Appendix B

Sizing Criteria Worksheets and Examples

This Appendix provides sizing criteria worksheets and examples to illustrate the correct procedures for determining the water quality design flow and volume for sizing stormwater treatment measures, and for sizing based on a combination of flow and volume. Additional resources provided to assist with sizing treatment measures include: local rainfall data; stormwater treatment measure volume-based sizing curves; runoff coefficients; and a map showing mean annual precipitation and soil types for Santa Clara Valley.

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- Example 3: Parking Lot
    - Simplified sizing method (4 percent method) for a bioretention facility

FIGURES

B.1 SCVURPPP Sizing Criteria Worksheets

These worksheets are designed to assist municipal staff and development project proponents in sizing stormwater treatment measures. Figures referenced in the computations can be found at the end of this Appendix B. Excel-based versions of the sizing worksheets are available on the SCVURPPP website at https://scvurppp.org/newdev/ .

Section I. Selecting Sizing Approach Based on Type of Treatment Measure

1. Does the treatment measure operate by detaining a volume of runoff for a certain amount of time for pollutant removal (i.e., is it a volume-based treatment measure)? See Table B-1 for examples.

   ___ Yes ____ No

If Yes, continue to Section II. Sizing for Volume-Based Treatment Measures.
If No, continue to next question.

2. Does the treatment measure operate based on the flow of runoff through the device (i.e, is it a flow-based treatment measure)? See Table B-1 for examples.

   ___ Yes ____ No

If Yes, continue to Section III. Sizing for Flow-Based Treatment Measures.

Table B-1. Flow and Volume Based Treatment Measure Sizing Criteria

Type of Treatment Measure	LID?	Hydraulic Sizing Criteria
Bioretention area	Yes	Flow- or volume-based or combination
Flow-through planter box	Yes	Flow- or volume-based or combination
Tree well filter	Yes[1]	Flow-based
Pervious pavement	Yes	Volume-based
Infiltration trench	Yes	Volume-based
Subsurface infiltration system	Yes	Volume-based
Rainwater harvesting and reuse	Yes	Volume-based
Media filter	No	Flow-based
Extended detention basin	No	Volume-based

[1] A tree well filter is considered LID treatment if biotreatment soil is used as the filter media and the unit is sized based on a 5 in/hr surface loading rate.

Section II. Sizing for Volume-Based Treatment Measures

The MRP Provision C.3.d allows two methods for sizing volume-based controls: 1) the WEF Urban Runoff Quality Management Method (URQM Method); or 2) the CASQA Stormwater Best Management Practice[2] (BMP) Handbook Volume Method adapted for Santa Clara Valley. The adapted CASQA Stormwater BMP Handbook Method is recommended because it is based on local rainfall data. Steps for applying these methods are presented in Sections II.A. and II.B. below.

Section II.A.— Sizing Volume-Based Treatment Measures based on the Urban Runoff Quality Management Approach (URQM Approach)

The equations used in this method are:

$$P_o = (a \times C_w) \times P_6$$

$$C_w = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$$

Where:

P_o = maximized detention storage volume (inches over the drainage area to the BMP)
a = regression constant (unitless)
C_w = watershed runoff coefficient (unitless)[3]
P_6 = mean storm event precipitation depth (inches);
i = watershed impervious ratio (range: 0-1)

Step 1. Determine the drainage area for the BMP, A = __________ acres

Step 2. Determine the watershed impervious ratio, "*i*", which is the amount of impervious area in the drainage area to the BMP divided by the drainage area, or the percent of impervious area in the drainage area divided by 100.

a. Estimate the amount of impervious surface (rooftops, hardscape, streets, and sidewalks, etc.) in the area draining to the BMP = ____________ acres

b. Calculate the watershed impervious ratio, *i*:

i = amount of impervious area /drainage area for the BMP

i = (**Step 2.a**)/(**Step 1**) = ____________ (range: 0-1)

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[2] For the purpose of this worksheet, a stormwater best management practice, or BMP, is the same as a stormwater treatment measure.

[3] For the purpose of this worksheet, the watershed runoff coefficient is notated as "C_w" to avoid confusion with the runoff coefficient "C" used in the Rational Method.

Section II. Sizing for Volume-Based Treatment Measures (continued)

Section II.A.— URQM Approach (continued)

Step 3. Determine the watershed runoff coefficient, "C_w", using the following equation:

$C_w = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$, using "*i*" from **Step 2.b.**

C_w = ____________

Step 4. Find the mean annual precipitation at the site (MAP_{site}). To do so, estimate where the site is on Figure B-1 and estimate the mean annual precipitation in inches from the rain line (isopleth) nearest to the project site.[4]

Mean annual precipitation at the site, MAP_{site} = ____________

(Each line on the figure, called a rainfall isopleth, indicates locations where the same amount of rainfall falls on average each year; e.g., the isopleth marked 14 indicates that areas crossed by this line average 14 inches of rainfall per year. If the project location is between two lines, estimate the mean annual rainfall by interpolation, based on the location of the site.)

Step 5. Identify the reference rain gage closest to the project site from Table B-2a.

Table B-2a: Precipitation Data for Three Reference Gages

Gages	Mean Annual Precipitation (MAP_{gage}) (in)	Mean Storm Event Precipitation $(P_6)_{gage}$ (in)
San Jose Airport	13.9	0.512
Palo Alto	13.7	0.522
Morgan Hill	19.5	0.760

Select the MAP_{gage} and the mean storm precipitation $(P_6)_{gage}$ for the reference gage, and use them to determine $(P_6)_{site}$ for the project site in Step 6.

MAP_{gage} = ____________

$(P_6)_{gage}$ = ____________

[4] Check with the local municipality to determine if more detailed maps are available for locating the site and estimating MAP.

Section II. Sizing for Volume-Based Treatment Measures, continued

Section II.A.— URQM Approach (continued)

Step 6. Calculate the mean storm event precipitation depth at the project site, called $(P_6)_{site}$. Multiply the mean storm event precipitation depth for the rain gage chosen by a correction factor, which is the ratio of the mean annual precipitation at the site (MAP_{site}) to the mean annual precipitation at the rain gage (MAP_{gage}).

$$(P_6)_{site} = (P_6)_{gage} \times (MAP_{site}) / (MAP_{gage}).$$

$$(P_6)_{site} = \text{Mean Event Precipitation } (P_6)_{gage} \text{ (Step5)} \times (MAP_{site}) \text{ (Step4)} / (MAP_{gage}) \text{ (Step5)}.$$

$P_{6\ site}$ = ________ inches

Step 7 Find "*a*", the regression constant (unitless)[5]:

a = 1.963 for a 48-hour drain time
a = 1.582 for a 24-hour drain time
a = 1.312 for a 12-hour drain time

a = ________

Recommendation: Use a 48-hour drain time.

