Stormwater Bio-Filtration: Joint Public/Private Case Study

Oros Green Street

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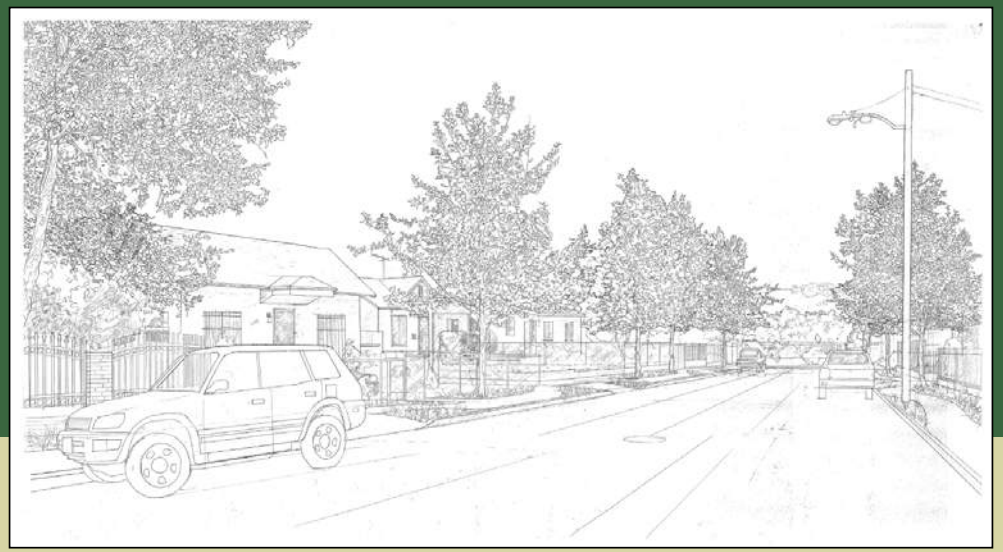

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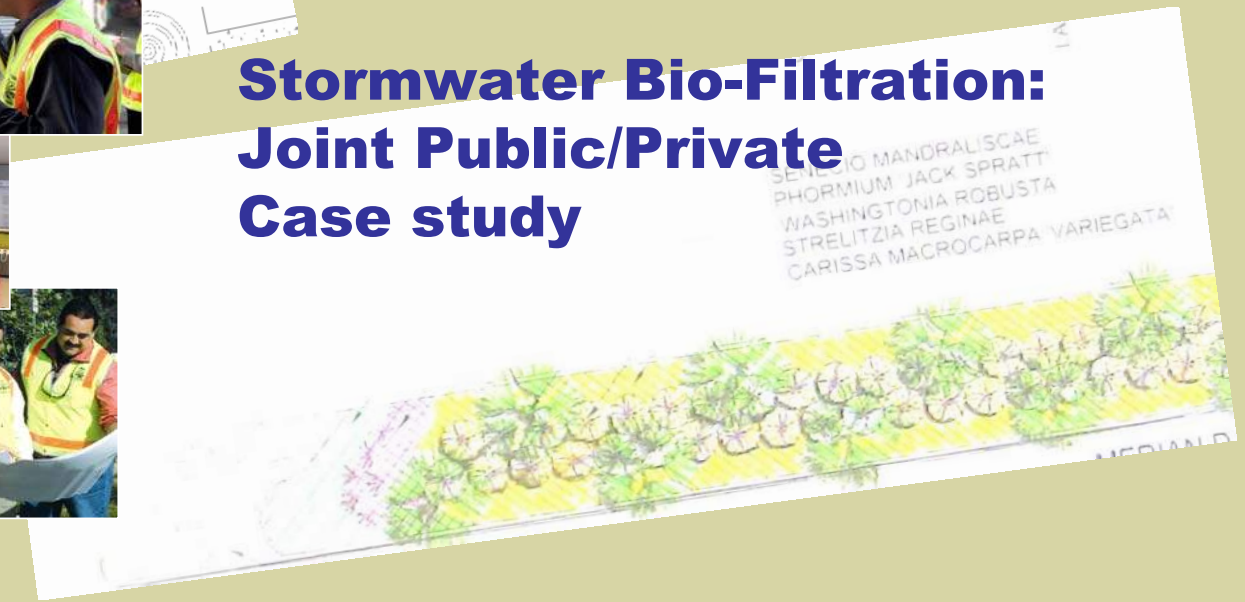


Traditional Methodologies for Constructing New Improvements within the Public Right-of-Way

City Sponsored Street Improvement Project

	Activity	Time Frame
1	City performs advance planning	1 to 5 years
2	City seeks out & secures project funding	1 to 5 years
3	City designs project with either in-house staff or via consultants	6 months to 5+ years
	If consultants are utilized, require either an RFP or on-call consultants (add 1 year and assoc. costs)	
	City project/contract management staff required for consultant oversight (additional assoc. costs)	
4	City performs public outreach as required during design process	
5	City prepares construction documents	3 months to 2 years
6	City goes through traditional bid & award process	6 month average
7	Upon approval of bid, Contractor is given a Notice to Proceed and initiates construction	3 months to 3 years
	Requires City Inspection for QA/QC	
	Requires City Construction/Project Management	
8	Upon completion of project, City assumes on-going maintenance responsibilities for new improvements	
	Total time frame for development and implementation	**3 ½ years to 15+ years**

Traditional Methodologies for Constructing New Improvements within the Public Right-of-Way

Private Development Street Improvement Project

	Activity	Time Frame
1	Private Developer performs advance planning	1 to 2 years
2	Private Developer secures funding	Typically done during advance planning stage
3	Private Developer retains his/her own design team and performs design/construction documents	6 months to 2 years
4	Private Developer goes through City permitting process for public works related improvements	3 to 12 months
5	Private Developer may or may not perform public outreach	
6	Private Developer retains his/her own construction team to build project	3 months to 2 years
7	When completed, City assumes on-going maintenance of standard street improvements; non-standard improvements are maintained via a separate covenant or revocable permit issued to the developer and/or his/her successors	
	Total time frame for development and implementation	**2 years to 7 years**

Pros/Cons

Traditional Implementation strategies:

- Both processes are very linear and somewhat inflexible
- Both processes have benefits and detractions at various phases of implementation
- City sponsored projects encounter the largest delays during the funding and public outreach (on controversial projects) phases, plus the added time to accommodate the bid and award process.
- City sponsored projects are generally based upon the needs of the City/community
- Private Development process is a more efficient way to implement improvements.
- Private Development projects are usually done only when/where there is some mutual benefit for the developer. i. e. such improvements are not based upon public need.
- Occasionally, the Private Development process might encounter delays in obtaining City approvals of their proposed improvements.

Joint Public/Private Development model

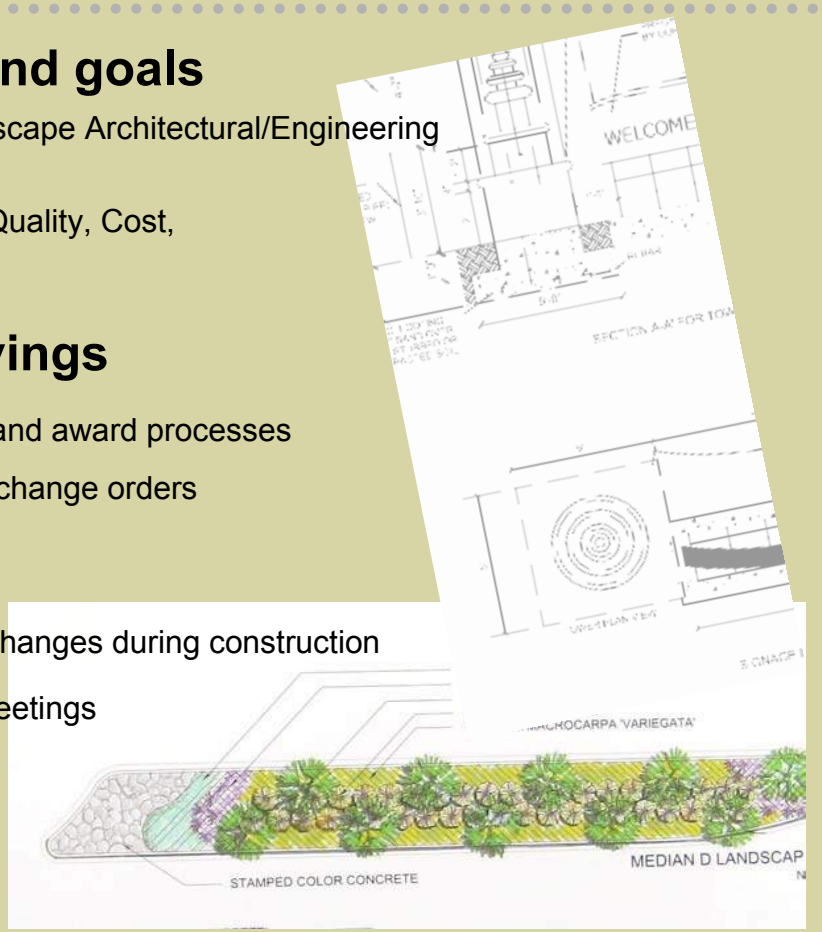
- Multiple opportunities at various project development phases to work collaboratively on a project
- As a more inclusive versus exclusive process, there are better lines of communication that result in fewer delays and reduced costs
- With both parties seeking a common goal, many traditional obstacles to development are overcome in a faster, more efficient manner
- Collaborative efforts typically result in a greater amount of benefits for both parties
- Projects can occur in areas based upon public needs
- Until a good working relationship is established, the collaborative effort is subject to dissolution due to the sometimes frail working relationship.
- Because many of the processes in working together fall outside of the traditional development process, new processes need to be developed that still work within the realm of the public sector requirements i.e. “we’ve never done this before”. Sometimes creating these new methodologies take time to develop resulting in some frustration and delays
- Typically requires a cooperative letter of agreement or memorandum of understanding

