

*Los Altos*

# Street Shoulder Improvement Policy



**City Council Study Session  
September 25, 2018**

# Background

## Shoulder Area

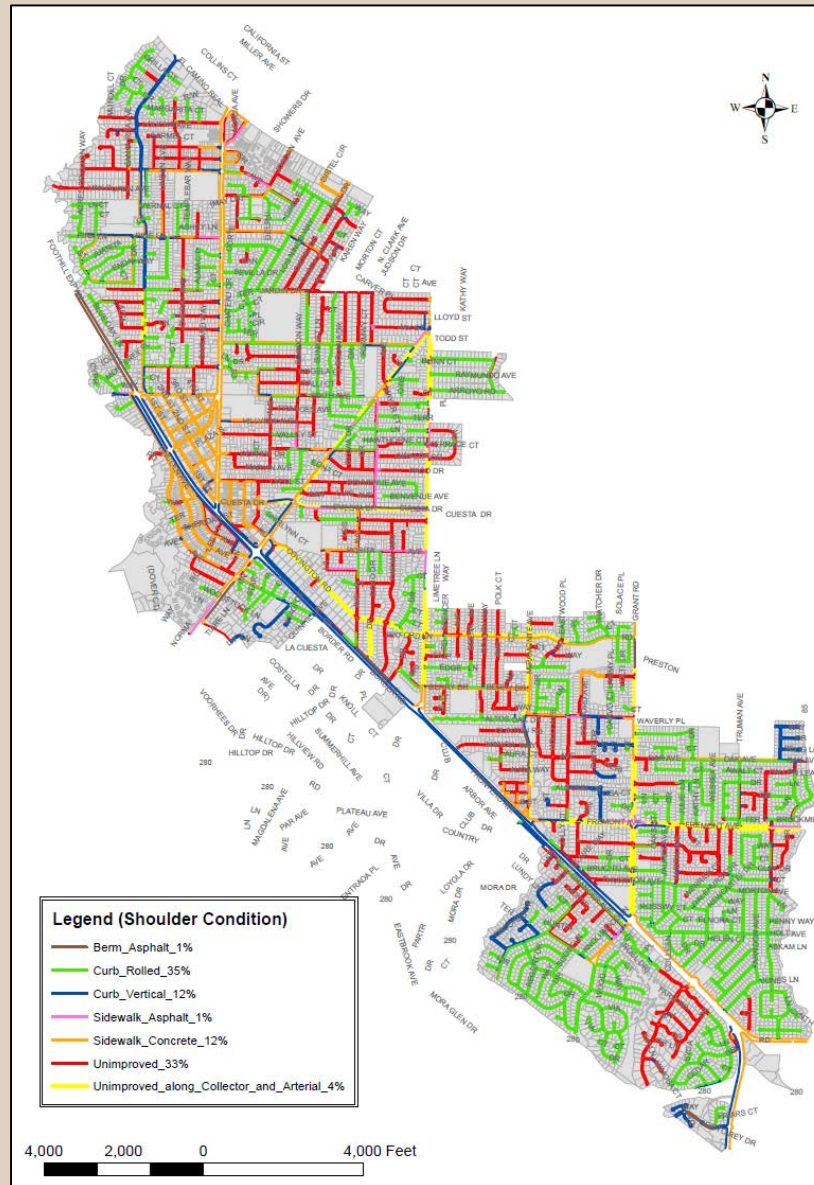
- Area between edge of pavement and property line
- Public Right –of-way

## Unimproved Shoulder

- No curb, gutter or berm to provide a separation between street and unpaved area
- Approximately 37% of total network (37 mile)



# Shoulder Condition Assessment



# Policy Development

- In 2000, Council directed staff to develop a policy for unimproved shoulders to address:
  - Negative appearance of large area of AC
  - Environmental issue of creating more impervious surfaces
- Policy development effort:
  - 8 council discussions over 20 month period
  - Consultant review
  - Council ad hoc subcommittee
- Policy was adopted in 2001
- Minor revisions between 2009 to 2011



# Current Policy

## Policy applies to:

- New constructions
- 50% or greater square footage remodeling
- Local streets only
- Streets with pavement width less than 36 feet

