DATE: September 12, 2016

AGENDA ITEM # 4

TO: Environmental Commission

FROM: J. Logan, Staff Liaison

SUBJECT: Receive staff report on revisions to the shoulder paving policy

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BACKGROUND

Stormwater management is under review by the Public Works Department and is a goal on the 2016/17 Environmental Commission Work Plan. At the April 19, 2016 Joint meeting with Council, it was determined that the Environmental Commission could provide support and resources on this topic and should collaborate with staff specifically on the incorporation of green infrastructure principles with respect to the City's shoulder paving policy and its effect on stormwater management.

At its April 26, 2016 Council meeting, Council adopted the Stormwater Master Plan and encouraged involvement of staff and the Environmental Commission to seek policy determinations for use of green infrastructure principles in the shoulder paving policy.

DISCUSSION

On May 9, 2016, Public Works Director Susanna Chan presented a report and engaged in discussion with Commissioners to determine collaborative efforts whereby the Commission can provide timely support and resources specifically aimed at the shoulder paving policy. A subcommittee composed of Vice Chair Weiden, Commissioners Bray and Halkola was appointed at the May 9, 2016, meeting and meet with Public Works Director Chan on the matter. A report from the subcommittee was presented at the June 13, 2016 Commission meeting. The shoulder paving subcommittee met with staff and engineering consultants and at its July 11, 2016 meeting provided a report on the process for shoulder paving policy revisions to the Commission.

The consultant's draft Shoulder Paving Policy report was received, reviewed and comments made by the subcommittee. A report by staff and the draft Shoulder Paving Policy report will be presented at the September 12, 2016 meeting along with the subcommittee's comments and discussion of the draft policy.

Attachment**:**

A. Draft Shoulder Paving Policy

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DRAFT MEMORANDUM

Date:	September 8th, 2016
To:	Susanna Chan, PE
From:	Franz Haidinger, PE; Marcy Kamerath, CPSWQ, QSD/QSP
Subject:	Los Altos Shoulder Paving Policy (Standard Detail SU-20, May 2010)

Background

The City of Los Altos has contracted with NCE to review and make recommendations for revising the City's current Shoulder Paving Policy (Policy) (Standard Detail SU-20, May 2010) (**Appendix A**) to address more recent concerns related to aesthetics, stormwater, and prescribed materials. In 2001 the City adopted the Policy with the primary goal to narrow streets, define the street edge, and provide traffic calming[1]. The Policy specifies shoulder treatments for residential properties which must be installed for construction of a new residence or when 50% or more of the square footage of an existing residence is being remodeled.

The Policy has two main components, a 3-foot wide asphalt concrete (AC) drainage swale, and a 5-foot wide shoulder parking area with pervious pavers or compactable pervious material (at least 5 feet wide x 22 feet long). In addition the Policy illustrates the addition of street trees, and location of existing or newly landscaped areas. The Policy does not apply if a homeowner is conducting repairs, resealing, and repaving in kind of existing shoulders. In addition, no shoulder improvements, other than landscaping and irrigation, are permitted on streets with a pavement width of 36 ft. or greater.

Review of Existing Information

To develop and recommend revisions to the Policy, which are outlined in this memorandum, NCE reviewed City Council reports and public concerns with the Policy; consulted with the City and Environmental Subcommittee; conducted a site visit; reviewed relevant stormwater manuals and design considerations; and qualitatively assessed alternative materials for use in the swale and parking areas.

[1] October 1, 2015 Agenda Item to Planning and Transportation Commission

The City Council has considered the Policy on several occasions[2] and from 2009 to 2011 made the following revisions to address public concerns regarding the Policy:

- Specified compactable materials in shoulder parking areas to address the concern that loose materials, such as bark or mulch can be transported onto public streets which can be unsafe for bicyclists or pedestrians, or could be transported into the storm drain system[3]
- Upheld the specification for an AC swale to promote positive drainage to address concerns related to ponding along the street edge or adjacent properties[3]
- Required a minimum 8-foot wide shoulder parking area regardless of street travel lane widths in order to maintain shoulder parking on narrow streets (i.e., street pavement width less is than 36 feet)[4]
- Did not permit shoulder improvements, other than landscaping and irrigation, on the widest streets in Los Altos (i.e., streets with travel lanes of 36 feet or greater) to address concerns about the visual widening of streets[4]

