



MANUAL CHANGE TRANSMITTAL		NO. 03-1
TITLE: Department of Transportation <i>Construction Manual</i>	APPROVED BY:  Robert Pieplow Chief, Division of Construction	DATE ISSUED: 06/30/03
SUBJECT AREA Index and other areas of the <i>Construction Manual</i>	ISSUING UNIT Division of Construction	
SUPERSEDES None	DISTRIBUTION All Manual Holders	

The purpose of this manual change transmittal is to provide updates and corrections to the 2001 edition of the Caltrans *Construction Manual*. Please update your manual in accordance with the table below. The relevant pages are indicated in the table.

Section(s)	Remove Old Page(s)	Insert New/Revised Page(s)
Updates: Chapter 4, Section 1902E, "Embankment Construction," Section 1902F, "Borrow Excavation," Section 1903A(3), "Slides & Slipouts," and 1903A(4), "Slopes"	4-19.3 thru 4-19.8	4-19.3 thru 4-19.8
Update: Chapter 5, Section 001, "Resident Engineer's Pending File," (bullet 11)	5-0.1	5-0.1
Update: Chapter 5, Section 508, "Prosecution of Work," (bullet 4)	5-5.4	5-5.4
Correction: Chapter 3, Section 805A(3). The term "Caltrans Working Day Calendar" revised to "Construction Workday Calendar"	3-8.14	3-8.14
Index	I-1 thru I-15	I-1 thru I-15
New: Golden Rod, Chapter 4, Section 20, "Erosion Control and Highway Planting"	N/A	4-0.i

progress. These signals are not intended to be meaningful to the public. The use of these signals is the preferred method of communication within the work area.

2. Signs, guards, and flaggers should be used for public communications. In many situations, the contractor may need a separate means of communication and control for public traffic. If radio communications will be used for site monitoring or traffic control, ensure the contractor adheres to the safe distance tables in the *Construction Safety Orders*. Adhering to safe distances becomes critical when “rolling roadblocks” or “traffic breaks” are to be used.
- On-site authority- Cal/OSHA regulations require that all blasting operations be under the direct control of a licensed blaster. The contractor should identify this person as the person who has final authority over the blasting and who will be responsible for giving the “all clear” following a postdetonation inspection of the blast area.

The relationship between the resident engineer and the licensed blaster is different from the relationships normally encountered on most contracts. By law and regulation, the licensed blaster is responsible for and is the final authority on the conduct of blasting operations. The resident engineer may only intervene in the case of a violation of the *Construction Safety Orders* or public safety. When intervening, the resident engineer may only suspend the operation until the hazards are abated or the contractor (blaster) conforms to the safety orders.

- Misfires- Misfires are very unusual occurrences, but when they occur, they pose serious safety problems. These problems have the potential to escalate rapidly when public traffic is involved. Ensure the adequacy of the contractor’s contingency plan for misfires.

4-1902B (2) Routine Duties

Review the special provisions for additional requirements or restrictions related to blasting. Sometimes presplitting of rock excavation is required, and considerable detail covering this work is included in the contract. The special provisions may also include other requirements such as ground motion limits and preblast surveys of nearby buildings.

The resident engineer should also perform the following routine duties, among others:

- Ensure the blaster understands the survey stakes sufficiently to avoid placing explosives beyond slope tolerances.
- Order the discontinuance of any method of blasting that leads to overshooting or destruction of property or natural features.
- Ensure that all legally required warning signs are in place.

4-1902C Structure Excavation and Backfill

To ensure the integrity of a structure, resident engineers and assistant resident engineers must pay considerable attention to structure excavation and backfill. Various categories of structure excavation and backfill and various methods of measurement and payment exist. Often, the payment limits will not match the physical

limits used in the construction of a facility. Before beginning work, it is essential to study the contract plans, *Standard Plans*, *Standard Specifications*, special provisions, and the work site. Also, take the following steps:

- Before excavation, review the plans and stakes to determine the following:
 1. Whether the structure will clear other facilities
 2. Whether the structure will function as planned in this location or should be adjusted
 3. Whether sufficient data is available for quantity calculations
- To install culverts in an embankment, ensure the embankment is at the elevation specified.
- Decide whether a camber is required in a culvert or other drainage structure. If so, give the survey crew or the contractor, or both, the necessary data.
- Before backfilling, inspect structures.
- Test backfill material for compliance with specifications and test compaction, and before backfilling, ensure that any required strutting or bracing, as shown on the plans, is in place.

4-1902D Ditch Excavation

Before excavating ditches, review the plans and the site to determine if original ground needs to be cross-sectioned. Most ditches will require slope stakes and, in even ground, you can use slope stake information alone to calculate quantities. If cross sections are necessary, the survey party can accomplish that work at the same time as slope staking.

4-1902E Embankment Construction

Carefully examine areas upon which embankments are to be constructed. Include a review of the materials information and an on-site observation during clearing.

Review permits, environmental studies, and requirements to ensure that the contractor meets all commitments, including any measures pertaining to providing necessary access roads. Where work will affect areas beyond those approved for construction purposes or involves an environmentally sensitive area, consult with the district or regional environmental office.

Look for the following:

- Lush vegetative growth in local areas, seepage, and springs indicating ground water.
- Trees, brush, or fences leaning downhill, indicating slippage of the surface material.
- Rolling, hummocky terrain, twisted trees, or lack of vegetation in otherwise timbered areas, indicating a large slide.

When foundation problems are known during the project's design, normally the contract will cover treatment of such areas. However, when serious problems exist that the contract does not cover, consult with the district materials engineer or the geotechnical engineer, or both.

Here are some of the most common major foundation problems and the types of solutions frequently recommended:

- The weight of the embankment displaces or consolidates material in the foundation causing settlement. This condition is corrected by the following:
 1. If it is economically feasible, remove the plastic material.
 2. Placing strut fills or buttress fills on either or both sides of the embankment to act as a counterweight. The fills resist any upward movement of the foundation material adjacent to the embankment.
 3. Constructing the embankment at a controlled rate so that any anticipated settlement will take place over time and allow hydrostatic pressures to dissipate.
 4. Constructing surcharges on the completed embankment to accelerate settlement. Settlement platforms or piezometers, or both, monitor rates of settlement. They may be installed and used under the direction of the district materials unit .
- Loss of stability may occur when the embankment forms a dam and impounds water, causing saturation. This may result in sloughing of part or all of the fill. This condition is corrected by the following:
 1. To provide drainage, placing a filter material blanket over the area that is to receive embankment. Stripping foundation material may be necessary.
 2. Constructing ditches or underdrains at the upper side of the fill to intercept water. This method is effective only if the underdrain or ditch intercepts and removes all the seepage water.
- The weight of a sidehill embankment causes movement on a slippage plane in the underlying foundation. This type of embankment failure is characterized by the mass movement of a large portion of the fill. This condition is corrected by the following:
 1. Constructing a stabilization trench through the slippage plane. Stabilization trenches, located beneath the embankment, are constructed in wet areas to intercept and remove water from deep, unstable embankment areas. These trenches may be major installations involving large quantities of excavation, filter material, and drainage pipe.
 2. Installing horizontal drains to drain water from the slippage plane.
 3. Changing a line or grade so that the roadway is in cut or on a smaller embankment, thus reducing the load on the slippage plane.