Step 8 Determine the maximized detention storage volume P_o:

$$P_o = (a \times C_w) \times P_6$$

P_o = (**Step 7**) × (**Step 3**) × (**Step 6**)

P_o = ________ inches

Step 9 Determine the volume of the runoff to be treated from the drainage area to the BMP (i.e., the BMP design volume):

Design volume = Po × A = (**Step 8**) × (**Step 1**) × 1 foot/12 inches

Design Volume = ________ acre-feet × 43,560 square feet/acre = ________ cubic feet

[5] *WEF Manual of Practice No. 23 and the ASCE Manual of Practice No. 87 (1998), pages 175-178.*

Section II. Sizing for Volume-Based Treatment Measures, continued

Section II.B. — Sizing Volume-Based Treatment Measures based on the Adapted CASQA Stormwater BMP Handbook Approach

The equation that will be used to size the BMP is:

Design Volume = (Rain Gage Correction Factor) × (Unit Basin Storage Volume) × (Drainage Area)

Step 1. Determine the drainage area for the BMP, A = ____________acres

Step 2. Determine percent imperviousness of the drainage area:

a. Estimate the amount of impervious surface (rooftops, hardscape, streets, and sidewalks, etc.) in the area draining to the BMP: ____________acres

b. % impervious area = (amount of impervious area/drainage area for the BMP) × 100
% impervious area = **(Step 2.a/Step 1)** × 100
% impervious area = _________%

Step 3. Find the mean annual precipitation at the site (MAP_{site}). To do so, estimate where the site is on Figure B-1 and estimate the mean annual precipitation in inches from the rain line (isopleth) nearest to the project site.[6] Interpolate between isopleths if necessary.

MAP_{site} = _____inches

Step 4. Identify the reference rain gage closest to the project site from Table B-2b and record the MAP_{gage}:

MAP_{gage} = _____inches

Table B-2b: Precipitation Data for Three Reference Gages

Reference Rain Gages	Mean Annual Precipitation (MAP_{gage}) (in)
San Jose Airport	13.9
Palo Alto	13.7
Morgan Hill	19.5

[6] Check with the local municipality to determine if more detailed maps are available for locating the site and estimating MAP.

Section II. Sizing for Volume-Based Treatment Measures, continued

Section II.B. —Adapted CASQA Stormwater BMP Handbook Approach (continued)

Step 5 Determine the rain gage correction factor for the precipitation at the site using the information from **Step 3** and **Step 4**.

Correction Factor = MAP_{site} (**Step 3**)/MAP_{gage} (**Step 4**)

Correction Factor = ______

Step 6. Identify the representative soil type for the BMP drainage area.

a) Identify from Figure B-1 or from site soils data, the soil type that is representative of the pervious portion of the project shown here in order of increasing infiltration capability:

____ Clay (D) ____ Sandy Clay (D) ____ Clay Loam (D)

____ Silt Loam/Loam (B) ____ Not Applicable (100% Impervious)

b) Does the site planning allow for protection of natural areas and associated vegetation and soils so that the soils outside the building footprint are not graded/compacted? ___ (Y/N)

If your answer is no, and the soil will be compacted during site preparation and grading, the soil's infiltration ability will be decreased. Modify your answer to a soil with a lower infiltration rate (e.g., Silt Loam to Clay Loam or Clay).

Modified soil type: ______

Step 7. Determine the average slope for the drainage area for the BMP: ______%

Step 8. Determine the unit basin storage volume from sizing curves.

a) Slope ≤ 1%

Use the figure at the end of this Appendix entitled "Unit Basin Volume for 80% Capture, 1% Slope" corresponding to the nearest rain gage: Figure B-2, B-3, or B-4 for San Jose, Palo Alto, or Morgan Hill, respectively. Find the percent imperviousness of the drainage area (from **Step 2**) on the x-axis. From there, find the line corresponding to the soil type (from **Step 6**), and obtain the unit basin storage volume on the y-axis.

Unit Basin Storage for 1% slope ($UBS_{1\%}$) = ______(inches)

b) Slope ≥ 15%

Use the figure at the end of this Appendix entitled "Unit Basin Volume for 80% Capture, 15% Slope" corresponding to the nearest rain gage: Figure B-5, B-6, or B-7 for San Jose, Palo Alto, or Morgan Hill, respectively. Find the percent imperviousness of the drainage area (from **Step 2**) on the x-axis. From there, find the line corresponding to the soil type (from **Step 6**), and obtain the unit basin storage volume on the y-axis.

Unit Basin Storage for 15% slope ($UBS_{15\%}$) = ______(inches)

Section II. Sizing for Volume-Based Treatment Measures, continued

Section II.B. —Adapted CASQA Stormwater BMP Handbook Approach (continued)

c) Slope > 1% and < 15%

Find the unit basin volumes for 1% and 15% using the techniques in **Steps 8.a** and **8.b** and interpolate by applying a slope correction factor per the following formula:

UBS_x = $UBS_{1\%}$ + ($UBS_{15\%}$ - $UBS_{1\%}$) × (X%-1%) / (15% -1%)
= (**Step 8a**) + (**Step 8b**- **Step 8a**) × (X%-1%)/(15%-1%)

Where UBS_x = Unit Basin Storage volume for drainage area of intermediate slope, X %

Unit Basin Storage volume (UBS_x) = ____________(inches)
(corrected for slope of site)

Step 9. Determine the Adjusted Unit Basin Storage Volume for the site, using the following equation:

Adjusted UBS = Rain Gage Correction Factor × Unit Basin Storage Volume

Adjusted UBS = (**Step 5**) × (**Step 8**)

Adjusted UBS = ________inches

Step 10. Determine the BMP Design Volume, using the following equation:

Design Volume = Adjusted Unit Basin Storage Volume × Drainage Area

Design Volume = (**Step 9**) × (**Step 1**) × 1 foot/12 inch

Design Volume = ________ acre-feet × 43,560 square feet/acre = ________ cubic feet

III. Sizing for Flow-based Treatment Measures

The MRP Provision C.3.d allows three methods for sizing flow-based treatment measures: 1) the Factored Flood Flow Method (10% of the 50-year peak flow rate); 2) the CASQA Stormwater BMP Handbook Method (the flow produced by a rain event equal to at least 2 times the 85th percentile hourly rainfall intensity); or 3) the Uniform Intensity Method (the flow produced by a rain event equal to at least 0.2 inches/hour intensity). Use of Method 2 or 3 is recommended. Steps for applying these methods are presented in Sections III.A, III.B, and III.C below.

Each of the three methods will require estimating a runoff coefficient for the area draining to the BMP. Recommended coefficients are provided in Table B-3.