More recently, residents and community groups have expressed the following concerns with the Policy:

- Asphalt materials in the drainage swale and/or shoulder parking area are not consistent with the City's preferred rural aesthetic
- Shoulder improvements do not capitalize on opportunities to achieve stormwater benefits
- Limited information and specificity on what compactable materials can be used in the shoulder parking area may result in use of materials that are not consistent with a rural aesthetic or create drainage related issues

Consultation with City, Subcommittee, and Site Visit

Following review of the Policy and associated public concerns, NCE met with the City and Environmental Subcommittee on July 8th, 2016 to discuss the goals of the Policy, review public concerns, and identify opportunities to clarify and improve the Policy. To find examples of existing shoulder paving practices, NCE searched for similar requirements from neighboring municipalities but found that no shoulder paving policies or standard specifications existed for shoulder improvements in residential areas within the neighboring communities of the City of Los Altos Hills, Palo Alto, or Atherton. Based on the review of concerns and consultation with the City and

[2] November 13, 2001, January 27, 2009, February 24, 2009, March 10, 2009, March 24, 2009, December 8, 2009, March 22, 2015, and October 25, 2015
[3] March 22, 2011 City Council Agenda Report
[4] March 24, 2009 City Council Agenda Report

Subcommittee, it was determined that a preferable revised Policy would uphold Policy requirements which address prior concerns, but also include new revisions which would result in a Policy that 1) specifies materials which are more consistent with the City's rural aesthetic and 2) can capitalize on opportunities to capture or infiltrate some stormwater runoff, where feasible[5].

On July 27th, 2016, NCE conducted a site visit to locations selected by the City, in consultation with the Environmental Subcommittee. This included 10 residences where the Policy had been implemented[6] in various ways and 2 locations where green infrastructure (GI) practices had been implemented to address post construction runoff[7]. Green infrastructure consists of rain gardens, bioswales, infiltration trenches, and other site design features which are sized to capture, store, and/or infiltrate a portion of stormwater runoff on-site, rather than conveying stormwater flows through conventional pipe and drainage swales to a central water collection system. Observations from the site visit helped to characterize concerns, identify site constraints, and identify opportunities to improve the Policy.

One prominent concern observed during the site visit is that misinterpretation of the Policy appears to result in AC being used in the shoulder parking area which creates a visual widening of the street (**Figure 1**). In some cases this increased the previous pavement width by up to 30%. Clarifying the Policy to specify which materials are suitable for use in the drainage area and shoulder parking area could improve implementation of the Policy and help address concerns related to aesthetics. In addition, the City recently improved its plan inspection and review procedures for implementation of the shoulder paving Policy which should help to minimize misinterpretation of the Policy.

A second concern is erosion occurring along shoulders where a swale is absent or not installed in a way to promote positive drainage. Clarifying the Policy to specify slopes for the drainage swale and parking area could improve drainage issues where the Policy is being implemented.

A third concern validated during the site visit was the presence of loose materials were observed in the roadway and in downstream storm drain facilities where decomposed gravel or granite was adjacent to the pavement edge.

One opportunity identified in the field is the option to include GI features, such as a rain garden or bioswale, into landscaped areas. Based on site observations,

[5] Quantification of runoff reduction or runoff quality is not addressed under the current scope of work
[6] 176 and 196 Angela Drive; 284 Frances Drive; 33 Yerba Buena Avenue; 225, 229, and 237 Del Monte Avenue; 610, 789, 932 Parma Way; Parma Way and Harrington Avenue
[7] Packard Foundation, on 2nd Street between Whitney and Lyell Streets; and Homestead and Grant Road to the City Limit

connecting GI features with an underdrain to existing storm drain infrastructure will not be viable at most properties. Therefore GI features, if installed at locations without nearby storm drain infrastructure, should be designed to allow stormwater flows into and out of the GI feature. Overflows would be routed back to the drainage swale. An example of a flow-through GI feature was observed on 2nd Street (**Figure 2**). While curb and gutter would not be present when applying a rain garden as part of the Policy, this provides an example of an inflow and outflow which allows stormwater flows to be routed through the GI feature so a portion of flows can be captured, infiltrated, and excess flows are routed back to a conveyance feature (i.e., curb and gutter, or drainage swale).