Bureau of Street Services' Design-Build System

- In-house Engineering and Landscape Architectural Staff
- In-house Construction and Maintenance Staff
- Quality Control and conformance to design

Benefits of Design-Build

- **Unified purpose and goals**
  - One entity provides Landscape Architectural/Engineering Design and Construction
  - Singular Responsibility - Quality, Cost, and Schedule Adherence
- **Cost and time savings**
  - Eliminates advertise, bid and award processes
  - Prevents potential claims/change orders
- **Collaboration**
  - Eliminates major design changes during construction
  - Bi-weekly Design-Build meetings



Benefits of Design-Build (continued)

- **Innovation**
  - Design, methods of construction, materials
  - Reduce maintenance
- **Improved customer/constituent service**
  - Improved responsiveness

About North East Trees/ Green Way

Founded as a 501c3 in 1990 by Scott Wilson

Mission:

To restore nature's services in resource challenged communities, through a collaborative resource development, implementation, and stewardship process.

Programs:

Urban Parks Design-Build Development
Watershed Rehabilitation
Community Stewardship
Urban Forestry
Youth Environmental Stewardship

Initiatives:

Green Way L.A.™
Creating Community One Tree at a Time™

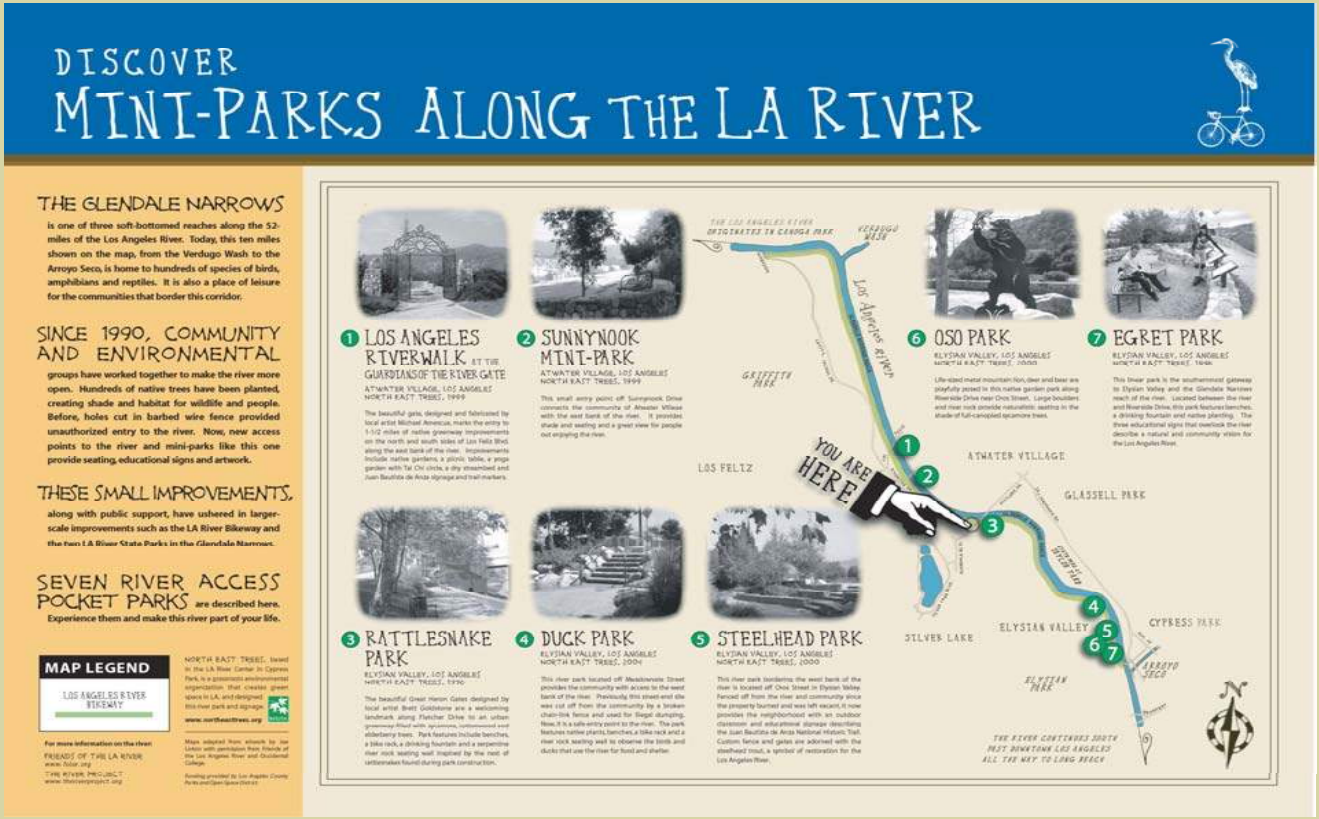
How? – 3 C's

Collaboration
Community
Commitment

Restoring Nature's Services – Urban Parks

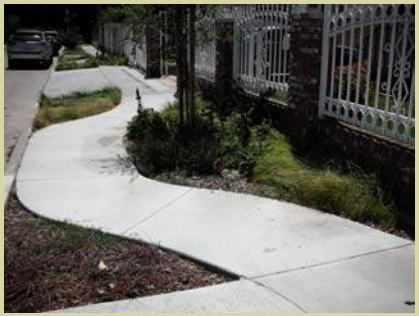
- **Urban Parks Development** – ***plans, designs and builds*** **community, neighborhood and river adjacent parks and trails for the purpose of restoring native habitat and creating passive recreation opportunities**
  - **Los Angeles River Bikeway – string of pocket parks along L.A. River**
    - **Steelhead Park**

Restoring Nature's Services – Focus on Glendale Narrows Section of L.A. River



Restoring Nature's Services – Watershed Rehabilitation

- **Watershed Rehabilitation** – ***plans, designs and implements*** **watershed improvements with the express purpose of restoring waterways and associated habitat, improving water quality and safely increasing stormwater detention**
  - **Specific projects within this program area include**
    - **Bresee Ecology Park**
    - **Oros Green Street**
    - **Vista Green Street**



Restoring Nature's Services – Community Stewardship

- **Community Stewardship – assists communities and neighborhoods in the development of resources, capacity and network links that can steward restored nature's services in resource challenged communities**

