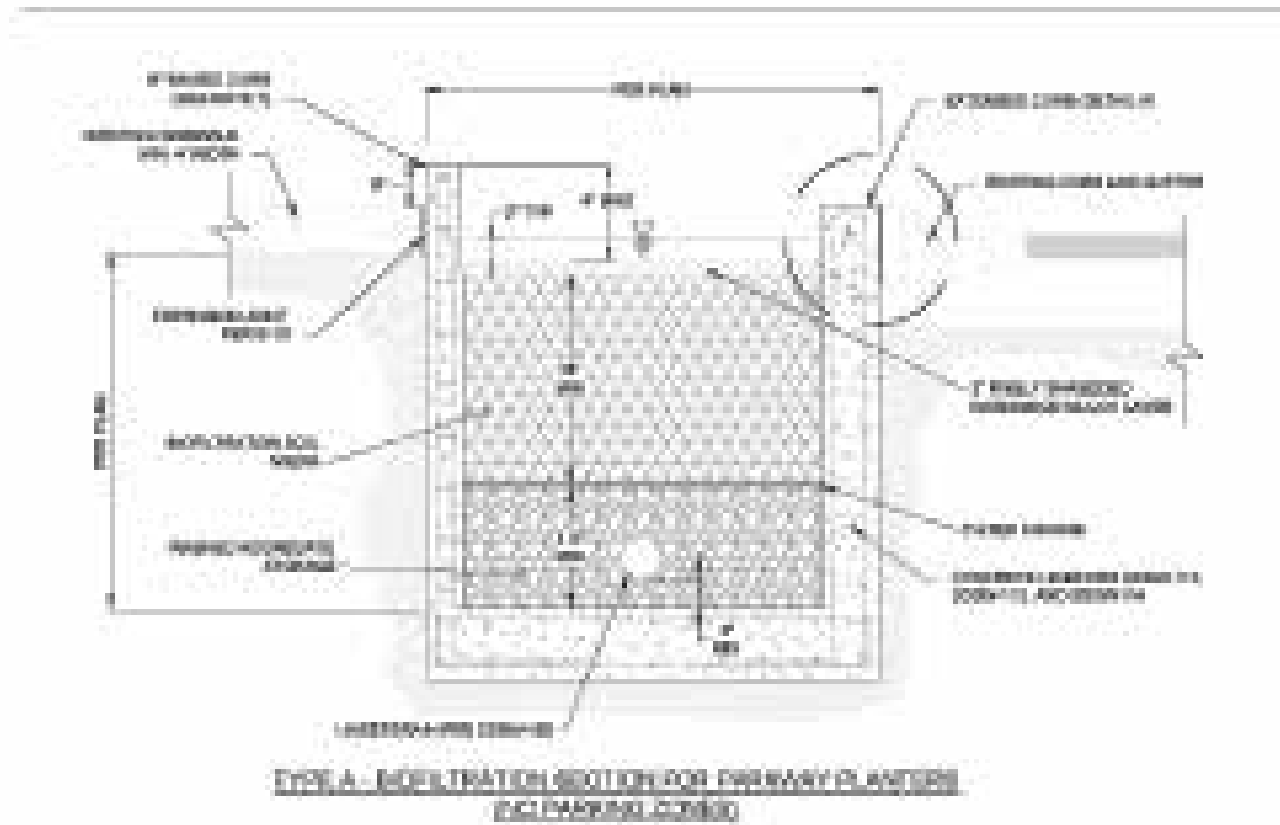
NOTES

- One tree for every 1000 sq.ft.
- At maturity 50% of landscape shall be covered with vegetation
- Verify plant locations

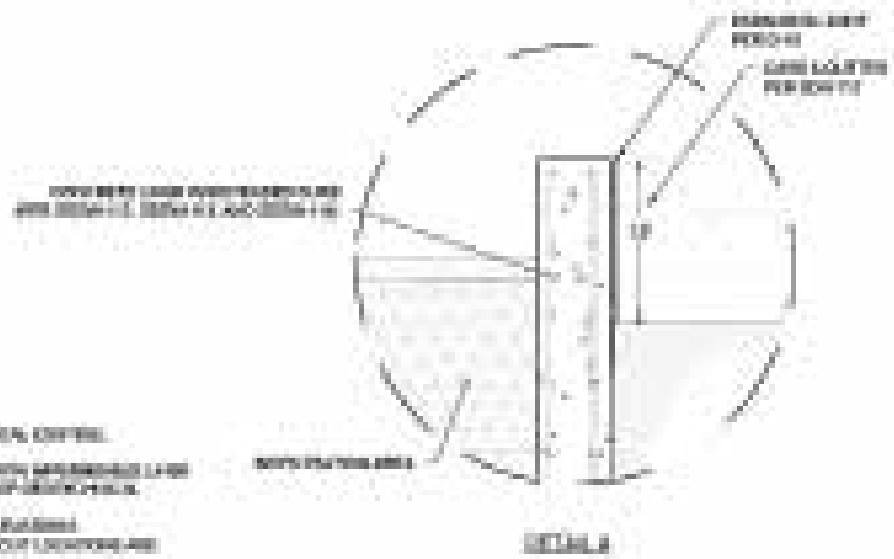


BMP TYPE	LANDSCAPE TYPE / SLOPE	SCALE
CISTERN/RAIN BARREL	OPEN SPACE / BELOW GROUND	





TYPE A - MODIFICATION SECTION FOR PRIMARY PLANTERS (EXCLUDING CURB)



DETAIL B

NOTES:
 1. SEE THE PLAN FOR DIMENSIONS, NOTATIONS, ETC.
 2. SEE THE PLAN FOR DIMENSIONS, NOTATIONS, ETC.
 3. SEE THE PLAN FOR DIMENSIONS, NOTATIONS, ETC.
 4. SEE THE PLAN FOR DIMENSIONS, NOTATIONS, ETC.
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 9. SEE THE PLAN FOR DIMENSIONS, NOTATIONS, ETC.
 10. SEE THE PLAN FOR DIMENSIONS, NOTATIONS, ETC.

VERTICAL DIMENSIONS
 SHEET 1 OF 3

ENGINEER NOTES	
•	qqq
•	qqq
•	qqq



BMP TYPE	LANDSCAPE TYPE / SLOPE	SCALE
CISTERN/RAIN BARREL DETAIL	OPEN SPACE / BELOW GROUND	





TYPICAL BMP INSTALLATION COST ESTIMATES

IMPLEMENTATION COMPONENT	PERMEABLE PAVEMENT
EXCAVATION	\$1.35/ft ² to \$2.65/ft ²
PERMEABLE PAVEMENT MATERIALS	
Pervious Asphalt	\$2.00/ft ²
Pervious Concrete	\$6.00/ft ²
PICP	\$4.00/ft ²
Plastic Grid Pavers	\$2.80 ea
BEDDING LAYER	
Washed Sand (2-inch layer)	\$0.25/ft ²
No. 8 Aggregate (min 2 inches thick)	\$0.30/ft ²
No. 57 Stone (min 6 inches to 1 foot)	\$1.00/ft ² to \$2.00/ft ²