Figure 1 - Asphalt used in shoulder parking and drainage swale area (NCE)

Other observations from the site visit worth noting include:

- Shoulder conditions which border properties that are subject to implementation of the Policy widely vary (e.g., asphalt, gravel, bare dirt)

- Stormwater conveyed from hardscape surfaces may collect and cause ponding, or erosion of unimproved shoulder areas
- Due to the patchwork implementation of the Policy and various shoulder conditions that will occur, some localized drainage issues will persist despite clarifications made to the Policy
- Potentially shallow underground utilities exist at several properties
- Due to presence of overhead powerlines at some properties, it may be preferable for the Policy to specify that street trees are optional

Figure 2- Example Rain Garden on 2nd Street, Los Altos (NCE)

Recommended Revisions to the Policy

Based on known public concerns with the Policy, site visit observations, consultation with the City and Subcommittee, and NCE's qualitative assessment of alternative pavements, NCE developed recommended revisions which are illustrated in Figure 3 and discussed in detail below.

1. *Specify Pervious Pavement Materials for use in AC Swale*

Description: The current Policy specifies installation of a 3-ft. wide asphalt concrete (AC) drainage swale along the length of the property. To address recent concerns that the AC swale is not consistent with a rural aesthetic or does not provide a stormwater quality benefit, a proposed revision is to specify pervious concrete pavers for use in the drainage swale.

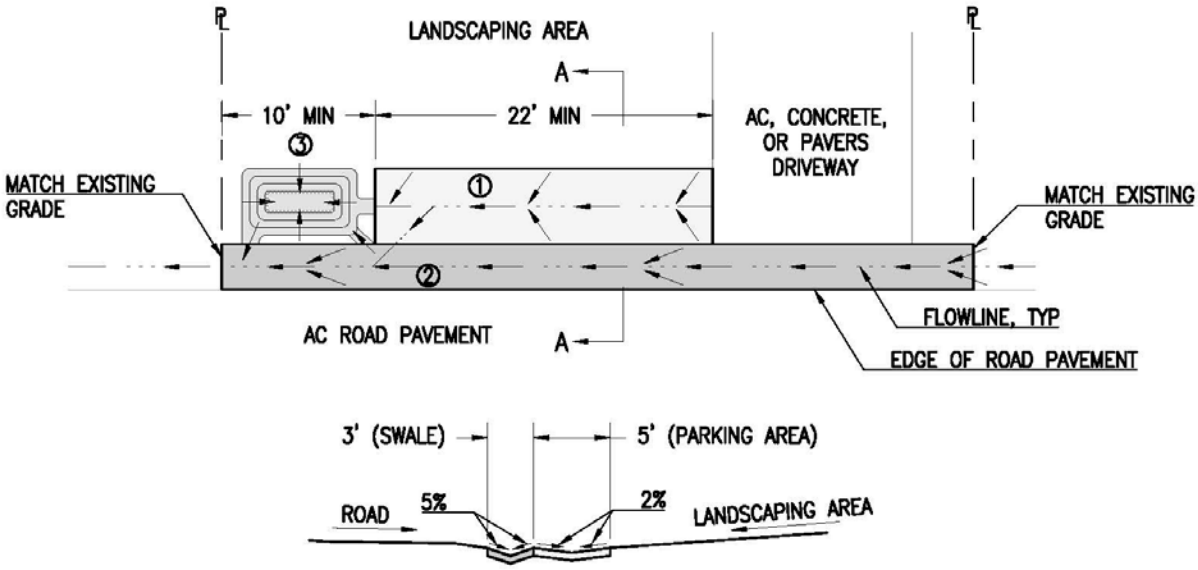
Rationale: **Table 1** summarizes other alternative permeable materials for use in lieu of AC in the drainage swale (AC is included in the table for comparison). Based on a qualitative review, pervious concrete pavers are proposed for use in the drainage swale. While several alternative materials could be used, pervious concrete pavers are suggested because they are more consistent with a rural aesthetic compared to porous AC or pervious concrete. Pervious concrete pavers provide an opportunity to infiltrate stormwater, and can be installed forming a swale to allow positive drainage of excess runoff through a swale (**Figure 4**). In addition, pervious concrete pavers are available in multiple color, texture, and patterns which the City can further specify to meet a desired aesthetic (**Figures 4, 5, and 6**).

