State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: DISTRICT DIRECTORS
DEPUTY DISTRICT DIRECTORS – PROJECT DELIVERY
HQ DIVISION CHIEFS – PROJECT DELIVERY

Date: July 30, 2004

From: MARK LEJA
Chief
Division of Design

ROBERT L. BUCKLEY
Chief
Division of Engineering Services

Subject: Cross-Section Preparation and Delivery

Earthwork cross-sections are a vital component in the development and construction of many projects. They assist the designer in developing the most efficient way to handle the earthwork items and assist the bidder in understanding the scope of the earthwork to be performed. Surveys, Construction and the Contractor utilize the earthwork cross-sections to construct the project as designed. The Department has produced cross-sections for use by bidders in only 15% of the 2003-2004 projects that meet the criteria described below. In the 2002-2003 year, 30% of projects had cross-sections for the bidder and in the 2001-2002 year, 45% of the projects had cross-sections. This policy is intended to reverse this trend.

Cross-sections shall be developed for projects which include any of the item(s) for roadway excavation, embankment or imported borrow, except:

- Projects which are exclusively resurfacing;
- Projects which are exclusively highway planting;
- Projects which are exclusively building construction with no improvements to parking lots or heavy equipment storage facilities (No roadway construction);
- Projects where minimal or no grading is required and it is determined during reviews with Construction and Surveys that sufficient information is contained in typical cross-sections, profile grade, contour grading and/or other plan sheets, or that the average-end area calculations are not used for payment purposes.

Effective September 1, 2004, cross-sections on projects requiring them shall be completed in order to achieve Ready to List (RTL) status. Final cross-sections shall be delivered to Surveys as

part of the Survey File Checklist and to Construction as part of the Resident Engineer File Checklist, no later than the RTL date. The attached document "Guidance for Cross-Sections" provides guidance regarding how cross-sections will be handled during the project delivery process. It also provides guidance regarding how the cross-section policy exception process is to be handled. These guidelines will be incorporated into the appropriate source manuals, e.g., "Project Development Procedures Manual," "Plans Preparation Manual," "Ready To List Guide" and the CADD Users Manual.

If you have any questions, please contact Sam Haack, Office of State Project Development Procedures and Quality Improvement, at (916) 654-6551 or Calnet 464-6551.

Attachment

c: Sam Haack

GUIDANCE FOR CROSS-SECTIONS

BACKGROUND:

Earthwork cross-sections are a vital component in the development and construction of many projects, but they have not been consistently made available to District Surveys, District Construction, or to potential bidders. The policy memorandum "Cross-Section Preparation and Delivery" requires that cross sections must be available no later than Ready-to-List (RTL) date.

Earthwork cross-sections are necessary throughout the development of a project, from constructability analysis/review to the construction of the project. Cross sections assist in the development of earthwork quantity calculations, assist in identifying conflicts and determining the haul distances for cut/fill in balancing the earthwork quantities within the limits of the project. Developing cross sections also leads to the creation of slope stake notes for construction staking.

Although cross-sections are not included in contract bid documents, they are supplemental information for the convenience of bidders. When cross-sections are prepared, they shall be made available to bidders and their availability should be noted in the cover memorandum of the PS&E Submittal. Potential bidders will be notified in the "Notice to Contractors" that cross-sections will be available through the District/Region Construction Duty Senior in the district in which the project is located.

This interim document provides guidance for earthwork cross-sections until source manuals are updated.

POLICY:

Cross-sections shall be developed for projects that include any of the item(s) for roadway excavation or imported borrow except for the following exemptions:

- Projects which are exclusively resurfacing
- Projects which are exclusively highway planting
- Projects that are exclusively building construction with no improvements to parking or heavy equipment storage facilities. (No roadway construction)
- Projects where minimal or no grading is required, as determined during reviews with Surveys and Construction, such that sufficient

information is contained in typical cross-sections, profile grade, contour grading and/or other plan sheets or that the average-end area calculations are not to be used for payment purposes.

The Project Engineer shall provide the following by RTL:

1. Earthwork cross-sections to Construction in print format, electronic format or both. Computer-generated cross-sections shall be developed using the authorized three dimensional, terrain modeling engineering software, currently CAiCE.

2. Electronic design files to Construction, including: vertical and horizontal geometric alignments, slope stake notes, mass diagrams, original ground listing, shrink and swell factors, and earthwork quantity calculation sheets.