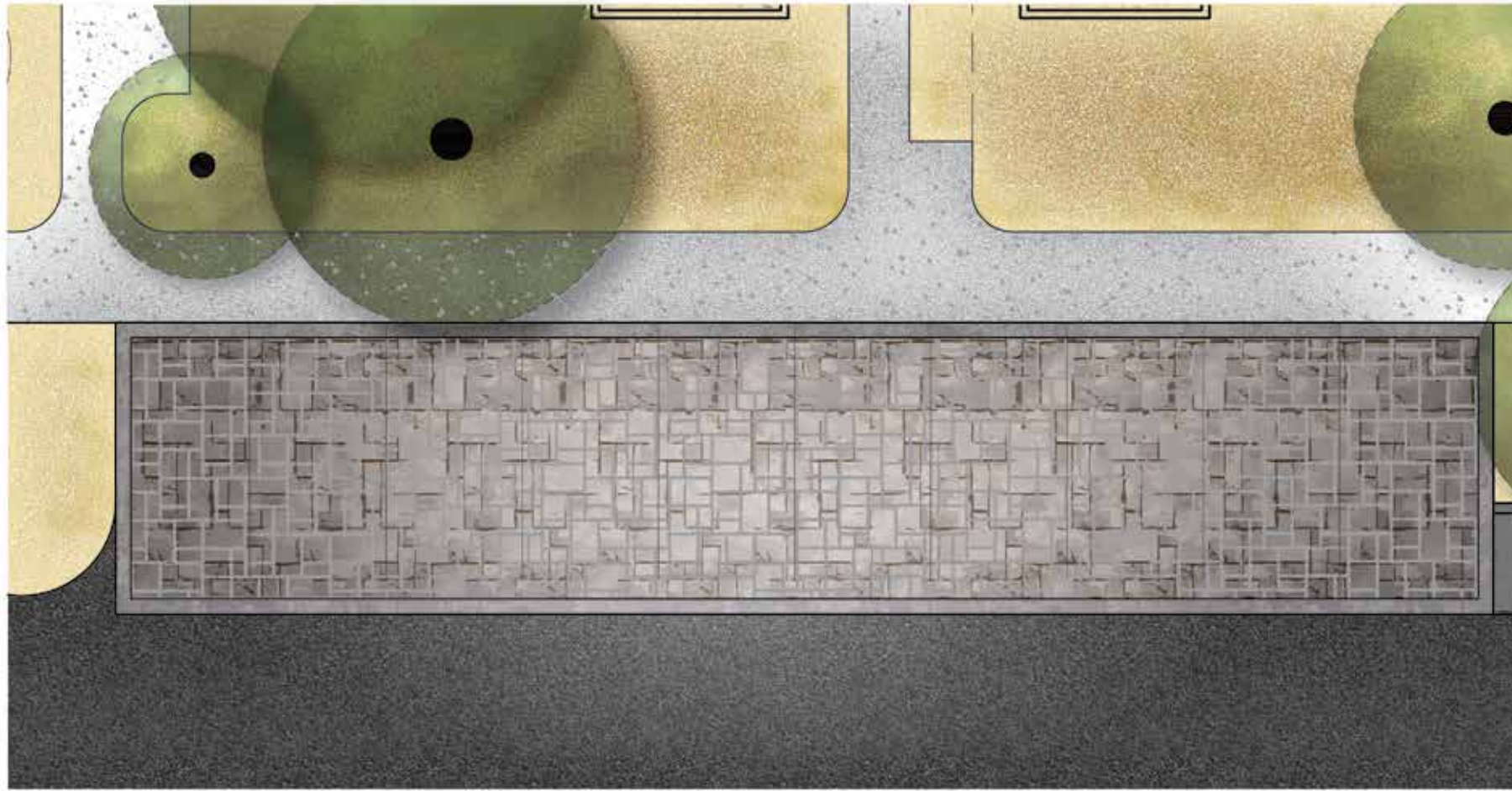
NOTES

- One tree for every 1000 sq.ft.
- At maturity 50% of landscape shall be covered with vegetation
- Verify plant locations



BMP TYPE	LANDSCAPE TYPE / SLOPE	SCALE
PERMEABLE PAVEMENT	PAVED / FLAT	





TYPICAL BMP INSTALLATION COST ESTIMATES

IMPLEMENTATION COMPONENT	PERMEABLE PAVEMENT
EXCAVATION	\$1.35/ft ² to \$2.65/ft ²
PERMEABLE PAVEMENT MATERIALS	
Pervious Asphalt	\$2.00/ft ²
Pervious Concrete	\$6.00/ft ²
PICP	\$4.00/ft ²
Plastic Grid Pavers	\$2.80 ea
BEDDING LAYER	
Washed Sand (2-inch layer)	\$0.25/ft ²
No. 8 Aggregate (min 2 inches thick)	\$0.30/ft ²
No. 57 Stone (min 6 inches to 1 foot)	\$1.00/ft ² to \$2.00/ft ²

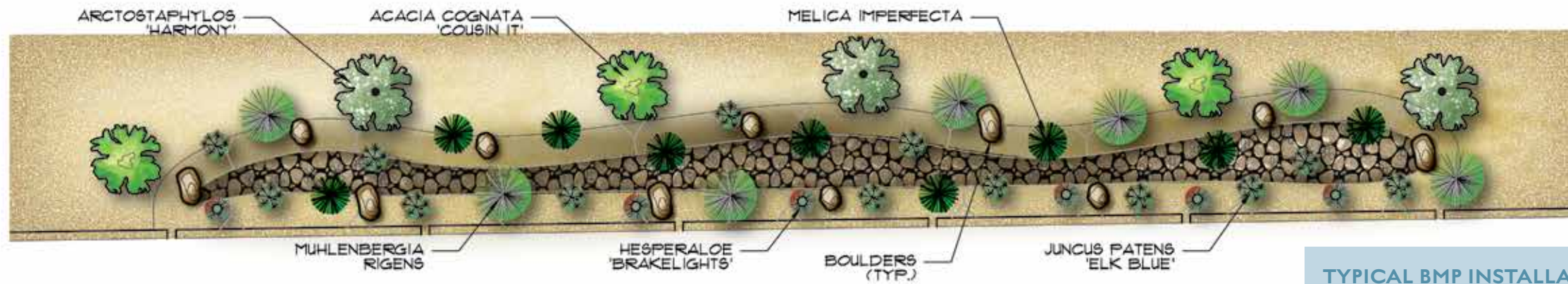
NOTES

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- Verify plant locations



BMP TYPE	LANDSCAPE TYPE / SLOPE	SCALE
PERMEABLE PAVEMENT	PAVED / MILD	





PLANT LIST

SYMBOL	QTY.	NAME	SIZE	WATER USE
	3	ARCTOSTAPHYLOS DENSIFLORA "HARMONY MANZANITA"	4' H X 5' W	0.2 LOW
	3	ACACIA COGNATA 'COUSIN IT' LITTLE RIVER WATTLE	2' H X 8' W	0.2 LOW
	7	MUHLENBERGIA RIGENS DEER GRASS	4' H X 5' W	0.2 LOW
	9	MELICA IMPERFECTA CALIFORNIA MELIC	2' H X 3' W	0.2 LOW
	13	JUNCUS PATENS 'ELK BLUE' CALIFORNIA GRAY RUSH	2' H X 2' W	0.2 LOW
	6	HESPERALOE 'BRAKELIGHTS' RED YUCCA	2' H X 2' W	0.2 LOW