Table B-3 – Estimated Runoff Coefficients for Various Surfaces During Small Storms

Type of Surface	Runoff Coefficient ("C" Factor)
Roofs	0.90
Concrete	0.90
Asphalt	0.90
Gravel, crushed aggregate, or decomposed granite	0.90
Stone, brick, or concrete pavers with mortared joints and bedding	0.90
Stone, brick, or concrete pavers with sand joints and bedding	0.10
Pervious concrete	0.10
Porous asphalt	0.10
Permeable interlocking concrete pavement	0.10
Grid pavements with grass or aggregate surface	0.10
Grass	0.10

Notes:

1. If the area draining to the BMP contains multiple types of surfaces, a weighted "C" factor should be computed for use in the equations.
2. These "C" factors are only appropriate for small storm treatment BMP design and should not be used for flood control sizing. Where available, locally developed small storm "C" factors for various surfaces should be used. Sources: BASMAA, 2003; Lindeburg, 2003; Hade and Smith, 1988; Smith, 2012.

III. Sizing for Flow-based Treatment Measures, continued

Section III.A. - Sizing Flow-Based Treatment Measures based on the Factored Flood Flow Approach

This method uses the Rational Method equation to determine the design flow, using a design intensity that is 10 % of the intensity for the 50-year return period found on the local intensity-duration-frequency (IDF) curve:

Q=CIA

Where:

Q = the design flow in cubic feet per second (cfs),
C = the drainage area runoff coefficient,
I = the design intensity (in/hr), and
A = the drainage area for the BMP (acres)

Step 1. Determine the drainage area for the BMP, A = ________ acres

Step 2. Determine the runoff coefficient, C = ______ from Table B-3.

Step 3. Find the time of concentration (t_c) for the site (i.e. the travel time from the most remote portion of the BMP drainage area to the BMP). (Check with local agency's Engineering Department for standard or accepted methods of computing t_c).

t_c = Time of overland flow + time in drainage pipe: ________hrs

Step 4. Using the time of concentration as the duration, use Figure B-8 to determine the intensity for the 50-year storm (IDF curve) (in/hr). _____

Intensity for the 50-year storm = ________in/hr

Step 5. The design intensity (I) will be 10% of the intensity obtained from the IDF curve (intensity for the 50-year storm).

I = (**Step 4** × 0.10) = ________in/hr

Step 6. Determine the design flow (Q) using the Rational Method equation:

Q = C × I × A
Q = (**Step 2**) × (**Step 5**) × (**Step 1**)
Q = ______ acres-in/hr

Design Flow, Q = ________________ cfs[7]

[7] No conversion factor for correct units is needed for the rational formula because (1 acre-in/hr) X (43,560 sq. ft./acre) X (1ft/12 in) X (1hr/3600 sec) ≈ 1 ft^3/sec or cfs.

III. Sizing for Flow-based Treatment Measures, continued

Section III.B.—Sizing Flow-Based Treatment Measures based on the CASQA Stormwater BMP Handbook Flow Approach

This method uses the Rational Method equation to determine the design flow:

$$Q=CIA$$

Where:
Q = the design flow in cubic feet per second (cfs),
C = the drainage area runoff coefficient,
I = the design intensity (in/hr), and
A = the drainage area for the BMP (acres)

Step 1. Determine the drainage area for the BMP, A = ______ acres

Step 2. Determine the runoff coefficient, C = _____ from Table B-3.

Step 3. Find the mean annual precipitation at the site (MAP_{site}). To do so, estimate where the site is on Figure B-1 and estimate the mean annual precipitation in inches from the rain line (isopleth) nearest to the project site.[8] Interpolate between isopleths if necessary.

MAP_{site} = ______ inches

Step 4. Identify the reference rain gage closest to the project site from Table B-2b and record the MAP_{gage}:

MAP_{gage} = ______ inches

Table B-2b: Precipitation Data for Three Reference Gages

Reference Rain Gages	Mean Annual Precipitation (MAP_{gage}) (in)
San Jose Airport	13.9
Palo Alto	13.7
Morgan Hill	19.5

[8] Check with the local municipality to determine if more detailed maps are available for locating the site and estimating MAP.

Section III. Sizing for Flow-Based Treatment Measures, continued

Section III.B.— CASQA Stormwater BMP Handbook Flow Approach (continued)

Step 5. Determine the rain gage correction factor for the precipitation at the site using the information from **Step 3** and **Step 4**.

Correction Factor = MAP_{site} / MAP_{gage} = (**Step 3**)/(**Step 4**)

Correction Factor = ______

Step 6. Select the design rainfall intensity, I, for the rain gage closest to the site from Table B-2c:

Table B-2c: Precipitation Data for Three Reference Gages

Reference Rain Gages	85th Percentile Hourly Rainfall Intensity (in/hr)	Design Rainfall Intensity (I) (in/hr)*
San Jose Airport	0.087	0.17
Palo Alto	0.096	0.19
Morgan Hill	0.12	0.24

*The design intensity is two times the 85th Percentile Hourly Rainfall Intensity.

Design Rainfall Intensity: I = ______ in/hr

Step 7. Determine the corrected design rainfall intensity (I) for the site:

Design intensity (site) = Correction factor × Design rainfall intensity for closest rain gage

Design intensity (site) = (**Step 5**) × (**Step 6**) = ______ in/hr

Step 8. Determine the design flow (Q) using the Rational Method equation:

$$Q = C \times I \times A$$

Q = (**Step 2**) × (**Step 7**) × (**Step 1**)

Q = ______ acres-in/hr

Design Flow, Q = ______ cfs[9]

[9] No conversion factor for correct units is needed for the rational formula because (1 acre-in/hr) X (43,560 sq. ft./acre) X (1ft/12 in) X (1hr/3600 sec) ≈ 1 ft^3/sec or cfs.

Section III. Sizing for Flow-Based Treatment Measures, continued

Section III.C.—Sizing Flow-Based Treatment Measures based on the Uniform Intensity Approach

This method uses the Rational Method equation:

$$Q=CIA$$

Where:

Q = the design flow in cubic feet per second (cfs),
C = the drainage area runoff coefficient,
I = the design intensity (in/hr), and
A = the drainage area for the BMP (acres)

Step 1. Determine the drainage area for the BMP, A = ______ acres

Step 2. Determine the runoff coefficient, C = ______ from Table B-3.

Step 3. Use a design intensity of **0.2 in/hr** for "I" in the Q=CIA equation.

I = 0.2 in/hr

Step 4. Determine the design flow (Q) using Q = CIA

$$Q = C \times I \times A$$

Q = (**Step 2**) × (0.2 in/hr) × (**Step 1**)

Q = ______ acres-in/hr

Design Flow, Q = ____________ cfs[10]

[10] No conversion factor for correct units is needed for the rational formula because (1 acre-in/hr) X (43,560 sq. ft./acre) X (1ft/12 in) X (1hr/3600 sec) ≈ 1 ft^3/sec or cfs.