Important Considerations:

- Costs can be substantially higher than conventional pavement
- Installation will require excavation into the subgrade to create storage for stormwater runoff and to match existing grades at the property line
- A vertical barrier must be installed around the perimeter of the permeable pavers to protect the roadway to confine the pavers (**Figure 7**)
- Where utility conflicts exist or other factors occur which prohibit use of pervious concrete pavers, an alternative could be stabilized decomposed granite which would limit the amount of material that migrates into the road and storm drain system
- Maintenance requirements can vary depending on the type of permeable concrete paver used. Material with smaller pore sizes may require specialized vacuum truck

Alternative Pavement Materials	Considerations					
	Structurally Adequate for Parking	Impacts on Adjacent Road Condition	Cost	Maintenance Needs	Stormwater Capture	Aesthetic
Permeable Concrete Pavers: Concrete paver blocks both solid and gridded systems (with open cells for aggregate) have been developed in a large variety of shapes, textures, patterns, and colors. The concrete pavers are installed with gaps that can vary is size based paver type that is filled in with aggregate allowing water to enter the surface. Typically an edge constraint is installed at the perimeter of the pavers or locations subject to lateral loading. A water barrier can be installed along edge of concrete pavers to help prevent water infiltration into subgrade of adjacent street infrastructure. Blocks installed over a bedding course and for further water reservoir capacity open graded base and then stone subbase (optional underdrain), with geotextile on bottom and sides. Minimum subgrade excavation depth required is approximately 8-12 inches, but can be greater in depth if additional reservoir capacity is required.	Yes	• Impacts to adjacent pavement subgrade reduced if edge treatment is installed (e.g., concrete wall and fabric)	• High, requires specialty contractor	• Moderate and infrequent, may require cleaning to maintain permeability • Maintenance needs vary depending on pore size between pavers. Small pores may require specialized vacuum equipment	Allows stormwater infiltration but degree of infiltration and stormwater capture can vary greatly depending on subgrade characteristics and thickness of aggregate reservoir materials	• May be consistent with aesthetic • Different colors and patterns exist • Gridded system can be installed with grass or gravel with gridded system
Porous Asphalt Porous asphalt allows water to flow through the paved surfaced and is achieved with open graded asphalt concrete fraction course. The porous asphalt pavement is typically constructed over a bedding course and stone subbase with geotextile on bottom and sides. A water barrier can be installed along edge of the porous asphalt pavement to help prevent water infiltration into subgrade of adjacent street infrastructure. Minimum subgrade excavation depth is approximately 8-12 inches, but can be greater in depth if additional reservoir capacity is required.	Yes	• Impacts to adjacent pavement subgrade reduced if edge treatment is installed (e.g., concrete wall and fabric)	• Moderate to Expensive material and expensive to install, requires specialty contractor	• Costly, requires special equipment to vacuum pavement pores to maintain permeability	Allows stormwater infiltration but degree of infiltration and stormwater capture can very greatly depending on subgrade characteristics and thickness of aggregate reservoir materials	• Inconsistent with desired aesthetic, looks similar to conventional pavement
Pervious Concrete Pervious concrete over a porous stone subbase of varying thickness. A water barrier can be installed along edge of the pervious concrete to help prevent water infiltration into subgrade of adjacent street infrastructure. Geotextile installed along between bottom of stone subbase and soil subgrade. Minimum subgrade excavation depth is approximately 8-12 inches, but can be greater in depth if additional reservoir capacity is required.	Yes	• Impacts to adjacent pavement subgrade reduced if edge treatment is installed (e.g., concrete wall and fabric)	• Expensive material and expensive to install, requires specialty contractor	• Costly, requires special equipment to vacuum pavement pores to maintain permeability.	Allows stormwater infiltration but degree of infiltration and stormwater capture can very greatly depending on subgrade characteristics and thickness of aggregate reservoir materials.	• Inconsistent with desired aesthetic, looks similar to conventional pavement