NOTES

- One tree for every 1000 sq.ft.
- At maturity 50% of landscape shall be covered with vegetation
- Verify plant locations

TYPICAL BMP INSTALLATION COST ESTIMATES

IMPLEMENTATION COMPONENT	BIORETENTION SWALE
Without Underdrains	\$4.00/ft ² to \$5.25/ft ²
With Underdrains	\$5.90/ft ² to \$7.20/ft ²
Recommended Mix	\$2.90/ft ² to \$4.30/ft ²
With Engineered Media	\$3.60/ft ² to \$5.40/ft ²
SOIL MEDIA BARRIER	
Geotextile	\$0.50/ft ²
Washed Sand (2-inch layer)	\$0.25/ft ²
No. 8 Aggregate (min 2 inches thick)	\$0.30/ft ²
UNDERDRAIN PIPE (includes drainage stone; assumes 5-foot spacing)	\$3.75/ft ²
CURB AND GUTTER	\$22/ft
MULCH (ranges from mixed hardwood to gorilla hair)	\$0.25/ft ² to \$0.50/ft ²
BOULDERS	\$150 each
CRUSHED AGGREGATE	\$1.50/ft ² to \$2.50/ft ²
HYDRAULIC RESTRICTION LAYER	
Filter Fabric	\$0.50/ft ²
Clay	\$0.65/ft ²
30-mil Liner	\$0.40/ft ²
Concrete Barrier	\$16.00/ft ²
VEGETATION	\$0.40/ft ² to \$4.00/ft ²
IRRIGATION	\$1.75 ft ² to \$2.25 ft ²
IRRIGATION CONTROLLER	\$500



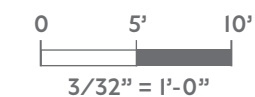
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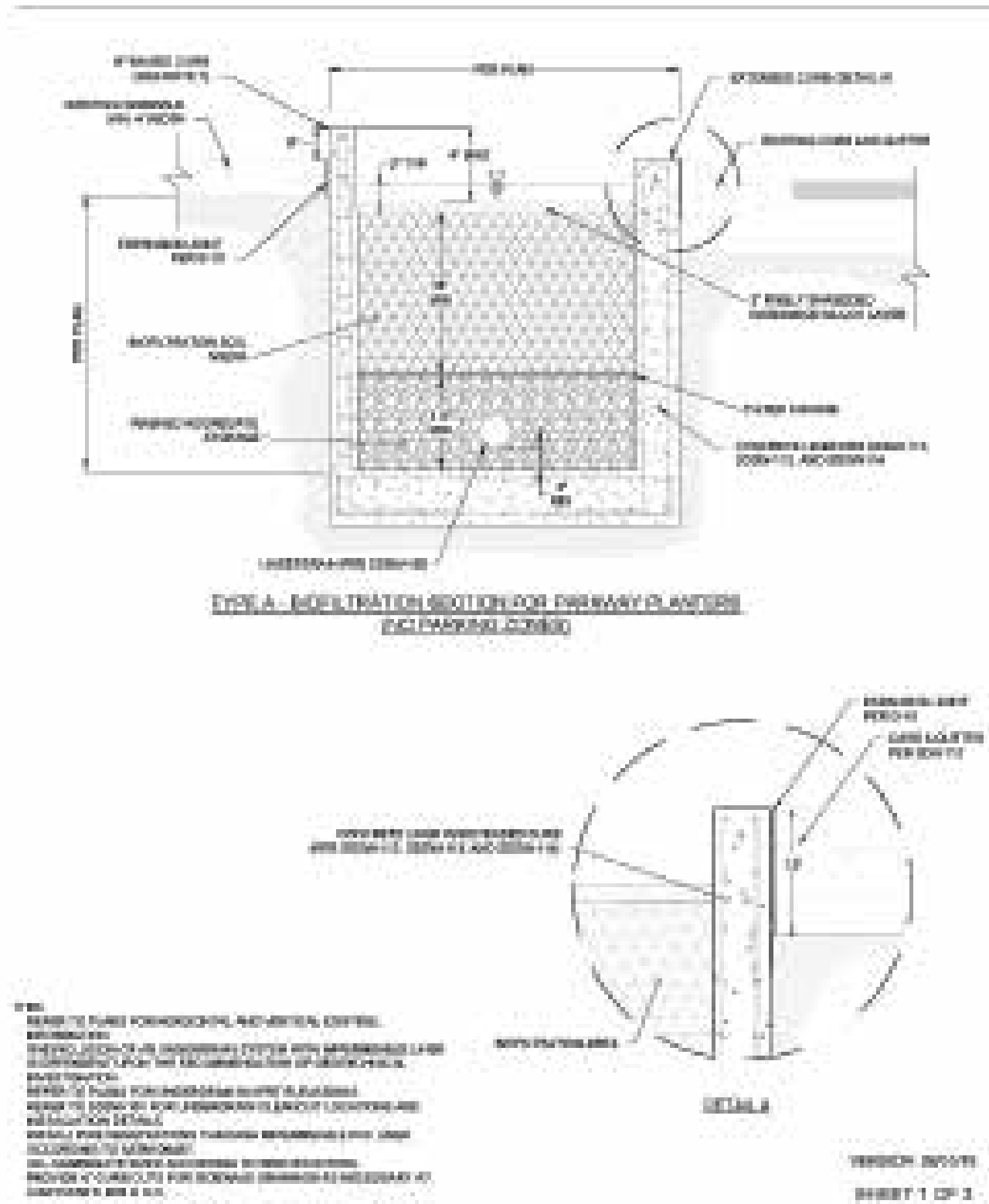
BIOSWALE