## Exemptions:

- Does not apply to repairs, resealing & repaving in kind of existing shoulder



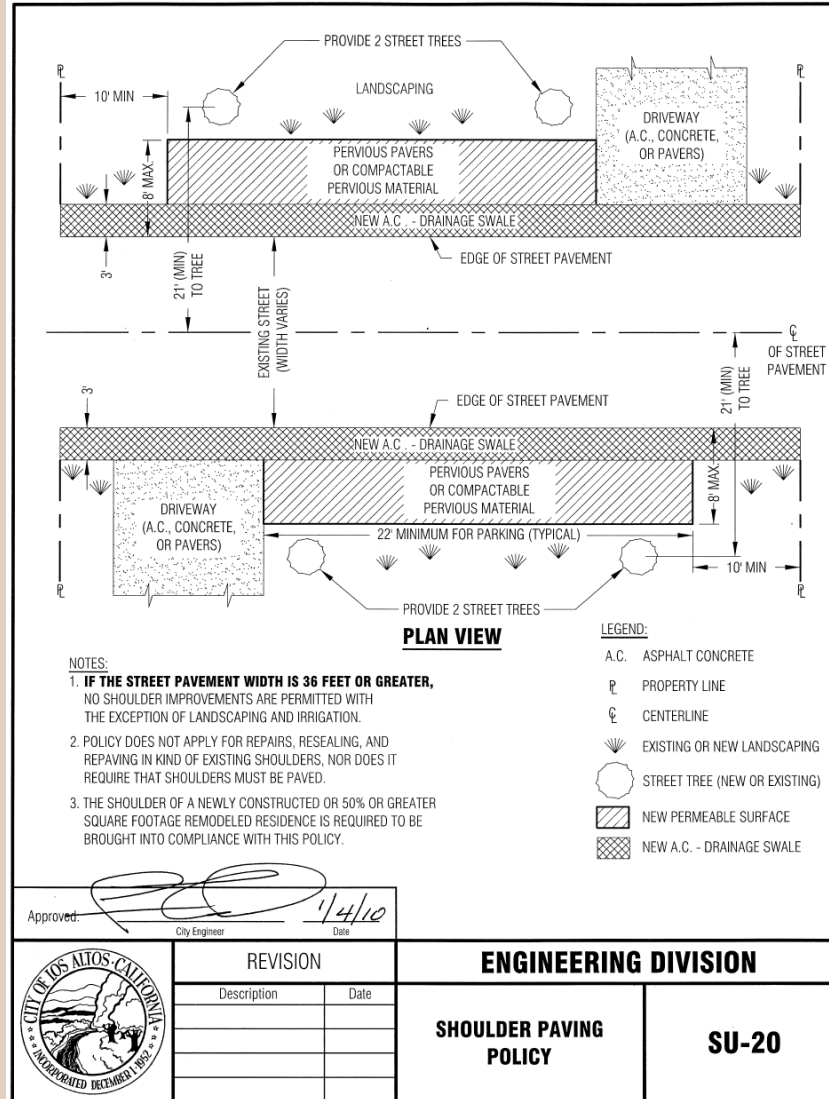
# Current Policy


## Major components


- 3-foot wide asphalt concrete drainage swale
- 5-foot wide shoulder parking area
- Landscaping and trees



# Current Policy Detail



Approved:  1/4/10  
 City Engineer Date

	REVISION		ENGINEERING DIVISION	
	Description	Date	SHOULDERS PAVING POLICY	
		SU-20		





# Shoulder Paving Policy Example Site



**465 San Luis Avenue**





# 2016 Update Effort

- In 2016, Council directed staff to revisit the policy due to concerns raised by residents and community group:
  - Asphalt swale is not consistent with preferred rural character of the city
  - Patchwork implementation leads to localized drainage issues
  - Shoulder improvements do not maximize storm water benefits



# Drainage Swale

## Current Policy:

- 3-foot wide asphalt concrete swale

## Consultant Initial Recommendation:

- Replace AC swale with concrete pavers

## Important Considerations:

- Cost is substantially higher than AC
- Installation requires excavation into subgrade
- Requires vertical barrier around the perimeter to protect roadway
- Maintenance varies depending on the type of permeable concrete paver used. May require specialized vacuum truck

## Environmental Commission Recommendation:

- Keep 3-foot wide asphalt concrete swale in the policy



# Parking Area

- ❖ **Current Policy:**
  - allows pervious pavers or compactable pervious material
- ❖ **Consultant Recommendation:**
  - Specifies which type of permeable materials are allowable
  - Porous AC or pervious concrete is not allowed
- ❖ **Important considerations:**
  - Cost consideration
  - Existing clay soils will limit infiltration capacity
  - Decomposed granite and gravel are included as allowable materials. Migration of loose materials can be a concern
- ❖ **Environmental Commission Recommendation**
  - Concur with consultant recommendation