Alternative Pavement Materials	Considerations					
	Structurally Adequate for Parking	Impacts on Adjacent Road Condition	Cost	Maintenance Needs	Stormwater Capture	Aesthetic
Stabilized Decomposed Granite (DG) Small sized granite aggregate mixed with a stabilizing agent and compacted and placed over existing permeable surfaces and 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 required.	Yes with maintenance	• DG can be loosened with parking and from water erosion and will require sweeping off of roadway. • Impacts to adjacent pavement subgrade reduced if edge treatment is installed (e.g., concrete wall and fabric)	• Low to Moderate	• Simple but frequent sweeping of loose material off roadway and replacing lost DG where eroded.	Allows stormwater infiltration but degree of infiltration and stormwater capture can very greatly depending on subgrade characteristics and thickness of aggregate reservoir materials.	• May be consistent with aesthetic, but washout of DG onto roadway may be an aesthetic deterrent
Asphalt Concrete This is conventional hot mix asphalt (HMA) that is widely used in paving roadways and is not permeable.	Yes	• Minimal	• Low to Moderate	• Simple and infrequent, similar to standard roadway maintenance	• None	• Known to be inconsistent with desired aesthetic



SECTION A–A

NOTES:

① PARKING AREA: PERVIOUS CONCRETE PAVERS, DECOMPOSED GRANITE, GRAVEL (CRUSHED STONE 1" MAX), GRASS BLOCKS, GRAVEL BLOCKS.
② DRAINAGE SWALE: PERVIOUS CONCRETE PAVERS, COLOR AS DETERMINED BY CITY.
③ OPTIONAL: BIOSWALE/RAIN GARDEN IN LANDSCAPE AREA IF FEASIBLE TO RECEIVE RUN–OFF FROM SWALE/PARKING AREA. DESIGN BY ARCHITECT OR ENGINEER.

Figure 3 - Recommended revisions to the Policy

Figure 4- Permeable concrete pavers articulated to form drainage swale (NCE)

Figure 5 - Permeable concrete pavers with lateral edge confinement adjacent to road (NCE)