The contractor may often need to use combinations of the above methods for the most troublesome foundation problems.

Before the construction of embankments, also do the following:

- When consolidation of the embankment's foundation can be estimated and will be appreciable, adjust the width to be staked. When applicable, remember to include any such change in quantity calculations.

- If the foundation material will be displaced and consolidated, undertake additional measures. Place a line of “telltale” or “heave” stakes 3 to 8 m outside of and generally parallel to the toe of the fill slope. Set these stakes to line and elevation by normal survey methods so that they will indicate both vertical and horizontal movement of the ground. In addition, inclinometers or slope indicators and settlement platforms may be used. For installing these devices, contact the district materials unit. Ensure that adequate cover is placed to protect settlement platforms from damage by the grading equipment. Schedule regular monitoring and recording.

4-1902F Borrow Excavation

Review the contract for specific types of borrow the contractor will use. Also, in the resident engineer’s pending file, review environmental and other requirements and commitments. This includes compliance with the Surface Mining and Reclamation Act, permits and right-of-way agreements and other items that may affect borrow excavation.

4-1903 During the Course of Work

4-1903 During the Course of Work

Inspect the earthwork operations identified below during the work.

4-1903A Roadway Excavation

Consider the following areas when inspecting roadway excavation:

4-1903A (1) Hauling Material

For the requirements for hauling material, refer to various sections of the contract and Section 3-701D(1), “Weight Limitations,” of this manual. Section 19-1.02, “Preservation of Property,” of the *Standard Specifications* further covers the hauling of earth, specifically with respect to spillage of material and dust control.

4-1903A (2) Unsuitable Material

Section 19-2.02, “Unsuitable Material,” of the *Standard Specifications* defines unsuitable material as “. . . material encountered below the natural ground surface in embankment areas or below the grading plane in excavation areas. . .” Section 19-2.02 does not cover material within excavation areas. For unsuitable material, the resident engineer’s duties include the following:

- For possibly unsuitable material, examine all basement material and all natural ground upon which embankments are to be constructed. Advise the contractor of the areas and depths of material to be removed.
- Before removing unsuitable material that is not shown on the plans or specifications, determine the method of payment for excavation and disposal:
 1. If payment will be at contract prices, record adequate measurements for calculating quantities.
 2. If the contractor requests payment to be made as extra work, obtain the request in writing. Prepare and process a contract change order, and keep the necessary records relating to extra work.
- Normally, unsuitable material may be placed in embankment or contour areas.
- Examine areas where the contractor has removed unsuitable material, and before backfilling, decide on any necessary drainage or other corrective action.
- Advise the contractor of the type of material that will be suitable backfill. Observe the operation to ensure it complies with specifications.

- In addition to routine data, record in the daily report all pertinent discussion with and orders to the contractor regarding unsuitable material.

4-1903A (3) *Slides and Slipouts*

Perform the following steps when handling slides and slipouts:

- Examine slopes for areas of potential slides. Decide on any corrective action necessary. Corrective action may include any of the measures suggested in the paragraph below. For detailed analysis and recommendations for major problems, consult with the district materials unit and geotechnical engineers.
- Examine slides and slipouts to determine their probable cause. Decide on any corrective work necessary. Corrective action for a slide may require totally or partially removing the slide and flattening slopes or installing horizontal drains or underdrains, or both. For small areas, consider constructing bulkheads or retaining walls. For large areas, consider constructing benches to reduce traffic hazards from falling material. When benches are constructed, provide access roads for future maintenance.
- Corrective action for a slipout may require totally or partially removing and reconstructing the embankment with more suitable material. Also, consider constructing fill struts, stabilizing trenches, and installing subsurface drainage facilities.
- When correcting slides and slipouts requires work in areas not already available for state use on the project, any or all of the following actions may be necessary before the work may proceed: 1) obtain new or revised permits; 2) conduct new environmental studies; and 3) meet new environmental compliance requirements. Review all previously identified haul roads and flattened slopes to determine if they involve impacts not disclosed by existing environmental documentation. If the needed area extends beyond that approved for construction or may affect an environmentally sensitive area, consult with the district or regional environmental office.
- Before removal or corrective operations, determine the method of payment:
 1. If the contractor requests the removal of slides and slipouts to be paid for as extra work, obtain this request in writing. When the resident engineer decides this removal should be paid as extra work, state this decision in the change order memorandum. Then prepare and process a contract change order when an ordered change or extra work is involved.
 2. When payment is by item price for roadway excavation, measure the additional quantities and enter them on appropriate source documents that clearly identify the limits of the slides or slipouts.
- Any applicable method or combination of methods of compensation may be used to pay for removing slides or slipouts. See Section 5-306C, "Methods of Payment," of this manual for compensation methods.
- Decide where the contractor should deposit the material resulting from slides and slipouts. When practicable, use all the material for embankments or for flattening slopes or contour grading.
- Take before-and-after photographs of the slide area.

4-1903A (4) Slopes

The engineer responsible for earthwork must review the slope stakes and ensure missing stakes are replaced in accordance with Section 5-1.07, “Lines and Grades,” of the *Standard Specifications*. Also, see Section 3-5, “Control of Work,” of this manual and Chapter 12, “Construction Surveys,” in the *Surveys Manual* for more information on staking. In addition, the resident engineer must perform the following steps:

- Make sufficient measurements to verify the proper start of slopes.
- Make sufficient spot-checks to verify the correct slope tolerances.
- Check the slope rounding for compliance with the contract. While the top of the slope is still reachable with equipment, decide whether the contractor should do additional slope rounding or contour grading.
- Ensure that the construction of any special items for erosion control complies with the contract. This review must include items on the contractor’s approved plan for controlling water pollution.
- Ensure all top-of-slope or toe-of-slope ditches will drain.
- Ensure that embankment widening complies with the contract plans for installing guard railing.
- Examine slopes for material that blasting has shattered or loosened. Order the removal of this material.

4-1903A (5) Surplus Material

The resident engineer’s responsibility for surplus material and related actions will vary considerably depending on the terms of a particular contract. Generally, for those contracts that include payment for embankment construction within the payment for roadway excavation, determine as early as possible whether there will be a surplus (or deficiency) of material. For contracts that provide separate payment for embankment, ensure only that the contractor satisfies the conditions in Section 7-1.13, “Disposal of Material Outside the Highway Right of Way,” of the *Standard Specifications*.