Section IV. Sizing for Flow- and Volume- Based Treatment Measures (Combination Flow and Volume Approach)

For bioretention areas and flow-through planters, the following approach may be used to take into consideration both the flow of stormwater through the planting media and the volume of stormwater in the surface ponding area. Note that the approach assumes that all of the design rainfall becomes runoff, and thus it is appropriate for use where the drainage area to the treatment measure is mostly impervious.

Step 1. **Contributing drainage area to the treatment measure:** ________ **sq. ft.**

Step 2/3. **Determine the required treatment volume using Adapted CASQA Stormwater BMP Handbook Approach** (Worksheet Section II.B). Copy the results from Steps 9 and 10 here:

Adjusted Unit Basin Storage (UBS) Volume: ________ **in.**

BMP Water Quality Design (WQD) Volume: ________ **cu. ft.**

Step 4. Determine the design rainfall intensity (Uniform Intensity Approach, Section III.C, Step 3):

Design Rainfall Intensity: **__0.2__ in/hr**

Step 5. Assume that the rain event that generates the Unit Basin Storage Volume of runoff occurs at the Design Rainfall Intensity for the entire length of the storm. Calculate the duration of the storm by dividing the Adjusted Unit Basin Storage Volume by the Design Rainfall Intensity. In other words, determine the amount of time required for the Adjusted Unit Basin Storage Volume to be achieved at the design intensity rate.

Duration = UBS Volume (inches) ÷ Design Rainfall Intensity (inches/hour)

Duration = (**Step 2**) ÷ 0.2 in/hr = __________ **hrs.**

IV. Sizing for Flow- and Volume-Based Treatment Measures, continued

Step 6. Make a preliminary estimate of the surface area of the bioretention facility by multiplying the drainage area to be treated by a sizing factor of **0.03.**

Estimated Surface Area = Contributing Drainage Area × 0.03

Estimated Surface Area = __________ sq. ft. × 0.03 = __________ **sq. ft.**
(**Step 1**)

Step 7. Calculate the volume of runoff that filters through the biotreatment soil at a rate of 5 inches per hour (the design surface loading rate for bioretention facilities), for the duration of the storm calculated in Step 5.

Volume of Treated Runoff = Estimated Surface Area × 5 in/hr × (1 ft/12 in) × Duration

Volume of Treated Runoff = ________ sq. ft. × 5/12 × _____ hrs. = ________ **cu. ft.**
(**Step 6**) (**Step 5**)

Step 8. Calculate the portion of the water quality design (WQD) volume remaining after treatment is accomplished by filtering through the biotreatment soil. The result is the amount that must be stored in the ponding area above the bioretention surface area estimated in Step 6.

Volume in ponding area = WQD Volume – Volume of Treated Runoff

Volume in ponding area = ________ cu. ft. – ________ cu. ft. = _________ **cu. ft.**
(**Step 3**) (**Step 7**)

Step 9. Calculate the depth of the volume in the ponding area by dividing this volume by the estimated surface area in Step 6.

Depth of ponding = Volume in Ponding Area ÷ Estimated Surface Area

Depth of ponding = __________ cu. ft. ÷ __________ sq. ft. = _________ **ft.**
(**Step 8**) (**Step 6**)

Check to see if the average ponding depth is between 0.5 and 1.0 feet (6 and 12 inches), which is the range of allowable ponding depths in a bioretention facility or flow-through planter (**0.5 feet is recommended**). If the ponding depth is less than 0.5 feet, the bioretention design can be optimized with a smaller surface area (i.e., repeat Steps 6 through 9 with a smaller surface area). If the ponding depth is greater than 1 foot, a larger surface area will be required (i.e., repeat Steps 6 through 9 with a larger surface area).

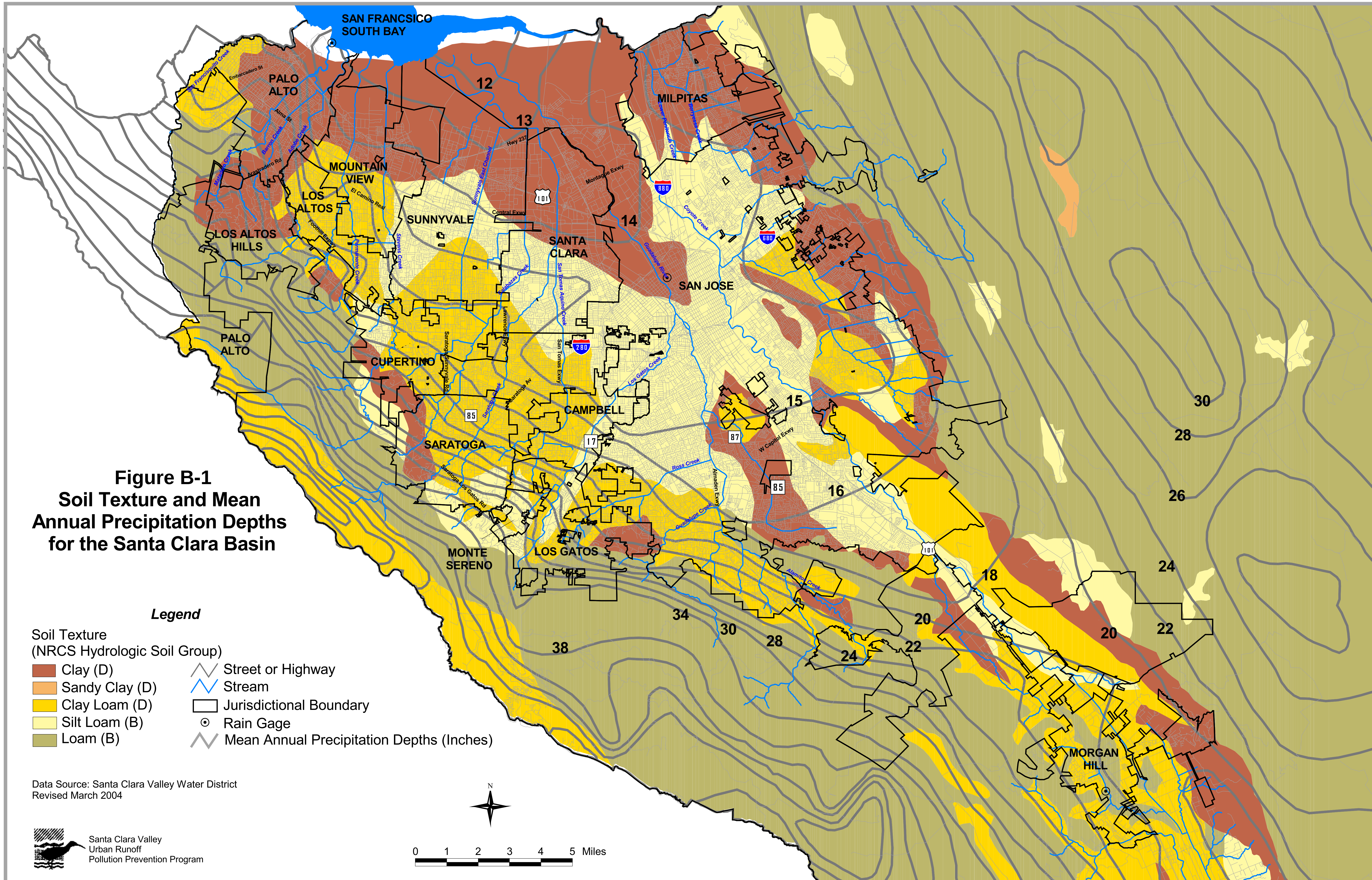

Figure B-1
Soil Texture and Mean Annual Precipitation Depths for the Santa Clara Basin

