

**DIVISION 32 – EXTERIOR IMPROVEMENTS**

<b>BASES, BALLASTS, AND PAVING</b>	<b>32 10 00</b>
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Roadway and parking pavement sections are to be designed by a licensed Geotechnical Engineer pursuant to the Traffic Index associated to the roadway or parking lot, in accordance with Caltrans Highway Design Manual, latest edition, for a 20-year life. Materials and installation shall conform to the Caltrans Standard Specifications and Plans, latest edition, unless otherwise required by the University's Representative. Traffic signs and pavement markings shall conform to California's September 26, 2006 adoption of the Federal Highway Administration (FHWA) Manual on Uniform Traffic Control Devices (MUTCD).

<b>CONCRETE PAVING</b>	<b>32 13 13</b>
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When the scope of the work is limited to relatively small areas, the guidelines specified in the University's Standard Specification Section 01 73 29 Cutting and Patching shall take precedence.

Mock ups are required for site concrete work including individual mockups for each paving finish, seat walls, and stem walls. Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for details and execution.

1. Build minimum of 5'x5' mockups of full-thickness sections of concrete paving.
2. Site wall mockups shall be a minimum of 5' in length.
3. Anticipate that up to 2 samples of each type of concrete may be required to establish accepted colors and finishes.
4. Cast samples from accepted materials identical to those to be used on site.
5. Mockups shall demonstrate typical finished edges, joints (including expansion joints with sealant), special design details (reveals, skateboard deterrents, multiple finishes, shiners etc.) surface finishes, texture, and color, curing, and standard of workmanship.
6. Build mockups where directed by University Representative and retain onsite until final acceptance or as directed by the University's Representative.
7. Mock ups must be approved by University's Representative prior to installation of site concrete. Refabricate samples until accepted. Accepted samples shall serve as standard for subsequent work. Mockups must be completed for review a minimum of 7 calendar days prior to scheduled site concrete installation.

Refer to Drawings section of Campus Design Guide for typical sidewalk details.

There are two types of standard finishes for sidewalks and flatwork: exposed aggregate with smooth perimeter and broom swept. Consult the University's Representative for the appropriate locations.

- A. Exposed aggregate sidewalks and flatwork

1. General Requirements: Application of the following exposed aggregate concrete specification is primarily intended to be used in conjunction with new building construction or extensive hardscape developments where an accepted uniform concrete finish and overall appearance for exterior concrete hardscape is desired. This specification, therefore, applies to the new sidewalks, pathways, courtyards and plaza areas of and surrounding new campus buildings. Additionally, when existing campus facilities are undergoing renovation and replacement of sidewalks, pathways, courtyards and similar areas, evaluation of utilizing this specification is required.
  
2. Scope of Work: Exterior concrete sidewalks, pathways, courtyards and plazas shall conform to the following design criteria:
  - a. Consist of concrete panels with 12-inch wide smooth banded perimeter sections surrounding interior sections of exposed aggregate.
  - b. Width, length and spacing of individual concrete panel sections to be a function of the surrounding physical requirements and constraints and shall attempt to incorporate the desired architectural theme of the campus improvement.
  
3. Materials:
  - a. Course aggregate: Cache Creek 3/8 inch x number 8 pea gravel, (1,650 lbs., 9.94 cubic feet, +/- 5 percent by volume).
  - b. Stone color: Red, black, brown and a minor amount of white evenly distributed. NOTE: Contractor to coordinate with the University's Representative regarding mix and finish. This may require, at the discretion of the University's Representative that a sample panel be provided by the Contractor for evaluation and approval by the University's Representative.
  - c. Reference mix design: Mix Number X8W6041A (Teichert Cache Creek Plant), or equal. Note to Design Professional: A reference site to serve as a control sample for finished appearance of this mix design is present in sidewalks located on the south and west sides of Hunt Hall on the UC Davis Campus.
  