Community Stewardship

Steelhead Mini-Park

Oso Mini-Park

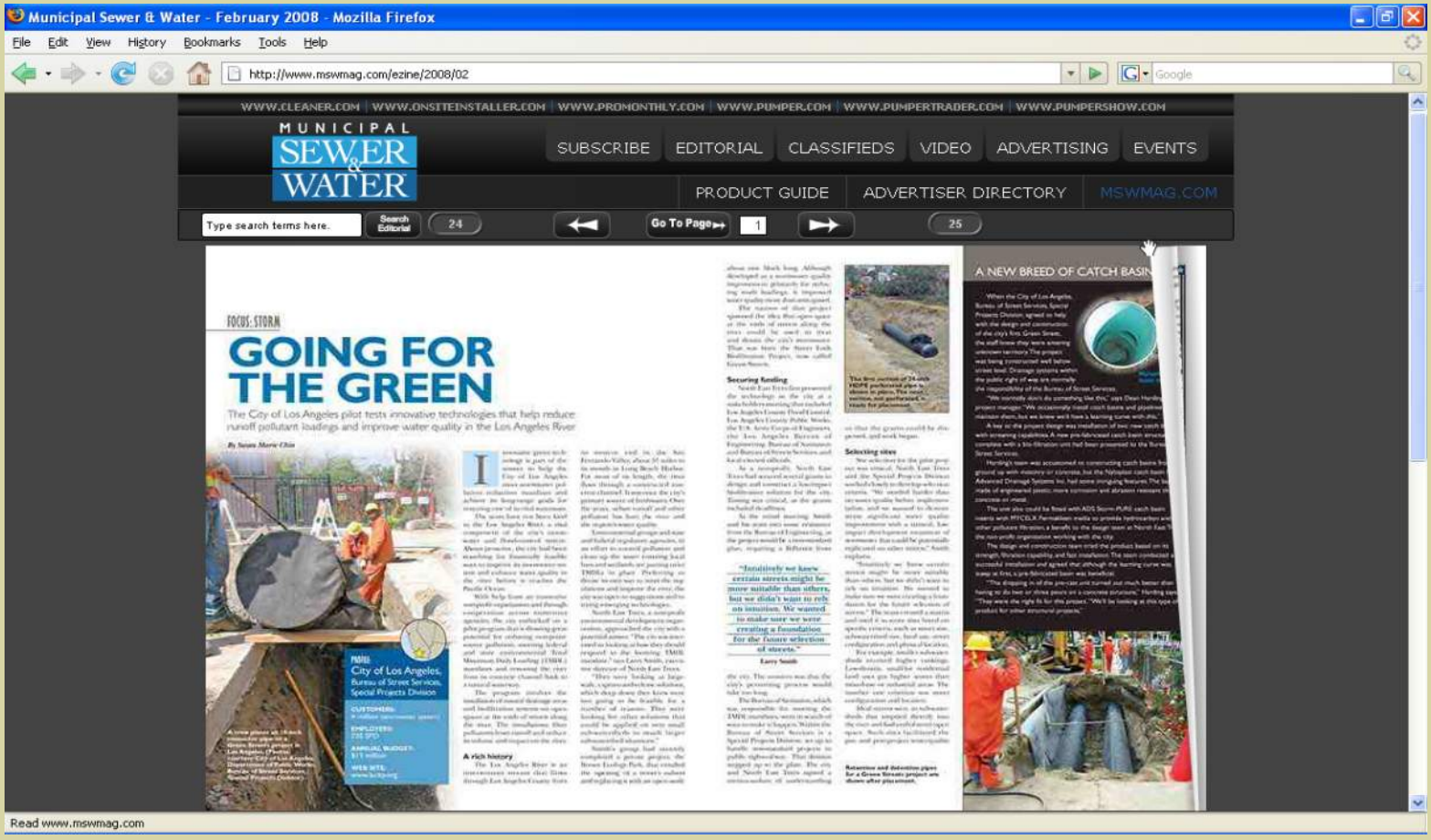
Egret Mini-Park

Water with Rocks Gate Improvements

Los Angeles Riverwalk

Going for the Green

Going for the Green – Oros Green Street



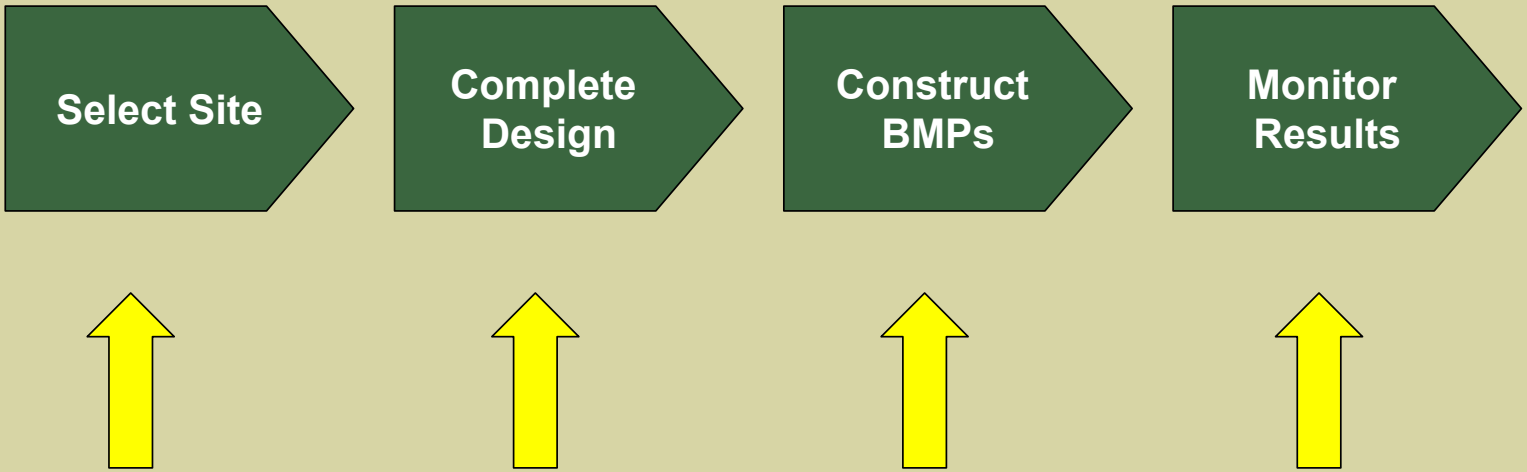
A Collaborative Methodology for Constructing New Improvements within the Public Right-of-Way

	Activity	Time Frame
1	Community Based Non-Profit performs advance planning & site investigation as needed	3 - 6 months
2	Community Based Non-Profit secures funding	Typically done prior to advance planning stage through grant acquisition & other fund raising
3	Community Based Non-Profit reaches out to City agency stakeholders during site selection process	Ongoing, but begins after advance planning & funding secured
4	Community Based Non-Profit utilizes in-house design team to performs design development/construction documents	3-6 months
5	Community Based Non-Profit collaborates with City design-build agency for public works related improvements	Overlaps design development/ construction document phase
6	Community Based Non-Profit performs public outreach	Overlaps design development/ construction document phase
7	Community Based Non-Profit collaborates with City design-build agency to construct project – City is developer	3 - 4 months
8	When completed non-standard improvements are maintained through Community Stewards Program	
	Total time frame for development and implementation	**1-2 years**

Oros Green Street - Overall Project Objectives

- **Prove that stormwater Best Management Practices (BMPs) are compatible with residential / light commercial neighborhoods**
  - **Don't always need large sites / large facilities to provide stormwater treatment.**
- **Test whether natural BMPs compatible with residential neighborhoods can aid in complying with TMDLs**
- **Prove that distributed BMPs are a cost-effective opportunity to increase regional treatment capacity**
- **Begin "testing" City of Los Angeles design standards that currently make BMP implementation difficult**
- **Disseminate tools, designs, and lessons learned to other parties seeking to employ these technologies in other parts of the city**

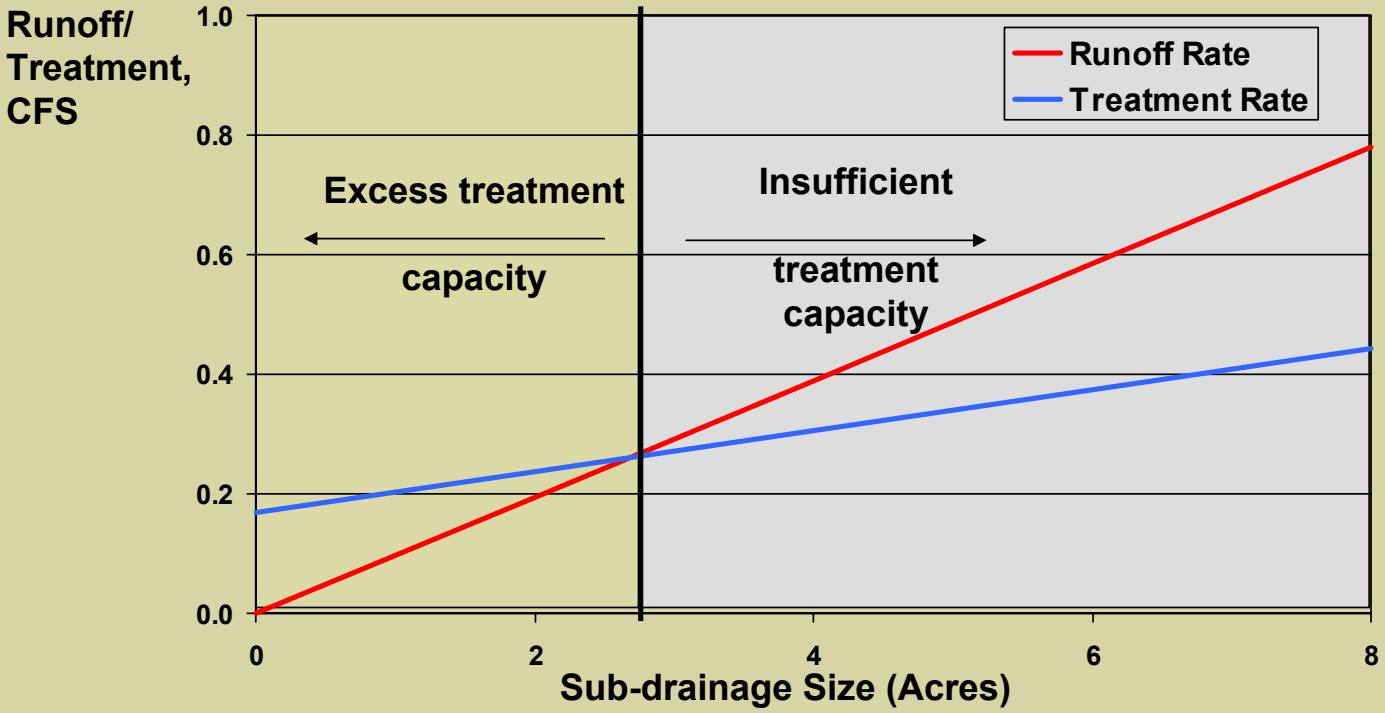
Project Process



Sub-Regional Selection Criteria

- Federally listed impaired water body
- Existing street run-off water enters River directly without treatment or filtration
- Communities are densely developed, with a mix of single family residential and industrial land uses.
- Adjacent communities are diverse in culture and language and are representative of the types of communities in urban Los Angeles