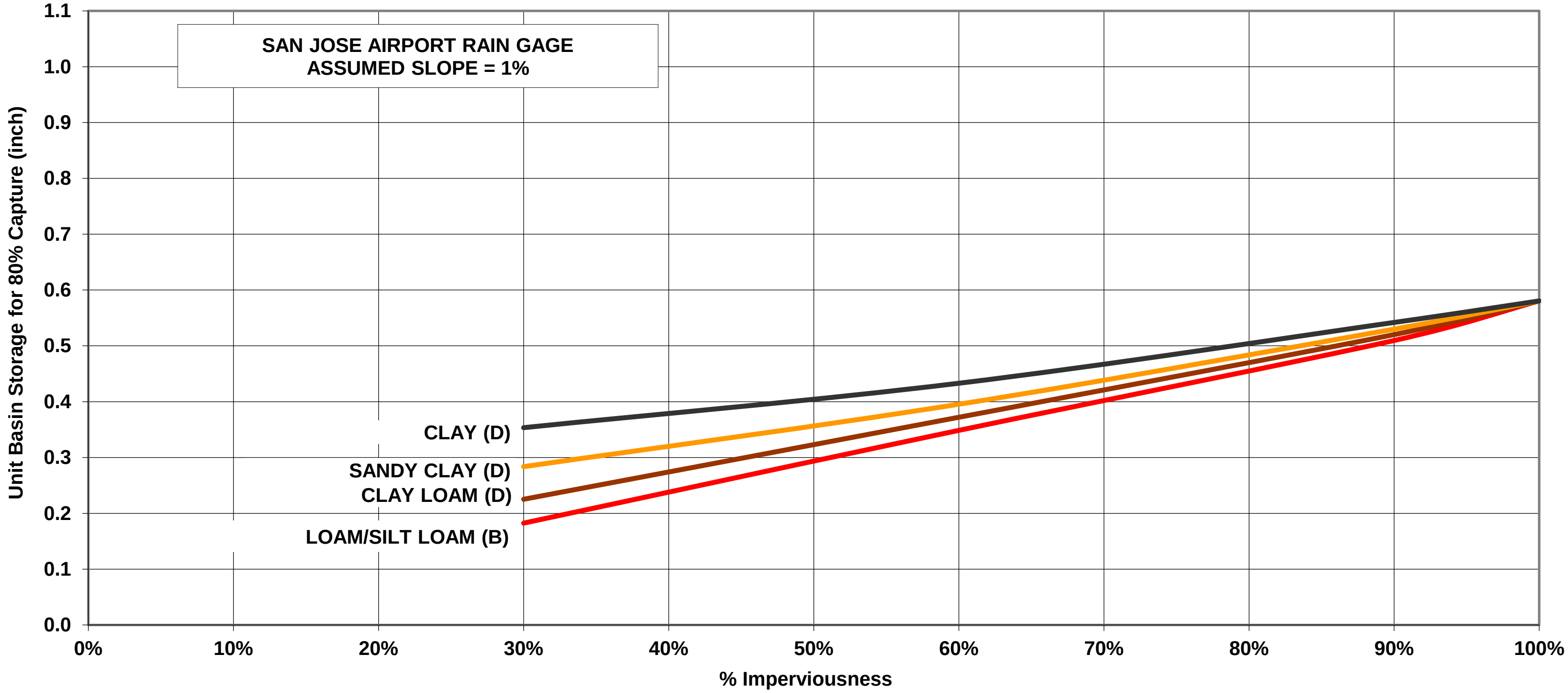

Figure B-2 Unit Basin Volume for 80% Capture - <u>San Jose Airport Rain Gage</u>

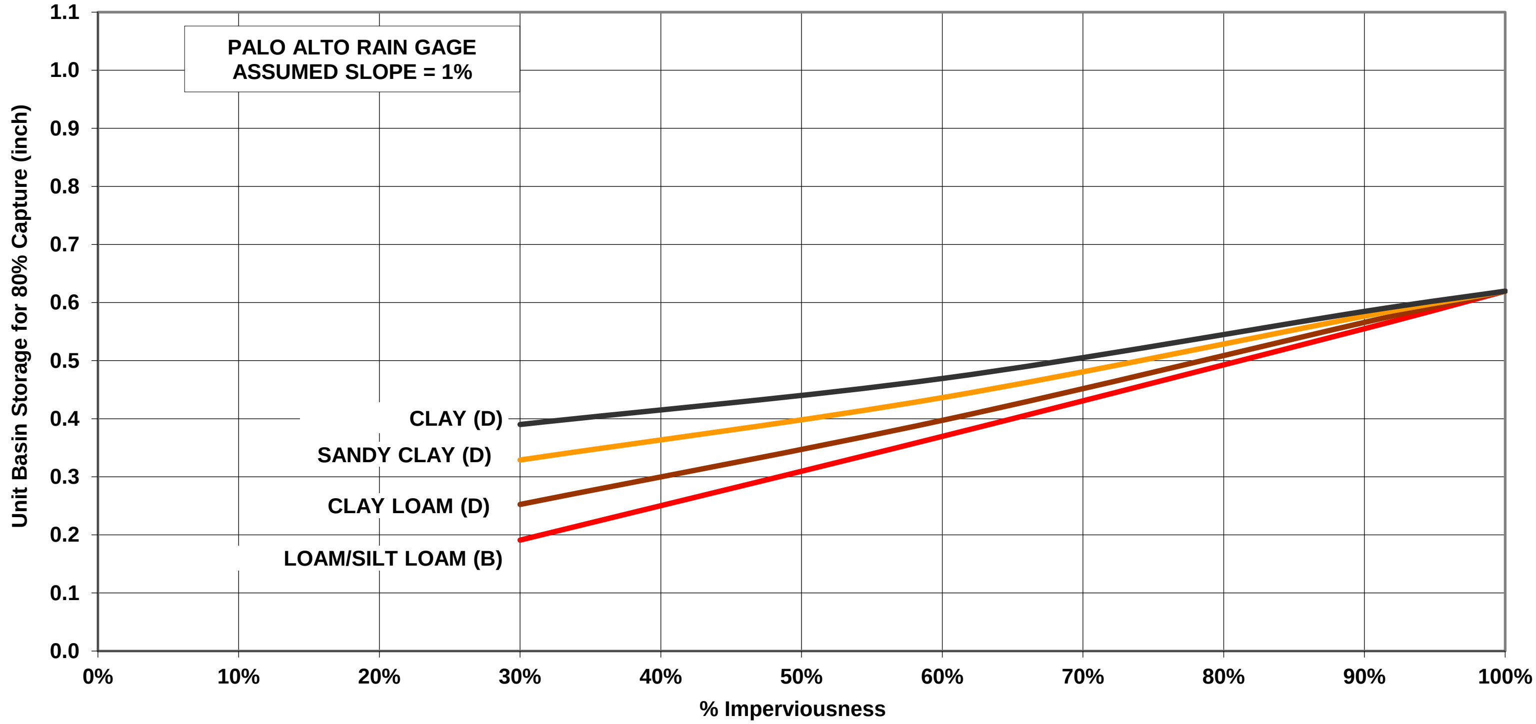

Figure B-3 Unit Basin Volume for 80% Capture - <u>Palo Alto Rain Gage</u>

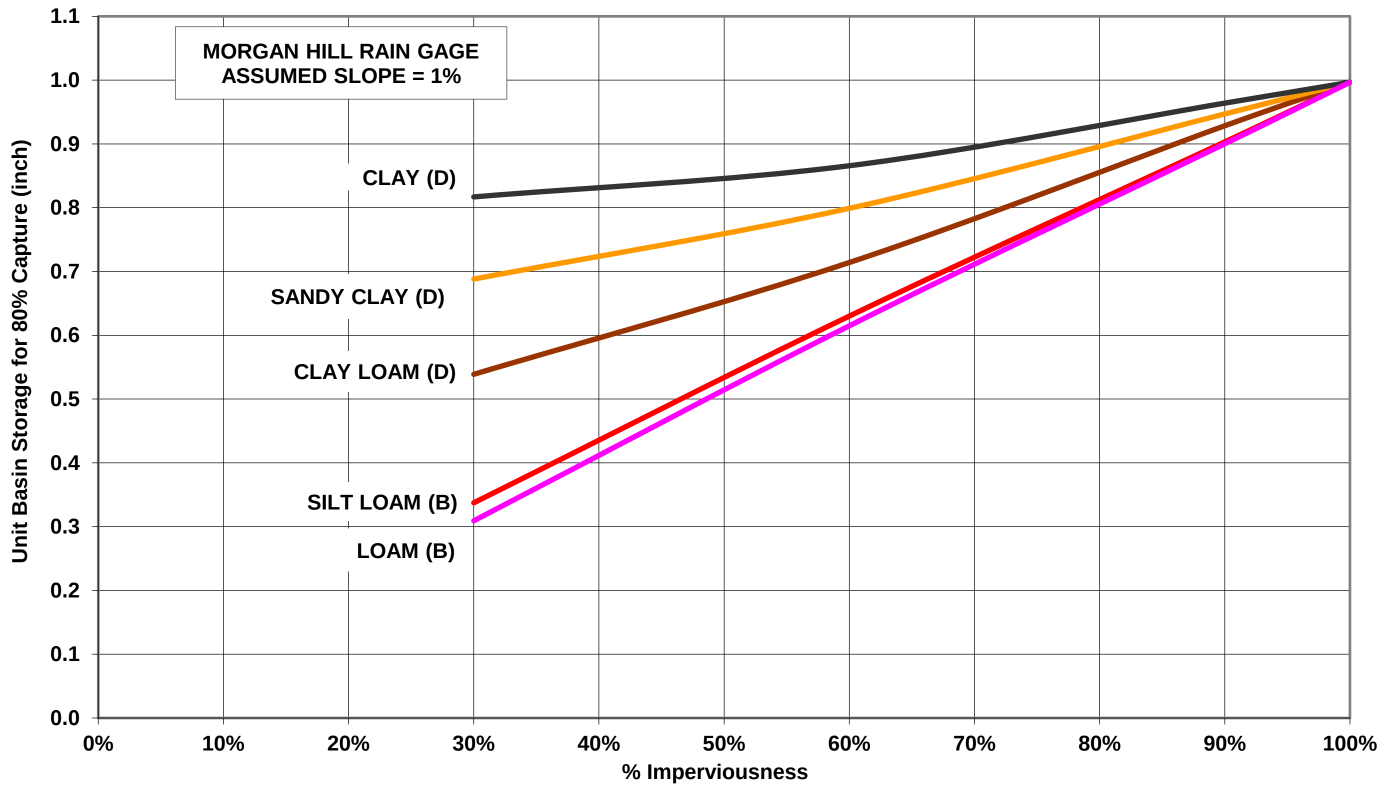

Figure B-4 Unit Basin Volume for 80% Capture - <u>Morgan Hill Rain Gage</u>

