



# Sustainability & Energy Management Utilities Division

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## STANFORD PERMEABLE PAVEMENT PARKING LOT

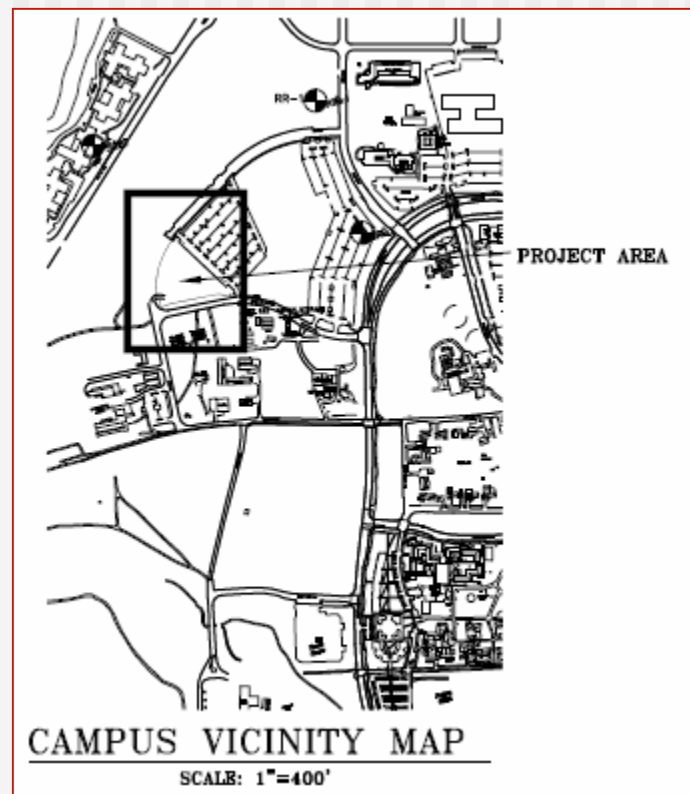
OAK AND STOCK FARM ROAD

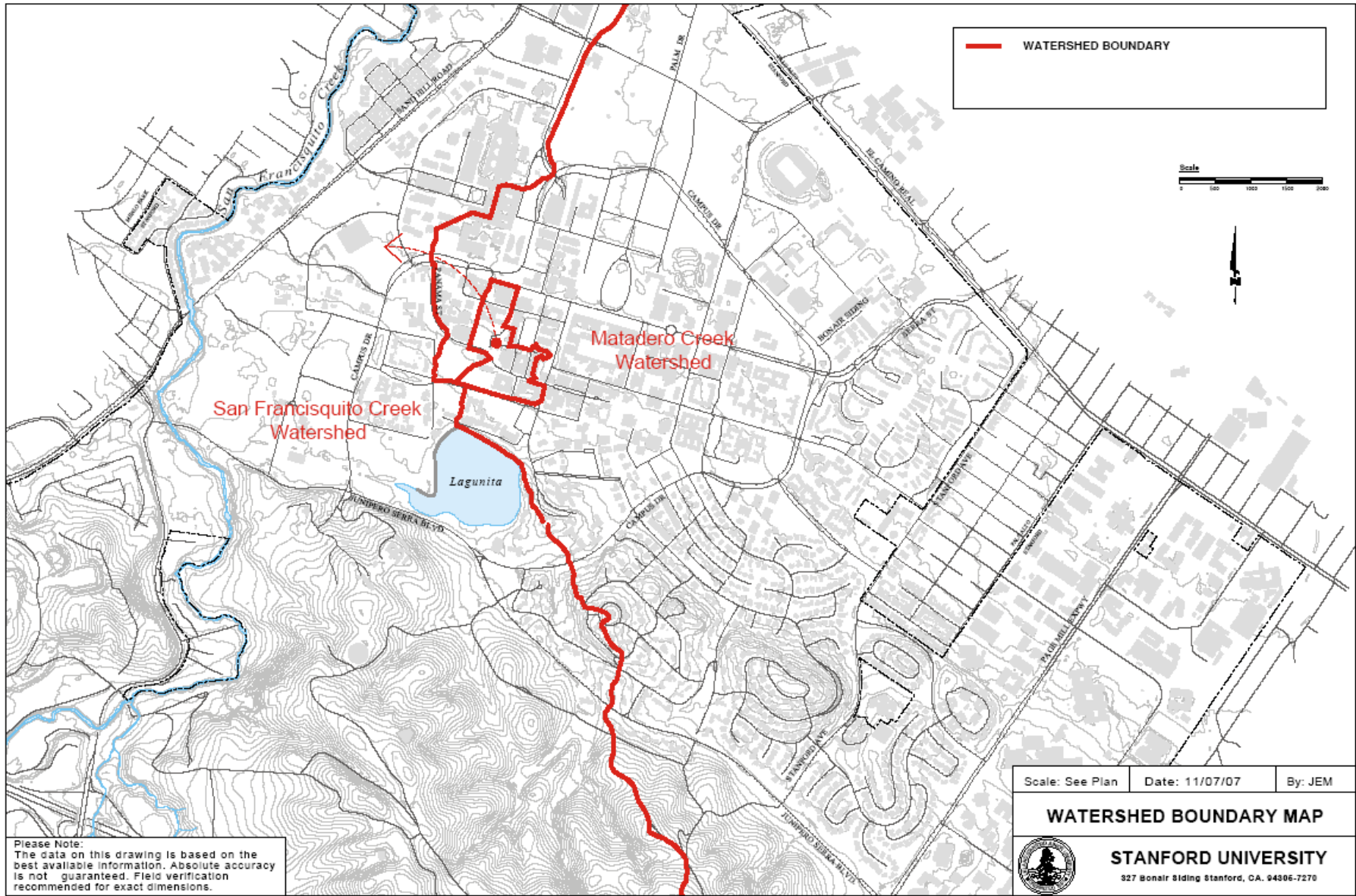




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PROJECT VICINITY – WEST CAMPUS AT THE INTERSECTION  
OF OAK ROAD AND STOCK FARM ROAD





Please Note:  
 The data on this drawing is based on the best available information. Absolute accuracy is not guaranteed. Field verification recommended for exact dimensions.

Scale: See Plan	Date: 11/07/07	By: JEM
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**WATERSHED BOUNDARY MAP**



**STANFORD UNIVERSITY**  
 827 Bonair Siding Stanford, CA, 94306-7270

FILE: W:\GCS\PROJECTS\OUTLET\REGISTRATION\MAPS\WATER\_BOUNDARY\_MAP\_110707.DWG



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- ❖ 1.75 acre site
- ❖ Open dirt lot in existing condition
- ❖ Originally proposed as standard asphalt surface parking lot



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- ❖ Project is in San Francisquito Creek Watershed
- ❖ Green area on following map refers to previous MRP designation of “subwatersheds less than 90% built out HMP required”





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Proposed Demonstration Project to compare different permeable surfaces