Design Challenge: As Drainage Size Increases, Runoff Exceeds Public ROW Treatment Capacity



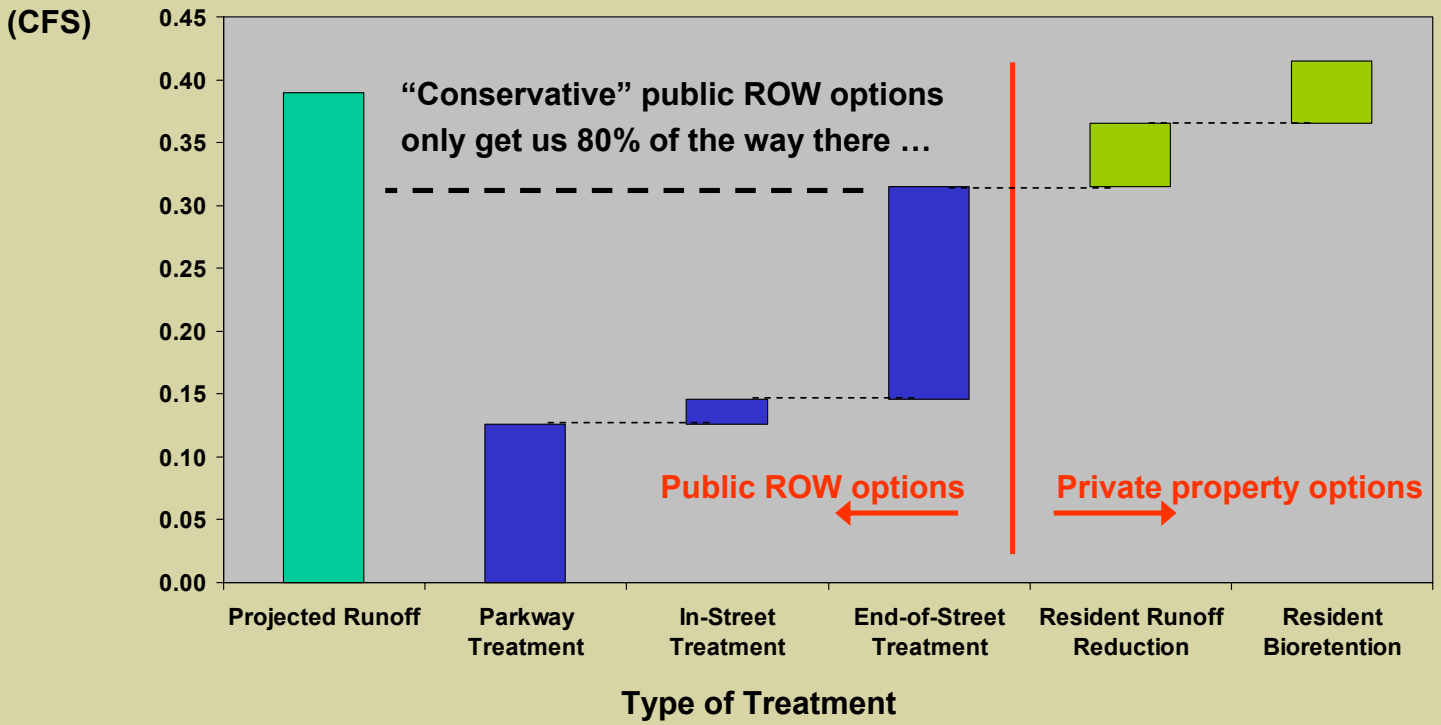
Note:

- Assumes use of infiltration treatment at end of street, bioretention areas in parkway, and permeable gutter along street edge.
- Calculations based on LA County SUSMP recommendations.

Several Opportunities to Address Challenge

- Use sub-watershed size as key selection factor
- Maximize opportunities to treat in public ROW
- Explore opportunities to engage private landowners in project

For A Given Street, Critical To Maximize All Treatment Opportunities



Site Selection

- Over 40 streets in Elysian Valley and Atwater Village considered for the project.
  - All dead-end along LA River, flow into river through end-of-street culverts or swales.
  - In-person reconnaissance and photo documentation of all streets.

- NET developed site selection criteria that took various factors contributing to project success into account, including:
  - Size of watershed vs. treatment area available
  - Land uses along street
  - Traffic levels / type of traffic
  - Presence of existing high-value / high quality street trees
  - Condition of parkway areas

- Oros Street the highest-ranked street. Key reasons:
  - Residential land use – no industry or industry-related traffic
  - Treatment areas all in public domain
  - Few high-quality street trees

Site Selection Matrix

SITE RANKING	CANDIDATE STREETS/ SUB-WATERSHEDS	Sub-watershed Size:				Land-use in Sub-watershed				Slope %				Pervious Land Cover in the Sub-watershed				No. of Street Trees				No. of Prop. Owners				Bikeway Access		
		Small sub-basin 1-2.5 ac.	Medium sub-basin 2.5-5.0 ac.	Large sub-basin >5.0 ac.	Street Criterion Score	Low density small-lot Residential	Low- to Medium Density Res.	Mixed Residential + Industrial	Street Criterion Score	Infiltration Area Slope % = <2.5%	Slope % = 2.5-5%	Slope = >5%	Street Criterion Score	% Pervious cover = > 60%	% Pervious Cover = 40-60%	% Pervious Cover = <40%	Street Criterion Score	No. of Street Trees = High	No. of Street Trees = Medium	No. of Street Trees = Low	Street Criterion Score	# of Property Owners per block = < 3 per side	# of Property Owners per block = 3-8 per side per side	# of Property Owners per block = >8 per side	Street Criterion Score	County Bikeway access point = Yes	County Bikeway access point = No	Street Criterion Score
	Ranking Points	5	3	0		5	3	0		5	3	0		5	3	0		0	3	5		5	3	0		5	0	
	Weights %	2.00				1.00				1.00				1.50				1.00				2.00				1.00		
1	Oros Street	5			10	5			5	5			5	5			8			5	5		3		6		0	0
2	Ripple Place	5			10			0	0		3		3		3		5			5	5		3		6		0	0
3	Harwood Street		3		6	5			5		3		3	5			8			5	5			0	0	5		5
4	Dallas Street	5			10			0	0		3		3		3		5			5	5		3		6		0	0
5	Altman Street		3		6			0	0	5			5			0	0			5	5		3		6		0	0
6	Fernleaf Street		3		6	5			5	5			5	5			8		3		3		3		6		0	0
7	Gatewood Street		3		6	5			5	5			5	5			8		3		3			0	0		0	0
8	Shoredale Avenue		3		6	5			5	5			5	5			8	0			0			0	0		0	0
9	Denby Avenue		3		6			0	0		3		3			0	0			5	5		3		6		0	0
10	Eads Street		3		6			0	0	5			5		3		5			5	5		3		6		0	0
11	North Coolidge Ave.		3		6			0	0		3		3			0	0			5	5		3		6		0	0
12	Newell Street			0	0			0	0	5			5		3		5			5	5		3		6		0	0
13	Duvall Street			0	0	5			5	5			5	5			8		3		3			0	0	5		5
14	Dorris Place-above Glover Place			0	0			0	0	5			5			0	0		3		3		3		6		0	0
15	Elmgrove Street			0	0	5			5	5			5	5			8		3		3			0	0		0	0
16	Partridge Avenue		3		6			0	0	5			5			0	0			5	5			0	0		0	0
17	Gleneden Place			0	0			0	0	5			5		3		5			5	5			0	0		0	0