The following are some of the factors to analyze when determining whether there will be an unplanned surplus (or deficiency) of roadway excavation:

- Determine as adequate or not the amount of embankment estimated for subsidence of original ground, considering possibly different field conditions than those the design engineer anticipated.
- Variations of slopes, even within specified tolerances, can significantly effect quantities.
- Be alert to differences between pay quantities and the actual amount of roadway excavation as a result of curve correction. On some projects, this difference can significantly effect a surplus (or deficiency) of material.

Conduct of the Work

5-001 Resident Engineer's Pending File

For guidance and information, the project engineer assembles and forwards to the resident engineer a set of letters, memoranda, and other data entitled, "resident engineer's pending file." This file must contain all pertinent information, comments, and advice that may be useful on the specific project to which the resident engineer is assigned. A detailed list of the information that should be included in the resident engineer's pending file is contained in Appendix GG, "Project Data Checklists," of the *Project Development Procedures Manual*. The file usually includes the following:

- Memoranda between programs, service centers, and districts, especially comments about preliminary reports and dummy special provisions.
- Special requirements that are enumerated in the freeway agreement and that may require action by the resident engineer. For instance, a special requirement may be notification of the date work begins on locally owned facilities.
- Memoranda about materials from the Office of Materials Engineering and Testing Services or the district materials unit.
- Copies of right-of-way agreements that require work to be done under the contract or that affect the project's construction.
- Copies of "Notice to Owner," which covers utilities and their completion status.
- Copies of the partially completed "Utility Service Request" form, which the resident engineer will use for the installation and coordination of utility services.
- Copies of correspondence giving the background of any unusual project features.
- All pertinent engineering data previously prepared in connection with the project. This data should include the project engineer's quantity calculations.
- Copies of the project report, preliminary report, and materials reports.
- A copy of the "materials information" as given to prospective bidders.
- A copy of the environmental document, including any permits, agreements, and commitments.
- A separate summary of all environmental commitments, as well as any special instructions or explanations for meeting permit and other legal requirements and commitments to other agencies.

The resident engineer must consult with the project engineer who forwarded the file if the file has any of the following problems:

- Information appears to conflict.
- Information appears to be missing.
- Additional information or explanations are required.

Conduct of the Work

5-001 Resident Engineer's Pending File

**5-002
Preconstruction
Conference With
Caltrans Personnel**

5-002 Preconstruction Conference With Caltrans Personnel

Before the start of construction, the resident engineer should review the job with the following people:

- Project manager
- Project engineer
- Right-of-way agent
- Hydraulics engineer
- Traffic engineer
- Materials engineer
- Maintenance superintendent
- Environmental planner
- Others who may have a direct interest in the project

At this preconstruction stage, such a review will significantly aid in explaining the reasons for certain design features such as the following:

- Right-of-way obligations
- Signing and traffic handling difficulties
- Materials sites
- Selected material
- Foundation treatment
- Potential slides
- Environmental commitments
- Potential drainage and maintenance problems, including erosion control and water pollution

The resident engineer must ensure implementation of environmental mitigation measures included in the project approval. To be fully informed of the environmental mitigation measures, commitments, or concerns on projects that include environmental commitments, the resident engineer must meet with the assigned environmental representative. At the same time, the resident engineer can reach agreement on both the assistance required from environmental specialists and also the tentative schedule and plan for environmental monitoring.

On projects involving structure construction personnel, preconstruction conferences are mandatory and should be held as soon as possible after bids are opened. The conferences should include structure and construction engineers, the resident engineer, and the structure representative. These personnel should reach agreement regarding the following items:

- Office facilities. The district must provide suitable office space and furniture for both district and structure field personnel. When the office facilities are trailers, the resident engineer and structure representative should both occupy the same trailer. When the office facilities are in a building, the engineer and the

When resource conflicts occur between ongoing and emergency work, and the selected contractor is the best for the emergency contract, district construction must determine the best course of action.

To avoid work conflicts, generally keep to a minimum the number of contractors; however, on large emergency contracts, multiple contractors may be necessary.

A representative from the Caltrans unit coordinating contractor selection will meet with a representative from the selected contractor to sign Form ADM-0366, “Confirmation of Verbal Agreement Other Than for Equipment Rental.” A senior-level engineer or higher must also sign Form ADM-0366 when district construction coordinates the selection of the contractor.

5-506 Initial Stages of the Project

A director’s order may take several days to obtain. However, in severe emergencies it is possible for the district maintenance unit to obtain verbal approvals by telephone in less than a day from the director or delegated deputy director.

While the director’s order is being obtained, representatives from the appropriate district units and divisions, such as district construction, maintenance unit, design unit, and environmental unit, should meet to discuss repair alternatives, cost estimates, and anticipated work duration.

The estimated cost and duration should be realistic. To cover unexpected situations, it is appropriate to place adequate cost and contingency time in the estimates.

During the initial meeting with the contractor, the resident engineer should discuss the scope of work, the proposed types of equipment and personnel, and expectations for performance.

Specifically document all discussions regarding safety. The discussions should include the nature of the operations, interaction with traveling public, worker fatigue, code of safe practices, and designation of the contractor’s safety officer. Top priorities are the safe passage of public traffic through or around the work and the safety of workers.

Develop a traffic management plan for the project.

5-507 Tracking Costs

The director’s order allows you to proceed with the emergency contract work. It describes the work’s scope and limits of the work, funding allocation, and duration. You are legally allowed to authorize fund expenditures up to the director’s order amount.

On emergency force account contracts, daily costs can be significant. Assistant resident engineers must include complete records of labor, equipment, and materials in the daily report. At the end of each shift, reach agreement with the contractor on this work. Make a daily estimate of costs based on the daily report. Encourage the contractor to submit a weekly bill itemizing labor, equipment, and material used on the contract.

For additional information on force account billing and record keeping, see Section 3-9, “Measurement and Payment,” of this manual.

5-506

Initial Stages of the Project

5-507

Tracking Costs

**5-508
Prosecution of the
Work**

5-508 Prosecution of the Work

The resident engineer must define the work to be done but only provide general direction for accomplishing the work. Generally, the contractor must select the means and methods to be used.