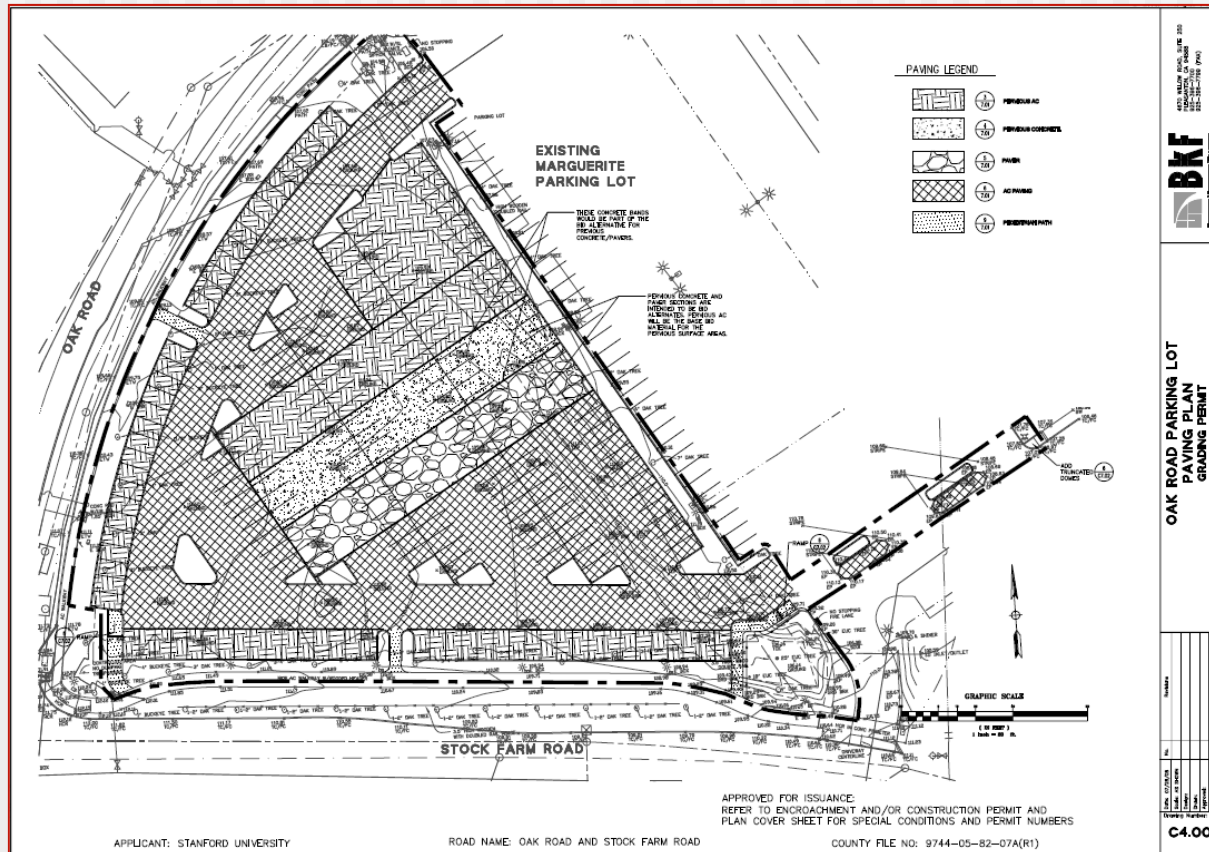
3 Surface Types Proposed:

- ❖ Porous Asphalt
- ❖ Porous Concrete
- ❖ Permeable Pavers



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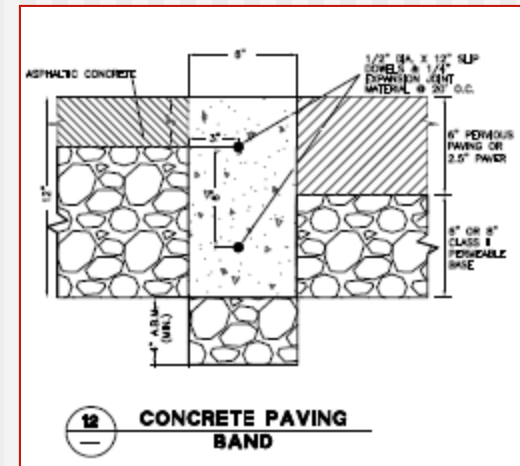
## SITE PLAN





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- 6" Class II Permeable Base Section
- Concrete Curbs to sub-grade to separate flow from each surface type





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- Sampling Ports provided at outlet of underdrain at downstream side of each section
- Underdrains outlet to grassy swale along perimeter of lot