# Parking Area

Alternative Pavement Materials for Parking Area	Considerations					
	Structurally Adequate for Parking	Impacts on Adjacent Road Condition	Cost	Maintenance Needs	Stormwater Capture	Aesthetic
<p><b>Permeable Concrete Pavers and Open Cell Concrete Blocks</b> Concrete paver blocks both solid and gridded systems (with open cells for aggregate, gravel, or grass) have been developed in a large variety of shapes, textures, patterns, and colors. The concrete pavers and open cell blocks are installed with gaps filled with sand and open cells that can vary in size, based on block type, that is filled in with aggregate, gravel, or grass, allowing water to enter the subgrade. Open cell concrete blocks can be installed over a bedding course. Further water reservoir capacity can be added by installing open graded base and then stone subbase (optional underdrain), with geotextile on bottom and sides. Typically an edge constraint is installed at the perimeter of the pavers or locations subject to lateral loading. Minimum subgrade excavation depth required is approximately 8-12 inches, but can be greater in depth if additional reservoir capacity is required. A vertical barrier can be installed along the edge of concrete pavers to help prevent water infiltration into the subgrade of adjacent road structure.</p>	Yes	<ul style="list-style-type: none"> <li>Impacts to adjacent pavement subgrade reduced if vertical treatment is installed (e.g., concrete wall and fabric)</li> </ul>	<ul style="list-style-type: none"> <li>High, requires specialty contractor</li> </ul>	<ul style="list-style-type: none"> <li>Moderate and infrequent, may require cleaning to maintain permeability</li> <li>Maintenance needs vary depending on gap size between pavers. Small gaps may require specialized vacuum equipment to sustain permeability</li> <li>Grass filled open cell concrete blocks may require mowing</li> </ul>	<ul style="list-style-type: none"> <li>Allows stormwater infiltration but degree of infiltration and stormwater capture can vary greatly depending on subgrade characteristics and thickness of aggregate reservoir materials</li> </ul>	<ul style="list-style-type: none"> <li>Different colors and patterns exist which can be specified further to meet desired aesthetic</li> <li>Gridded system can be installed with grass or gravel with gridded system</li> </ul>
<p><b>Compacted Aggregate Base (AB)</b> 1-1/2 inch or 3/4 inch Class 2 Aggregate Base (6 inches thick on compacted native soil)</p>	Yes with maintenance	<ul style="list-style-type: none"> <li>AB can be loosened by vehicles and from water erosion and will require sweeping off of roadside swale</li> <li>Impacts to adjacent pavement subgrade reduced if edge treatment is installed (e.g., geotextile fabric)</li> </ul>	<ul style="list-style-type: none"> <li>Low to Moderate</li> </ul>	<ul style="list-style-type: none"> <li>Simple but frequent sweeping of loose material off roadway and replacing lost AB where eroded</li> <li>May require maintenance and cleaning of downstream storm drain inlets</li> </ul>	<ul style="list-style-type: none"> <li>Allows stormwater infiltration but degree of infiltration and stormwater capture can vary greatly depending on subgrade characteristics</li> </ul>	<ul style="list-style-type: none"> <li>May be consistent with aesthetic, but washout of AB into AC swale and road is possible</li> </ul>
<p><b>Compacted Stabilized Decomposed Granite (DG)</b> Small sized granite aggregate mixed with a stabilizing agent and compacted and placed over existing permeable surfaces and 6 inches of aggregate base if subgrade is less suitable. Minimum subgrade excavation required is approximately 8-12 inches, but can be greater in depth if additional reservoir capacity is considered. DG layer shall be minimum 4 inches thick.</p>	Yes with maintenance	<ul style="list-style-type: none"> <li>DG can be loosened by vehicles and from water erosion and will require sweeping off of roadside swale</li> <li>Impacts to adjacent pavement subgrade reduced if edge treatment is installed (e.g., geotextile fabric)</li> </ul>	<ul style="list-style-type: none"> <li>Low to Moderate</li> </ul>	<ul style="list-style-type: none"> <li>Simple but frequent sweeping of loose material off roadway and replacing lost DG where eroded</li> <li>May require maintenance and cleaning of downstream storm drain inlets</li> </ul>	<ul style="list-style-type: none"> <li>Allows stormwater infiltration but degree of infiltration and stormwater capture can vary greatly depending on subgrade characteristics</li> </ul>	<ul style="list-style-type: none"> <li>May be consistent with aesthetic, but washout of DG into AC swale and road is possible</li> </ul>



# Compacted Aggregate Base (AB)





# Decomposed Granite (DG)



# Pervious Concrete Pavers



# Landscape Area

- Current Policy:
  - Specifies minimum of 10' existing or new landscaping in area adjacent to the shoulder parking area or driveway
- Consultant Initial Recommendation:
  - Encourage integration of GI feature, such as rain garden or bioswale





# Landscape Area

- Environmental Recommendations:
  - Separate landscape area and rain garden area
  - Require the installation of a rain garden
  - The size of the rain garden should be proportional to the frontage length of the lot



# Landscape Area

## Final Recommendation:

- Require installation of bioswale/rain garden to receive run-off from street and parking area
- Sizing requirements:
  - Frontage < 75': 50 sf minimum
  - 75' < Frontage < 100': 100 sf minimum
  - 100' < Frontage < 150': 200 sf minimum
  - Frontage > 150': 300 sf minimum
  - Replace a minimum of 2.5' of native soil with engineering soil