The following bullets list items either that the resident engineer must perform or of which the resident engineer must be aware:

- As the work progresses, work plans will probably need adjusting. If you believe the emergency work is not progressing as quickly as it should, seek management advice, and discuss with the contractor ways to increase production. Be innovative by using the following:
 1. Concurrent operations
 2. Multiple shifts
 3. Local material sites
 4. Detours to limit the effects on traffic
 5. Matches of the desired equipment and resources with the changing circumstances of the work to be performed
- Although cost effectiveness is always desirable, in some emergency situations production must predominate, sometimes requiring excess equipment to sit idle to gain overall production.
- Ensure that the means and methods the contractor proposes are safe and appropriate.
- To ensure that environmental mitigation, compliance requirements, and commitments are adhered to, always coordinate with your contractor selection coordinator, environmental/construction liaison, district or regional environmental office and project manager.
- Continuously try to prevent improper storm water runoff. Some operations may have unavoidable sediment runoff. To ensure the timely involvement of regulatory agencies, have prior discussions with them, both during the emergency and in the future.
- The governor's emergency proclamation for a disaster may temporarily waive the regulations of the Surface Mining and Reclamation Act of 1975 (SMARA). This waiver is intended to allow Caltrans to use non-SMARA certified locations if no other option is available to reopen a closed facility during the height of an emergency. (Mining operations determined to be in compliance are listed on the AB 3098 SMARA Eligible List. You can obtain this list from the Division of Construction or the Department of Conservation's web site at the following address: <http://www.consrv.ca.gov/omr/SMARA/3098-list>.)

**5-509
Functional Unit
Support**

5-509 Functional Unit Support

District management must assign a project manager to emergency contracts. The project manager will assist the resident engineer in coordinating support from other Caltrans units, other government agencies, the community, and legislators. To allow you more time to properly administer the contract, fully use the project manager and other appropriate units.



When determining nonworking days, loss of time due to inclement weather may extend beyond the period of actual inclement weather. The following list provides examples of this type of situation:

- Although the weather may be suitable, the grade may still be too wet to work because of previous days of inclement weather.
- If, due to unstable material, the contractor spent the major portion of the day rebuilding haul roads and removing saturated material from the tops of fills, no progress toward completion would have been made even though the full crew might have worked the entire day.

Inclement weather can be other than wet or cold weather. For instance, it may be too hot to produce concrete that meets specified temperatures. If all specified precautions have been complied with and the concrete work is the controlling operation, a weather nonworking day could be granted.

If a nonworking day is granted because of requirements in Section 10, “Maintaining Traffic” of the special provisions, state the reason in the “Remarks” section of Form CEM-2701.

A temporary short-term suspension, for reasons such as anticipated heavy traffic for an event or holiday, must be noted in the “Weather, Weather Conditions or Other Conditions” section and explained in the “Remarks” section. Do not show any charges for working or nonworking days. Include the suspension day in the “Days contract suspended” line under the heading “Computation of Extended Date for Completion” on Form CEM-2701.

In the column titled “Working Days No Work Done on Controlling Operation,” record any working day on which no work is done on the project or on the controlling operations. If the resident engineer knows the reasons for lack of work, the resident engineer should note them in the daily report.

3-805A (2) Time Extensions (the Center Block)

This section is used for recording extensions of time for causes specifically set forth in Section 8-1.07, “Liquidated Damages,” Section 8-1.09, “Right of Way Delays,” and Section 8-1.10, “Utility and Non-Highway Facilities,” of the *Standard Specifications* or for applicable requirements in the special provisions.

Analyze possible time extensions while the circumstances are still fresh in the minds of the principals.

In the “CCO” column, record working days granted for contract change orders. In the “Other” column, record all other time extensions covered by the above mentioned sections not included in contract change orders.

Use the following procedure for approving an “other day”:

- Under “Remarks,” the resident engineer will acknowledge the receipt of a letter from the contractor requesting a time extension.
- The resident engineer will forward the contractor’s letter to the construction engineer with a cover letter containing the following information:
 1. Number of days requested and the contractor’s justification for the request.
 2. Cause of delay.

3. Statement describing what controlling operation or operations are delayed and to what extent.
 4. Resident engineer's recommendation.
 5. Reference to supporting data.
 6. On federal oversight projects, comments from the area engineer of the Federal Highway Administration.
- The construction engineer or appropriate approving engineer (depending on district policy), will note approval, if appropriate, on the resident engineer's letter and return a copy to the resident engineer or notify the resident engineer of other steps to be taken.
 - If the time extension is approved, the resident engineer will enter it on Form CEM-2701, "Weekly Statement of Working Days," as an approved extension, with a statement under "Remarks" similar to that shown on Example 3-8.4, at the end of this section.

The Division of Construction must approve "other days" granted after the completion of the final weekly statement of working days.

If contract time has expired, the engineer may consider time extensions for causes described in the fifth paragraph of Section 8-1.07, "Liquidated Damages," of the *Standard Specifications* and in Section 8-1.09, "Right of Way Delays," and Section 8-1.10, "Utility and Non-Highway Facilities," of the *Standard Specifications* the director must approve all other time extensions for causes occurring after the contract working days have expired.

In considering time extensions for any of the specific causes designated in the contract, deduct all nonworking days within the extension period, and ensure the extension is made only for the working days charged to the contract during the extension. For additional information on time extensions after contract completion, see "Liquidated Damages" later in this section.

3-805A (3) *Computation of Extended Date for Completion (the Lower Block)*

In the lower section of the form, summarize the information the contractor will receive.

The "first working day" is the calendar day specified in Section 4, "Beginning of Work, Time of Completion and Liquidated Damages," of the contract's special provisions. This day is usually the 15th calendar day after contract approval.

Several methods are used to specify the first working day. The resident engineer must read and understand the contract's specifications and correctly record the date of the first working day.

Use the Construction Workday Calendar to determine the correct values to place in the "Numbered Day" column on Form CEM-2701 for the first working day, the computed date for completion, and the extended date for completion. The calendar is available at the following address:

<http://www.dot.ca.gov/hq/construc/calendar.html>

The number shown on the calendar on a particular date is that date's numbered day.