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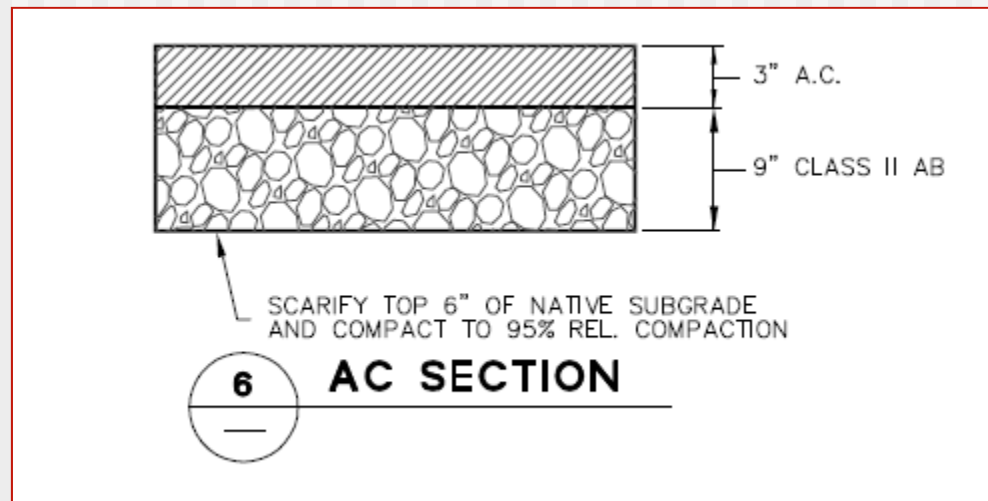
- ❖ Approximate treatment flow for project = 0.16 cfs
- ❖ Curb cuts to grassy swales to allow surface flow to outlet to swale





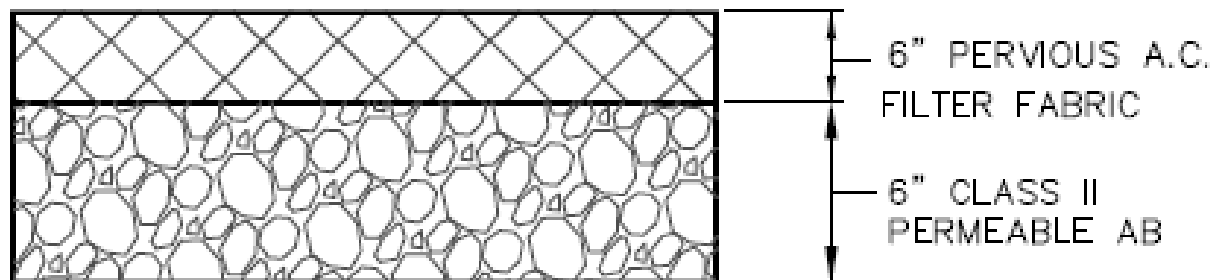
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- ❖ All 3 materials within test sections were the same area 5,600 sf and had a consistent 1% slope
- ❖ Standard asphalt was used for a portion of the project to meet project budget requirements

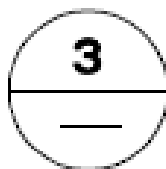




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SCARIFY TOP 6" OF NATIVE SUBGRADE  
AND COMPACT TO 95% REL. COMPACTION



## PERVIOUS PAVEMENT SECTION 1



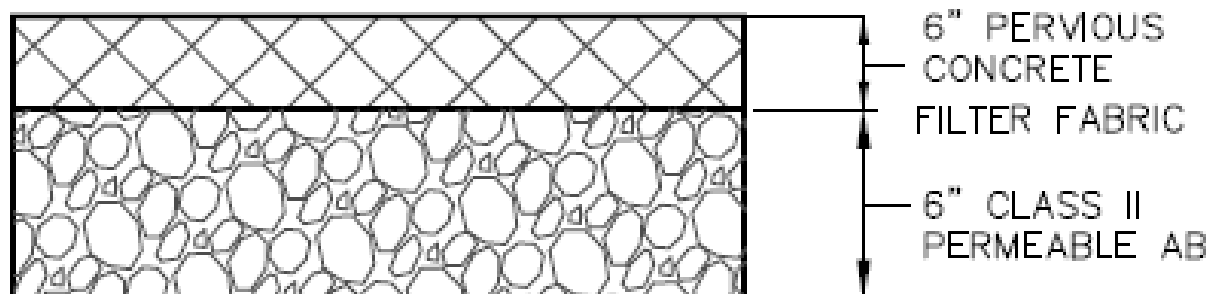
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- ❖ Granite Rock supplied pervious AC and provided guidance on mix design
- ❖ National Asphalt Paving Association (NAPA) spec was used