Site Selection Matrix

SITE RANKING	CANDIDATE STREETS/ SUB-WATERSHEDS	Available Open Space Beyond Street End				ROW Width				Pkwy. Paved?				No. of Curb Cuts				Need/ Use of Street Parking			Street Tree Conflict			Total Score	Additional Site Selection Criteria - Yes/No - "Yes" Results in Street Excluded			
		Large to Medium Space Available	Small Amount of Open Space Available	No Open Space Available	Street Criterion Score	Width of ROW = >50 ft.	Width of ROW = 50 ft	Width of ROW = <50 ft.	Street Criterion Score	Parkway paved both sides of street	Parkway partially paved	Parkway mostly unpaved	Street Criterion Score	No. of Curb Cuts = low (<5/side)	No. of Curb Cuts = medium (5-9/side)	No. of Curb Cuts = high (>9/side)	Street Criterion Score	Low Demand/Low Use	High Demand/High Use	Street Criterion Score	Street Tree Conflicts = No	Street Tree Conflicts = Yes	Street Criterion Score		Homeless Encampment	Trash Dumping	Pending Development	Industrial Site Beyond Street End
	Ranking Points	5	3	0		5	3	0		0	3	5		5	3	0		5	0		3	0						
	Weights %	2.00				1.00				1.00				1.50				1.50			1.00							
1	Oros Street	5			10		3		3			5	5		3		4.5		0	0	3		3	64				
2	Ripple Place		3		6			0	0		3		3	5			7.5	5		7.5	3		3	55.5	v	v	v	
3	Harwood Street	5			10		3		3			5	5			0	0		0	0	3		3	52.5				
4	Dallas Street		3		6		3		3			5	5		3		4.5		0	0	3		3	50				
5	Altman Street		3		6		3		3		3		3		3		4.5	5		7.5	3		3	49				v
6	Fernleaf Street			0	0		3		3			5	5		3		4.5		0	0	3		3	48				
7	Gatewood Street	5			10		3		3			5	5			0	0		0	0		0	0	44.5				
8	Shoredale Avenue	5			10		3		3			5	5			0	0		0	0	3		3	44.5				
9	Denby Avenue		3		6			0	0	0			0		3		4.5	5		7.5	3		3	41				
10	Eads Street			0	0		3		3	0			0	5			7.5		0	0	3		3	40				
11	North Coolidge Ave.		3		6		3		3	0			0			0	0	5		7.5	3		3	39.5				
12	Newell Street			0	0		3		3	0			0		3		4.5	5		7.5	3		3	38.5				
13	Duvall Street			0	0		3		3			5	5			0	0		0	0	3		3	36.5				
14	Dorris Place-above Glover Place			0	0		3		3		3		3		3		4.5	5		7.5		0	0	32				
15	Elmgrove Street			0	0		3		3			5	5			0	0		0	0	3		3	31.5				
16	Partridge Avenue			0	0			0	0		3		3			0	0	5		7.5	3		3	29.5				
17	Gleneden Place			0	0		3		3			5	5			0	0		0	0	3		3	25.5			v	v

Site Overview

Geographic Location

Drainage Area

Setting

Intersection of Blake Avenue and Oros Street

Setting

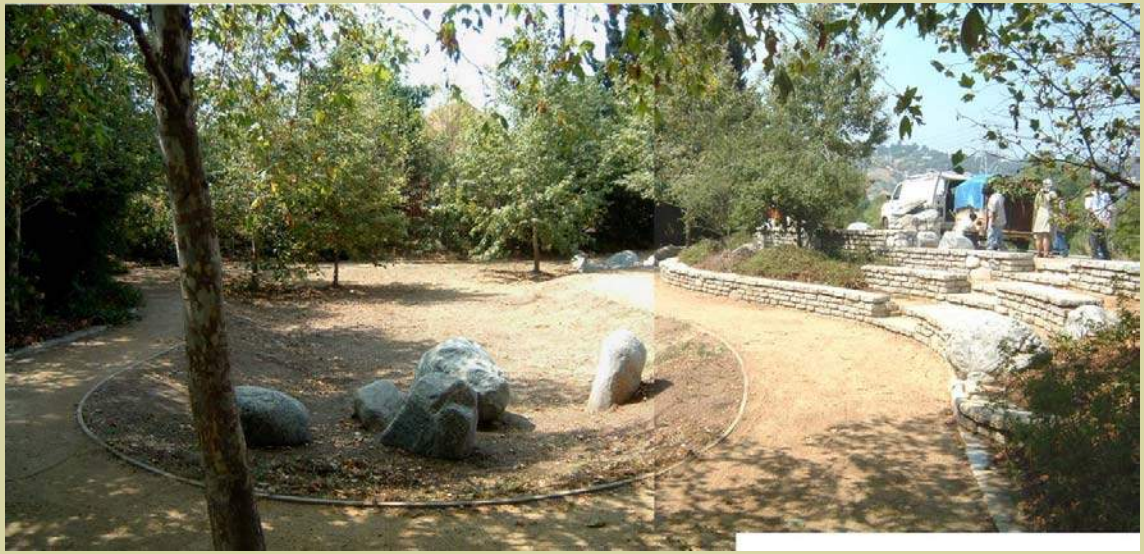
Looking SW Away From River Towards Interstate 5

Setting

Street-End Culvert, Showing Entrance To Steelhead Park

Setting

Steelhead Park



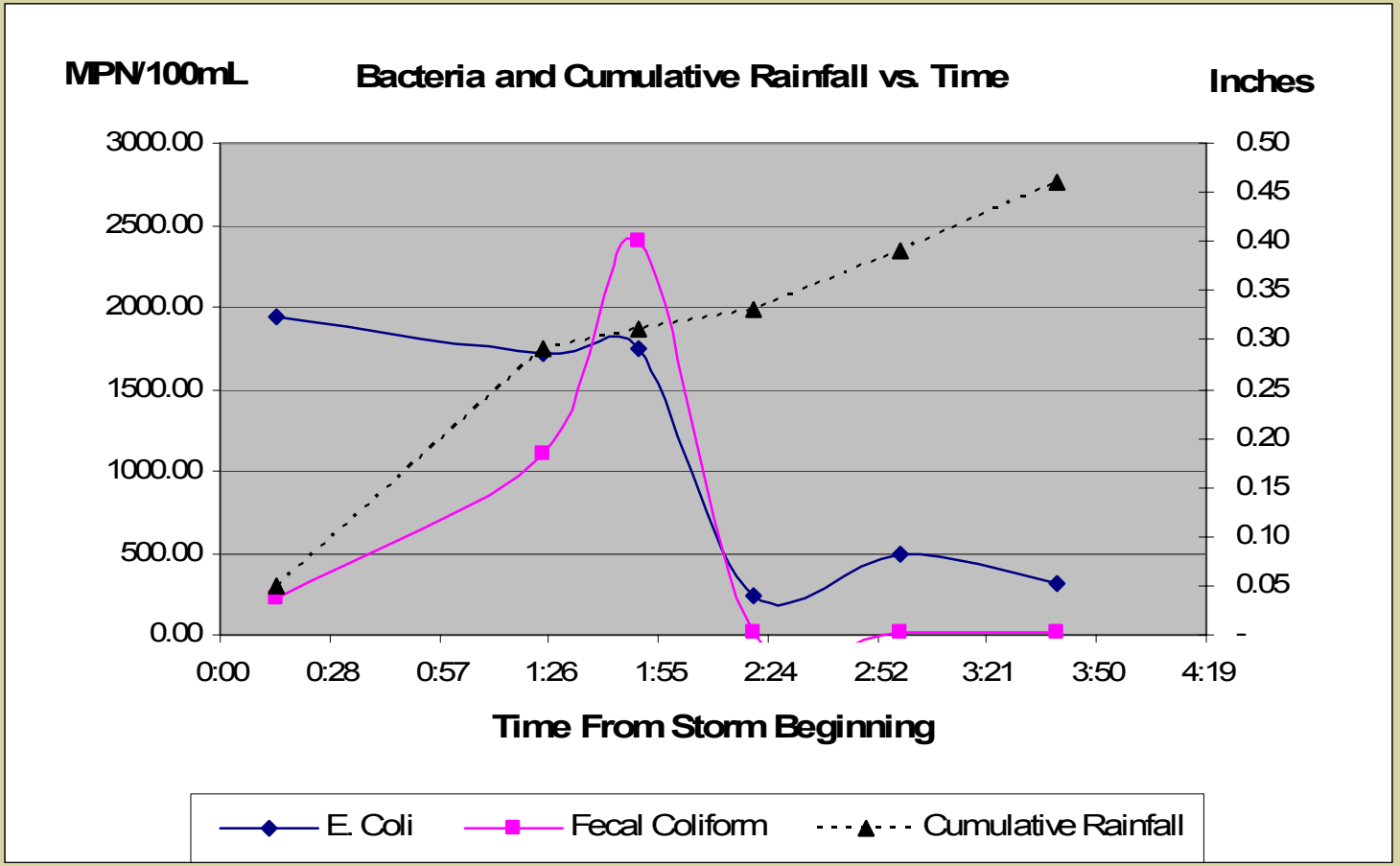
Typical Rainy Day Along Oros Street

Water Quality Issues In the Project Area

Water Quality Objective Exceedences, February 2006 Storms

Parameter	Water Quality Objective	Storm 1	Storm 2
Copper	LA River TMDL	X	X
Lead	LA River TMDL	X	
Zinc	LA River TMDL	X	X
E.coli	Basin Plan	X	X
Enterococcus	Basin Plan	X	X
Fecal Coliform	Basin Plan	X	X
Total Coliform	Basin Plan	X	X