A

Abbreviations	3-1.1
AC	See Asphalt Concrete
Acceptance of contract	3-7.12
Acceptance of materials	6-2.4
Acceptance records	6-1.4
Acceptance tests	6-1.2
Access to the work	3-5.3
Additives, chemical, water	4-17.1
Adhesive	4-95.1
Adjustment in compensation	5-3.6, 3-9.6, 5-3.36
Adjustment of overhead costs	3-9.15
Administration	1-0.1
Aggregate bases	4-26.1
Aggregate subbases	4-25.1
Air entrainment	4-90.11
Air pollution control	3-7.2, 7-1.3
Alternative equipment	3-5.4
Apprentices	8-1.7
Approach slabs	4-51.1
Arbitration	5-4.14
Asbestos sheet packing	6-1.25, 6-2.8
Asphalt	
membrane waterproofing	4-54.1
mopping	6-1.26
plank	6-1.25
Asphalt binder	4-39.1
Asphalt concrete	4-39.1, 6-1.16
Asphalt rubber latex joint filler	6-2.6
Asphalt treated permeable base	4-29.2, 6-1.21
Asphaltic emulsions	4-94.1
Asphalts	4-92.1
Audits	5-4.13
Authority of engineer	3-5.1
Authorized representative	3-5.1
Automotive	1-4.2
Award and execution of contract	3-3.1



B

Backflow preventers, irrigation systems	4-20.15
Bars, raised (precast)	6-1.27
Barbed wire	4-80.1, 6-1.25, 6-2.8
Barricades	4-12.2
Barriers	4-83.1
Barriers, railings and	4-83.1
Basement soil	6-1.23



Index

Bases	
aggregate	4-26.1
asphalt treated permeable	4-29.2, 6-1.21
cement treated	4-27.1, 6-1.20
cement treated permeable	4-29.2, 6-1.21
lean concrete	4-28.1, 6-1.18
Bearing devices, structures	4-51.3
Beginning of work	3-8.8
Bid openings	3-2.1
Bids	3-2.1
Bitumen ratio	4-37.6
Bituminous adhesive, pavement markers	4-85.1
Bituminous seals	4-37.1, 6-1.24
Blasting	4-19.2
Bolted connections	4-56.2
Borrow	
excavation	4-19.13
imported	4-19.9
Brick	6-1.26, 6-2.8
Bridge removal	4-15.2
Bridge deck finishing	4-42.2
Bridge railing	4-83.1
Budgeting	1-3.3
Buy America requirements	3-6.2

C

	Cable railing	4-83.4
	Calibration program for equipment	6-3.1
	California test methods	6-3.3
	California test number:	
	109	6-3.6, 3-9.3
	110	6-3.3
	115	6-3.2
	121	6-3.6
	202	6-3.2
	223	4-90.10
226	4-20.3	
231	6-3.6	
312	6-3.3, 6-1.20	
338	4-27.2, 6-3.3, 6-1.20	
339	4-37.3	
375	6-1.17	
504	6-3.2, 4-90.13	
518	6-3.4, 4-72.3	
523	4-40.4	
526	6-3.3, 4-42.2, 4-40.8	

California test number: <i>(continued)</i>	
529	4-90.14
533	6-3.4
540	6-3.4
541	4-41.2
Carpobrotus cuttings	4-20.8
Cash expenditure voucher	1-5.2
Cast-in-place	
concrete pipe	4-63.1
concrete	4-50.1
Cement mortar	4-65.2
Cement treated	
permeable base	4-29.2
permeable material	4-68.2, 4-29.1
Cement treated bases	4-27.1
Certification of environmental compliance	7-1.22
Certification of samplers and testers	6-1.3
Chain link fence	4-80.1
Chain link railing	4-83.4
Changeable message signs, portable	4-12.3
Channelizers	4-12.2
Character of workers	3-5.5
Claims	5-4.1
Cleaning up, final	3-4.1
Clearing and grubbing	4-16.1
Coating tests	6-1.2
Compliance, Certificates of	3-6.2
Compressive strength samples & tests	6-3.4
Concrete	
compressive strength	6-3.4
curbs and sidewalks	4-73.1
pavement, portland cement	4-40.1
railing	4-83.4
removal	4-15.2
retaining walls	4-51.1, 6-1.11
structures	4-51.1
Concrete barriers	4-83.4
Concrete structures	4-51.1
Cones, traffic	4-12.3
Construction area signs	4-12.2
Construction area traffic control devices	4-12.1
Contract acceptance	See Acceptance of contract
Contract change order	5-3.28
Control	
of materials	3-6.1
of work	3-5.1
Controlling operation	3-8.10
Copeland Act	8-1.20

Index

Corrugated metal pipe	4-66.1
Cost reduction incentive	3-5.7
Critical path method	3-8.10
CTB	4-27.1
Culverts, concrete	4-62.1
Curb ramps (wheelchair ramps)	4-73.1
Curbs and sidewalks	4-73.1
Curing compound	6-2.9

D

Daily extra work	5-1.25
Damage, responsibility for	3-7.4
Damages, liquidated	3-8.28
Dampproofing	4-54.1
Davis Bacon Act	8-1.14
DBE	8-3.1, 3-8.1
Decreased quantities, increased and	3-4.2
Defective materials	3-6.2
Delays, right of way	3-8.35
Delineation	2-2.9
Delineators, markers	4-82.1
Details, shop	4-56.1
Detours	3-4.5
Differing site conditions	3-5.4
Disadvantaged business enterprise(s) (DBE)	8-3.1
Disposal, Staging and Borrow Sites (DSB)	7-1.2
Drain hole	4-86.7
Drainage inlets	4-51.1
Drainage pumping equipment	4-74.1
Drains	
horizontal	4-68.1
overside	4-69.1
subsurface	4-68.1
Dry sieve analysis	6-3.3
Dump truck rental	3-9.11
Dust control	4-10.1
Dust palliative	4-18.1

E

Earthwork	4-19.1
shipouts and slides	4-19.7
slope rounding	4-19.8
slopes, embankment	4-19.12
local borrow	4-19.9
Edge drains	4-68.1
Electrical	4-86.1
Eliminated items	3-4.3
Employee complaints	8-2.2

Emulsions, asphaltic	4-94.1
Engineering fabrics	4-88.1
Entrained air	4-90.11
Environmental Compliance Certification	7-1.22
Environmental Quality Act	7-1.2
Epoxy	4-95.1
Equal employment opportunity	8-2.1
Erosion control	4-20.1
Erosion control and highway planting	4-20.1
Excavation	4-19.1
Execution of contract	3-3.1
Execution of contract, award and	3-3.1
Expansion joint armor	4-51.3

F

Facilities, existing highway	4-15.1
Fair Labor Standards Act	3-7.1
False Information Act	8-1.21
Falsework	3-7.2, 4-51.1
lighting	4-86.9
Fences	4-80.1
Field	
Inspection	3-5.6, 6-3.1
Laboratory	6-3.1
Office	1-4.1
Testing Equipment	6-3.1
Filter fabric	4-88.1
Final cleaning up	3-4.1
Finishing bridge decks	4-42.2
Finishing roadway	4-22.1
Flagging	4-12.1
Flashing arrow signs	4-12.2
Flashing beacons, portable	4-12.2
Fog seal coat	4-39.9
Force account payment	3-9.6, 5-3.1
Foreign materials	3-6.2
Form	
CEM-0101, Resident Engineer's Report of Assignment	5-1.1, A-1.1
CEM-0501, Relief from Maintenance	5-1.1, A-1.2
CEM-0601, Construction Safety Report	5-1.2, A-1.3
CEM-0602, Project Safety Program Statement	5-1.2, A-1.4
CEM-0603, Major Construction Incident Notification	5-1.2, A-1.5
CEM-1201, Subcontracting Request	5-1.2, A-1.7
CEM-2001, National Pollution Discharge Elimination System	
Annual Certification	5-1.2, A-1.9
CEM-2002, Notification of Construction (NOC)	5-1.2, A-1.11
CEM-2003, Notification of Completion of Construction (NCC)	5-1.2, A-1.15
CEM-2101, COZEEP Daily Report	5-1.3, A-1.17