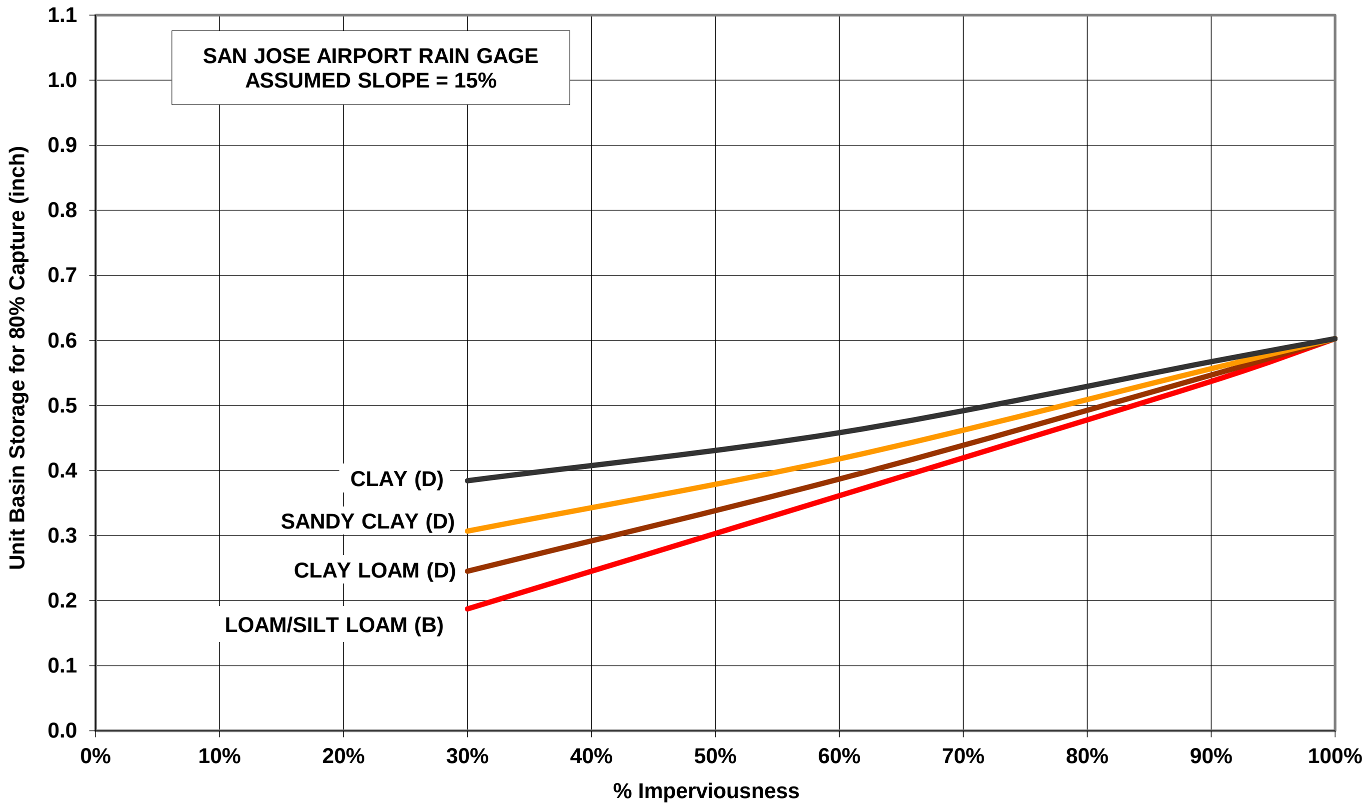

Figure B-5 Unit Basin Volume for 80% Capture - <u>San Jose Airport Rain Gage</u>

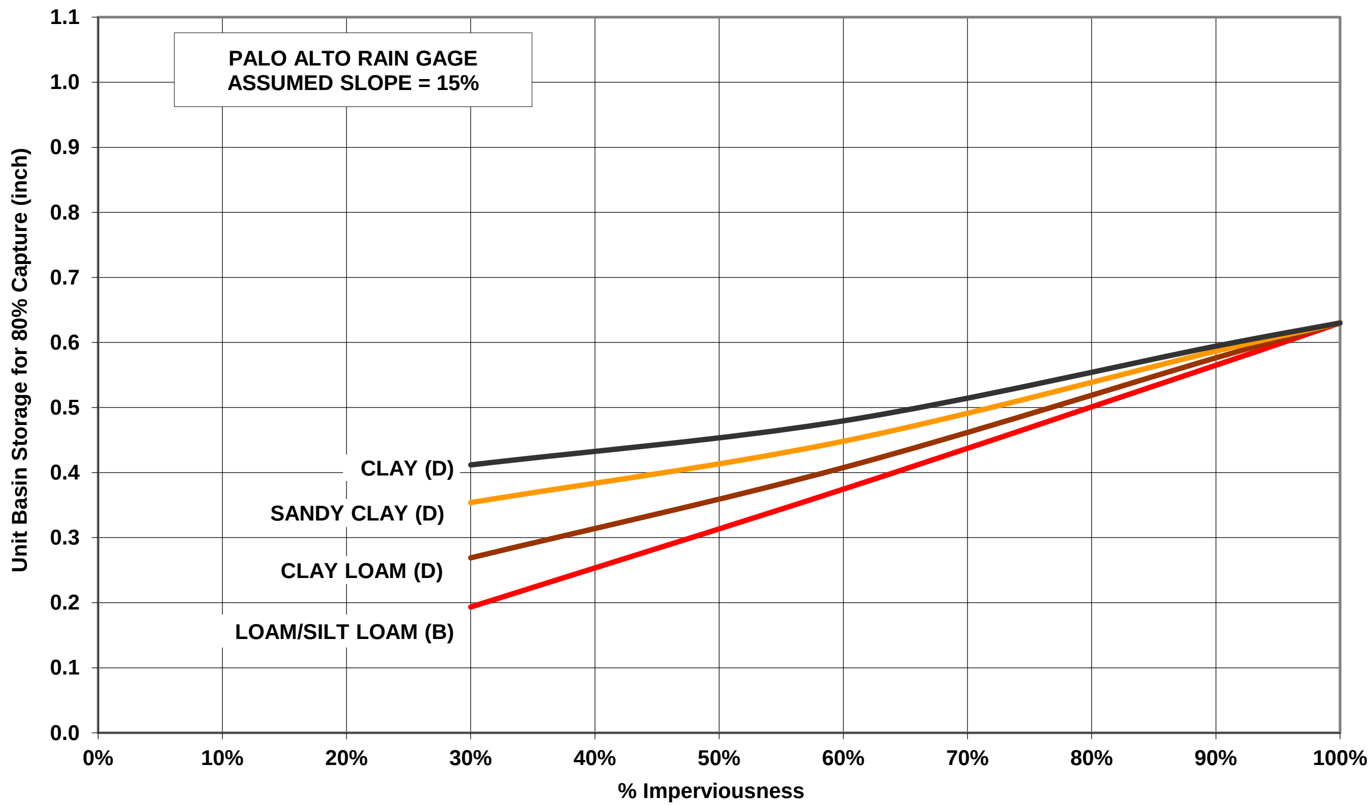

Figure B-6 Unit Basin Volume for 80% Capture - <u>Palo Alto Rain Gage</u>

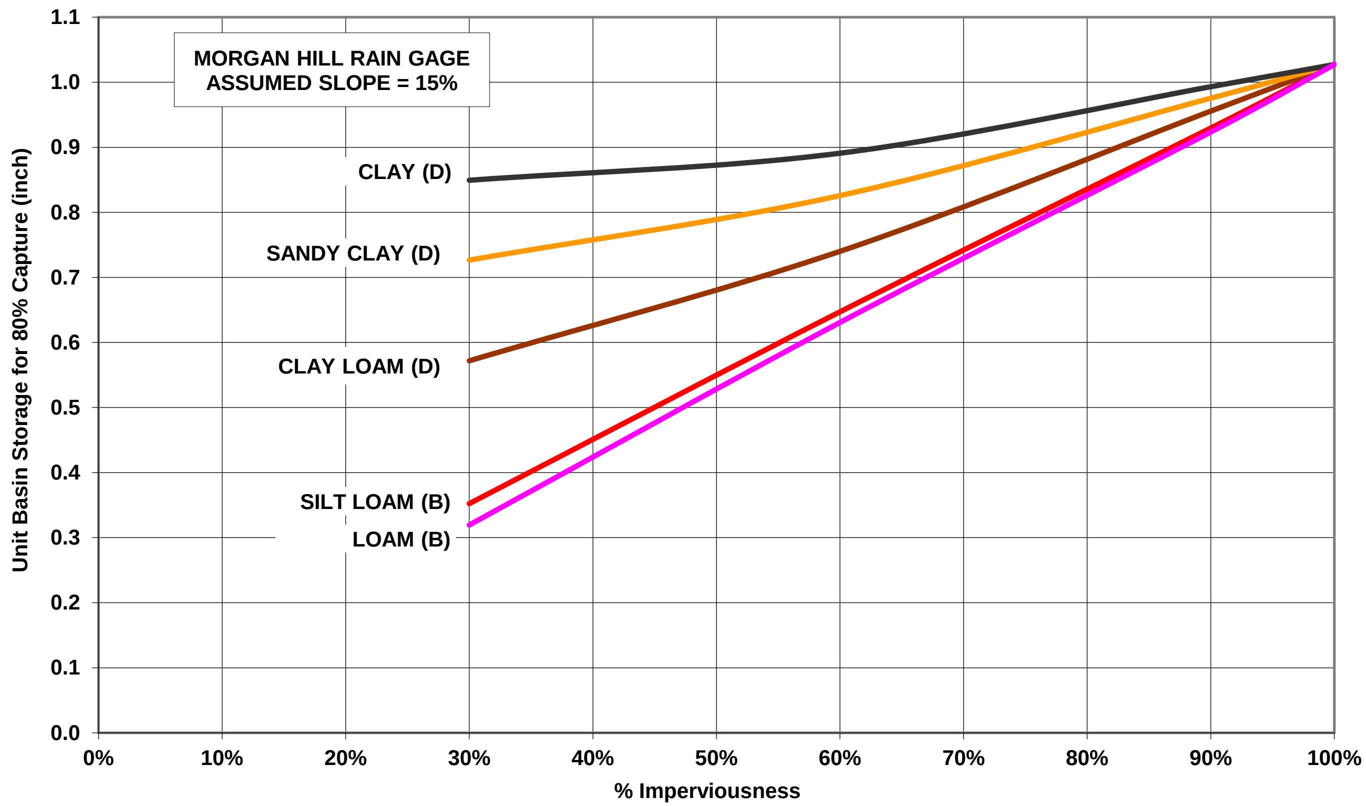