3. Electronic and hardcopy design files to District Surveys. See the Survey File Checklist in the Project Development Procedures Manual to determine additional electronic files that District Surveys may need.

The District/Region Construction Duty Senior shall provide to the District Office Engineer one of the following to meet RTL certification:

1. A verification memorandum stating that final cross-sections were received.

2. A verification memorandum stating that cross sections are not required under the above policy criteria.

3. An approved exception memorandum as described under "Exceptions to Policy " below.

Final cross sections shall be made ready for distribution to potential bidders no later than the project advertisement date.

EXCEPTIONS TO POLICY:

Exception to Preparation of Cross-Sections:

For projects that have earthwork and where cross-sections do not improve the constructability of the project, an exception to the requirement for cross-sections preparation may be obtained. The exception process is as follows:

The decision to not prepare cross-sections shall be made as early as possible. District Construction and Surveys must concur with this decision in writing.

The District Director shall approve project specific exceptions to this cross-section preparation policy. This authority may be delegated not lower than the Deputy District Director for Design.

A memo stating the reason(s) and justifications for not preparing cross-sections must be included in the PS&E submittal package in order to certify the RTL milestone. The memo shall include the signatures of District Construction and District Survey representatives indicating their concurrence.

Exception to Delivery of Cross-Sections at RTL:

Exceptions to the policy that cross-sections shall be completed by RTL can only be granted by the Division Chief of Design. The Deputy District Director for Design may request an exception to the requirement for the delivery of cross-sections by RTL. This request cannot be sub-delegated.

As part of the request, the district shall provide details regarding the past fiscal-year delivery of cross-sections for all projects with earthwork. This information should include if cross sections were prepared and when they were delivered to bidders or an explanation for not providing cross-sections.

This exception grants the district the ability to deliver cross-sections after the RTL date but before the Advertisement date. This exception does not relieve the district from the responsibility of preparing cross-sections. Projects will not be advertised without final cross-sections available for bidders use.

The PS&E submittal must indicate when cross-sections will be available in order to certify the RTL milestone. The memo shall include the signatures of District Construction and District Survey representatives indicating their concurrence.

GUIDANCE:

Cross sections, slope stake notes, and earthwork quantities should be produced concurrently and based on identical data. Cross-sections should be provided at specific locations as necessary to show representative conditions, critical situations and unusual excavation or grading as needed to clearly show the scope of earthwork to be performed.

Construction and drainage details should not be duplicated on the cross-section sheets. General information such as location and alignment may be shown for clarification. Representation of retaining walls and other structure elements may also be graphically represented for clarification but should include a reference to the Structure or Roadway Plans.

Early coordination with District Surveys and Construction during reviews is necessary to address any special concerns involving cross-sections or slope stake notes for items such as detours, staging earthwork or adjacent alignments. Alignment offset data is used to describe relationships between nonparallel overlapping detour alignments. Any earthwork conflicts such as the lay out of irregular areas should also be resolved during the draft report and constructability reviews. Cross-sections and/or electronic design files should be provided to Surveys and Construction as early as possible in order to allow for sufficient review time.

The information on cross-sections shall include but is not limited to: alignment (stationing), finish grade, sub-grade, original ground, existing and proposed edge of traveled way, existing and proposed edge of pavement, hinge point, catch point and right-of-way.

Earthwork cross-section plotting scales, both horizontal and vertical, should be 1:100 for rural projects and 1:50 for urban projects. Cross-section intervals shall not be more than 20 meters and should include additional locations as required due to constraints or roadway features.. Maintain the same scale for all cross-sections for one alignment.

Full size cross-section sheets, 559 mm x 864 mm (22" x 34"), are recommended. Cross-sections may be oriented either landscape (preferred) or portrait. However, the orientation selected should be consistent throughout all sheets. Arrange sections with increasing stationing from bottom to top of sheet.

Cross-sections shall be labeled "For Earthwork Development Only". Label all pertinent cross-section features. Labeling should also include sheet number and total number of sheets, District-County-Route, Expenditure Authorization (EA), vertical and horizontal scale, and date of cross-section plots.

APPLIES TO:

This cross-section policy applies to improvements to any state transportation facility regardless of whether or not it is implemented or sponsored by the Department.