- B. Broom swept, smooth finish sidewalks and flatwork
  1. General Requirements: Application of the following smooth finish concrete specification is primarily intended to be used at minor walkways. Verify locations with the University's Representative.
  2. Finish: Medium broom finish swept perpendicular to direction of path.
  
- C. Expansion joints in concrete paving
  1. Expansion joints are to be construction and finished with Silica Sand 20 Mesh from Cascade Rock of Sacramento (or equal) over tooled Sikaflex 2C NS EZ (or equal) over capped with 'zip strip' (or equal) plastic separation cap over 3/8" fiber expansion joint. Silica sand shall be applied liberally and adhered to sealant immediately after installation.

Refer to the University's Standard Specification Section 32 90 00 Planting.

<b>TACTILE WARNING SURFACING</b>	<b>32 17 26</b>
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- A. Truncated Domes:
  - 1. Materials: Tek-Way concrete dome tiles with integral color and spacing at 2.35 inches on center, or equal (no known equal).
  - 2. Color:
    - a. At new locations where all connecting crosswalks are to be new installations, the charcoal/black color shall be selected.
    - b. At locations connecting to existing truncated dome installations to remain, the color shall be selected from the manufacturer's standard colors to match existing.

<b>AUTOMATED VEHICLE GATES</b>	<b>32 31 13</b>
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- A. General requirements:
  - 1. Automated vehicular gates shall comply with the following:
    - a. UL325 Safety Standards
      - i. Per UL 325, vehicular gate operators are not authorized for use by pedestrians, thus an alternate entry point must be provided if pedestrians are to gain access to a secured area.
    - b. ASTM F2200 Gate and Fence Standards.
    - c. Manufacturer product literature demonstrating the gate mechanism has been tested to 200,000 cycles without breakdown.
    - d. Five year limited warranty against defects in materials and workmanship
    - e. Minimum of ten years of experience in the manufacture of hydraulic gate operators of the type specified
- B. Design requirements:
  - 1. Vehicular gates shall utilize a ground mounted V-track roller system the entire gate travel length. Pipe track roller systems are not acceptable.
  - 2. Operation shall be by means of a metal rail passing between a pair of hydraulically driven solid metal wheels with polyurethane treads. Operator motors shall be hydraulic, geroller type, and system shall not include belts, gears, pulleys, roller chains or sprockets to transfer power from operator to gate panel. The operator shall generate a minimum horizontal pull of 300 pounds (136 kg) without the drive wheels slipping and without distortion of supporting arms. Operator shall be capable of handling gates weighing 1500 pounds (680 kg) to 8000 pounds (3629 kg). Gate panel velocity shall not be less than 1.0 foot (.30 m) per second and shall be stopped gradually to prevent shock loads to the gate and operator assembly.
  - 3. Gate operator shall be HySecurity Model - 222 1 HP, hydraulic, sized appropriately for the gate design, with extruded 6061-T6 aluminum, 3/16 inch thick drive rail, or equal.
    - a. All components shall be housed in a 16 gauge minimum, zinc plated, lockable steel enclosure with textured TGIC polyester powder coat finish, proven to withstand 1000-hour salt spray test
    - b. Chassis: 1/4" (6.35 mm) steel base plate, and 12 Ga. (2.66 mm) sides and back welded and ground smooth all joints welded and ground smooth
    - c. Chain drive gate operator systems are not acceptable.