Index

Form (Continued)

CEM-2102, COZEEP/MAZEEP Task Order	5-1.3, A-1.19
CEM-2401, Substitution Report for Disadvantaged Business Enterprise/Disabled Veteran Business Enterprise	5-1.3, A-1.21
CEM-2402(F), Final Report- Utilization of Disadvantaged Business Enterprises (DBE), First - Tier Subcontractors (Federally Funded Projects)	5-1.3, A-1.23
CEM-2402(S), Final Report - Utilization of Disabled Veteran Business Enterprises (DVBE) State Funded Projects	5-1.3, A-1.25
CEM-2403(F), Disadvantaged Business Enterprises (DBE) Certification Status Change	5-1.3, A-1.27
CEM-2404(F), Monthly DBE Trucking Verification	5-1.3, A-1.29
CEM-2501, Fringe Benefit Statement	5-1.4, A-1.31
CEM-2502, Contractor/Subcontractor Payroll	5-1.4, A-1.32
CEM-2503, Statement of Compliance	5-1.4, A-1.33
CEM-2504, Employee Interview: Labor Compliance/EEO	5-1.4, A-1.35
CEM-2505, Owner - Operator Listing Statement of Compliance	5-1.4, A-1.37
CEM-2506, Labor Compliance – Wage Violation	5-1.4, A-1.39
CEM-2507, Labor Violation: Case Summary	5-1.4, A-1.41
CEM-2508, Contractor's Payroll Source Document Review	5-1.4, A-1.43
CEM-2509, Checklist – Source Document Review	5-1.4, A-1.45
CEM-2601, Construction Progress Chart	5-1.5, A-1.47
CEM-2701, Weekly Statement of Working Days	5-1.5, A-1.49
CEM-2702, Overrun in Contract Time	5-1.5, A-1.51
CEM-3101, Notice of Materials to be Used	5-1.5, A-1.53
CEM-3501, AC Production/Placement Checklist	5-1.5, A-1.55
CEM-3701, Test Result Summary	5-1.5, A-1.57
CEM-3702, Relative Compaction Summary	5-1.5, A-1.58
CEM-4101, Materials Release Summary	5-1.5, A-1.59
CEM-4102, Material Inspected and Released on Job	5-1.5, A-1.60
CEM-4202, Material Plant Safety Checklist	5-1.5, A-1.61
CEM-4204, California Test 109 Sticker	5-1.6
CEM-4501, Resident Engineer's Daily Report/Assistant Resident Engineer's Daily Report	5-1.6, A-1.62
CEM-4601, Assistant Resident Engineer's Daily Report	5-1.6, A-1.63
CEM-4701, Drainage System Summary	5-1.6, A-1.65
CEM-4801, Quantity Calculations	5-1.6, A-1.67
CEM-4900, Contract Change Order	5-1.6, A-1.68
CEM-4901, Contract Change Order Input	5-1.6, A-1.71
CEM-4902, Extra Work Bill (Short)	5-1.6, A-1.73
CEM-4902A, Extra Work Bill - Title Page	5-1.7, A-1.75
CEM-4902B, Extra Work Bill - Labor Charges	5-1.7, A-1.77
CEM-4902C, Extra Work Bill - Equipment Charges	5-1.7, A-1.79
CEM-4902D, Extra Work Bill - Material Charges	5-1.7, A-1.81
CEM-4903, Contract Change Order Memorandum	5-1.7, A-1.83
CEM-5101, Request for Payment for Materials on Hand	5-1.7, A-1.85
CEM-6001, Project Record - Estimate Request	5-1.8, A-1.86

Form (Continued)

CEM-6002, Contract Administration System (CAS) –Report Requests	5-1.8, A-1.87
CEM-6003, Progress Pay - Estimate Project Initiation or Update	5-1.8, A-1.88
CEM-6004, Contract Transactions Input	5-1.8, A-1.89
CEM-6201, Notice of Potential Claim	5-1.8, A-1.91
CEM-6301, Contract Acceptance	5-1.8, A-1.93
CEM-9001 Construction Manual Proposed Change	5-1.8, A-1.95

Office of Materials Engineering and Testing Services Forms

TL-0028, Notice of Materials to be Inspected	5-1.8
TL-0029, Report of Inspection of Material	5-1.9
TL-0101, Sample Identification Card	5-1.9, A-1.96
TL-0502, Field Sample of Portland Cement Concrete Sample Card	5-1.9, A-1.97
MR-0518, Job Cement Samples Record	5-1.9, A-1.98
TL-0608, Notice of Materials to be Furnished	5-1.9
TL-0624, Inspection Release Tag	5-1.9
TL-0649, Inspector's Report of Material on Hand	5-1.9
TL-3096, Pavement Core Record	5-1.9
TL-6037, Fabrication Progress Report	5-1.9

Other State Forms

DAS-1, Apprentice Agreement	5-1.9
H-ESP-16, Request for Construction Staking	5-1.9
LA-16, Product, Material, or Method Report	5-1.9, A-1.99
LA-17, Report of Chemical Spray Operations	5-1.9, A-1.100
TR-0019, Notice of Change in Clearance or Bridge Weight Rating	5-1.9, A-1.101
TR-0020, Notice of Change in Vertical or Horizontal Clearance	5-1.9, A-1.102
TR-0029, Notice of Change in Clearance or Bridge Weight Rating	5-1.9, A-1.103

Federal Forms

FHWA-47 Statement of Materials and Labor used by Contractors on Highway	
Construction involving Federal Funds	5-1.11
FHWA-1022, United States Department of Transportation Notice	5-1.11
FHWA-1391 Federal-Aid Highway Construction	
Contractors Annual EEO Report	5-1.11
DOL SF-308 Request for Wage Determination and Response to Request	5-1.11
Equal Employment Opportunity is the Law Poster	5-1.11
FHWA-1495, Wage Rate Information Federal-Aid Highway Project	5-1.11

Forms used for contract administration	5-1.1
Funds/Funding	5-2.1, 9-1.1

G

Geo-synthetics	6-1.26
Glass beads	4-84.1
Grading plane	3-5.3
Grates, frames and miscellaneous metal	4-75.1
Groove and grind pavement	4-42.1
Guard railing, metal beam	4-83.1
Guide posts	6-1.2