LANDSCAPE TYPE / SLOPE

NARROW / MILD

SCALE





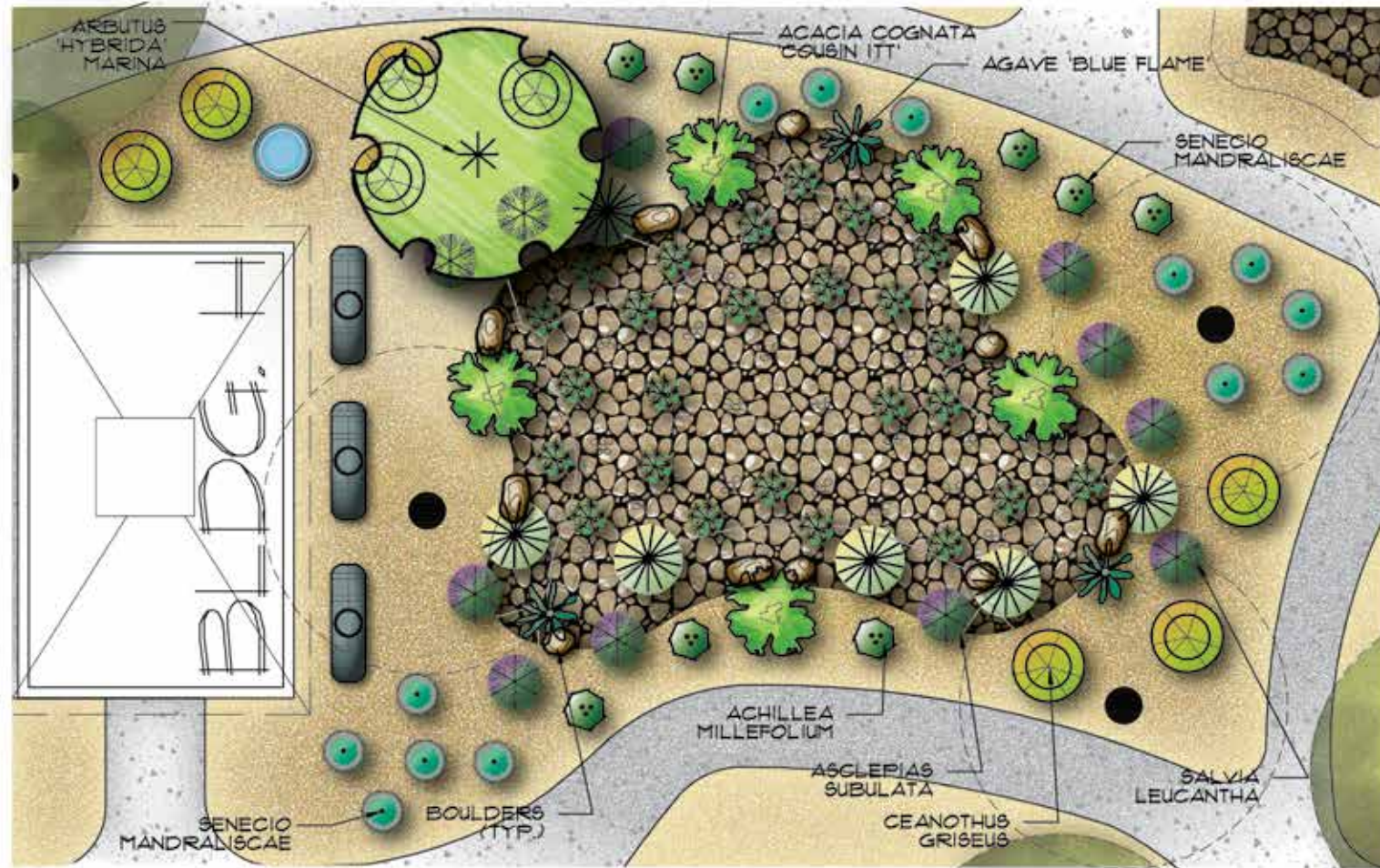
ENGINEER NOTES

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BMP TYPE	LANDSCAPE TYPE / SLOPE	SCALE
BIOSWALE DETAIL	NARROW / MILD	





PLANT LIST

SYMBOL	QTY.	NAME	SIZE	WATER USE
	1	ARBUTUS HYBRIDA 'MARINA' "MARINA STRAWBERRY TREE"	40' H X 30' W	0.2 LOW
	8	CEANOTHUS GRISEUS "DIAMOND HEIGHTS"	1' H X 5' W	0.2 LOW
	11	SALVIA LEUCANTHA "MEXICAN SAGE"	3' H X 5' W	0.2 LOW
	8	ACHILLEA MILLEFOLIUM COMMON YARROW	2' H X 1.5' W	0.2 LOW
	7	ASCLEPIAS SUBULATA DESERT MILKWEED	2' H X 3' W	0.2 MOD
	25	JUNCUS PATENS 'ELK BLUE' CALIFORNIA GRAY RUSH	2' H X 2' W	0.2 LOW
	13	SENECIO MANDRALISCAE BLUE CHALKSTICKS	1' H X 10' W	0.2 LOW
	5	ACACIA COGNATA 'COUSIN ITT' LITTLE RIVER WATTLE	2' H X 3' W	0.2 LOW
	3	AGAVE 'BLUE FLAME' BLUE FLAME AGAVE	2' H X 3' W	0.2 LOW

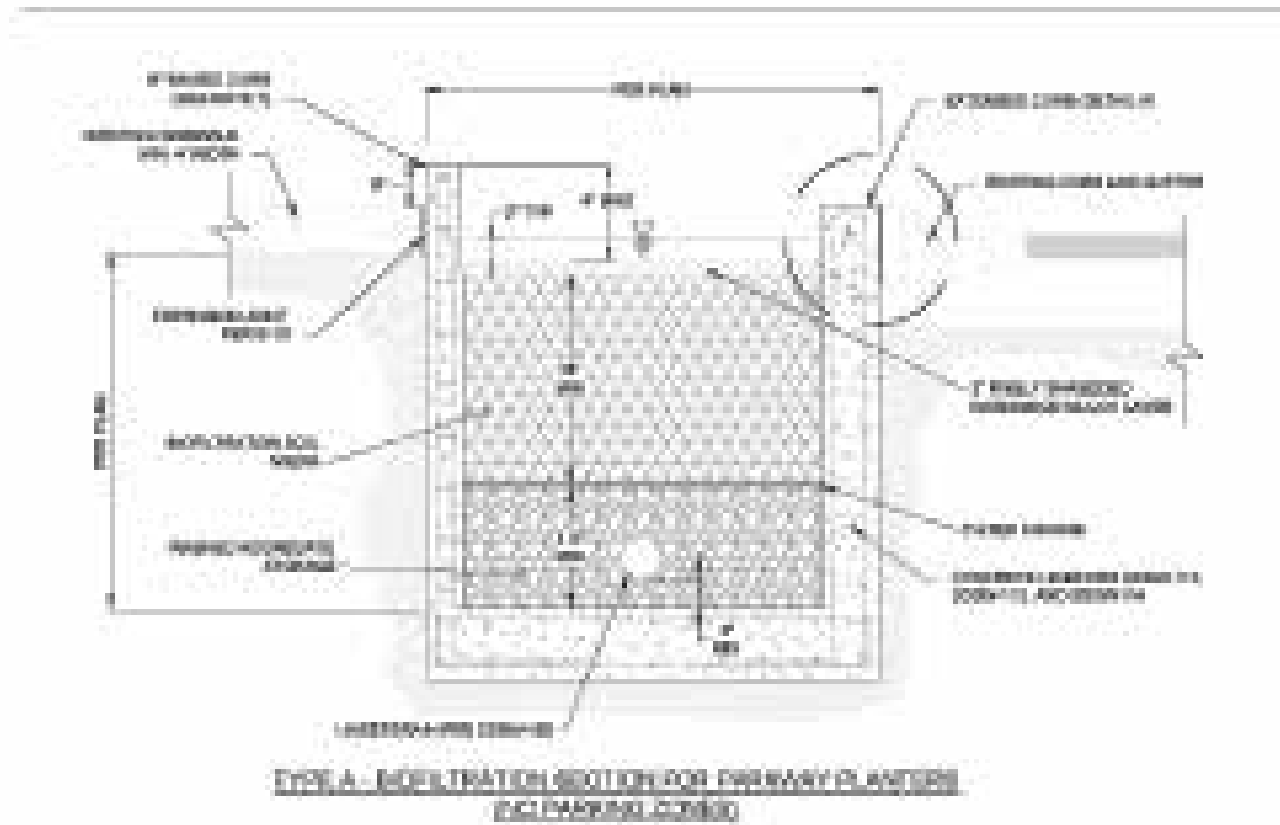
TYPICAL BMP INSTALLATION COST ESTIMATES	
IMPLEMENTATION COMPONENT	VEGETATED SWALE
EXCAVATION	\$1.32/ft ³
FINE GRADING	\$0.34/ft ²
SOIL MEDIA BARRIER	
BOULDERS	\$150 each
CRUSHED AGGREGATE	\$1.50/ft ² to \$2.50/ft ²
HYDRAULIC RESTRICTION LAYER	
Sod	\$0.42/ft ²
Seeding	\$0.33/ft ²
IRRIGATION	\$1.75 ft ² to \$2.25 ft ²
IRRIGATION CONTROLLER	\$500