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SCARIFY TOP 6" OF NATIVE SUBGRADE  
AND COMPACT TO 95% REL. COMPACTION

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## PERVIOUS PAVEMENT SECTION 2



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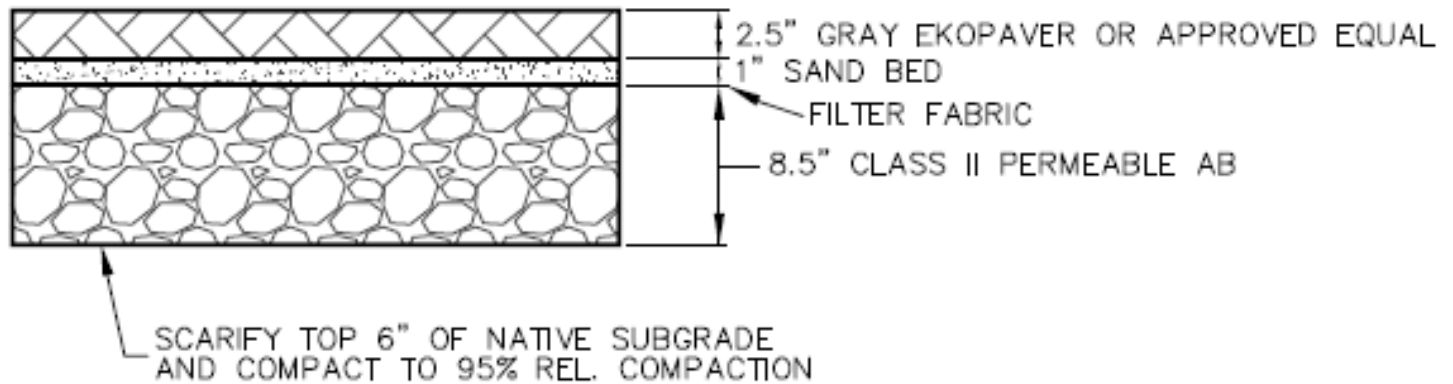
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- ❖ 6" Porous Concrete Section installed by KMA concrete
- ❖ Specification based on Caltrans





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## PERVIOUS PAVEMENT SECTION 3



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- ❖ Ceramic Ekopavers manufactured by Airostone Corporation and supplied by Peninsula Building Materials
- ❖ Average permeability rate of 2in/min
- ❖ Average minimum compressive strength of 8000 psi





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## COST INFORMATION

❖ Parking Lot Construction Cost: \$686,000

Porous AC \$7.50/sf

Porous Concrete \$9.00/sv

Porous Pavers \$17.00/sf

❖ Landscaping and Irrigation Cost: \$119,000



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### COST INFORMATION

#### FACTORS OF NOTE REGARDING UNIT COSTS

- ❖ Oil Escalation impacted porous AC price more significantly than the other 2 materials
- ❖ Binder required has minimum batch size
- ❖ Variation in installation areas
  - AC – 19,500 sf
  - Concrete – 5,600 sf
  - Pavers 5,600 sf
- ❖ Installed by Subcontractor (concrete and pavers) vs. Installed by General (asphalt) resulted in support cost impact on concrete and paver unit costs



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Design Engineer: BKF Engineers

General Contractor: Top Grade Construction

Concrete Subcontractor: KMA Concrete

Paver Subcontractor: European Paving