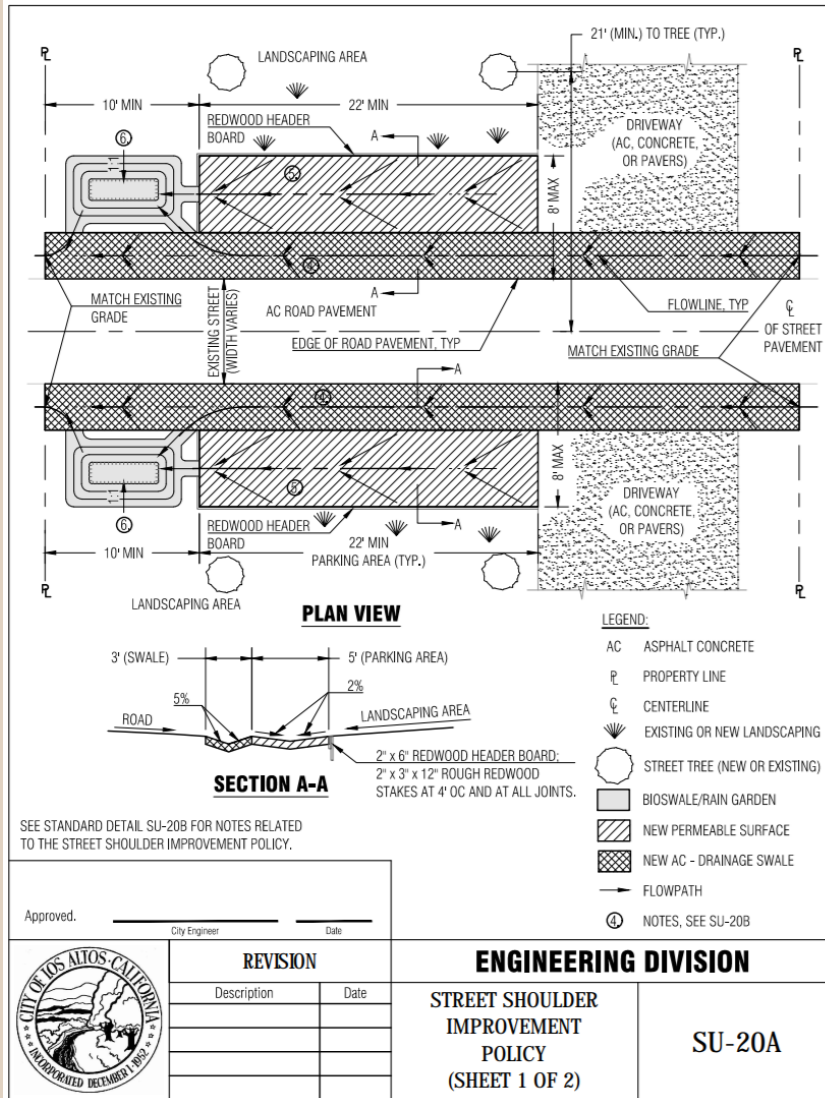


# 2016 BPAC Review

- BPAC reviewed the proposed recommendations at its October 26 meeting
- BPAC felt that overall the proposed changes provide stormwater benefits and do not adversely affect pedestrian and bicycle activities
- BPAC concerns related to the Policy:
  - No policies regarding acceptable landscaping for front yard and in the shoulder area
  - Oversight and enforcement of improvements in shoulder area
  - Patchwork implementation
  - School route impacts



# Street Shoulder Improvement Policy



**NOTES:**

- IF THE STREET PAVEMENT WIDTH IS 36 FEET OR GREATER, NO SHOULDER IMPROVEMENTS ARE PERMITTED WITH THE EXCEPTION OF LANDSCAPING AND IRRIGATION.
- POLICY DOES NOT APPLY FOR REPAIRS, RESEALING, AND REPAVING IN KIND OF EXISTING SHOULDERS, NOR DOES IT REQUIRE THAT SHOULDERS MUST BE PAVED.
- THE SHOULDER OF A NEWLY CONSTRUCTED OR 50% OR GREATER SQUARE FOOTAGE REMODELED RESIDENCE IS REQUIRED TO BE BROUGHT INTO COMPLIANCE WITH THIS POLICY.
- AC DRAINAGE SWALE:
  - 3' WIDE;
  - MAXIMUM CROSS SLOPE 5%;
  - AC THICKNESS SHALL MATCH THE THICKNESS OF ROAD PAVEMENT OR 4" WHICHEVER IS THICKER.
  - PLACE 6" COMPACTED AGGREGATE BASE UNDER AC; COMPACT TO 95% MAXIMUM DRY DENSITY.
- PARKING AREA SHALL FEATURE ONE OF THE FOLLOWING MATERIALS:
  - PERMEABLE CONCRETE PAVERS AND OPEN CELL CONCRETE BLOCKS: CONCRETE PAVER BLOCKS BOTH SOLID AND GRIDDED SYSTEMS (WITH OPEN CELLS FOR AGGREGATE, GRAVEL, OR GRASS) HAVE BEEN DEVELOPED IN A LARGE VARIETY OF SHAPES, TEXTURES, PATTERNS, AND COLORS. THE CONCRETE PAVERS AND OPEN CELL CONCRETE BLOCKS SHALL BE INSTALLED PER MANUFACTURE'S RECOMMENDATIONS. GAPS OF CONCRETE PAVERS, IF FEATURED BY THE TYPE OF PAVER, SHALL BE FILLED WITH SAND. OPEN CELL CONCRETE BLOCKS VARY IN SIZE BASED ON BLOCK TYPE AND SHALL BE FILLED IN WITH GRAVEL OR GRASS, ALLOWING WATER TO ENTER THE SUBGRADE. CONCRETE PAVERS