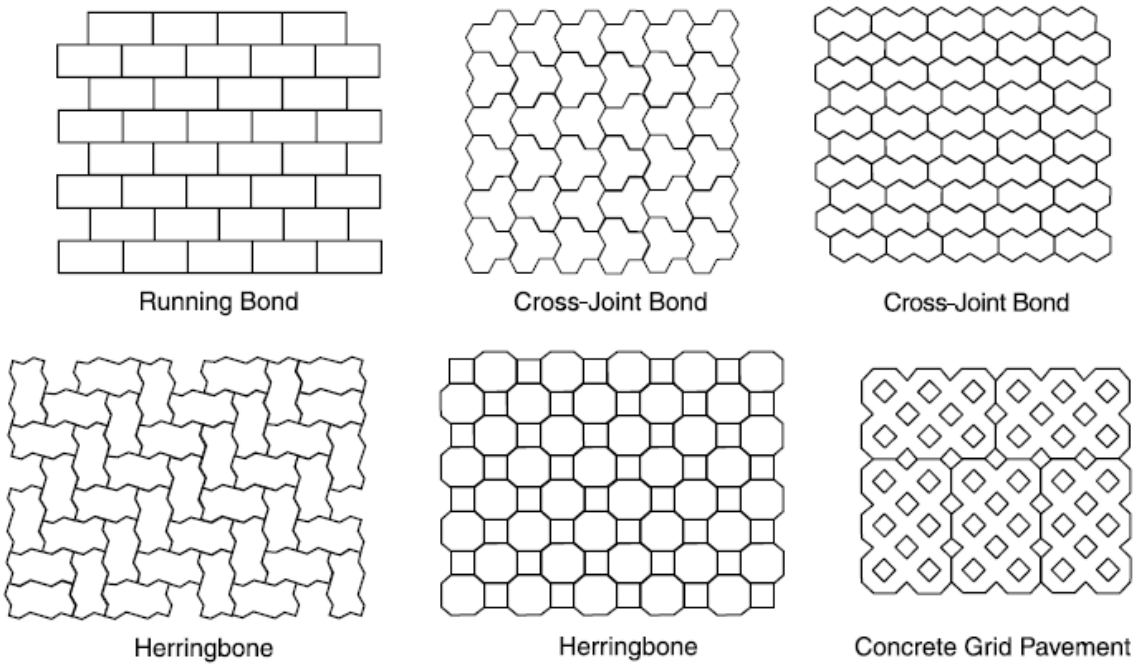


Figure 6 - Various patterns for installation of permeable concrete pavers (Interlocking Concrete Pavement Institute, 2004)

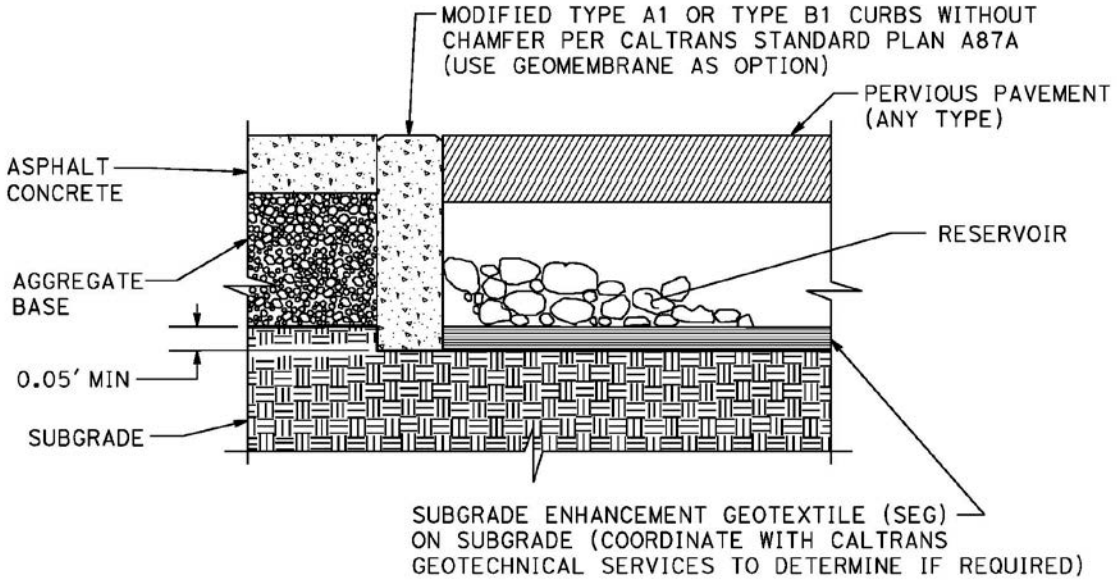


Figure 7 - Cross section showing vertical barrier between pervious pavement and existing road (Caltrans Pervious Pavement Design Guidance, 2014)

2. *Specify permeable materials for use in parking area*

Description: The current Policy specifies pervious pavers or compactable pervious material for the shoulder parking area. The recommendation is to detail which type of permeable materials are allowable and specify these types. Use of AC or pervious AC is not included in the list and should be prohibited for use in the parking area to address aesthetic concerns.

Rationale: The Policy appears to be misinterpreted in some locations and installation of AC in the parking area has a significant street-widening effect.