Figure B-7 Unit Basin Volume for 80% Capture - <u>**Morgan Hill Rain Gage**</u>

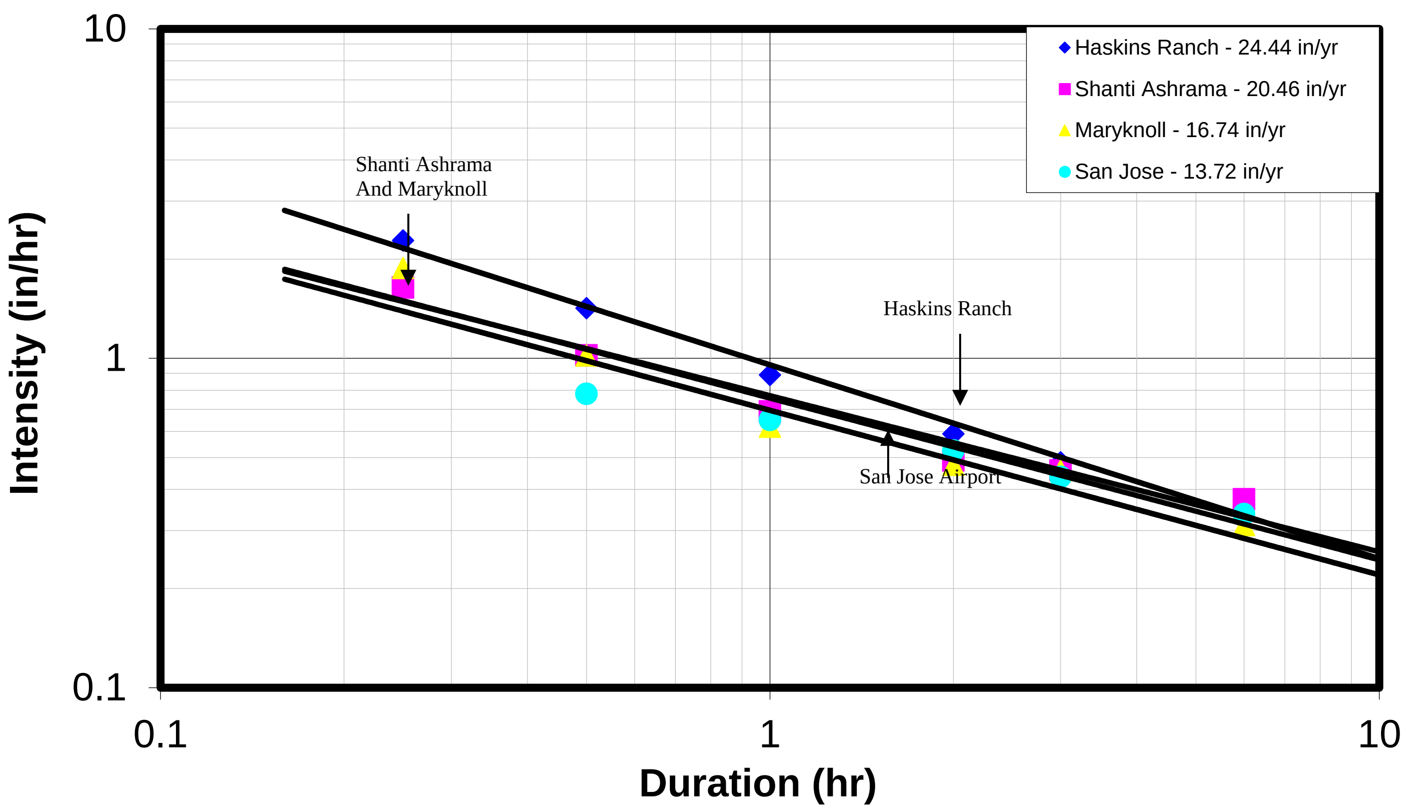

Figure B-8 Intensity-Frequency-Duration Curves for a 50-Year Return Period for Haskins Ranch, Shanti Ashrama, Maryknoll, and San Jose Airport Rain Gages

B.2 Treatment Measure Sizing Examples

This section presents examples showing how to use the worksheets to determine the water quality design flow and volume for several treatment measures, as well as an example of the combined flow and volume based sizing method. Refer to Chapter 5 for more background on and description of the various sizing methods.

[NOTE: THIS SECTION IS BEING UPDATED AND IS NOT AVAILABLE AT THIS TIME.]