NOTES
• One tree for every 1000 sq.ft.
• At maturity 50% of landscape shall be covered with vegetation
• Verify plant locations

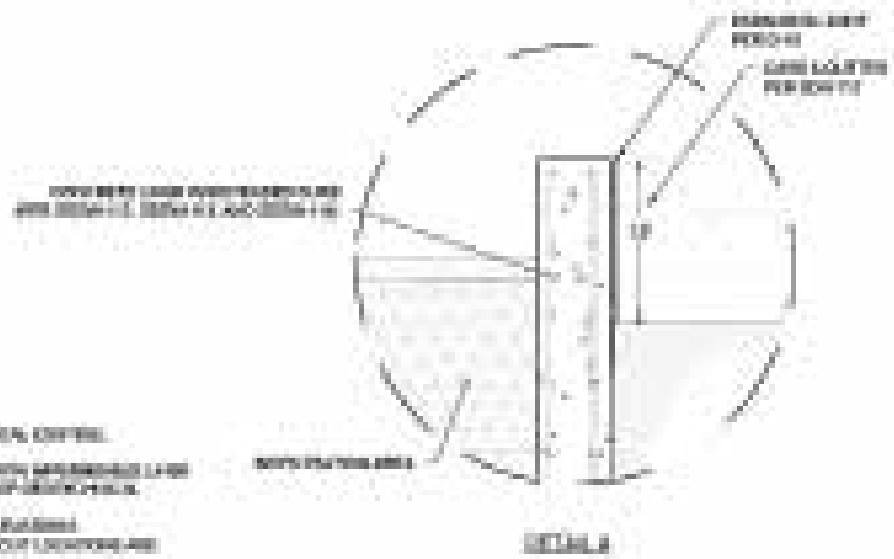


BMP TYPE	LANDSCAPE TYPE / SLOPE	SCALE
SUBSURFACE IRRIGATION	OPEN SPACE / MILD	0 5' 10' 3/32" = 1'-0"





TYPICAL IRRIGATION SECTION FOR PRIMARY PLANTER (INCLUDING CURB)



DETAIL

VERTICAL DIMENSIONS
SHOWN IN FEET

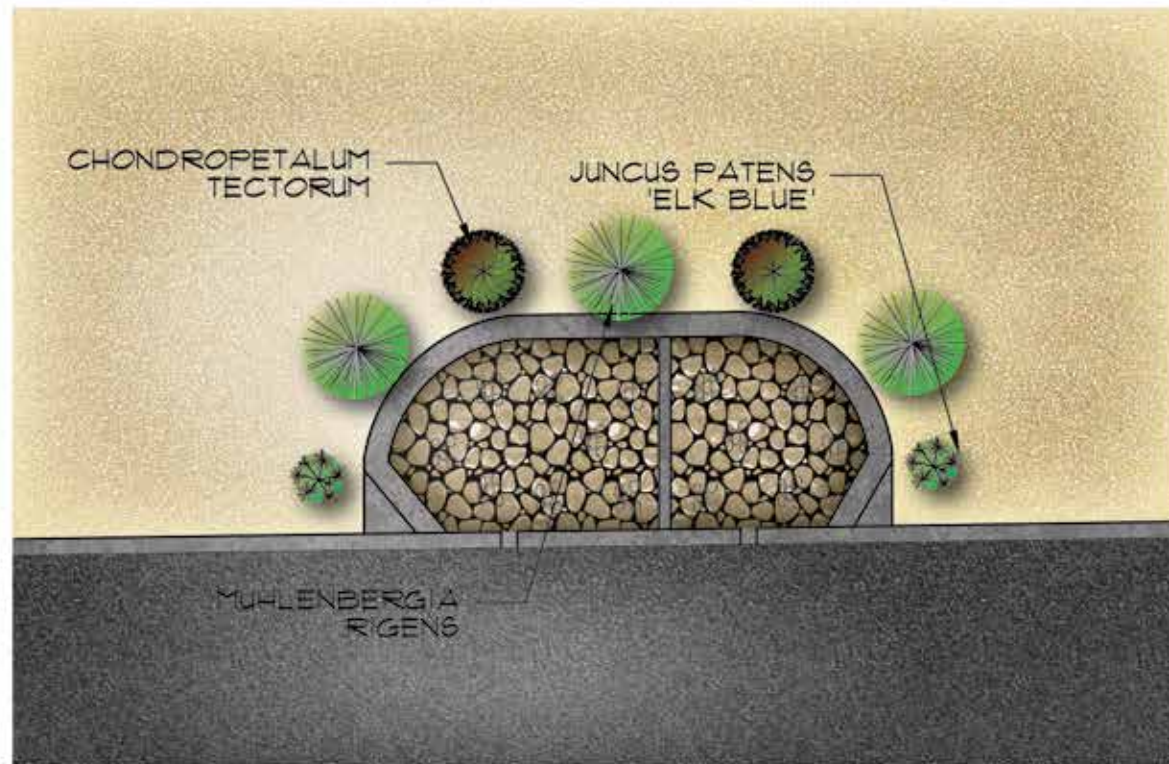
NOTES:
 1. SEE PLAN FOR DIMENSIONS, MATERIALS, ELEVATIONS, AND FINISHES.
 2. THE 1/2\"/>

ENGINEER NOTES	
•	999
•	999
•	999



BMP TYPE	LANDSCAPE TYPE / SLOPE	SCALE
SUBSURFACE IRRIGATION DETAIL	OPEN SPACE / MILD	





PLANT LIST

SYMBOL	QTY.	NAME	SIZE	WATER USE
	2	CHONDROPETALUM TECTORUM "SMALL CAPE RUSH"	2' H X 3' W	0.2 LOW
	3	MUHLENBERGIA RIGENS DEER GRASS	4' H X 5' W	0.2 LOW
	2	JUNCUS PATENS 'ELK BLUE' CALIFORNIA GRAY RUSH	2' H X 2' W	0.2 LOW

TYPICAL BMP INSTALLATION COST ESTIMATES

IMPLEMENTATION COMPONENT	FLOW THROUGH PLANTER BOXES
EXCAVATION	\$5.90/ft ² to \$7.20/ft ²
Recommended Mix	\$2.90/ft ² to \$4.30/ft ²
With Engineered Media	\$3.60/ft ² to \$5.40/ft ²
SOIL MEDIA BARRIER	
Geotextile	\$0.50/ft ²
Washed Sand (2-inch layer)	\$0.25/ft ²
No. 8 Aggregate (min 2 inches thick)	\$0.30/ft ²
UNDERDRAIN PIPE (includes drainage stone; assumes 5-foot spacing)	\$3.75/ft ²
CURB AND GUTTER	\$22/ft
MULCH (ranges from mixed hardwood to gorilla hair)	\$0.25/ft ² to \$0.50/ft ²
HYDRAULIC RESTRICTION LAYER	
30-mil Liner	\$0.40/ft ²
Concrete Barrier	\$16.00/ft ²
VEGETATION	\$0.40/ft ² to \$4.00/ft ²