Important Considerations:

- See Considerations listed under Recommendation 1, above
- Existing clay soils are likely to occur in subgrade within the City of Los Altos and will limit infiltration capacity below the subsurface
- Decomposed granite and gravel are included in the list of allowable materials to provide a lower cost alternative. These materials can be stabilized if concerns regarding rutting, or migration of loose materials into the roadway or storm drain are significant

3. *Provide option to integrate GI feature, such as rain garden or bioswale in landscape area*

Description: The current Policy specifies existing or new landscaping in areas adjacent to the shoulder parking area or driveways. Where shoulder parking area requirements are met, an option could be included to install GI features, such as rain gardens or bioswales. These rain gardens or bioswales would be graded to allow runoff from the shoulder parking area and drainage swale to enter this drainage feature which would provide a new stormwater quality benefit. Depending on existing storm drain infrastructure within the right of way, underdrains and basin overflows could be installed and connected to the storm drain system. Where there is no storm drain infrastructure in close proximity to these drainage features the overflow would discharge back into the drainage swale similar to the landscaped shoulders on 2nd Street between Whitney and Lyell Streets.

Rationale: GI features can help to capture and treat a portion of stormwater runoff and create additional landscape features that can add aesthetic value. If a portion of flows are directed to GI features these recommended revisions can assist the City with implementing applicable requirements in the Municipal Regional Permit (MRP). Provision C.3.i. requires the City, a permittee under the MRP, to require development projects for detached single-family home projects with create or replace between 2,500-10,000 square feet of impervious surface, to implement site design measures

which will direct stormwater runoff from impervious surfaces to permeable or vegetated surfaces.

Important Considerations:

- Not all locations will be suitable for rain gardens or bioswales due to presence of utilities, conditions on neighboring properties, or size limitations
- Rain gardens must not contain ponded water for more than 48-72 hours for vector control
- Implementation and design of these GI features may have to be considered and assessed by the Architect or Contractor working on the new construction or remodeling project

Additional Clarifications to Policy

Clarifications which could improve the Policy are included in **Figure 3** and include the following:

- Flow routing – Flow paths are presented in Figure 3 to provide clarification and guide contractors implementing the shoulder improvements. Constructing improvements consistent with the illustrated flow paths will promote positive drainage through the swale, allow the shoulder parking area to receive and capture some runoff, and route excess flows to the drainage swale.
- Specify slopes for drainage swale and shoulder parking area – A typical cross section specifies a 5% slope for the drainage swale to promote positive drainage away from the roadway. A 2% slope is specified for the parking area to promote positive drainage to landscaped areas where they are installed downgradient from the parking area, and/or to convey excess flows which do not infiltrate into the shoulder parking area into the drainage swale.
- Match existing grades – To reduce drainage issues associated with planned improvements, the Policy should specify that the up and downstream limit of improvements must match existing grade.

Conclusion

The recommended revisions are provided for consideration by the City and the Environmental Subcommittee and are subject to further review. There are several considerations and constraints which are important to consider prior to adopting revisions to the Policy and several were highlighted above, although this is not an exhaustive list of considerations. NCE looks forward to further review by the City and Environmental Subcommittee and developing these or other recommended revisions to the Policy.