AND OPEN CELL CONCRETE BLOCKS SHALL BE INSTALLED OVER A SAND BEDDING COURSE (MINIMUM 1" THICK OR PER PAVER MANUFACTURER'S RECOMMENDATION). FURTHER WATER RESERVOIR CAPACITY CAN BE ADDED BY INSTALLING OPEN GRADED BASE AND STONE SUBBASE WITH AN OPTIONAL UNDERDRAIN (TO BE ROUTED TO THE BIOSWALE/RAIN GARDEN), WITH GEOTEXTILE ON BOTTOM AND SIDES. TYPICALLY AN EDGE CONSTRAINT IS INSTALLED AT THE PERMETER OF THE PAVERS OR LOCATIONS SUBJECT TO LATERAL LOADING. SUBGRADE EXCAVATION DEPTH REQUIRED IS 8-12 INCHES, BUT CAN BE GREATER IN DEPTH IF ADDITIONAL RESERVOIR CAPACITY IS DESIRED.
  - COMPACTED AGGREGATE BASE (AB): 1-1/2 INCH OR 3/4 INCH CLASS 2 AGGREGATE BASE (6 INCHES THICK ON COMPACTED NATIVE SOIL)
  - COMPACTED STABILIZED DECOMPOSED GRANITE (DG): SMALL SIZED GRANITE AGGREGATE MIXED WITH A STABILIZING AGENT, COMPACTED AND PLACED OVER EXISTING PERMEABLE SURFACES AND 6 INCHES OF AGGREGATE BASE IF SUBGRADE IS LESS SUITABLE. SUBGRADE EXCAVATION REQUIRED IS 8-12 INCHES, BUT CAN BE GREATER IN DEPTH IF ADDITIONAL RESERVOIR CAPACITY IS CONSIDERED. DG LAYER SHALL BE MINIMUM 4 INCHES THICK. GRADE TO DRAIN.
- BIOSWALE/RAIN GARDEN IN LANDSCAPE AREA DESIGNED TO RECEIVE RUNOFF FROM AC SWALE/PARKING AREA. DESIGN AND SHAPE OF BIOSWALE/RAIN GARDEN BY ARCHITECT OR ENGINEER. MINIMUM DEPTH SHALL BE 2.5'. REFER TO THE C.3 STORMWATER HANDBOOK FOR DESIGN PARAMETERS AND SPECIFICATIONS OF SOILS OR PLANTS. AREA SHALL BE DEPENDING ON LENGTH OF FRONTAGE (DISTANCE MEASURED PARALLEL TO EDGE OF ROAD BETWEEN PROPERTY LINES) AS FOLLOWS:
  - FRONTAGE < 75': 50 SF MINIMUM
  - 75' < FRONTAGE < 100': 100 SF MINIMUM
  - 100' < FRONTAGE < 150': 200 SF MINIMUM
  - FRONTAGE > 150': 300 SF MINIMUM
- LOTS LOCATED ALONG SUGGESTED ROUTES TO SCHOOL MAY REQUIRE MODIFICATION TO THIS STANDARD DETAIL AS APPROVED BY THE CITY ENGINEER.
- DRAINAGE SWALE MAY BE CONSTRUCTED USING PERMEABLE CONCRETE PAVERS PER DETAIL SU-24.