NOTES

- One tree for every 1000 sq.ft.
- At maturity 50% of landscape shall be covered with vegetation
- Verify plant locations



APPENDIX

2



**CONSTRUCTION
MATERIALS**

CONSTRUCTION MATERIALS



MATERIAL	NAME/SIZE	SUPPLIER
D.G.	Desert Gold Decomposed Granite	Southwest Boulder & Stone
Crushed Stone	Mojave Gold Crushed Stone	Southwest Boulder & Stone
Pebble	Del Rio Pebble	Southwest Boulder & Stone
Boulders	Apache Sunset Boulders	Southwest Boulder & Stone
Mulch	Supreme Walk-On Bark Mulch	Southwest Boulder & Stone

CONSTRUCTION MATERIALS



DESCRIPTION	MANUFACTURER / MODEL	COLOR / FINISHES / REMARKS
Natural Concrete Paving	/	Natural Grey / Medium broom finish
Interlocking Pavers	Belgard / Aqua Roc	"sri victorian blend" / 80mm / 4.5" x 9" / refer to plan for pattern / Install per manufacturers recommendations / available at Thompson building materials
Angular cobble	Southwest boulder	Baja cresta / 4" - 8" / infill with crushed rock / or approved equal
Non Stabilized Decomposed Granite	KRC rock, inc.	New california gold / 3/8" minus / 2" depth / all planting areas to receive non-stabilized DG unless otherwise noted on plan
Gravity Retaining Wall	Keystone / Standard - Straight Split	Keystone natural with keystone straight wall cap - 4" high
Steel edging	Sure-loc	1/8" / steel edging / painted black / install per manufacturers
Rainwater tank	Bushman usa	530 gallon slimline water harvesting tank / color per owner
Metal garden bed	Earthmark / alto series	Square bed (mgb-lo43) with alto extension set (mgb-ho44) / 17" x 40" x 76" / install per manufacturers recommendations



PLANTS

TREES



Olneya tesota



Chilopsis linearis



Parkinsonia x. 'Desert Museum'

LATIN NAME	COMMON NAME	MATURE SIZE	BLOOM SEASON	EXPOSURE	WATER
<i>Arbutus hybrida</i> 'Marina'	Marina Strawberry tree	20' h x 35' w	All	Full sun	☹☹☹☹
<i>Aesculus californica</i>	California Buckeye	20' h x 25' w	Spring	Full sun	☹☹☹☹
<i>Caesalpinia cacalaco</i>	Cascalote	18'h x 18' w	Late Fall - Winter	Full sun	☹☹☹☹
<i>Chilopsis linearis</i>	Desert Willow	30' h x 25' w	Spring - Summer	Full sun	☹☹☹☹
<i>Ebenopsis ebano</i>	Texas Ebony	30' h x 30' w	Summer - Fall	Full sun/Part shade	☹☹☹☹
<i>Parkinsonia</i> x. 'Desert Museum'	Desert Museum	25'h x 25'w	Spring	Full sun	☹☹☹☹
<i>Lysiloma thornberi</i>	Fern of the desert	15'h x 12'w	Spring	Full sun	☹☹☹☹
<i>Olneya tesota</i>	Desert Ironwood	20' h x 20' w	Summer	Full sun	☹☹☹☹
<i>Olea europaea</i> 'Swan Hill'	Swan Hill Fruitless Olive	20'h x 15'w	N/A	Full sun	☹☹☹☹
<i>Quercus agrifolia</i>	Coast Live Oak	45'h x 40'w	N/A	Full sun	☹☹☹☹
<i>Quercus suber</i>	Cork Oak	60' h x 45' w	Late Spring	Spring	☹☹☹☹
<i>Bauhinia lunarioides</i>	Anacacho Orchid	12'h x 10' w	Spring-Summer	Full sun-Part shade	☹☹☹☹

WATER KEY

Very Low ☹☹☹☹

Low ☹☹☹☹

Medium ☹☹☹☹

High ☹☹☹☹

Very High ☹☹☹☹

GROUNDCOVER / SLOPE PLANTINGS



Acacia redolens 'Prostrata'



Carissa "Green Carpet"



Lantana 'Spreading Sunset'

LATIN NAME	COMMON NAME	MATURE SIZE	BLOOM SEASON	EXPOSURE	WATER
Acacia redolens 'Prostrata'	Desert Carpet	2' h x 8' w	Spring	Full sun	☪☪☪☪
Achillea millefolium	Common Yarrow	1.5'h x 1.5' w	Spring-Summer	Full sun/Part shade	☪☪☪☪
Arctostaphylos 'Pacific Mist'	Pacific Mist Manzanita	3' h x 12' w	Winter	Sun-Shade	☪☪☪☪
Baccharis x centennial	Prostrate Desert Bloom	2' h x 6' w	Spring	Full sun	☪☪☪☪
Carissa "Green Carpet"	Prostrate Natal Plum	2' h x 4' w	Spring-Summer	Full sun/Part shade	☪☪☪☪
Ceanothus Griseus	'Yankee Point'				☪☪☪☪
Ceanothus Griseus	'Diamond Heights'				☪☪☪☪
Dalea capitata	Golden dalea	1' h x 3' w	Spring-Fall	Full-Reflected	☪☪☪☪
Eschscholzia californica	California poppy	2' h & 7' w	Spring-Summer	Full sun	☪☪☪☪
Melampodium leucanthum	Blackfoot Daisy	1'h x 2'w	Spring-Fall	Ful sun-Part Shade	☪☪☪☪
Lantana 'New Gold'	New gold lantana	3'h x 8' w	All	Full sun	☪☪☪☪
Lantana 'Spreading Sunset"	Spreading lantana	3' h x 8' w	All	Full sun	☪☪☪☪
Myoporum parvifolium	Myoporum	4" h x 6' w	Spring	Part Shade	☪☪☪☪

SHRUBS



Carpenteria Californica



Acacia cognata 'Cousin Itt'



Cassia nemophila

LATIN NAME	COMMON NAME	MATURE SIZE	BLOOM SEASON	EXPOSURE	WATER
Arctostaphylos Densiflora	Howard 'MicMinn' Manzanita	6'h x 12'w	Winer-spring	Full sun	☹☹☹☹
Acacia cognata 'Cousin Itt'	Little river wattle	2'h x 4' w	Spring	Sun-Shade	☹☹☹☹
Bougainvillea 'Monka'	Oo-La-La Bougainvillea	2'h x 6' w	Summer and Fall	Full sun	☹☹☹☹
Bougainvillea 'Barbara Karst'	Barbara Karst Bougainvillea	6' h x 4' w	Summer and Fall	Full sun	☹☹☹☹
Carpenteria Californica	Bush Anemone	6'h x 4' w	Spring-Summer	Sun-Shade	☹☹☹☹
Callistemon "Little John"	Dwarf Bottlebrush	3' h x 3' w	Fall-Spring	Full sun	☹☹☹☹
Carissa "Boxwood Beauty"	Dwarf Natal Plum	2' h x 2' w	Spring-Fall	Full sun- Part shade	☹☹☹☹
Cassia nemophila	Green Cassia	8' h x 8' w	Winter-Spring	Full-Reflected	☹☹☹☹
Ceanothus 'Dark Star'	California Lilac	4'h x 8'w	Spring	Full sun	☹☹☹☹
Dodonea viscosa	Hopseed Bush	15' h x 10' w	None	Full sun	☹☹☹☹
Encelia farinosa	Brittle Bush	3' h x 4' w	Spring	Full sun	☹☹☹☹
Eremophila hygrophana	Blue Emu Bush	2'h x 3'w	Fall-Spring	Full-Reflected	☹☹☹☹