Pollutant Concentrations Highest At Beginning Of Storm, Fall Off Well Short of 0.75" of Rainfall



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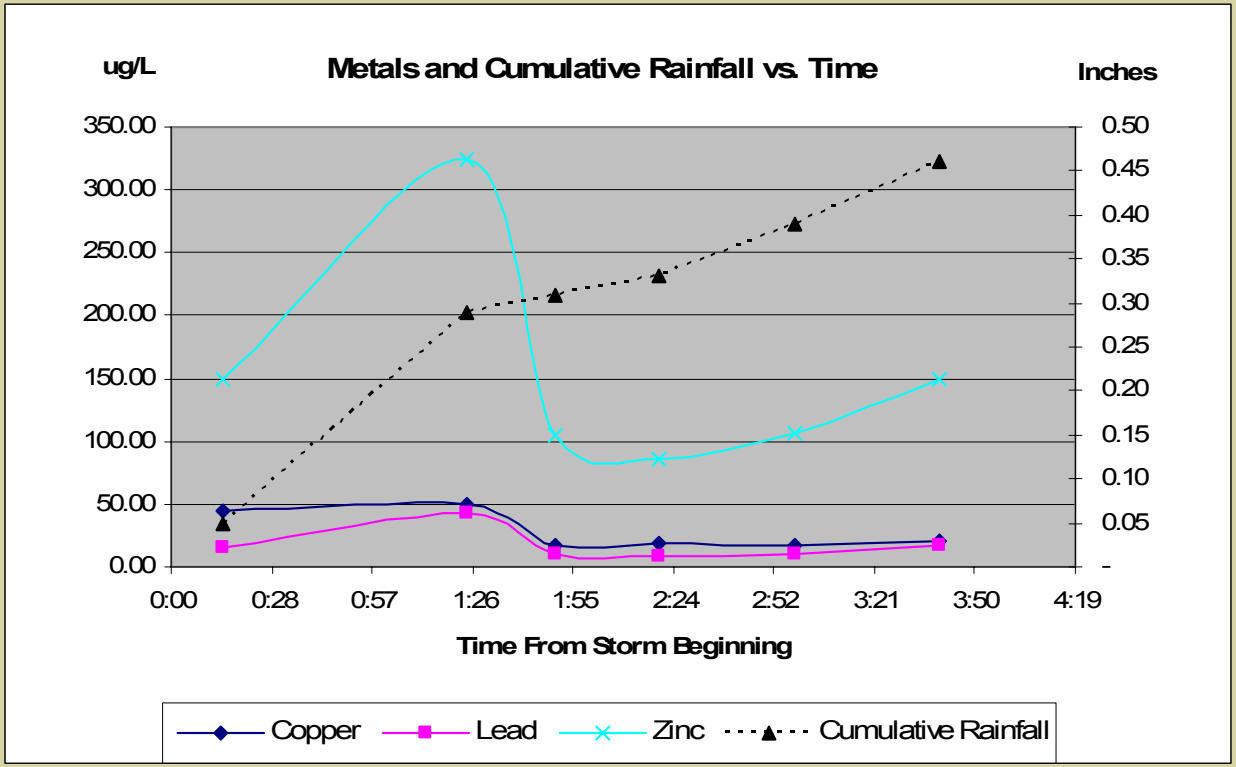


LAR TMDL Limits:

Copper:	**17 ug/l**
Lead:	**62 ug/l**
Zinc:	**159 ug/l**

Design Summary

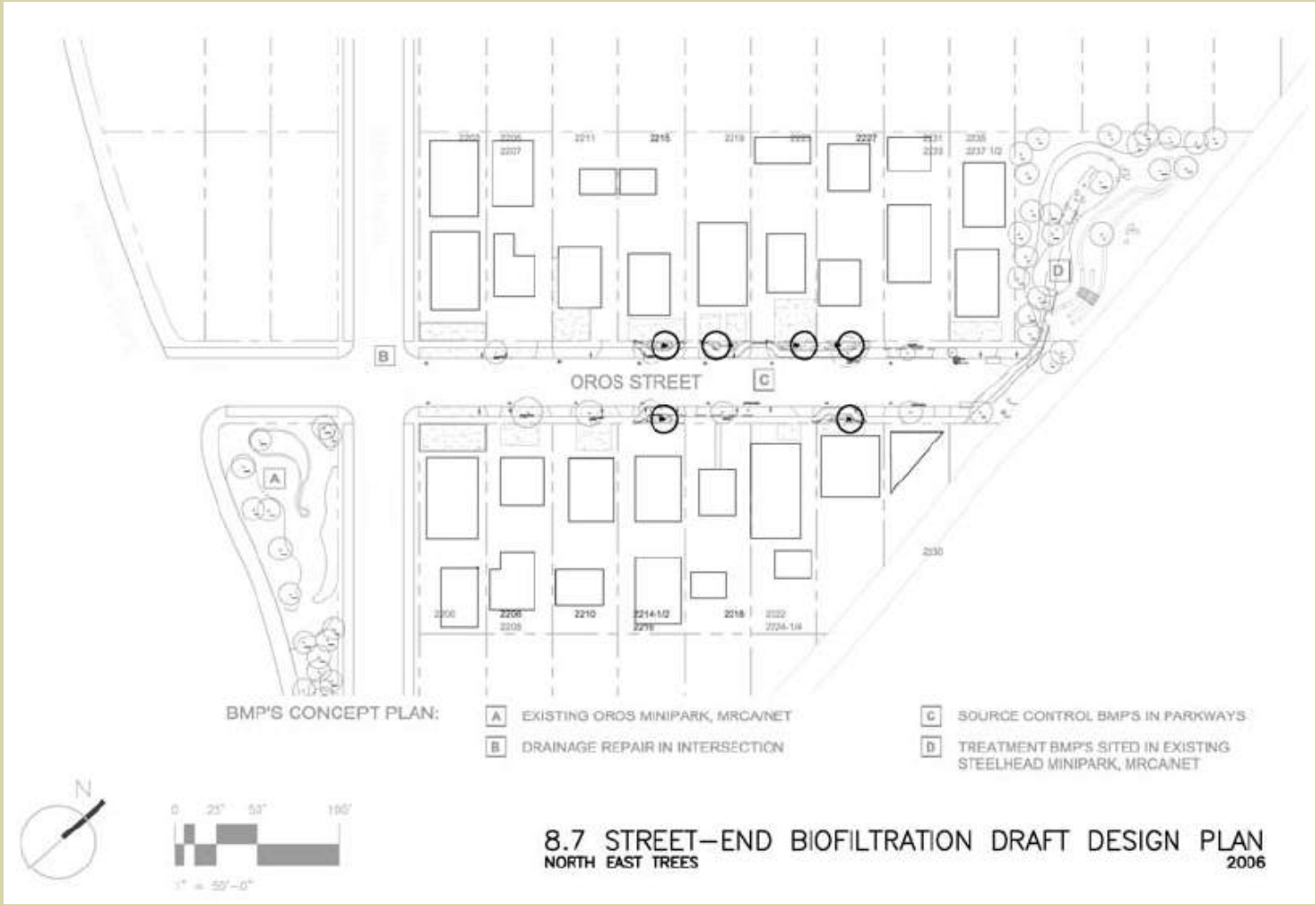
Summary Statistics		
Total runoff produced by a 0.75" storm event:	5,200	cubic feet
Total number of lots draining to Oros Street:	17	

Parkway Treatment - Stormwater Gardens		
Treatment volume per linear foot of stormwater garden:	21	cubic feet
Total proposed number of lot-length stormwater gardens:	5	units
Total linear feet of stormwater gardens	135	feet
Total stormwater garden treatment capacity	2,822	cubic feet
Total number of lots draining into stormwater gardens:	7	lots
Total estimated runoff from lots (per 3/4" storm):	1,806	cubic feet
Safety factor (capacity above required volume)	36%	