NCE

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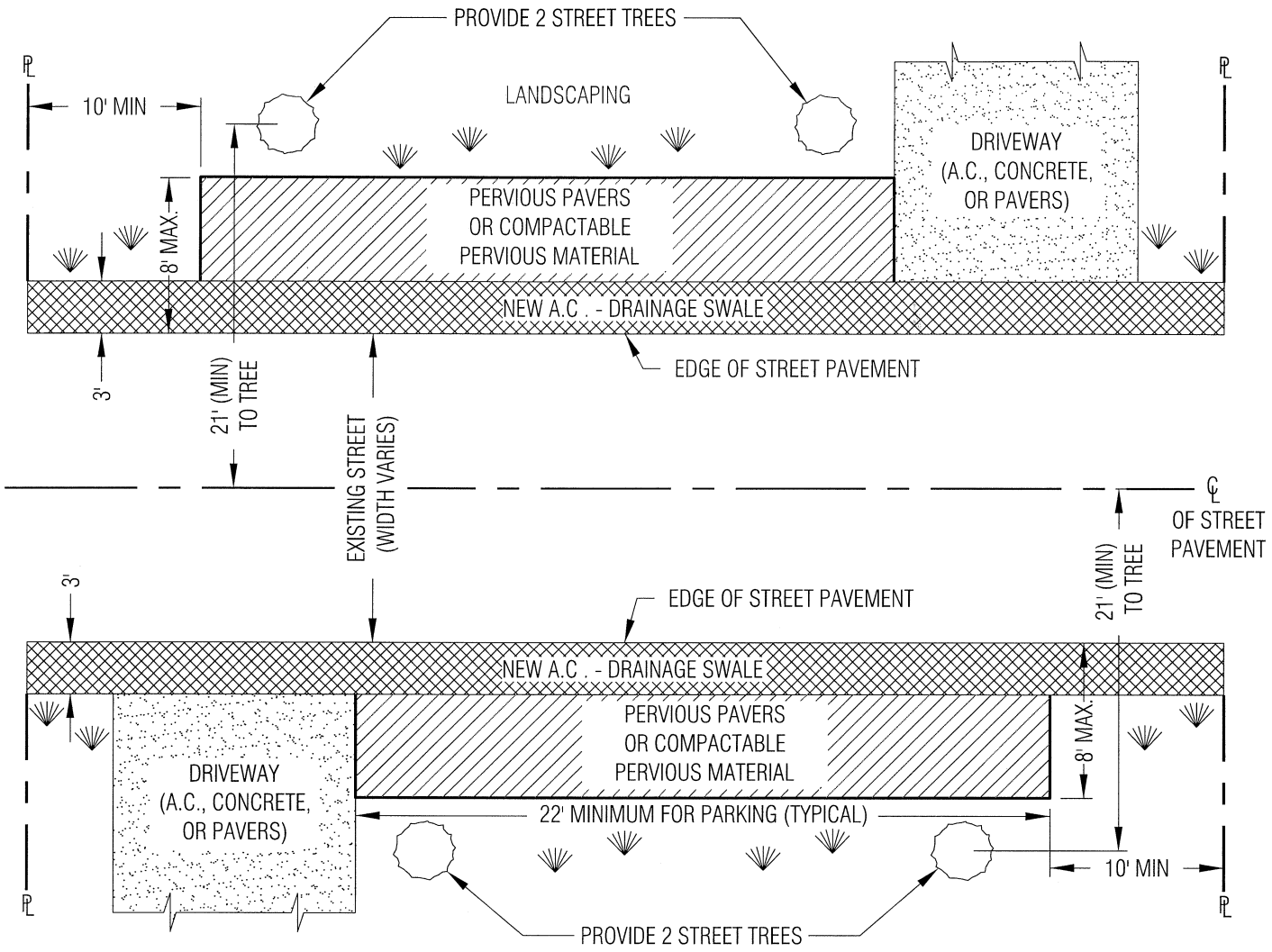
Appendix A

CITY OF LOS ALTOS SHOULDER PAVING POLICY - STANDARD DETAIL SU-20, MAY 2010



PLAN VIEW

LEGEND:

A.C.	ASPHALT CONCRETE
PL	PROPERTY LINE
CL	CENTERLINE
	EXISTING OR NEW LANDSCAPING
	STREET TREE (NEW OR EXISTING)
	NEW PERMEABLE SURFACE
	NEW A.C. - DRAINAGE SWALE

NOTES:

1. **IF THE STREET PAVEMENT WIDTH IS 36 FEET OR GREATER,** NO SHOULDER IMPROVEMENTS ARE PERMITTED WITH THE EXCEPTION OF LANDSCAPING AND IRRIGATION.
2. POLICY DOES NOT APPLY FOR REPAIRS, RESEALING, AND REPAVING IN KIND OF EXISTING SHOULDERS, NOR DOES IT REQUIRE THAT SHOULDERS MUST BE PAVED.
3. THE SHOULDER OF A NEWLY CONSTRUCTED OR 50% OR GREATER SQUARE FOOTAGE REMODELED RESIDENCE IS REQUIRED TO BE BROUGHT INTO COMPLIANCE WITH THIS POLICY.

Approved: _____ City Engineer 1/4/10 Date

CITY OF LOS ALTOS · CALIFORNIA · INCORPORATED DECEMBER 1, 1952

REVISION	
Description	Date

ENGINEERING DIVISION

SHOULDER PAVING POLICY

SU-20