SHRUBS ... CONTINUED



Leucophyllum langmaniae



Rhamnus californica 'Little Sur'



Salvia greggii 'Alba'

Heteromeles arbutifolia	Toyon	6'h x 8'w	Summer	Sun-Shade	☺☺☺☺
Leucophyllum "Green Cloud"	Green Cloud	6-8' h x 6-8' w	Summer-Fall	Full reflected	☺☺☺☺
Leucophyllum pruinosum	Sierra Bouquet	6-8' h x 6-8' w	Summer-Fall	Full reflected	☺☺☺☺
Leucophyllum langmaniae	Lynn's Legacy	5' h x 5' w	Summer and Fall	Full reflected	☺☺☺☺
Leucophyllum lanmaniae 'Rio Bravo'	Rio Bravo	5' h x 5' w	Summer	Full reflected	☺☺☺☺
Rhamnus californica 'Little Sur'	Little Sur Coffeeberry	4'h x 4'w	Spring	Sun-Shade	☺☺☺☺
Salvia leucantha	Mexican sage	3'h x 4'w	Year Round	Sun-Shade	☺☺☺☺
Salvia greggii 'Alba'	White sage	2'h x 3'w	Spring-Fall	Sun	☺☺☺☺
Westringia fruticosa	Coast Rosmary	4'h x 6'w	Sun-Yearound	Full sun	☺☺☺☺
Simmondsia chinensis	Jojoba	8' h x 8' w	Spring	Full sun	☺☺☺☺
Tagetes lemmonii	Desert Marigold	4' h x 4' w	Fall	Full-Part shade	☺☺☺☺
Tecoma x. 'Orange Jubilee"	Orange Bells	12' h x 8' w	Spring-Fall	Full sun	☺☺☺☺

GRASSES



Chondropetalum Tectorum



Festuca glauca



Muhlenbergia Lindheimeri

LATIN NAME	COMMON NAME	MATURE SIZE	BLOOM SEASON	EXPOSURE	WATER
Buchloe Dactyloides	Bull Buffalo Grass	3" x Spreading	Spring	Sun-Shade	☹☹☹☹
Chondropetalum Tectorum	Small cape rush	2'h x 3'w	Summer-Fall	Sun-shade	☹☹☹☹
Festuca californica	California fescue	1'h x 2'w	Summer	Sun-Shade	☹☹☹☹
Festuca glauca	Blue fescue	1'h x 2'w	Summer	Full Sun	☹☹☹☹
Muhlenbergia Lindheimeri	Lindheimer's Muhly	4' h x 5' w	Summer-Fall	Full reflected	☹☹☹☹
Nassella tenuissima	Mexican Feather Grass	2' h x 2' w	N/A	Full	☹☹☹☹



SUCCULENTS/CACTUS



Agave 'Blue Flame'



Pedilanthus macrocarpus



Dasylyrion longissimum

LATIN NAME	COMMON NAME	MATURE SIZE	BLOOM SEASON	EXPOSURE	WATER
Agave americana	Century plant	10' h x 10' w	N/A	Full reflected	☹☹☹☹
Agave 'Blue Flame'	Blue flame agave	3'h x 3'w	N/A	Full sun-Part shade	☹☹☹☹
Agave geminiflora	Twin flowered agave	3' h x 3' w	N/A	Full reflected	☹☹☹☹
Asclepias subulata	Desert Milkweed	4' h x 4' w	Spring-Fall	Full sun	☹☹☹☹
Aloe 'Blue Elf'	Blue Elf Aloe	3' h x 3' w	Winter-Spring	Part sun	☹☹☹☹
Aloe Vera	Medicinal Aloe				☹☹☹☹
Dasylyrion longissimum	Mexican Grass Tree	10' h x 6' w	N/A	Full sun	☹☹☹☹
Dasylyrion wheeleri	Desert Spoon	5' h x 5' w	N/A	Full sun	☹☹☹☹
Hesperaloe 'Brakelights'	Red Yucca	3' h x 3' w	Spring-Summer	Full sun	☹☹☹☹
Pedilanthus macrocarpus	Lady Slipper	3' h x 3' w	Spring-Fall	Full sun	☹☹☹☹
Senecio Mandraliscae	Blue chalksticks	2'h x 3'w	Summer	Full sun	☹☹☹☹



Muhlenbergia rigens



Platanus racemosa



Juncus patens 'Elk blue'

VINES

LATIN NAME	COMMON NAME	MATURE SIZE	BLOOM SEASON	EXPOSURE	WATER
Bougainvillea species		20' h x 15' w	Spring-Fall	Full sun	

BIOSWALE PLANTINGS

LATIN NAME	COMMON NAME	MATURE SIZE	BLOOM SEASON	EXPOSURE	WATER
Muhlenbergia rigens	Deer Grass	4'h x 5'w		Sun/Shade	
Carex barbarae	Basket sedge	1.5'h x 1.5'w		Part Shade	
Juncus patens 'Elk blue'	California gray rush	1'h x 2'w	Spring-Fall	Sun-Shade	
Platanus racemosa	California Sycamore	50'h x 40'w	Spring	Full sun	
Aesculus californica	California Buckeye	20' h x 25' w	Spring	Full sun	
Melica Imperfecta	California Melic				
Myrica californica	Pacific Wax Myrtle	20'h x 20'w	Spring	Sun/Shade	
Achillea millefolium	Common Yarrow				

CITRUS







Grapefruit



Lime



Lemon

LATIN NAME	COMMON NAME	MATURE SIZE	BLOOM SEASON	EXPOSURE	WATER
	Grapefruit	10' -12' h & w	Spring	Full sun	
	Orange	10' -12' h & w	Spring	Full sun	
	Lemon	10' -12' h & w	Spring	Full sun	
	Lime	10' -12' h & w	Spring	Full sun	



IRRIGATION

IRRIGATION EQUIPMENT LIST

PRODUCT	SECTION	MANUFACTURER
SPRAY HEADS	Irrigation	Rain Bird I800 Series
ROTOR HEADS	Irrigation	Rain Bird 5000 Series
DRIPLINE	Irrigation	Rain Bird XFCV Series
BUBBLERS	Irrigation	Rain Bird I400 series
DRIP EMITTER	Irrigation	Rain Bird Salco
VALVE BOX	Irrigation	NDS Carson
QUICK COUPLERS	Irrigation	Rain Bird QC Series
MASTER VALVES	Irrigation	Griswold 2000 Series
IRRIGATION CONTROLLER	Irrigation	Rain Bird
WEATHER BASED		WeatherTrak Calsense
ENCLOSURE	Irrigation	VIT StrongBox
CONTOLLERS/ BACKFLOWS		All SPEC
FLOW SENSOR	Irrigation	Rain Bird Data Industrial Octave
BACKFLOW PREVENTER	Irrigation	Febco Watts Wilkins
AUTOMATIC VALVES	Irrigation	Rain Bird PEB / PESB Seris
ISOLATION VALVES	Irrigation	Nibco
PVC PIPE	Irrigation	PW Eagle Sch 40 / Class 315 / Class 200