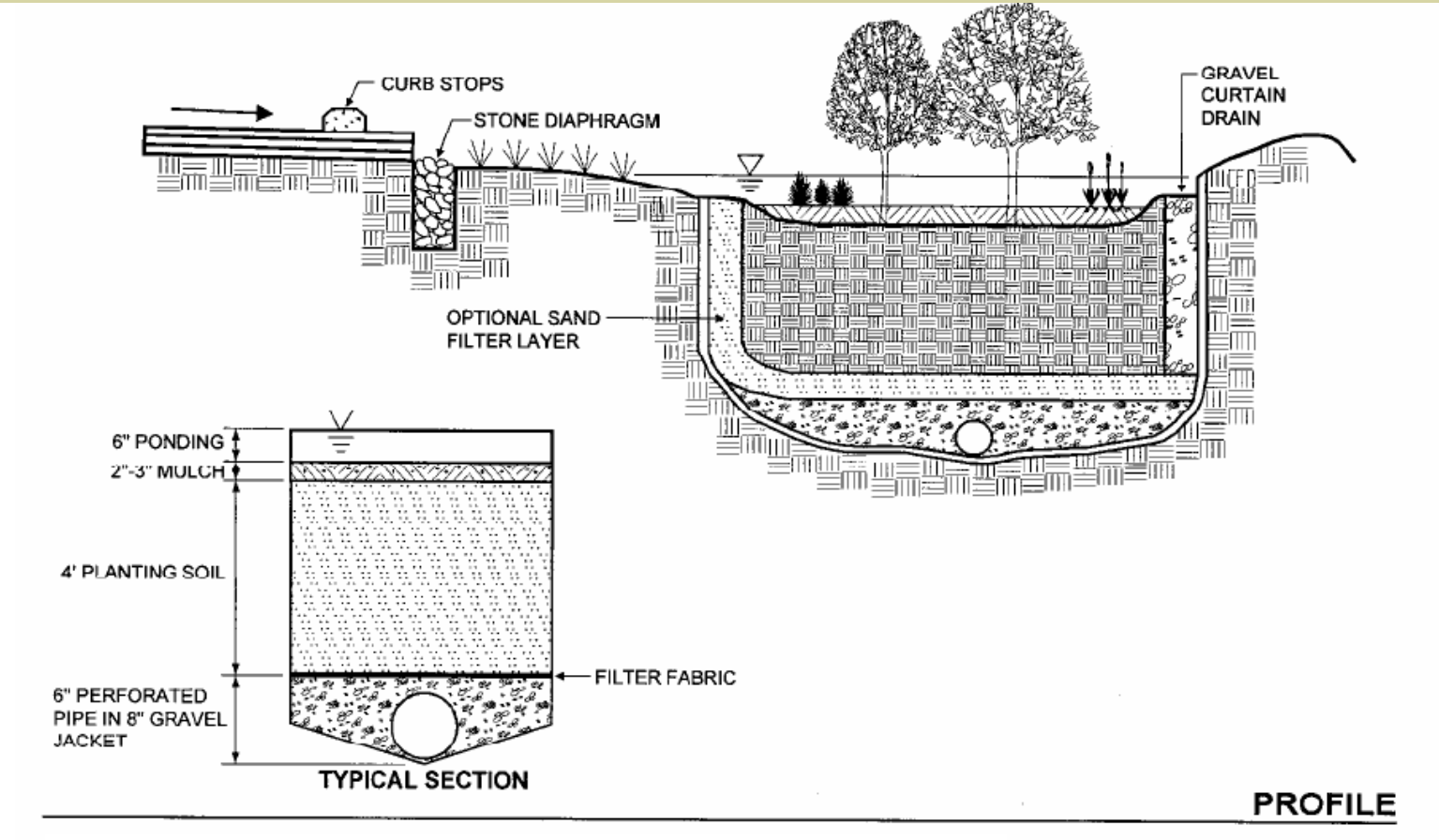
Infiltration Trench Treatment		
Remaining runoff not captured by stormwater gardens	3,394	cubic feet
Capacity of Steelhead Park infiltration trench	4,325	cubic feet
Safety factor (capacity above required volume)	22%	

Overall Summary		
% Runoff treated in stormwater gardens	35%	
% Runoff treated in infiltration trench	65%	