Approved: \_\_\_\_\_

City Engineer \_\_\_\_\_ Date \_\_\_\_\_

REVISION		ENGINEERING DIVISION	
Description	Date	STREET SHOULDER IMPROVEMENT POLICY (SHEET 2 OF 2)	
		SU-20B	



# Current Update Effort

- Updated Policy Detail per 2016 recommendations
- Environmental Commission May 14, 2018 Review
  - Made minor comments
  - Renamed policy to Street Shoulder Improvement Policy
  - Requested to return with revised version
- Environmental Commission June 11, Review
  - 4 members presented
  - No consensus reached
  - Comments ranged from supporting the 2016 recommendations; reducing the width of the swale; allowing greater use of permeable surfaces; to eliminate the AC swale completely



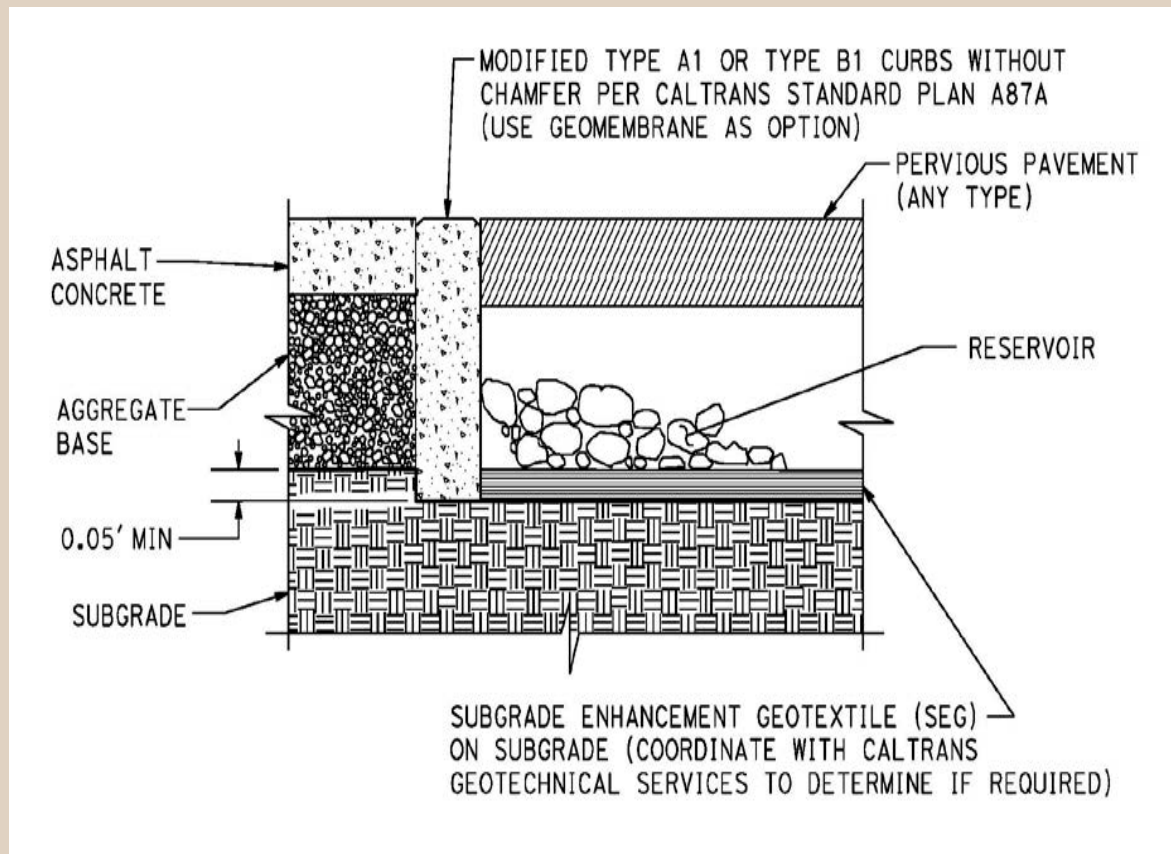
# Community Input

- Council and staff continue to receive comments from the community on the proposed changes:
  - Primarily focus on the 3-foot AC swale
  - AC swale does not capture and treat storm water
  - AC swale is not consistent with the rural character of the city



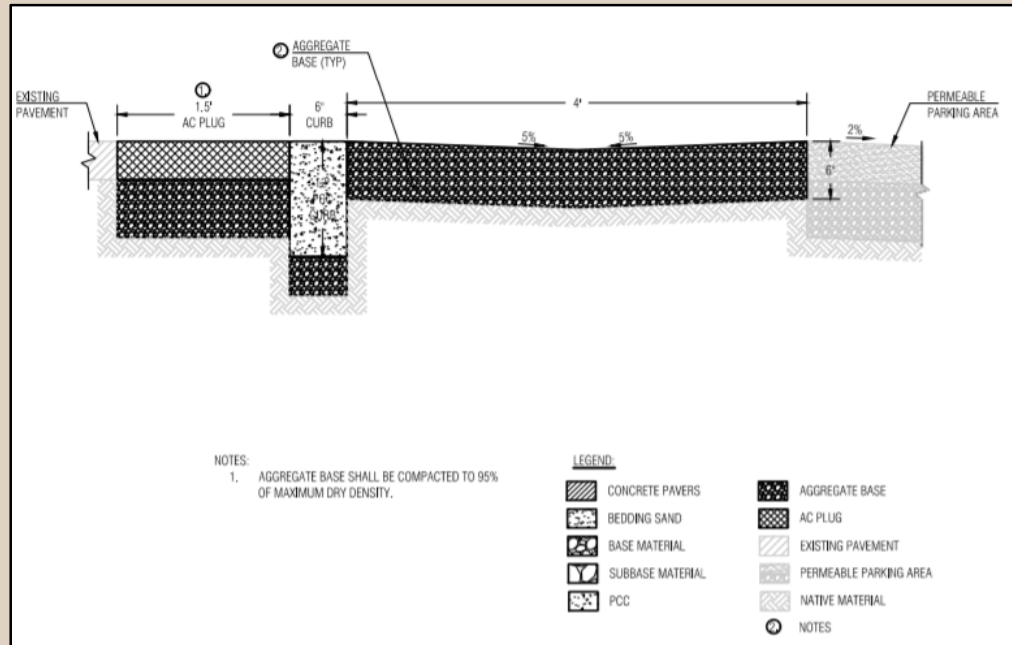
# Concrete Barrier

- Cross section showing vertical barrier between pervious pavement and existing road (Caltrans Pervious Pavement Design Guidance, 2014)