IRRIGATION EQUIPMENT NOTES

GENERAL NOTES

The contractor shall furnish all labor, materials, equipment, property, transportation and perform all operations required for a complete and operable irrigation system as indicated on, or reasonably implied by the details, specifications and notes. Included as a part of the irrigation work, but not limited by it, are the following items:

1. **GENERAL** - all work shall be in accordance with applicable city and county codes, and these plans and specifications. The contractor shall apply for all permits and pay for same.
 - a. The contractor shall carry all worker's compensation, public liability and property damage insurance, as required by the owner.
 - b. The contractor shall verify all conditions and dimensions shown on the plans at the site prior to commencement of any work under this contract.
 - c. The contractor shall visit the site and review the existing condition of the irrigation valves.
2. **SCOPE OF WORK** - unless otherwise specified, the construction of irrigation systems shall include the furnishing, installing and testing of all mainline, point of connection, lateral line, risers and fittings; and the furnishing and installing of sprinkler heads, automatic controllers, control wires (to valves), electric control valves, back flow protection, excavation and backfill and all other work in accordance with the details and specifications.
 - a. Install complete operable and automatic irrigation system
 - b. All irrigation work shall be guaranteed by the contractor as to materials and workmanship, including settling of backfilled trenches below grade for a period of one year following the date of final acceptance of the work.
3. The landscape architect shall decide all questions relating to interpretation of the performance spec and the acceptable fulfillment of the contract.
4. Contractor shall route piping to avoid conflict with stationary elements and in such a manner as to conform with the various details.
5. The contractor shall at all times protect his work from damage and theft and replace all damaged or stolen parts at his expense until the work is accepted, in writing, by the owner.
6. Extreme care shall be exercised in excavating and working near existing utilities. Contractor shall verify the location and condition of all utilities and be responsible for any damage.
7. The contractor shall keep the premises clean and free of excess equipment, materials and rubbish incidental to his work.
8. Irrigation design shall be based on 10% less than the lowest water pressure on site or water pressure provided by the local water purveyor.
9. Water meter is existing and shall be protected in place.
10. Irrigation contractor shall be responsible for connecting 120 volt service to the controller. Electrical power source will be provided by the owner, if the controller is being replaced
11. All control wire and irrigation line runs under paving shall be encased in schedule 40 PVC pipe sleeves. (18" min. Cover)
12. Final location of control valves shall be approved in the field by the landscape architect.
13. All brass or galvanized connections shall be coated with Teflon tape or led-lube joint compound (or equal). All PVC threaded connections shall be coated with Teflon tape.
14. All pvc solvent-weld connections shall be made with solvent-weld materials as recommended by the pipe manufacturer. Solvent-weld primer shall be applied at all connections.

DESIGN GUIDELINES:

1. **TRENCHING** - shall be a minimum of 12" depth for lateral line, 18" minimum depth for mainline, and 18" minimum depth for control wire. All pipe and wire chases shall be placed a minimum of 18" below finish grade.
2. **SYSTEM DESIGN** - areas to be irrigated: all planting areas are to receive irrigation by use of drip emitter type system. Systems shall be valves to separate turf areas from ground-cover areas, and to separate areas of high solar exposure from areas of low solar exposure. All areas shall receive 100% double coverage. Equipment as specified in the legend are to be utilized.

a. DRIP EMITTER DISTRIBUTION:

Refer to planting legend for plant water use:

Rainbird xeri-bug emitter

- low water use plant - 1 gph emitter
- moderate water use plant - 2 gph emitter
- high water use plant - 5 gph emitter

b. SIZING OF SYSTEMS:

System water volume shall not exceed 22 gallons per minute. Heads shall be spaced to provide 100% head to head double coverage. Lateral line pipe shall be sized as follows (not to exceed 5 cu. Ft./sec.):

- 0 - 5 gpm: 1/2"
- 0 - 10 gpm: 3/4"
- 11 - 15 gpm: 1"
- 16 - 25 gpm: 1-1/4"

Water volume emitted per head to be used in sizing of lateral line pipe shall be per manufacturer's specifications. All mainlines to be 1-1/4".

Prior to construction, the contractor shall contact the landscape architect and coordinate all inspections. Contractor shall request inspections by the landscape architect 48 hours (min.) Prior to an inspection.

1. **FINAL INSPECTION** - upon completion of the irrigation systems, contractor shall perform a coverage test with the landscape architect on all systems to verify full operation the contractor shall perform all work and furnish all materials necessary to correct any inadequacies.

EQUIPMENT:

1. **BALL VALVES** - shall be Nibco t-580 or equal (to be approved by landscape architect) size per line. Install in plastic round gate valve box, Ametek or equal.
2. **BACK-FLOW PREVENTER** - shall be Rainbird pvb-100 pressure vacuum breaker. (install per code)
3. **REMOTE CONTROL VALVES** - reuse existing valves. Verify location infield. Replace valves if leaking or inoperable.
4. **CONTROLLER** - reuse existing controller
5. **MAINLINE** - shall be PVC sch 40 by Lasco industries or equal (to be approved by landscape architect) verify mainline location and size.
6. **LATERAL LINE** - shall be PVC class 200 by Lasco industries or equal as above.
7. **FITTINGS** - shall be PVC schedule 40 by Lasco industries or equal as above.
8. **PIPE OR WIRE SLEEVES** - 2" PVC schedule 40.
9. **CONTROLLER WIRE** - shall be u.f. direct burial, solid copper, 12 gauge common, 14 gauge pilot. (route with mainline)

WATER BUDGET

IRRIGATION TABLE KEY

Evapotranspiration (ETo)	83	
Conversion Factor	0.001	
Estimated Total Adjustment Factor (ETAf)	0.45	
Plant Factor (PF)	Very Low	0-0.1
	Low	0.1-0.3
	Moderate	0.4-0.6
	High	0.7-1.0
	Pool/Water Feature	1.00
Irrigation Efficiency (IE)	Spray Head	0.75
	Bubblers	
	Drip	0.81
	Pool/Water Feature	1.00

Planting Description	PF	Irrigation Method	IE	ETAf = PF/IE	Landscape Area (LA) Sq.Ft.	ETAf x Area	Estimated Total Water Use (ETWU)
Regular Landscape Area							
Low	0.20		0.81	0.25	150.00	37.04	2.55
Moderate							
High							
Rock							
Turf (non recreational)							
Pool	1.00		1.00	1.00		0.00	0.00
TOTALS					150.00	37.04	
Special Landscape Area (SLA)							
Edible Plants				1.00		0.00	0.00
Recreational Area (turf)				1.00		0.00	0.00
Pool				1.00		0.00	0.00
TOTALS					0.00	0.00	
ETWU TOTAL							2.55
MAXIMUM ALLOWED WATER ALLOWANCE (MAWA)							4.64