Index

H

Handrailing	4-83.4
Highway facilities, existing	4-15.1
Highway planting	4-20.1
Hook details	4-52.1
Horizontal drains	4-68.1
Hydraulic jacks	6-3.3
Hydroseeding	4-20.2

I

Imported borrow	4-19.9, 6-1.23
Increased and decreased quantities	3-4.2
Indemnification and insurance	3-7.8
Independent assurance sampling and testing	6-1.3
Items	
eliminated	3-4.3
final pay	3-9.6

J

Jacking	
corrugated steel pipe	4-66.2
pavement	4-41.1
reinforced concrete pipe	4-65.2
Job categories, alphabetical list of	5-1.32
Job categories, numerical list of	5-1.30
Joint filler expansion	6-1.26
Joint sealing compounds	6-1.26, 6-2.6

L

Labor surcharge	3-9.8
Labor Code	8-1.1, 3-7.1
Labor compliance	8-1.1
Laws to be observed	3-7.1
Lean concrete base	4-28.1
Legal relations and responsibility	3-7.1
Licensing laws, contractor	3-7.1
Lime stabilization	4-24.1
Lines and grades	3-5.3
Liquid asphalts	4-93.1, 6-1.4
Load limitations	3-7.1
Local	
Assistance	9-1.1
Roads	3-4.5
Local borrow	4-19.9
Local material	3-6.3
Log of test borings	3-5.4

M

Maintenance and responsibility, relief from	3-7.10
Manholes	4-70.1
Manual of Traffic Controls	4-12.1, 2-2.1
Markers	
and delineators	4-82.1
object	4-82.1
pavement	4-85.1
Median barriers	4-83.3
Mesh-reinforcing	6-1.27
Metal beam guard railing	4-83.1
Metal railing	4-83.2
Mineral admixtures	4-90.14
Minor B projects	3-2.1
Minor concrete	4-90.5
Minor structures	4-51.2
Miscellaneous	
iron and steel	4-75.1
metal	4-75.1
Miscellaneous facilities	4-70.1
Mix design	4-90.7
Mobilization	4-11.1
Monuments	4-81.1

M 

N

Night work	2-2.8, 7-1.8
Non-highway facilities, utility	3-8.36
Notices, stop	3-9.15
Nuclear Gages	1-4.2, 6-3.6

N 

O

Object markers	4-82.1
Obliterating roads and detours	4-15.1
Office Engineer, Office of	3-3.1
Operation, controlling	3-8.10, 5-0.5
Order of work	3-5.2, 3-7.5
Overhead costs, adjustment of	3-9.6, 5-3.14
Overhead sign structures	4-56.2
Overside drains	4-69.1
Owner-operated equipment	3-9.11, 5-5.6, 8-1.11
Owner-operators	5-1.4, 8-1.10, 8-1.11, 8-1.14

O 

Index

P	
Palliative, dust	4-18.1
Partial payments	3-9.16
Pavement	
asphalt concrete	4-39.1
joints, longitudinal	4-39.9
joints, transverse	4-39.9
grind	4-42.1
groove	4-42.1
jacking	4-41.1
portland cement concrete	4-40.1
subsealing	4-41.1
Pavement markers	4-85.1
Pavement recesses	4-85.2
Pavement reinforcing fabric	4-88.1
Payment	
final	3-9.24
force account	3-9.6
measurement and	3-9.1
offset	3-9.24
Payroll records	8-1.5
PCC pavement (see also portland cement concrete)	
joints, contact	4-40.8
joints, weakened plane	4-40.7
slip-form	4-40.2
thickness deficiency	4-40.10
tie bars for	4-40.3
water supply for	4-90.5
weakened plane joints	4-40.7
Penetration treatment	6-1.24
Perforated pipe	4-68.1
Permeable base	
asphalt treated	4-29.2
cement treated	4-29.2
Permits	7-1.13
encroachment	9-1.2
Pervious backfill material	4-19.11
Pesticides	4-20.6
Pigmented curing compound	6-1.10
Piling	4-49.1
Pipe	
alternative pipe and pipe arch culverts	4-62.1
cast-in-place concrete	4-63.1
corrugated metal	4-66.1
corrugated metal, aluminum	4-66.1
corrugated metal, steel	4-66.1
plastic	4-64.1
reinforced concrete	4-65.1
structural metal plate	4-67.1

Plans	
working drawings	3-5.1
intent of	3-4.1
Plant establishment work	4-20.12
Plant pumping equipment	4-74.1
Plant stakes, highway planting	4-20.10
Plants	
highway planting and erosion control	4-20.1
watering	4-20.11
Plastic pipe	4-64.1, 4-20.1
Pollution control	
air	7-1.6
storm water	7-1.6
water	7-1.6
Polysulfide	6-1.26
Polyurethane	6-1.26
Portable	
changeable message signs	4-12.3
delineators	4-12.2
Portland cement concrete	4-90.1
admixtures	4-90.3, 6-1.9
compressive strength	6-3.4
Portland cement concrete pavement	4-40.1
Potential claim, notice of	5-4.2
Precast raised traffic bars	6-2.8
Preliminary tests	6-1.1, 5-1.19
Preparing planting areas	4-20.9
Preservation of property	3-7.8
Preservative treatment of lumber, timber and piling	4-58.1
Prestressing concrete	4-50.1
Prevailing wage	8-1.16
Priority tests	6-1.2
Procedure and protest	3-4.2
Profile index	4-42.2
Profilograph	6-3.3
Progress	
of work	3-8.26
prosecution	3-8.1
schedule	3-8.10
Progress pay estimate project initiation of update	5-1.57
Project certification	6-1.5
Project records	5-1.1
categories, alphabetical list of	5-1.32
categories, numerical list of	5-1.30
Property, preservation	3-7.8
Proposal requirements and conditions	3-2.1
Proposed final estimate	3-9.29
Prosecution and progress	3-8.1

Index

Public access to project records	5-1.69
Public convenience	3-7.3
Public interest	3-6.6
Public relations	1-2.1
Pull boxes	4-86.7

Q

Quality Assurance Program	3-9.3, 6-1.3
---------------------------------	--------------

R

Railings (Type K), temporary	4-12.2, 4-83.1
Railings and barriers	4-83.1
Reinforced concrete pipe	4-65.1
Reinforcing bars	4-52.1
Reinforcing fabric	4-88.1
Relative compaction	6-3.6
Relief from maintenance and responsibility	3-7.10
Remote control valves	4-20.15
Removal of rejected and unauthorized work	3-5.3
Removal, bridge	4-15.2
Rental	
dump truck	3-9.11
equipment	3-9.9
Responsibility for damage	3-7.4
Retaining walls, concrete	4-51.1, 6-1.11
Retroreflective pavement markers	4-85.1
Right-of-way delays	3-8.35
Rights in land and improvements	3-7.12
Roadside signs	4-56.1
Roadway excavation	4-19.1
Rock slope protection	4-72.1
Rock slope protection fabric	4-88.1
Root protectors, highway planting	4-20.5
Rubber	6-1.2