4. V - Groove wheels shall be 6 inch hardened, solid steel, with 2 inch hub, utilizing two sealed bearings.
  5. Drive wheels shall be two 6" (152 mm) Dia. metal hub with polyurethane tread.
  6. Drive release must instantly release tension on both drive wheels, and disengage them from contact with the drive rail in a single motion, for manual operation
  7. Tension spring shall be 2-1/2" (63.5 mm) heavy duty with 800 pound (363 kg) capacity
  8. Hydraulic hose shall be 1/4" (6.35 mm) synthetic rated to 2750 PSI
  9. Hydraulic valves shall be individually replaceable cartridge type, in an integrated hydraulic manifold
  10. Wire loops shall be Service Wire Company 12AWG USE-2, RHH, RHW-2, or equal.
  11. Access on the exterior side of the gate shall be provided by both, UCDFD Standard Knox switch and Schlage Locknetics 653-0505-WP or equal key switch mounted in an 8 inch x 8 inch square housing, (Pedestal CEO model # MC-CS-8-E or equal) on a goose neck pedestal.
    - a. Pedestal shall be protected on both sides parallel to the flow of traffic by 4 inch or 6 inch concrete filled steel bollards.
    - b. If system is configured with credentialed exiting (Key/Card), interior pedestal shall be configured as described above.
    - c. For specific requirements for gate controls, consult the University's Representative.
- C. Minimum Standard electrical requirements
1. 1 HP, 56C, TEFC, continuous duty pump motor, with a service factor of 1.15, or greater. Standard voltages available, single or three phase
    - a. inherent entrapment sensor;
    - b. built in "warn before operate" system;
    - c. built in timer to close;
    - d. liquid crystal display for reporting of functions;
    - e. 26 programmable output relay options;
    - f. anti-tailgate mode;
    - g. built-in power surge/lightning strike protection;
    - h. menu configuration, event logging and system diagnostics easily accessible with a laptop and software;
    - i. RS232 port for connection to laptop or other computer peripheral and RS485 connection of Master/Slave systems or network interface

<b>PLANTING IRRIGATION</b>	<b>32 84 00</b>
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- A. General notes and design requirements
1. Design of irrigation systems shall be based on hydrozones and plant requirements. Areas with differing exposures and groups of plants with different water needs shall not be grouped into the same irrigation zone.
  2. While design of water efficient irrigation systems is recommended, use of drip irrigation may not be approved for certain areas where future disturbance is anticipated (in utility corridors, high traffic areas etc.). Use of high efficiency spray systems where appropriate, is encouraged.
  3. Irrigation stations with low precipitation rate, multi-stream spray heads must not be designed for maximum flow rate. Design to 70 percent of pipe capacity. Irrigation systems must be designed with match precipitation rates for all spray heads on the same station. Low precipitation rate, multi-stream nozzles have varying precip rates that must be taken into account in design ( For example: Hunter MP 1000-3000 series should not be combined with SR 800 and 815 series).

- B. The Campus has developed a Standard Specification, Section 32 84 00 Planting Irrigation. The specification shall be modified by the Design Professional to meet project requirements. An electronic copy (Word document) is available, contact the University's Representative.

<b>PLANTING</b>	<b>32 90 00</b>
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- A. General notes and design requirements
  - 1. Planting design shall carefully consider site microclimate conditions. Plants shall be grouped into zones based on their compatibility with regard to microclimate, water requirements, size etc. Placement of plants and their relationship to the irrigation system components such as spray heads shall be considered during design.
  - 2. The exterior of all buildings that adjoin landscape areas must incorporate a maintenance border consisting of a minimum 30 inch x 3 inch section of crushed, clean, 3/4 inch-1inch rock with a steel header. Sample of rock to be submitted to University's Representative for approval.
  - 3. Where vines are specified, an appropriate support structure must be designed to support vine growth. Smooth walls, columns, and vertical wires are not acceptable as support structures.
  - 4. If problems with soil drainage rates or subsurface conditions are anticipated or arise during construction, additional subsurface drainage in planting areas will be required. Subsurface drain system shall include gravel wrapped 3 inch or 4 inch diameter, perforated, schedule 40 PVC drain pipe, and clean out risers.
  - 5. Trees planned within plazas, parking lots, or other paved areas on site where the proposed supporting landscape area is less than 150 sf. must include modular suspended pavement systems such as Silva Cells (Deep Root) or Strata Vault (City Green) or equal. Uncompacted soil volume minimum for each new tree is 750 cubic feet.
  
- B. The Campus has developed a Standard Specification, Section 32 90 00 Planting. The specification shall be modified by the Design Professional to meet project requirements. An electronic copy (Word document) is available, contact the University's Representative for additional information.

END OF DIVISION 32