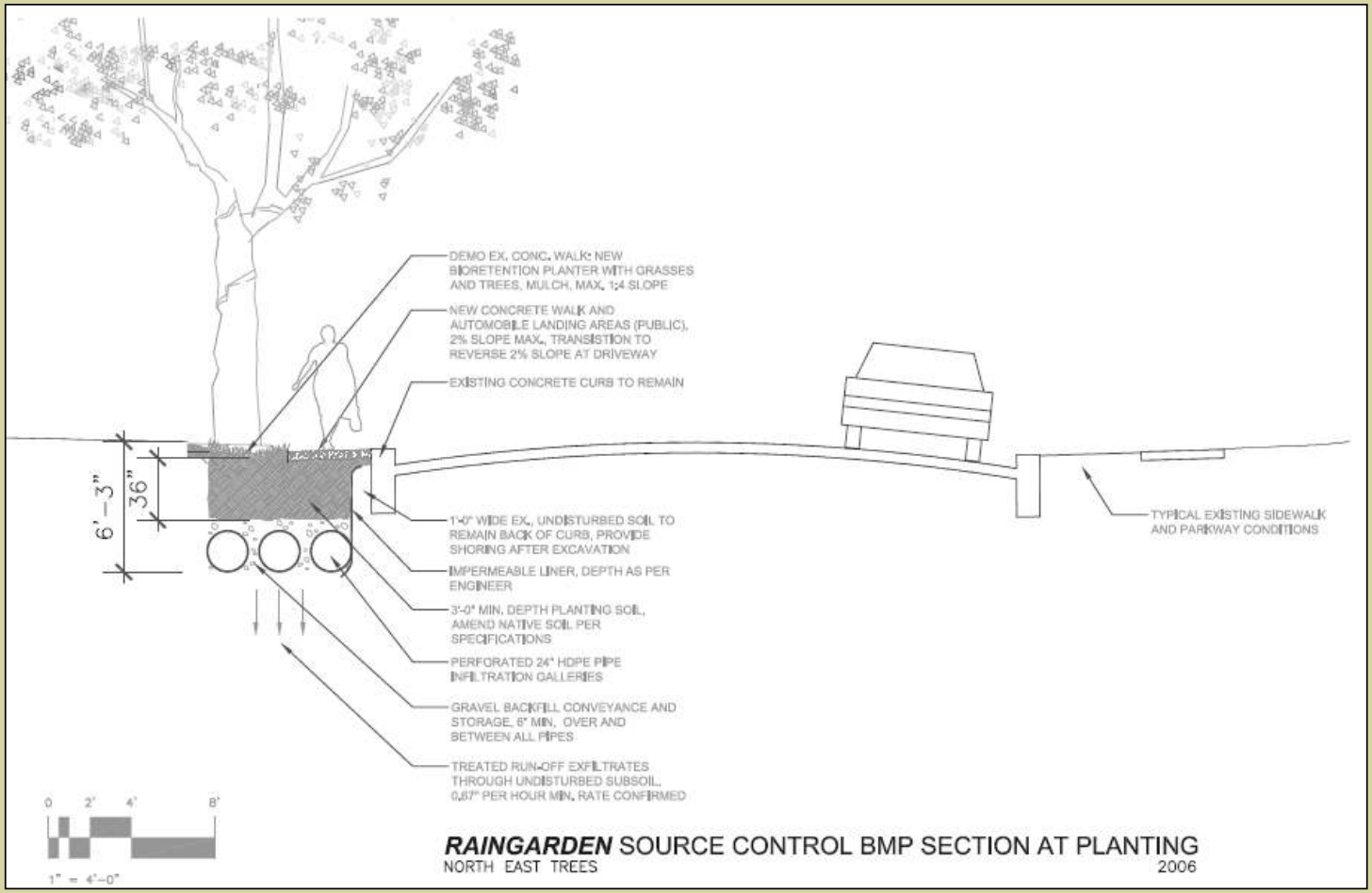
Plan View of Entire Street



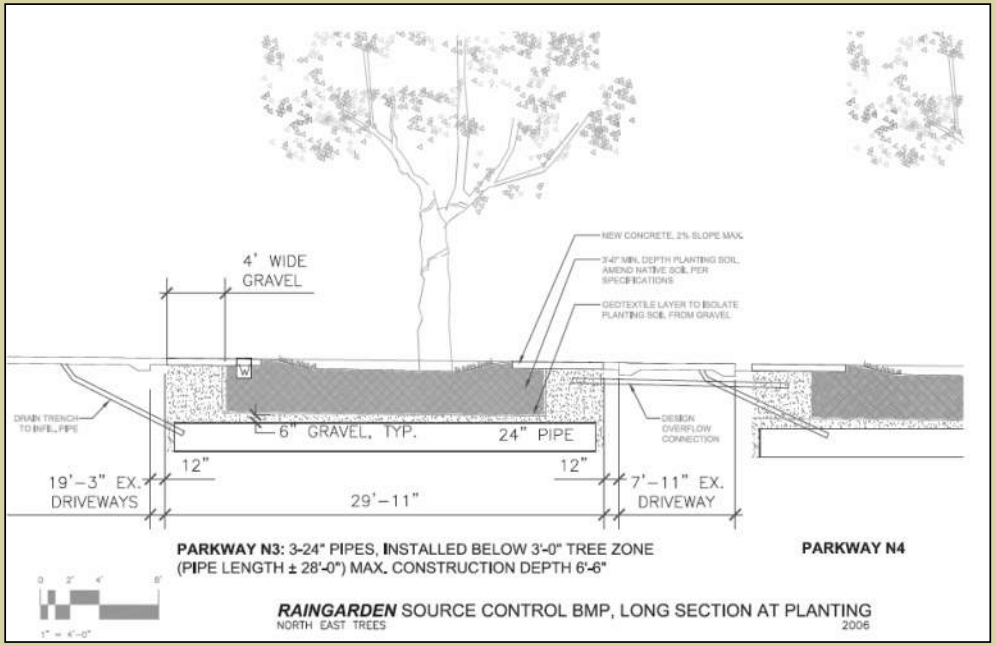
Typical Bioretention Design

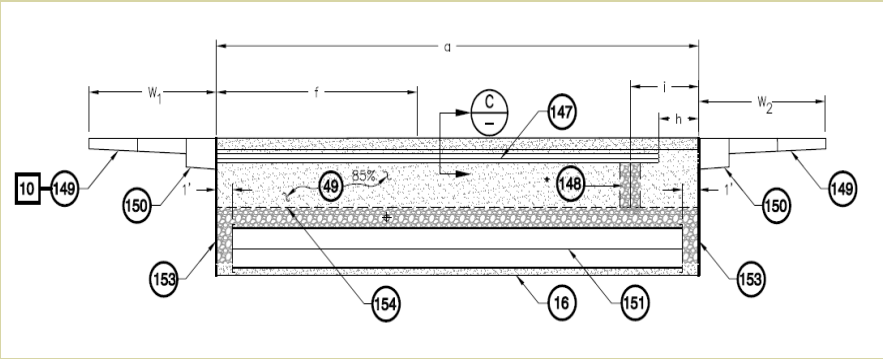


Conceptual Design of Stormwater Garden

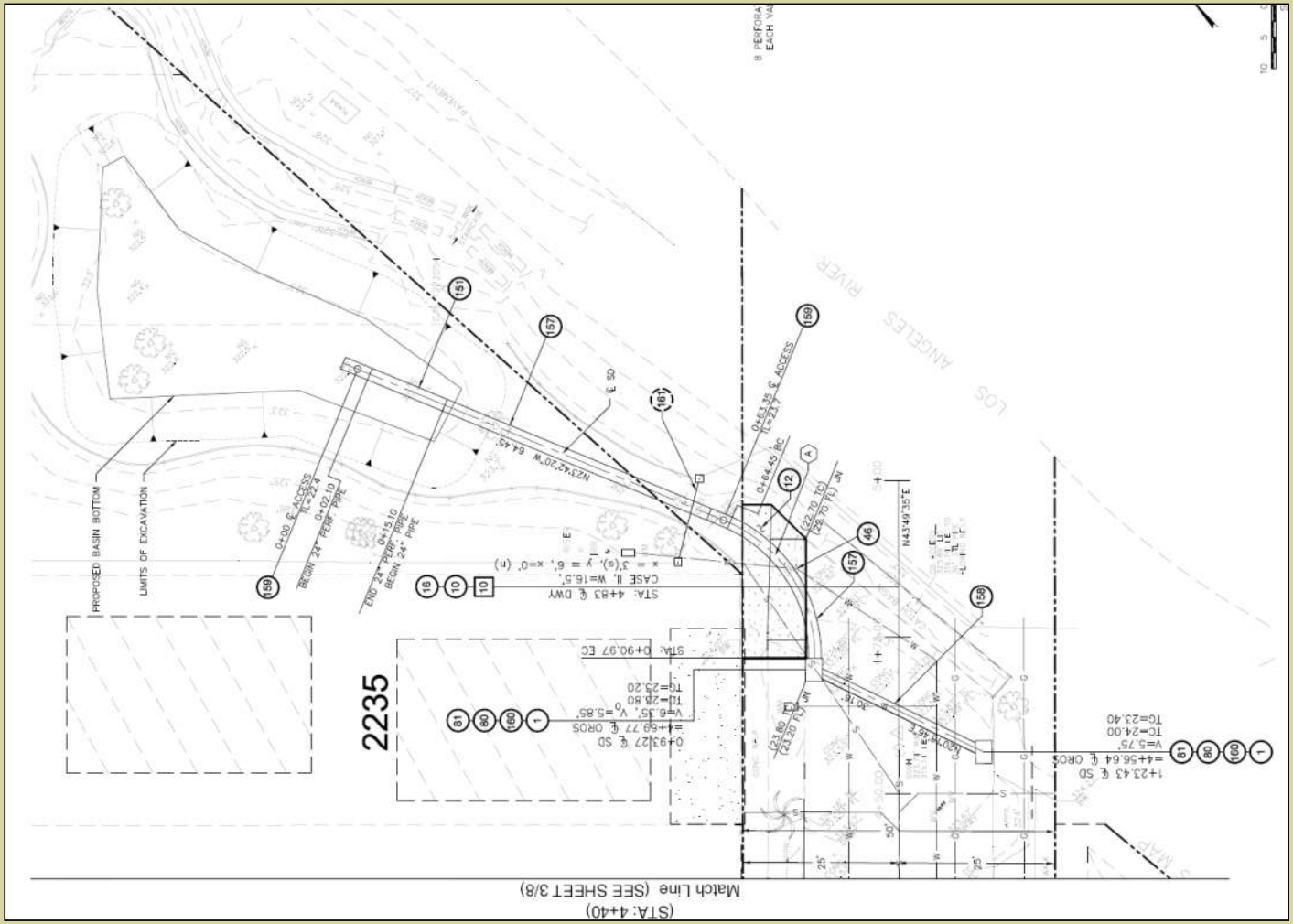


Conceptual and Engineering Design of Stormwater Garden





Engineering Design for Steelhead Park Infiltration Area



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http://www.greenway.net/orosgreenstreet.asp

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Green Way

Collaboration • Community • Commitment

Green Way Explained | Our Projects | How You Can Participate | Your Donation Helps! | Our Sponsors

What is a Green Street and How Does it Work?

Before the city was developed, most of the rain was absorbed by plants or soaked into the ground. Today, most of the ground surface is covered by buildings and roads. The rain washes over roofs and pavement, picking up dirt, oils, metals and other pollutants on its way to the ocean.

Green Streets are streets that have been transformed from "water conveyance channels" designed to route rainwater unfiltered swiftly into the Los Angeles River and other tributaries to streets where rainwater is intercepted and cleaned using "nature's services" provided by soil and vegetation.

To do this requires retrofitting driveways, sidewalks, parkways and streets with devices to intercept the water and direct it into places where it can percolate through gravel and soil and be taken up by plant roots into the plants themselves.

Both of these methods act as filters to remove debris, sediment, grease and oil, trace metals and bacteria from the water. These methodologies provide the added benefit of safely storing this stormwater naturally underground within the local sub-watershed, and transpiring it back into the atmosphere.

Project Timeline

- State Funding Secured by June 2005 – Prop. 13 and CWA 319h
- Research & Site Investigation begins June 2005
  - Site Selection
  - BMP Research
  - Site Investigation by GeoSyntec – primarily geotechnical
- Concept Design completed by September 2005
- City Stakeholders convened – collaborative model developed Sept. 2005-November 2005
  - City of LA Bureau of Street Services identified as lead agency collaborative partner
- Additional funding applied for by NET – Prop. O
- Blake-Oros Intersection Construction completed March 2006
- Full project construction documents completed by December 2006
- Additional funding – Prop. O secured by December 2006
- Full Project Construction completed June, 2007

All Stakeholders Matter

Lessons Learned

- Non-standard “Green Infrastructure” applications/projects require creative collaborative project partners process
- Community Outreach must be very “fine-grained” – literally door to door conversations – “afternoon teas”
- All stakeholders have to “win” and take ownership
- Thorough site analysis matters
- Political leadership and support imperative

Future Opportunities & Challenges

- Funding must be private-public partnership
- Continue to value engineer to reduce unit costs
- Two key questions govern rollout elsewhere:
  - Are parkways large enough to provide adequate treatment?
  - Are soils permeable enough to allow for infiltration?
- Need to do prototype projects within a representative cross-section of environments to develop comprehensive “tool kit” that will allow Green Street Standards to be development by Public Works
- Need to continue to establish performance metrics

Additional Milestones

- Bureau of Engineering completes L.A. River Revitalization Master Plan and incorporates “Green Streets” into Plan
- Board of Public Works creates Green Streets Committee
- Bureau of Sanitation continues support of Low Impact Development approach to meeting TMDL mandate
- Funding secured for additional Green Street development by North East Trees/ Green Way
- Private funding secured for Vista Green Street Project by North East Trees/Green Way – groundbreaking expected later in Fall 2008
- City secures state funding for Riverdale Green Street Project in Elysian Valley
- DWP develops own list of Green Streets Projects based on potential for groundwater recharge

Current Activities

- Using existing foundation funding to revise “Selection Criteria” across a greater variety of street “typologies”
- Developing appropriate design solutions for less permeable soils, and for dry weather runoff parkway irrigation use
- Additional “Green Street” opportunities have been identified for implementation over the next 12-24 months
- Continuing collaboration between North East Trees/Green Way and Bureau of Street Services to develop additional “Green Streets”

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