S

Safety and health provisions	2-1.1
Sample	6-1.1
Sampling & testing	6-1.1
Scale sheets	3-9.4
Scales	6-3.2
Scales and balances	6-3.2
Scope of work	3-4.1
Screens and sieves	6-3.2

Seal coats	4-37.1
Seed	4-20.2
Semifinal estimate	3-9.33
Shop details	4-56.1
Shoring	4-19.1
Shortage of materials	3-8.28
Shotcrete	4-53.1
Sidehill embankment	4-19.5
Sidewalks	4-73.1
Sieve analysis	6-3.2
Sign structures	4-56.1
Signals, lighting and electrical systems	4-86.1
Signs	4-56.1
Silos, asphalt concrete	4-39.8
Slides and slipouts	4-19.7
Slipouts and slides	4-19.7
Slope	
embankment	4-19.12
paving	4-72.4
protection	4-72.1
rounding	4-19.8
Slotted pipe, edge drains	4-68.4
Slurry seal	4-37.5, 6-1.24
Surface Mining and Reclamation Act of 1975 (SMARA)	7-1.4
Soil, basement	6-1.23
Sound control requirements	3-7.3
Source documents	3-9.2
Special forces	3-9.13
Special services	3-9.13
Speed zones	2-2.7
Stakes and marks	3-5.3
State Contract Act	1-1.5
State-furnished materials	3-6.1
State Right of Way, contractor's use	7-1.5
Stop notices	3-9.15
Straw, erosion control	4-20.2
Striping	4-84.1
Structural metal plate pipe, arches and pipe arches	4-67.1
Structural steel	4-51.1
Structure backfill	4-19.11, 6-1.25
Structure excavation	4-19.3
Structure excavation and backfill	4-19.3
Styrofoam filler	6-2.8
Subbases, aggregate	4-25.1, 6-1.22
Subcontracting	3-8.1
Subsealing pavement	4-41.1
Subsistence and travel allowance	3-9.8, 8-1.\

Index

Substitution request-DBE/DVBE	8-3.7
Subsurface drains	4-68.1
Superintendence	3-5.2
Surcharge, labor	3-9.8
Survey monuments	4-81.1
Suspension of work, temporary	3-8.10

T

Temporary railing (Type K)	4-12.2
Temporary suspension of work	3-8.10
Termination of contract	3-8.38
Termination of control	3-8.31
Test borings, log of	3-5.4
Test/testing	6-3.1
Test cylinders	6-3.4
Thermoplastic traffic stripes and pavement markings	4-84.1
Thrie beam barrier	4-83.2
Tile	6-2.8
Timber piles	3-8.29
Timber structures	4-57.1
Time of completion	3-8.11
Traffic cones	4-12.3
Traffic control devices, construction area	4-12.1
Training	1-3.1
Treated permeable bases	4-29.1
Trenches	4-19.5
Truck rental, dump	3-9.11

U

Underdrains	4-68.1
Unsuitable material	
earthwork	4-19.6
removing	4-19.6
Use of materials found on the work	3-4.6
Use of pesticides	4-20.6
Utility and non-highway facilities	3-8.36

V

Vehicle Code	3-7.1
Vehicle detectors	4-86.9

W

Wage prevailing	8-1.16
Water	4-17.1
water pollution control	7-1.6
Water pollution control plan	7-1.10

Water supply	4-17.1
Waterproofing	4-54.1, 6-1.27
Waterproofing, asphalt membrane	4-54.1
Waterstops, concrete structures	4-51.4
Weep holes	
concrete slope protection	4-72.4
concrete structures	4-51.4
Weigh sheets	4-20.3
Weights and measures	3-9.2
Welded steel pipe	4-70.1
Welded wire fabric	4-52.1, 6-2.8
Wheelchair ramps	
curb ramps, concrete	4-73.1
Windrows	4-39.9
Wire mesh, fences	4-80.1
Wire mesh reinforcing	6-1.27
Wiring	4-20.17
Working drawings	3-5.1

Section 20 Erosion Control and Highway Planting

4-2001 General

4-2002 Erosion Control

4-2002A Materials

- 4-2002A (1) Topsoil
- 4-2002A (2) Commercial Fertilizer
- 4-2002A (3) Straw
- 4-2002A (4) Fiber
- 4-2002A (5) Seed
- 4-2002A (6) Stabilizing Emulsion

4-2002B Before Work Begins

4-2002C During the Course of the Work

4-2002D Measurement and Payment

4-2003 Highway Planting

4-2003A Materials

- 4-2003A (1) Soil Amendment
- 4-2003A (2) Iron Sulfate
- 4-2003A (3) Lumber
- 4-2003A (4) Plants
- 4-2003A (5) Foliage Protectors
- 4-2003A (6) Root Protectors
- 4-2003A (7) Mulch and Compost

4-2003B Before Work Begins

- 4-2003B (1) Pesticides
- 4-2003B (2) Plants

4-2003C During the Course of Work

- 4-2003C (1) Roadside Clearing
- 4-2003C (2) Pesticides
- 4-2003C (3) Preparing Planting Areas
- 4-2003C (4) Header Boards
- 4-2003C (5) Planting
- 4-2003C (6) Watering
- 4-2003C (7) Replacement
- 4-2003C (8) Plant Establishment Work
 - 4-2003C (8a) Administering Plant Establishment Time Requirements
 - 4-2003C (8b) Tracking Time for Type 1 Plant Establishment
 - 4-2003C (8c) Tracking Time for Type 2 Plant Establishment

4-2003 C Measurement and Payment

4-2004 Irrigation Systems

4-2004A Components of Irrigation Systems

- 4-2004A (1) Water Meter
- 4-2004A (2) Backflow Preventer
- 4-2004A (3) Wye Strainers
- 4-2004A (4) Main Supply Line
- 4-2004A (5) Master Remote Control Valve
- 4-2004A (6) Remote Control Valves
- 4-2004A (7) Quick Coupling Valve
- 4-2004A (8) Gate Valve
- 4-2004A (9) Lateral Supply Line
- 4-2004A (10) Emitters and Sprinklers
- 4-2004A (11) Filter Assembly Unit
- 4-2004A (12) Irrigation Crossovers
- 4-2004A (13) Irrigation Controllers
- 4-2004A (14) Electrical Conduit, Pull Boxes, and Conductors

4-2004B Before Work Begins

4-2004C During the Course of Work

- 4-2004C (1) Water Lines and Conduit
- 4-2004C (2) Electrical Installations

4-2004D Measurement and Payment