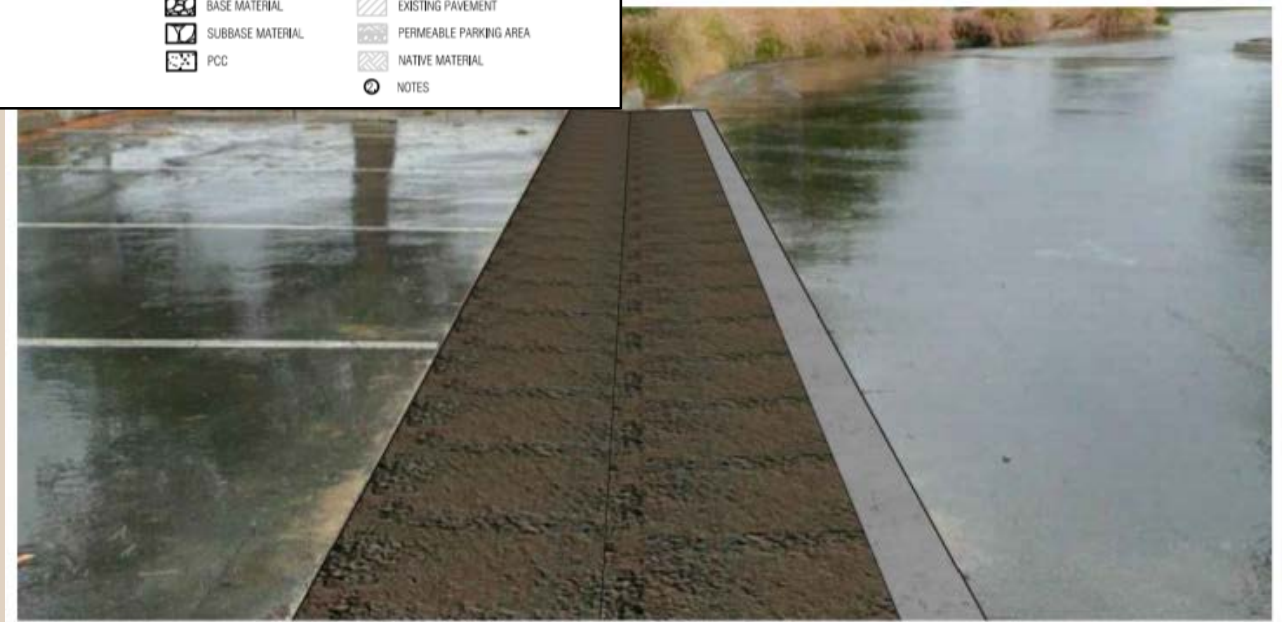




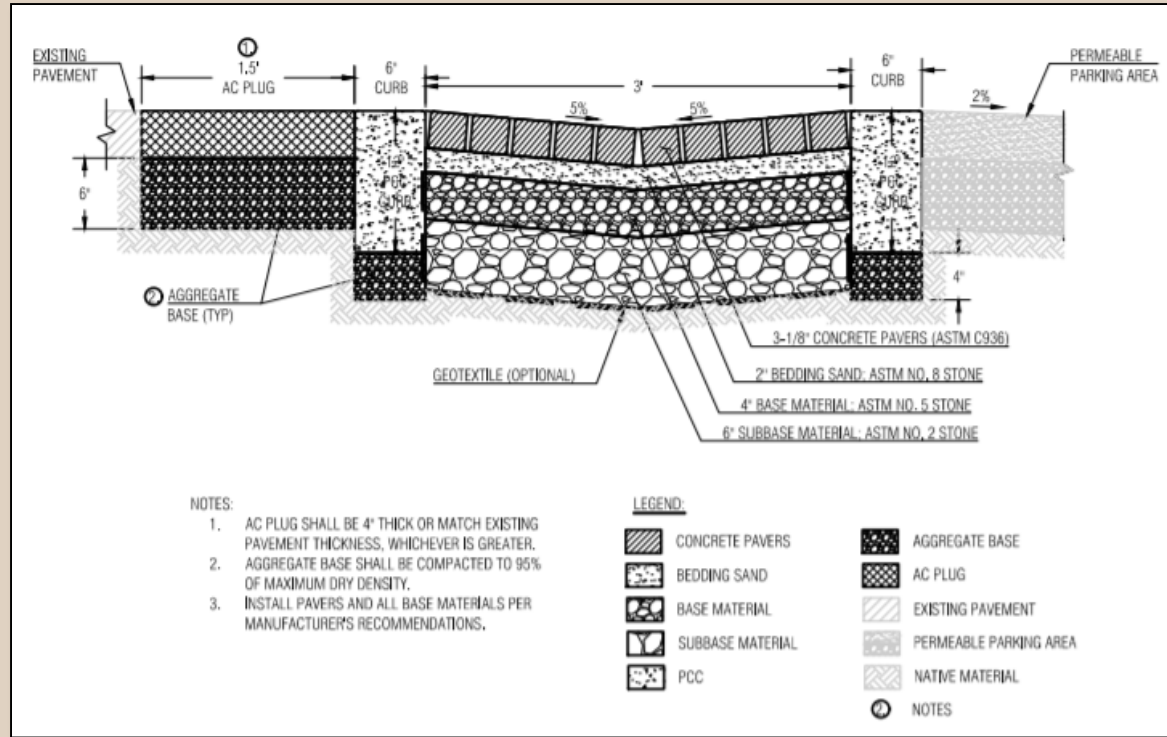
# Compacted Aggregate Base




Compacted Aggregate Base in Roadside Swale



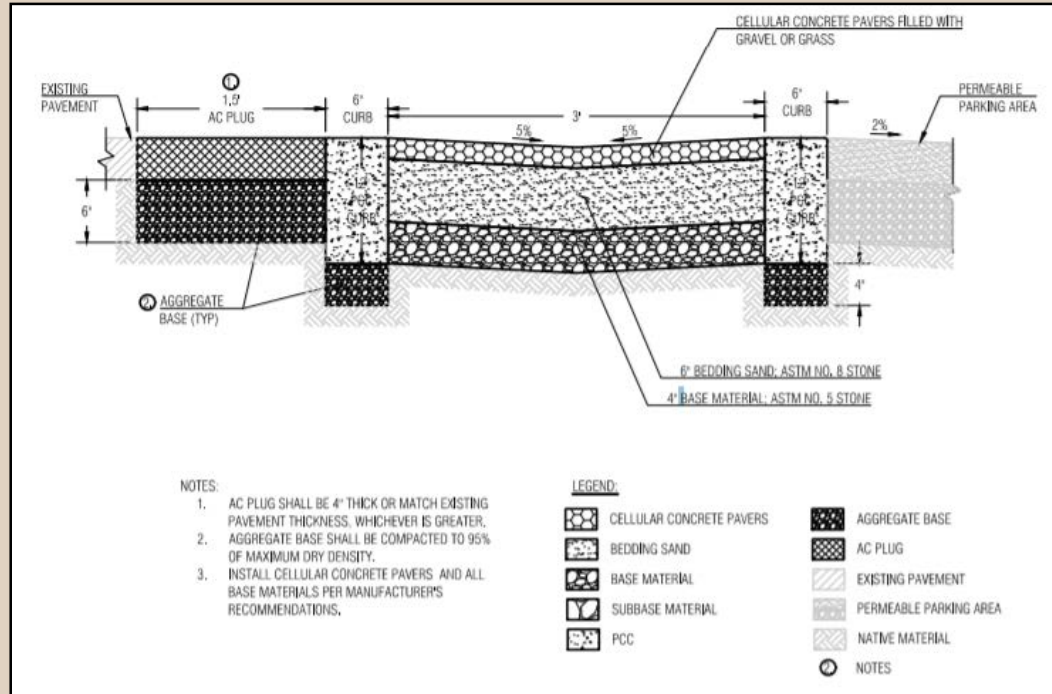
# Permeable Concrete Pavers




 Permeable Concrete Pavers in Roadside Drainage Swale



# Cellular Concrete Blocks

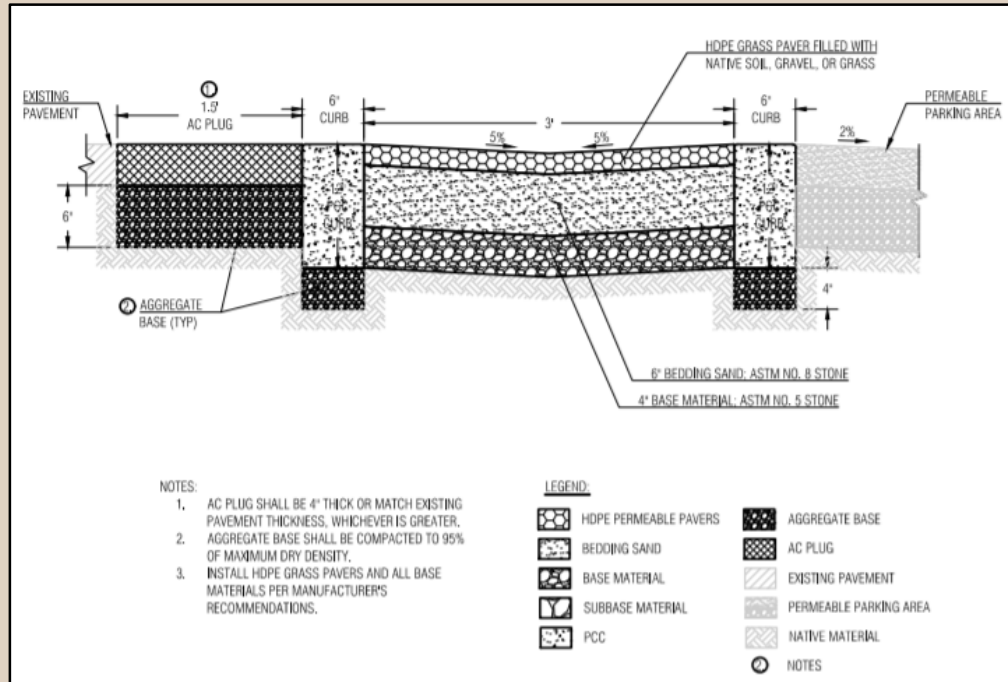


Cellular Concrete Blocks in Roadside Drainage Swale





# HDPE Pavers



## HDPE Paver in Roadside Swale



# Installation Cost and Maintenance

## Installation Cost

- AC: \$20 -\$25/linear foot
- Concrete barrier: \$45 to \$55/ linear foot
- Compacted Aggregate Base: \$90 – 110/linear foot
- Permeable concrete paver: \$170 to \$190/linear foot
- Cellular concrete block: \$180-\$200/linear foot
- HDPE cell paver: \$180-\$200/linear foot

## Maintenance

- City will make temporary repairs to paved shoulders that present an immediate safety hazard to public
- Property owner is responsible for permanent repairs





# Other Considerations

- Maintaining shoulder as unimproved
- Applying AC swale on streets with very narrow pavement width only
- Keeping the 3-foot AC swale requirement in the Policy



# CSC Input

- ❖ CSC reviewed various options on August 22, 2018
- ❖ Overall CSC were concerned about:
  - potential safety hazards
  - Installation cost
  - Potential liability
  - Intensified patchwork implementation
- ❖ Majority of CSC favored keeping AC swale
- ❖ Other comments:
  - Not all streets are equal
  - SRTS should be treated differently
  - Consider separating policy into two



# Next Steps

- Receive Council direction
- Update Policy Detail per Council directions
- Obtain Council approval of final Policy Detail

